

Striking the balance

How and where will oil and gas producers deploy their cash?

A report on investment choices and strategies of global upstream oil and gas producers by the Deloitte Research Center for Energy & Industrials

August 2022



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Executive summary: Investing in the future of energy

Recession worries and energy policy shifts present downside risks to energy markets.

But disrupted trade flows and ongoing financial discipline of O&G companies, along with low inventories and spare capacity, could limit significant downside despite volatility in energy prices.

Over the next decade, O&G companies could have a key role in striking the balance between energy security and energy transition, while helping commercialize essential low-carbon technologies.

Backed by strong financial health and discipline, oil and gas (O&G) companies can play a big role in accelerating and securing the energy transition

Global O&G upstream likely to generate highest-ever **US\$1.4 trillion** in free cash flows in 2022.¹

O&G industry's financial health is excellent at **20% leverage** and **4%–6%** of dividend yield.²

US shales can potentially become **debt-free** by early 2024 if prices stay strong and discipline prevails.³

Global upstream likely to generate up to **US\$1.5 trillion in surplus cash** by 2030, after meeting all its cash priorities.⁴

How big is this surplus? Enough to fund and balance both **low-carbon and core O&G** priorities in this decade.⁵

70% of the surplus could be generated by 2024, making it an inflection point for investment in new energy solutions.⁶

Low-carbon capex as a percentage of total capex of global upstream could reach **30% by 2030** in certain scenarios, from the current 5%.⁷

Going green can reduce the overall internal rate of return (IRR) of an O&G company by **2% to 4.5%**. Is the trade-off significant?⁸

Notes: Please refer to sources and citations at the end for more details. Also, the analysis excludes the impact of the Inflation Reduction Act (IRA) of 2022, a bill passed by both chambers of Congress in August 2022. The bill contains a wide array of subsidies, taxes, credits, and pricing reforms, each with varying impacts on households and businesses. Additionally, the bill contains several energy, environment, and climate-related provisions that may influence production, cost competitiveness, profitability, tax payouts, and investment and share buyback decisions of US O&G companies. For more details, refer: [The Inflation Reduction Act \(IRA\)](#).

A series of disruptions amid ongoing underinvestment ...

Oil prices have risen sharply and remain highly volatile as ongoing disruption exacerbates the underinvestment problem

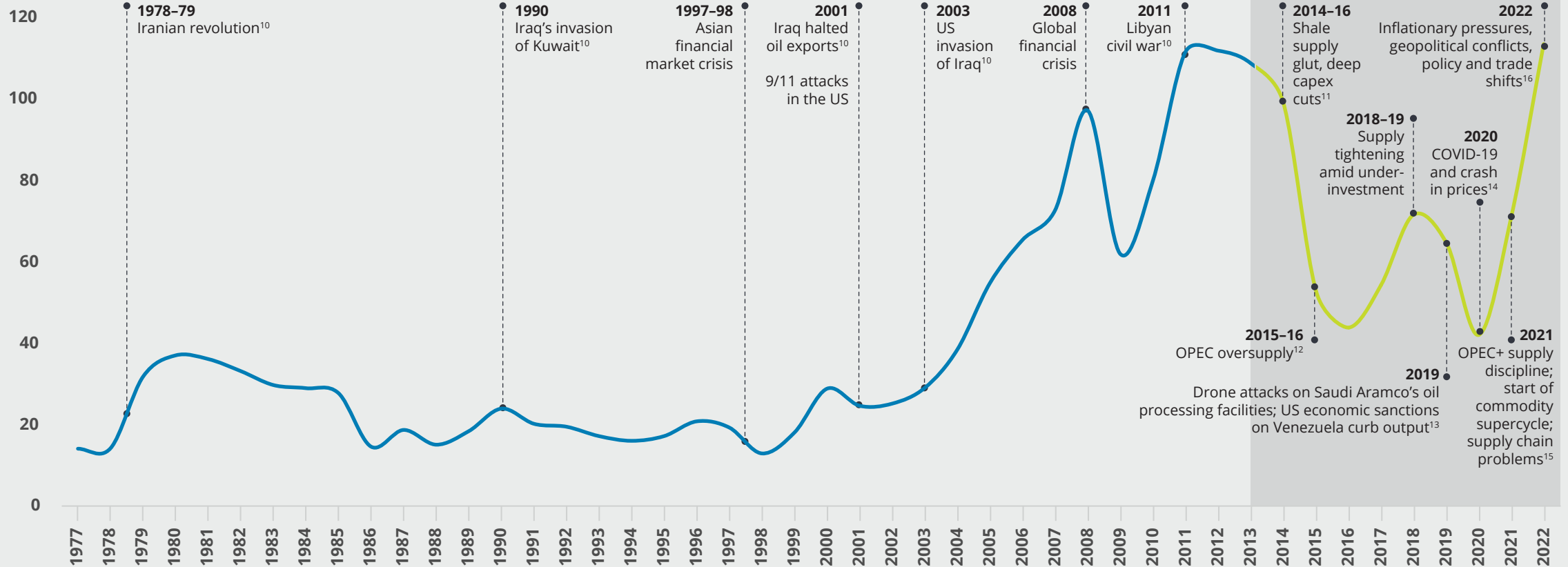
— Average annual Brent prices — Average annual Brent prices, 2014 to now

A history of disruptions and impact on oil prices⁹

Oil markets are not new to geopolitics, wars, economic crises, or financial disruptions ...

... but a series of disruptions amid ongoing underinvestment in the O&G industry has quickly taken oil prices to new highs with extreme price volatility

US\$ per barrel
(annual average price)



Sources: US Energy Information Administration and International Energy Agency.

... triggering a readjustment in the broader energy market ...

Existing energy narratives, corporate priorities, and trade relationships are undergoing a massive shift

⊕ Natural gas prices outpacing oil prices in Europe

Disrupted trade flows have spurred European natural gas prices to 8–10 times that of the United States and higher than oil in energy equivalent terms.¹⁷

⊕ Widening margins between the US, European, and Asian refiners

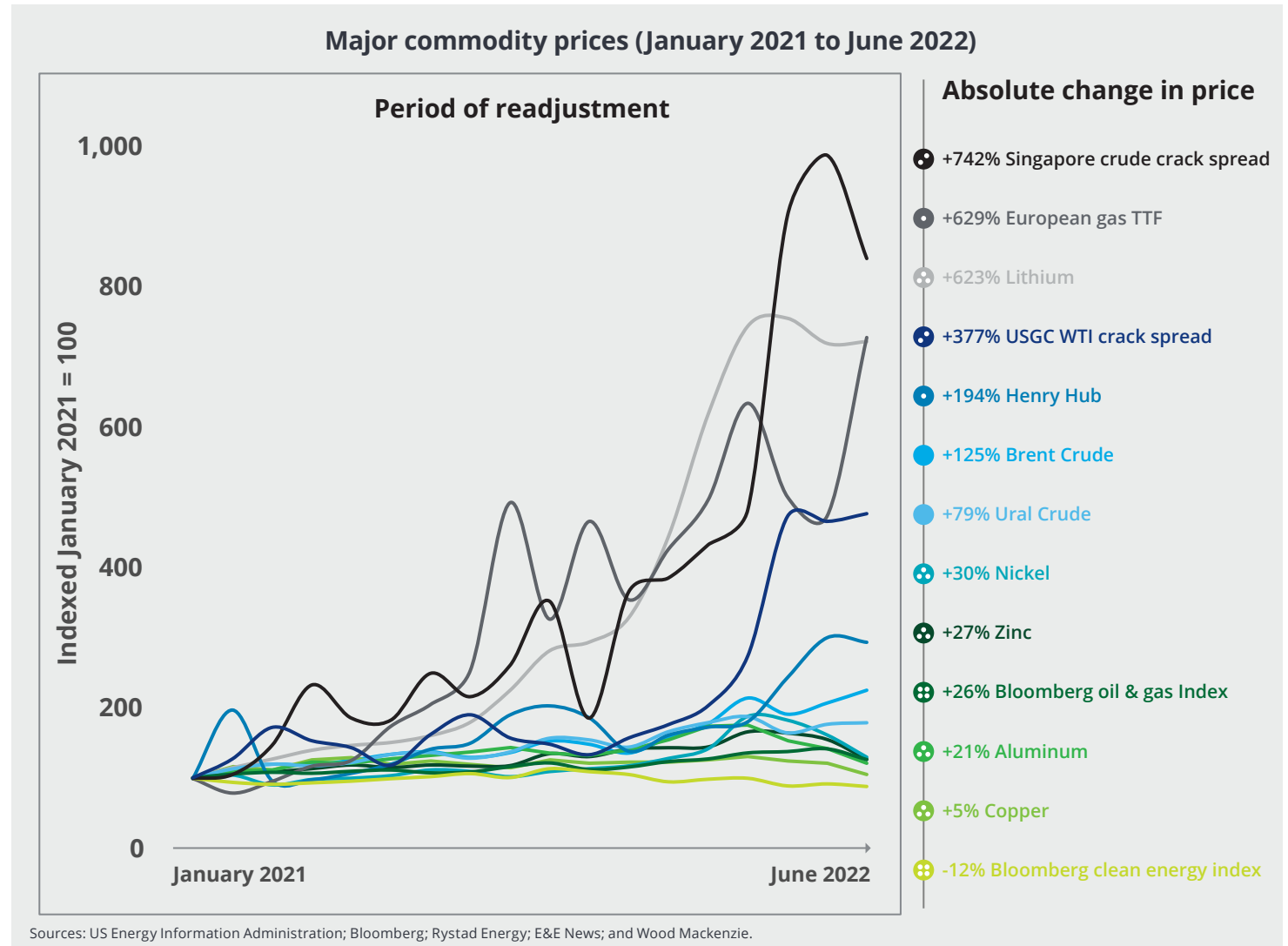
Differential feedstock pricing (Russia's crude to Asia is at a significant discount)¹⁸ and changes in gasoline taxes and energy subsidies have led to a significant divergence in downstream prices and profitability worldwide.¹⁹

⊕ Energy transition faces energy security risks

Limited supply of key materials, high raw material prices, and ongoing supply chain disruption are adding pressure on renewable project economics, which are already characterized by single-digit IRRs.²⁰

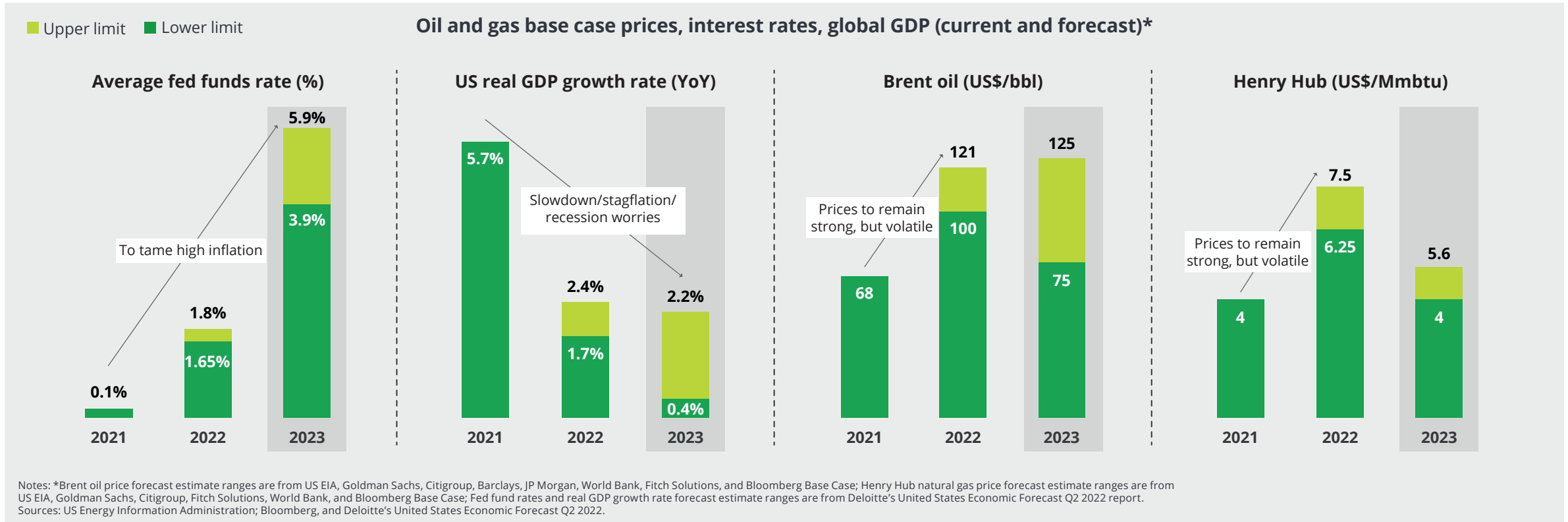
⊕ Resource industries gaining interest of investors

Postpandemic recovery amid compressed oil price cycle supported by active capital management have crowned resource industries stocks as top market performers in 2021 and 2022 YTD.²¹



... which is likely to keep prices high for a while

Despite recessionary fears, higher short-term prices are driven by the underlying supply crunch and trade flow disruption



2021

- Economic activity recovered²²
- O&G capex remained muted
- Travel and consumption rebounded²³
- Supply chain disruptions persisted²⁴

2022

- Geopolitical driven supply constraints²⁵
- Low levels of oil and gas reserves²⁶
- Tightening monetary policy sparking recession concerns²⁷
- Rising LNG demand to keep natural gas prices high²⁸
- Rerouted trade flows²⁹

2023

- Economic slowdown or recession worries
- Continued O&G supply and trade flow constraints
- Tight US Federal monetary policy³⁰
- Uncertainty limits energy investment

The result: O&G producers set to report highest-ever free cash flows of US\$1.4 trillion in 2022

High prices and financial discipline could lead to as much as a three-fold jump in the industry's cash flows

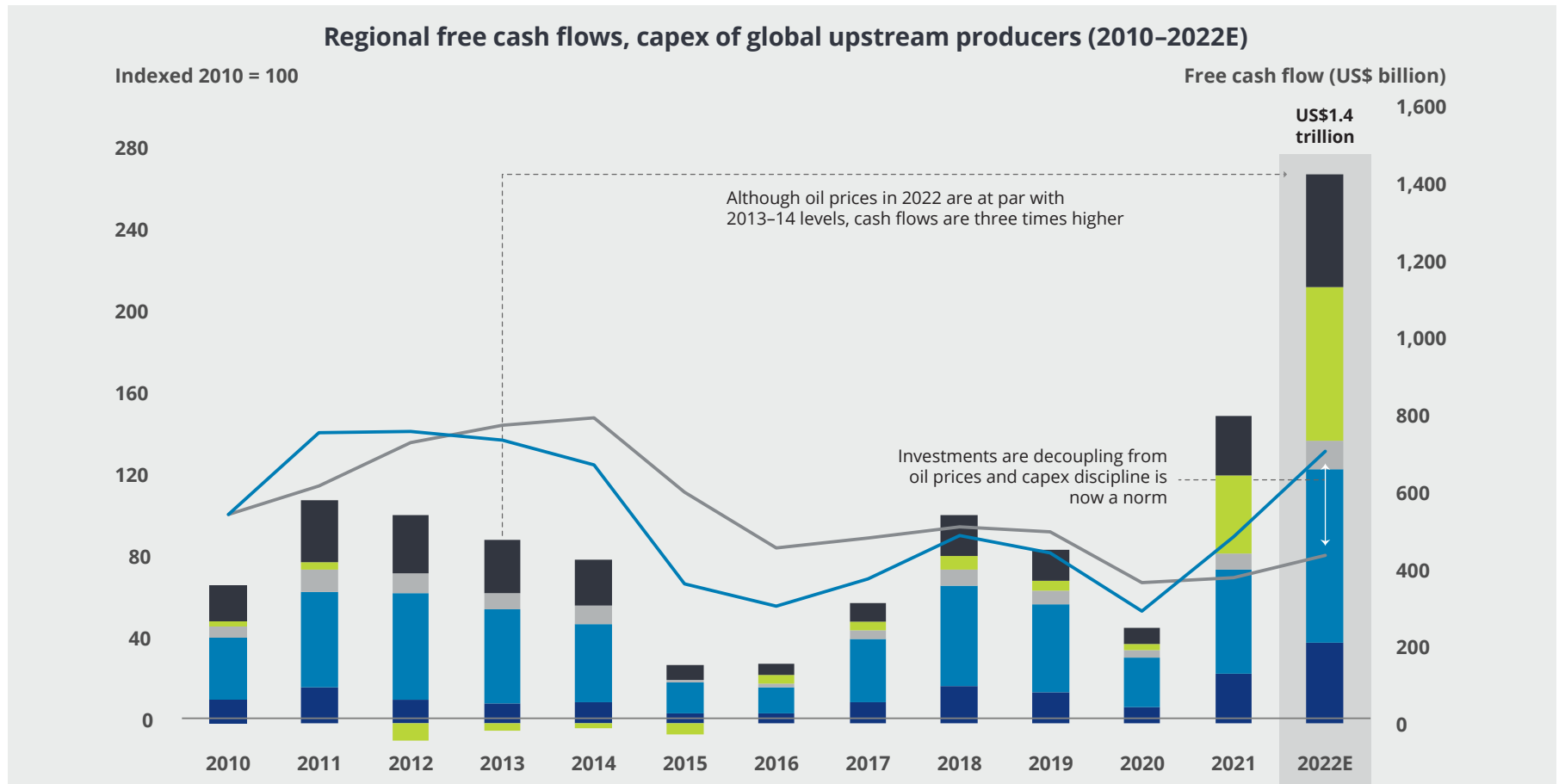
Left axis: — Indexed WTI prices — Indexed capex
 Right axis: ■ Europe ■ North America ■ South America ■ Middle East & Africa ■ Asia Pacific

The industry has been running ahead of the oil price cycle—for instance, it generated approximately US\$793 billion of **free cash flows in 2021**, **three times higher** than the previous high price period of 2013–14.³¹

Capital discipline is now a practiced norm for most in the industry. Despite oil prices recovering by about 70% in 2021 YoY, capex growth was below 10%.³²

Global upstream producers are projected to generate **record free cash flows of US\$1.4 trillion in 2022** (Brent at US\$106/bbl assumed) in 2022.³³

Regional share of cash flows is shifting from Middle East & African producers (above 50% in 2010–20 vs. 30% in 2021–22) toward North American producers.³⁴



Notes: Free cash flows are operating cash flows minus capex of global O&G upstream companies (US\$ billion). The analysis excludes the impact of the Inflation Reduction Act (IRA) of 2022, a bill passed by both chambers of Congress in August 2022. The bill contains a wide array of subsidies, taxes, credits, and pricing reforms, each with varying impacts on households and businesses. Additionally, the bill contains several energy, environment, and climate-related provisions that may influence production, cost competitiveness, profitability, tax payouts, and investment and share buyback decisions of US O&G companies. For more details, refer: [The Inflation Reduction Act \(IRA\)](#). Source: Deloitte analysis based on data accessed from Rystad Energy Ucube and US Energy Information Administration.

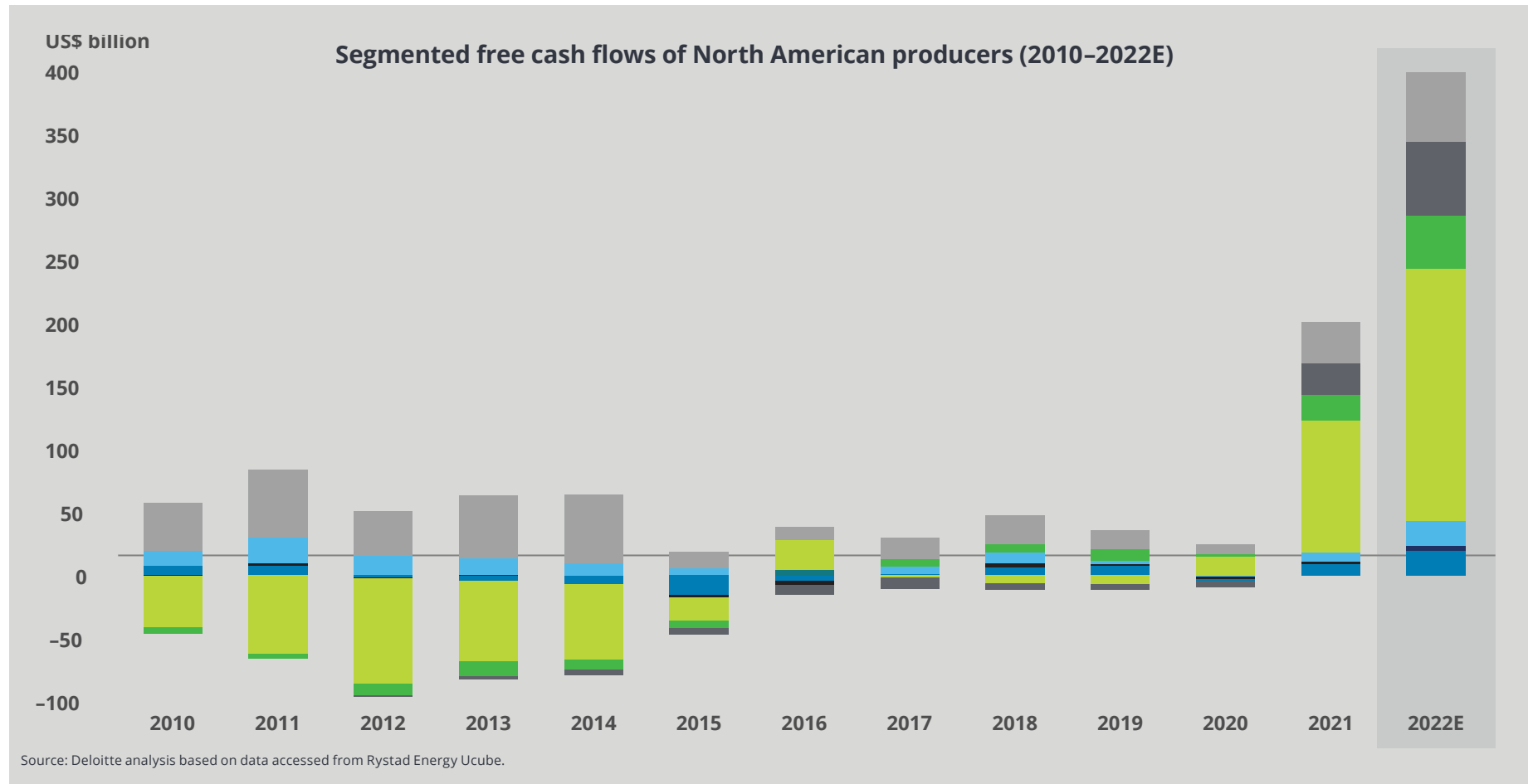
North American upstream to generate US\$600 billion free cash flow in 2021-22, primarily led by shales

- Offshore deepwater
- Offshore midwater
- Offshore shelf
- Shale/tight oil
- Oil sands
- Onshore LNG
- Other onshore

The North American upstream industry cumulatively generated only US\$47 billion in free cash flows over the last decade (2010–2020) due to losses in shale plays.³⁵

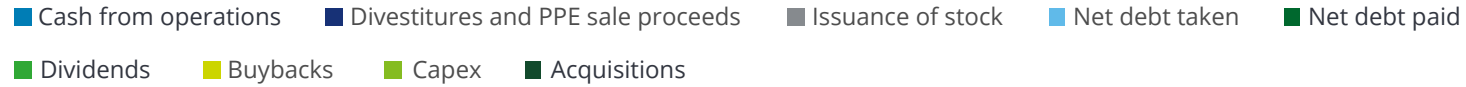
However, the industry is expected to generate **US\$600 billion in free cash flows just between 2021–2022**, a 13-time quantum jump over the cumulative cash flows made between 2010–2020.³⁶

Shale producers, which generated negative cash flows in nine out of the last 10 years, will likely witness a **record free cash flow in 2021–2022 that could overcome the decade-long loss of US\$300 billion.**³⁷



Since 2014, the industry has been reducing debt, increasing efficiency, and practicing capital discipline

From reducing debt to practicing capital discipline and prioritizing shareholder returns



Higher internal cash reliance:

Cash from operations funded over 90% of inflows in 2021 (vs. ~75% in 2014)³⁸

Favorable debt equation:

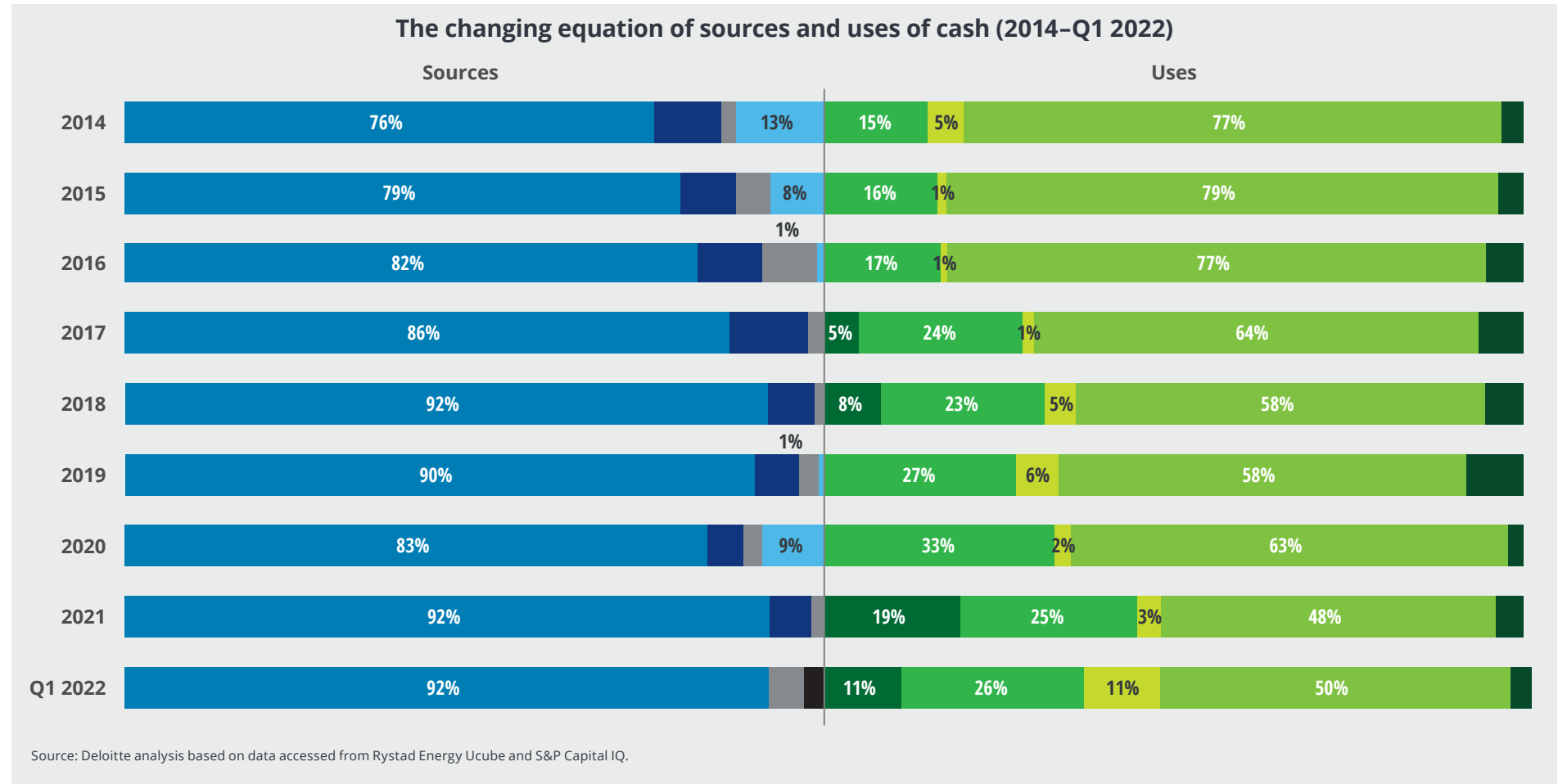
Net debt is at the lowest in recent years with the debt equation shifting positively³⁹

Prioritized shareholder returns:

Returns have become a key priority, up to about 30% in recent years (vs. 15–17% in 2013–15)⁴⁰

Cautious/paced capital deployment:

Capex intensity consistently reduced YoY (77% pre-2016 to less than 50% in 2022)⁴¹



**The O&G industry
is strongly
positioned due to
its healthy financial
state and industry-
leading returns**

40%–135%*

shareholder growth of O&G subsectors between 2021 and June 2022,⁴² reflecting renewed market appraisal.

20%

leverage ratio in 2021, the best in the history of upstream industry.⁴³

4%–6%

dividend yield, the highest among all industries over the last three years.⁴⁴

**US\$275
billion**

free cash flows for US shale producers in 2022–2023, which could make the industry debt-free* by 2024.⁴⁵

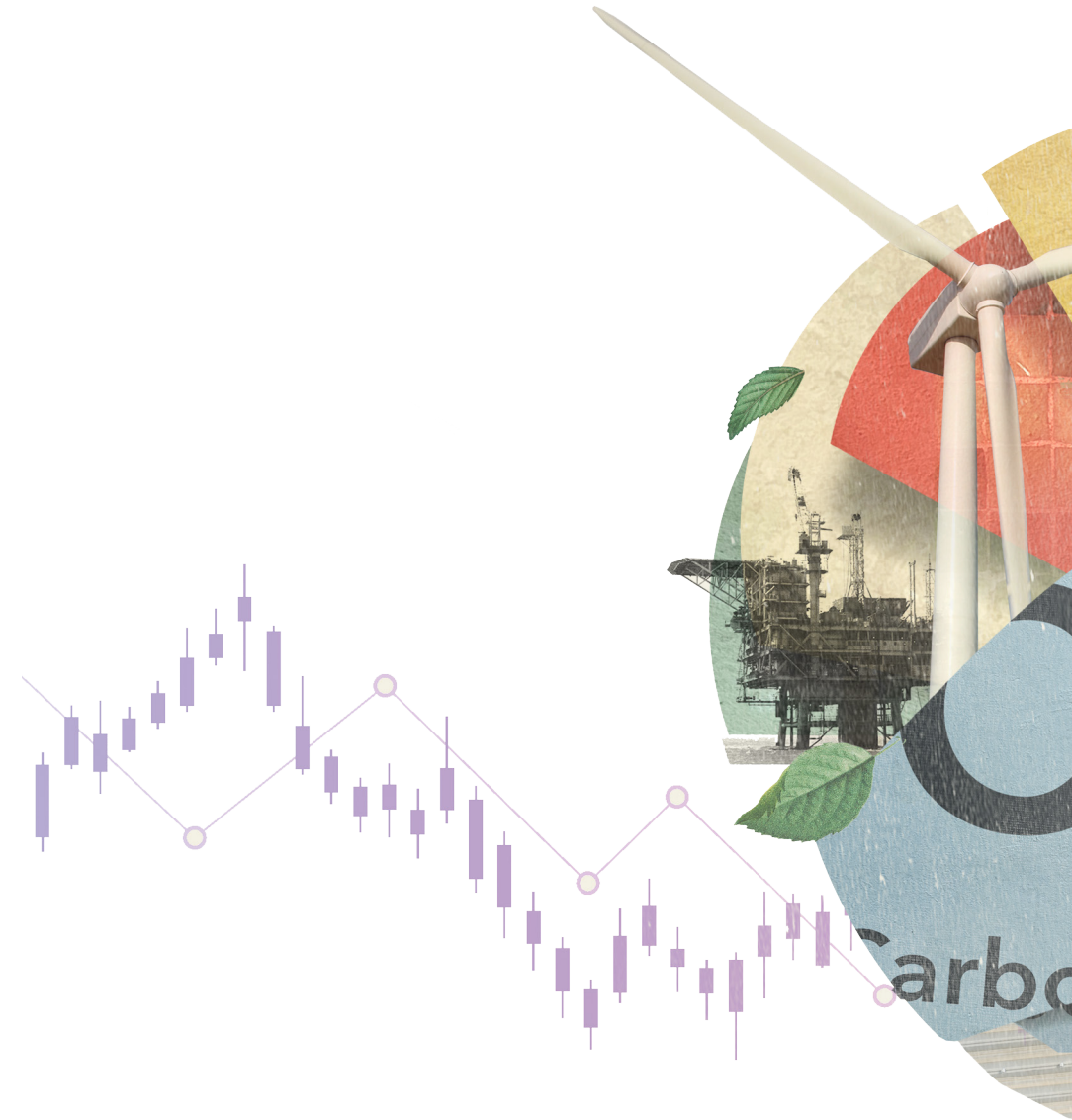
*Note: Assuming maintained capital discipline.

Sources: Deloitte analysis based on data accessed from Rystad Energy Upstream Ucube and S&P Capital IQ.

Investing for an uncertain future

Faced with record-high cash flows, O&G companies have decisions to make—where to invest, and how much.

But the future path is not easy due to critical uncertainties, including price volatility and supply and trade disruption in the long road to a low-carbon world.

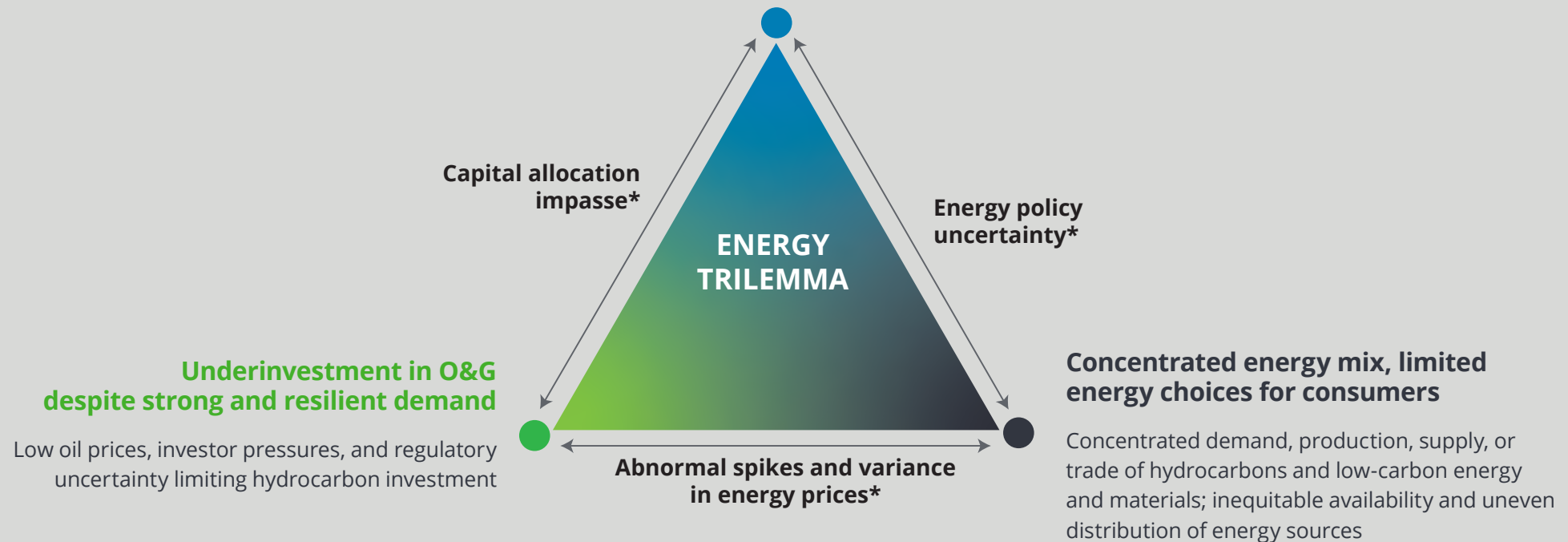


The ongoing energy trilemma is complicating investment decision-making for O&G companies

Evolving questions around energy transition, security, and diversification are creating a “trilemma” of concerns

Slow transition to low-carbon energy

Evolving low-carbon technologies and demand, hard-to-abate sectors, nascent infrastructure, low returns



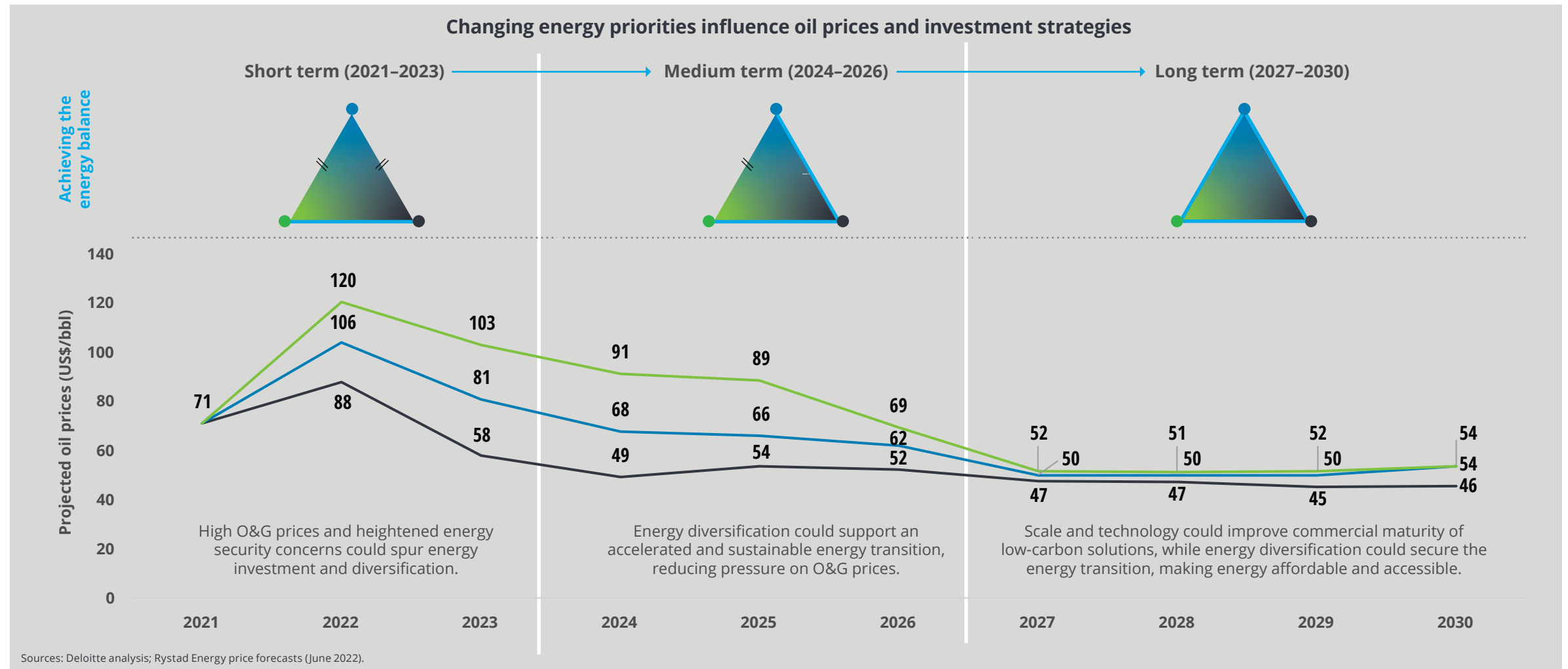
Note: *Impact on energy markets and balance
 Source: Deloitte analysis.

Solving the puzzle is possible, but it will take time

High oil prices could spur short-term energy investment and diversification, while a clean, secure energy mix could reduce long-term prices

Rystad Energy price scenarios⁴⁶

— Low case — Base case — High case ● Energy security (hydrocarbons) ● Energy transition ● Energy diversification



Balancing priorities

Would a maintained, disciplined capex program amid a high oil price environment help the industry deliver on its priorities?

US\$3.6 trillion is the projected hydrocarbon capex at base price^ to maintain operations and generate significant cash flows during 2022-2030.⁴⁷

Significant investments are required to strike a careful energy balance, but they would be competing with growing priorities for cash irrespective of changes in oil prices

		Priorities*			
Oil prices		Low-carbon growth	Shareholder payouts	Buybacks	Debt repayment
Strong	Accelerate ↑	Accelerate ↑	Maintain →	Reduce ↓	
Weak	Accelerate ↑	Maintain →	Accelerate ↑	Accelerate ↑	

Notes: *Growing priorities are majorly applicable for public, nongovernment-owned companies such as IOCs and public E&Ps mainly based out of the United States and may differ for NOCs with differing priorities. For more details on the split between capex and cash flows between company types, refer to the Appendix ; ^Rystad's base case scenario is covered in the previous page. Source: Deloitte analysis.

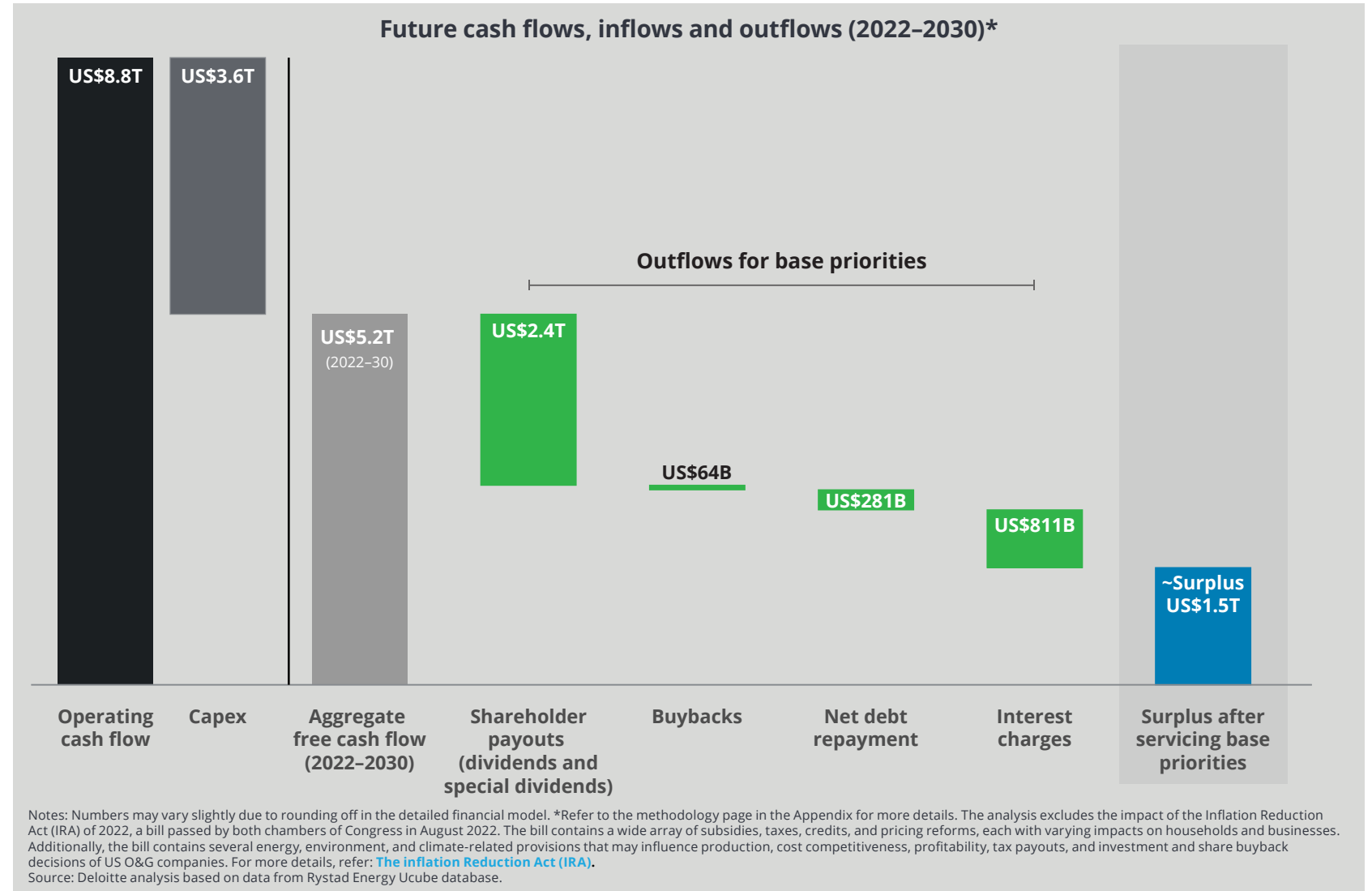
After meeting all priorities, global O&G could still have a cash surplus of US\$1.5T between 2022–2030

Of the estimated free cash flows of US\$5.2T, about 70% would go toward rewarding shareholders and strengthening the balance sheet

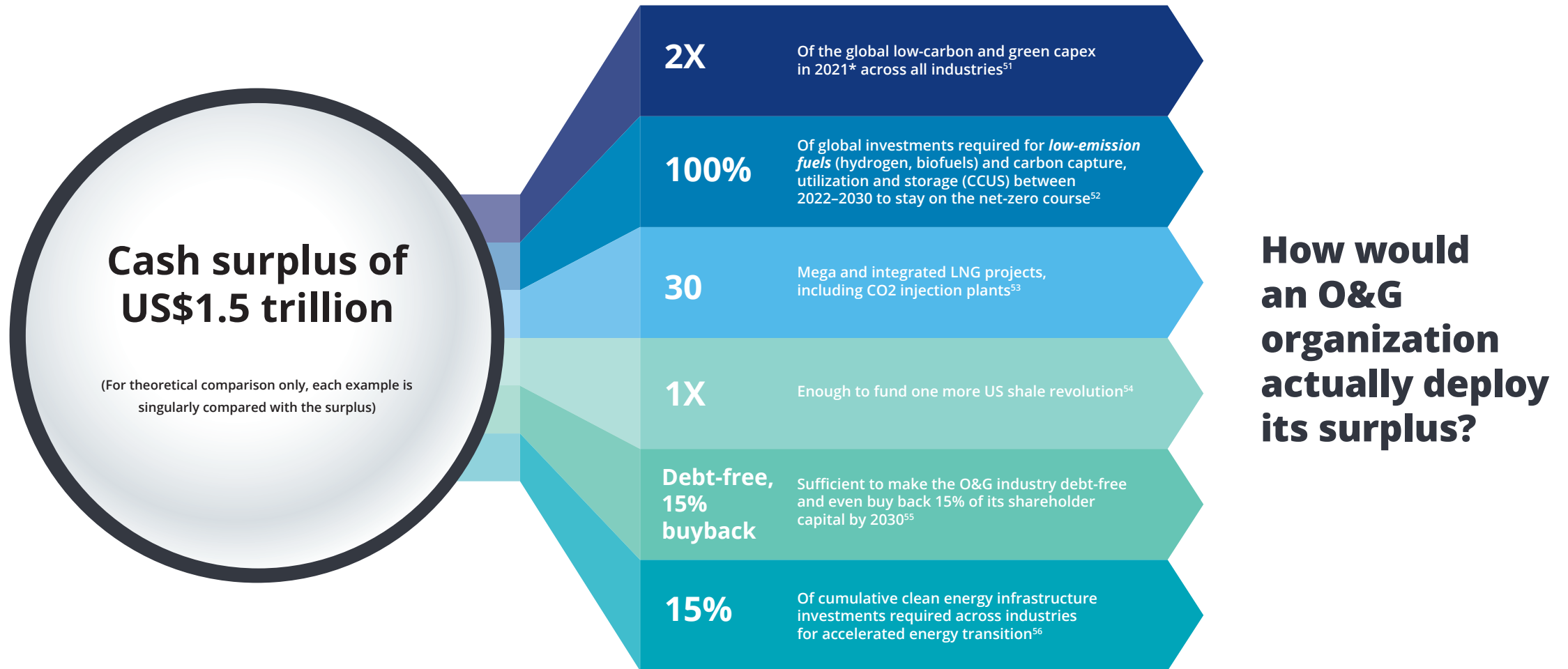
The global upstream industry is expected to generate US\$5.2 trillion in free cash flow by 2030 after taking care of core hydrocarbon capex requirements.⁴⁸

Base corporate financial priorities such as shareholder payouts, buybacks, debt repayment, and interest charges are expected to take up about 70% (US\$3.7 trillion) of the future cash flow.⁴⁹

Even after taking care of all priorities, global upstream is likely to have a cash surplus balance of about US\$1.5 trillion between 2022 to 2030.⁵⁰



How big is the projected cash surplus of US\$1.5 trillion?



Note: *IEA projections for low-carbon fuels and CCUS, 2022-2030.
Sources: Deloitte analysis; International Energy Agency, *World energy investment 2022*; and Goldman Sachs, *Carbonomics*.

Sensitivity of hydrocarbon profits to market risk (scenarios)

Extreme economic conditions and an unfavorable regulatory stance would cut into the surplus

Impact on the US\$1.5 trillion surplus (recent headwinds)

-US\$125 billion*

if US Fed rates increase by an additional 1% over and above the assumed increase of 2.5% in 2022 and 2023⁵⁷

-US\$650 billion*

if crude oil and natural gas prices fall to projections before Russia's invasion of Ukraine⁵⁸

Notes: *Assumes direct impact on pretax cash flows with other things equal. Also, the analysis excludes the impact of the Inflation Reduction Act (IRA) of 2022, a bill passed by both chambers of Congress in August 2022. The bill contains a wide array of subsidies, taxes, credits, and pricing reforms, each with varying impacts on households and businesses. Additionally, the bill contains several energy, environment, and climate-related provisions that may influence production, cost competitiveness, profitability, tax payouts, and investment and share buyback decisions of US O&G companies. For more details, refer: [The Inflation Reduction Act \(IRA\)](#).
Sources: Deloitte analysis; S&P Capital IQ.

But the renewed focus on natural gas for energy security and decarbonization could limit major downsides to hydrocarbon markets

European LNG import terminals announced since the Russia-Ukraine conflict began



Note: Refer to the Appendix for detailed sources.
Source: International Gas Union, *Global Gas Report 2022*.

Enabling energy security

- Europe is increasingly relying on imported natural gas for energy security, shifting focus from pipelines to LNG terminals (15+ new import terminals proposed in Europe since February 2022).⁵⁹
- Major capacity expansions are being planned across top LNG exporters, including the United States, which aims to increase production by at least 1.5 times by 2030.⁶⁰
- Rising natural gas demand is also driving exploration and production (E&P) activity across Africa that is estimated to result in a 30% rise in gas production by the end of the decade.⁶¹

Ensuring energy decarbonization

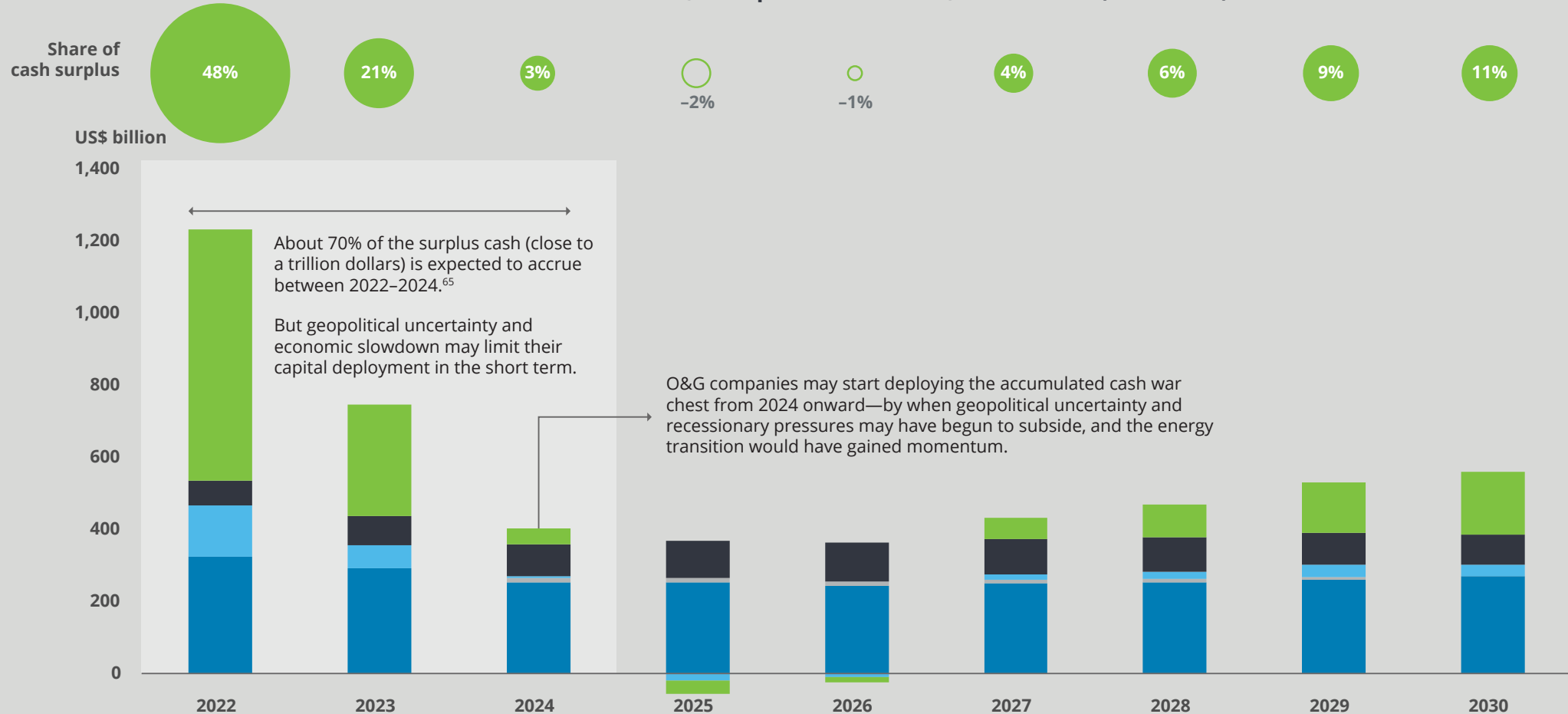
- Natural gas is a viable low-emission fuel source, especially for developing nations aiming for electrification, but volatile and high natural gas prices could occasionally incentivize fuel switching toward coal.⁶²
- Natural gas, along with CCUS, supports deeper decarbonization of hard-to-abate industrial sectors, which utilize fossil fuels to run high-temperature processes economically.⁶³
- Some major national oil companies (NOCs) are utilizing natural gas to produce low-carbon fuels such as ammonia and hydrogen.⁶⁴

2024 will likely be an investment inflection point for the O&G industry

About 70% of the O&G industry's projected US\$1.5T cash surplus will likely be generated by 2024

■ Shareholder payouts ■ Buybacks ■ Net debt repaid ■ Interest charges ■ Surplus

Annual free cash flows, base priorities on cash, and balance (2022–2030)



Note: *Refer to the methodology page in the Appendix for more details
Source: Deloitte analysis based on data from Rystad Energy Ucube database.

Commitment to a low-carbon world was already gaining momentum

Over the past five years, O&G companies have been accelerating their low-carbon investment commitments by reducing emissions at source, investing in carbon management technologies to develop the ecosystem, and boosting renewable power generation and electrifying transportation.



50% reduction

in direct carbon emissions (scope 1) over the last three years by select O&G majors⁶⁶

75% of global

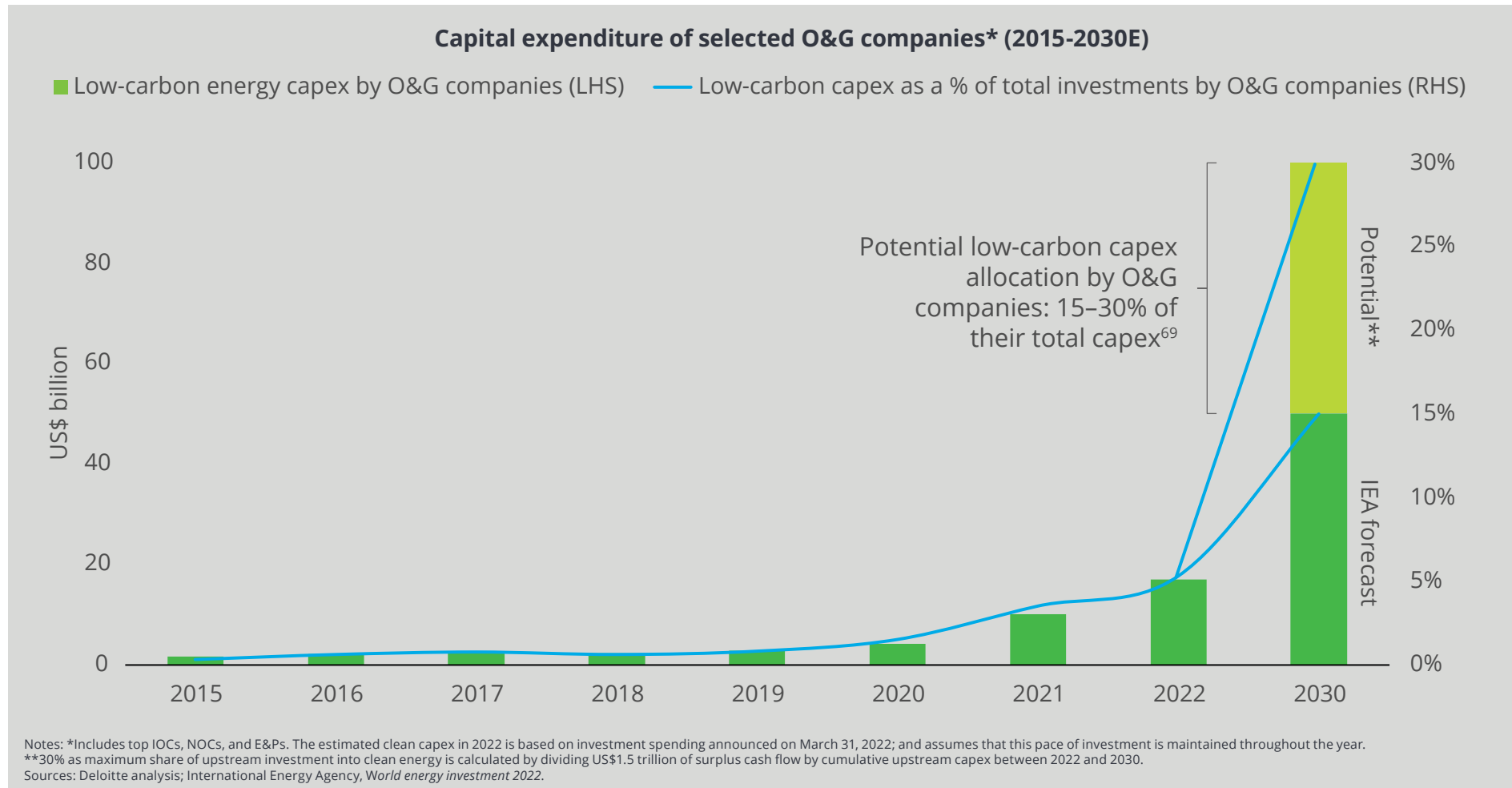
CCUS investment in 2021 made by O&G companies⁶⁷

10.5 GW

operating renewable capacity of O&G companies in 2021, with a 100% growth over the last three years⁶⁸

What could be the low-carbon capex share of O&G companies by 2030?

The industry's low-carbon capex could see new momentum, technically raising the share to 30% by 2030



The trade-off in low-carbon investments

A 30% low-carbon capex allocation by 2030 could mean a hit of 2%–4.5% to the overall corporate IRR of an O&G company

The question: Is this trade-off worth pursuing?

Low-carbon capex as a percentage of total investable amount (2022–2030)



Impact on corporate IRR (scenarios)⁷⁰

	BASE/business as usual O&G: Base (US\$45 by 2030, Avg IRR: 20%) Renewables: Current (Avg IRR: 8%)*	Economical green O&G: Base (US\$45 by 2030, Avg IRR: 20%) Renewables: Beneficial (Avg IRR: 12%)	High energy prices O&G: High (US\$80, Avg. IRR: 31%) Renewables: Rewarding (Avg IRR: 15%)
0%	0.00%	0.00%	0.00%
5% (current)	-0.45%	-0.35%	-1.13%
10%	-0.90%	-0.70%	-2.17%
15% (potential)^	-1.25%	-1.00%	-3.02%
20%	-1.56%	-1.22%	-3.71%
25%	-1.83%	-1.43%	-4.26%
30% (highest)**	-2.01%	-1.56%	-4.61%

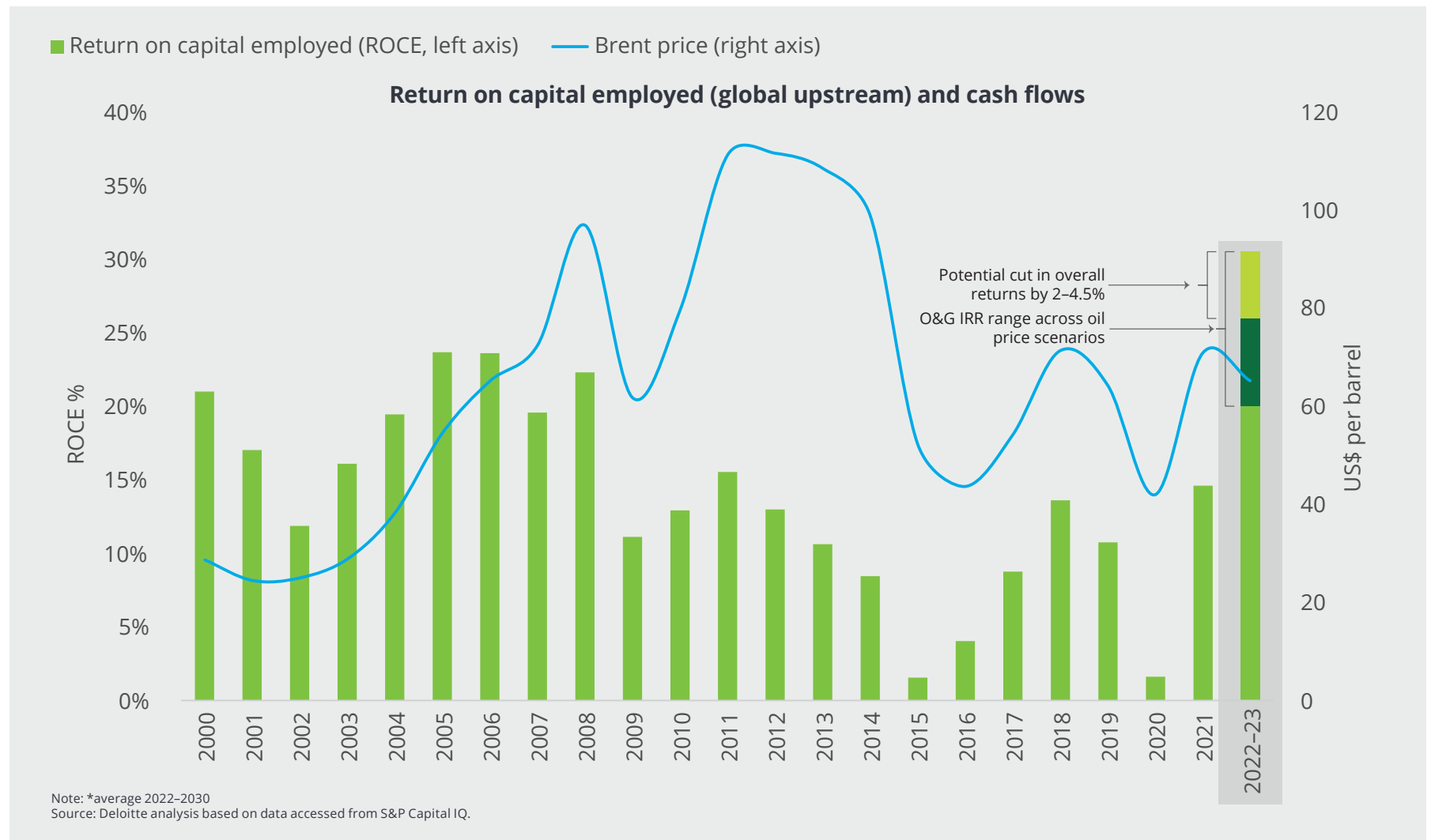
Notes: Assumes existing regulatory and environmental policies.
 * Current Avg IRR of renewables is based on returns of utility-scale projects. IRRs of solar, wind, and offshore wind projects vary significantly.
 ^ Potential low-carbon capex share allocation by O&G companies by 2030 if entire cash surplus of US\$1.5 trillion is invested in clean energy.
 **If the entire projected surplus of US\$1.5 trillion is invested in green energy businesses.
 Source: Deloitte analysis.

Does giving away a bit of IRR for lower-emissions investments have a bigger benefit than cost for companies?

Even after adjusting for a drop in corporate returns by 2%–4.5%, the industry’s overall return profile appears strong and close to previous highs.⁷¹

Benefits of “investing in low-carbon business”:

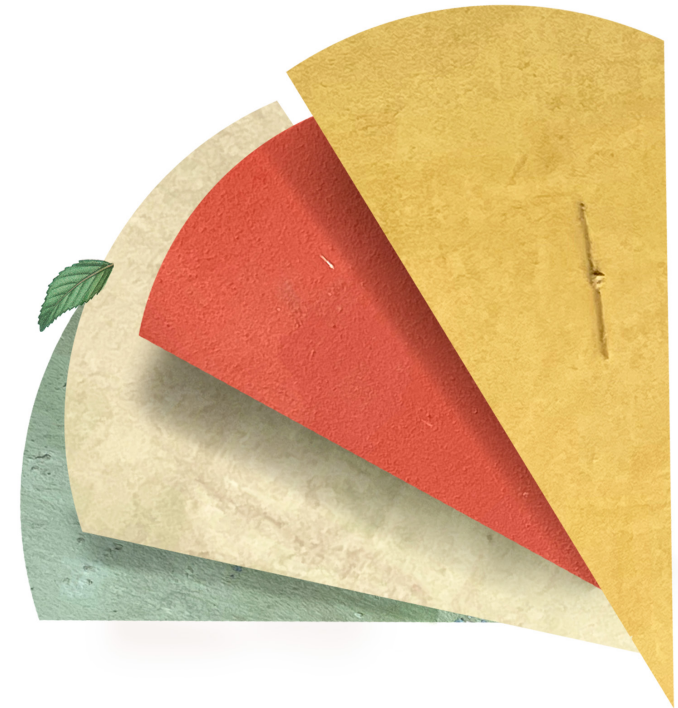
1. Enabling regulatory environment
2. Lower emissions profile
3. Higher revenue growth potential
4. Business model innovation
5. Supportive shareholders
6. Access to green environment, social, and governance (ESG) funds/investors



Range of investment choices

As lower-carbon investments take center stage, how and where companies choose to play will depend on which “archetype”* they most identify with—hydrocarbon stalwarts, low-carbon producers, green followers, or net-zero pioneers—and how the broader green ecosystem evolves.

How will each of these archetypes approach and deploy the US\$1.5 trillion surplus?



*For more details on the spectrum of O&G archetypes, read our previous research, [Positioning for green: Oil and gas business in a low-carbon world](#).

Multiple pathways to deploy cash across the spectrum, from low-carbon O&G to green energy

Each company archetype* should play complementary, and not conflicting roles to make the new energy system efficient

Not an investment priority
 Low priority
 Medium priority
 High priority

		Archetypes ^{72*}			
		Hydrocarbon stalwarts Gain market share in hydrocarbons business with the least costs and risks	Low-carbon producers Build a lean, decarbonized, & optimal hydrocarbon portfolio	Green followers Pace into low-carbon business once technologies commercially mature	Net-zero pioneers Divest most of their hydrocarbon business, first movers into green
Resources (green to hydrocarbons)	Solar	Invest via sovereign wealth funds to align with national and broader energy goals		Operationalize and scale in-progress utility-scale projects	Build scalable positions in renewables by making them economical and developing a strong decentralized end-customer base
	Onshore wind		Favor buying green power, as against producing and selling it, apart from that developed for captive power usage	Invest cautiously due to rising competition from utilities and specialists	
	Offshore wind			Invest by leveraging operational synergies with upstream	Start building new positions in less competitive, engineering and tech-oriented plays
	Green fuels (hydrogen, ammonia)	Invest to build a circular economy in downstream		Build and own a centralized, differentiated, and connected green ecosystem to both store and sell carbon	Engage in partnerships for hydrogen derivatives
	CCS ⁺ clean fuels	Foster public-private partnerships to develop infrastructure	Invest primarily for a CO2 offset strategy		Take minority stakes in large-scale CCS projects
	Mobility solutions	Elevate retail experience and invest in EV infrastructure		Part of a wider commitment to provide a range of lower-carbon transport options	Move investment along the electrification value chain
	Biofuel/bioenergy				License and/or build partnerships for setting up biomass refineries
	Hydrocarbons	Develop low-cost, most competitive O&G projects	Digitize to decarbonize and specialize	Initiate structural cost reductions and reduce carbon intensity	Maintain marginal position for cash flow support

* Notes: Please refer to Deloitte's earlier publication [Positioning for green: Oil and gas business in a low-carbon world](#) for a more detailed understanding of the spectrum of O&G archetypes. [^] CCS denotes carbon capture and storage technology. Source: Deloitte analysis.

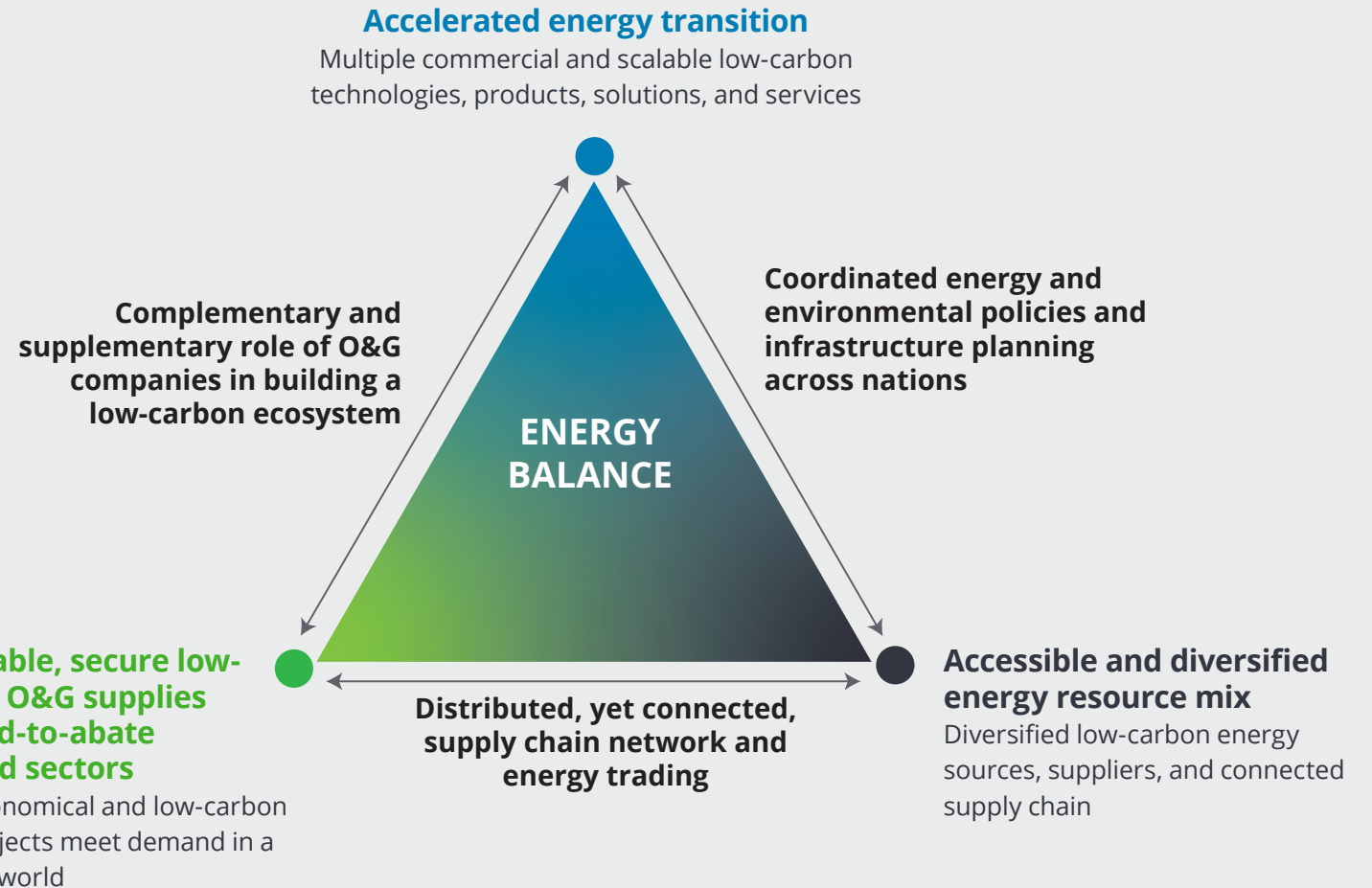
The balanced low-carbon world

Affordable and accessible hydrocarbons, especially for hard-to-abate sectors and when the broader demand is still transitioning, are necessary to strike the right balance for a low-carbon economy.

A healthy and disciplined O&G industry could overcome the energy underinvestment and supply concentration issue and enable an accelerated energy transition.

The pace and direction of this transition hinges on a supportive regulatory and stable policy environment, coordinated alliances across the low-carbon ecosystem, and innovative business models complementing core values and capabilities.

Affordable, secure low-carbon O&G supplies for hard-to-abate demand sectors
Most economical and low-carbon O&G projects meet demand in a net-zero world



APPENDIX



Methodology

Assessment of surplus cash

Parameter	Source	2022	2023	2024	2025	2026	2027	2028	2029	2030
Oil price forecast (base, US\$/bbl)	Rystad	106	75	54	51	52	55	57	59	60
Operating cash flows (A)	Rystad	A bottom-up estimate for all assets of a company at the above base case oil price scenario								
Maintenance capex (B1)	Rystad	A bottom-up estimate for all “producing assets in 2022” of a company at base case oil price scenario								
Growth capex (B2)	Rystad	A bottom-up estimate for all “nonproducing assets in 2022” of a company at base case oil price scenario								
Free cash flows (A–B=C)	Formula	Operating cash flows (OCF) minus capex is equal to FCF								
Dividends (E)**	Capital IQ, Deloitte	<ol style="list-style-type: none"> 1. If operating cash flows is negative, no dividends 2. If operating cash flows in CY is > PY, 2% annual growth rate over the past five-year average dividends* 3. If operating cash flows in CY is < PY, 0.5% annual growth rate over the past five-year average dividends* *Subject to a maximum of distributable cash (operating cash flows–maintenance capex)/operating cash flows								
Special dividends (F)**	Capital IQ, Deloitte	<ul style="list-style-type: none"> • Special dividends kick in if leverage ratio is below 25% and oil prices trade above US\$60/bbl • Special dividend ratio is 20% of incremental free cash flows (FCF base case minus FCF at US\$60) 								
Buybacks (G)***	Capital IQ, Deloitte	<ul style="list-style-type: none"> • Buybacks kick in if oil price is below US\$60/bbl and FCF minus dividends is greater than zero • Buyback proportion is past 5-year average multiplied by (CY FCF / LY FCF) 								
Unlevered surplus cash (C–F–G=H)	Formula	Free cash flows minus (dividends, special dividends, and buybacks)								
Debt repayment (I)^	Capital IQ, Deloitte	<ul style="list-style-type: none"> • If unlevered surplus is negative, then debt increases by unlevered cash surplus • If unlevered surplus is positive and PY leverage ratio is <25%, then debt reduces by 1/7th of unlevered surplus • If unlevered surplus is positive and PY leverage ratio is >25%, then debt reduces by 1/5th of unlevered surplus 								
Interest charges (J)^	Capital IQ, Deloitte	Assumes “global average” interest rate increases by 1% in 2022, 1.5% in 2023, and stays flat until 2030								
Adjusted surplus cash (H–I–J)	Formula	Unlevered cash flows minus debt payment minus interest payment								

Notes: Small-sized companies having production below 5 kboed in 2022 have been excluded for the purpose of this analysis

** Dividends by an unlisted NOC is ascertained using aggregated dividend proportion of listed companies on its FCF; dividends are not considered for unlisted private E&Ps; Common and special dividends for IOCs have been adjusted to proportionately reflect their upstream segments.

*** Buybacks are not considered for unlisted upstream companies (NOCs and E&Ps).

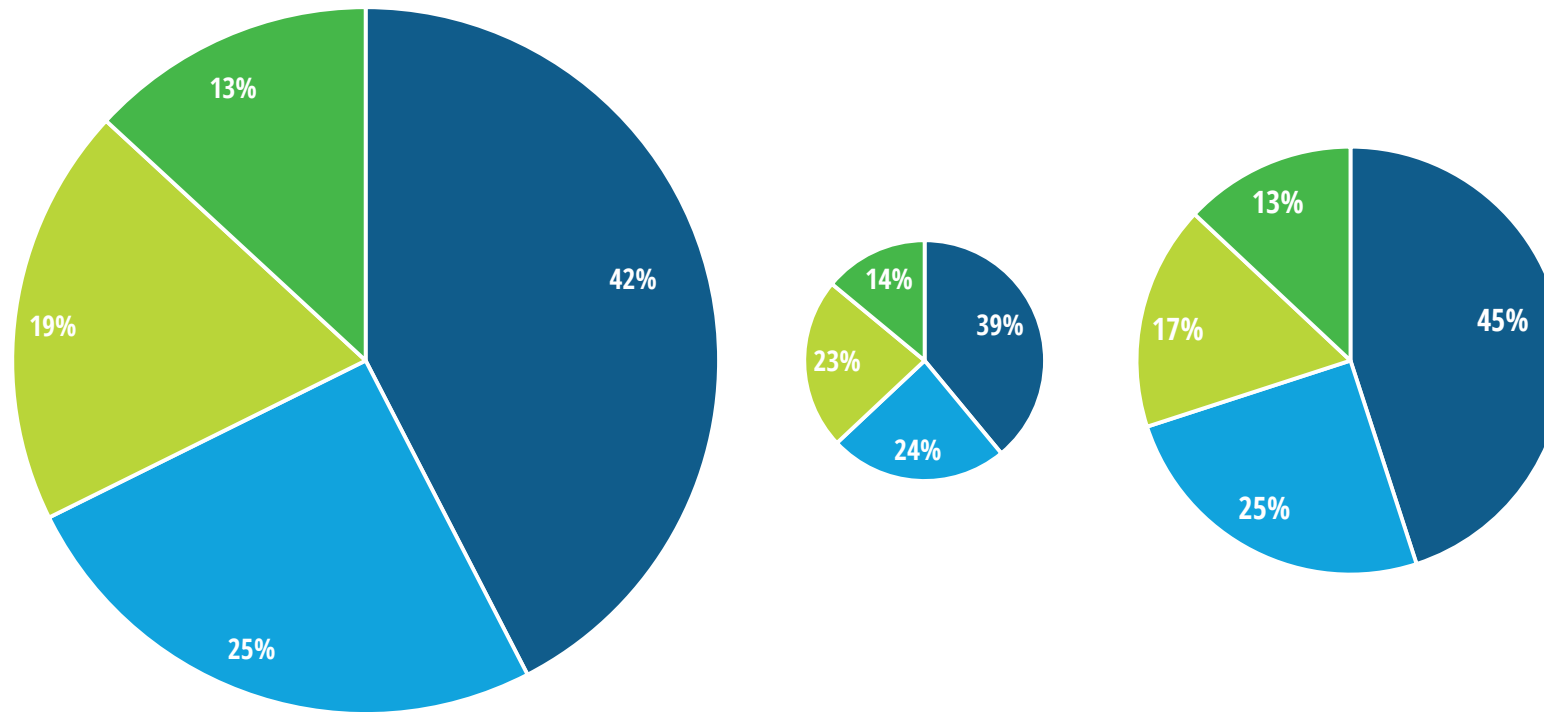
^ Debt repayment and interest charges for an unlisted upstream company are ascertained using the aggregate proportion of listed companies on its FCF.

Operating cash flows, capex, and free cash flow share by company types

Share of operating cash flows, capex, and free cash flows split by company groups (2022–2030)⁷³

■ NOC (National oil companies)
 ■ IOC (Integrated oil companies)
 ■ Public E&Ps
 ■ Private E&Ps

Operating cash flows (US\$8.8T) — Capex (US\$3.6T) = Free cash flows (US\$5.2T)



Sources: S&P Capital IQ; Rystad Energy Ucube database.

Funding a sizeable share of the total green pie

Rising focus on energy security, energy transition, and energy diversification driving a new era for clean energy investments.

US\$10.3 trillion of cumulative investments in clean energy infrastructure is estimated between 2022 and 2030.⁷⁵

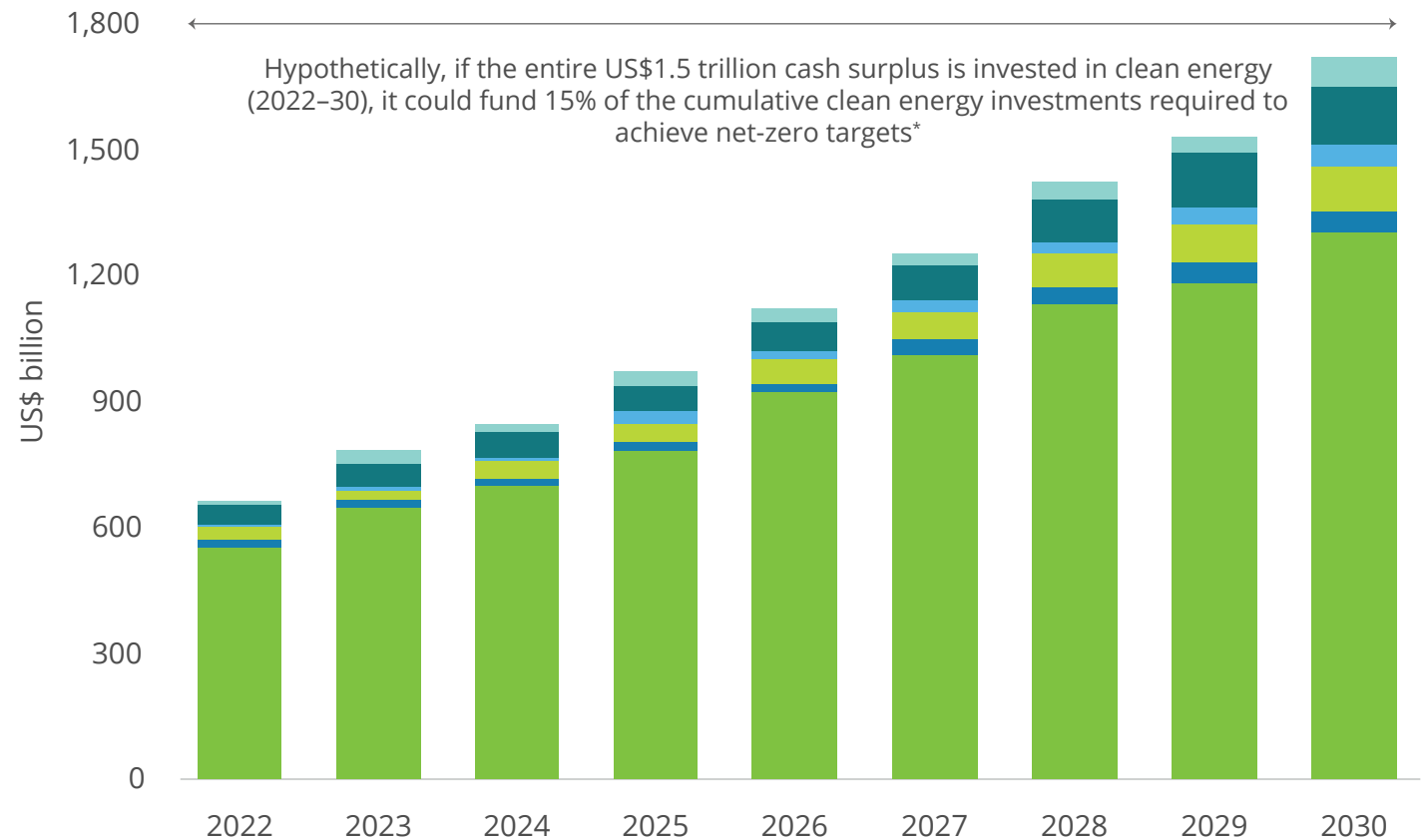
Infrastructure investments for power generation dominates with an average share of 80% of clean energy infrastructure until 2030.⁷⁶

Biorefineries and hydrogen plants expected to grow fastest with a CAGR of 33% and 28% respectively, between 2022 and 2030.⁷⁷

The O&G industry could effectively undertake 15% of the total clean energy infrastructure investment required for net-zero targets over the next eight years

- Renewable power generation
- Energy storage (batteries)
- EV and FCEV charging stations
- Biorefineries
- Industry (including CCUS)
- Hydrogen plants

Clean energy infrastructure investment required to achieve net-zero targets (2022-2030)⁷⁴



Note: *only includes incremental infrastructure investments but does not include maintenance and other end-use capex. Sources: Deloitte analysis; Goldman Sachs, Carbonomics.

O&G companies have a lot to offer in the energy transition

Tapping existing capabilities of O&G companies to unlock synergies for green energy space

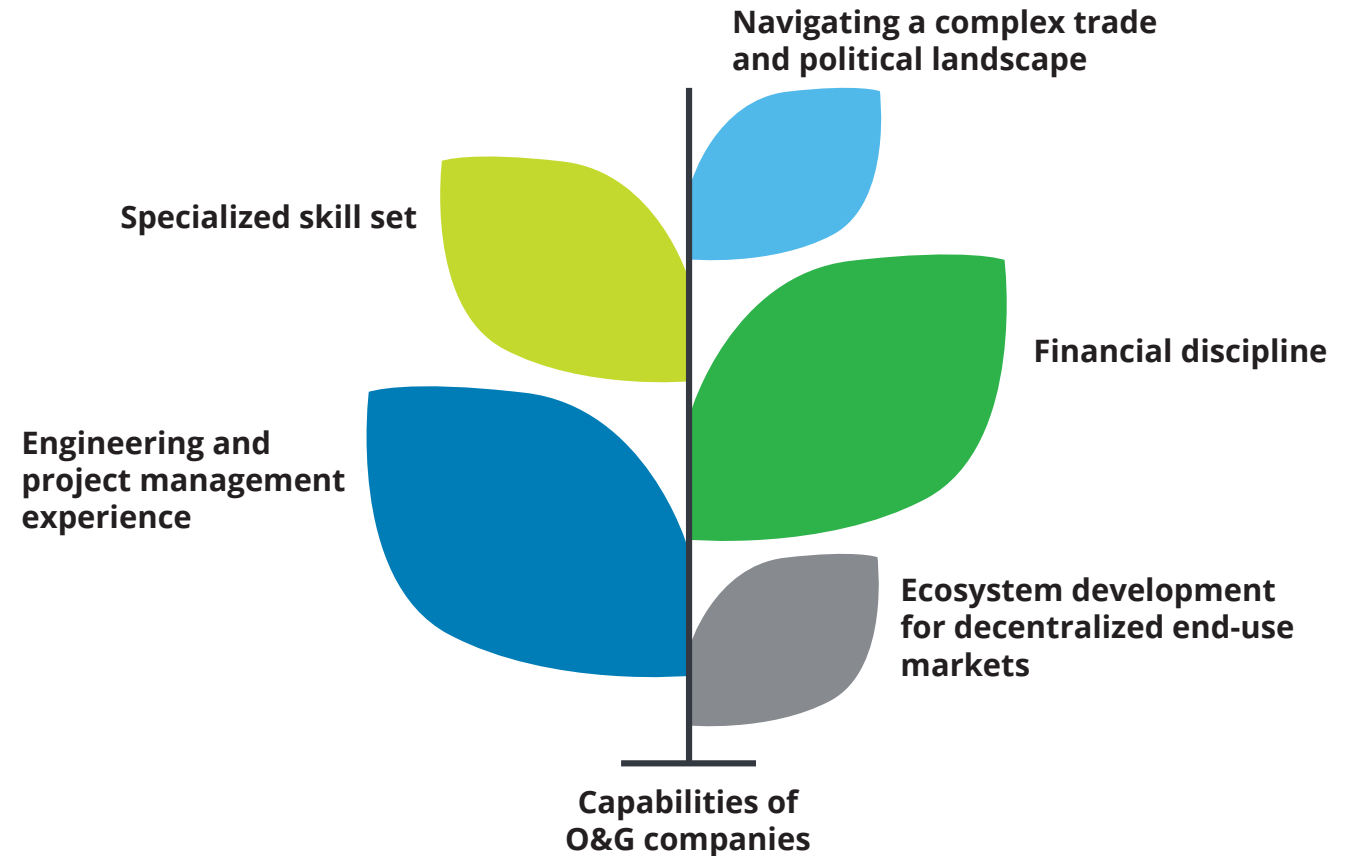
Engineering and project management capabilities and experience. Leveraging large-scale engineering and project management capabilities and experience helps upscale while reducing the costs of green technologies.⁷⁸

Subsurface expertise and infrastructure planning expertise. Specialized upstream skills, including geological and geophysical knowledge, guiding selection of underground carbon storage sites while also supporting geothermal production.⁷⁹ Moreover, expertise in pipeline and associated infrastructure supports hydrogen and carbon transfers.⁸⁰

Well-versed in navigating complex trade and political landscape. Prior experience in working with international governments by overcoming political, cultural, and trade barriers.

A long history of shareholder focus and economic returns. Stringent capital discipline showcased by O&G companies could help boost the returns of renewable projects.⁸¹

Developing centralized and decentralized end-use markets. Establishing ecosystems for green energy markets aids in coordinating across decentralized and fragmented end-use markets.



Source: Deloitte analysis.

Endnotes

1. Deloitte analysis based on data accessed from Rystad Energy Ucube Upstream database, June 2022.
2. Deloitte analysis based on data accessed from S&P Capital IQ, July 2022.
3. Deloitte analysis; Rystad Energy Ucube Upstream.
4. Deloitte analysis; S&P Capital IQ; and Rystad Energy Ucube Upstream.
5. Ibid.
6. Ibid.
7. Ibid.
8. Ibid.
9. US Energy Information Administration, *Crude oil spot prices*, accessed July 2022.
10. International Energy Agency (IEA), *Response system for oil supply emergencies*, February 2012.
11. Deloitte analysis based on Rystad Energy Ucube Upstream, and International Energy Agency.
12. Navi Dhaliwal, "OPEC tips crude oil markets over the cliff," Federal Reserve Bank of Dallas, accessed August 1, 2022.
13. Yun Li, "Saudi oil production cut by 50% after drones attack crude facilities," CNBC, September 14, 2019.
14. US Bureau of Labor Statistics, "From the barrel to the pump: the impact of the COVID-19 pandemic on prices for petroleum products," October 2020.
15. Anshu Siripurapu, "What happened to supply chains in 2021?" Council on Foreign Relations, December 13, 2021.
16. United Nations Conference on Trade and Development, "Global trade update," July 2022.
17. International Gas Union (IGU), *Global gas report 2022*, May 25, 2022.
18. Benjamin Storrow and Sara Schonhardt, "Europe's scramble for LNG leaves Asia starving for energy," E&E News, April 1, 2022.
19. Huileng Tan, "China and India now account for about 50% of Russia's seaborne oil exports, as Asian demand props up Moscow's energy revenues," Markets Insider, June 2022.
20. Saket Sundria, "Costly gasoline spurs tax cuts that may delay demand destruction," Bloomberg Quint, March 23, 2022; Channel News Asia, "New Zealand reduces fuel excise duty as Ukraine war drives petrol prices up," March 15, 2022.
21. Dan Gearino, "Inside clean energy: Wind and solar costs have risen. How long should we expect this trend to last?," February 15, 2022; Inside Climate News, January 20, 2022; European Securities and Markets Authority, "ESMA warns consumers of risk of significant market corrections," February 15, 2022.
22. International Monetary Fund (IMF), *World Economic Outlook*, October 2021.
23. Ibid.
24. Ibid.
25. Claudio Galimberti and Emily McClain, "The great trade-flows reshuffle, and the fragmentation of supply chains," Rystad Energy, June 21, 2022.
26. IMF, *World economic outlook*.
27. Deloitte analysis based on Rystad Energy Ucube Upstream.
28. Tan, "China and India now account for about 50% of Russia's seaborne oil exports, as Asian demand props up Moscow's energy revenues."
29. U.S. Energy Information Administration, "Short-term energy outlook," July 12, 2022.
30. Kristalina Georgieva, "Facing a darkening economic outlook: How the G20 can respond," IMF, July 13, 2022.
31. Deloitte analysis; U.S. Energy Information Administration; and Rystad Energy Ucube Upstream database, July 2022.
32. Ibid.
33. Deloitte analysis and U.S. Energy Information Administration.
34. Deloitte analysis based on data accessed from Rystad Energy Ucube Upstream database, July 2022.
35. Ibid.
36. Ibid.

37. Ibid.
38. Deloitte analysis; S&P Capital IQ, July 2022.
39. Ibid.
40. Ibid.
41. Ibid.
42. O&G sectoral indexes include S&P 500 Energy Sector; S&P 500 Integrated Oil & Gas; S&P 500 Exploration & Production Select Industry; S&P 500 Equipment; Alerian MLP; S&P 500 Refining and Marketing. Deloitte analysis; S&P Capital IQ, June 2022.
43. Deloitte analysis; S&P Capital IQ, July 2022.
44. Ibid.
45. Ibid.
46. Rystad Energy oil price forecasts, June 2022.
47. Deloitte analysis and Rystad Energy Ucube Upstream database, July 2022.
48. Refer to page 27 in the Appendix for detailed methodology on cash surplus model. Rystad Energy Ucube Upstream database, June 2022.
49. Deloitte analysis based on modeling of data accessed from Rystad Energy Ucube and S&P Capital IQ.
50. Ibid.
51. BloombergNEF, "Global investment in low-carbon energy transition hit \$755 billion in 2021," January 27, 2022.
52. IEA, *World energy investment 2022*, June 2022.
53. Seb Kennedy, "Soaring costs curb enthusiasm for US LNG," *Energy Monitor*, May 2, 2022.
54. Deloitte analysis based on data accessed from S&P Capital IQ, July 2022.
55. Ibid.
56. Deloitte analysis; Goldman Sachs, *Carbonomics*, March 17, 2022.
57. Deloitte analysis; S&P Capital IQ, July 2022.
58. Ibid.
59. IGU, *Global gas report 2022*.
60. Claudio Galimberti and Emily McClain, "The great trade-flows reshuffle, and the fragmentation of supply chains."
61. Rystad Energy, "Gas starved Europe looks to Africa for new supplies as E&Ps reconsider shelved projects," May 2022.
62. International Energy Forum, "4 reasons natural gas is a critical part of the energy transition," September 20, 2021.
63. Lombard Odier, "Challenge or opportunity? Rethinking hard-to-abate sectors," September 13, 2021.
64. Anthony Di Paola, "UAE sells another blue ammonia cargo to Japan in hydrogen push," Bloomberg, August 18, 2021.
65. Refer to the methodology page in the Appendix for more details. Deloitte analysis based on data from Rystad Energy Ucube database.
66. Bloomberg; Deloitte analysis.
67. Deloitte analysis; IEA, *World Energy Investment 2022*.
68. Ibid.
69. The estimated clean capex in 2022 is based on investment spending announced on March 31, 2022, and assumes that this pace of investment is maintained throughout the year. Deloitte analysis; IEA, *World energy investment 2022*.
70. Deloitte analysis; S&P Capital IQ; Rystad Energy Ucube database, July 2022.
71. Ibid.
72. Amy Chronis et al., *Positioning for green: Oil and gas business in a low-carbon world*, Deloitte Insights, October 12, 2022.
73. Deloitte analysis; S&P Capital IQ; Rystad Energy Ucube Upstream.
74. Goldman Sachs, *Carbonomics: Security of supply and the return of energy capex*, March 17, 2022.
75. Ibid.
76. Ibid.
77. Ibid.

78. Robert Johnson, Reek Blakemore, and Randolph Bell, *The role of oil and gas companies in the energy transition*, Atlantic Council, January 9, 2020.
79. Journal of Petroleum Technology, "As the energy transition accelerates, spaces open for oil and gas engineers," February 1, 2021.
80. Astley Hastings and Pete Smith, "Achieving net zero emissions requires the knowledge and skills of the oil and gas industry," Frontiers Media S.A., December 2020.
81. Deloitte analysis based on data accessed from S&P Capital IQ, July 2022.

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