



Energy Strategy 4

Fall 2025 – Online

Course plan

Module	Session #	Block
1. References	1	Intro
2. The energy cake	2	Market: Energy
3. Energy efficiency		
4. Electrification		
5. Future scenarios	3	
6. Emissions		
7. Investment		Market: Carbon
8. Carbon	4	
9. Oil market	5	
10. US shale oil	6	
11. Peak oil	7	
12. Gas and LNG	8	Players
13. Refining and chemicals	9	
14. Energy companies		
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16. The Middle East	10	
17. Iran's energy profile		
18. Iran's oil and gas		

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A simplified classification of references

Organizations	Institutes	Traditional news/data/advisory	New generation of data/advisory
IEA	Oxford Energy	S&P Global Platts (+ IHS Markit)	Refinitiv
EIA	KAPSARC	Argus	Vortexa
OPEC	Baker institute CES	FGE NexantECA	Kpler
GECF		Wood Mackenzie	
IRENA		Rystad Energy	
		ICIS	
		Energy Intelligence	
		Westwood Energy	

IEA (International Energy Agency)

- Born with the 1973-1974 oil crisis, after the oil embargo.
- Founding members were Austria, Belgium, Canada, Denmark, Germany, Ireland, Italy, Japan, Luxembourg, The Netherlands, Norway (under a special Agreement), Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States.
- In 2015, the IEA's Ministerial Meeting approved a new modernization strategy presented by the Agency's newly appointed Executive Director, Dr Fatih Birol.
- The IEA is made up of 32 Member countries. In addition, the IEA family also includes thirteen Association countries.
- Promotes energy transition and is the main publisher in this area.

EIA (Energy Information Administration)

- The U.S. Energy Information Administration (EIA) was created in response to the need for additional Federal initiatives to collect and disseminate energy-related information, and to evaluate and analyze this information. These needs were revealed as the United States sought to respond to the energy crises of the 1970s. The first law to address these needs was the Federal Energy Administration Act of 1974 and, over the years, many subsequent laws have contributed to EIA's evolution and growth.
- The U.S. Energy Information Administration (EIA) collects, analyzes, and disseminates independent and impartial energy information.
- Provides a vast amount of data with the possibility to download.

OPEC (Organization of Petroleum Exporting Countries)

- The Organization of the Petroleum Exporting Countries (OPEC) is a permanent, intergovernmental Organization, created at the Baghdad Conference on September 10–14, 1960, by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela.
- OPEC had its headquarters in Geneva, Switzerland, in the first five years of its existence. This was moved to Vienna, Austria, on September 1, 1965.
- OPEC's objective is to co-ordinate and unify petroleum policies among Member Countries, in order to secure fair and stable prices for petroleum producers; an efficient, economic and regular supply of petroleum to consuming nations; and a fair return on capital to those investing in the industry.
- Member Countries: Algeria, Congo, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, United Arab Emirates, and Venezuela.

GECF (Gas Exporting Countries Forum)

- The origins of the Gas Exporting Countries Forum (GECF) can be traced to the First Meeting of Ministers held in Iran in 2001. This Ministerial Meeting was convened by the Minister of Petroleum of Iran and was attended by the governments of Algeria, Brunei, Indonesia, Iran, Malaysia, Oman, Qatar, the Russian Federation, Turkmenistan and Norway (Observer).
- The Gas Exporting Countries Forum (GECF) is an international governmental organization which provides the framework for exchanging experience and information among Member Countries. The GECF is a gathering of the world's leading gas exporting countries and was set up with the objective to increase the level of coordination and strengthen the collaboration among its members.
- The full-fledged Members of the GECF are Algeria, Bolivia, Egypt, Equatorial Guinea, Iran, Libya, Nigeria, Qatar, Russia, Trinidad and Tobago, UAE and Venezuela. Angola, Azerbaijan, Iraq, Malaysia, Mauritania, Mozambique, Peru and Senegal hold the status of Observers. Together, they represent 69% of the world's gas reserves, 39% of the marketed production, and 40% of global gas exports. Moreover, GECF member countries collectively account for more than half of the world LNG exports (51%).

International Renewable Energies Agency

- The proposal for an international agency dedicated to renewable energy was made in 1981 at the United Nations Conference on New and Renewable Sources of Energy, held in Nairobi, Kenya. The idea was further discussed and developed by major organizations in the field of renewable energy, such as Eurosolar.
- The International Renewable Energy Agency (IRENA) was officially established in Bonn in 2009.
- The International Renewable Energy Agency (IRENA) is an intergovernmental organization that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international cooperation, a center of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy.

OIES (Oxford Institute for Energy Studies)

- The Oxford Institute for Energy Studies (OIES) was founded in 1982 as an independent center for advanced research into the social science aspects of international energy.
- The Oxford Institute for Energy Studies is a world leading independent energy research institute specializing in advanced research into the economics and geopolitics of the energy transition and international energy across oil, gas and electricity markets.

King Abdullah Petroleum Studies and Research Center

- King Abdullah Petroleum Studies and Research Center (KAPSARC) is an advisory think tank within global energy economics and sustainability providing services to entities and authorities in the Saudi energy sector.
- Over 250 staff and 80 insights in 2022. Inaugurated in 2017 – however, the establishment dates to around a decade before that.



Center for Energy Studies at Baker Institute for Public Policy

- From its location in the energy capital of the world — Houston, Texas — the Center for Energy Studies (CES) at Rice University's Baker Institute for Public Policy provides critical insights on the world's complex and evolving energy landscape.
- Economic modeling and forecasting; expanded emphasis on the nexus between energy and environment; and a continued focus on emerging technologies, regulations, and geopolitical risk reinforce the center as a key resource for policymakers and the energy industry.

S&P Global (1/3)

- In 2022, S&P Global completed a merger with IHS Markit, resulting in the formation of S&P Global Commodity Insights.
- **Platts** was founded in 1909 by the journalist Warren C. Platt who starts a monthly new magazine, National Petroleum News (NPN). This Publication provides essential insights to the oil industry and helps investors to leverage that intelligence into smart investment decisions.
- S&P Global Platts is the leading independent provider of information and benchmark prices for the commodities and energy markets. Customers in over 150 countries look to Platts's expertise in news, pricing and analytics to deliver greater transparency and efficiency to markets.
- Platts' coverage includes oil and gas, power, petrochemicals, metals, agriculture and shipping. A division of S&P Global, Platts is headquartered in London and employs over 1,000 people in more than 15 offices worldwide.
- **IHS** was founded in 1959 by Richard O'Brien as a provider of product catalog databases on microfilm for aerospace engineers. Since then, IHS Markit has served customers ranging from governments and multinational companies to smaller businesses and technical professionals.
- IHS Markit is a dynamic team that includes more than 5,000 analysts, data scientists, financial experts and industry specialists.
- IHS Markit partners with hundreds of leading solution providers to deliver information and insight to customers throughout global financial, resources, transportation and other sectors.

S&P Global (2/3)

❖ **Market Intelligence**

(effective 2022, division is a combination of S&P Global's Market Intelligence and IHS Markit's Financial Services division and Maritime & Trade business)

● **Ratings**

▲ **Commodity Insights**

(effective 2022, division is a combination of S&P Global Platts and IHS Markit's Energy & Natural Resources. Division formerly named "Platts" from 2016 to 2022)

+ **Mobility**

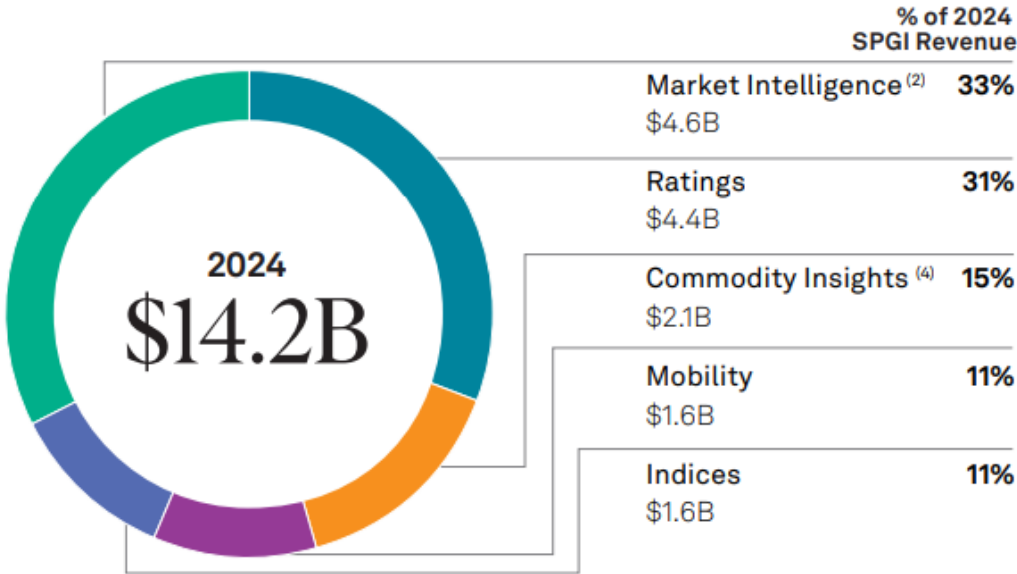
(effective 2022; formerly IHS Markit's Transportation division (minus the Maritime & Trade business which is now part of S&P Global Market Intelligence)

* **Indices**

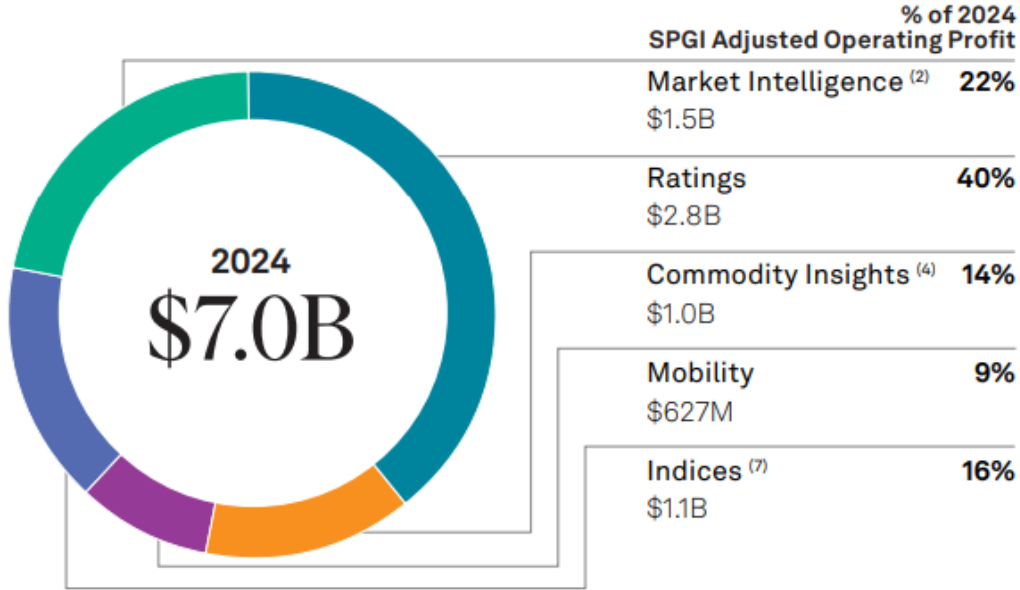
The S&P Dow Jones Indices joint venture was established in June 2012. Effective 2022, Indices includes certain products from IHS Markit's Financial Services division

S&P Global (3/3)

Revenue ⁽¹⁾



Adjusted Operating Profit



Argus

- Argus was founded in 1970 and is a privately held UK-registered company. It is owned by employee shareholders, global growth equity firm General Atlantic and Hg, the specialist software and technology services investor.
- Headquartered in London with over 1,400 staff, Argus is an independent media organization with 30 offices in the world's principal commodity trading hubs.
- Companies, trading firms and governments in 160 countries around the world trust Argus data to make decisions, analyze situations, manage risk, facilitate trading and for long-term planning. Argus prices are used as trusted benchmarks around the world for pricing transportation, commodities and energy.

FGE NexantECA

- FGE and NexantECA were merged in 2025 by investment from TA Associates.
- FGE was incorporated as Fesharaki Associates Consulting & Technical Services (FACTS) in 1983. The company was the first consulting firm to specialize in the oil and gas markets East of Suez and remains one of the very few firms to focus expertise on the Asia Pacific.
- With the acquisition of Energy Market Consultants (EMC) in 2006, the FGE group is unique in the oil and gas consultant market, with focused expertise on the Asia Pacific, Middle Eastern, North American, European, and former Soviet Union markets. FGE combines its technical tools, economic analysis, computer simulation, and engineering considerations with qualitative analysis of market behavior and political realities.
- NexantECA (Energy and Chemicals Advisory) was separated from Nexant and rebranded separately from 2021. Nexant itself was the result of merger (in 2001) between the old Chem Systems consulting business and a business within Bechtel Engineering, which was included their engineering consulting business. Chem Systems was founded in 1964

Wood Mackenzie

- Wood Mackenzie was founded in 1923 as a small, relatively unknown, Edinburgh-based stockbroker. By the 1970s, it had become one of the top three stockbrokers in the UK, renowned for the quality of its equity research. In 1973, its equity analysts published the first oil report.
- For nearly 50 years, Wood Mackenzie has been providing quality data, analytics, and insights used to power the natural resources industry.
- Dedicated oil, gas & LNG, power & renewables, chemicals, and metals & mining sector teams
- In 2015, were acquired by Verisk and in 2022 acquired by Veritas.

Rystad Energy

- Jarand Rystad founded Rystad Energy in 2004 and has, since its inception, managed the company.
- Offices in more than 28 locations worldwide, and with a 600-strong team of talented Rystad Energy employees from more than 60 countries.
- An independent energy research and business intelligence company providing data, tools, analytics and consultancy services to clients exposed to the energy industry across the globe.
- Energy fundamentals, oil and gas markets, supply chains, renewables and energy transition.
- Main sources are governmental databases and archives, company presentations, professional and scientific reports, media as well as user feedback.

ICIS (Independent Commodity Intelligence Services)

- ICIS was founded in 1980 by Humphrey Hinshelwood (1929-2001), a petrochemicals reporter. ICIS later was merged with London Oil Report. ICIS's history goes back to 1871 as ICIS Chemical Business (ICB) magazine's forerunner *Oil, Paint and Drug Reporter* was launched in 1871, providing pricing information and insight on specialty commodities.
- ICIS is a team of over 800 people, more than a quarter of whom are subject matter experts, located in 22 offices around the world.
- Focused on energy, petrochemical and fertilizer markets.

Energy Intelligence

- The Oil Daily was founded in 1951 as a newspaper for the US oil industry in the post-World War II economic boom. In 1986, Mr Sidawi acquired The Oil Daily Co. and subsequently launched Energy Compass.
- Petroleum Intelligence Weekly (PIW) was founded in 1961 by the legendary oil journalist Wanda Jablonski, who single-handedly invented international energy journalism in the 1950s. Ms. Jablonski sold PIW Publications in 1988. In 1996, Mr Sidawi's The Oil Daily Co. bought PIW Publications, creating Energy Intelligence.



Westwood Energy

- Formed in 2015 due to a merger between Douglas Westwood (founded in 1990), Hannon Westwood (founded in 1993), and Richmond Energy (founded in 2006).
- Provides subscription-based data services, bespoke reporting, and commercial advice to clients in upstream operations, onshore energy services, including North American unconventional, and offshore energy services.

Refinitiv (part of LSEG)

- Refinitiv is an American-British global provider of financial market data and infrastructure.
- The company was founded in 2018 as a subsidiary of Thomson Reuters, which then sold a 55% stake to Blackstone Group LP in August 2018. In October 2019, Blackstone and Thomson Reuters announced the sale of the company to London Stock Exchange Group. LSEG completed the US\$27 billion purchase from the two previous owners in late January 2021, and Refinitiv is now a subsidiary of LSEG.
- LSEG is one of the world's leading providers of financial markets infrastructure and delivers financial data, analytics, news and index products to more than 40,000 customers in over 170 countries.

Vortexa

- Since Fabio and Etienne started Vortexa in early 2016, the fast-growing team of engineers, data scientists, and market analysts have been creating a best-in-class system of data and analytics tools with the most complete view of global flows of oil & gas, delivered in real-time.
- The company uses technologies such as reusable rocket launching, lower-cost satellites, cloud-scale computational power and machine learning modelling.
- Vortexa has over 100 employees and 200 clients with 5 global offices.

Kpler

- In 2014, Kpler released the first cargo-tracking platform for LNG. The product was a breakout success which fostered the further growth of Kpler. Since then, Kpler have expanded its portfolio of solutions to more than 40 types of commodities.
- Today, Kpler is the biggest commodity data platform available across the industry. Kpler is a success story.
- Kpler has grown from a start-up to a global group of 150 people, serving more than 600 accounts in 65 countries.

Domestic References

IIES

Sobhan

RIEMP

GPTT

PetroView

VCM
Study

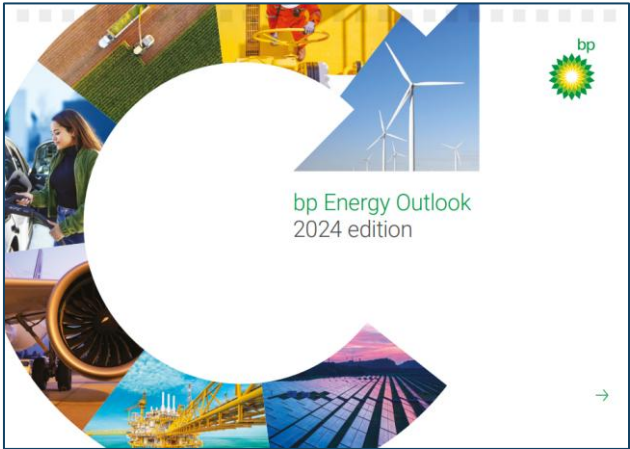
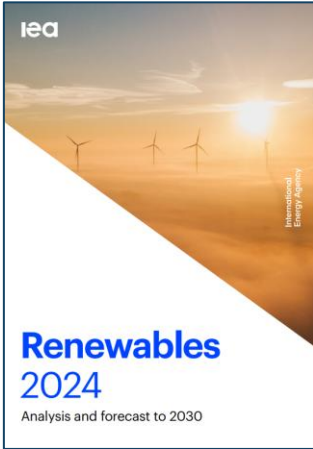
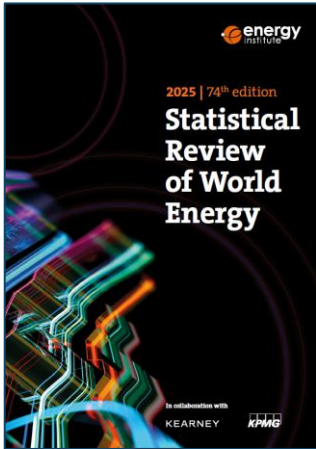
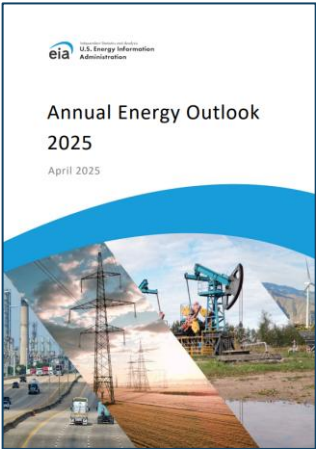
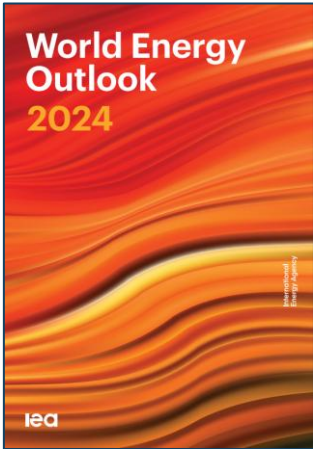
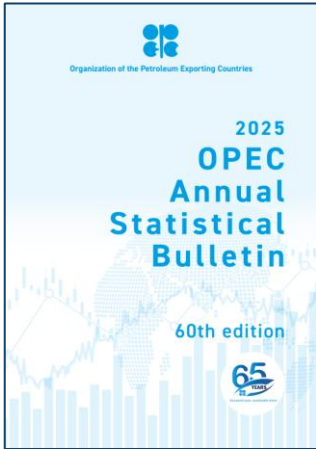
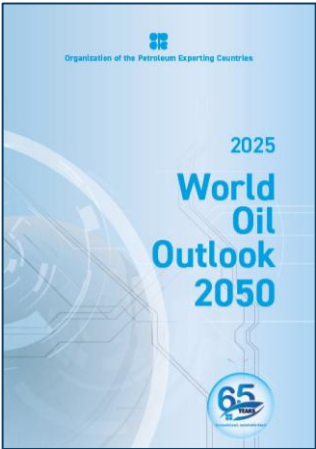
VCDC

SolutiEn

Events

ADIPEC	CERAWeek	APPEC	WPC	EIF
• From 1984 in Abu Dhabi	• From 1983 in Houston	• From 1984 in Singapore	• From 1933	• From 1980 in London

Reports



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How should we analyze the energy industry at high level?

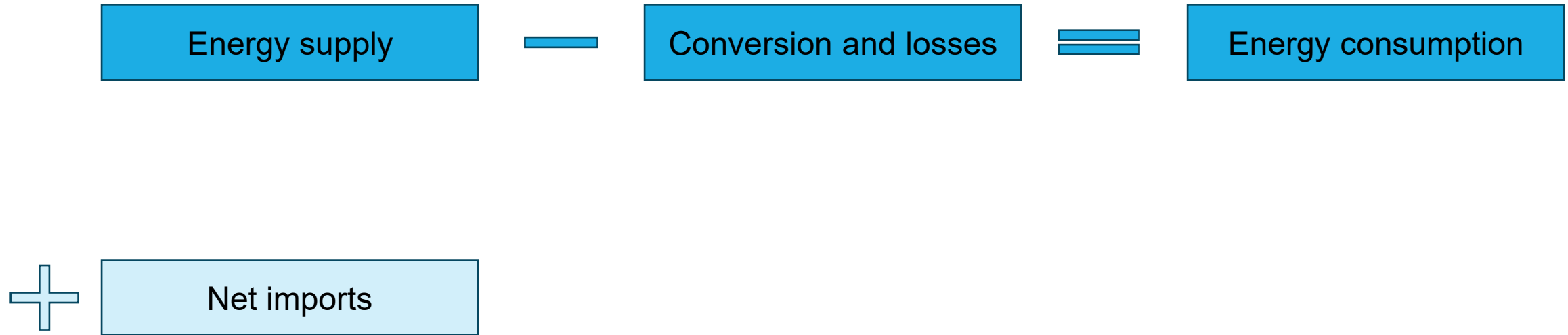
Two dimensions of the cake



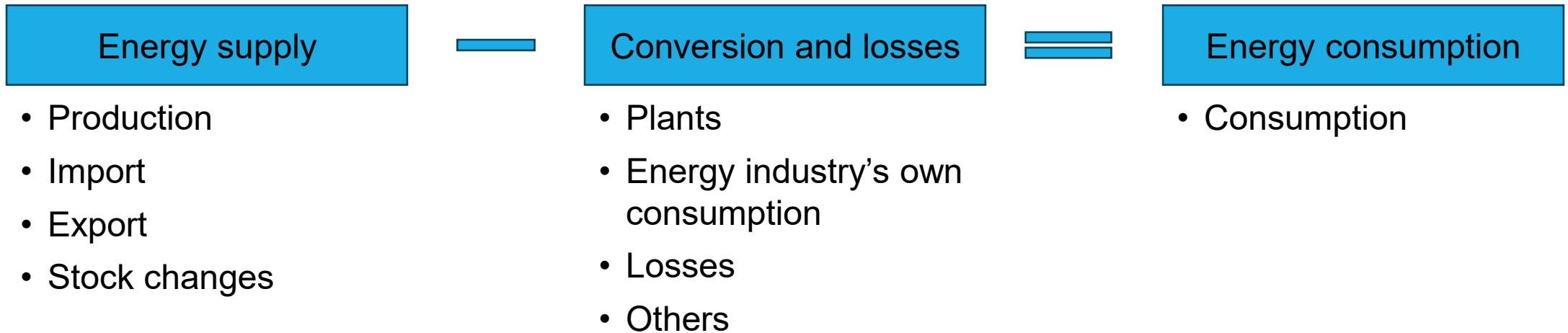
From which sources

How much

Basic energy equation



Basic energy equation – details



Additional dimensions for energy modelling

Sectors

- Industry, transportation, agriculture, etc.

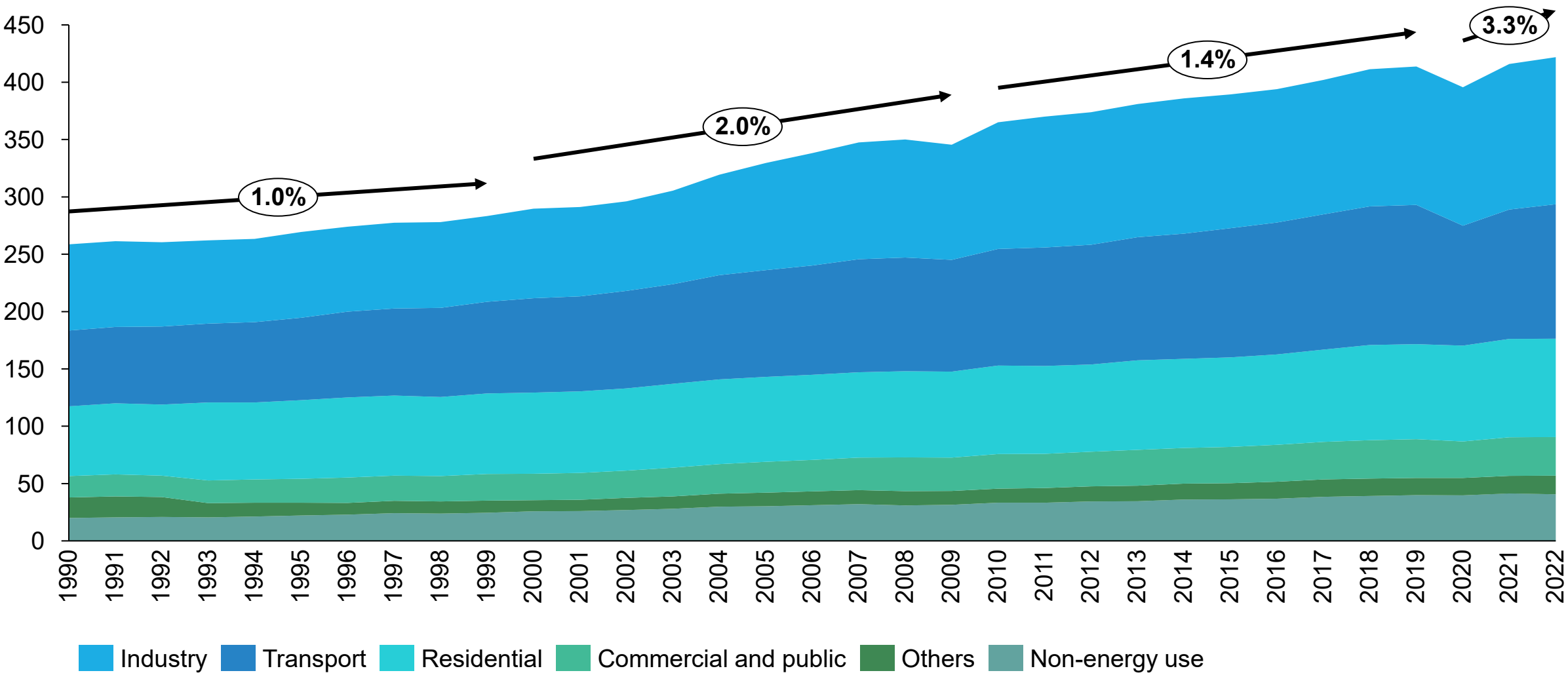
Fuels

- Renewable versus non-renewable
- Gas, liquid, solid, electricity

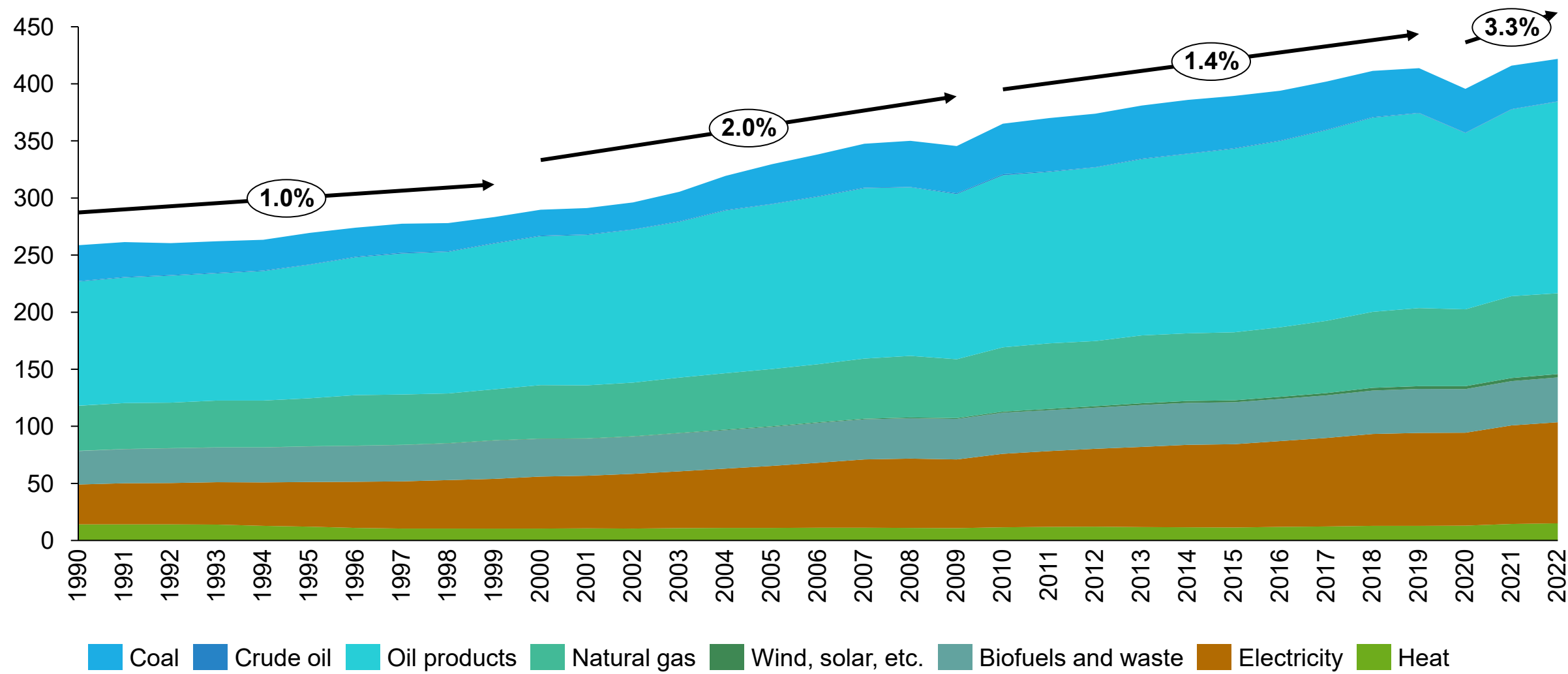
Geography

- Continents
- Countries and states
- Emerging and developed economies

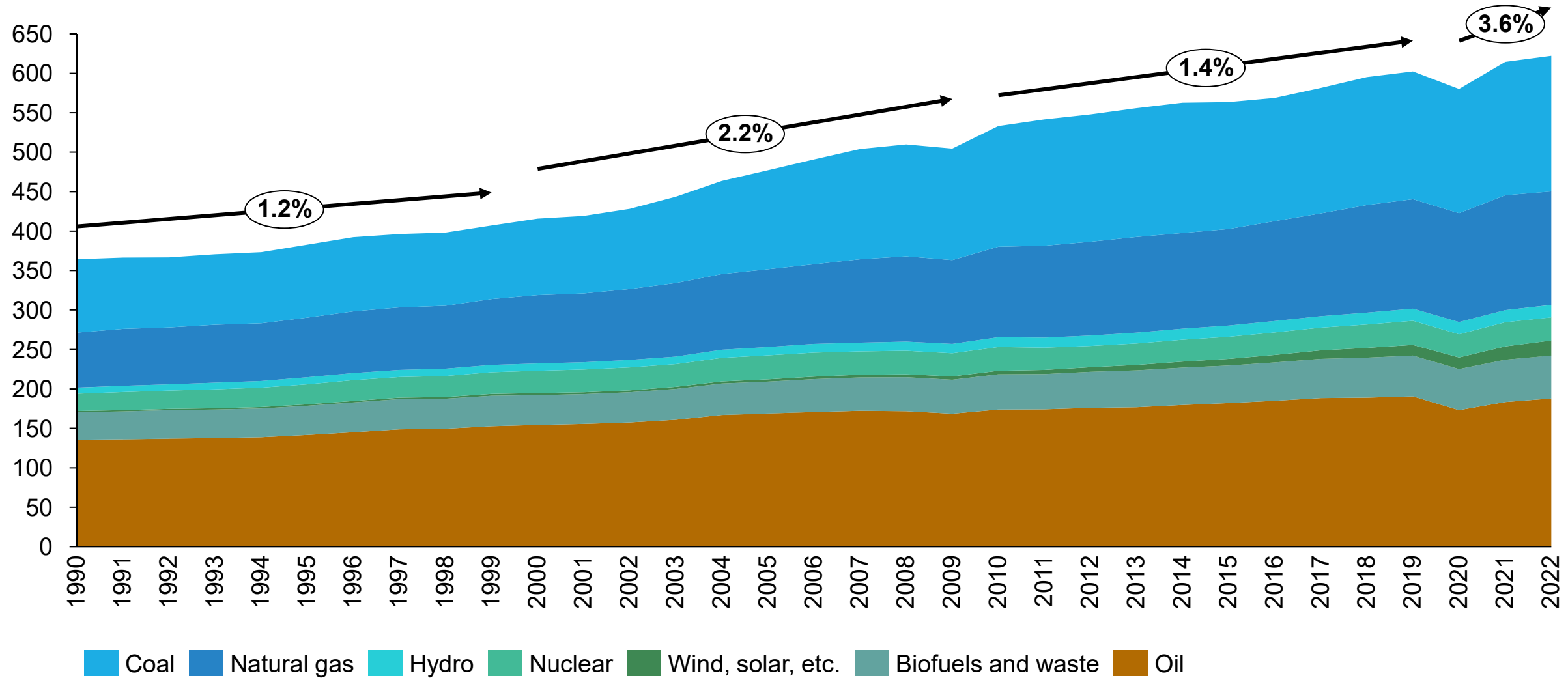
World total final consumption by sector (EJ)



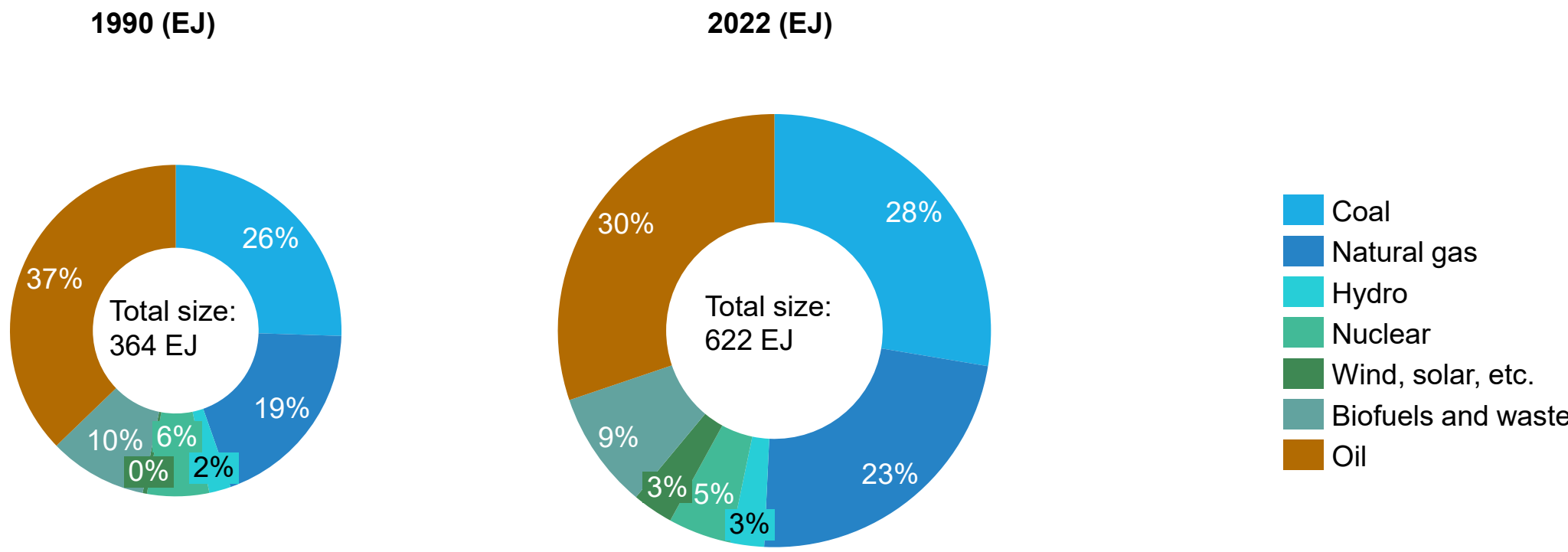
World total final consumption by source (EJ)



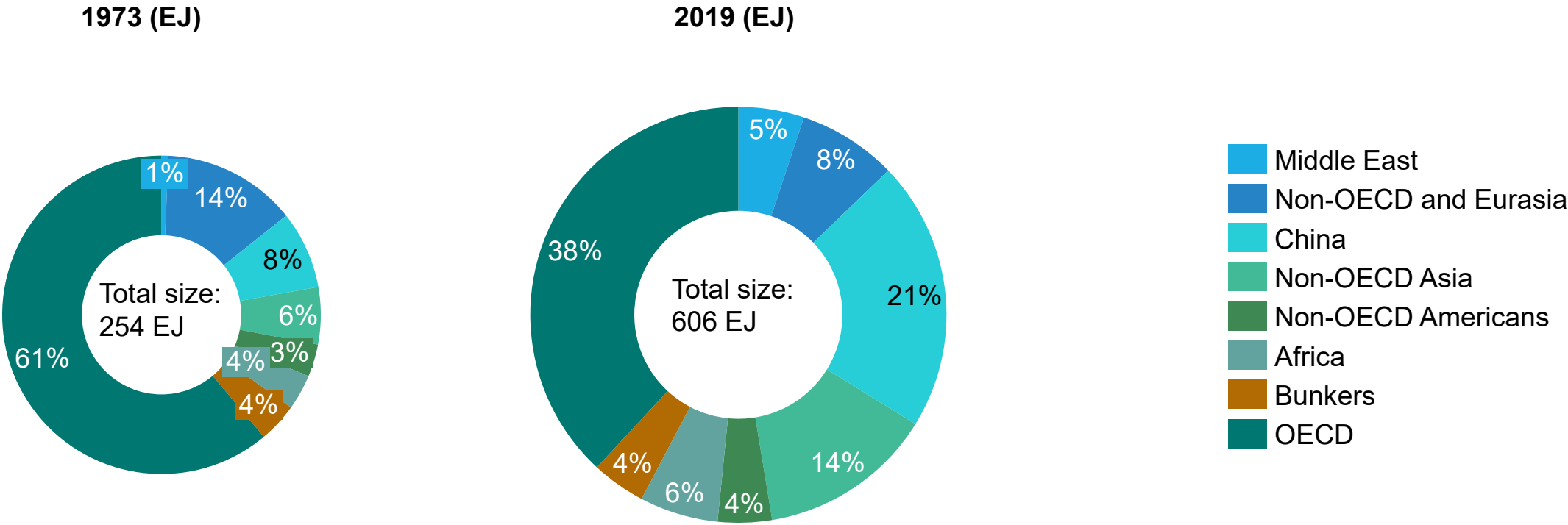
World total energy supply by source (EJ)



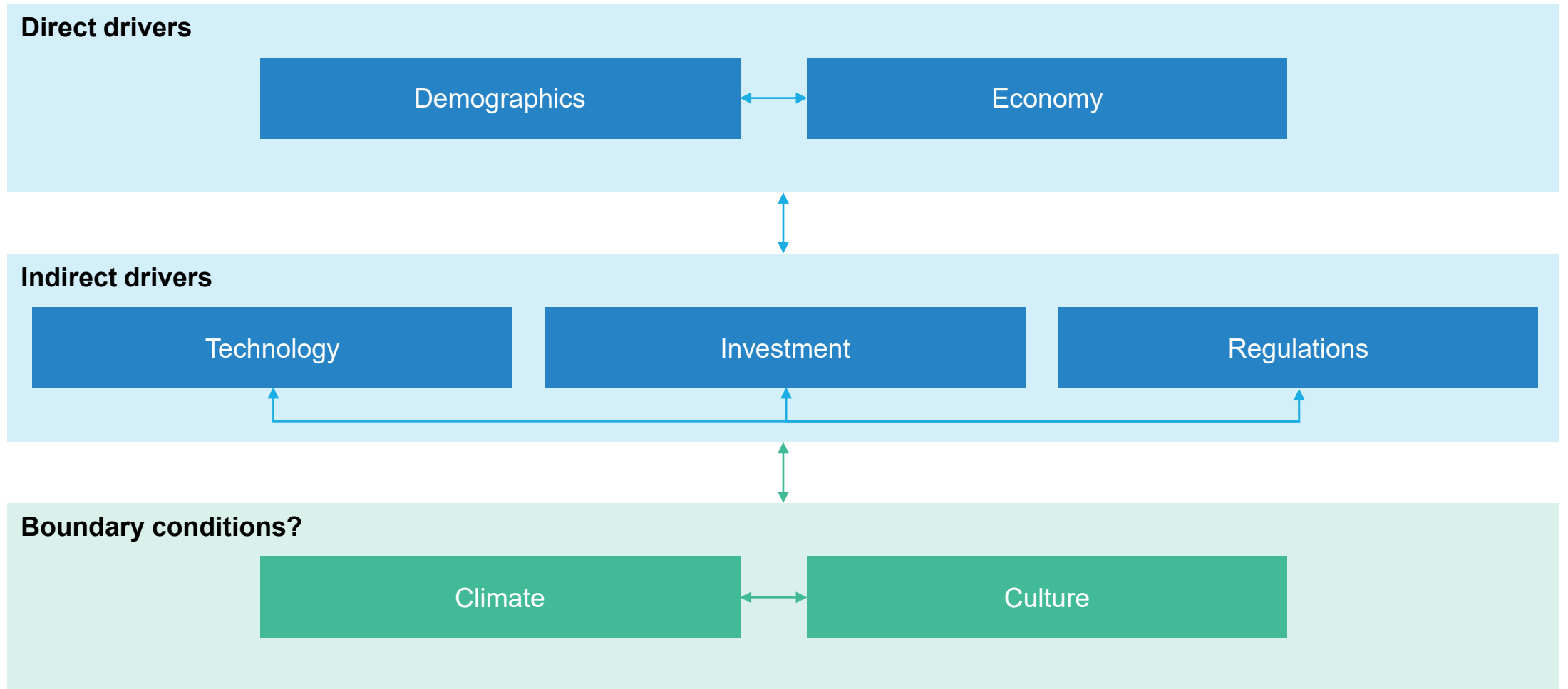
Energy supply by source from 1990 to 2022 – doughnut view



World total final consumption by region (1973-2019) – doughnut view



Energy demand drivers



References

- IEA, Energy Statistics Data Browser
- IEA, Key World Energy Statistics

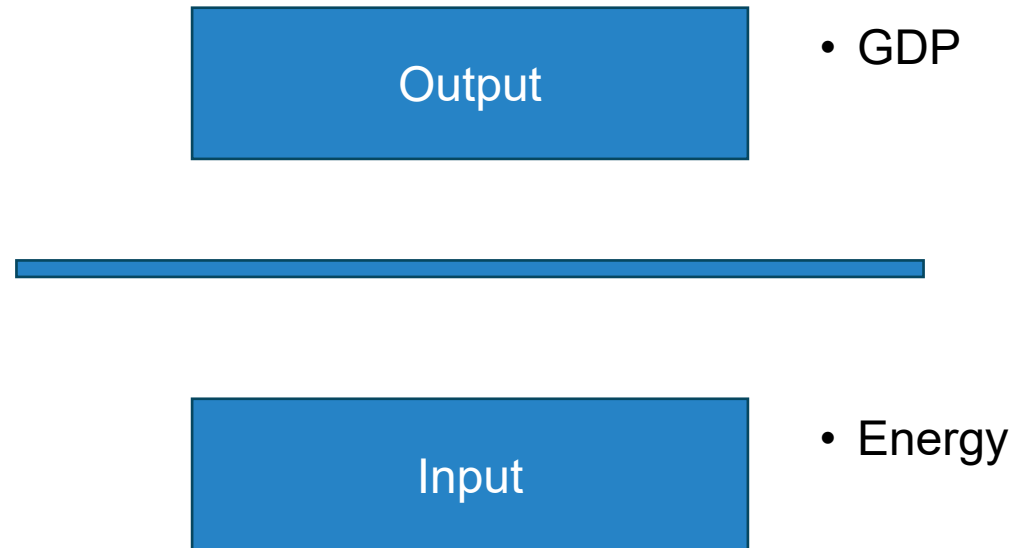
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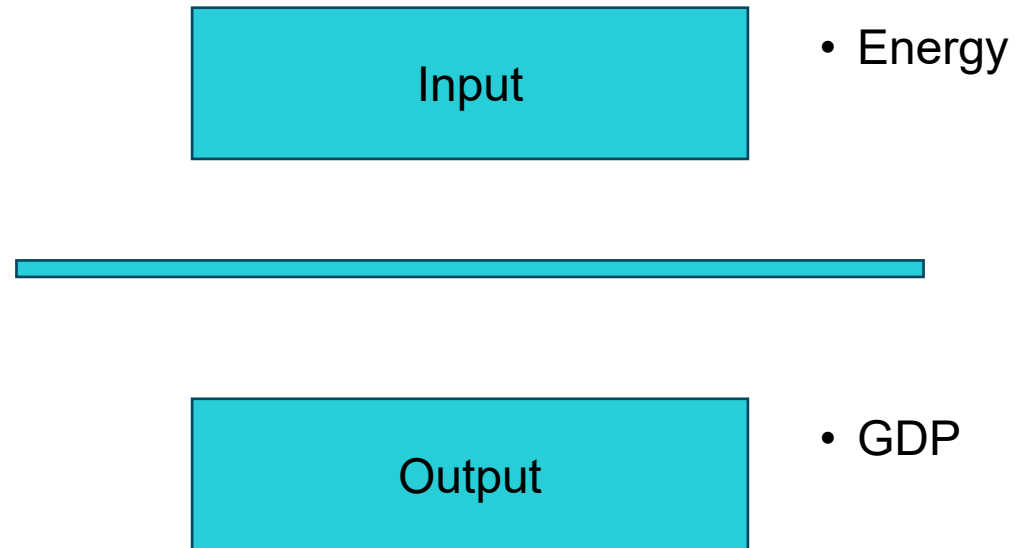


What do you think about energy efficiency in Iran?

Productivity (= efficiency in energy economics)



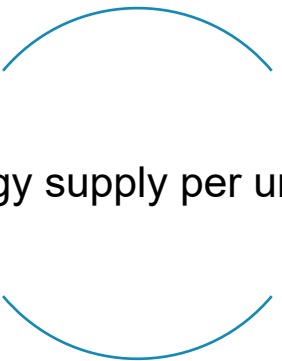
Intensity



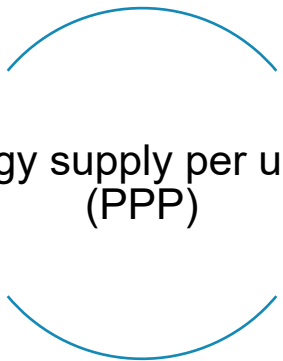
Energy intensity and energy efficiency

- Energy intensity is a proxy to understand how efficiently we use energy
- Energy efficiency is meaningless at aggregate levels – we use it for simplicity and use
- Two items matter: disaggregation at granular level, and other explanatory items considered

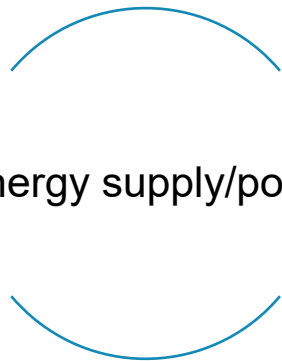
Key energy efficiency metrics



Total energy supply per unit of GDP

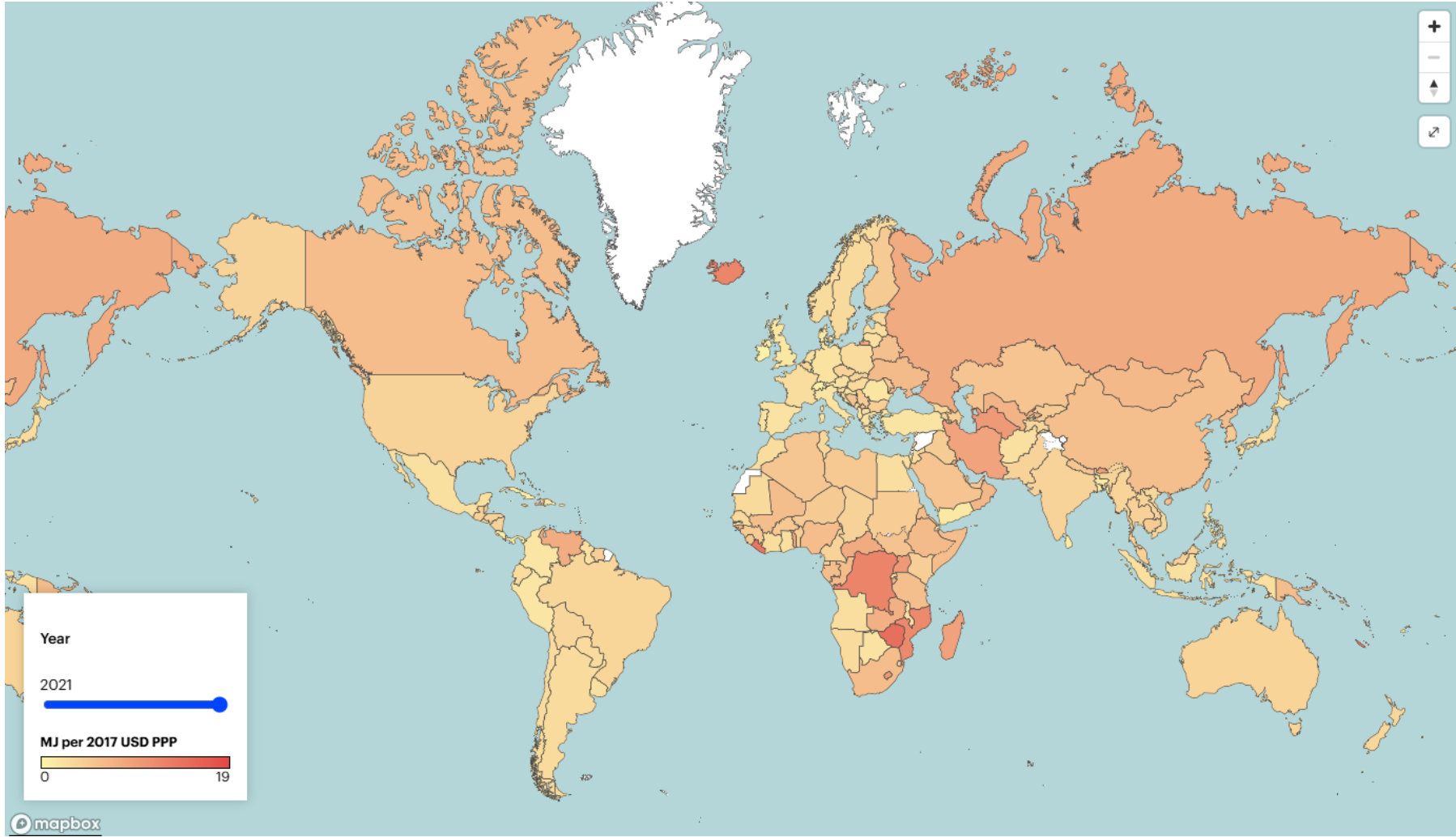


Total energy supply per unit of GDP
(PPP)

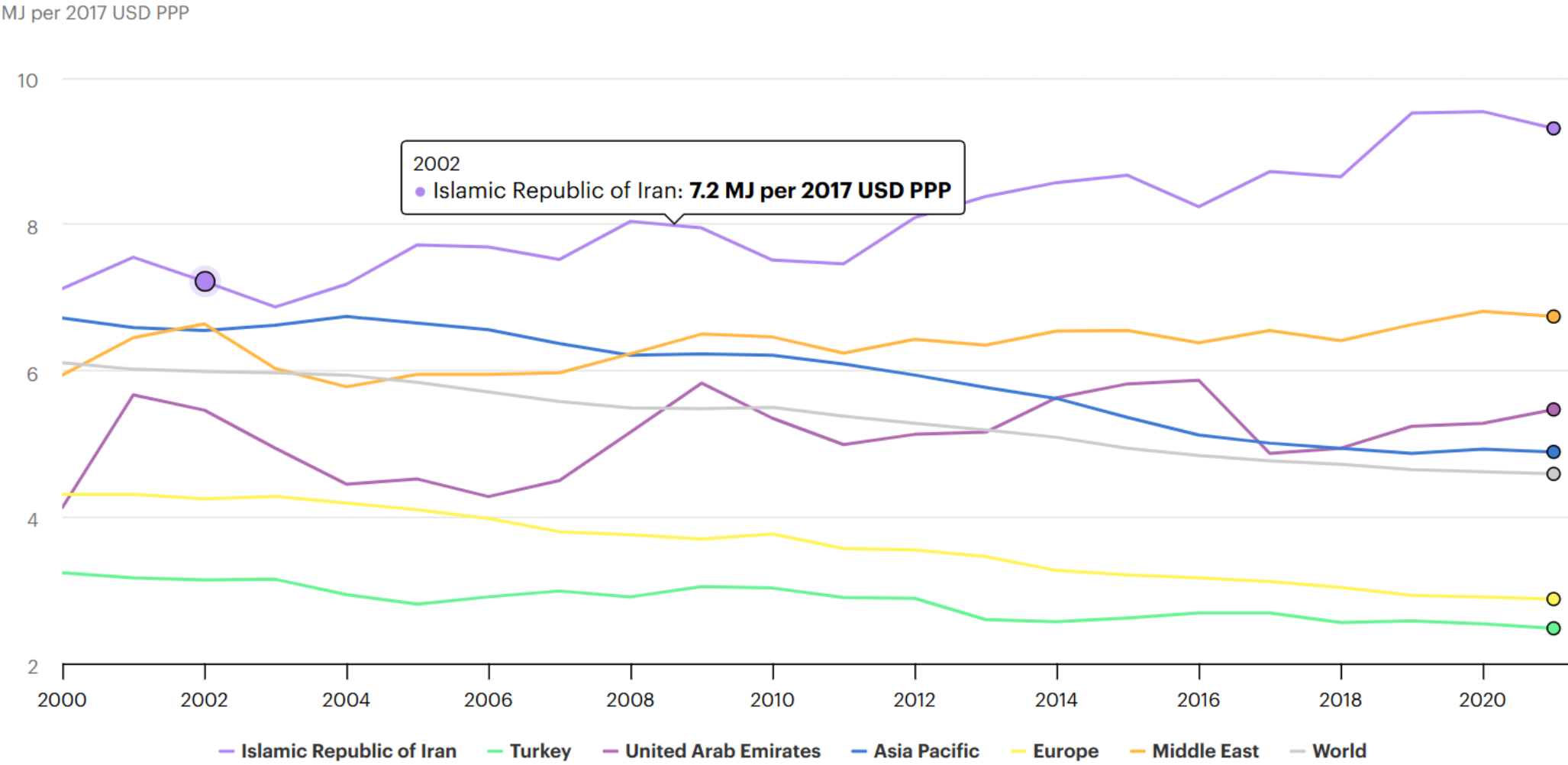


Total energy supply/population

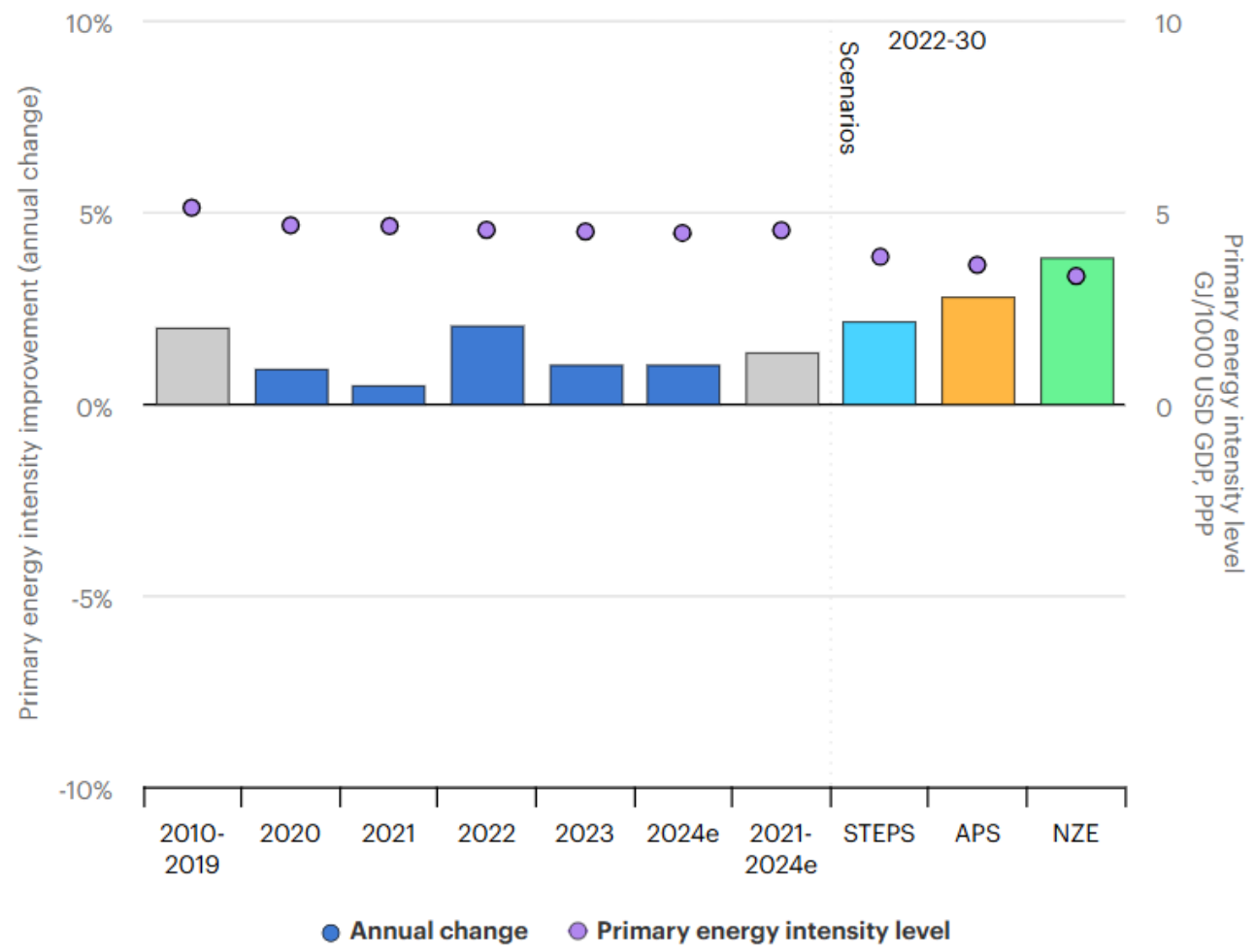
Energy intensity measured in terms of primary energy and GDP



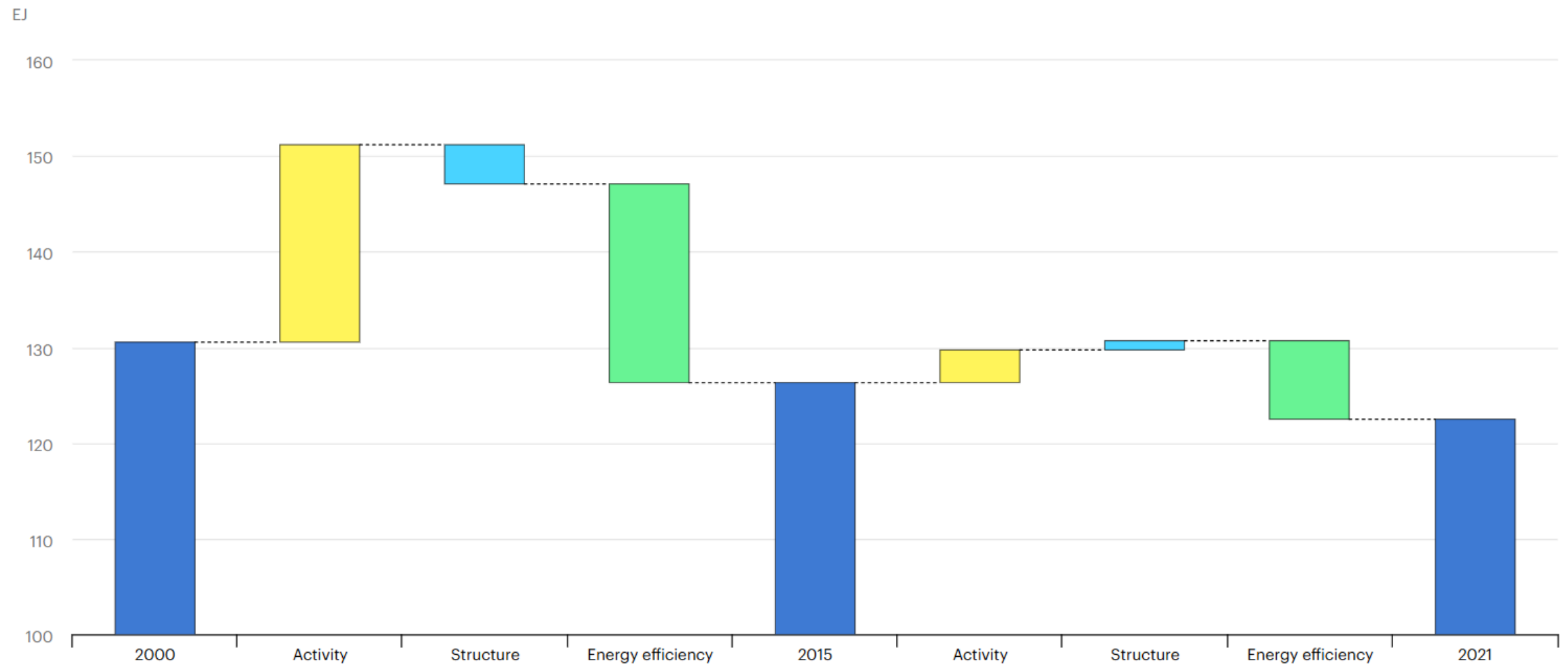
Energy intensity measured in terms of primary energy and GDP



World primary energy intensity, 2010-2024 and scenarios to 2030

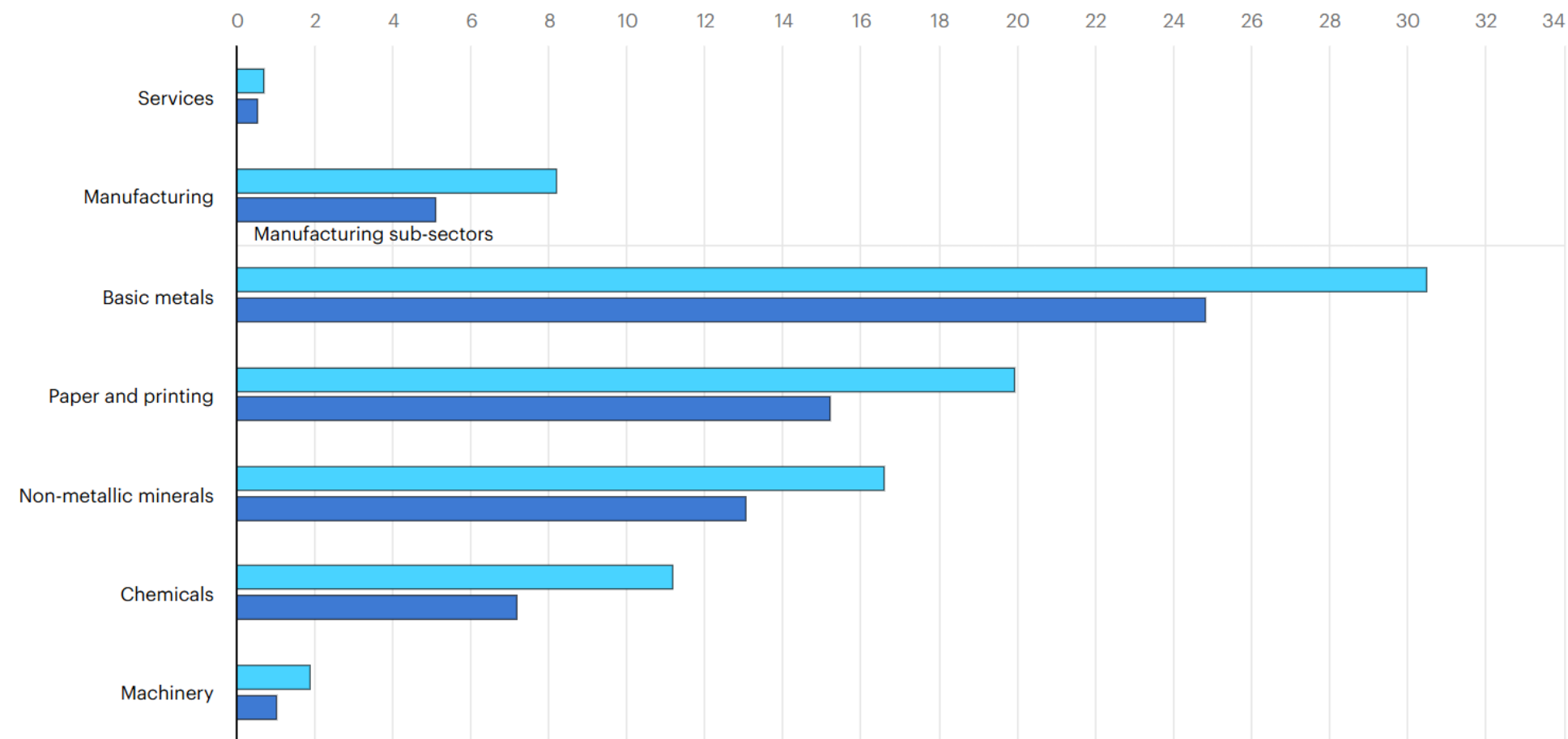


Decomposition of change in IEA countries total final energy use, 2000-2021



Services and manufacturing in selected IEA countries: energy per value added

MJ/2015 USD PPP



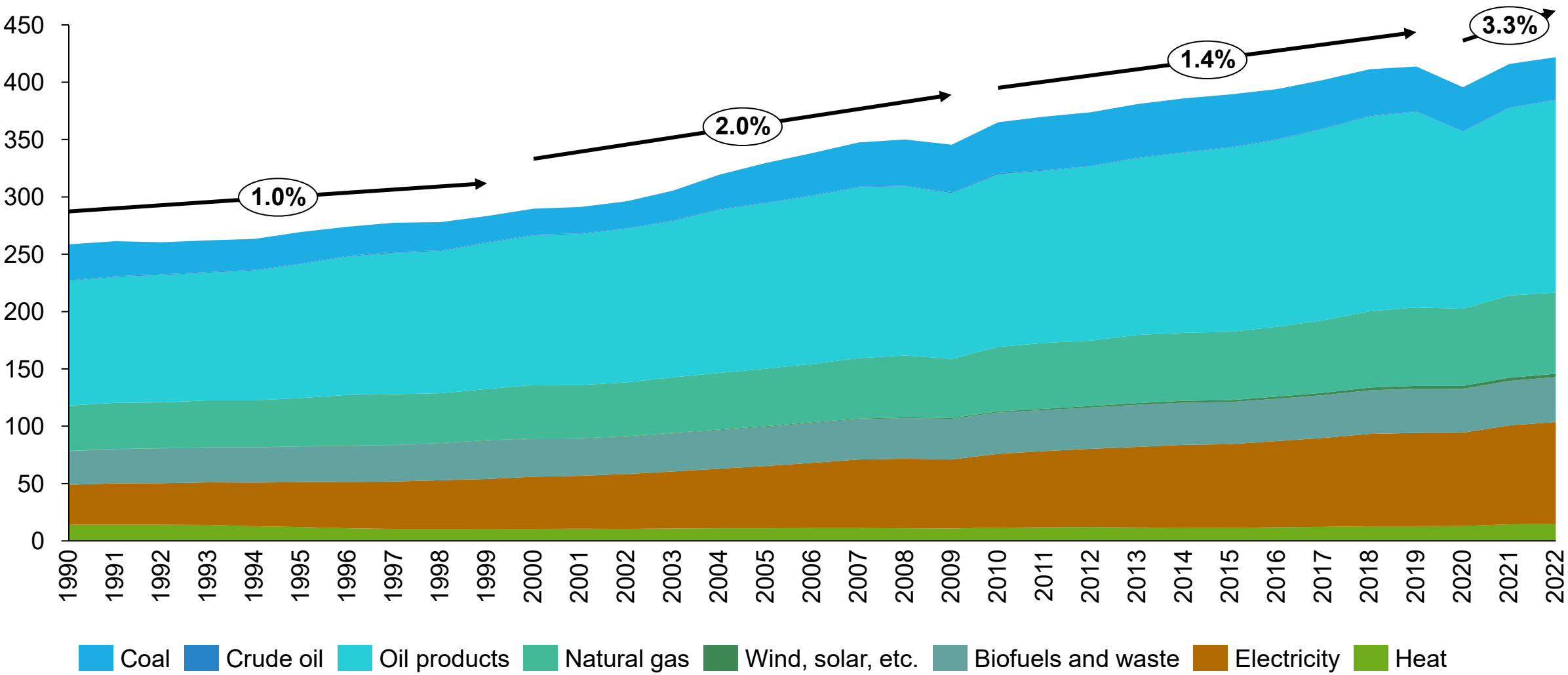
References

- IEA website
- US Department Of Energy
- IEA, Energy intensity

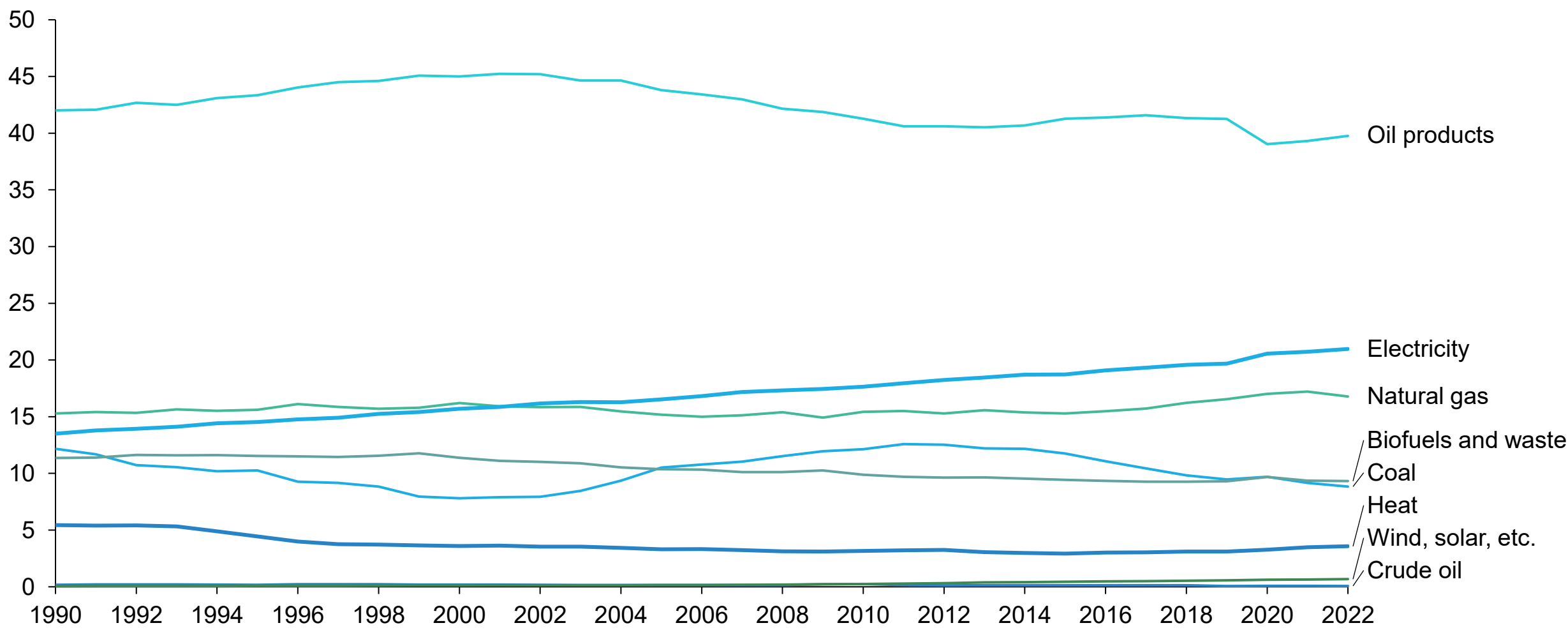
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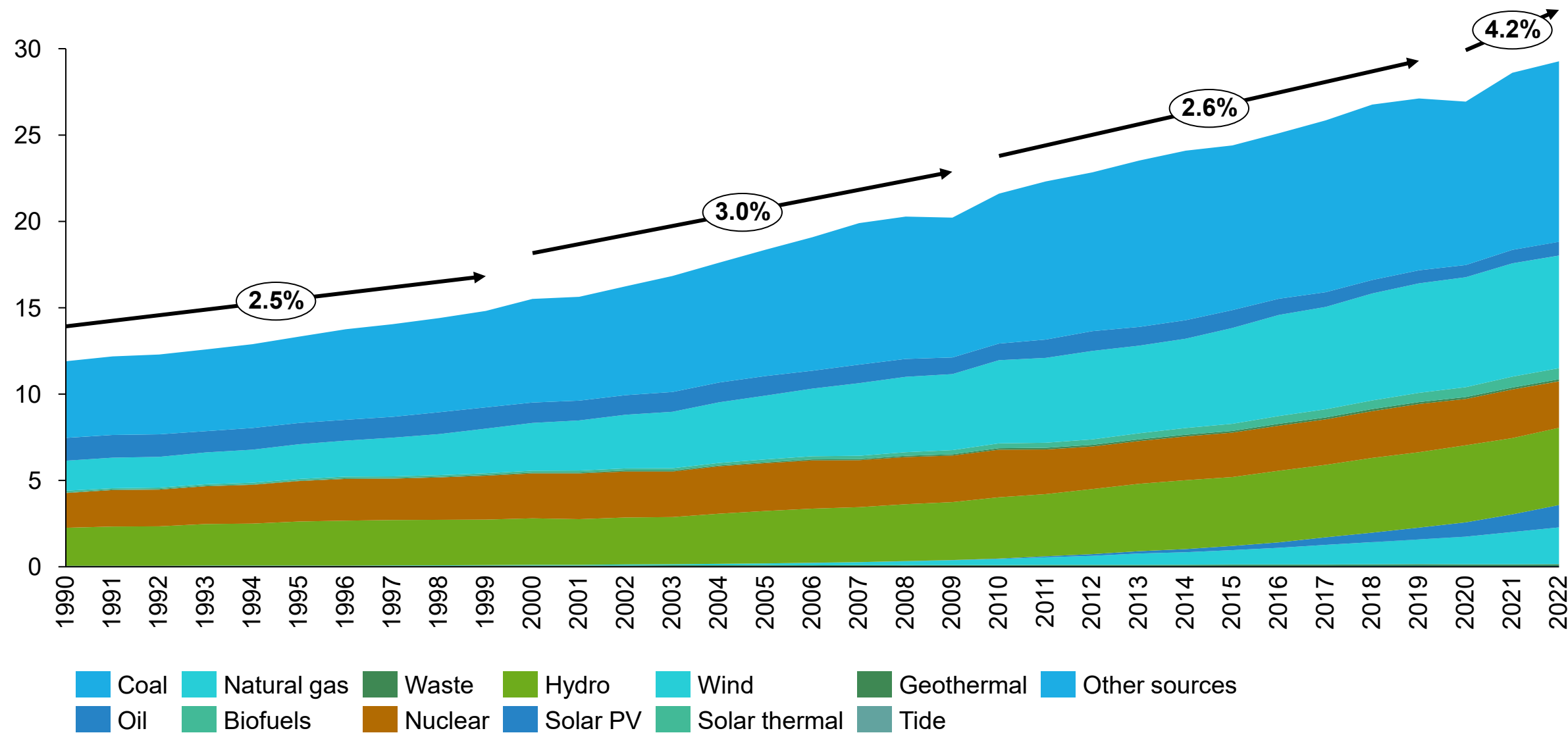
World total final consumption by source (EJ)



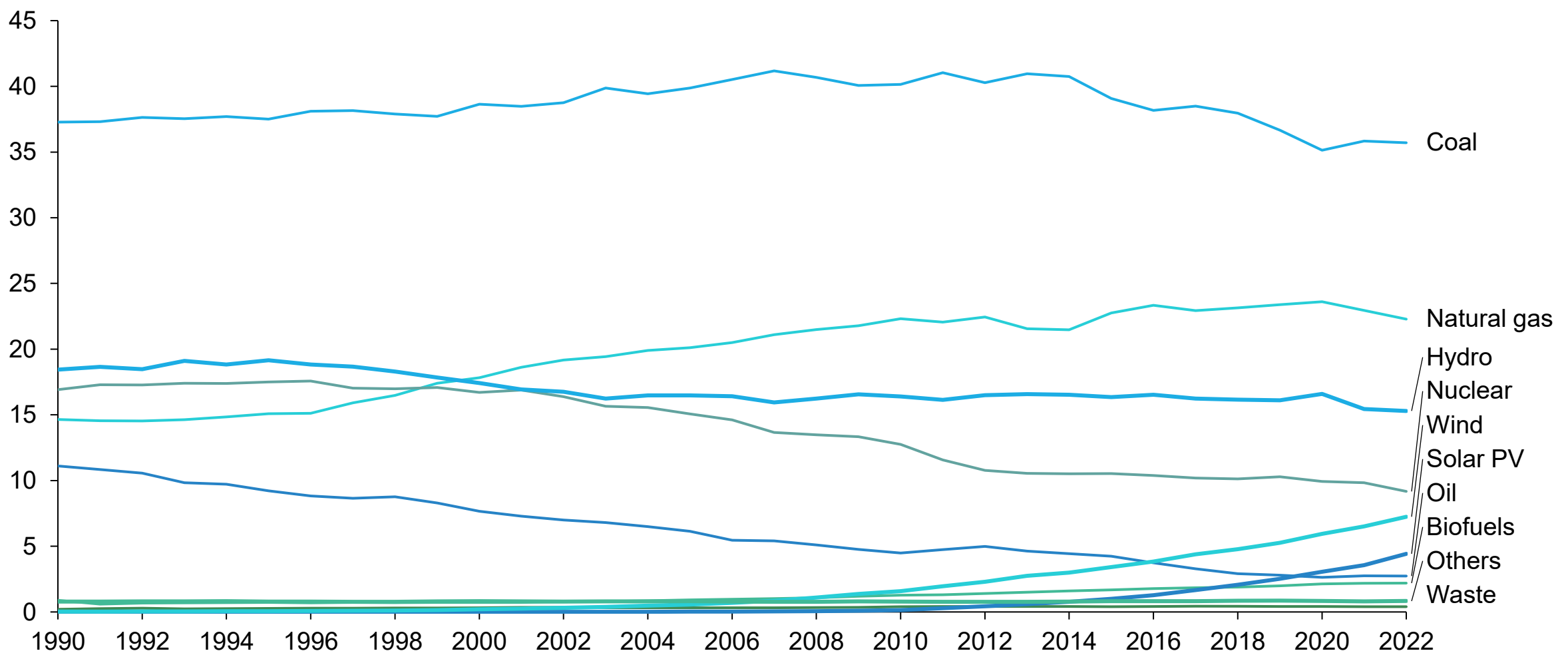
World total final consumption by source (%)



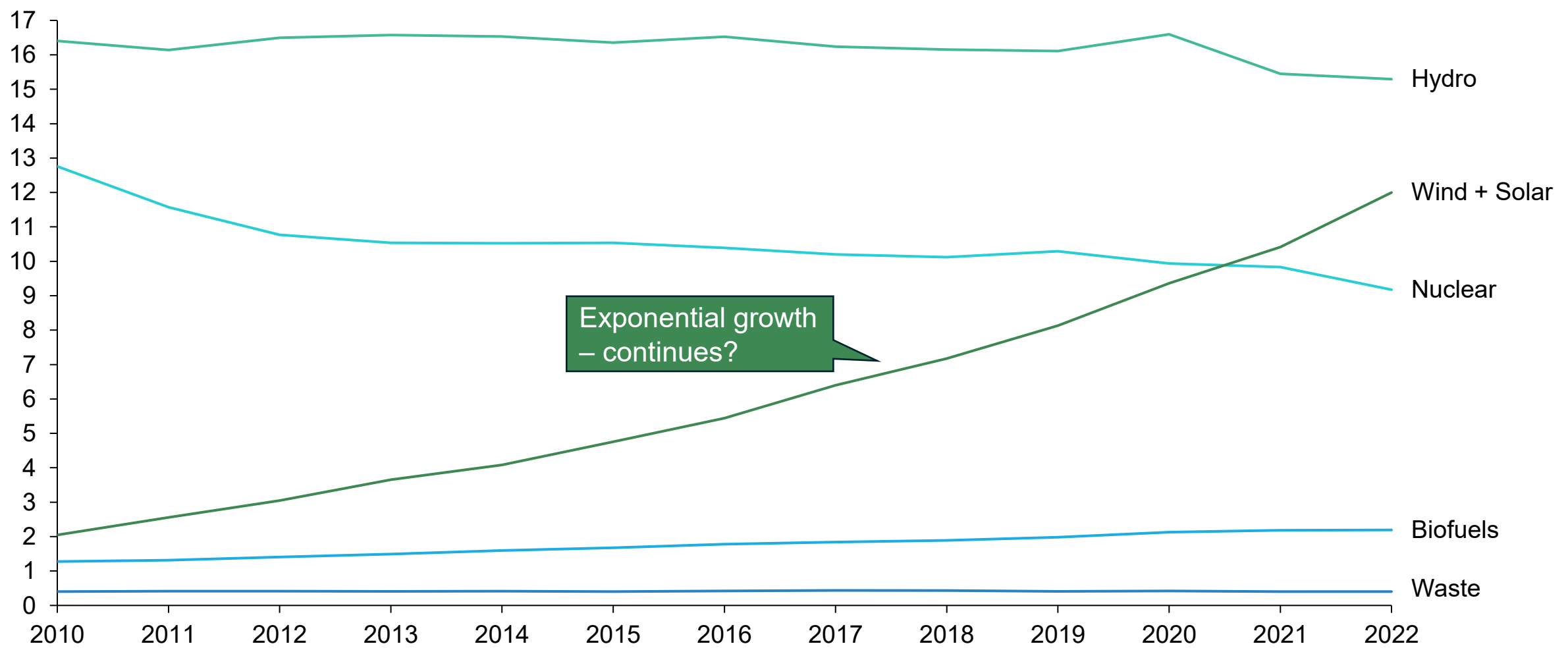
World electricity generation by source (PWh)



World electricity generation by source (%)



World electricity generation by source (%)





Can growth continue?

Renewable electricity generation (TWh) – excluding nuclear



Key metrics to measure electricity cost

Energy value 2.0 (energy value while considering chemical and physical)
Capital expenditures and all other costs

Different metrics for different applications, like energy per volume or weight

Energy value (energy capacity after adjusting for energy, capacity, and flexibility)
Capital expenditures and all other costs

Value-adjusted levelized cost of electricity (VALCOE)
\$/KWh

Energy capacity (energy capacity multiplied by capacity factor)
Capital expenditures and all other costs

Levelized cost of electricity (LCOE)
\$/KWh

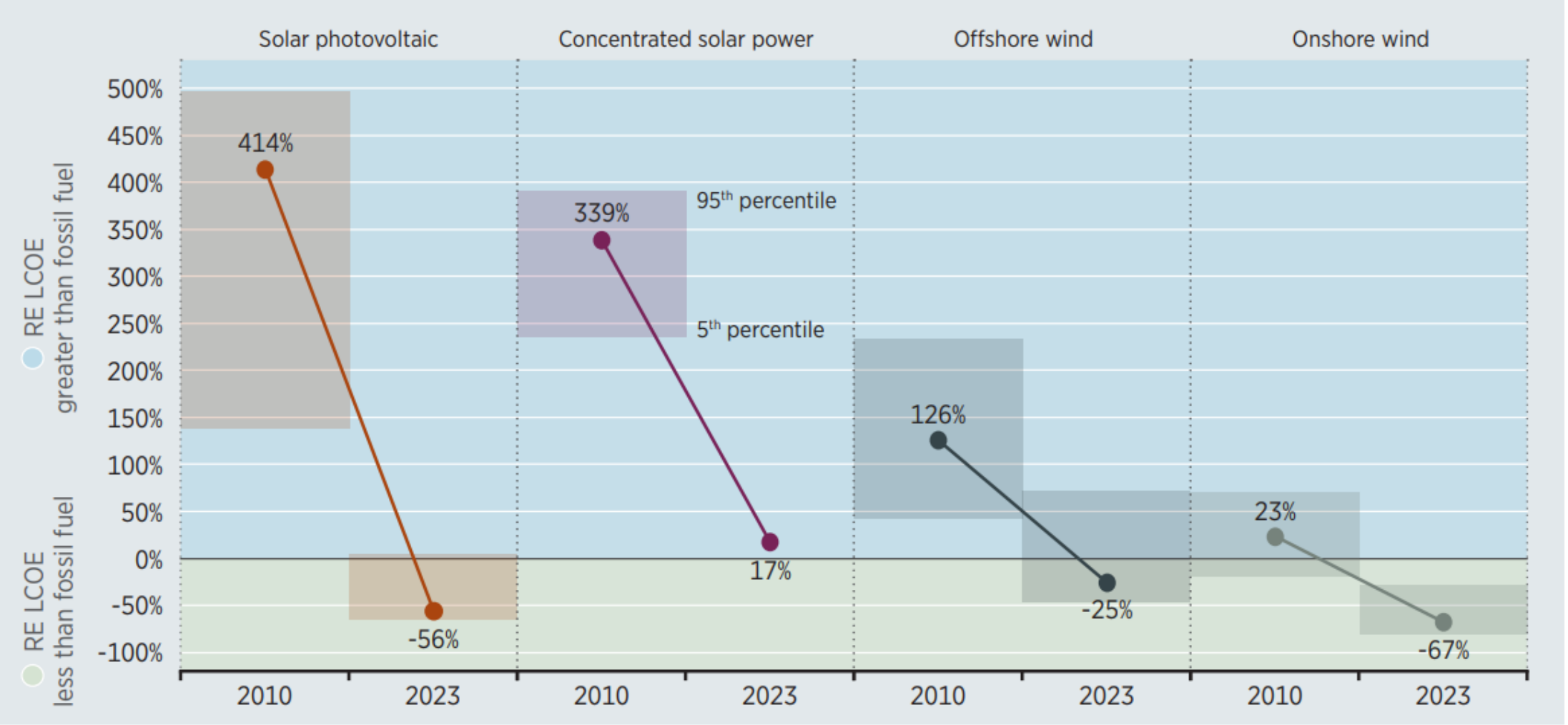
Power capacity
Capital expenditures

CAPEX
\$/KW

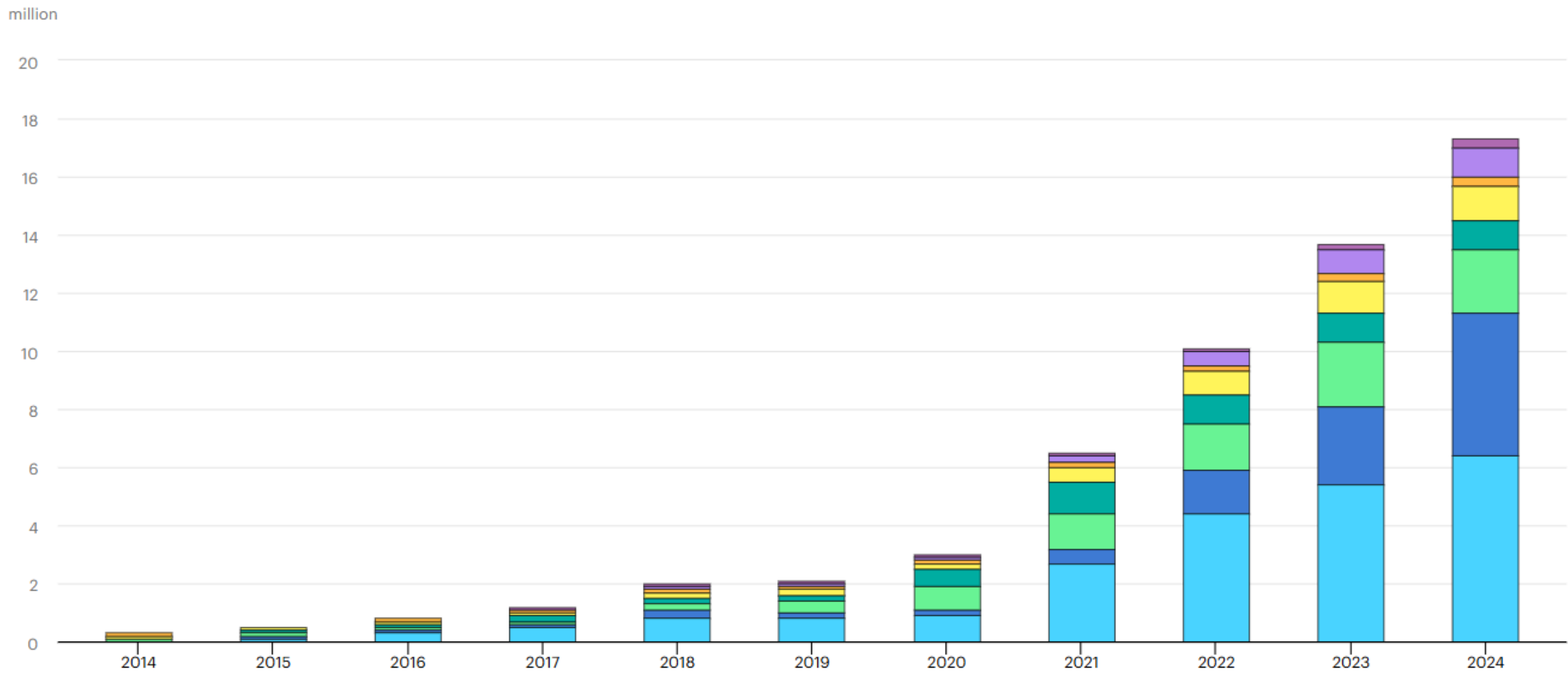
Total installed cost, capacity factor and LCOE trends by technology

	Total installed costs			Capacity factor			Levelised cost of electricity		
	(2023 USD/kW)			(%)			(2023 USD/kWh)		
	2010	2023	Percent change	2010	2023	Percent change	2010	2023	Percent change
Bioenergy	3 010	2 730	-9%	72	72	0%	0.084	0.072	-14%
Geothermal	3 011	4 589	52%	87	82	-6%	0.054	0.071	31%
Hydropower	1 459	2 806	92%	44	53	20%	0.043	0.057	33%
Solar PV	5 310	758	-86%	14	16	14%	0.460	0.044	-90%
CSP	10 453	6 589	-37%	30	55	83%	0.393	0.117	-70%
Onshore wind	2 272	1 160	-49%	27	36	33%	0.111	0.033	-70%
Offshore wind	5 409	2 800	-48%	38	41	8%	0.203	0.075	-63%

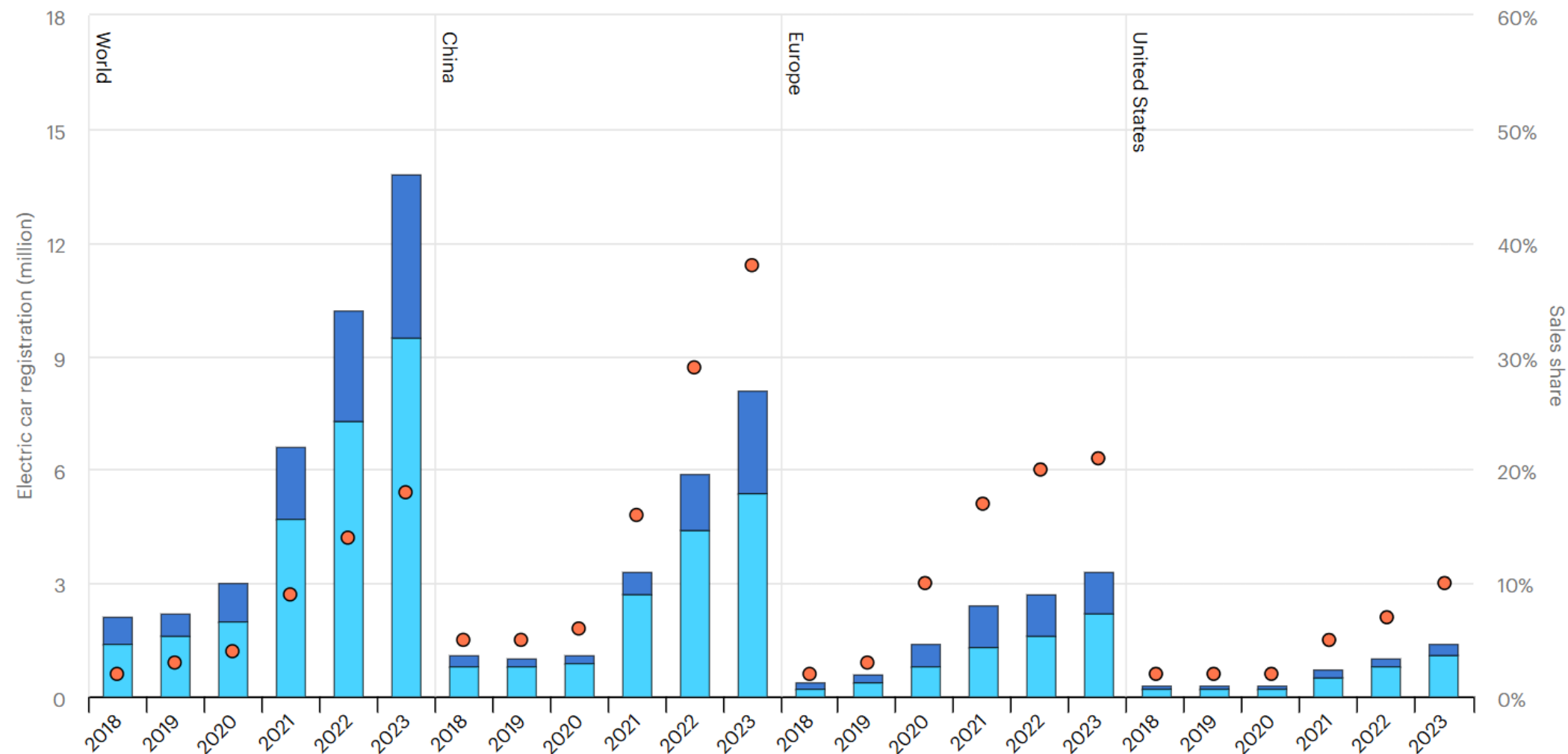
Global weighted average LCOE



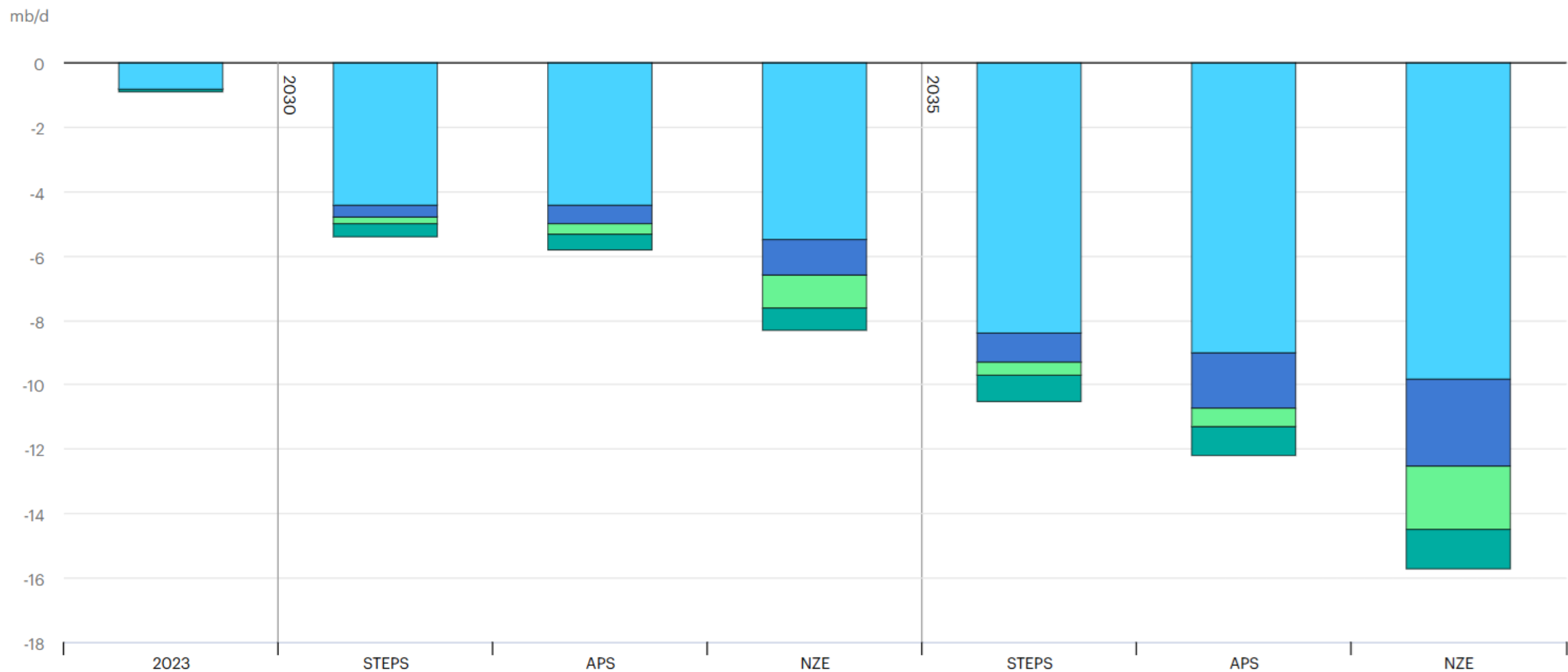
Global electric car sales



Electric car registrations and sales share



Oil displacement by mode (2023-2035)



IEA Total Cost of Ownership Tool

Country/Region

Custom

Year

Today

Annual driving distance

10000 km/year

Vehicle type

Medium car

Fuel-powertrain ?

Vehicle 1

Battery electric

Vehicle 2

Petrol

Purchase costs ?

Home charging installation

Yes No

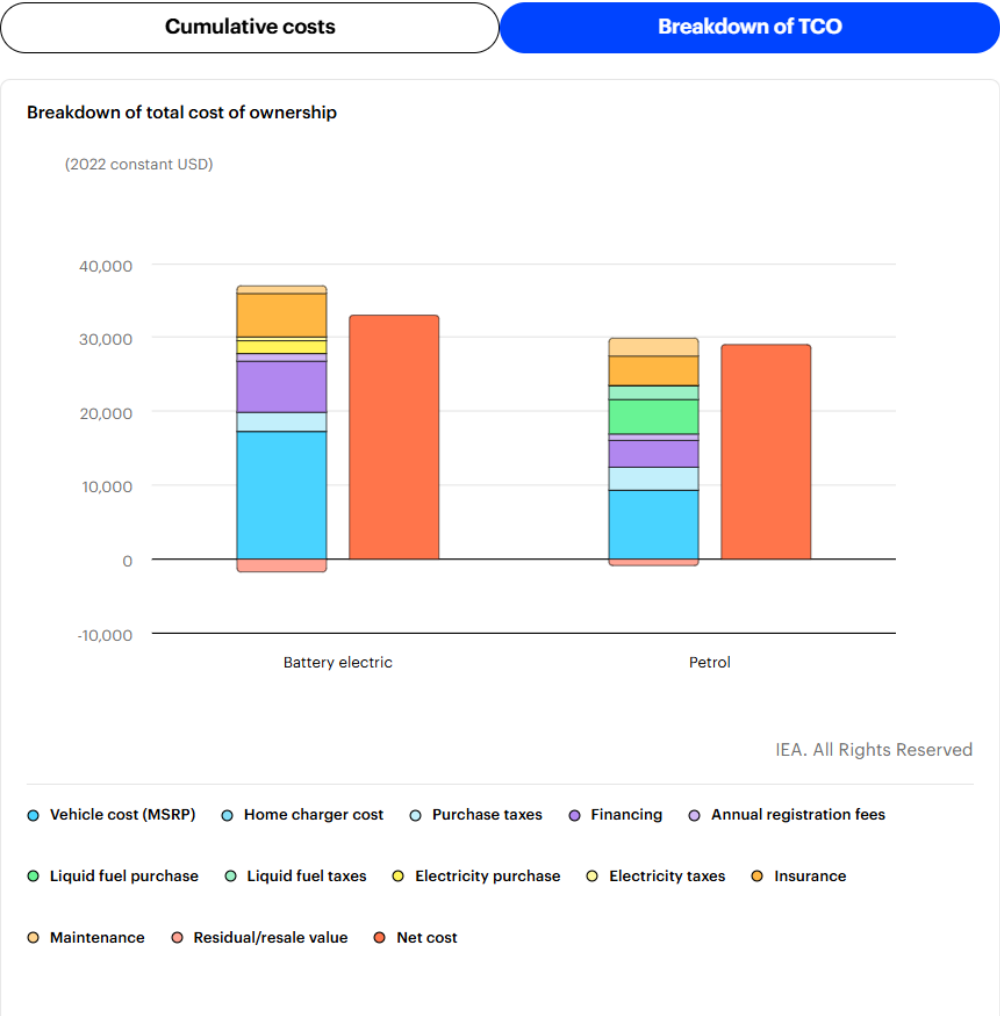
Operating costs ?

Electricity day cost (inc. tax)

0.16 USD/kWh

Fuel cost (inc. tax)

1.00 USD/L



References

- IEA, Energy Statistics Data Browser
- IEA, Global EV Outlook 2025
- IRENA, Renewable Power Generation Costs in 2024

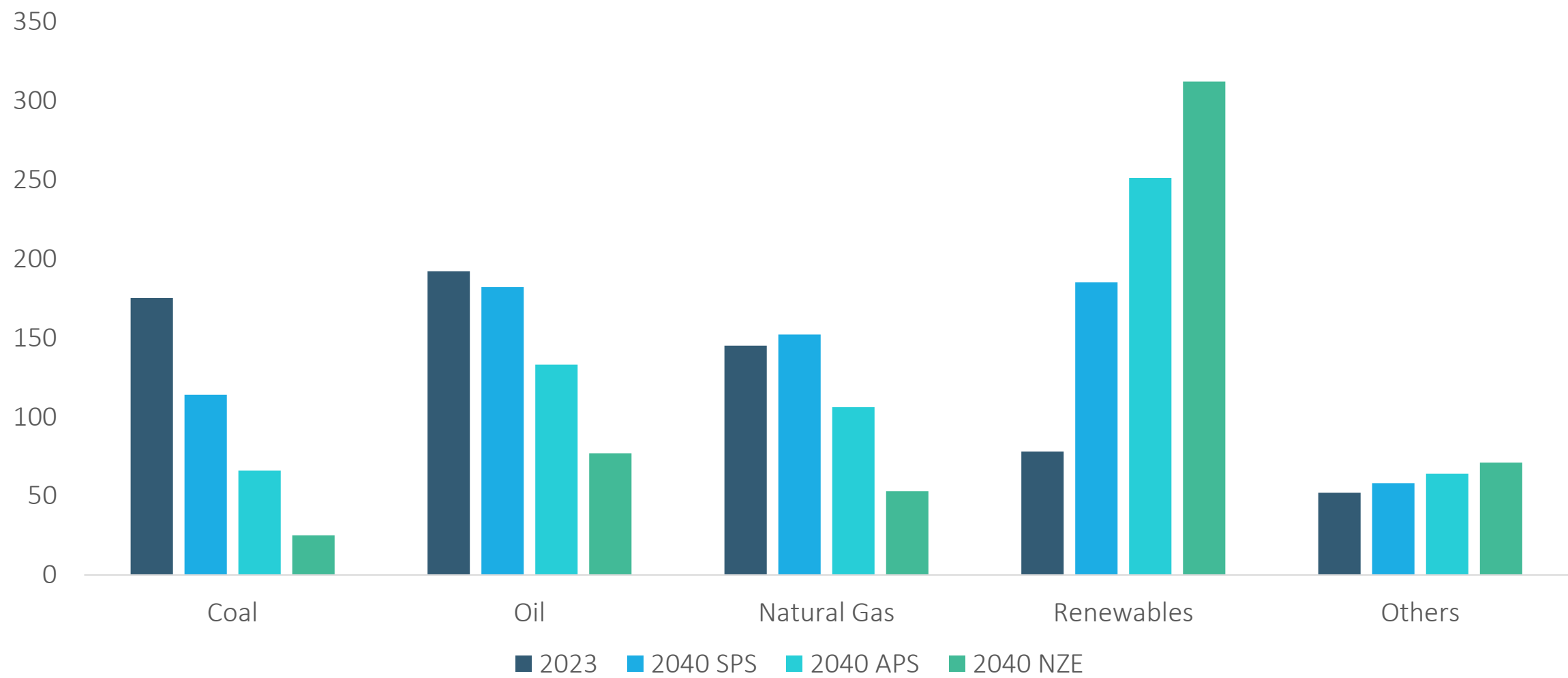
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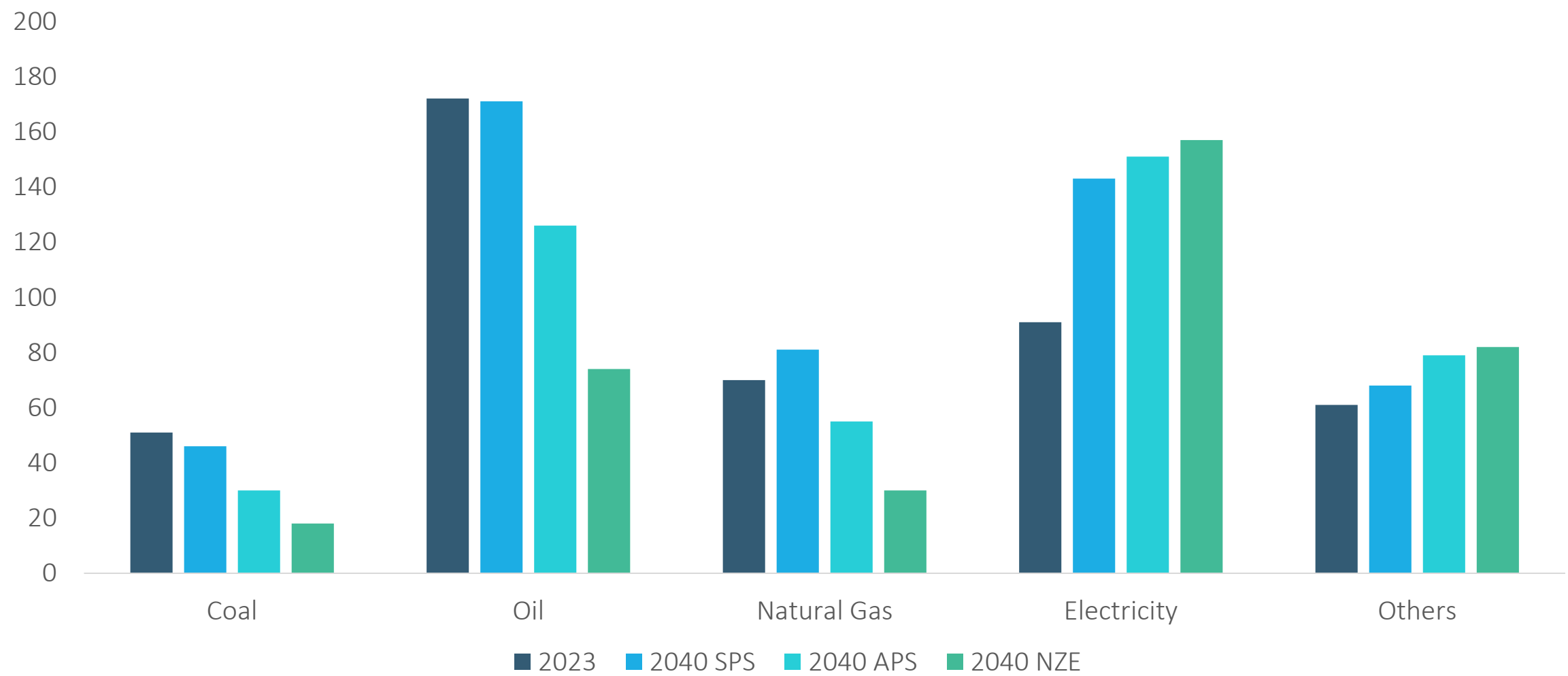
Any reflections?



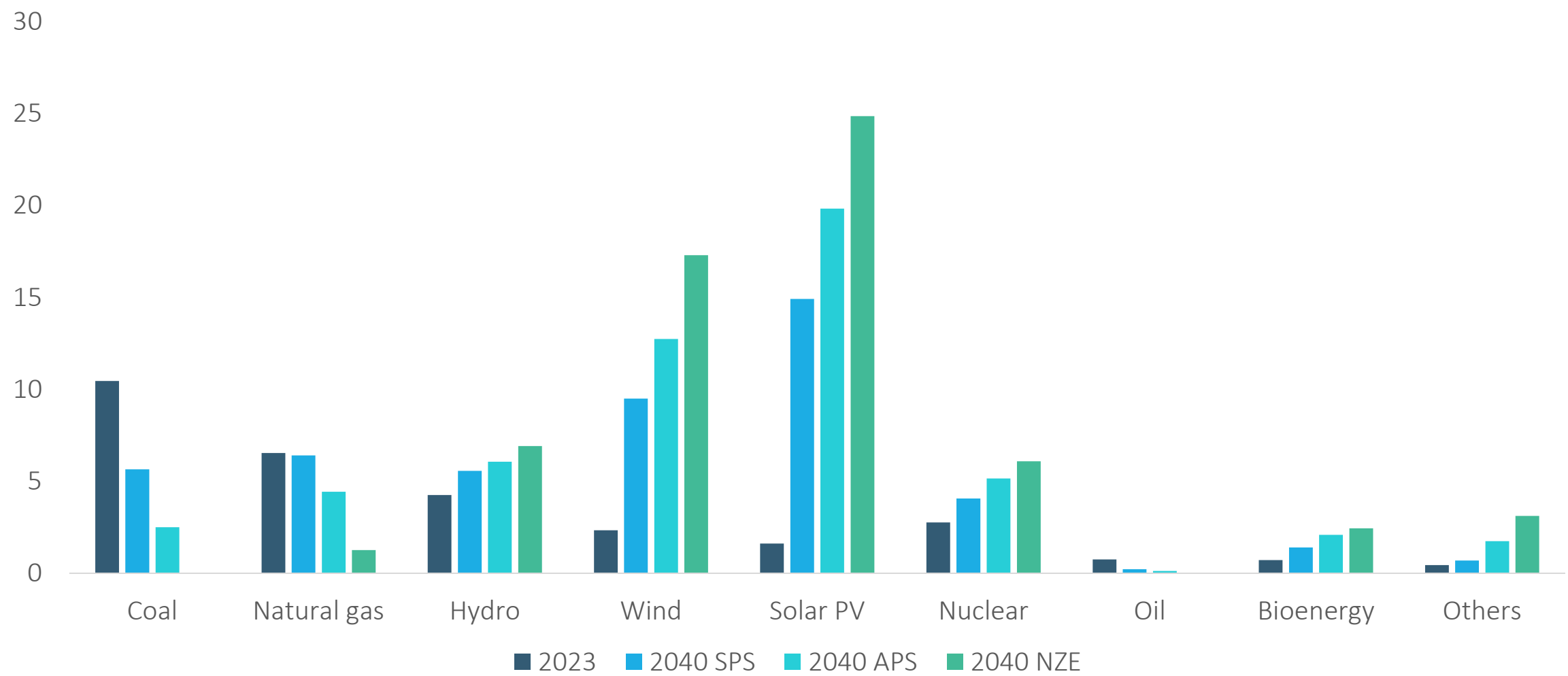
World total energy supply (EJ)



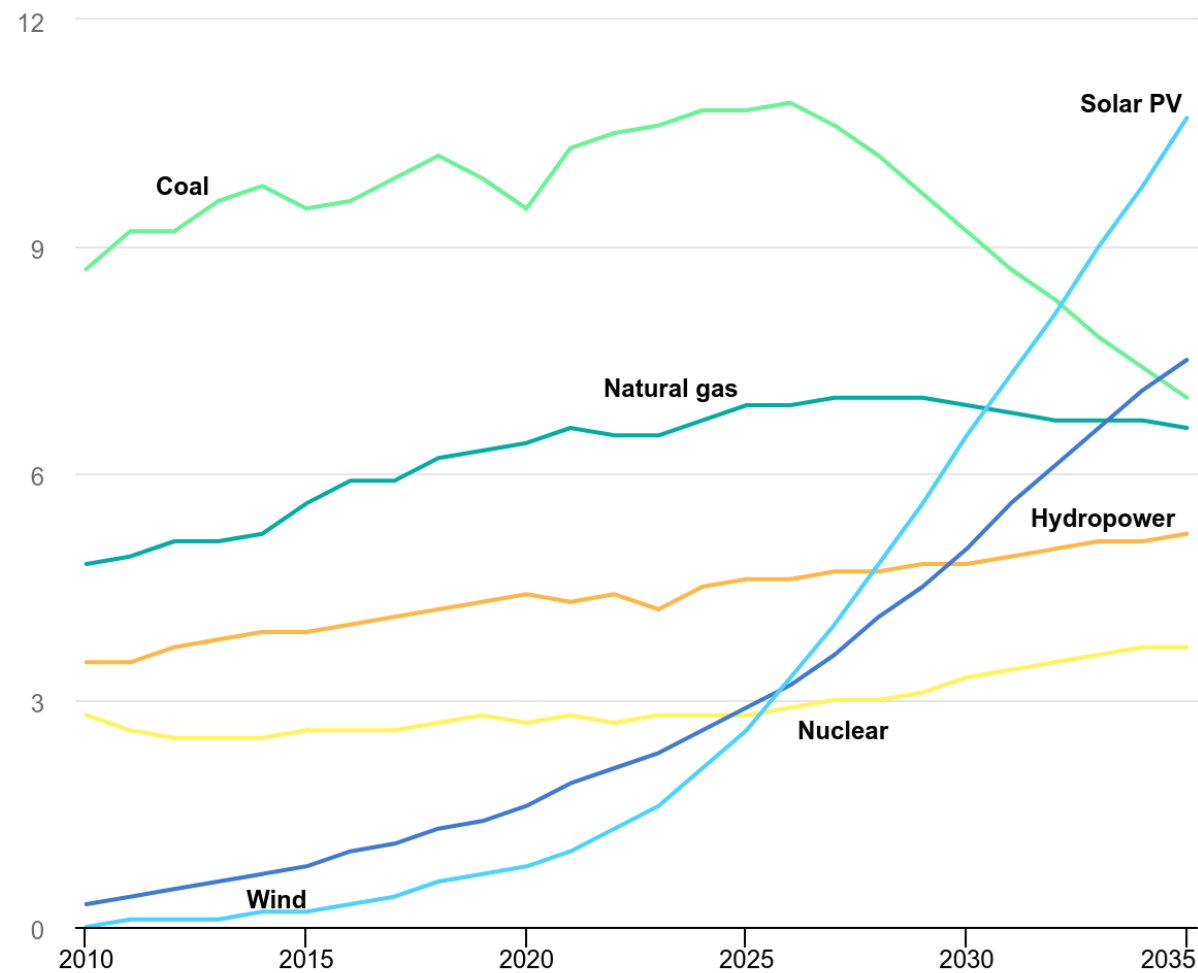
World total final consumption (EJ)



World electricity generation (PWh)



World electricity generation in the SPS



References

- IEA, World Energy Outlook 2024

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Let's ask ChatGPT...

ChatGPT 5 Instant ▾

اثر گلخانه‌ای چیست؟

اثر گلخانه‌ای پدیده‌ای طبیعی در جو زمین است که باعث گرم ماندن دمای سطح زمین می‌شود.

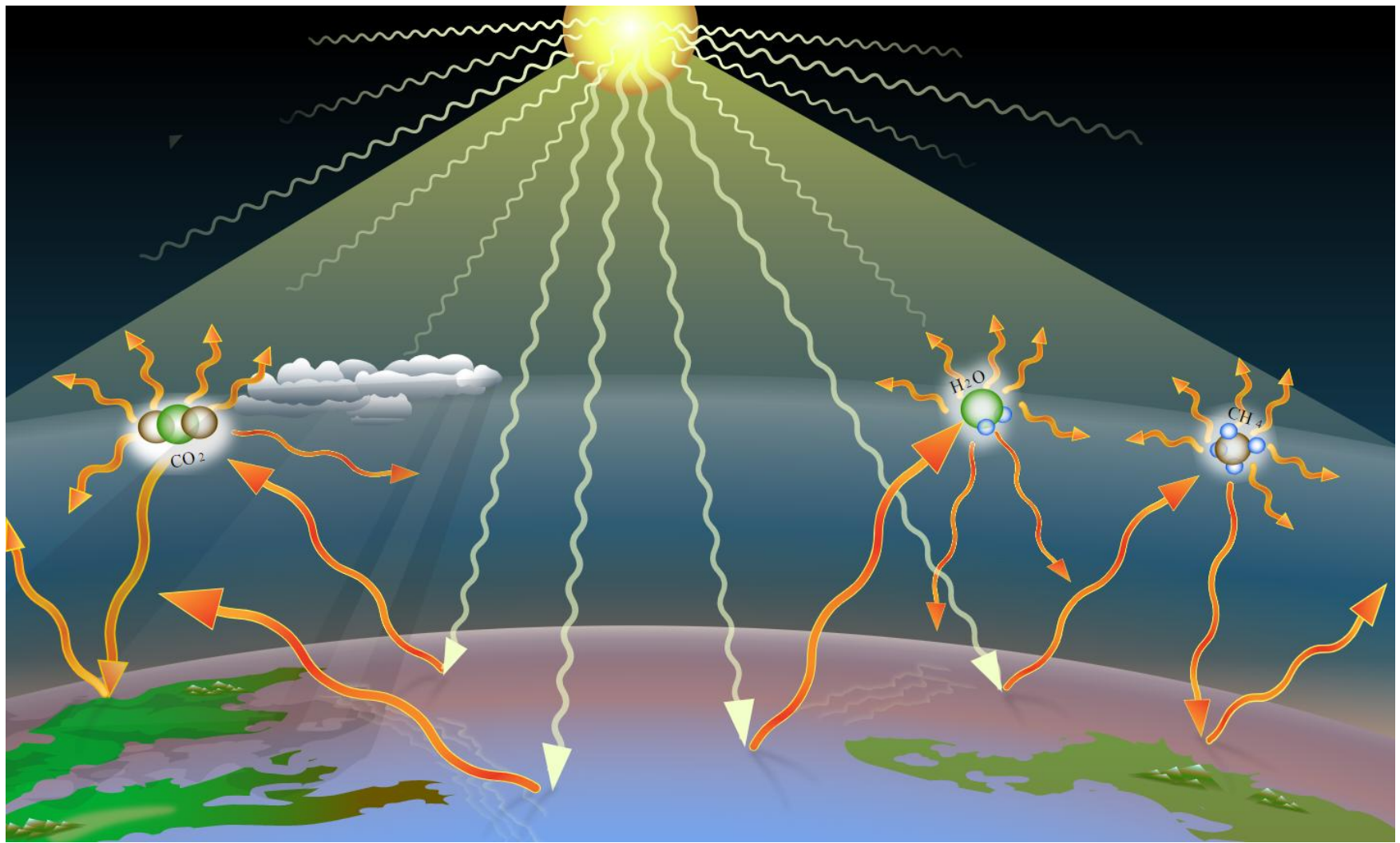
🌞 روند به طور ساده:

1. نور خورشید (به‌ویژه پرتوهای مرئی) به زمین می‌رسد.
2. سطح زمین بخشی از این انرژی را جذب کرده و گرم می‌شود.
3. زمین انرژی جذب‌شده را به صورت تابش فروسرخ (مادون قرمز) دوباره به فضا می‌فرستد.
4. گازهای گلخانه‌ای (مانند دی‌اکسید کربن، بخار آب، متان و اکسید نیتروژن) بخشی از این تابش فروسرخ را جذب کرده و دوباره به همه جهات – از جمله به سمت سطح زمین – بازتاب می‌دهند.
5. این بازتاب باعث می‌شود گرما در جو زمین نگه داشته شود و دمای سطح زمین بالاتر برود.

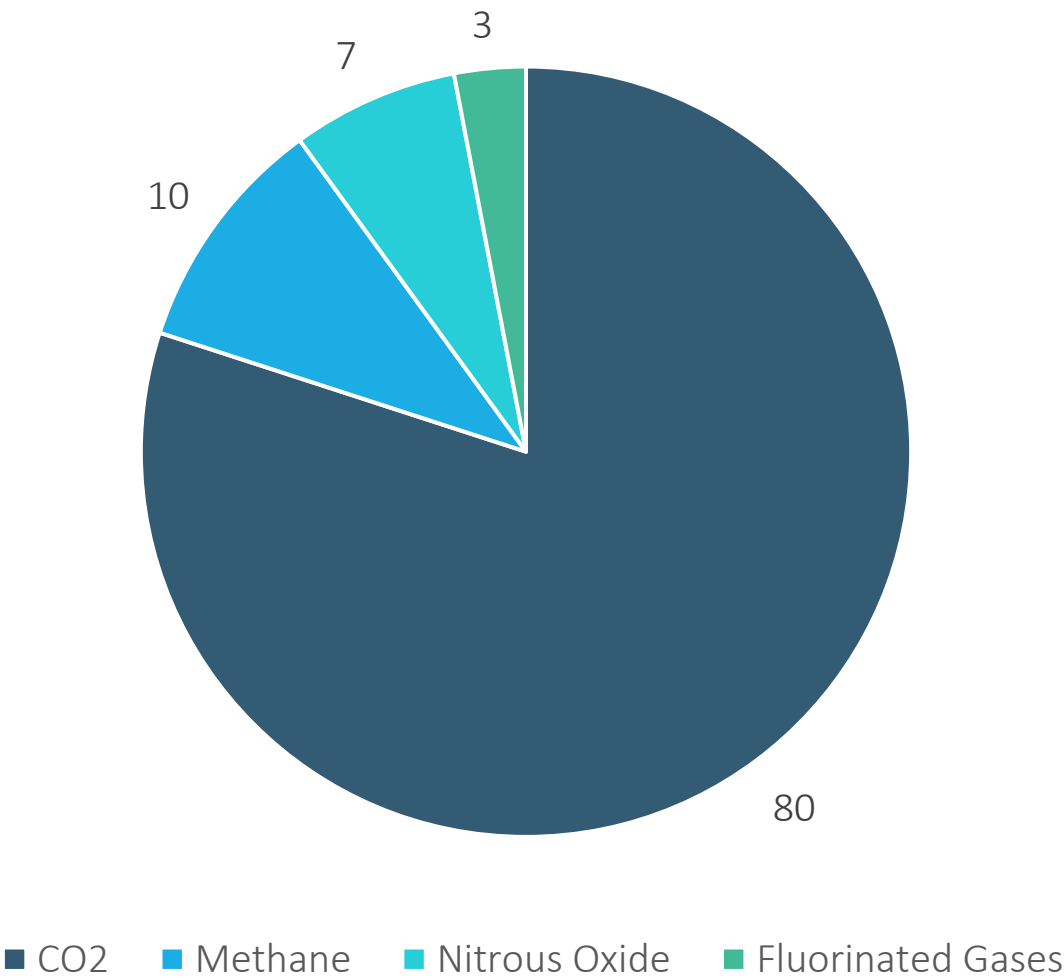
🌍 اهمیت:

- بدون اثر گلخانه‌ای، دمای متوسط زمین حدود 18°C - سانتی‌گراد می‌بود و حیات پیچیده امکان‌پذیر نمی‌شد.
- اما افزایش بیش از حد گازهای گلخانه‌ای (ناشی از فعالیت‌های انسانی مثل سوختن سوخت‌های فسیلی، جنگل‌زدایی و کشاورزی صنعتی) باعث گرمایش جهانی و تغییرات اقلیمی می‌شود.

Greenhouse effect

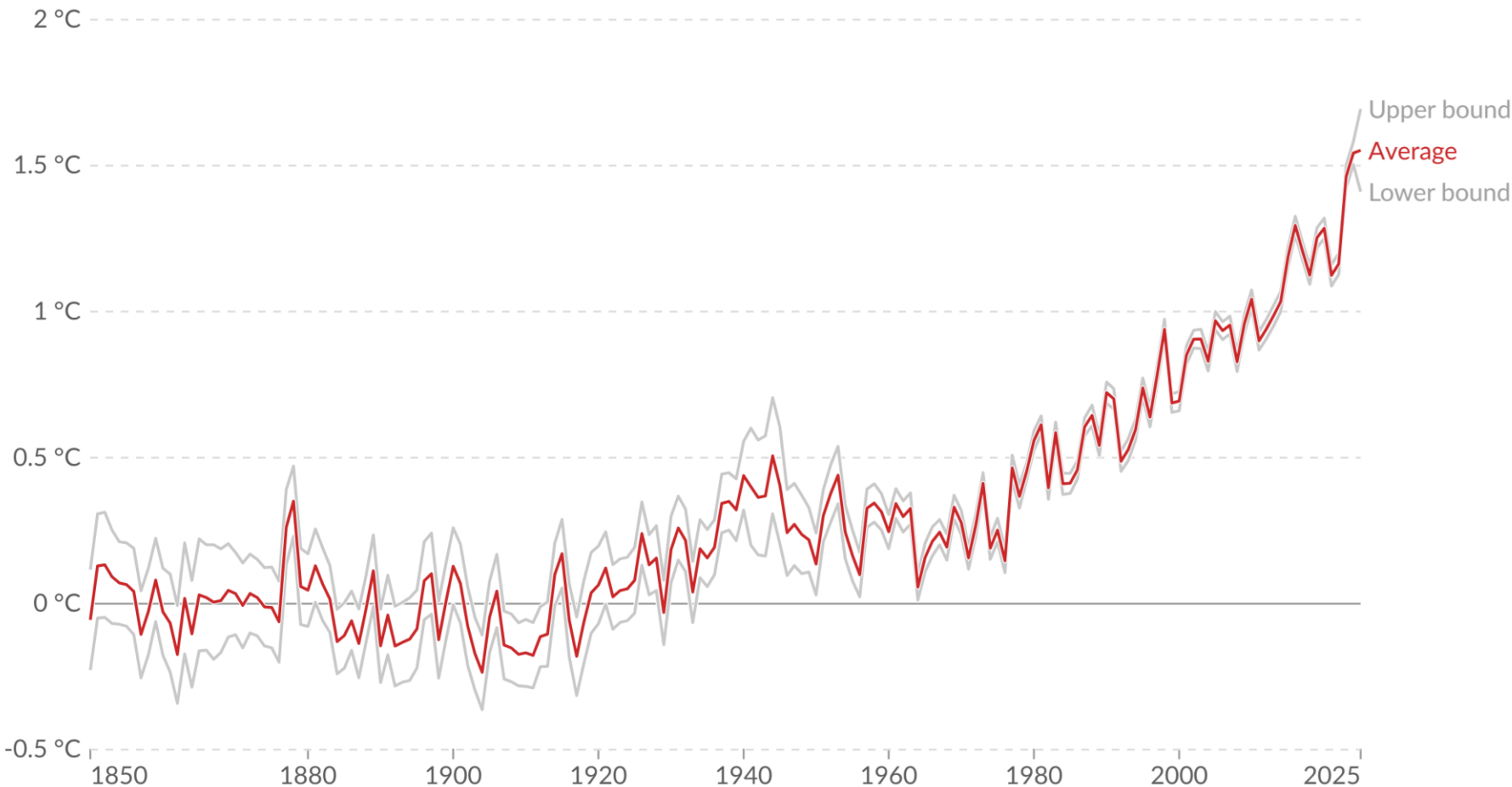


GHG emissions

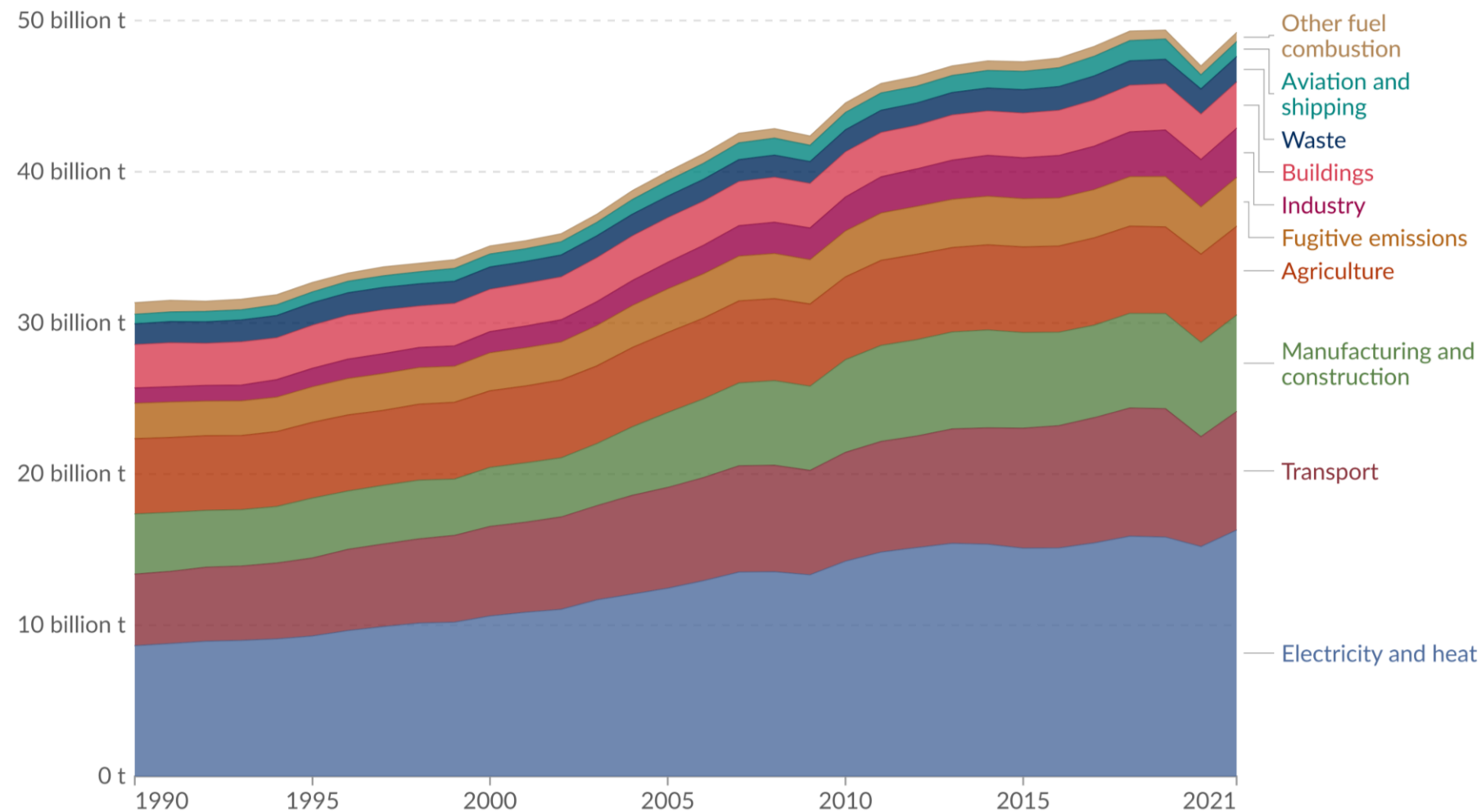


Average temperature anomaly (global)

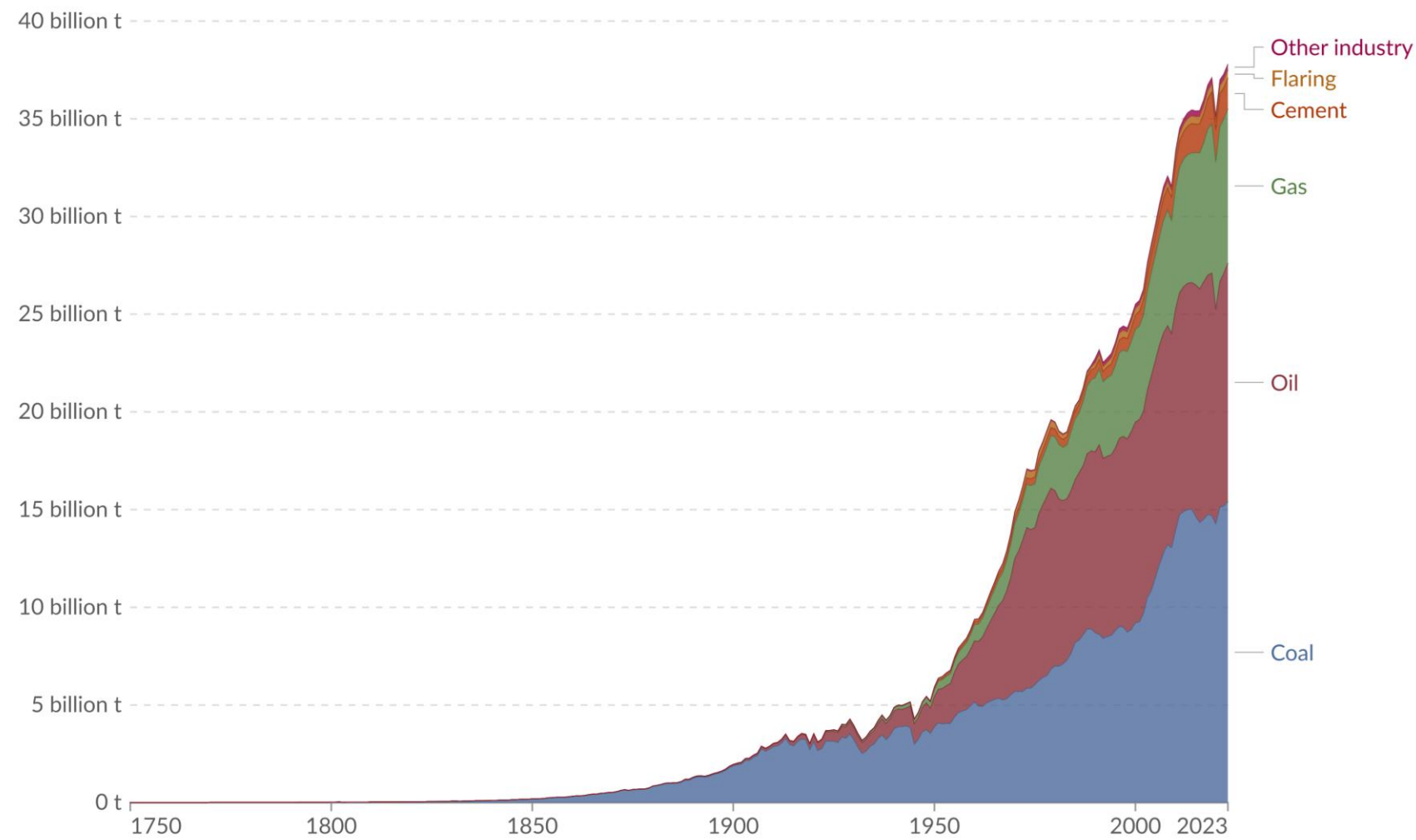
The difference in average land-sea surface temperature compared to the 1861-1890 mean, in degrees Celsius.



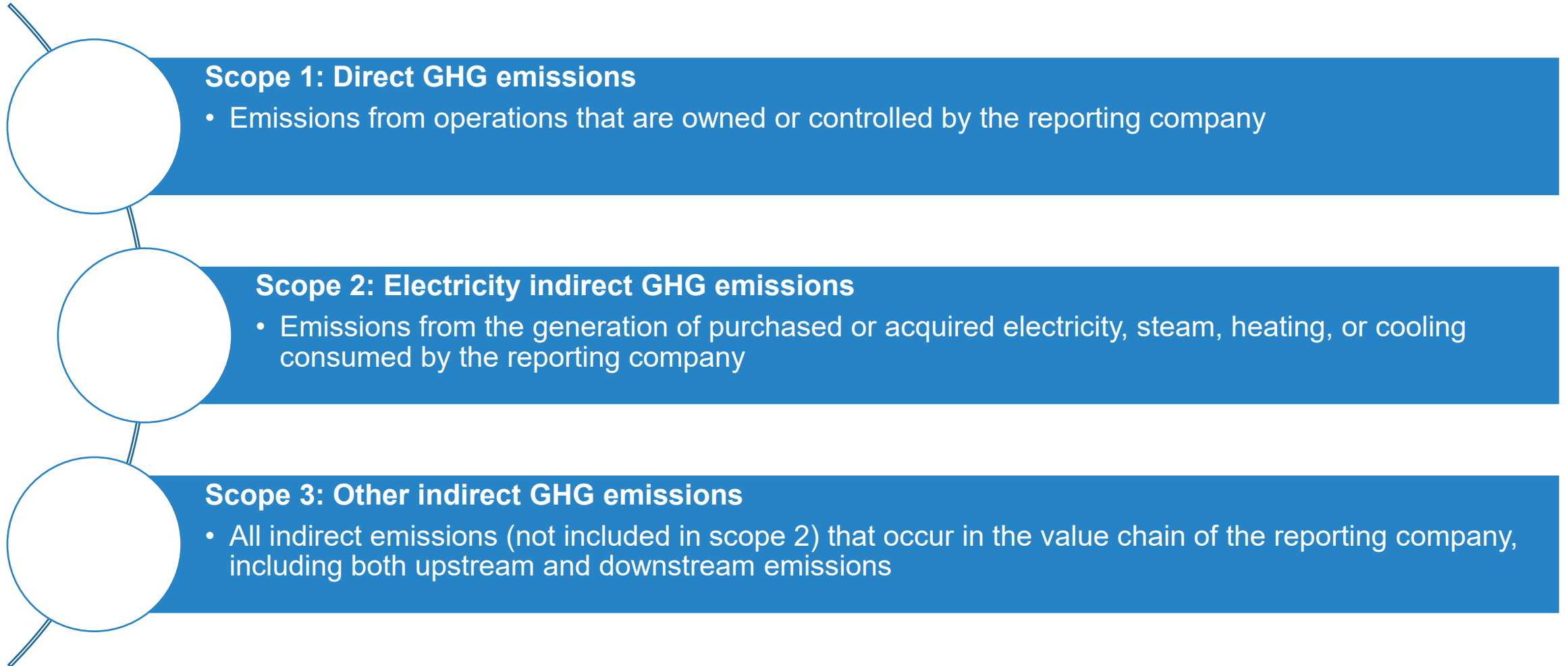
Greenhouse gas emissions by sector



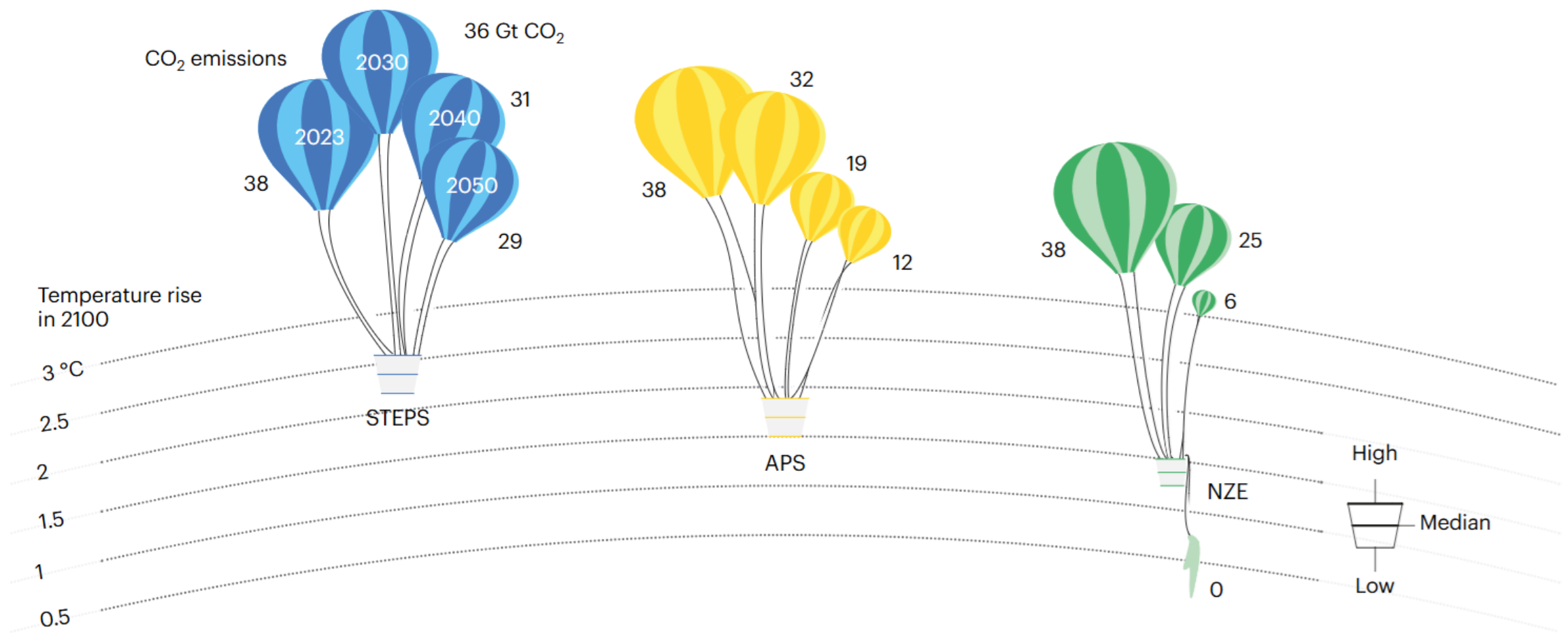
Annual CO₂ emissions from fossil fuels



3 scopes of emissions



Global emissions in 3 scenarios



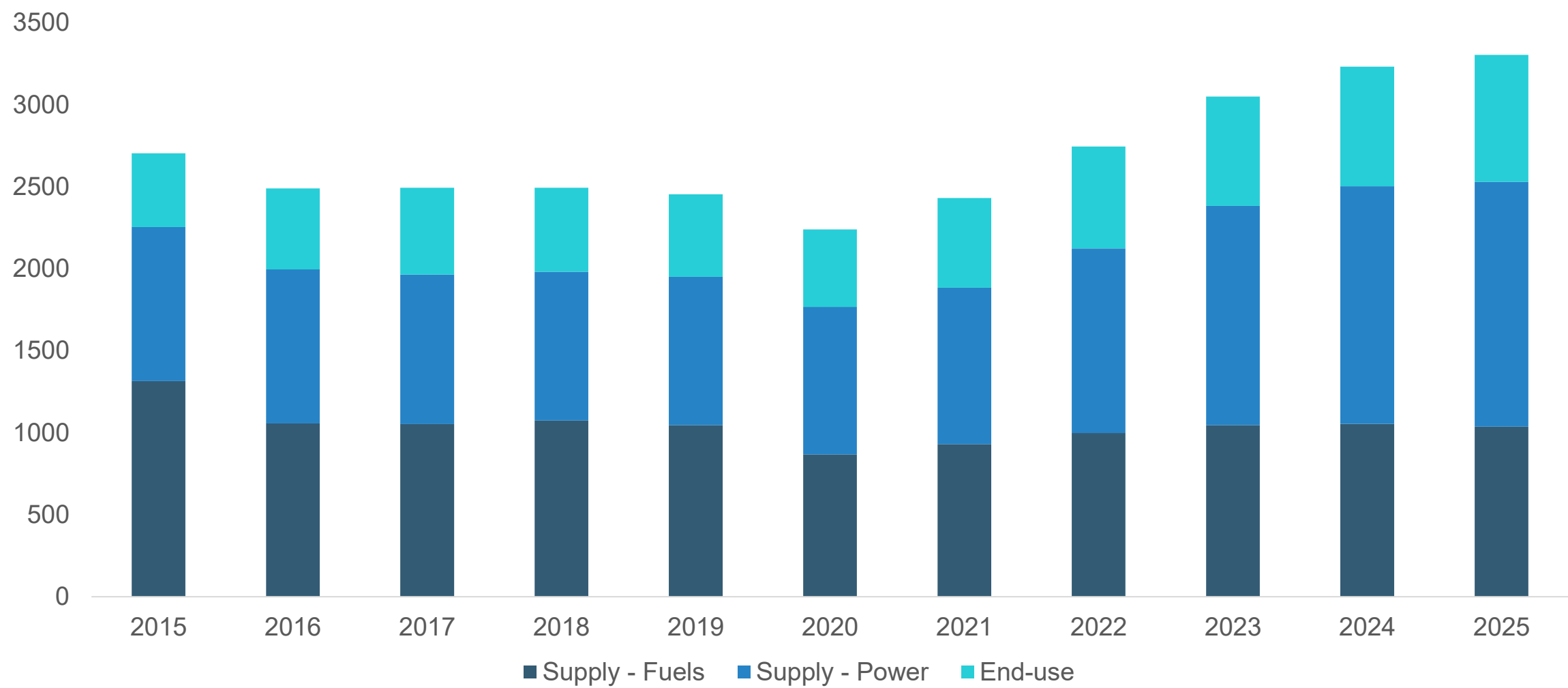
References

- <https://ourworldindata.org/co2-and-greenhouse-gas-emissions>
- <https://ourworldindata.org/emissions-by-fuel>
- ghgprotocol.org

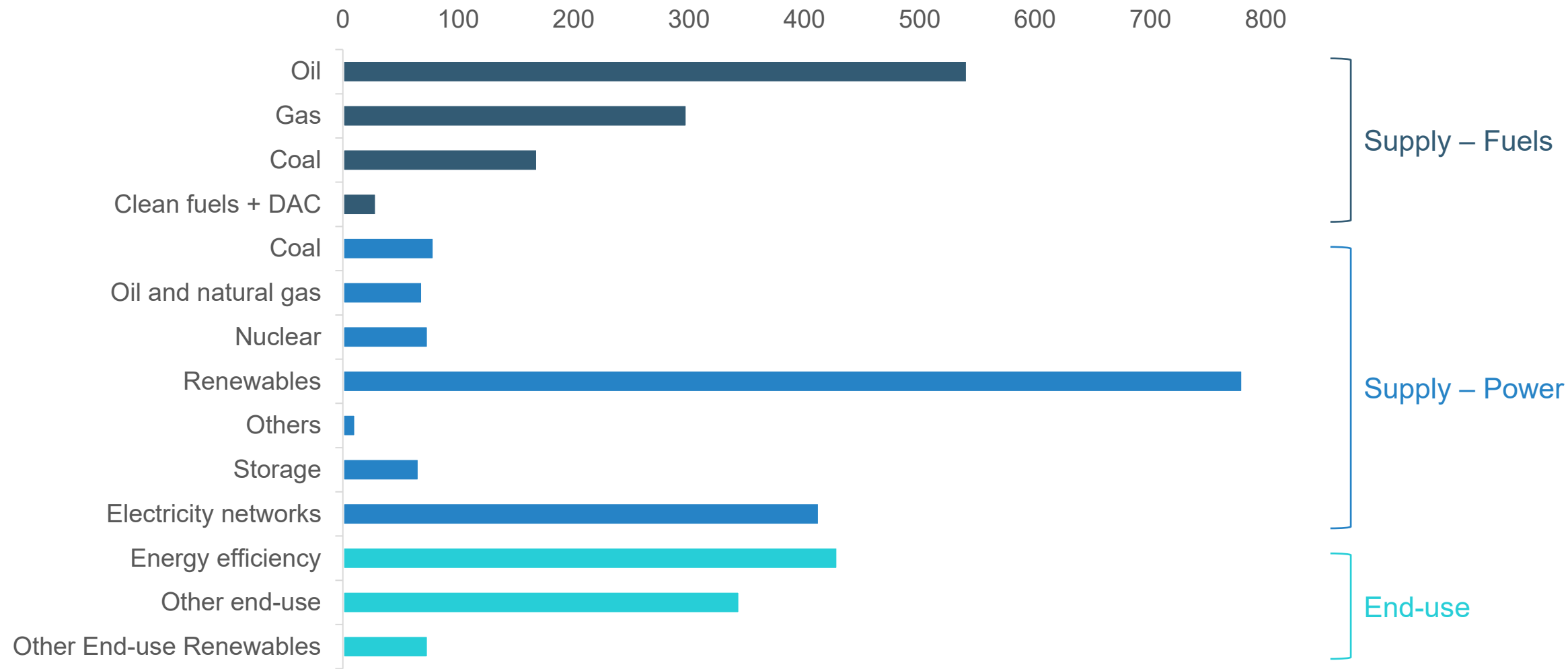
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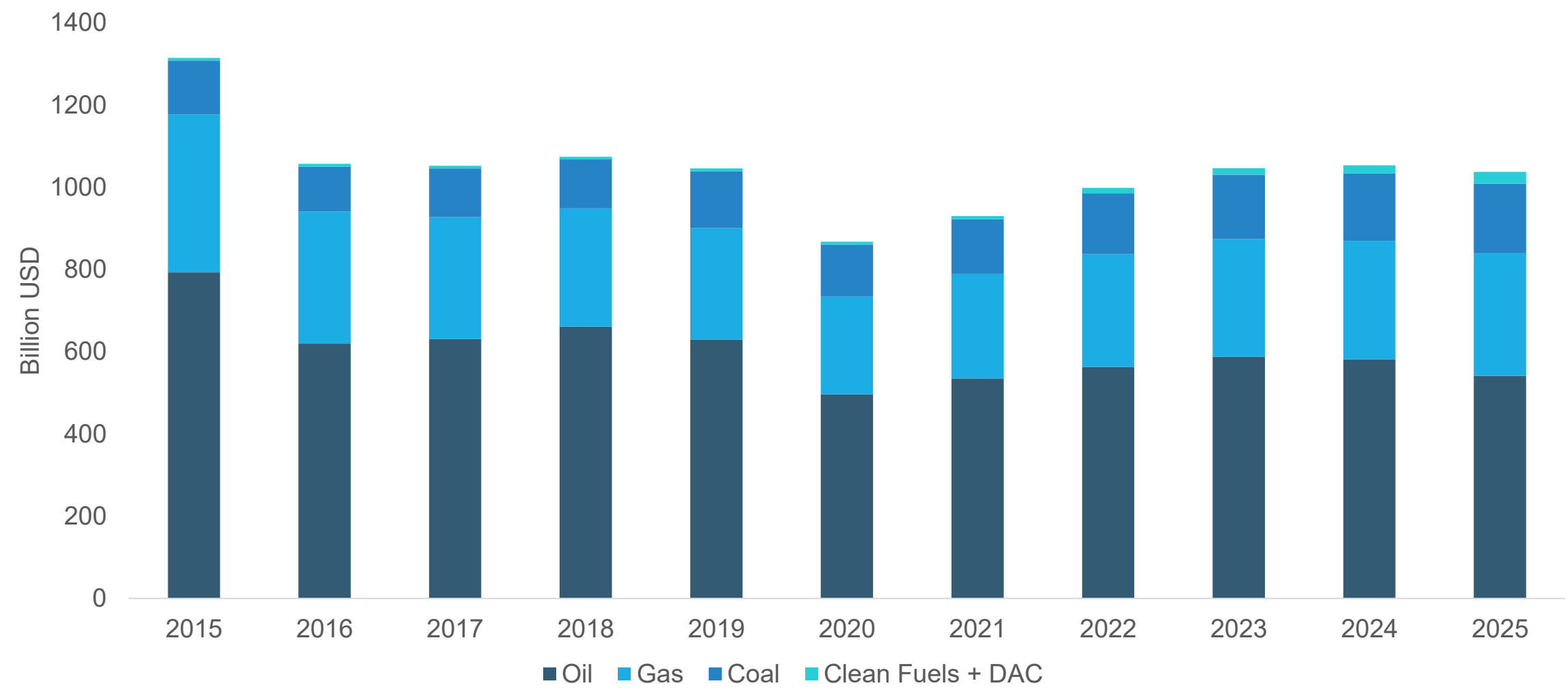
World energy investment (Billion USD)



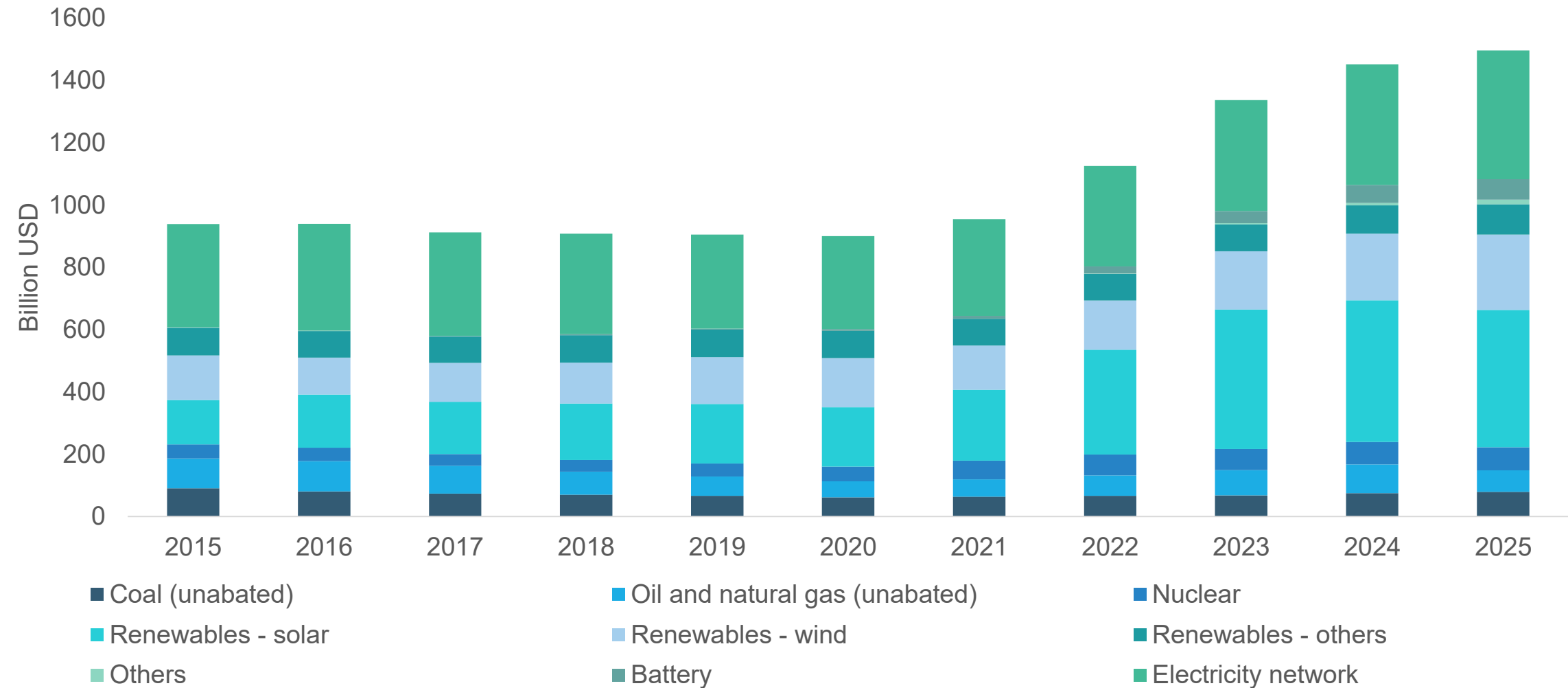
World energy investment (Billion USD)



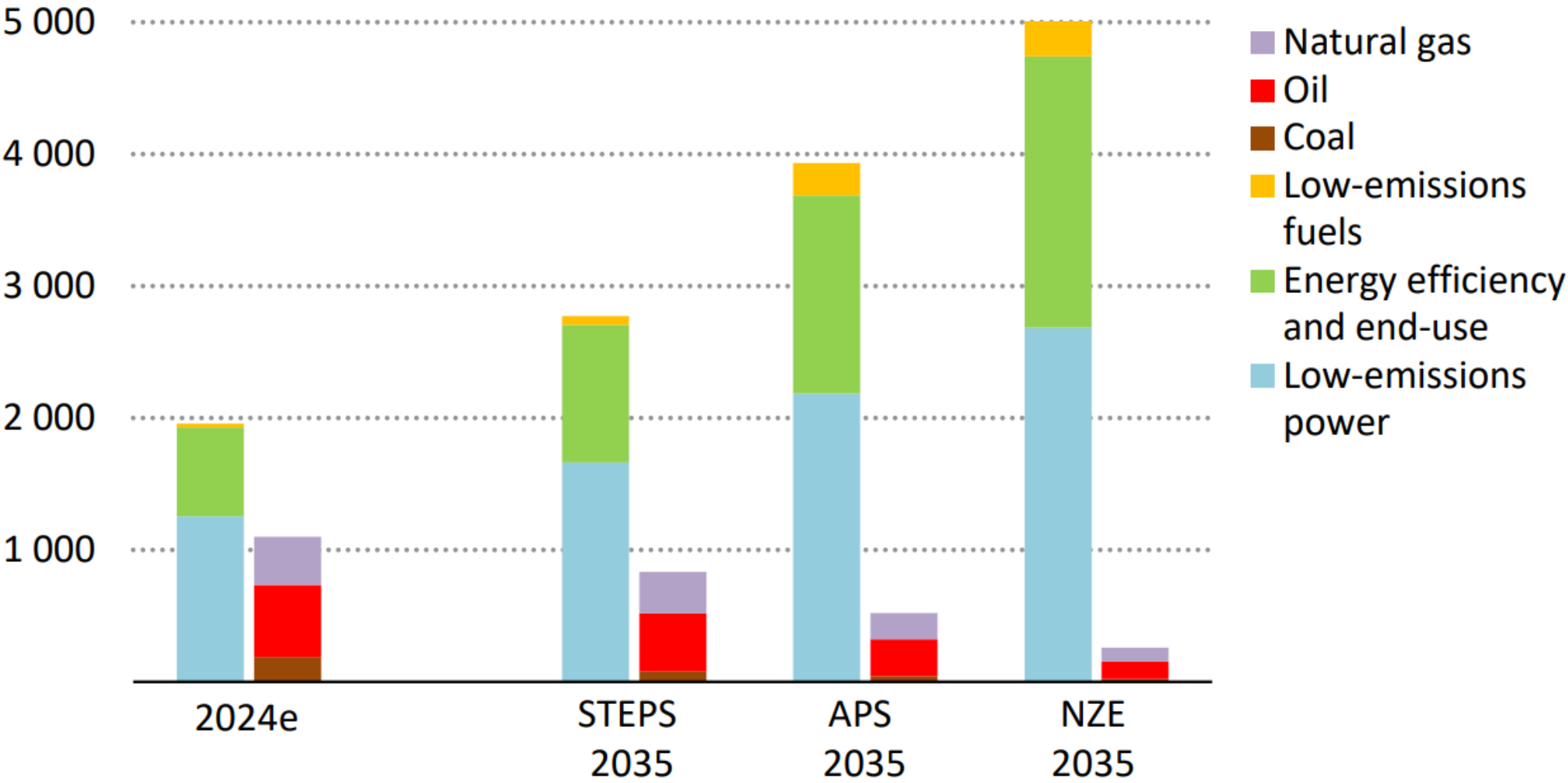
Investment in fuels supply (Billion USD)



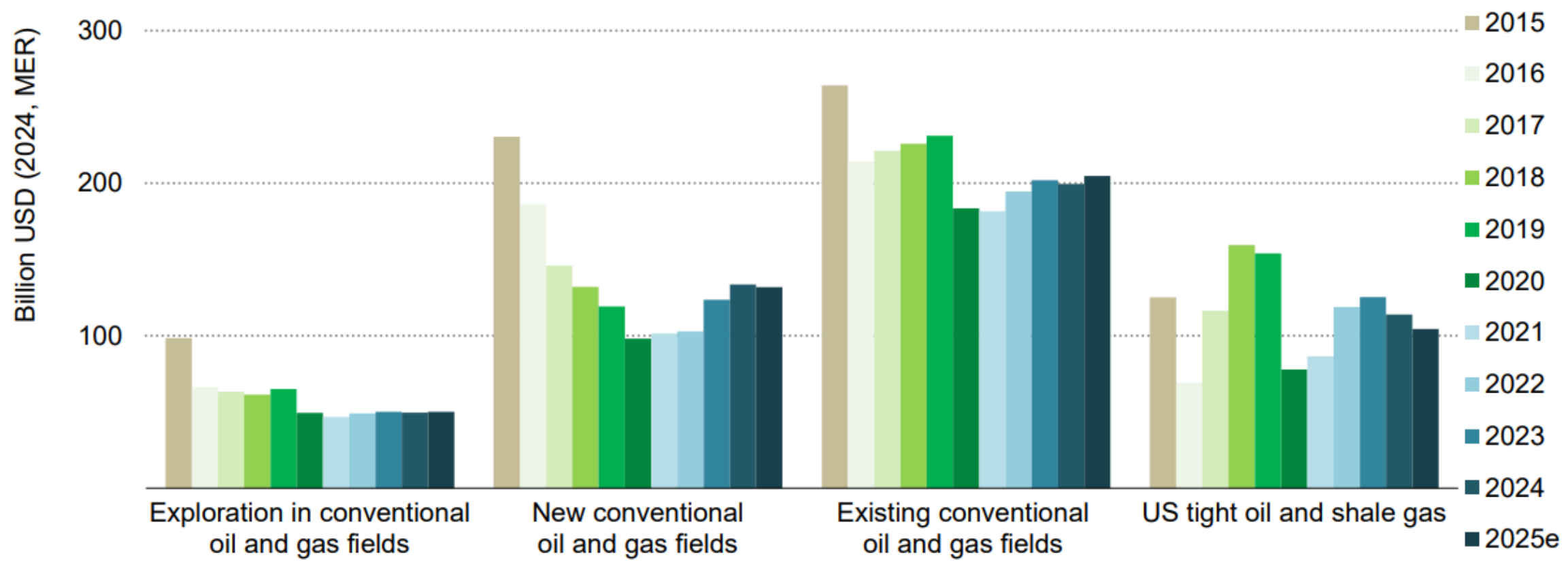
Investment in power supply (Billion USD)



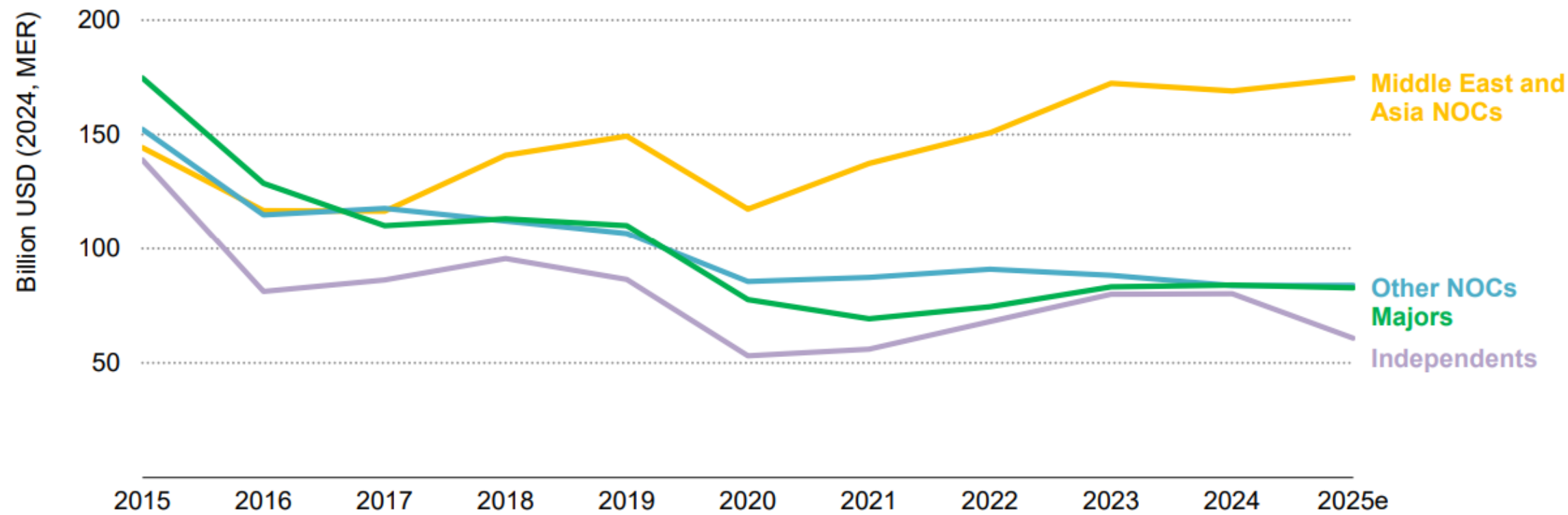
Annual energy sector investment by sector and scenario



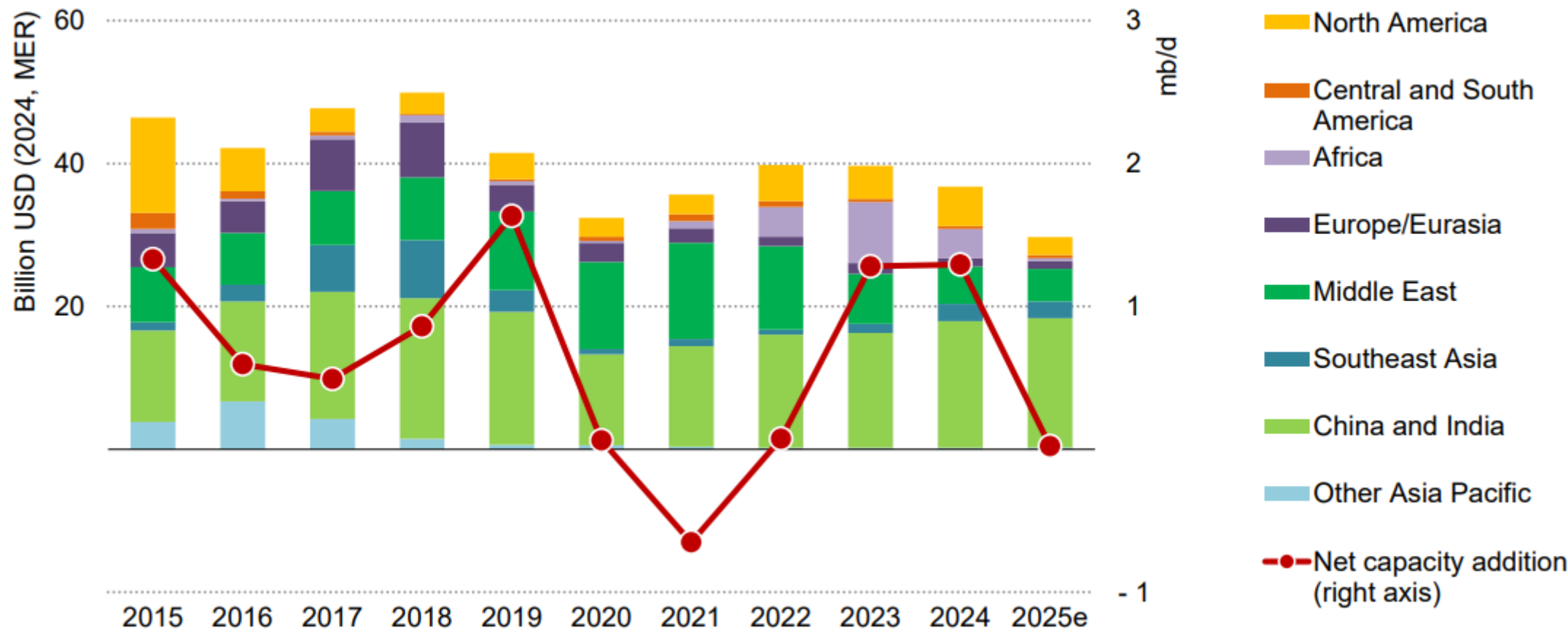
Upstream oil and gas capital expenditure by activity and field type



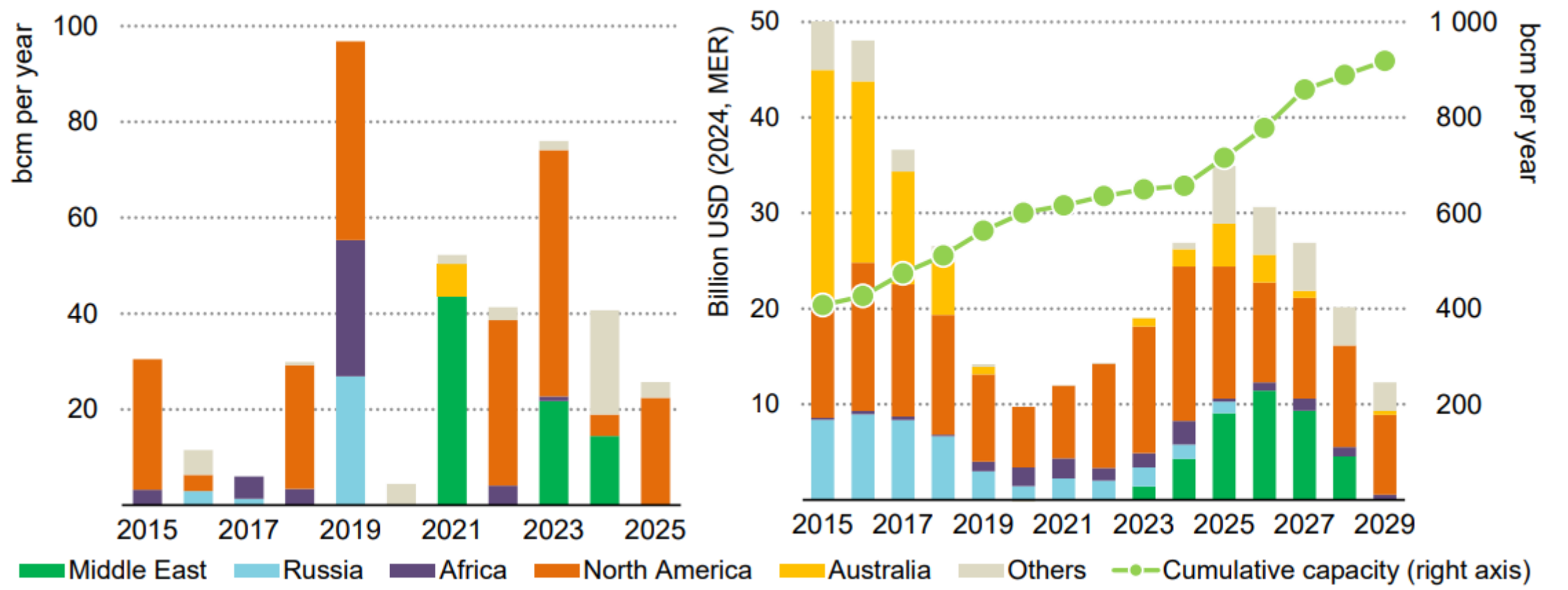
Upstream oil and gas investment by company type



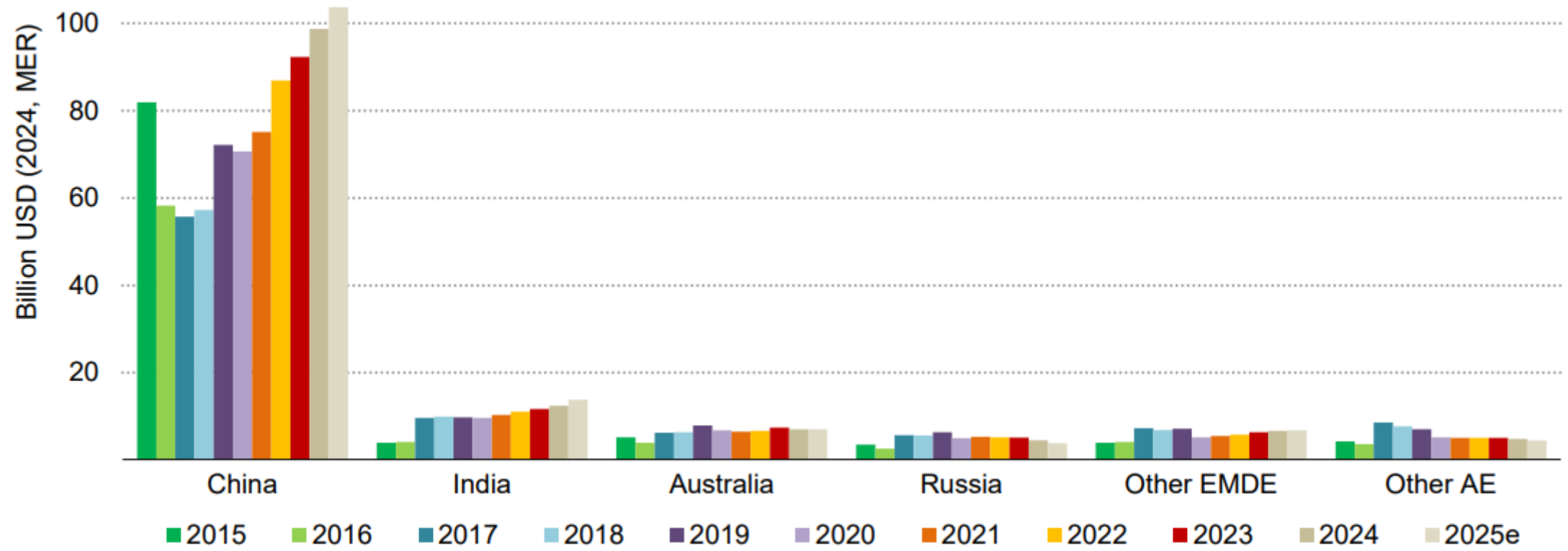
Investment in refineries by region and net refining capacity change



Final investment decisions for LNG export capacity (right) and investment and cumulative export capacity (left)



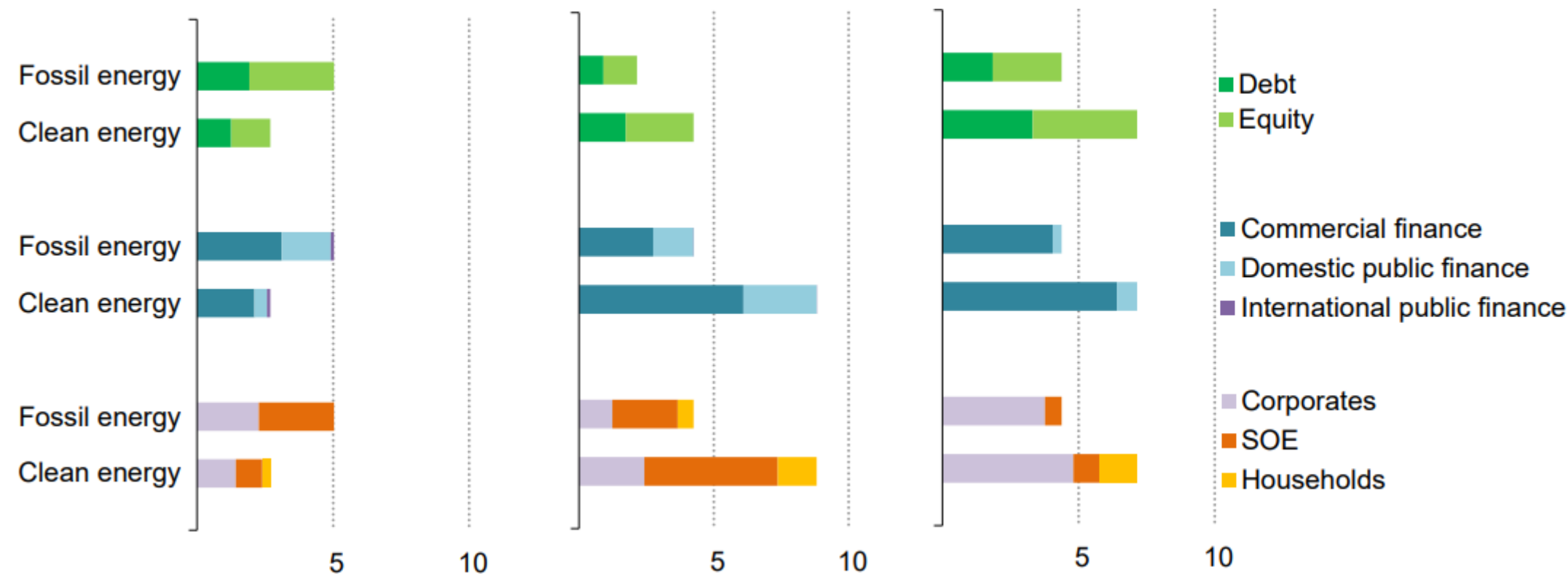
Investment in coal production



Source of finance?



Cumulative historic clean and fossil energy in other EMDE (left), China (middle) and advanced economies (right), 2015-2024



Value creation

Operating profit after tax

—

Cost of capital

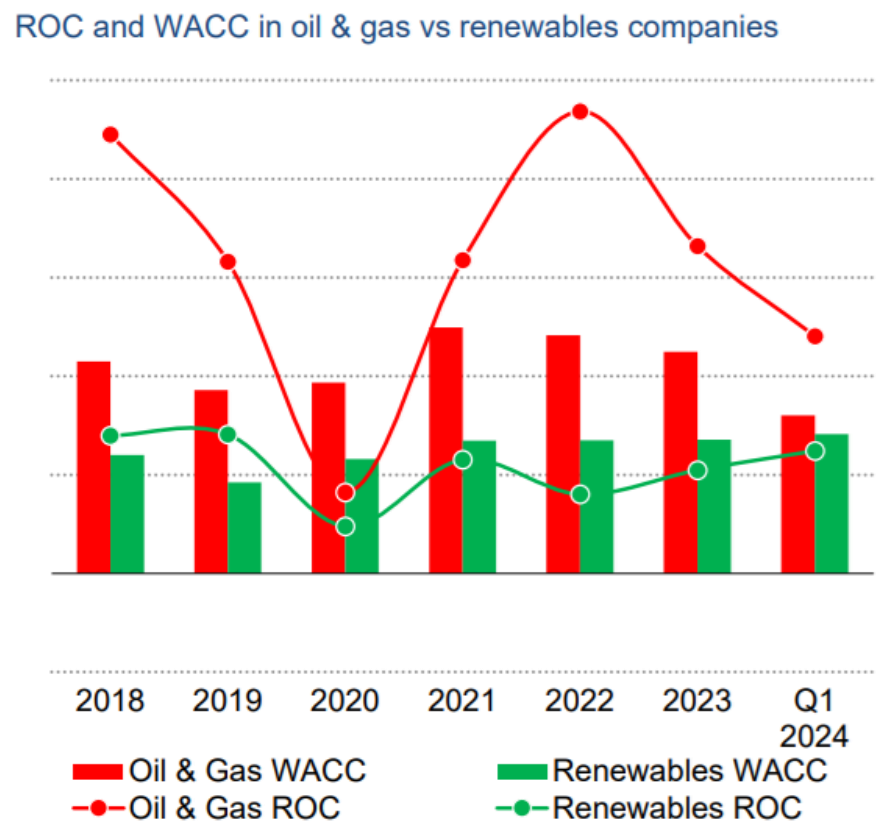
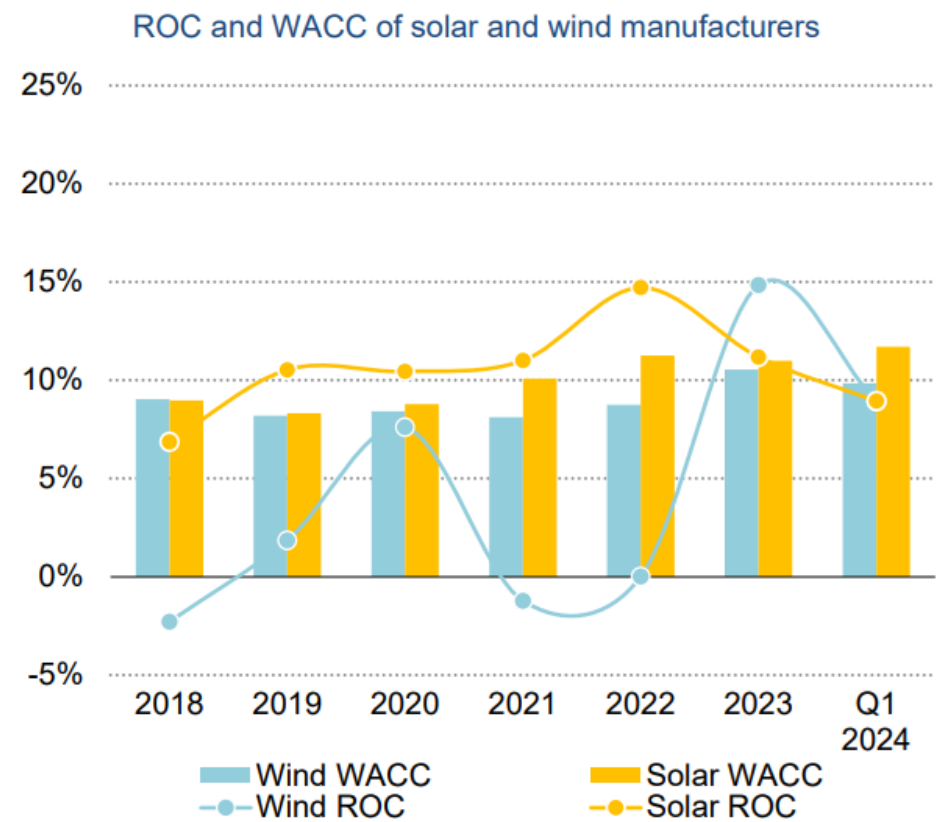
• WACC

=

Economic value added

• EVA

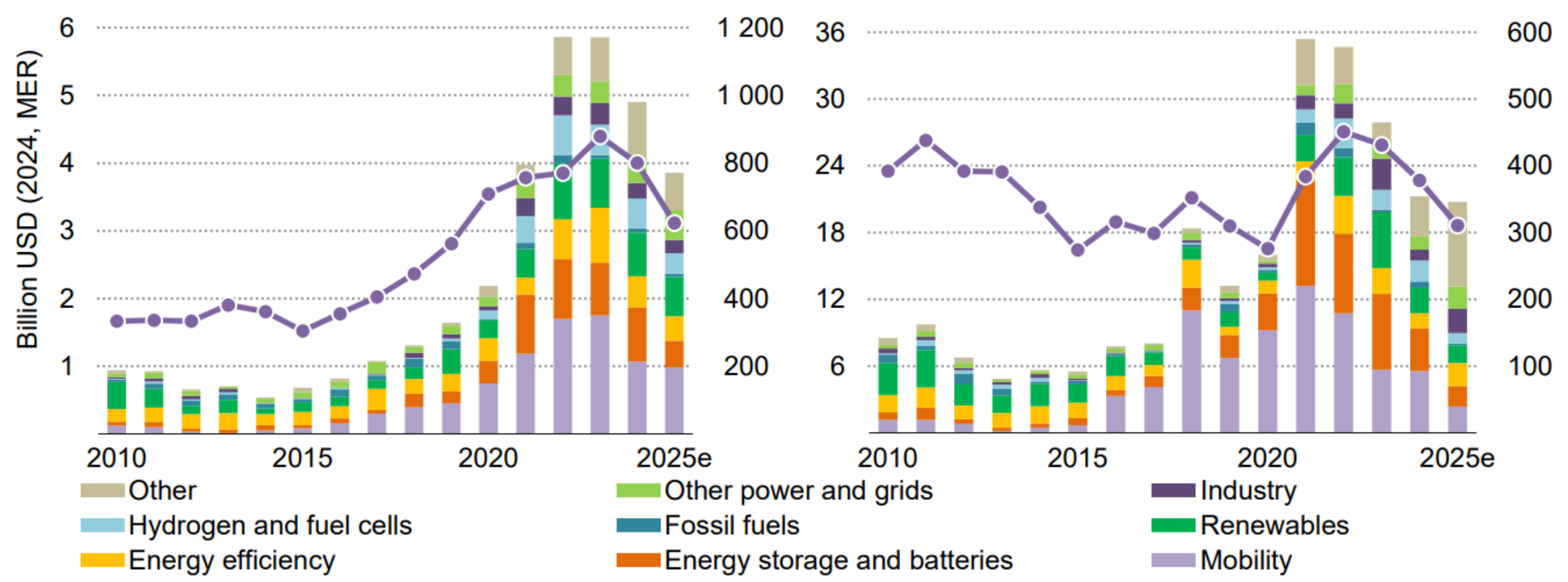
ROC and WACC



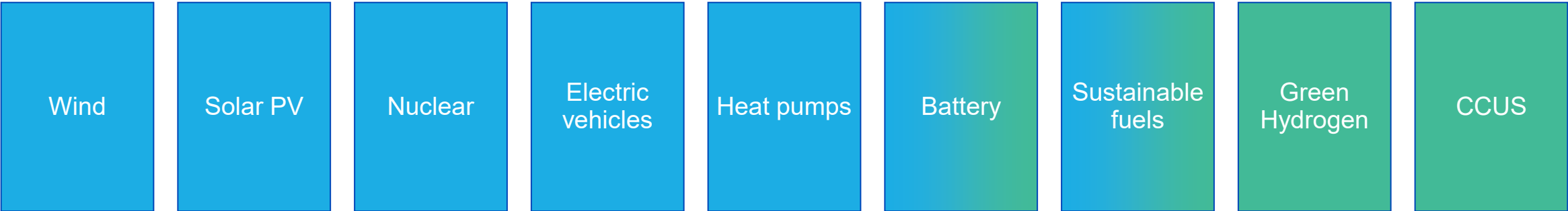
IEA. CC BY 4.

Note: ROC = return on capital. WACC = weighted average cost of capital. Calculation based on the top 25 publicly listed companies in each sector according to production capacity, primarily concentrated in advanced economies and China. Renewable companies include utilities and manufacturers. WACC is based on implied market valuation. 2024 Q1 values based on obtainable data from companies.
Source: IEA analysis based on Bloomberg data and S&P Capital IQ.

Venture capital investment in energy start-ups, by technology area, for early-stage (left) and growth-stage deals (right)



Key technologies



References

- IEA, World Energy Investment 2025
- IEA, World Energy Outlook 2024

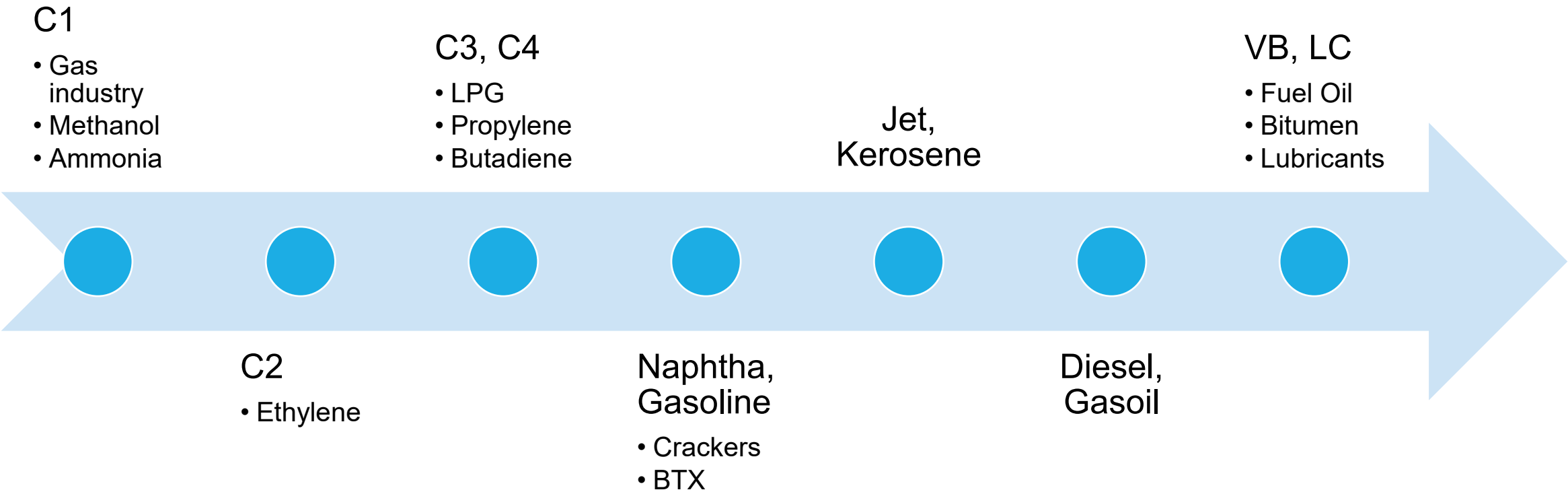
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What is a hydrocarbon?



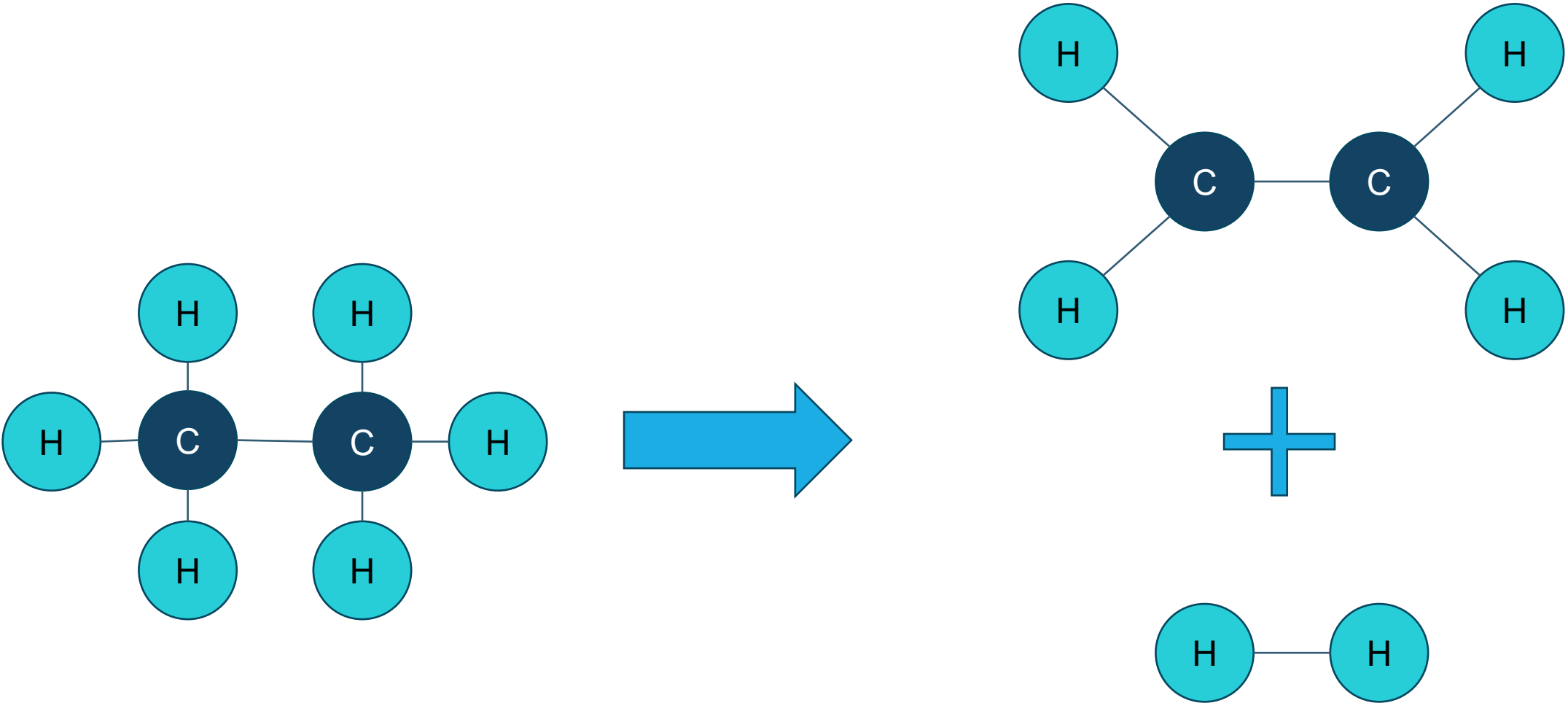
Overview of key hydrocarbons



Some important hydrocarbon groups

Group	Description	Example
Alkane (Paraffin)	Consisting only of atoms connected by single bonds	Ethane – C ₂ H ₆
Alkene (Olefin)	Contains at least one double bond	Ethene (ethylene) – C ₂ H ₄
Cyclo-alkane (Naphthene)	Presence of 2 hydrogen atoms per carbon atom, with a ring structure	Cyclohexane – C ₆ H ₁₂
Aromatics	Presence of a 6-atom cycle with alternating single and double bonds (benzene core)	Benzene – C ₆ H ₆

Steam cracking of Ethane



Gas abbreviations

CNG

- Compressed Natural Gas (Cars in Iran)

LNG

- Liquefied Natural Gas (Power Sector)

NGL

- Natural Gas Liquid (C2+ for Olefin, ...)

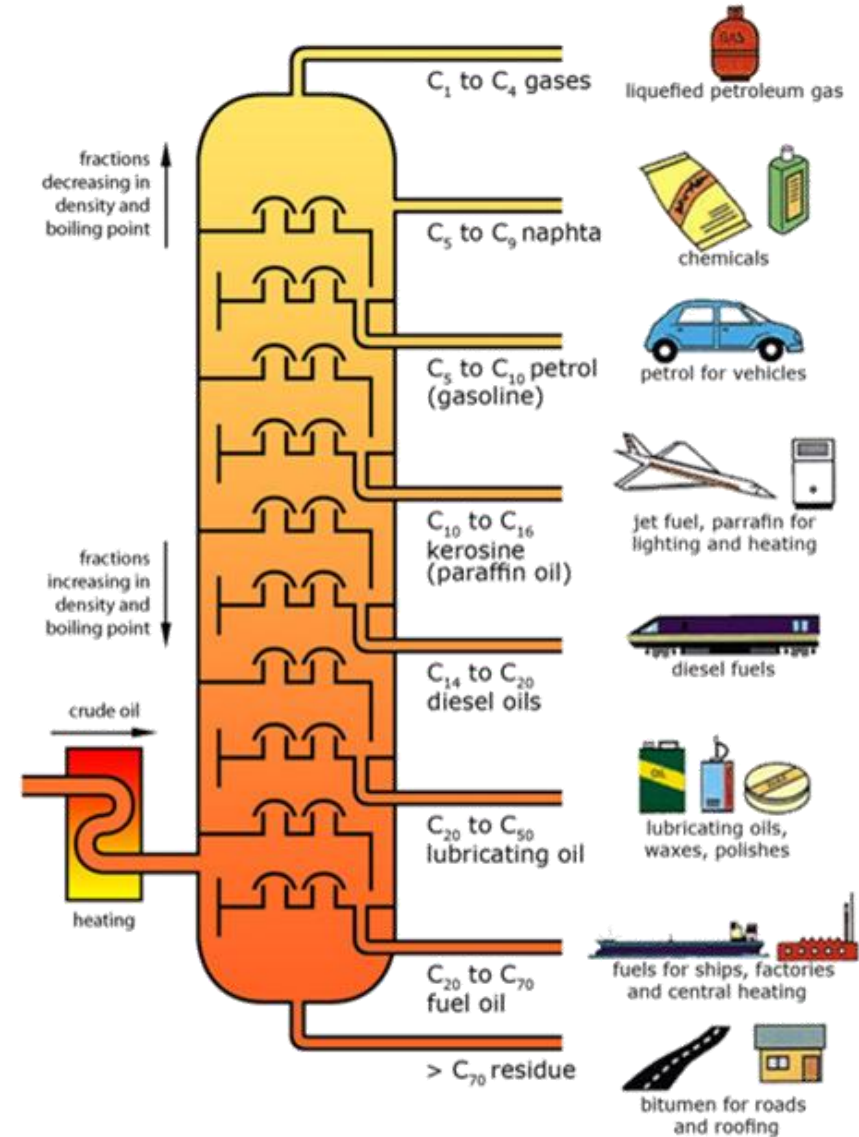
LPG

- Liquid Petroleum Gas (C3 & C4 for fuel, ...)

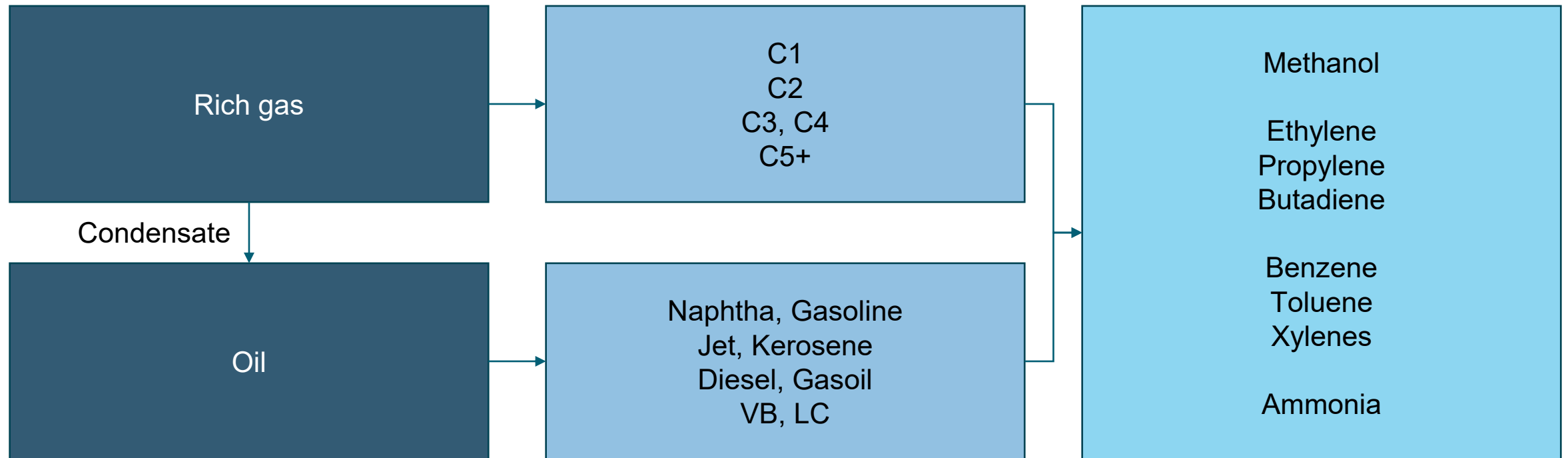
GTL

- Gas to Liquid (Convert C1 to Products)

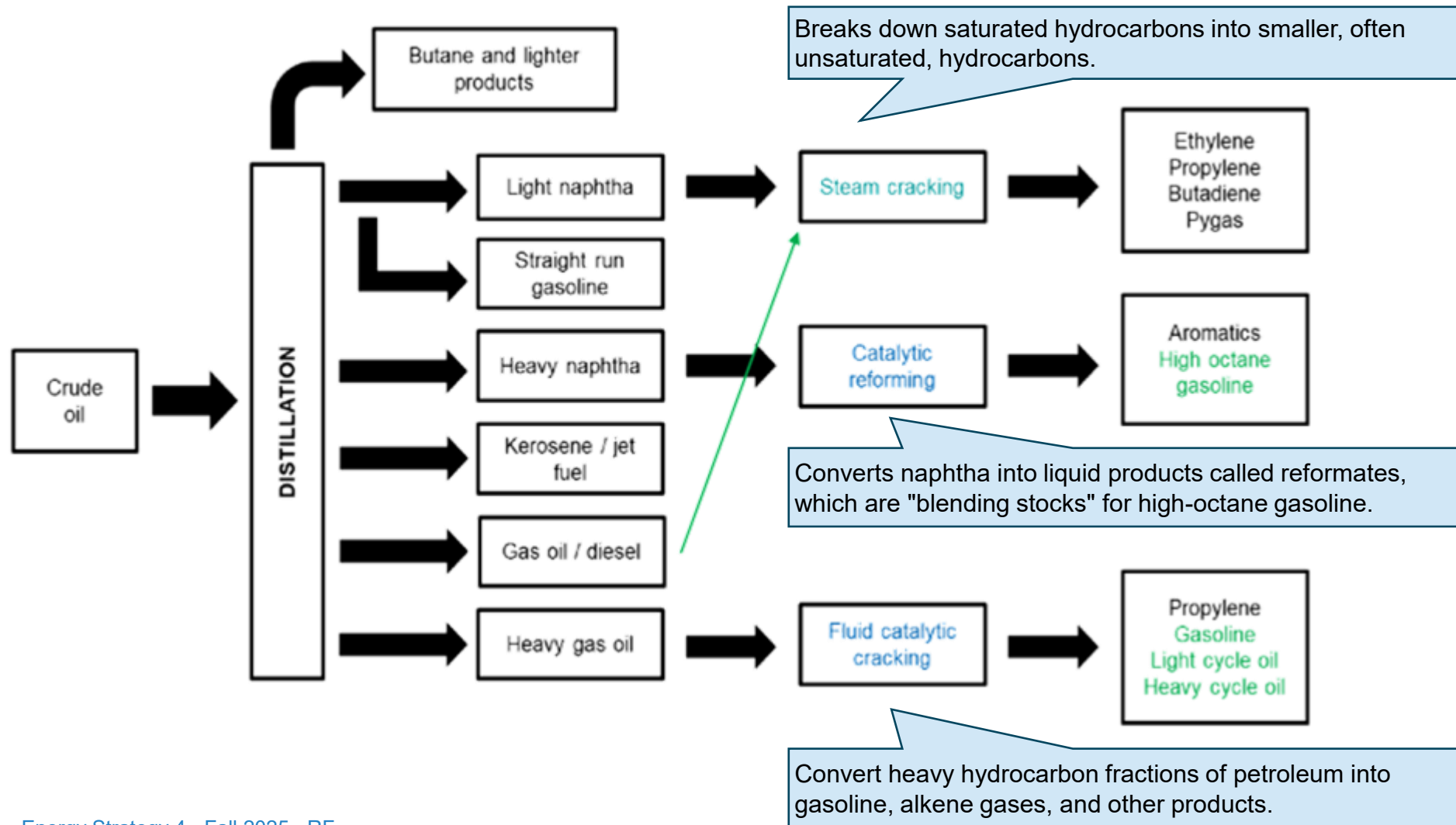
Distillation tower



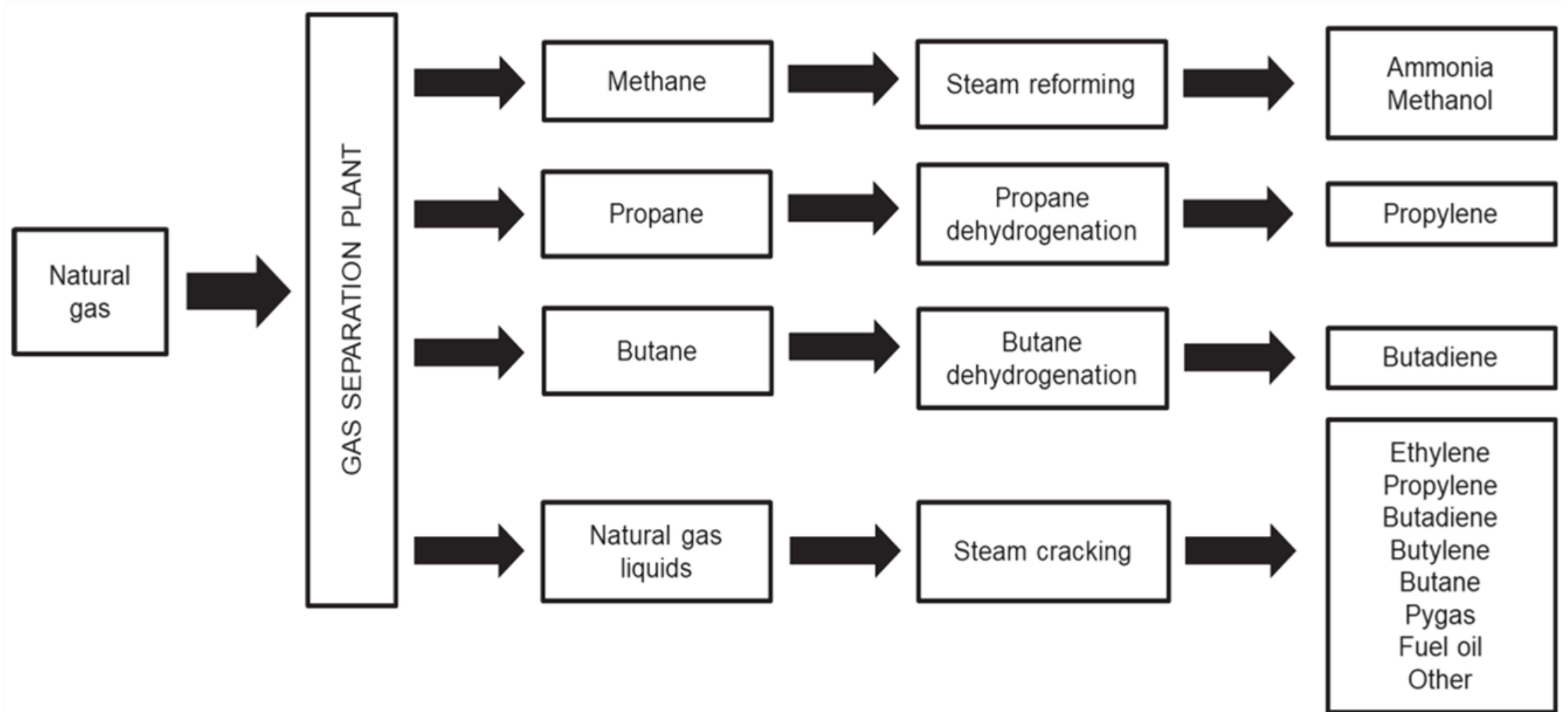
A simplified industry flow



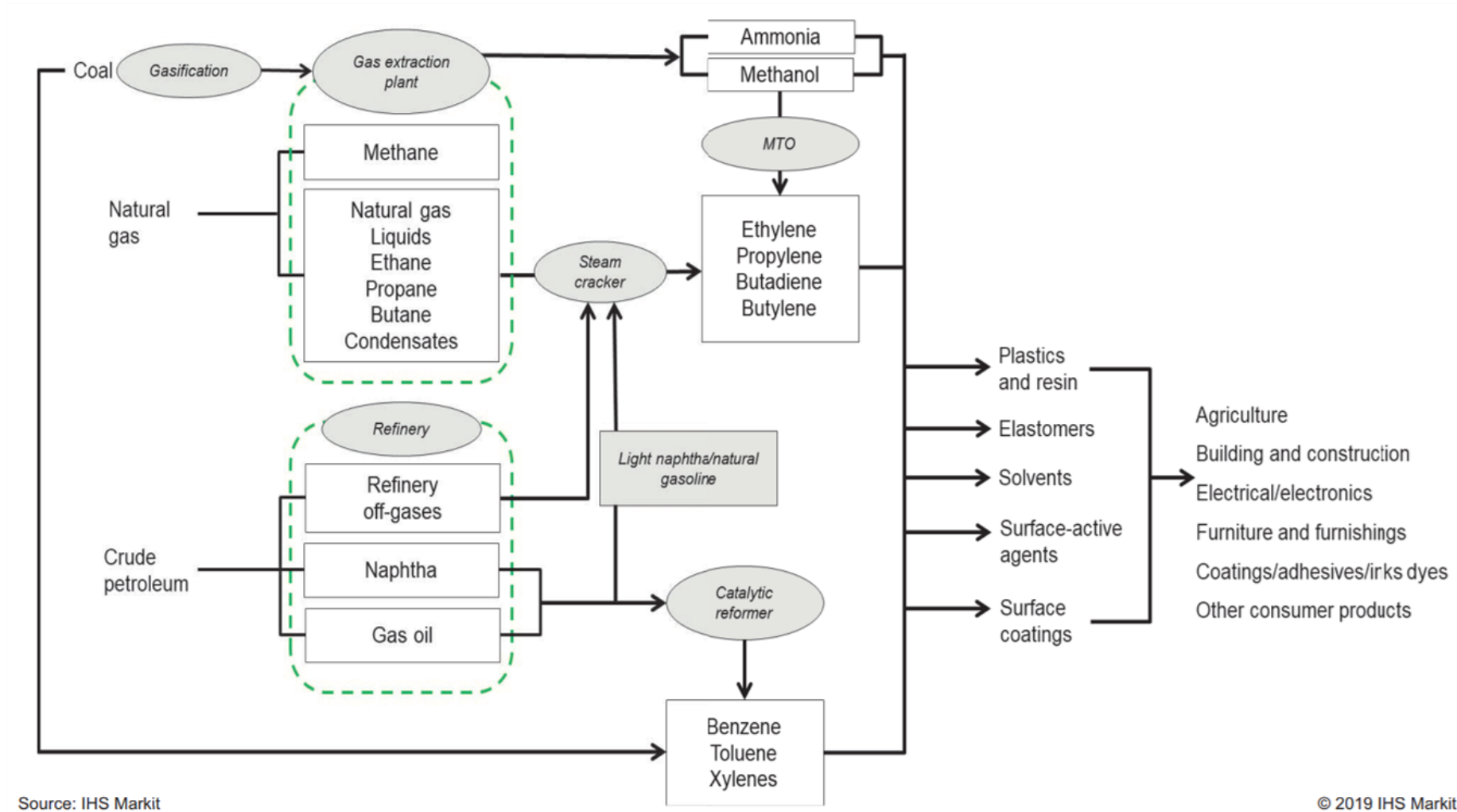
From crude oil to basic petrochemicals



From natural gas to basic petrochemicals



Petrochemical feedstock and derivatives



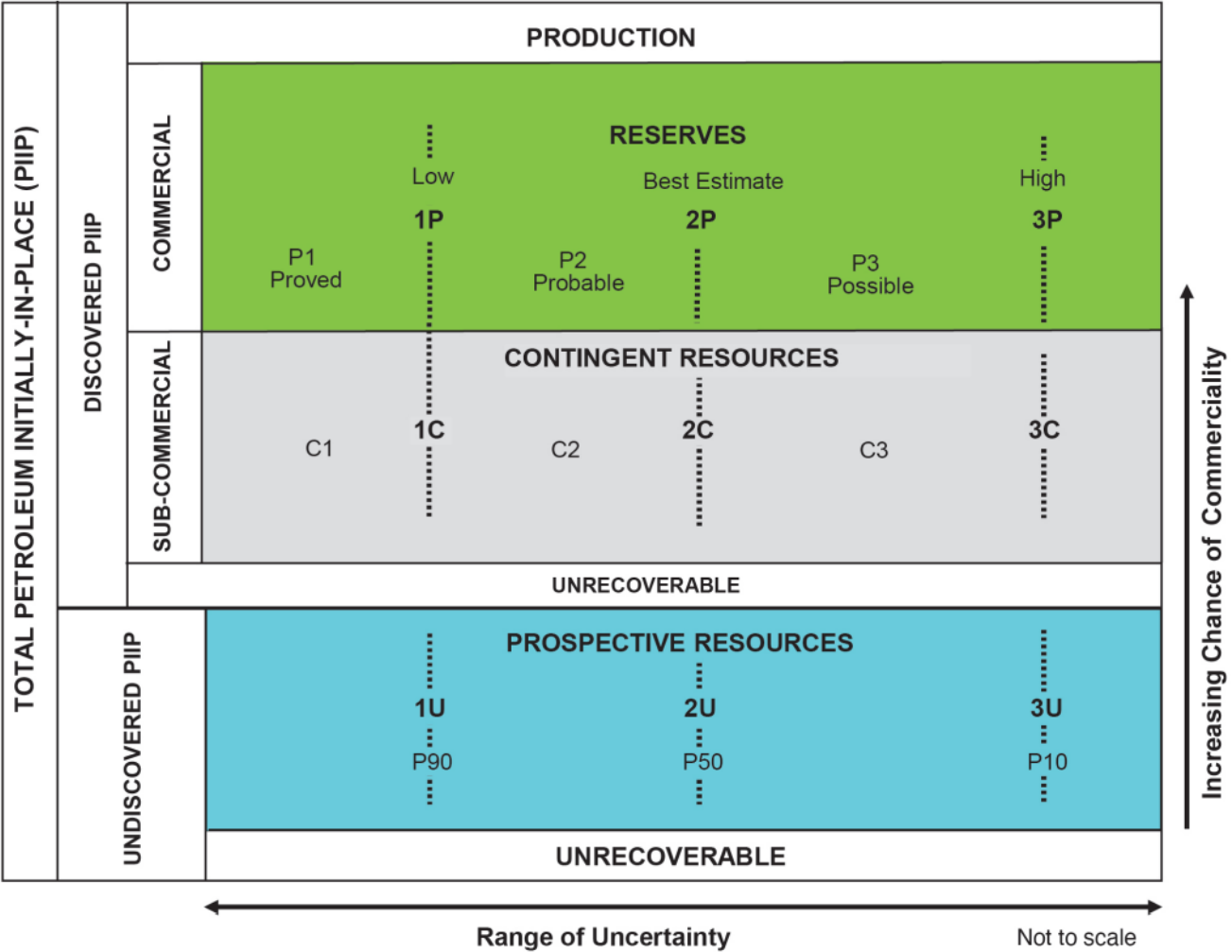
References

- S&P Global Commodity Insights, Petrochemical Industry Overview
- Total, Introduction to hydrocarbons
- Wikipedia

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Resources classification framework

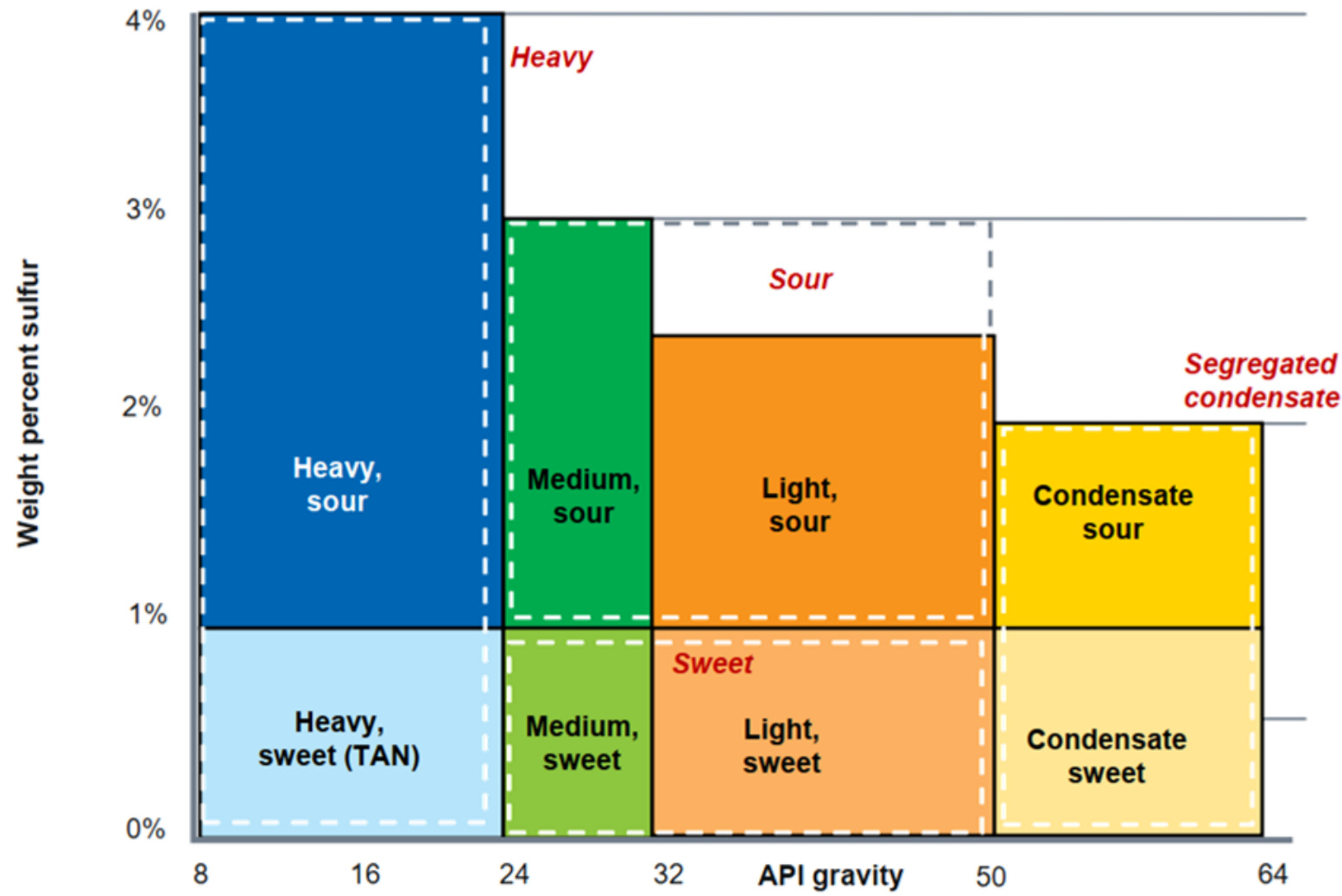


Global recoverable oil reserves

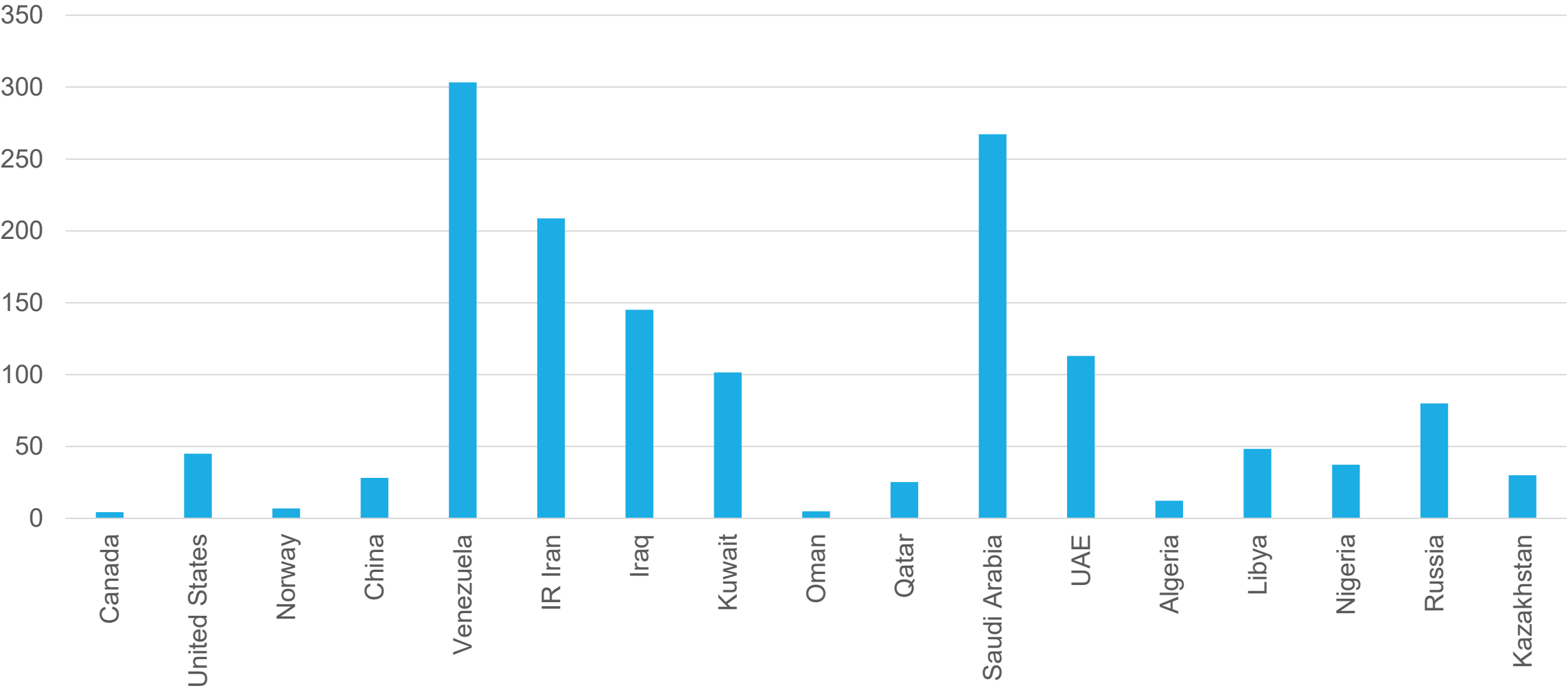
	1P	2P	2PC	2PCX	Added	Mb/d*	1P life	2PCX life
Non-OPEC	216	337	644	875	17	54.6	11	44
United States	34	47	119	169	17	13.5	7	34
Russia	58	93	123	137	0	10.1	16	37
Canada	31	43	108	119	-3	4.9	17	66
China	18	33	52	70	-1	4.3	12	45
Brazil	12	23	38	53	-2	3.8	8	38
Qatar	9	15	33	36	-0	1.4	18	70
Argentina	2	3	22	32	12	0.8	7	108
Kazakhstan	13	16	25	30	-2	2.1	17	40
Mexico	4	7	14	21	-1	1.7	7	33
Norway	5	7	10	14	-1	1.9	7	21
Guyana	2	5	11	12	-0	0.7	8	48
Angola	3	6	9	12	-	1.1	8	31
Other	24	41	79	170	-4	8.3	8	56
OPEC	219	373	585	643	-12	29.4	20	60
Saudi Arabia	103	170	229	242	-4	9.8	29	68
Iraq	26	50	99	105	-2	4.1	17	70
Iran	27	48	76	84	-2	4.1	18	56
UAE	28	46	71	82	3	3.3	23	68
Kuwait	16	28	42	45	-3	2.5	17	50
Venezuela	4	7	23	27	-3	1.0	11	73
Nigeria	4	7	18	21	-0	1.7	7	35
Libya	6	10	14	19	-1	1.4	13	37
Algeria	4	6	8	12	-1	1.1	11	30
Congo	1	1	3	4	0	0.3	9	41
Gabon	0	1	1	2	-0	0.2	7	29
Equatorial Guinea	0	0	1	1	0	0.1	6	21
Grand Total	435	710	1,229	1,519	5	84.0	14	50
Natural Gas Liquids						14.0		
Other liquids						6.2		
World Total Liquids production 2025e						104.2		

*Global oil production 2025, excludes natural gas liquids, biofuel and refinery gains. **1P** = Proved oil reserves (as of 1.1. 2025), conservative estimate in existing fields. **2P** = proved + probable oil reserves, most likely estimate in existing fields. **2PC** = proved + probable oil reserves plus mean contingent recoverable oil resources in yet undecided projects/discoveries, including noncommercial volumes. **2PCX** = Most likely estimate for existing fields, plus contingent resources in discoveries, plus risked prospective resources in yet undiscovered fields.

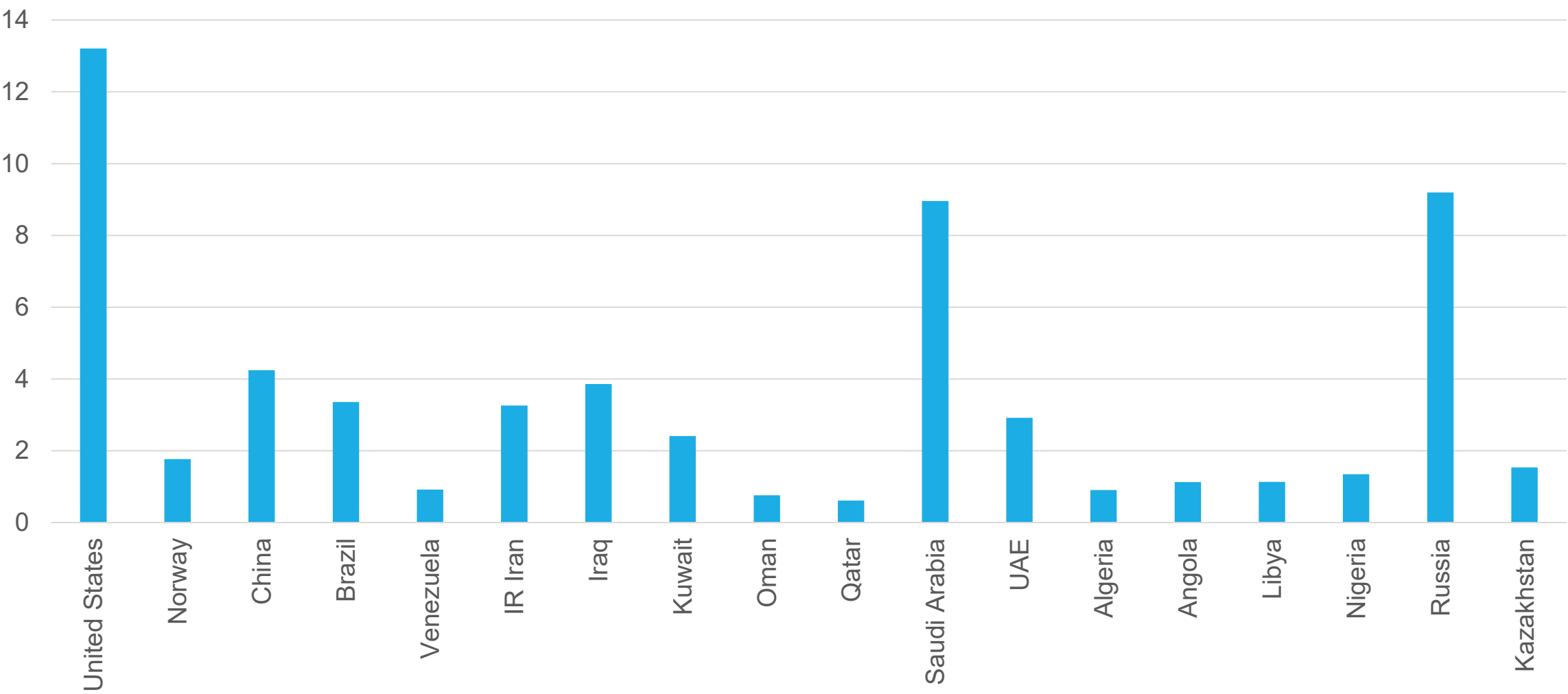
Oil markets and downstream crude oil grade map (general)



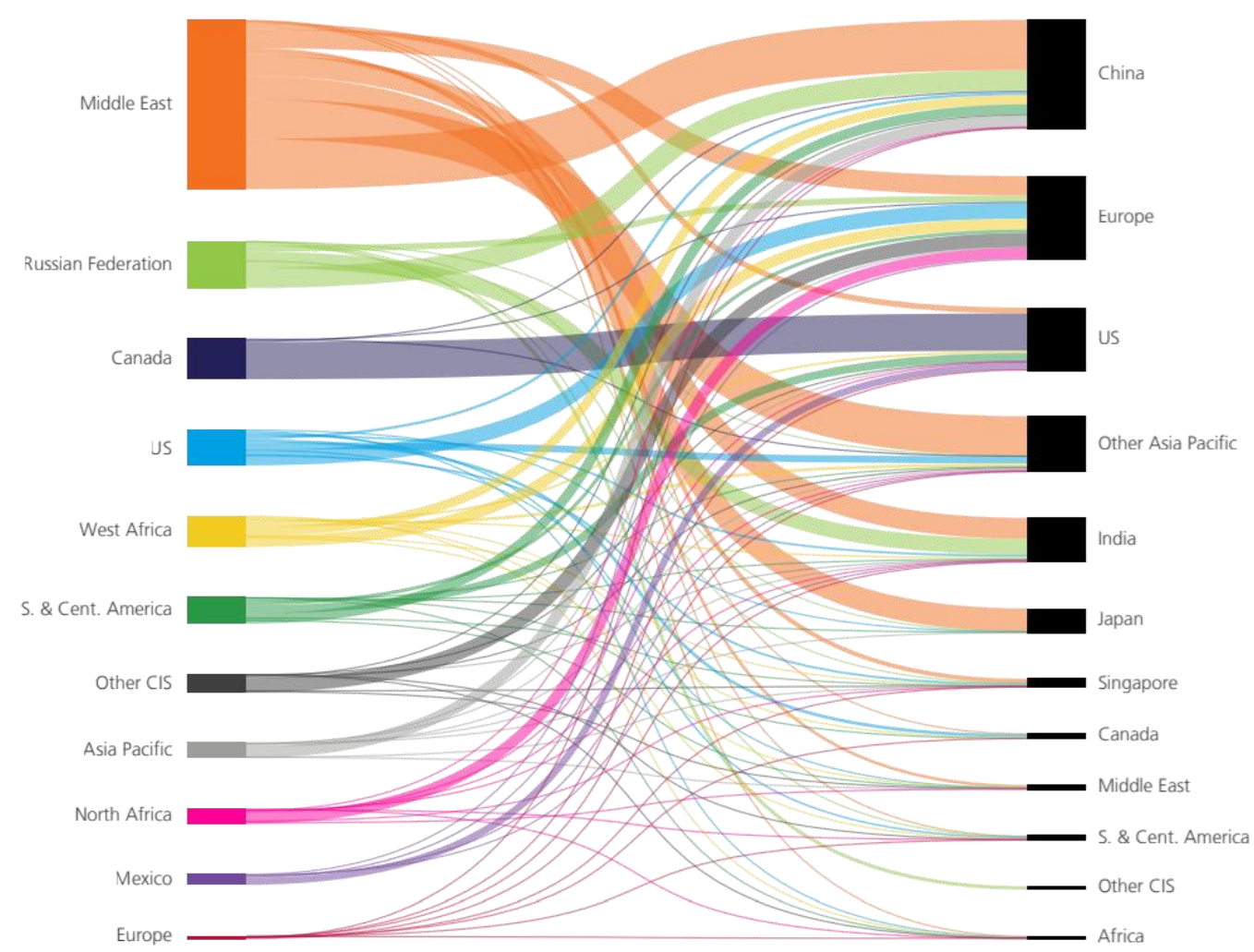
World proven crude oil reserves by country (Billion barrels)



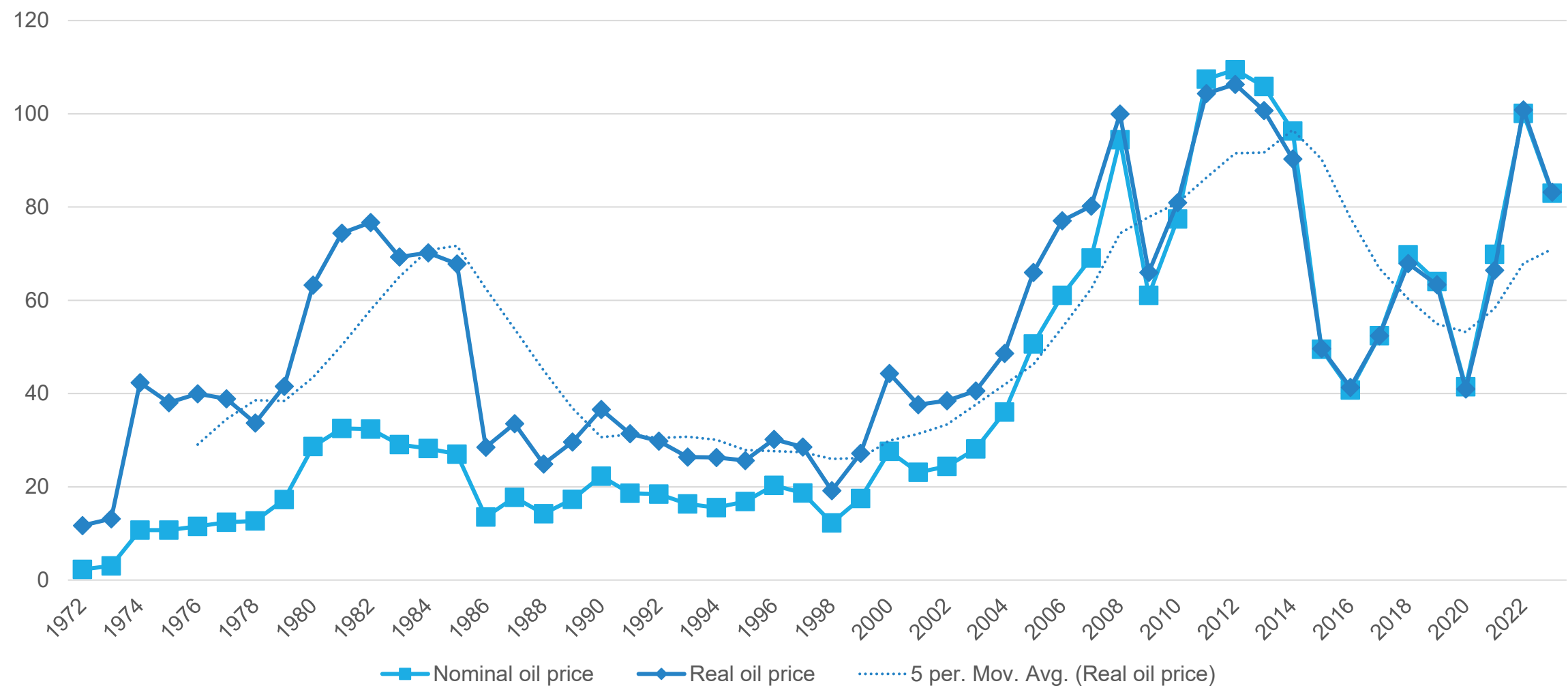
World proven crude oil reserves by country (Million barrels per day)



Oil trade movements



OPEC Reference Basket in nominal and real terms



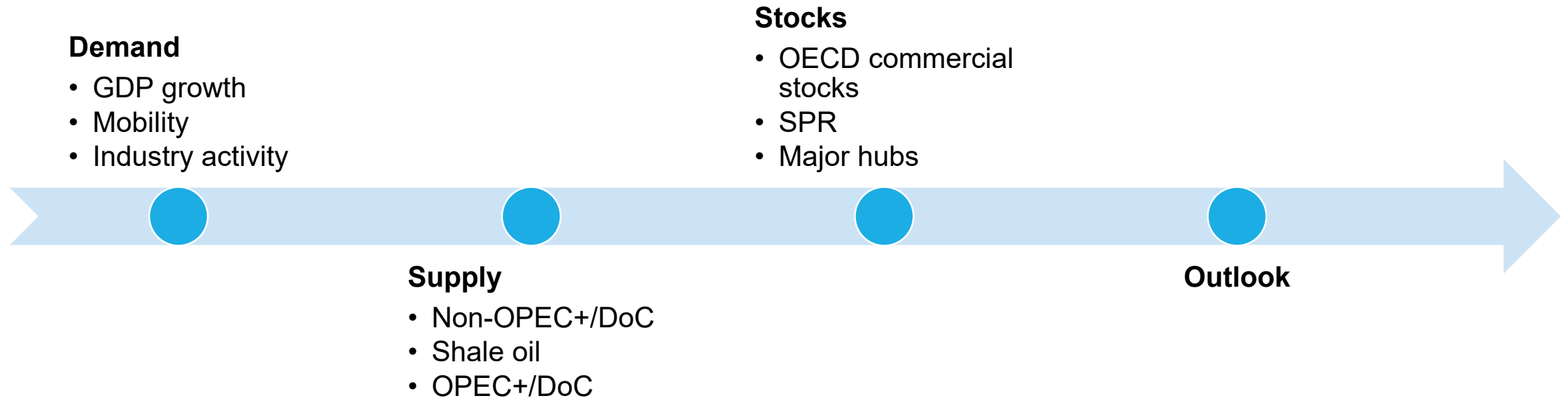
- 159 liters of oil = 70 USD => .44 USD/liter
- 9 liters of Zamzam = 2.7 USD => .3 USD/liter

A row of six identical plastic bottles of Coca-Cola Zero Sugar. Each bottle is dark with a red label featuring the white Coca-Cola script logo and the words 'ZERO SUGAR' below it. The bottles are arranged in a slightly overlapping manner against a plain white background.

What is oil? What is gas?



Short-to-medium term oil price forecast methodology



World oil demand (Million barrels per day)

World oil demand	2024	1Q25	2Q25	3Q25	4Q25	2025	Change 2025/24
Americas	24.94	24.86	25.03	25.32	25.20	25.10	0.16
of which US	20.42	20.42	20.48	20.67	20.72	20.57	0.15
Europe	13.51	12.96	13.63	14.06	13.52	13.54	0.03
Asia Pacific	7.21	7.34	6.96	6.95	7.41	7.17	-0.04
Total OECD	45.67	45.15	45.62	46.32	46.13	45.81	0.14
China	16.65	16.86	16.47	17.03	17.04	16.85	0.20
India	5.55	5.70	5.70	5.50	5.91	5.70	0.15
Other Asia	9.67	9.87	10.25	9.76	9.76	9.91	0.24
Latin America	6.75	6.80	6.89	6.96	6.91	6.89	0.14
Middle East	8.85	8.78	8.83	9.28	9.15	9.01	0.16
Africa	4.65	4.89	4.58	4.68	5.07	4.80	0.16
Russia	3.98	4.01	3.85	4.04	4.19	4.02	0.04
Other Eurasia	1.26	1.42	1.31	1.18	1.32	1.31	0.05
Other Europe	0.80	0.81	0.83	0.77	0.87	0.82	0.02
Total Non-OECD	58.17	59.13	58.72	59.21	60.23	59.33	1.15
Total World	103.84	104.29	104.34	105.53	106.36	105.14	1.29
Previous Estimate	103.84	104.33	104.30	105.53	106.36	105.13	1.29
Revision	0.00	-0.04	0.04	0.00	0.00	0.00	0.00

Note: * 2025 = Forecast. Totals may not add up due to independent rounding.

Source: OPEC.

Non-OPEC+/DoC liquids production (Million barrels per day)

Non-DoC liquids production	2024	1Q25	2Q25	3Q25	4Q25	2025	Change 2025/24
Americas	27.71	28.06	28.31	28.11	28.08	28.14	0.43
<i>of which US</i>	21.76	21.82	22.37	22.12	21.96	22.07	0.31
Europe	3.53	3.59	3.53	3.55	3.61	3.57	0.04
Asia Pacific	0.44	0.40	0.44	0.43	0.42	0.42	-0.01
Total OECD	31.68	32.05	32.28	32.09	32.12	32.13	0.46
China	4.56	4.69	4.66	4.50	4.53	4.59	0.03
India	0.81	0.83	0.82	0.82	0.80	0.82	0.02
Other Asia	1.61	1.63	1.63	1.57	1.57	1.60	-0.01
Latin America	7.23	7.42	7.59	7.50	7.65	7.54	0.31
Middle East	1.99	2.01	2.01	2.00	2.00	2.01	0.02
Africa	2.33	2.32	2.25	2.29	2.29	2.29	-0.05
Other Eurasia	0.37	0.36	0.35	0.37	0.36	0.36	0.00
Other Europe	0.10	0.09	0.10	0.10	0.10	0.10	0.00
Total Non-OECD	19.00	19.35	19.42	19.15	19.31	19.31	0.31
Total Non-DoC production	50.68	51.40	51.70	51.24	51.43	51.44	0.76
Processing gains	2.52	2.57	2.57	2.57	2.57	2.57	0.05
Total Non-DoC liquids production	53.20	53.97	54.27	53.81	54.00	54.01	0.81
Previous estimate	53.20	53.97	54.06	53.83	54.19	54.01	0.81
Revision	0.00	0.00	0.21	-0.01	-0.19	0.00	0.00

Note: * 2025 = Forecast. Totals may not add up due to independent rounding.

Source: OPEC.

DoC NGLs + non-conventional liquids production (Million barrels per day)

DoC NGLs and non-conventional liquids	Change		Change		1Q26	2Q26	3Q26	4Q26	Change	
	2024	24/23	2025	25/24					2026	26/25
OPEC	5.77	0.14	5.90	0.13	5.96	6.03	6.08	6.11	6.05	0.15
Non-OPEC DoC	2.77	0.03	2.76	-0.01	2.75	2.73	2.65	2.75	2.72	-0.04
Total	8.54	0.16	8.65	0.12	8.72	8.75	8.73	8.86	8.77	0.11

Note: 2025-2026 = Forecast.

Source: OPEC.

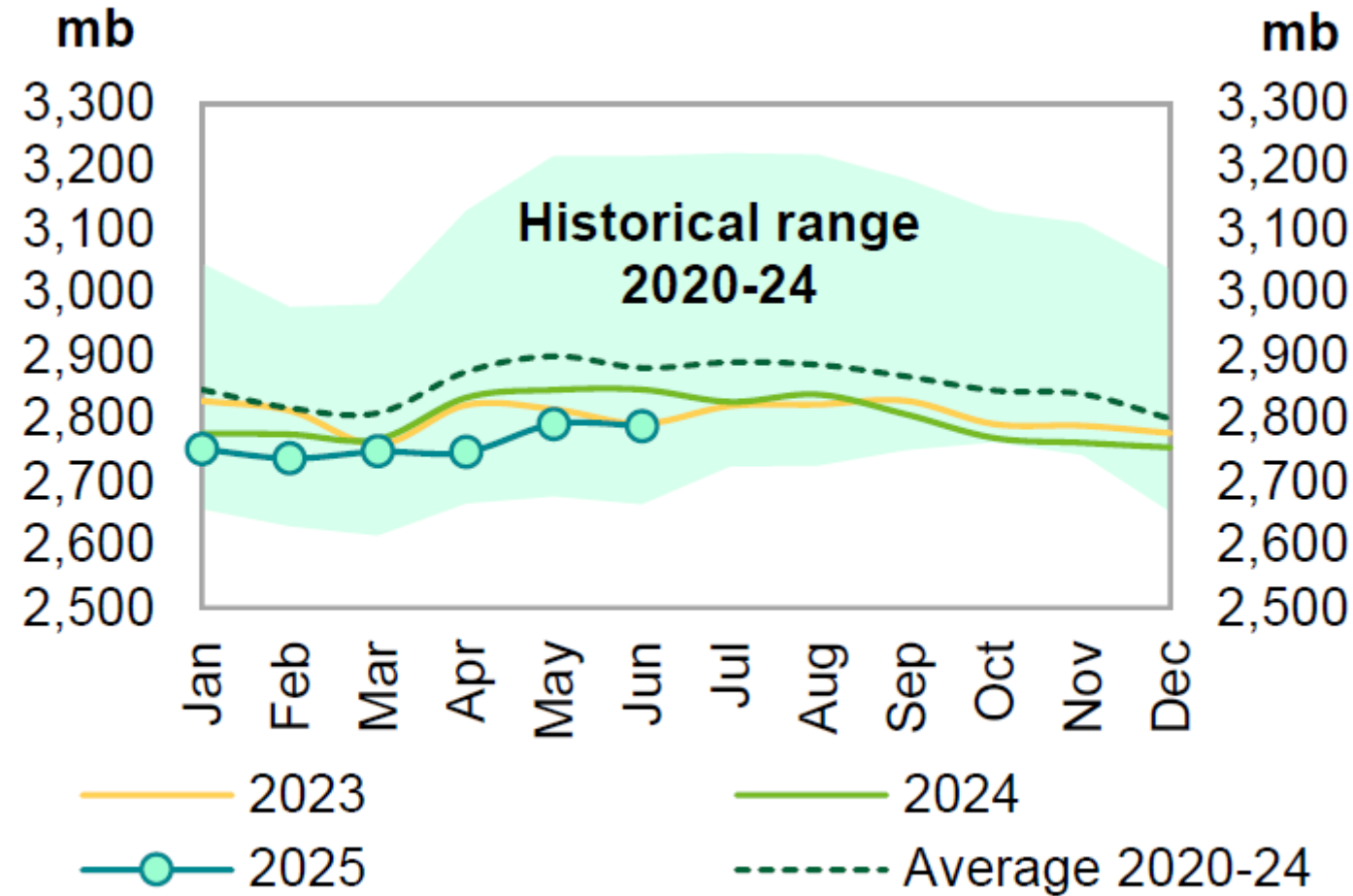
DoC production/demand balance for 2025 (Million barrels per day)

	2024	1Q25	2Q25	3Q25	4Q25	2025	Change 2025/24
(a) World oil demand	103.8	104.3	104.3	105.5	106.4	105.1	1.3
Non-DoC liquids production	53.2	54.0	54.3	53.8	54.0	54.0	0.8
DoC NGL and non-conventionals	8.5	8.7	8.7	8.6	8.7	8.7	0.1
(b) Total non-DoC liquids production and DoC NGLs	61.7	62.6	62.9	62.4	62.7	62.7	0.9
Difference (a-b)	42.1	41.6	41.4	43.1	43.7	42.5	0.4
DoC crude oil production	40.9	40.9	41.3				
Balance	-1.2	-0.7	-0.1				

Note: * 2025 = Forecast. Totals may not add up due to independent rounding.

Source: OPEC.

OECD commercial stocks



Sources: EIA, IEA, METI, OilX and OPEC.

DoC crude oil production based on secondary sources (kilo barrels per day)

Secondary sources	2023	2024	4Q24	1Q25	2Q25	May 25	Jun 25	Jul 25	Change Jul/Jun
Algeria	969	905	904	910	920	921	927	931	4
Congo	261	254	255	259	258	256	258	263	6
Equatorial Guinea	57	57	59	60	55	57	53	53	0
Gabon	213	224	231	227	230	232	233	228	-5
IR Iran	2,884	3,257	3,290	3,307	3,306	3,324	3,257	3,245	-12
Iraq	4,265	4,163	4,015	3,998	3,957	3,939	3,953	3,902	-51
Kuwait	2,595	2,429	2,422	2,415	2,431	2,430	2,444	2,452	7
Libya	1,153	1,092	1,183	1,288	1,284	1,304	1,280	1,302	22
Nigeria	1,337	1,426	1,485	1,518	1,527	1,513	1,543	1,559	16
Saudi Arabia	9,618	8,978	8,959	8,948	9,178	9,175	9,356	9,526	170
UAE	2,954	2,950	2,947	2,939	2,994	2,975	3,060	3,169	109
Venezuela	760	867	905	926	924	925	918	914	-4
Total OPEC	27,065	26,602	26,655	26,796	27,062	27,050	27,281	27,543	263
Azerbaijan	504	482	487	467	462	464	463	462	-1
Bahrain	185	176	182	186	183	177	186	186	0
Brunei	70	79	82	88	83	80	83	83	0
Kazakhstan	1,603	1,539	1,417	1,758	1,824	1,781	1,863	1,827	-36
Malaysia	374	347	345	350	346	346	340	340	0
Mexico	1,651	1,578	1,519	1,455	1,457	1,462	1,450	1,447	-3
Oman	819	766	761	755	763	761	768	774	7
Russia	9,596	9,193	9,015	8,972	8,995	8,984	9,022	9,120	98
Sudan	56	30	26	25	26	26	26	26	0
South Sudan	146	72	55	71	107	111	124	132	8
Total Non-OPEC DoC	15,004	14,261	13,890	14,127	14,245	14,191	14,324	14,397	72
Total DoC	42,069	40,863	40,545	40,923	41,307	41,241	41,605	41,940	335

Notes: Totals may not add up due to independent rounding, given available secondary sources to date.

Source: OPEC.

DoC crude oil production based on direct communication (kilo barrels per day)

Direct communication	2023	2024	4Q24	1Q25	2Q25	May 25	Jun 25	Jul 25	Change Jul/Jun
Algeria	973	907	908	909	920	920	927	937	10
Congo	271	260	265	260	267	268	263	271	8
Equatorial Guinea	55	57	58	56	46	45	46	48	2
Gabon	223	..	..	..	..	..	..	..	..
IR Iran	..	..	..	..	..	..	..	..	..
Iraq	4,118	3,862	3,731	3,667	3,632	3,605	3,627	3692*	65
Kuwait	2,590	2,411	2,404	2,406	2,418	2,420	2,420	2,445	25
Libya	1,189	1,136	1,252	1,386	1,367	1,366	1,367	1,377	10
Nigeria	1,187	1,345	1,435	1,468	1,481	1,453	1,505	1,507	2
Saudi Arabia	9,606	8,955	8,935	8,941	9,183	9,184	9,360**	9,525**	165
UAE	2,944	2,916	2,884	2,906	2,958	2,930	3,033	3,141	108
Venezuela	783	921	982	1,035	1,062	1,066	1,069	1,084	15
Total OPEC	..	..	..	..	..	..	..	..	..

Notes: .. Not available. Totals may not add up due to independent rounding.

* Reported as federal government production, not including production of KRG.

** Saudi Arabia's supply to the market was 9,360 tb/d and 9,525 tb/d in June and July 2025, respectively;

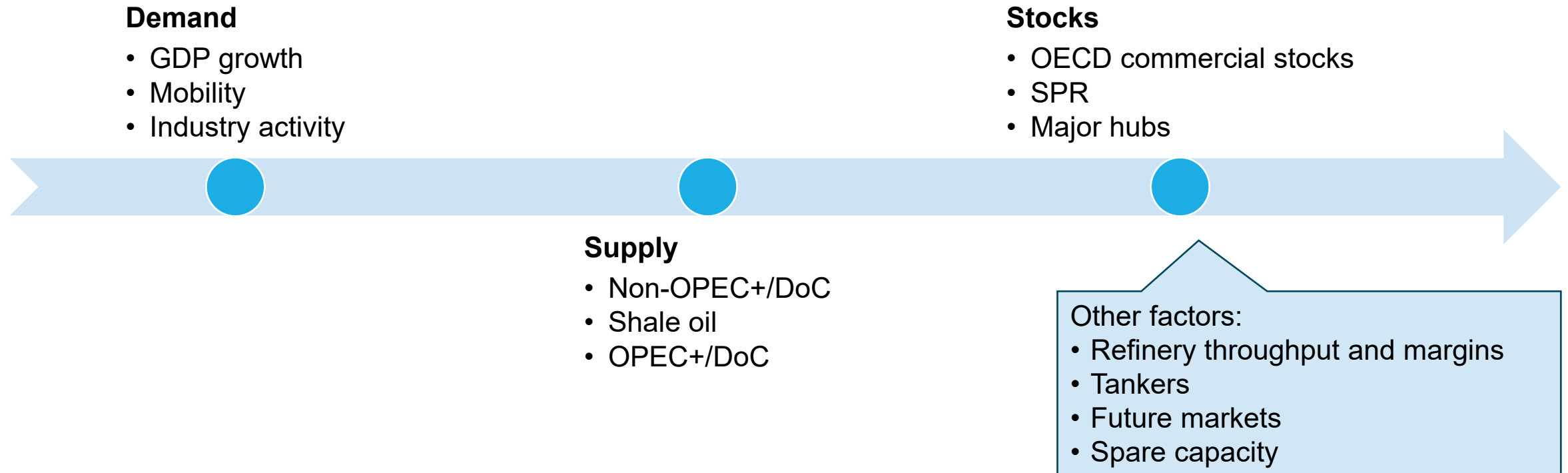
Saudi Arabia's production was 9,752 tb/d and 9,201 tb/d in June and July 2025, respectively.

Source: OPEC.

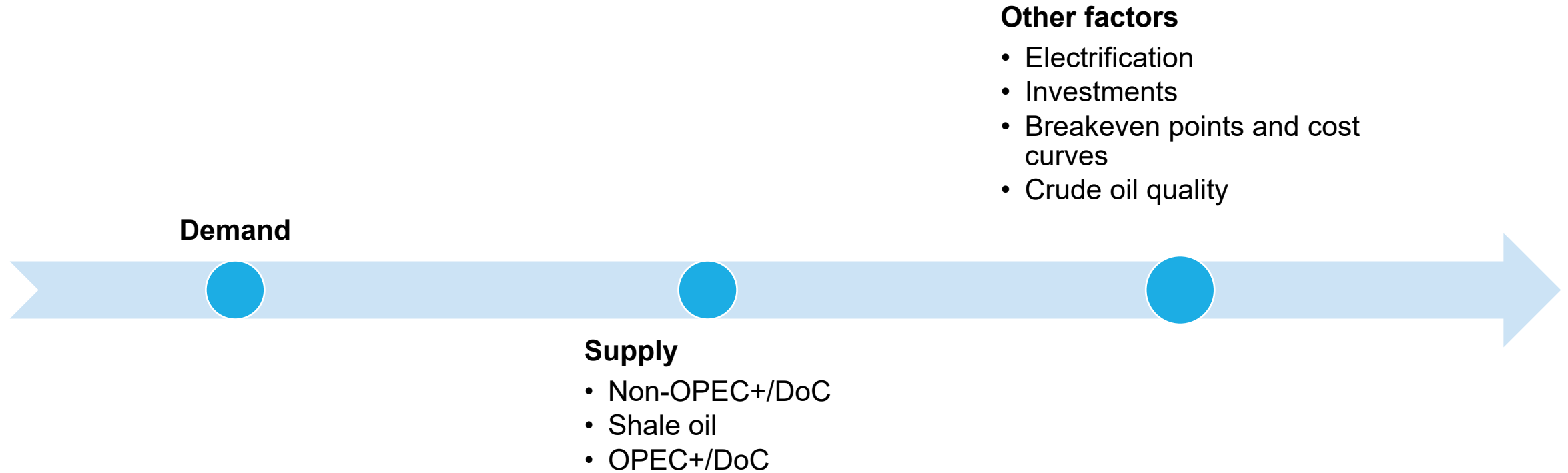
OPEC secondary sources

Before 2022	After 2022	After 2025
Platts	Platts	Platts
Argus	Argus	Argus
Energy intelligence	Energy intelligence	Energy intelligence
IHS Markit	IHS Markit	IHS Markit
EIA	EIA	EIA
IEA	IEA	
	Wood Mackenzie	Wood Mackenzie
	Rystad Energy	Rystad Energy
		Kpler
		OilX
		ESAI

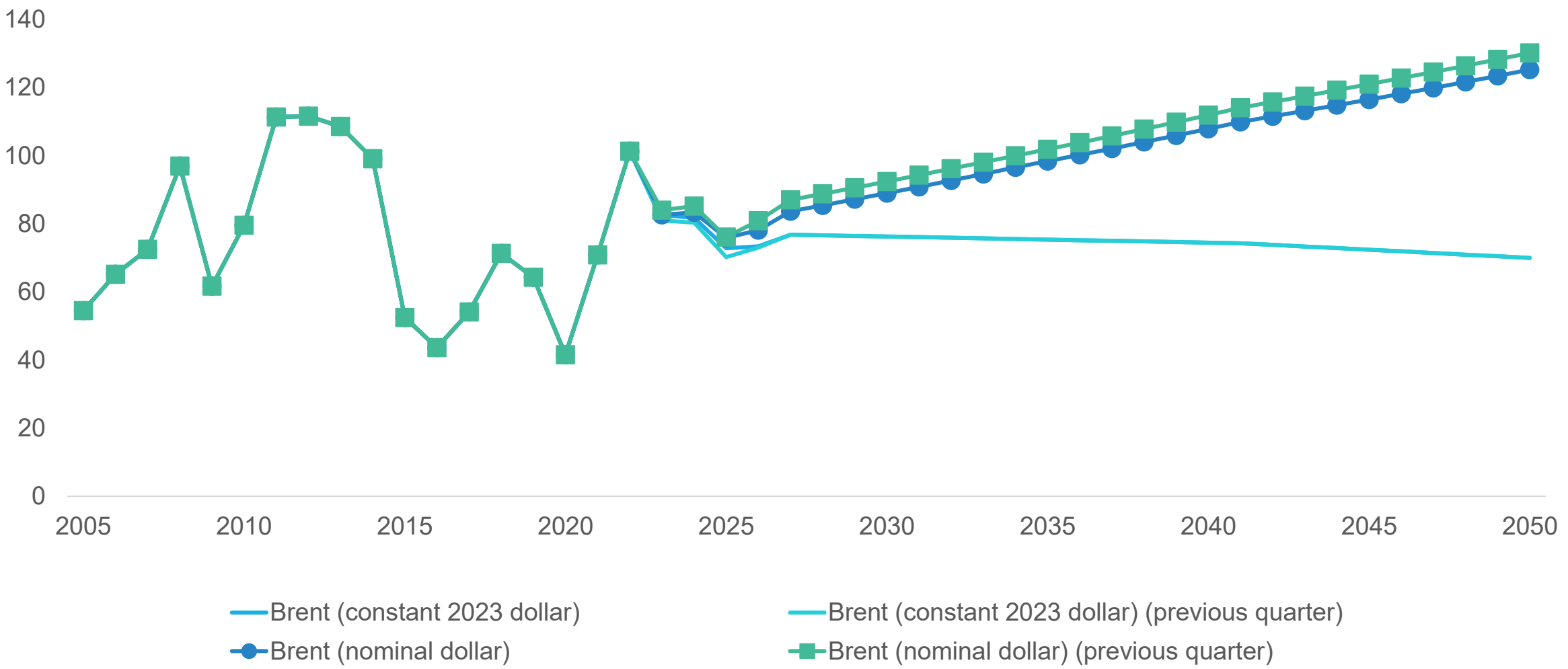
Short-to-medium term oil price forecast methodology



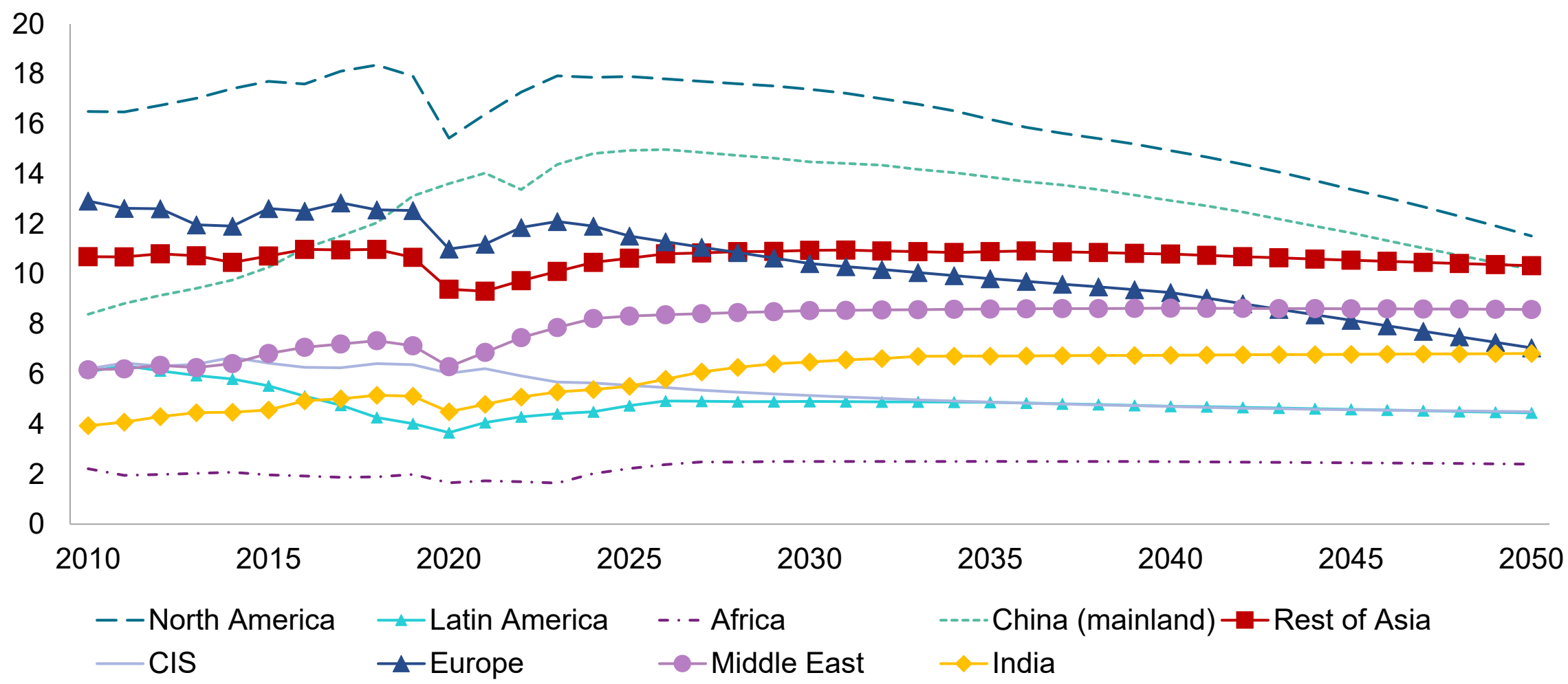
Long-term price forecast methodology



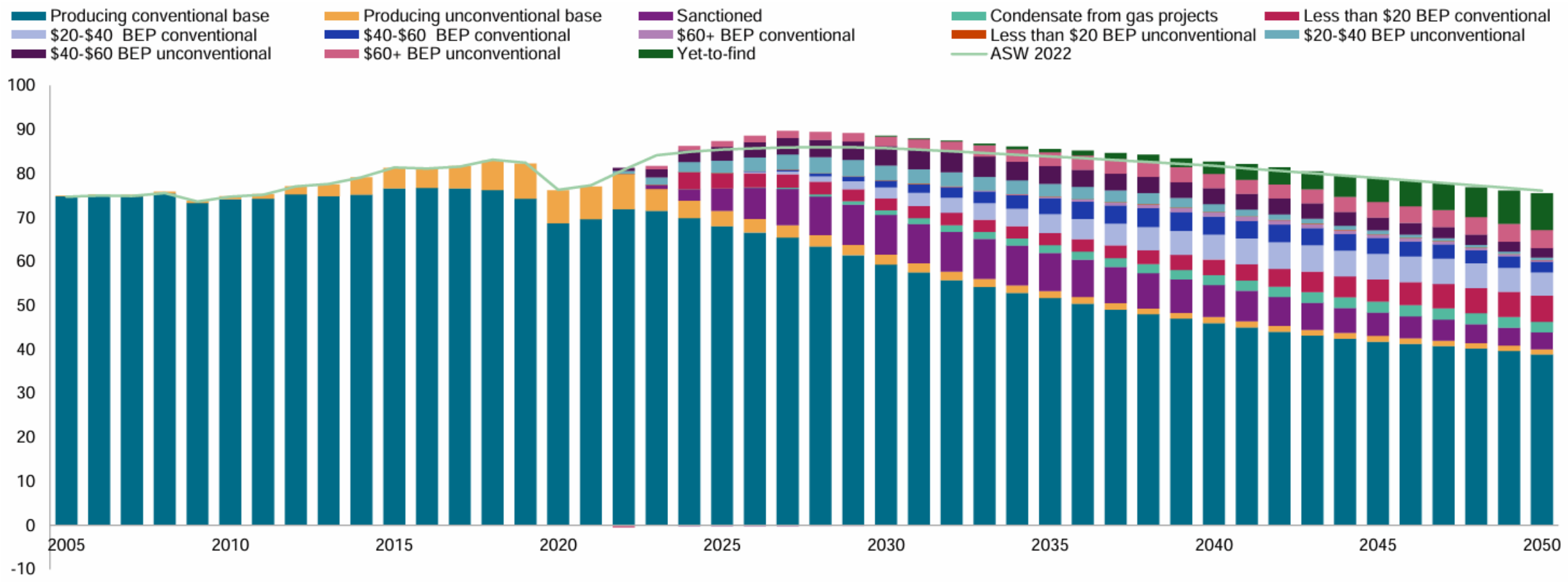
Crude oil dated brent price forecast (USD) – IHS



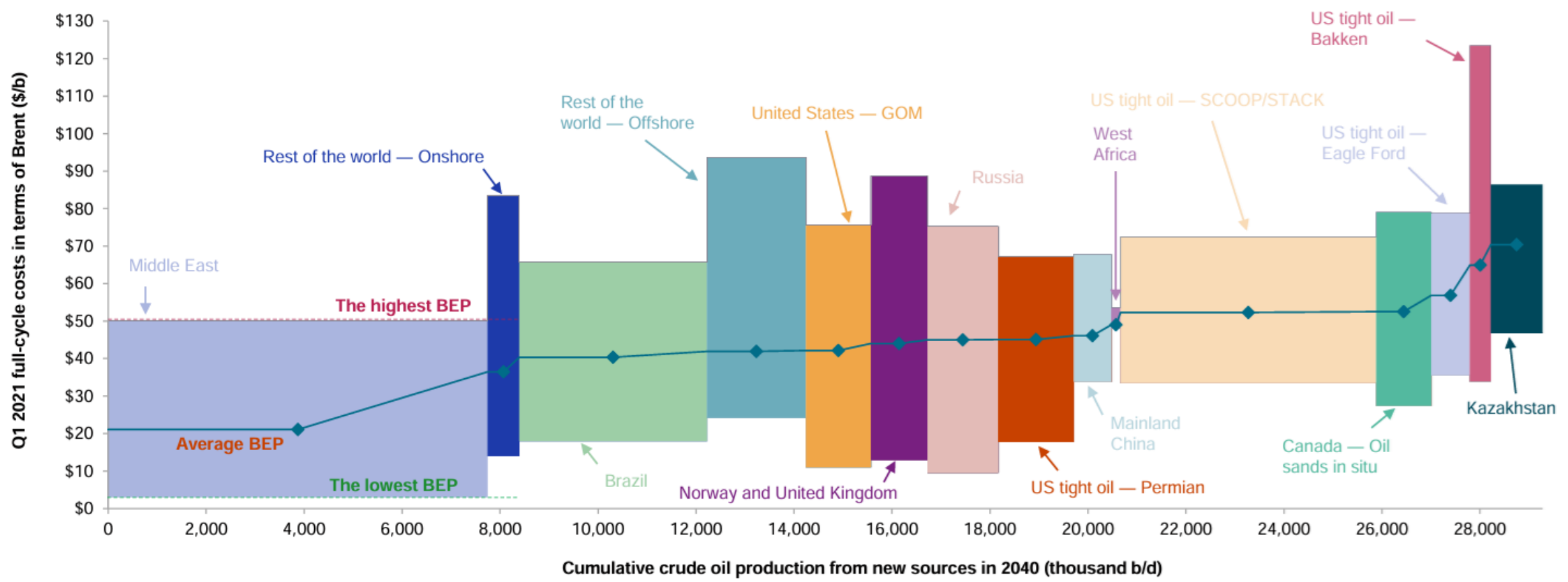
Global crude oil runs by region (million barrels per day) – IHS



World oil supply by breakeven point – IHS



Cost curve



References

- SPE, Petroleum Resources Management System
- [Rystad Energy](#)
- OPEC, Annual Statistical Bulletin
- OPEC, Monthly Oil Market Report
- S&P Global Platts Commodity Insights (IHS), 2024 Long Term Prices and Margins Forecast

Agenda

1. References
2. The energy cake
3. Energy efficiency
4. Electrification
5. Future scenarios
6. Emissions
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8. Carbon
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11. Peak oil
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16. The Middle East
17. Iran's energy profile
18. Iran's oil and gas



Is shale oil important to us? Why?

An old story

مجله ی 29 - توصیه های پسران اخبار بین الملل (انرژی)

تاریخ انتشار: شنبه ۱۴ بهمن ۱۳۹۱

چگونه ذخایر نامتعارف، تولید انرژی در آمریکا را متحول کرده است؟

انقلاب رُسی

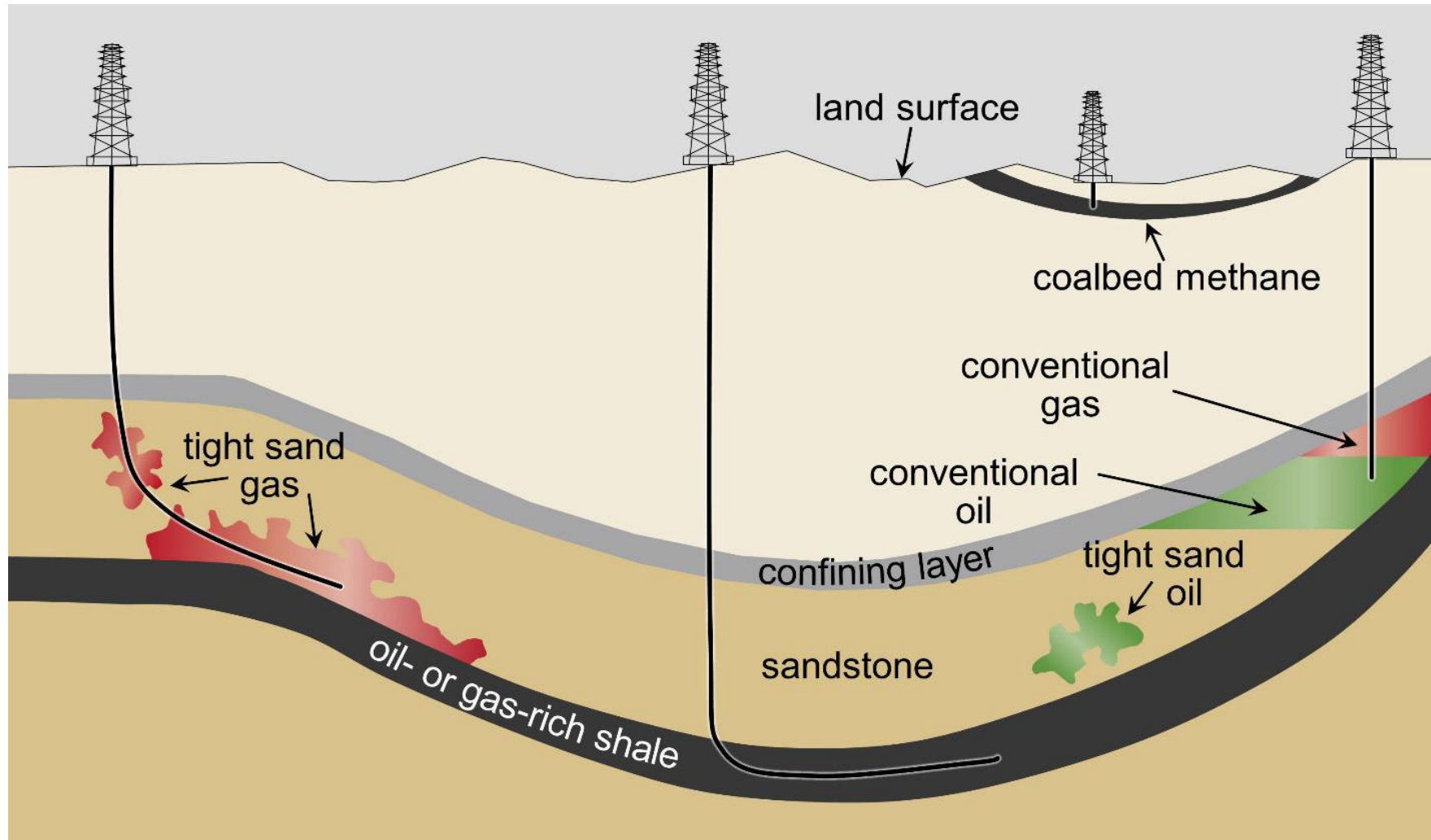
رامین فروزنده

«آمریکا احتمالاً در سال ۲۰۱۳ با پشت سر گذاشتن روسیه و عربستان، به بزرگ‌ترین تولیدکننده سوخت‌های مایع در جهان تبدیل خواهد شد.»

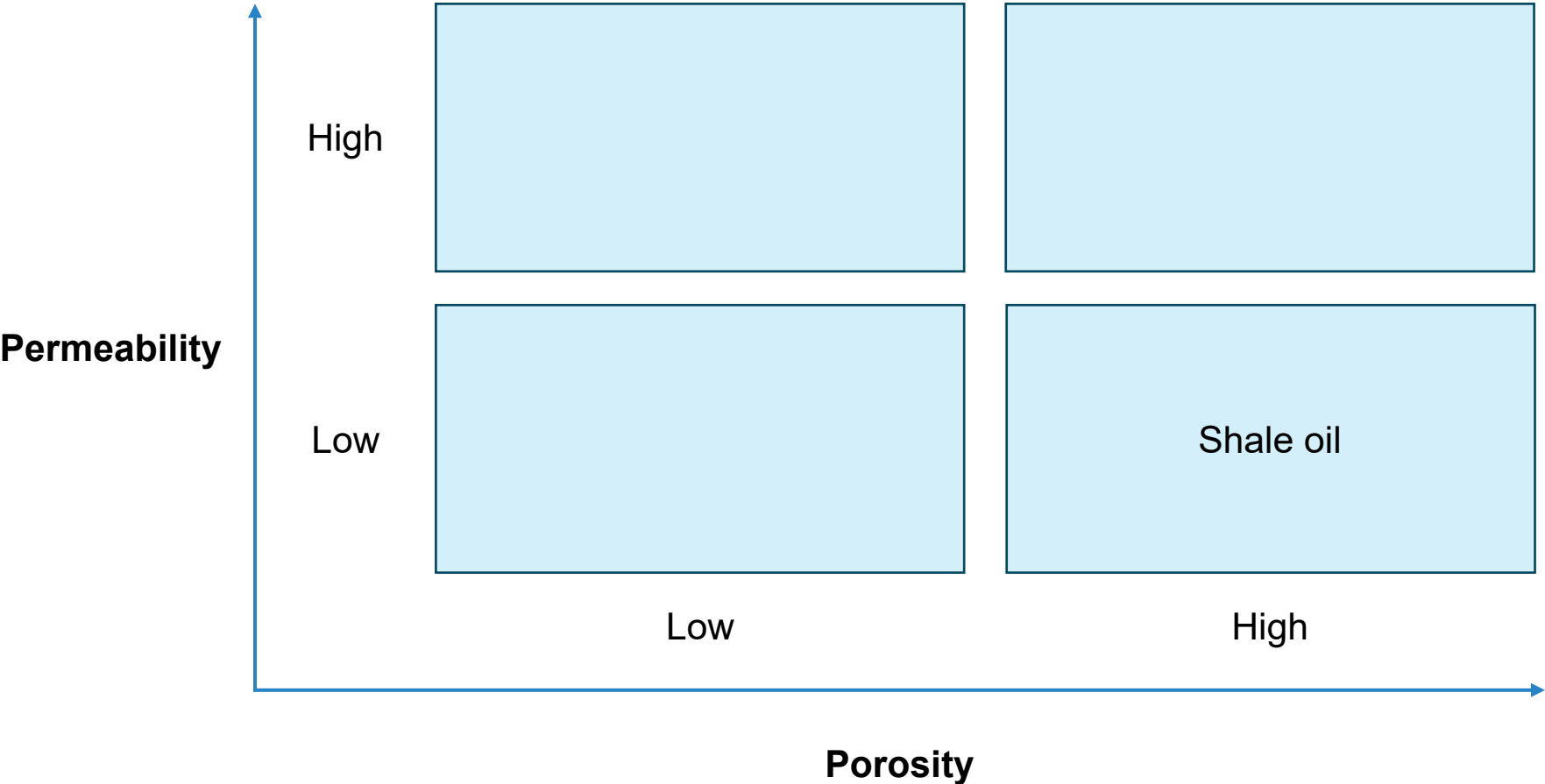


«آمریکا احتمالاً در سال 2013 با پشت سر گذاشتن روسیه و عربستان، به بزرگ‌ترین تولیدکننده سوخت‌های مایع در جهان تبدیل خواهد شد.» این جمله، شاید مهم‌ترین پیش‌بینی گزارش جدید شرکت بریتیش پترولیوم باشد؛ به خصوص اگر بدانیم سهم اصلی در افزایش تولید نفت و گاز را در آمریکا، ذخایر نامتعارف خواهند داشت. گزارش چشم‌انداز انرژی 2030 که در اواسط ژانویه سال جدید میلادی منتشر شد، نخستین گزارشی نیست که بر نقش تولید نفت و گاز از منابعی مثل شیل1 (سنگ حاوی ذخایر هیدروکربن که از رُس تشکیل شده است) متمرکز شده است. گفته می‌شود تولید از ذخایر نامتعارف که با افزایش قیمت‌های جهانی انرژی و بهبود فناوری‌های صنعت نفت اقتصادی همراه شده است، چشم‌انداز جدیدی را به روی صنعت نفت و گاز جهان گشوده است که می‌توان از آن به «انقلاب رُسی» یاد کرد.

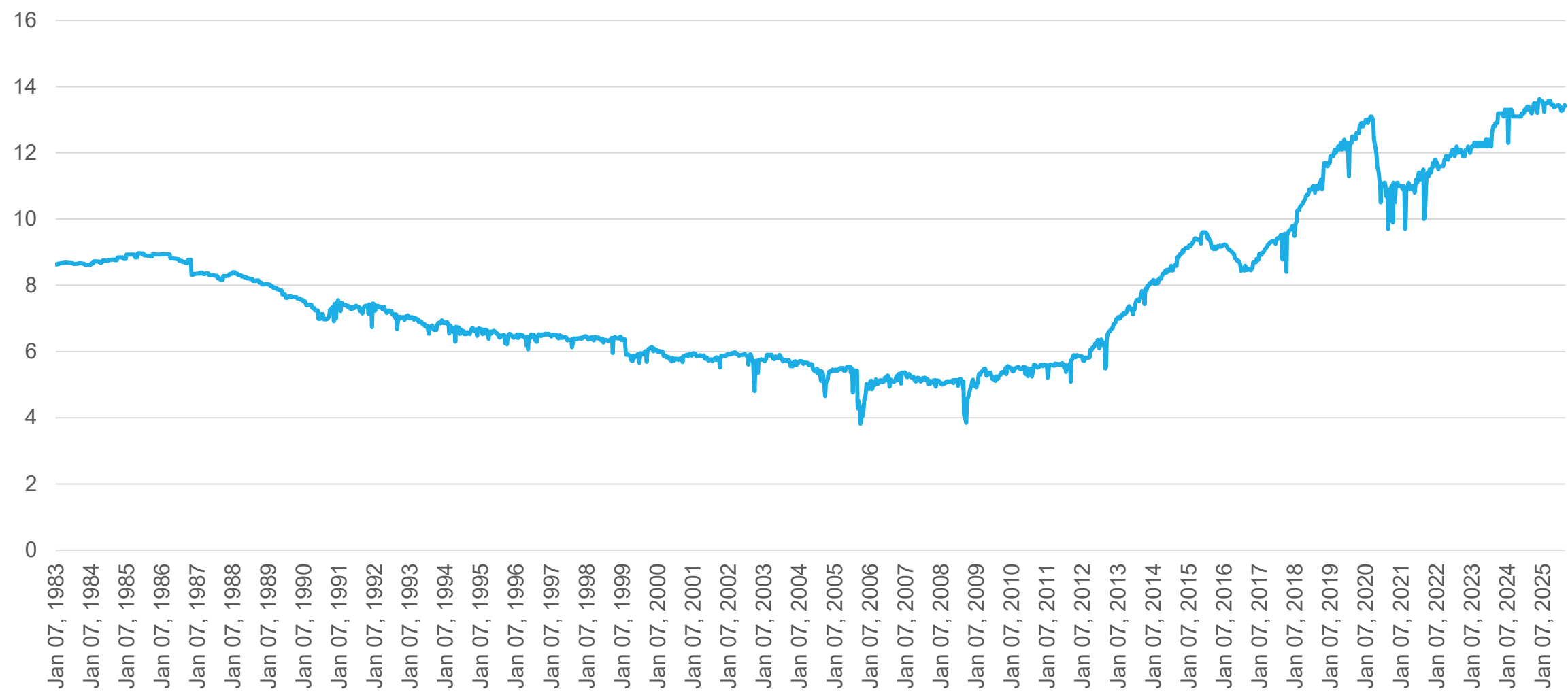
Overview of shale oil and gas production



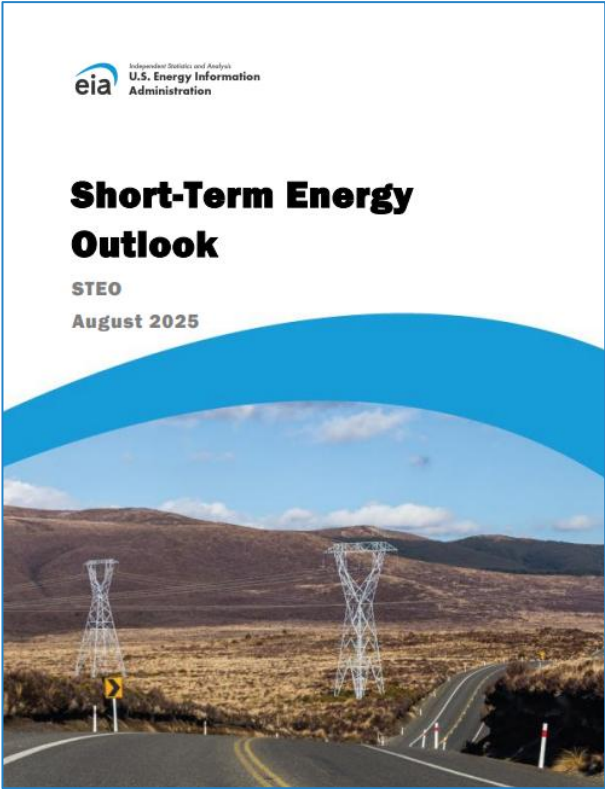
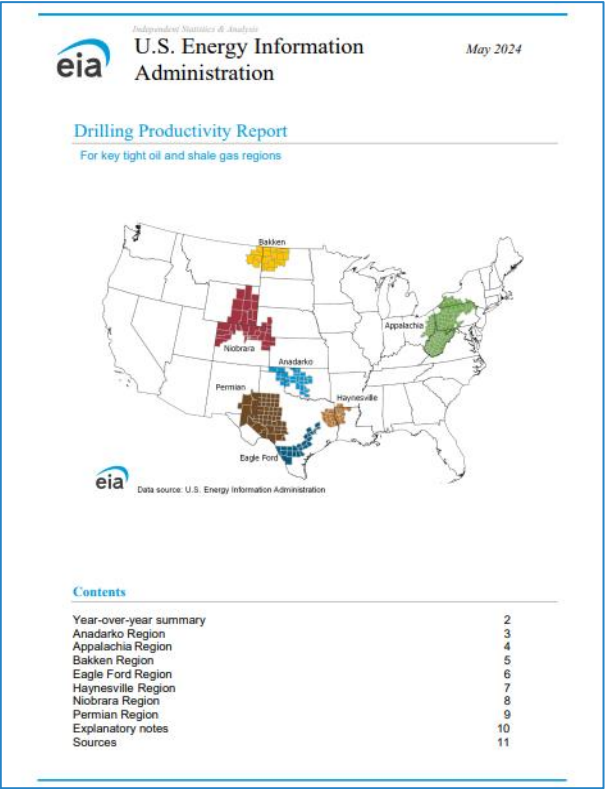
Shale oil porosity and permeability



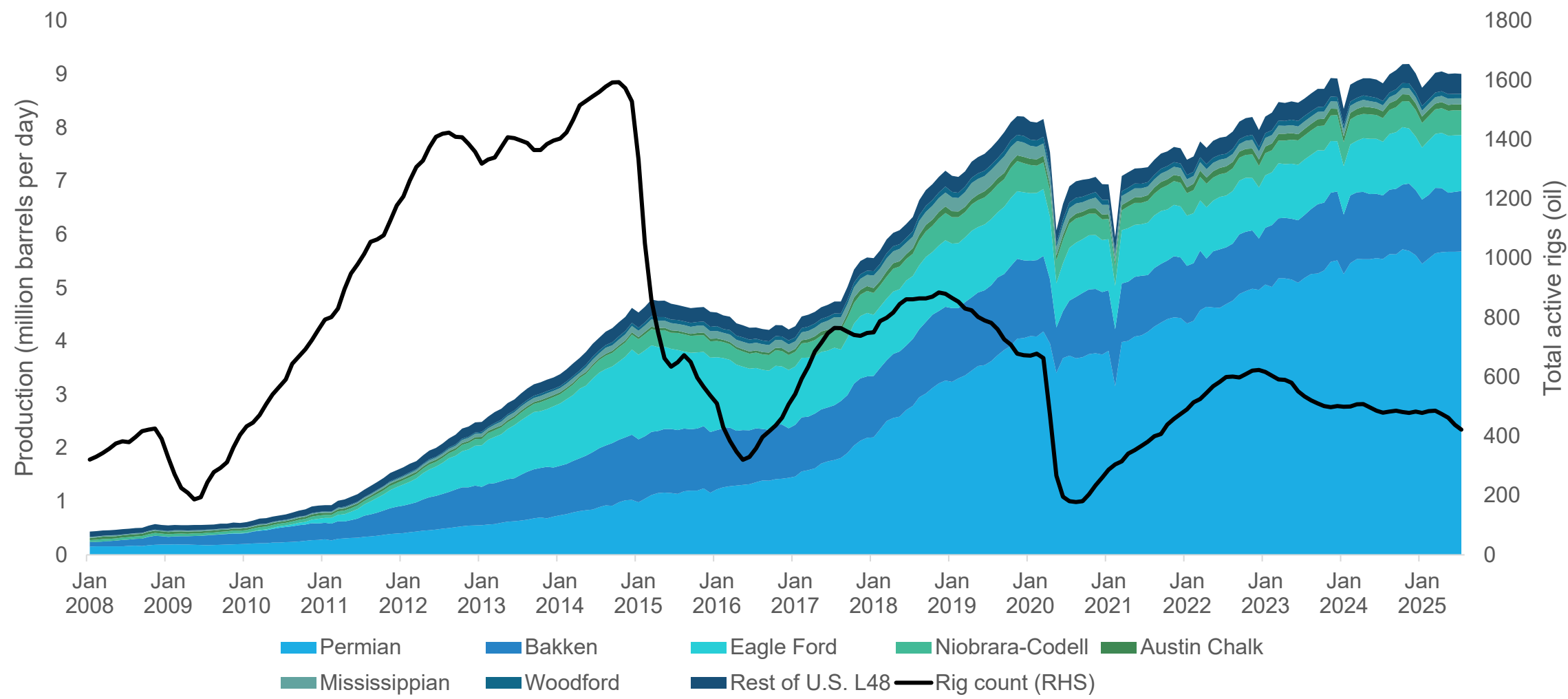
Weekly US crude oil production (million barrels per day)



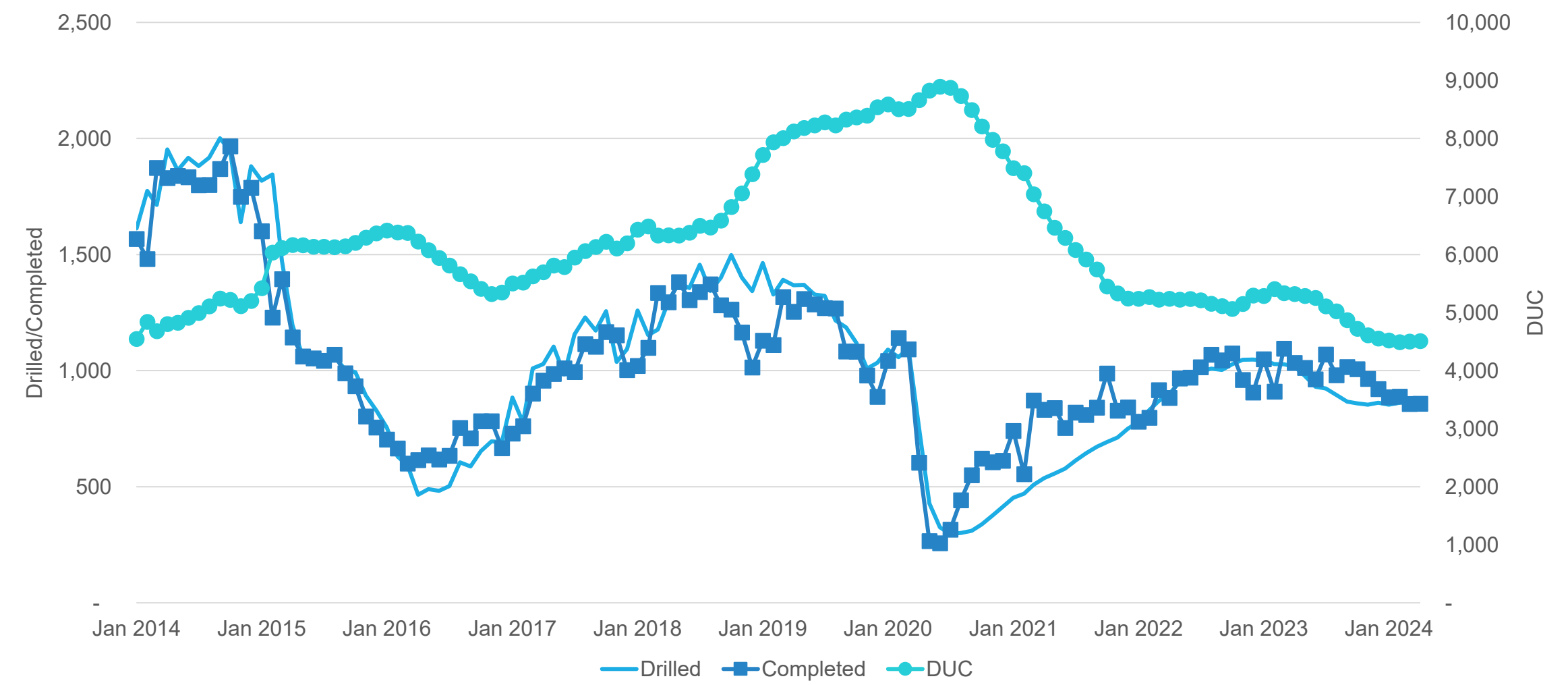
Shale oil data



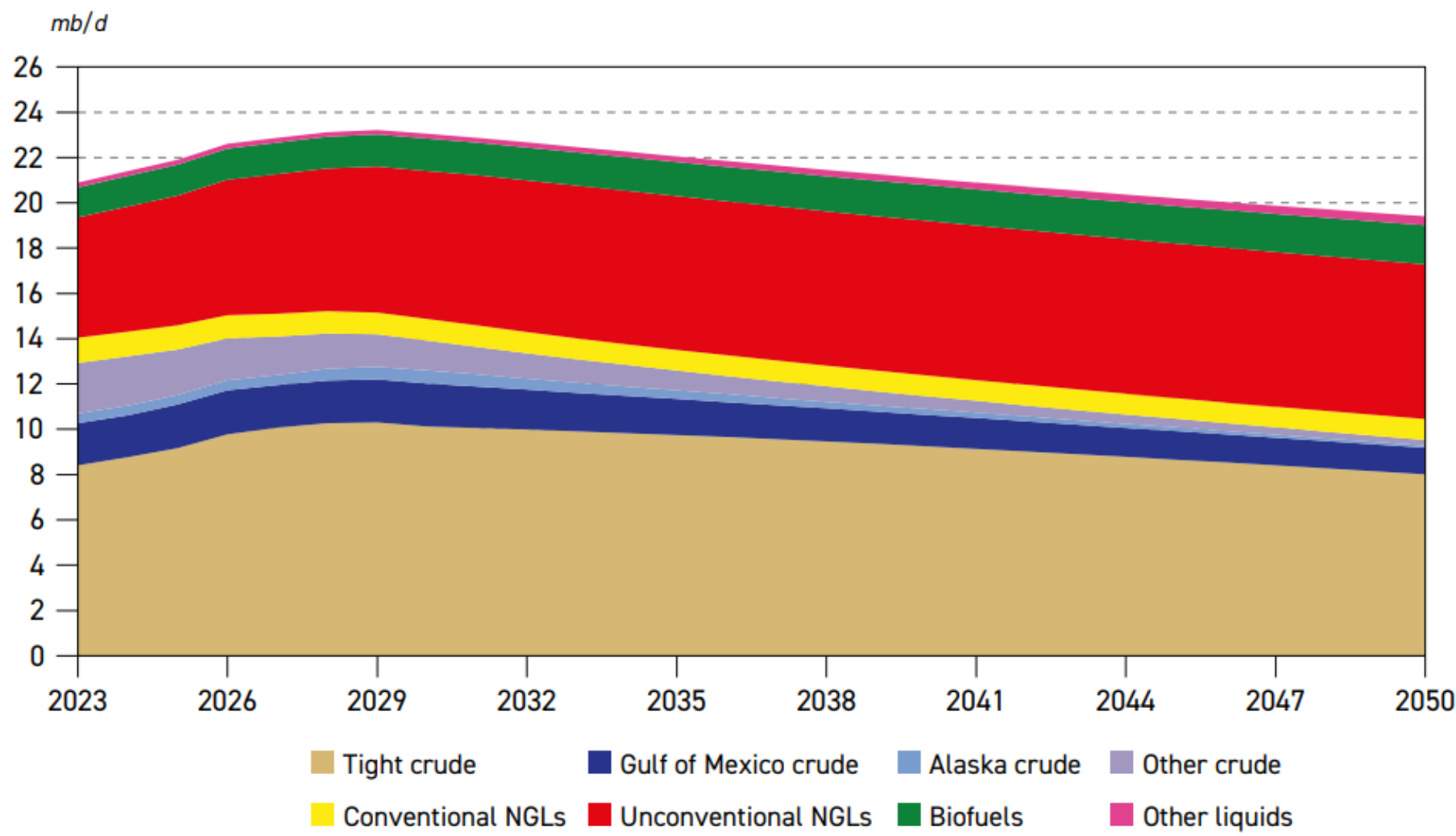
US tight oil production and active oil rigs (total)



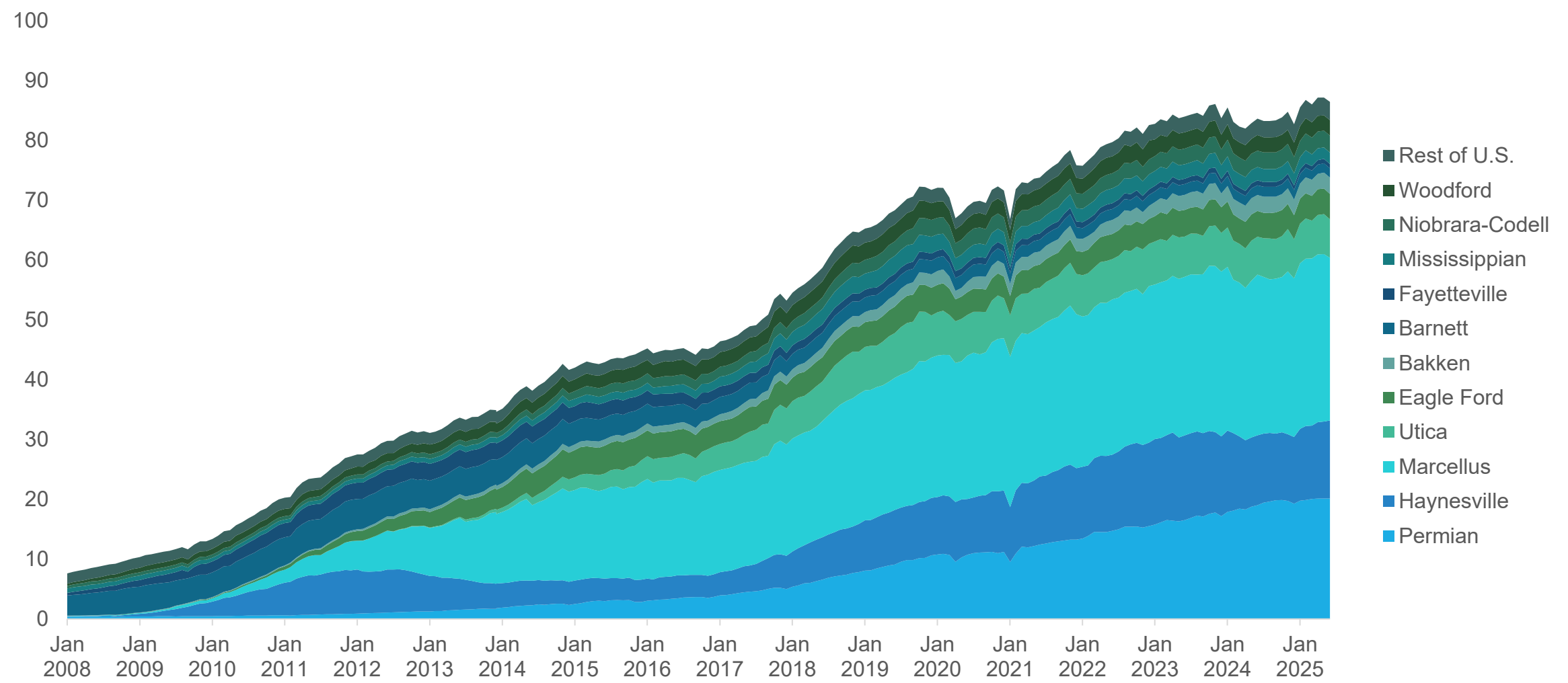
DUC wells



US liquids supply outlook



US shale gas production (billion cubic feet per day)



The underlying law...

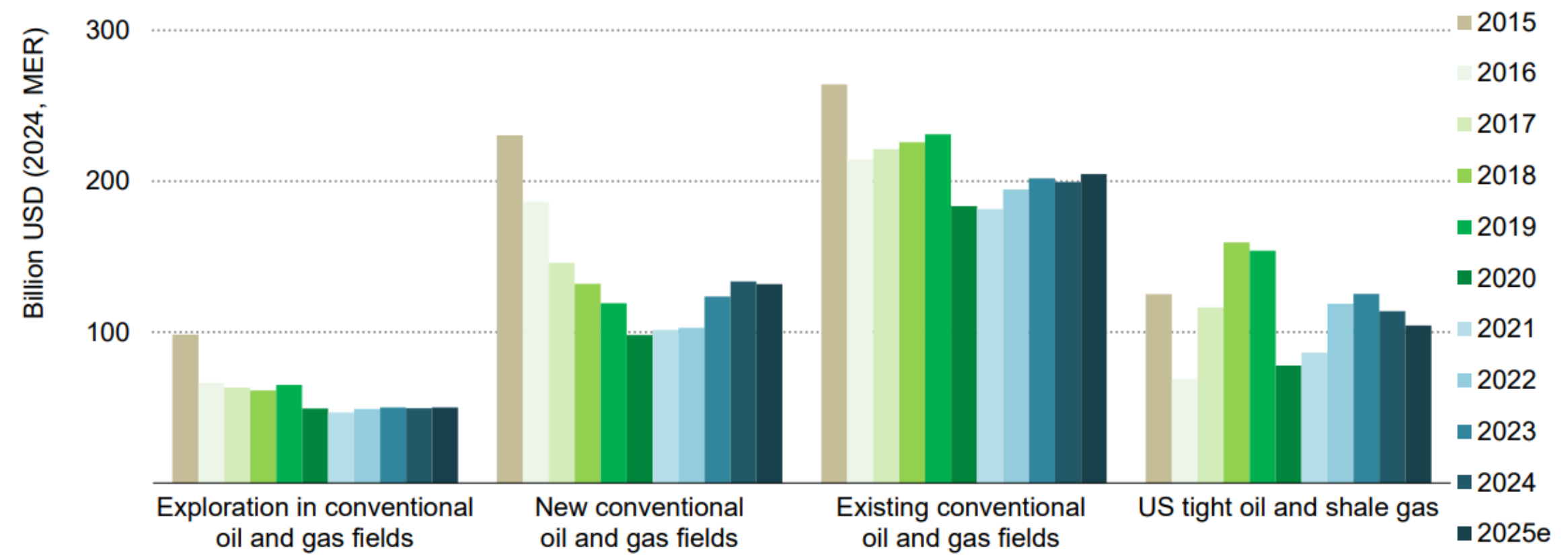


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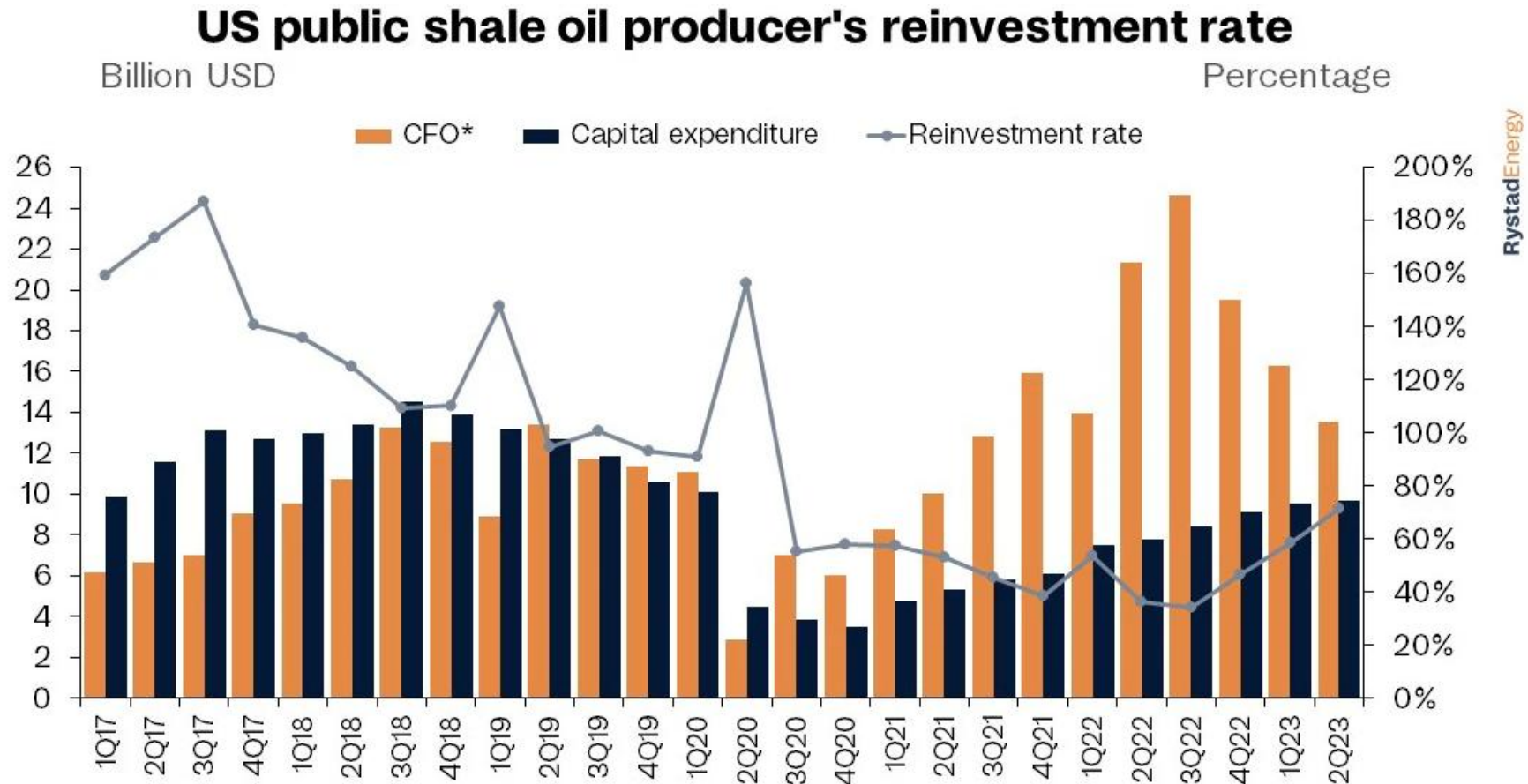
Law

- Rule of Capture:
 - The owner of a tract of land acquires title to the oil or gas which he produces from wells on his land, though part of the oil or gas may have migrated from adjoining lands.

Upstream oil and gas capital expenditure by activity and field type



US Shale oil CFO and CAPEX



*Cash flow from operations. Peer group of 18 public shale oil producers = ~40% of total output.

Source: Rystad Energy's Shale Solution, August 2023

A Rystad Energy graphic

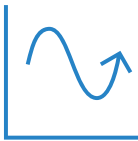
Breakeven reduction



Structural

Productivity

Drilling and completion
efficiency

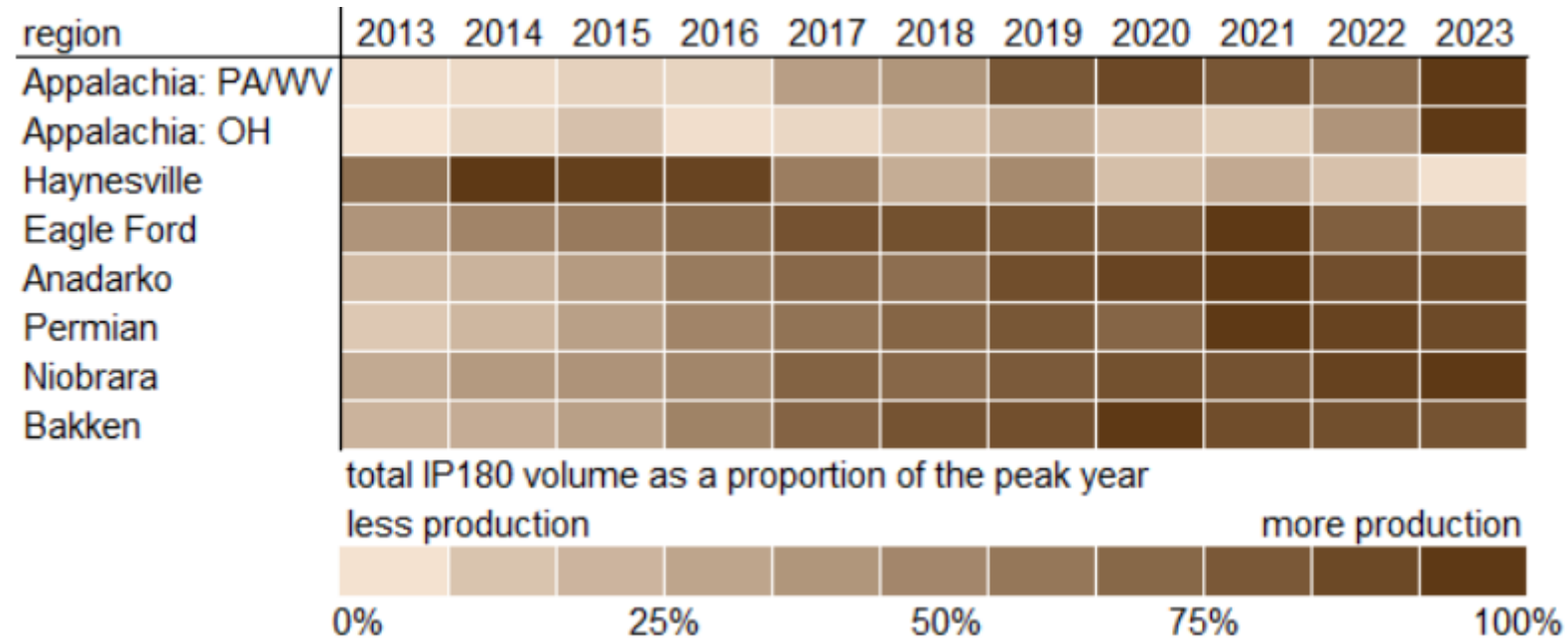


Cyclical

Costs

High-grading

Vintage year order for crude oil IP180 by region



Six-month initial production of crude oil by region

Figure 10. Anadarko Region, six-month crude oil production by vintage year

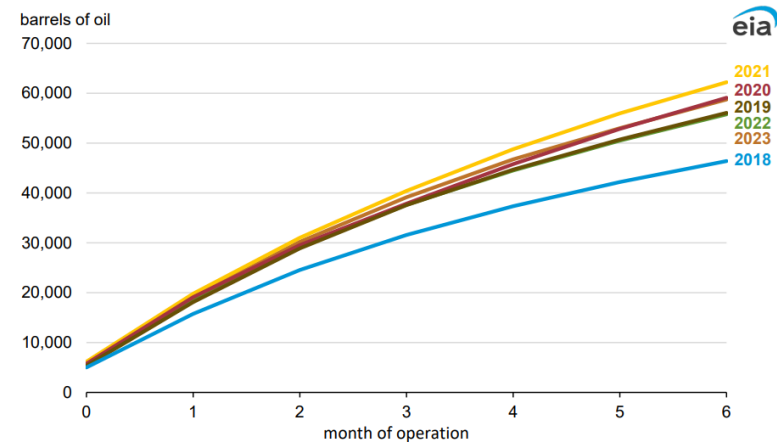


Figure 11. Appalachia Region, six-month crude oil production by vintage year

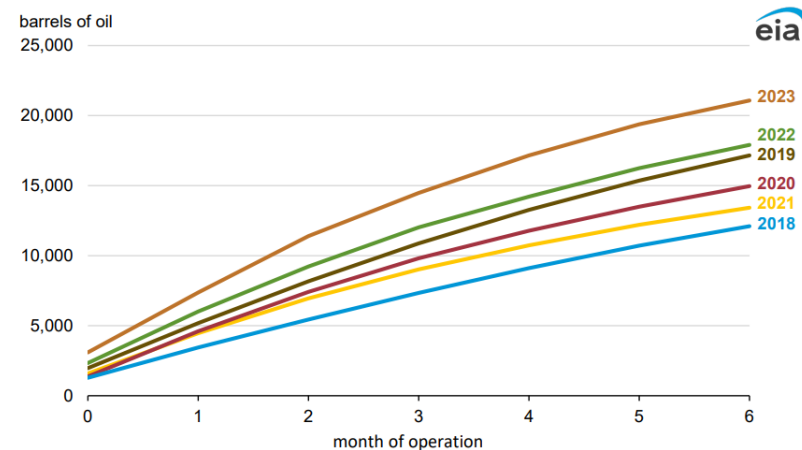


Figure 12. Bakken Region, six-month crude oil production by vintage year

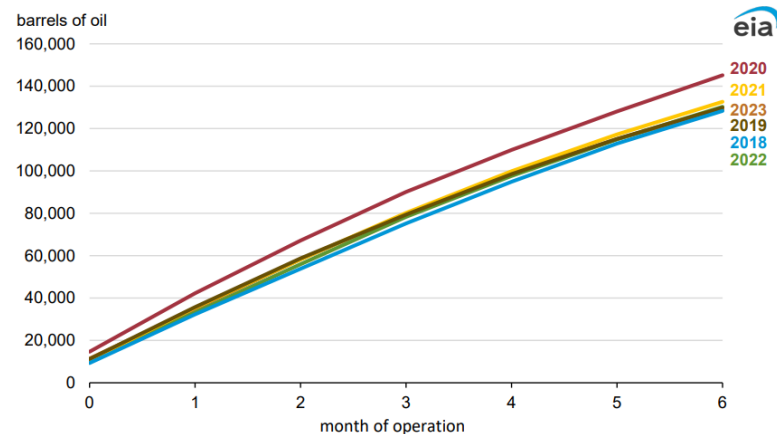
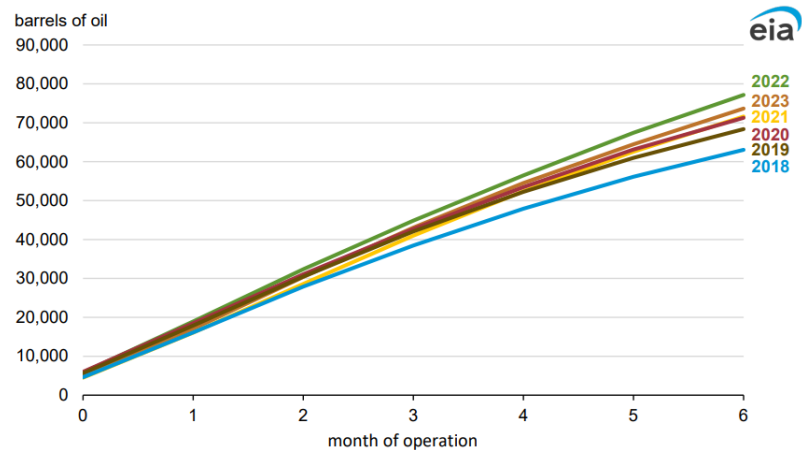
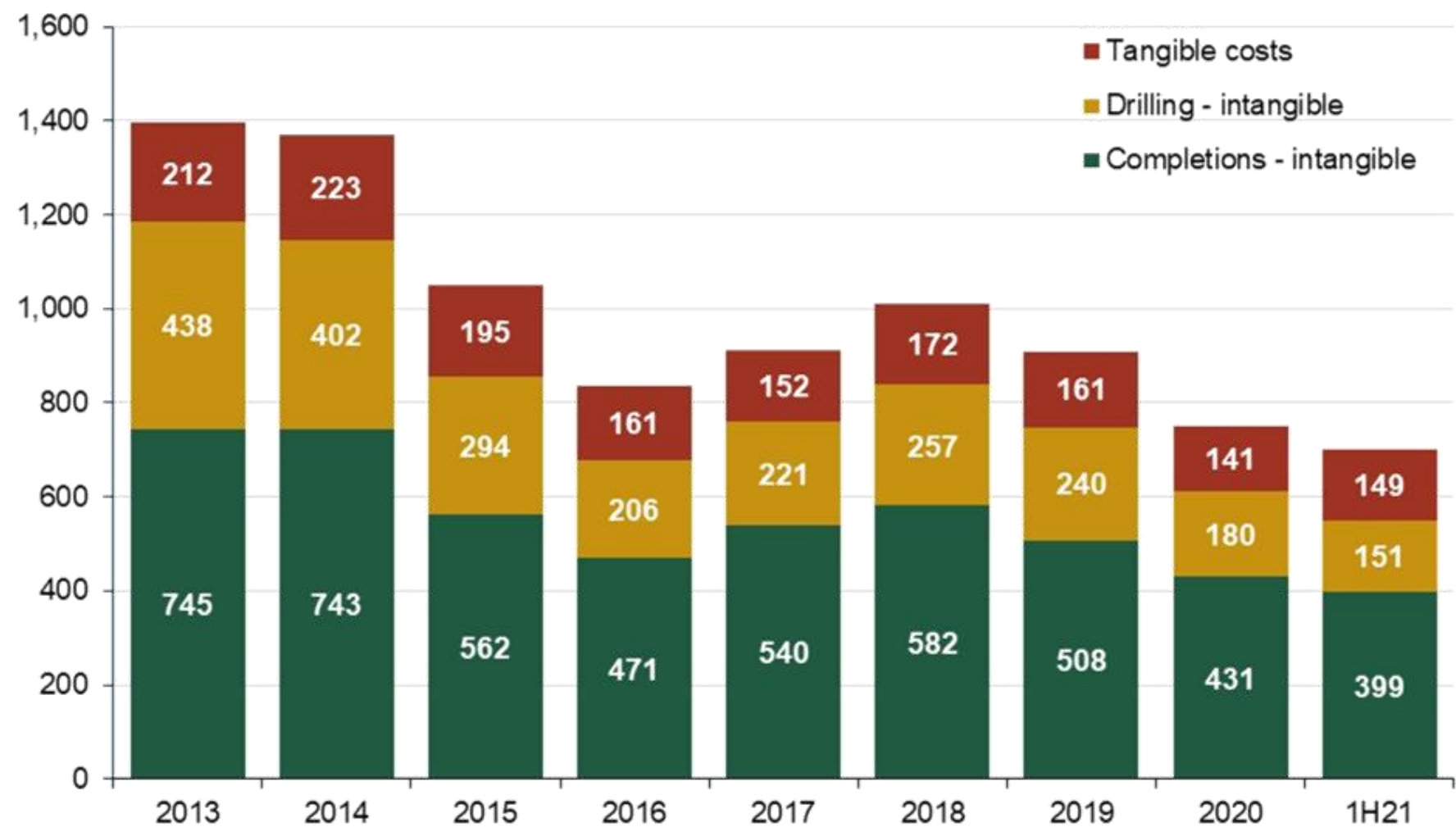


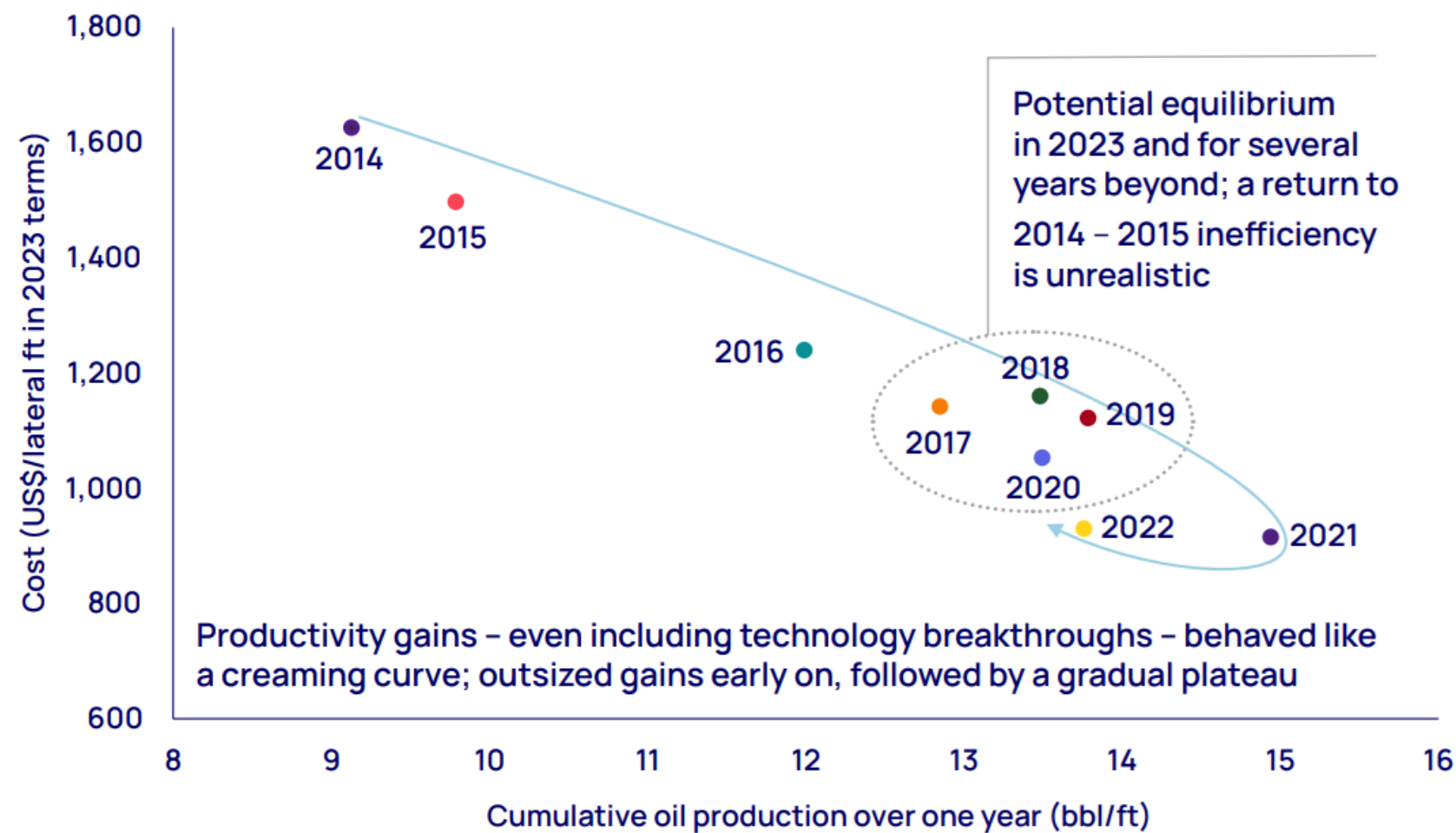
Figure 15. Niobrara Region, six-month crude oil production by vintage year



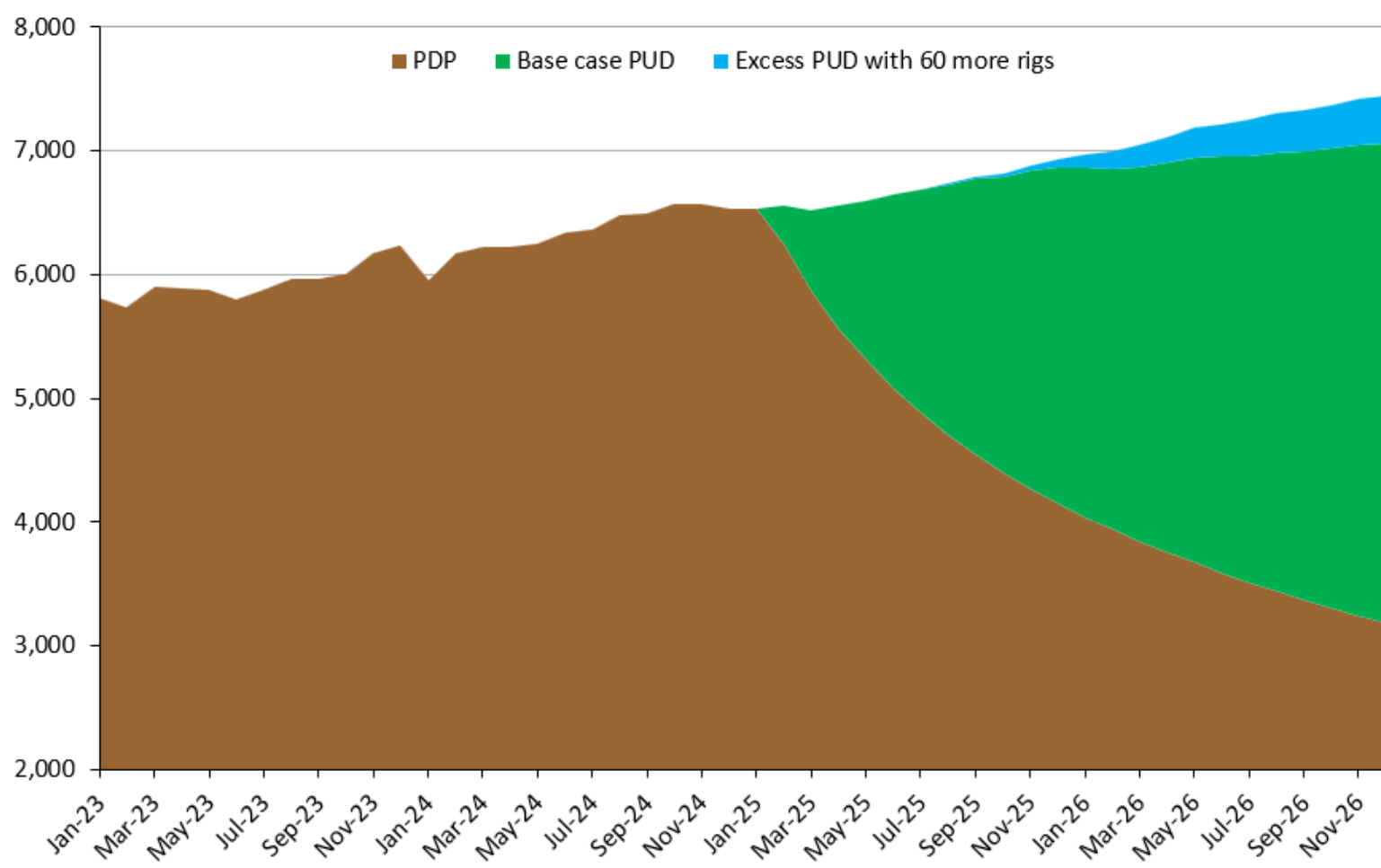
Permian P50 drilling and completion cost by completion year (USD/feet)



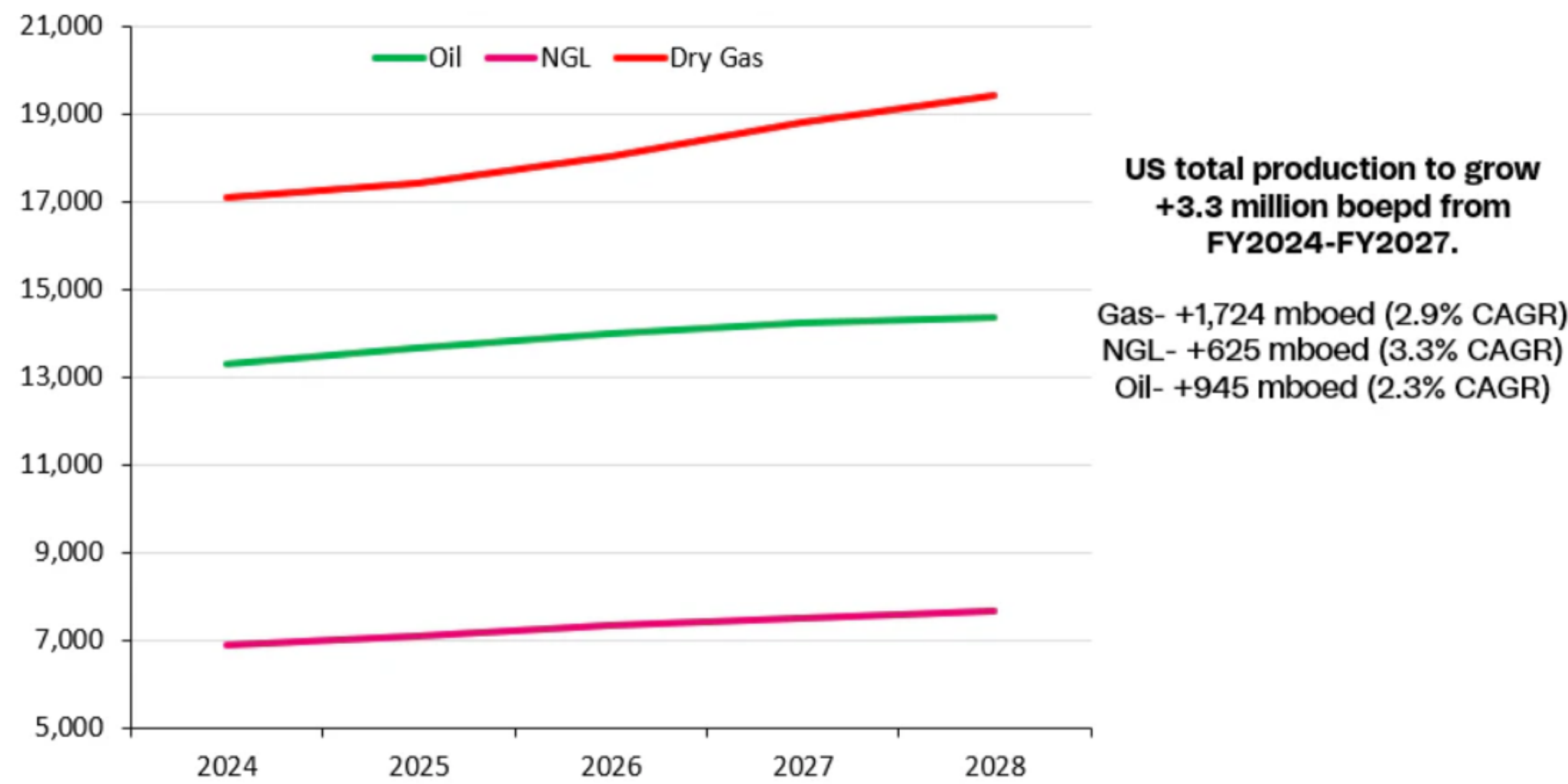
Cumulative oil production and cost changes (2014-2022)



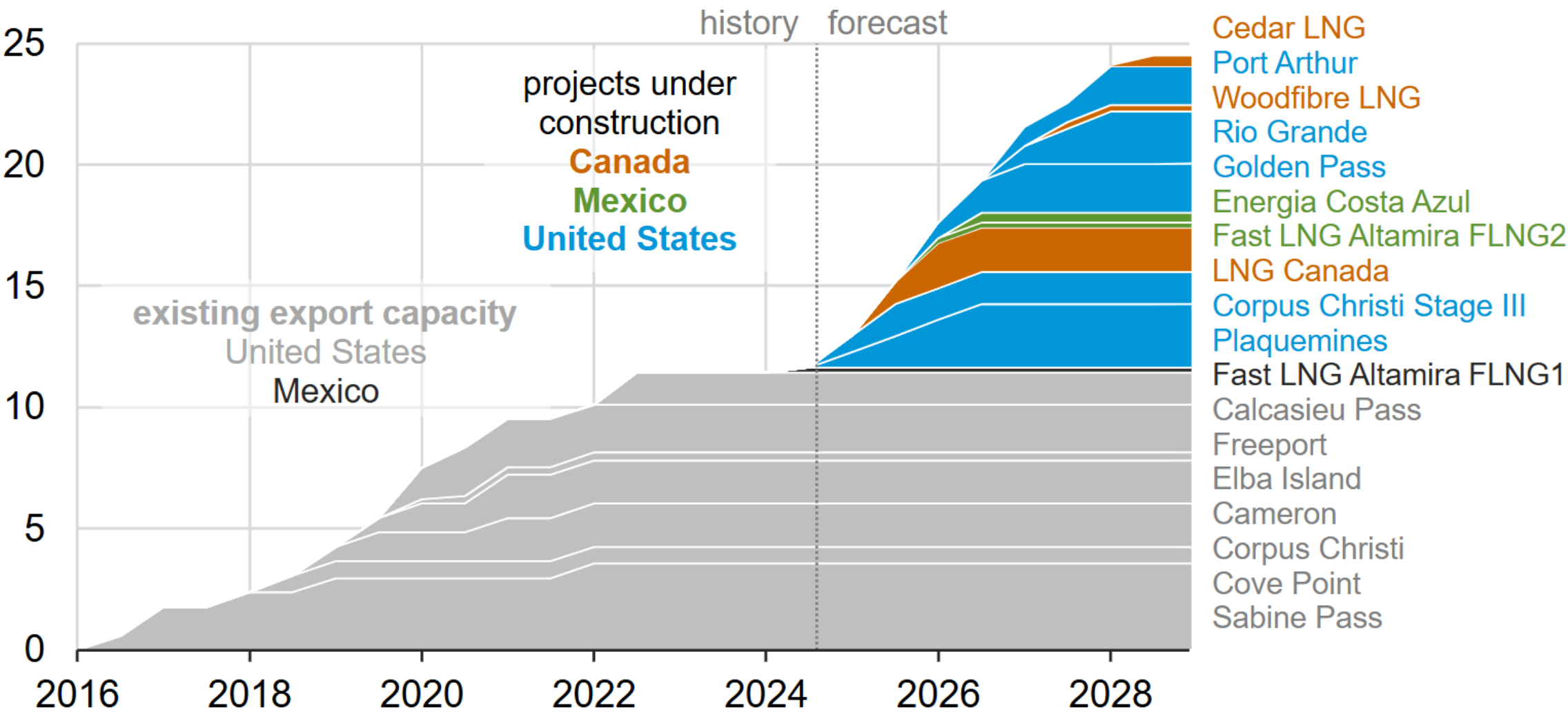
Permian oil production forecast in January 2025 (Thousand barrels per day)



US oil, gas, and NGL production forecast in January 2025



North America LNG export capacity (billion cubic feet per day)



US LNG exports

Natural gas Trade movements 2024 as liquefied natural gas*

	From																						
	US	Peru	Trinidad & Tobago	Other Americas*	Norway	Other Europe**	Russian Federation	Oman	Qatar	United Arab Emirates	Yemen	Algeria	Angola	Egypt	Nigeria	Other Africa	Australia	Brunei	Indonesia	Malaysia	Papua New Guinea	Other Asia Pacific*	Total imports
Billion cubic metres To																							
Canada	†	0.2	0.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.4
Mexico	0.2	–	0.2	–	–	–	–	–	–	–	–	–	–	–	0.1	–	–	–	0.5	–	–	–	1.0
US	–	–	0.3	†	0.1	†	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	†	0.5
North America	0.2	0.2	0.7	†	0.1	†	–	–	–	–	–	–	–	–	0.1	–	–	–	0.5	–	–	†	1.8
Argentina	1.4	–	0.2	–	–	0.1	–	–	–	–	–	0.1	–	–	–	–	–	–	–	–	–	–	1.7
Brazil	2.9	–	†	–	–	–	–	–	–	–	–	–	–	–	0.1	–	–	–	–	–	–	–	3.0
Chile	1.2	–	1.7	–	–	–	–	–	–	–	–	–	–	–	–	0.1	–	–	–	–	–	–	3.0
Other S. & Cent. America	4.6	–	2.8	0.3	0.2	0.1	–	–	–	–	–	–	–	0.1	1.3	†	–	–	0.1	–	–	–	9.5
S. & Cent. America	10.1	–	4.7	0.3	0.2	0.2	–	–	–	–	–	0.1	–	0.1	1.4	0.1	–	–	0.1	–	–	–	17.2
Belgium	1.1	–	–	–	–	–	3.4	–	3.1	–	–	–	–	–	0.1	–	–	–	–	–	–	–	7.7
France	9.5	0.3	†	–	0.9	0.1	8.4	–	0.4	–	–	4.6	0.2	0.1	1.0	0.1	–	–	–	–	–	0.1	25.7
Italy	5.0	–	0.2	–	–	0.2	0.1	–	6.6	–	–	2.0	0.3	0.1	–	0.2	–	–	–	–	–	–	14.6
Spain	5.1	0.1	0.2	–	0.2	0.3	6.5	–	1.0	–	–	2.3	0.2	–	2.2	0.3	–	–	†	–	–	–	18.4
Türkiye	4.9	–	0.2	–	0.1	0.3	0.5	–	–	–	–	5.5	–	0.2	0.1	0.3	–	–	–	–	–	–	12.0
United Kingdom	6.8	–	0.7	–	0.2	–	–	–	0.8	–	–	0.5	0.3	0.1	0.2	0.1	–	–	–	–	–	–	9.7
Other European Union	28.4	1.3	1.9	0.1	4.5	0.1	2.5	–	2.5	–	–	0.8	0.4	0.1	2.3	0.1	–	–	–	–	–	0.2	45.3
Rest of Europe	–	–	–	–	–	0.1	†	–	–	–	–	–	–	–	–	–	–	–	–	–	–	†	0.1
Europe	60.7	1.7	3.3	0.1	6.0	1.1	21.4	–	14.6	–	–	15.6	1.3	0.5	5.8	1.0	–	–	†	–	–	0.3	133.5
Egypt	3.3	–	†	–	–	0.2	–	–	–	–	–	–	–	–	0.3	0.1	–	–	–	–	–	–	3.9
Kuwait	0.9	–	0.1	–	–	–	0.3	0.3	6.0	–	–	–	0.4	–	1.6	0.2	–	–	–	–	–	–	9.7
United Arab Emirates	0.1	–	–	–	–	–	–	–	1.1	–	–	–	–	–	–	–	–	–	–	–	–	–	1.2
Other Middle East & Africa	1.2	–	–	–	–	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	†	1.3
Middle East & Africa	5.4	–	0.1	–	–	0.3	0.3	0.3	7.1	–	–	–	0.4	–	1.9	0.3	–	–	–	–	–	–	16.1
China	5.8	0.4	0.3	†	0.1	0.1	11.4	1.5	25.2	1.3	–	†	–	0.2	1.9	1.6	35.8	1.1	4.9	10.5	3.3	–	105.2
India	7.3	–	0.5	–	–	0.2	–	2.0	15.3	4.6	–	–	2.5	–	2.0	3.2	0.2	–	0.1	–	–	–	37.9
Japan	8.6	0.6	0.1	†	–	–	7.7	4.6	3.9	1.3	–	0.1	–	–	0.7	0.6	34.2	3.7	4.3	13.2	5.0	0.3	89.0
Malaysia	0.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.2	3.4	–	–	–	0.1	†	4.2
Pakistan	–	–	–	–	–	–	–	–	9.8	–	–	–	–	–	1.0	0.1	–	–	0.1	–	–	–	11.0
Singapore	1.5	–	0.3	–	–	–	–	–	2.3	–	–	–	–	–	†	1.4	2.5	–	0.1	0.1	–	0.1	8.4
South Korea	7.8	1.1	†	–	–	0.1	2.9	6.5	12.2	0.6	–	–	–	0.1	1.3	0.9	15.6	0.8	4.2	8.4	0.8	0.3	63.6
Taiwan	2.9	0.5	–	–	–	–	0.6	0.4	7.4	0.6	–	–	–	–	0.4	0.4	11.0	0.5	1.2	1.4	1.9	–	29.1
Thailand	2.9	0.1	0.3	–	–	–	–	0.7	3.1	0.2	–	0.1	0.6	–	0.7	0.7	2.8	0.2	0.9	2.3	–	0.2	15.8
Other Asia Pacific	1.4	–	–	–	–	–	–	–	6.0	–	–	0.1	0.1	–	1.2	0.5	1.4	0.2	0.3	0.2	–	0.1	11.4
Asia Pacific	38.7	2.8	1.6	†	0.1	0.3	22.6	15.7	85.2	8.6	–	0.3	3.2	0.3	9.1	9.6	106.8	6.4	15.9	36.0	11.1	0.9	375.5
Total exports	115.2	4.7	10.3	0.4	6.4	1.9	44.3	16.0	106.9	8.6	–	16.0	4.9	0.9	18.4	11.0	106.8	6.4	16.5	36.0	11.1	1.3	544.1

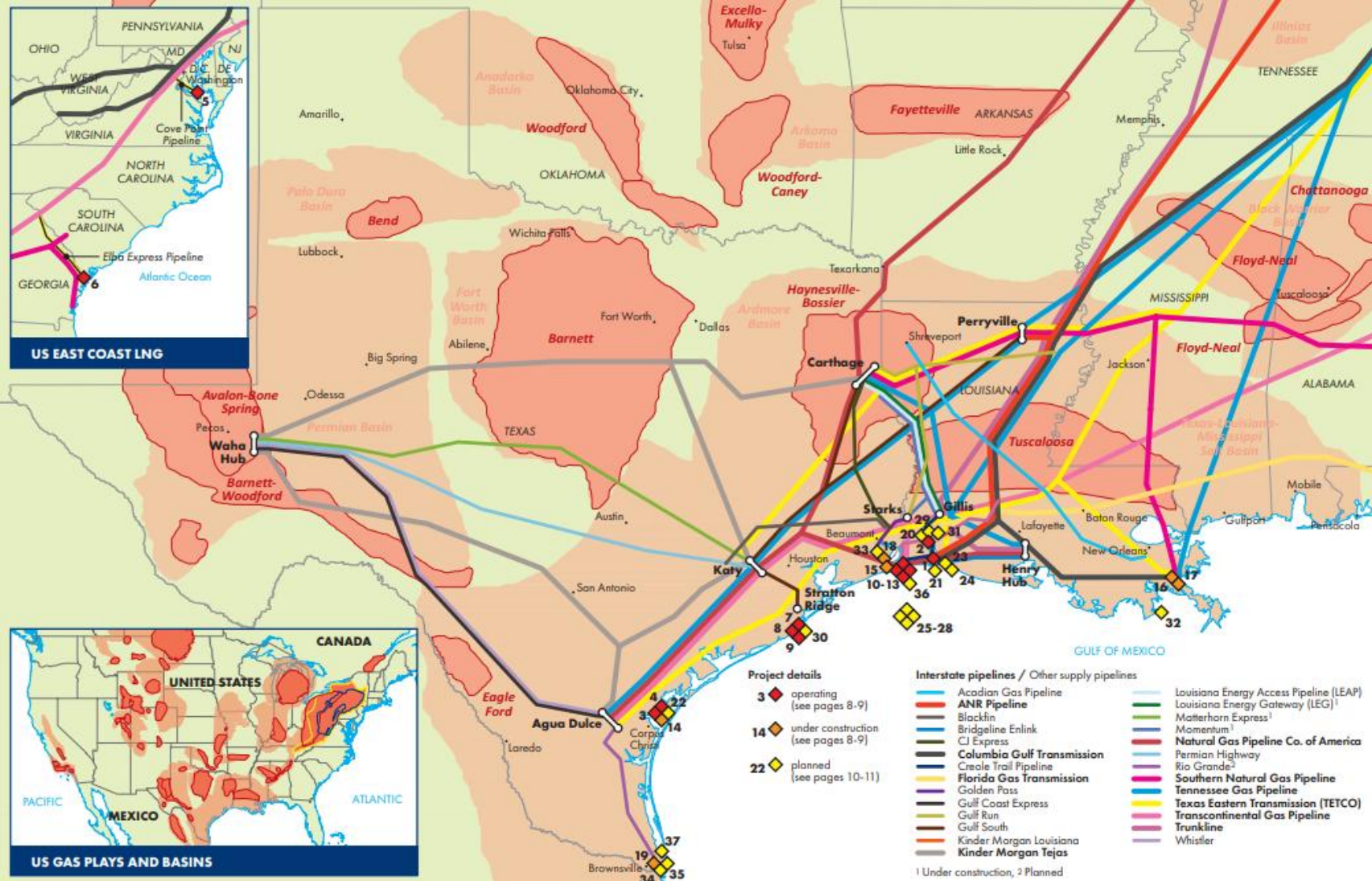
Source: Includes data from GILGNL, S&P Global Commodity Insights.

* Includes re-exports.

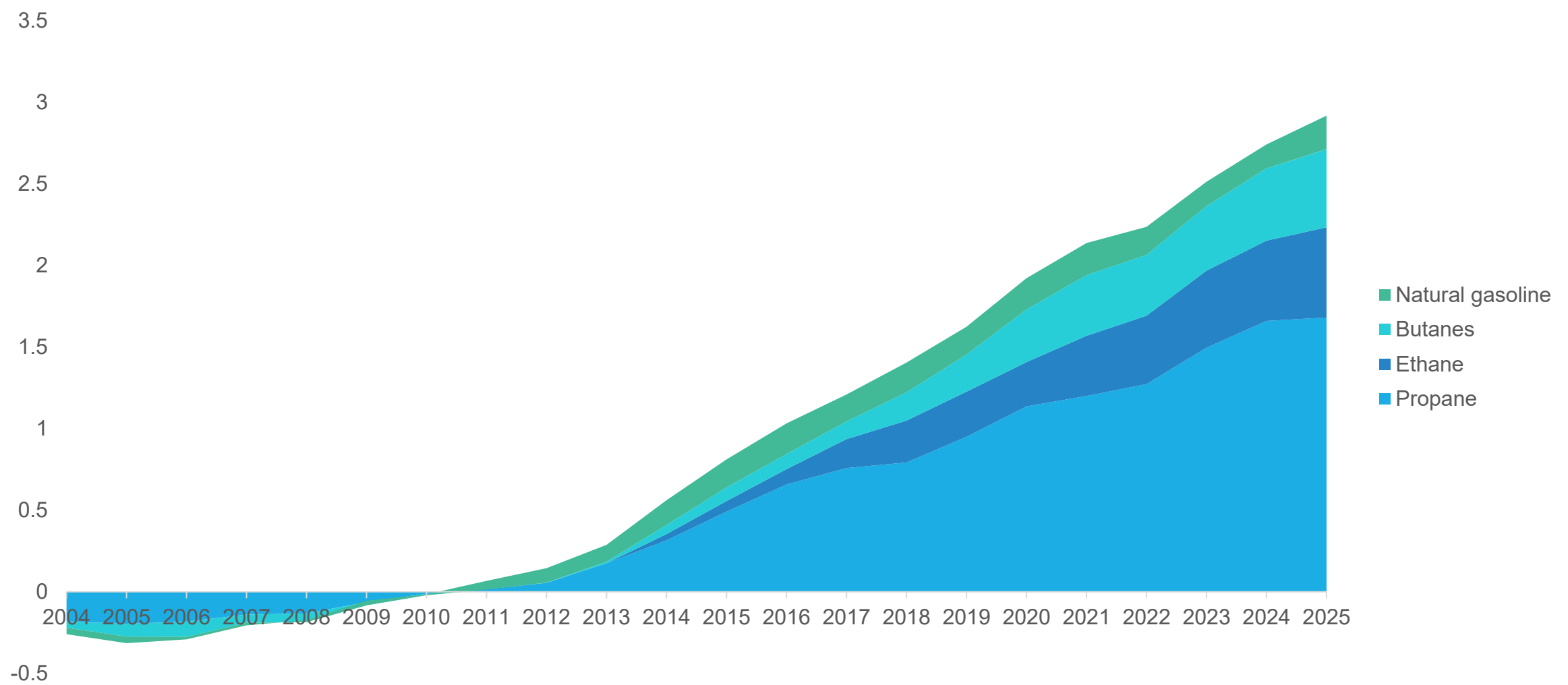
† Less than 0.05.

Note: As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar) and has been standardised using a gross calorific value (GCV) of 40 MJ/m³.

US LNG facilities as of 2024



US net trade of hydrocarbon gas million barrels per day)



References

- Tejarat-e Farda, Volume 29
- Wikipedia on tight oil
- EIA ([1](#), [2](#), [3](#), [4](#), [5](#), [6](#))
- OPEC, World Oil Outlook
- Rystad Energy ([1](#), [2](#))
- IEA, World Energy Investment
- Petroleum Economist, US LNG Factbook
- Energy Institute, Statistical Review of World Energy

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Do you expect a peak oil? What does it mean?

Peak oil

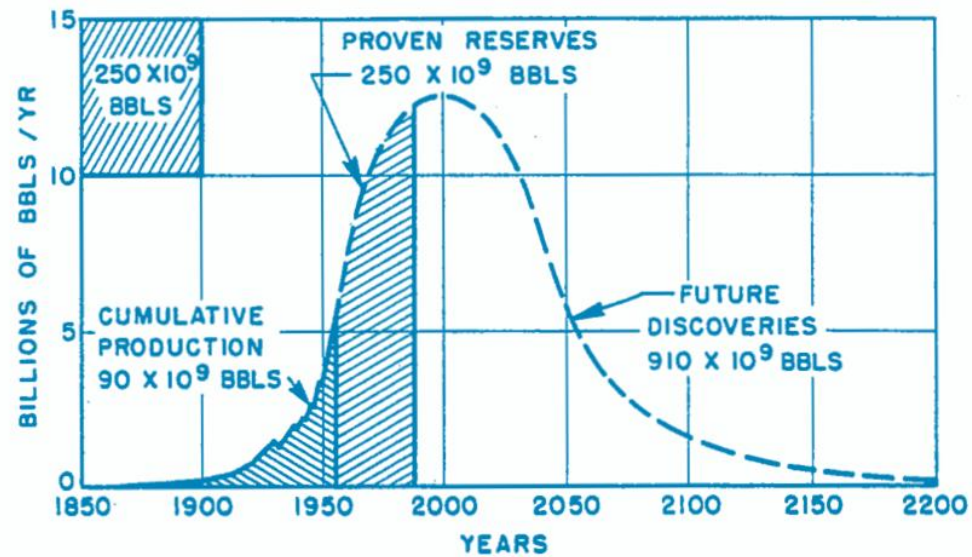


Figure 20 - Ultimate world crude-oil production based upon initial reserves of 1250 billion barrels.

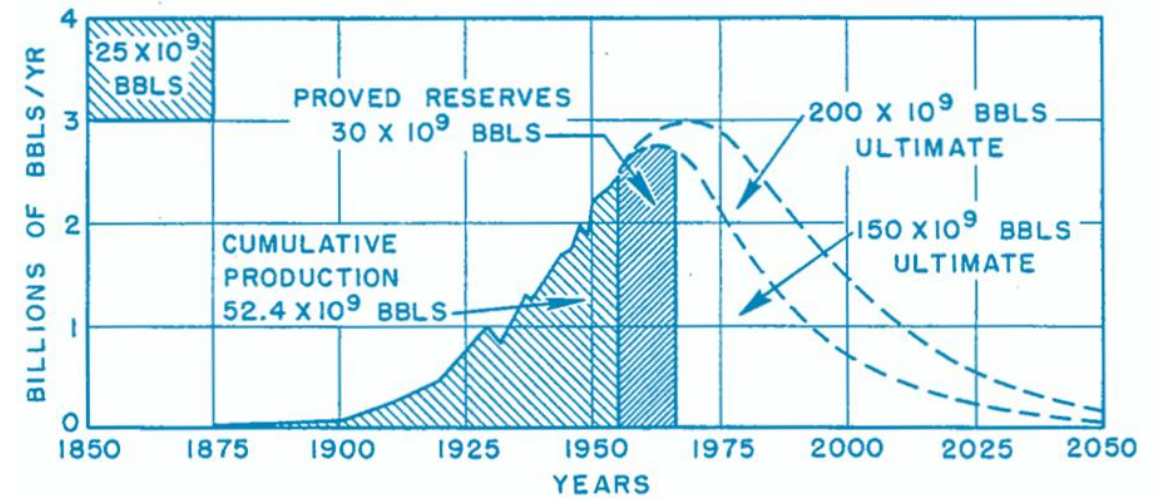


Figure 21 - Ultimate United States crude-oil production based on assumed initial reserves of 150 and 200 billion barrels.

Old and new peak oils



Old: peak supply

- **Paradigm:** resource scarcity
- **Concern:** asset over-exploitation



Old: peak demand

- **Paradigm:** resource abundance
- **Concern:** stranded assets

Parliament's view – by Professor Saidi (2002)

۱۸۲ مجلس پژوهش

سال ۹ شماره ۳۴

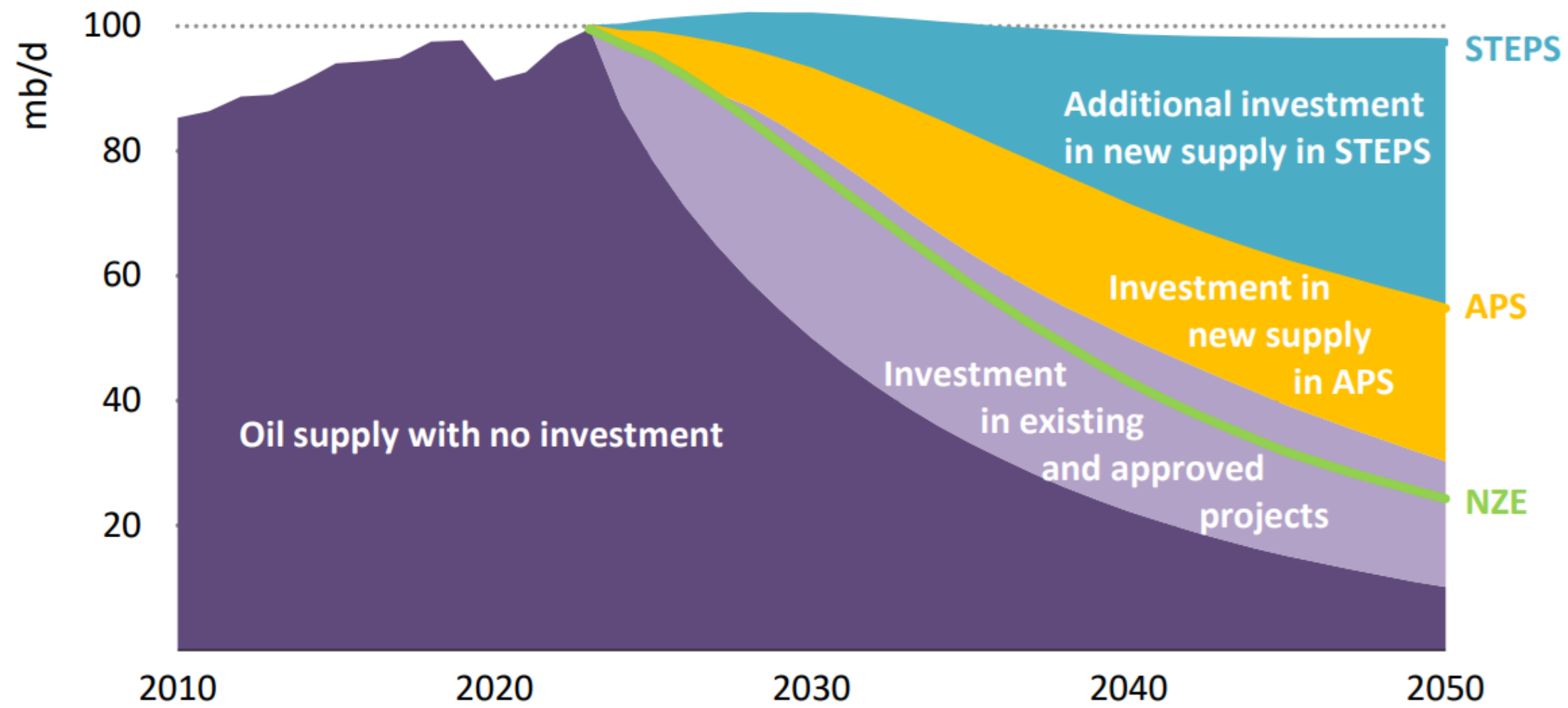
ط - جهت نگهداری توان تولید ۴ میلیون بشکه در روز (۳/۵ میلیون بشکه تولید واقعی در روز) شرکت ملی نفت نیاز به حفر حدود ۶ هزار حلقه چاه جدید در ۲۰ سال آینده خواهد داشت. این امر نیازمند سرمایه گذاری حدود ۳۳ میلیارد دلار است. در صورت تزریق گاز بر مبنای ۲۰ میلیارد پای مکعب در روز، تعداد این چاهها به حدود ۳ هزار حلقه کاهش می یابد. میزان صرفه جویی در این امر، نزدیک به میزان سرمایه گذاری جهت تولید، حمل و تزریق روزانه ۲۰ میلیارد پای مکعب گاز در مخازن نفتی کشور است.

ی - از سال ۲۰۱۵ میلادی به بعد به دلیل عدم توانایی تولید کشورهای صادرکننده نفت، قیمت نفت و گاز بسیار بالاتر از نرخ فعلی خواهد رسید و کشور ما با سرمایه گذاری لازم در زمان حال می تواند به سود بسیار بالایی در آینده ای نزدیک دست یابد.

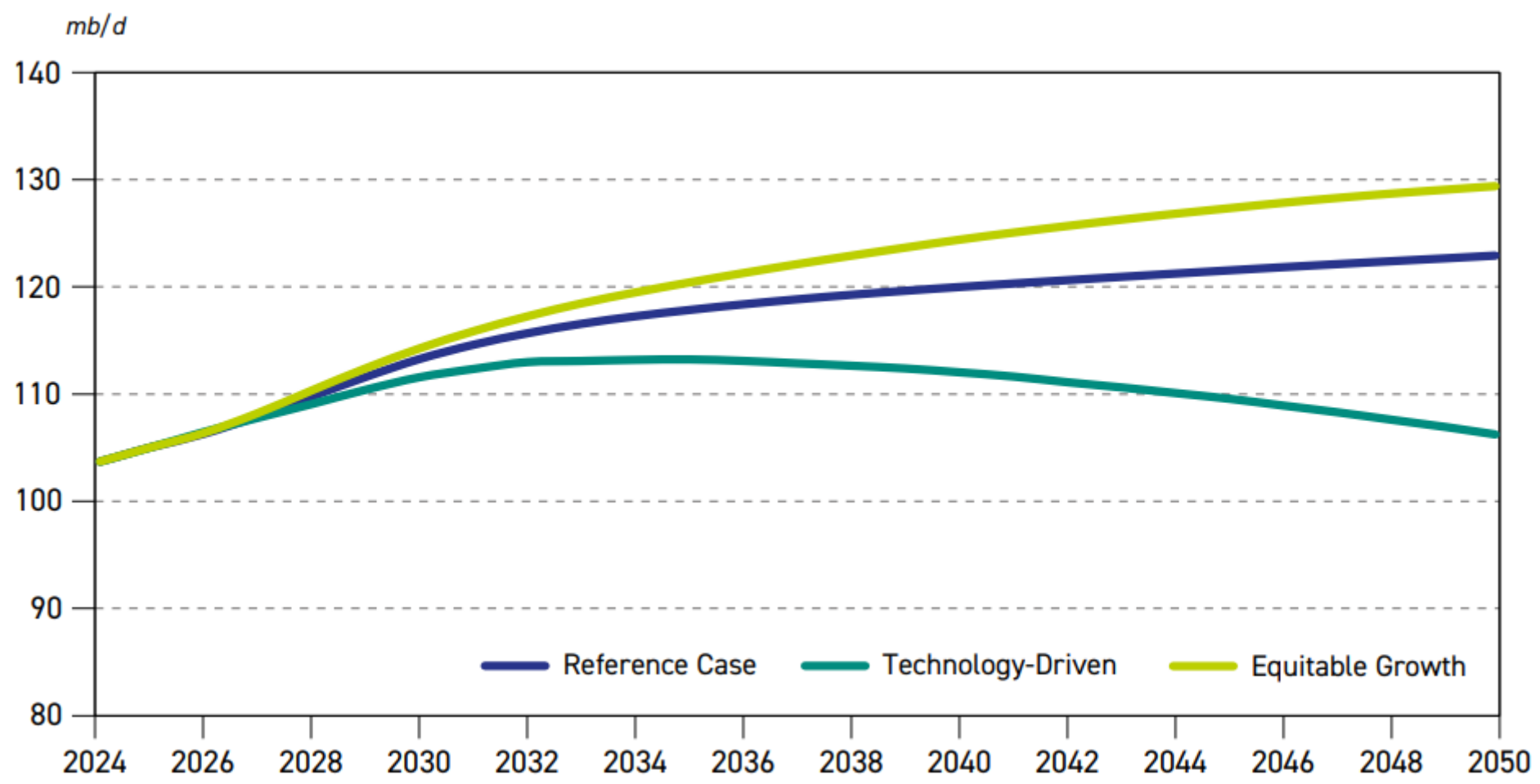
از بررسی ذخایر و توانایی تولید کشورهای تولیدکننده نفت عضو اوپک و غیرعضو اوپک - که نگارنده با بعضی از آنها آشنایی نزدیک دارد - چنین برمی آید که بجز کشورهای تولیدکننده شرق افریقا، عراق، عربستان و احتمالاً روسیه، با فن آوری موجود، امکان افزایش نفت کافی از سال ۲۰۱۵ به بعد وجود نخواهد داشت. در حقیقت تولید از بیشتر مخازن اصلی نفت موجود در جهان در حال کاهش است.

بیشتر مخازن عظیم نفتی در دهه های پنجاه و شصت میلادی کشف شده اند و بیش از ۵۰ درصد ذخایر نفتی آنها استخراج شده و در واقع، این مخازن تا سال ۲۰۱۵ یک - چهارم آخرین دوره عمر خود را سپری خواهند کرد. بنابراین مخازن فوق قادر نخواهند بود تولید خود را حتی به میزان تولید فعلی ادامه دهند. مخازن جدید کوچک تر نیز با توجه به مصرف فعلی جهان - که در حدود ۳۰ میلیارد بشکه نفت در سال است - نمی توانند جایگزین مخازن بزرگ فعلی شوند. کشور اندونزی تا چند سال آینده، واردکننده نفت خواهد بود. تولید نفت در کشورهای حوزه دریای شمال و مکزیک نیز تا قبل از سال ۲۰۱۵ میلادی به طور شدید رو به کاهش خواهد رفت.

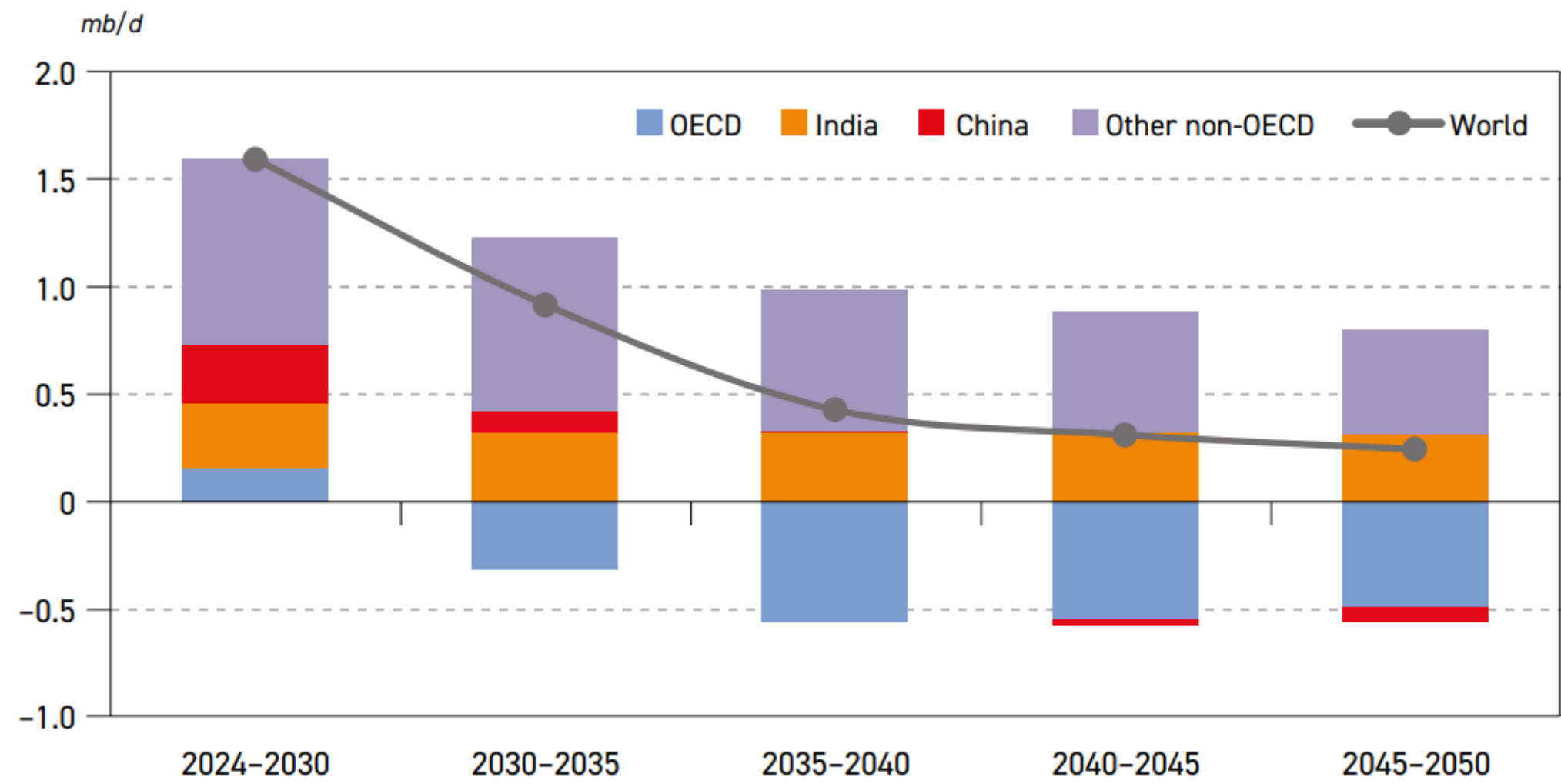
Global oil demand at risk (IEA)



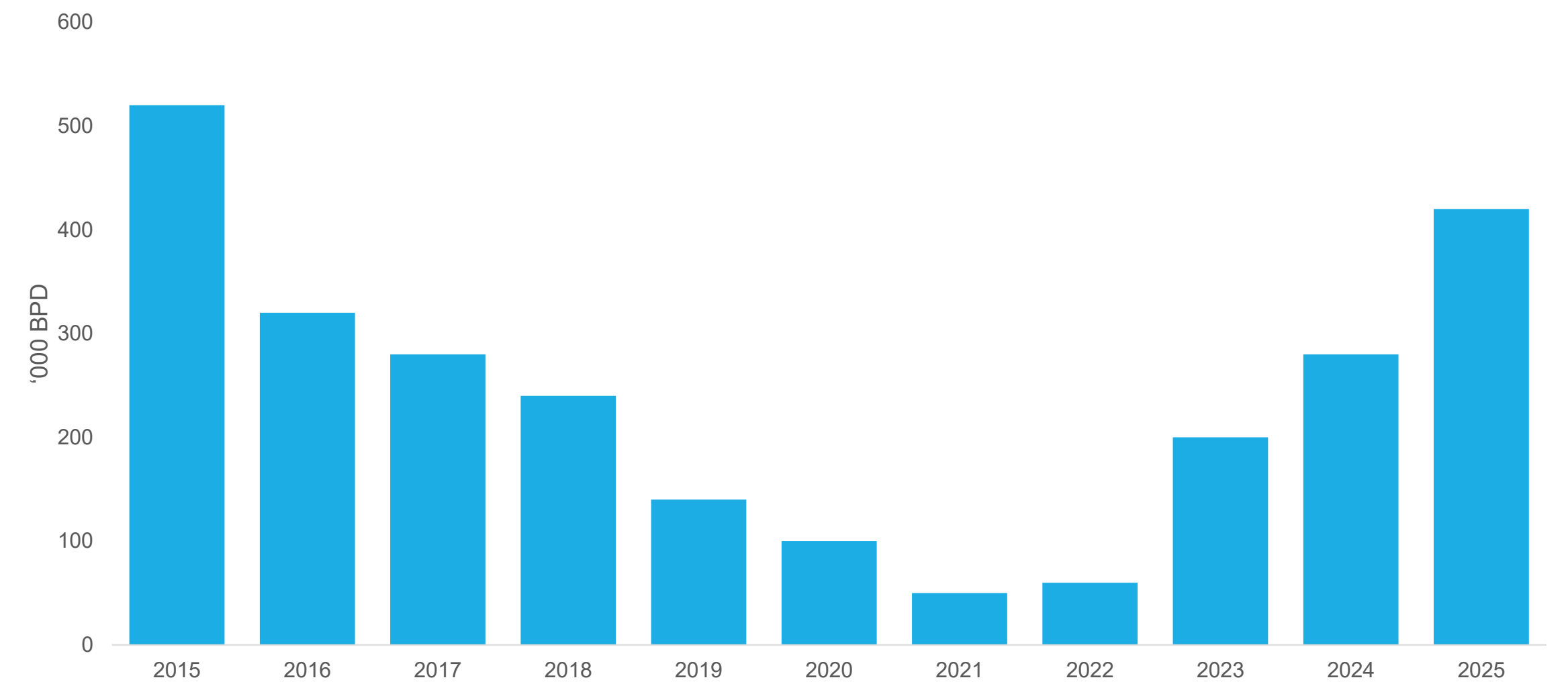
Global liquids demand (OPEC)



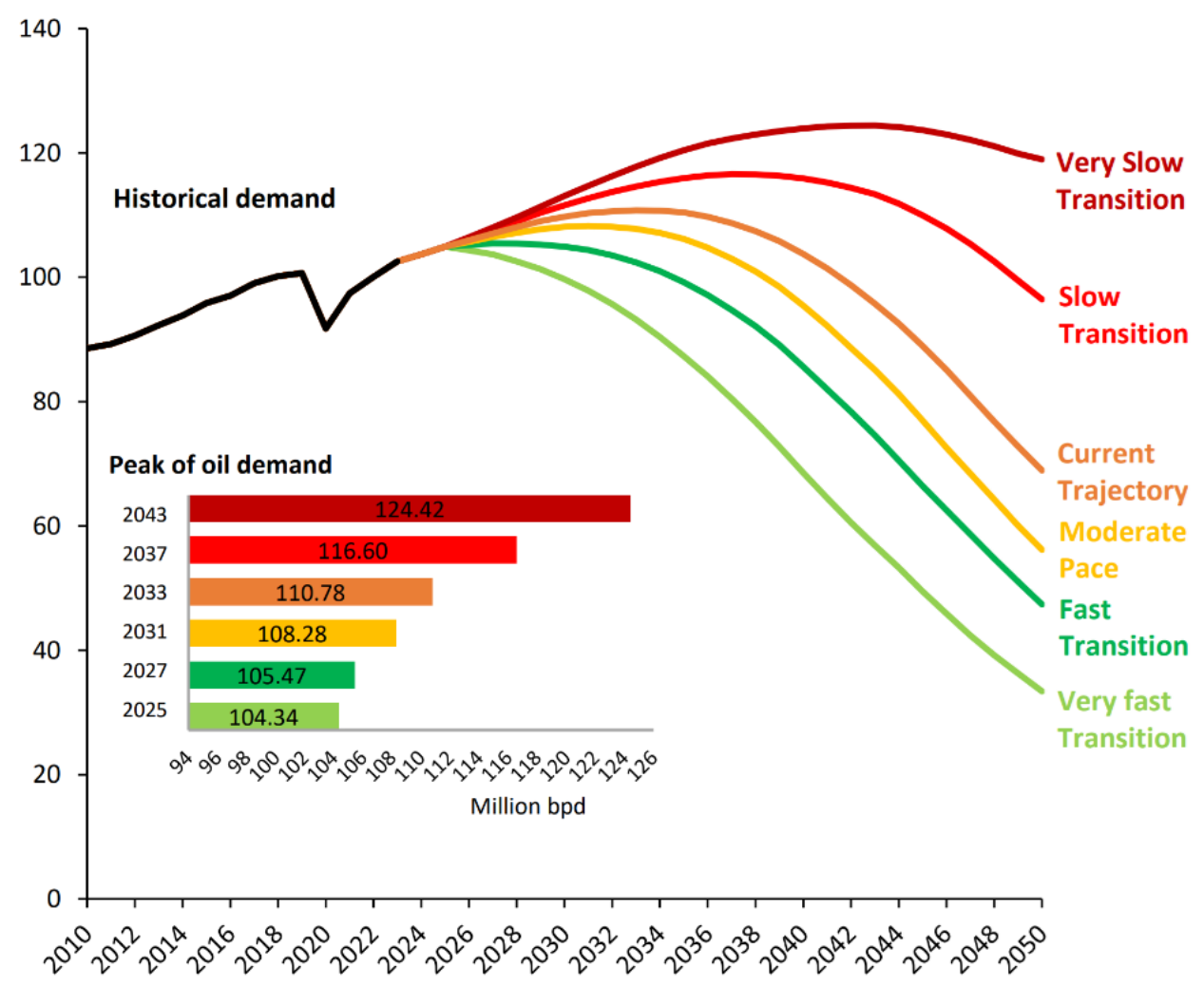
Average annual oil demand growth (OPEC)



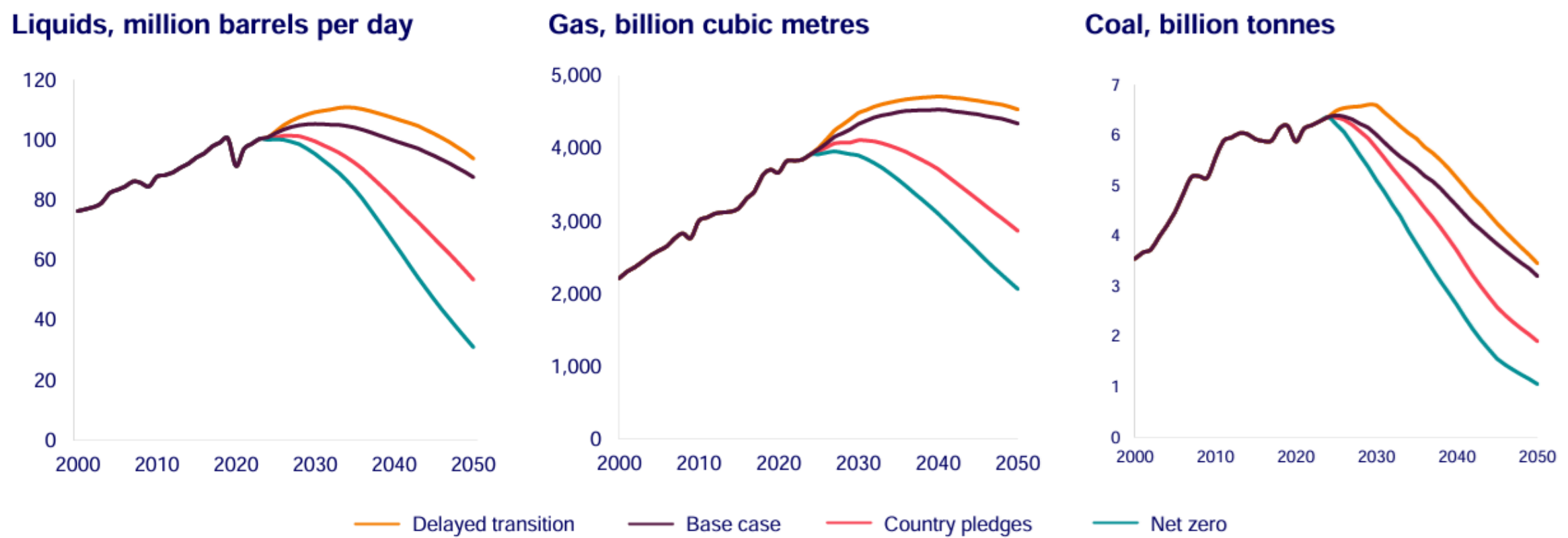
Average annual oil demand growth in OPEC WOO for period 2035–2040



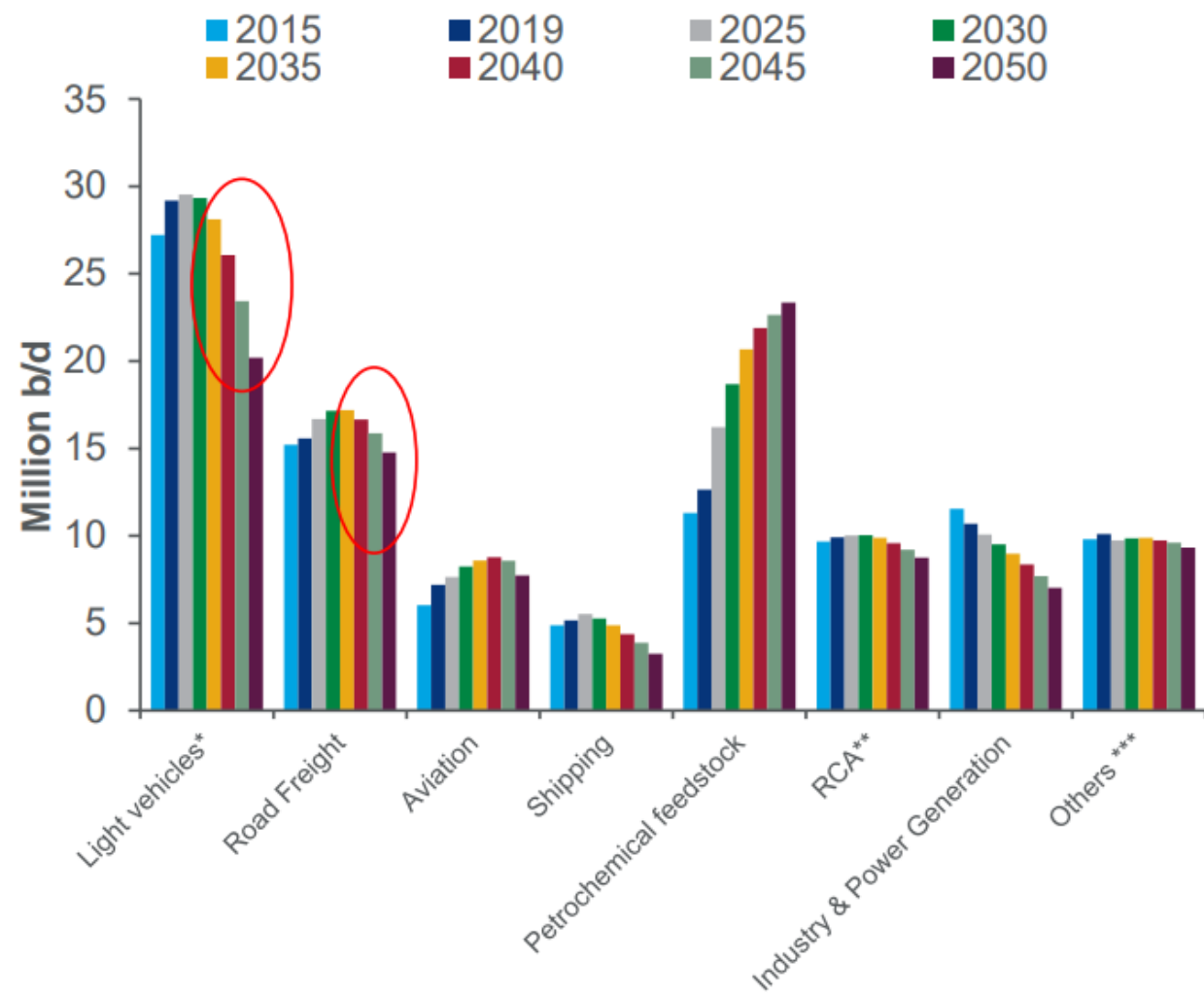
Global oil demand forecast (Rystad Energy)



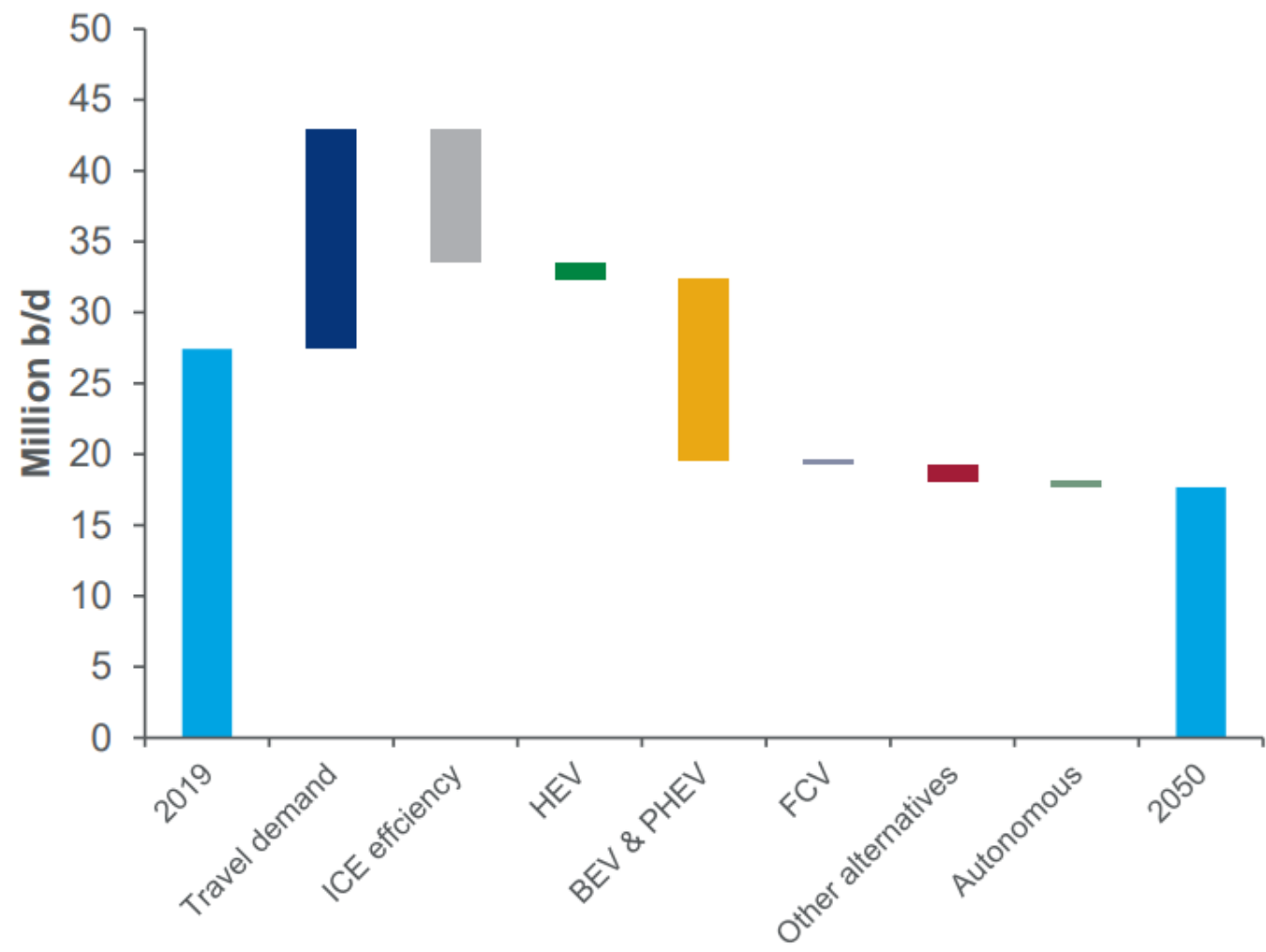
Fossil fuels demand outlook (Wood Mackenzie)



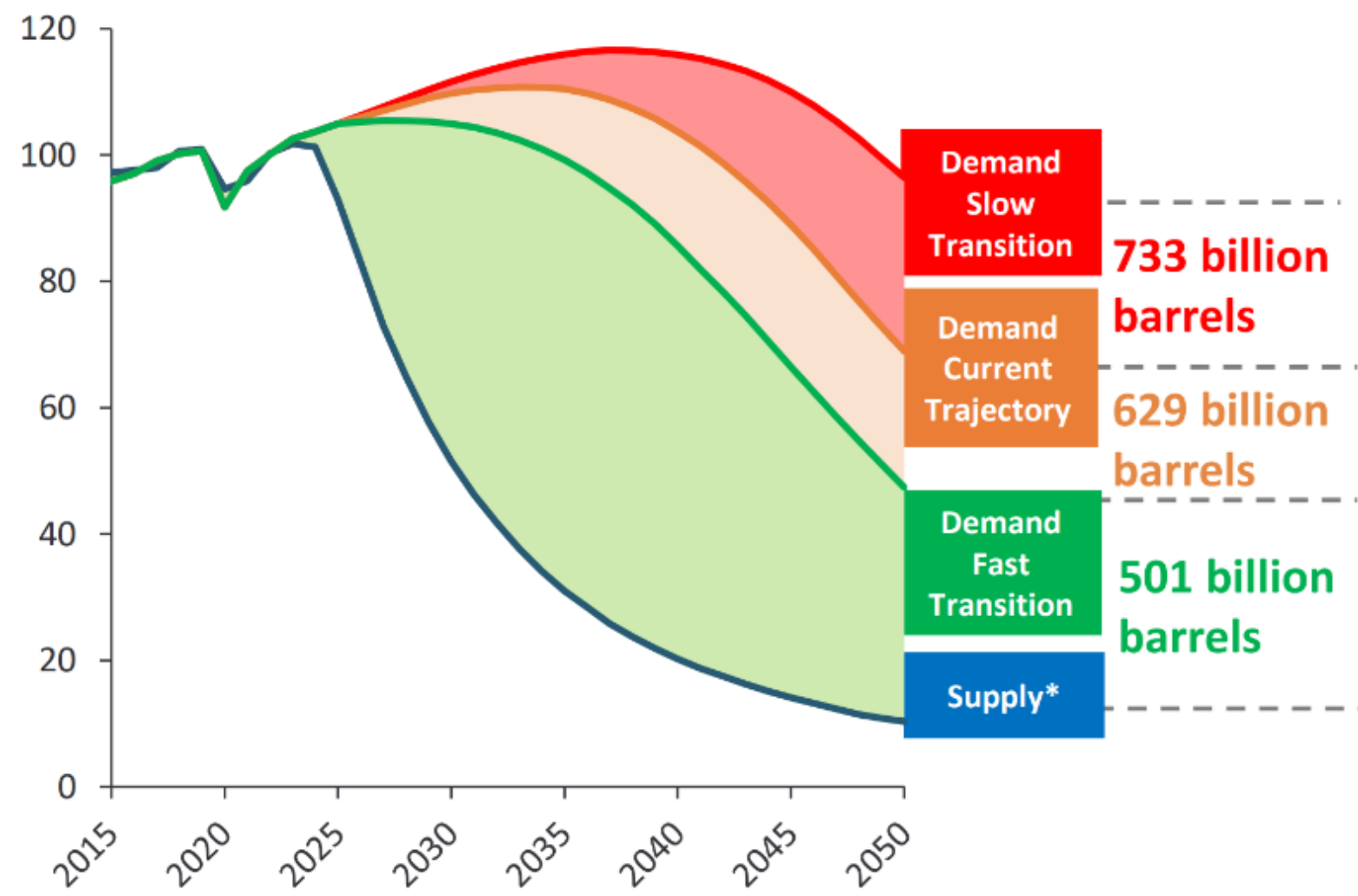
Liquids demand per sector



Global liquids demand for light vehicles



Oil supply by scenario (Rystad Energy)



Another old story

مجله ی 181 - آن که گفت آری، آن که گفت نه اخبار بین الملل (اقتصاد)
تاریخ انتشار: هفتم ۲۹ خرداد ۱۳۹۵

مرگ مدل قدیمی کسب و کار شرکتهای بینالمللی نفتی

پایان غولها

آینده شرکت‌های نفتی بزرگ بین‌المللی (IOCها)، شامل بی‌پی، شورو، اگزون موبیل، شل و توتال، در حاله‌ای از تردید قرار دارد. مدل کسب و کار که طی قرن بیستم موجب بقای آنها شد، اکنون دیگر برای دستیابی به اهداف مناسب به نظر نمی‌رسد. در نتیجه این شرکت‌ها با دو انتخاب مواجه هستند: مدیریت نزولی آرام از طریق کوچک‌سازی؛ یا ریسک سقوطی سریع با تلاش برای تداوم استفاده از مدل قبلی. اغلب تحلیلگران در زمینه مشکلات IOCها، بر سقوط اخیر قیمت نفت و تعهدهای رو به فزونی در سطح جهان برای مقابله با تغییرات اقلیمی متمرکز شده‌اند. این در حالی است که طالع آنها پیش از این دو مورد تاریک به نظر می‌رسید. آخرین تکرار مدل کسب و کار IOCها طی دهه ۱۹۹۰ ظهور کرد و بر سه ستون استوار بود: افزایش ارزش دارایی سهامداران، حداکثرسازی ذخایر قابل ثبت و حداقل کردن هزینه.

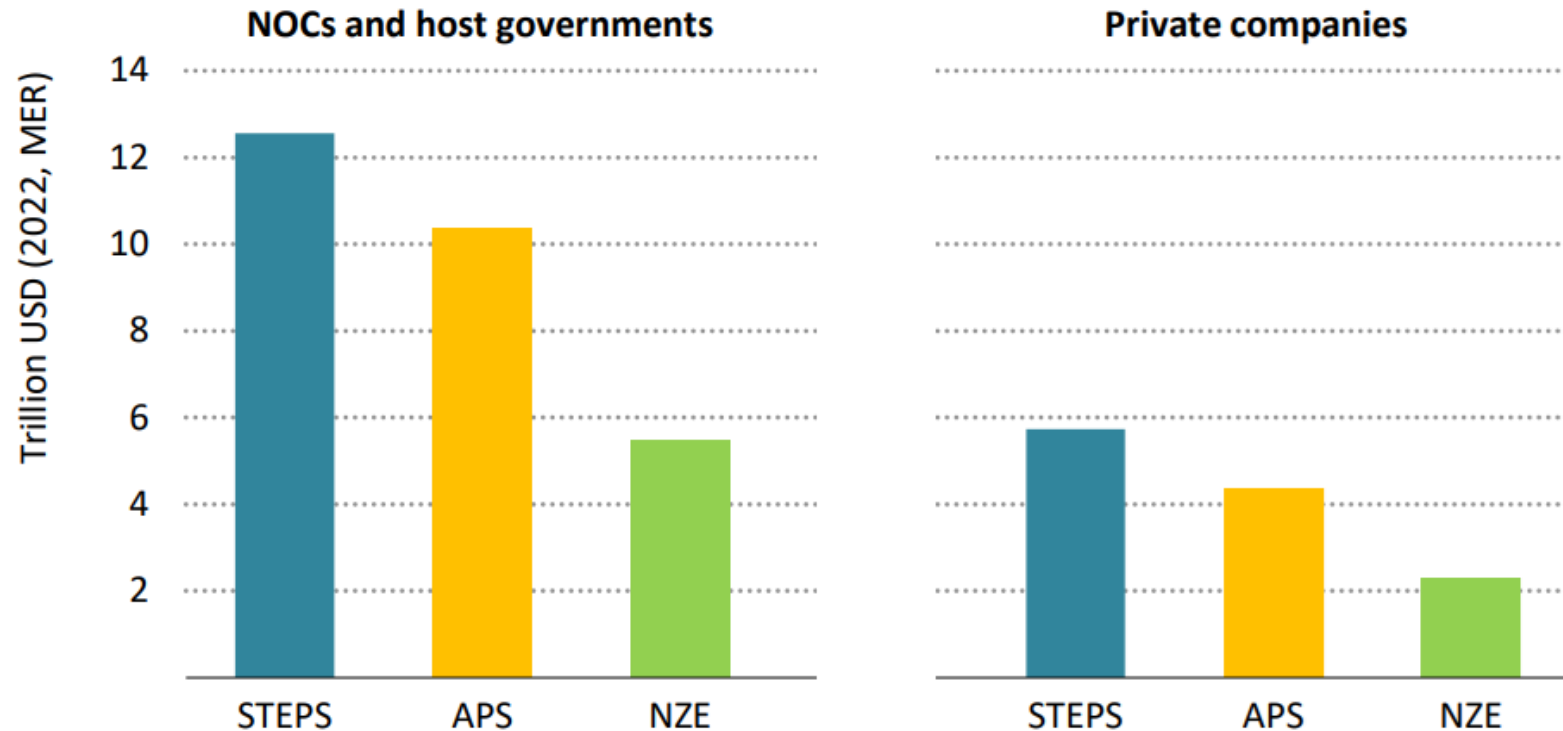
پل استیونس پژوهشگر چتم هاوس /ترجمه: رامین فروزنده

آینده شرکت‌های نفتی بزرگ بین‌المللی (IOCها)، شامل بی‌پی، شورو، اگزون موبیل، شل و توتال، در حاله‌ای از تردید قرار دارد. مدل کسب و کار که طی قرن بیستم موجب بقای آنها شد، اکنون دیگر برای دستیابی به اهداف مناسب به نظر نمی‌رسد. در نتیجه این شرکت‌ها با دو انتخاب مواجه هستند: مدیریت نزولی آرام از طریق کوچک‌سازی؛ یا ریسک سقوطی سریع با تلاش برای تداوم استفاده از مدل قبلی. اغلب تحلیلگران در زمینه مشکلات IOCها، بر سقوط اخیر قیمت نفت و تعهدهای رو به فزونی در سطح جهان برای مقابله با تغییرات اقلیمی متمرکز شده‌اند. این در حالی است که طالع آنها پیش از این دو مورد تاریک به نظر می‌رسید. آخرین تکرار مدل کسب و کار IOCها طی دهه 1990 ظهور کرد و بر سه ستون استوار بود: افزایش ارزش دارایی سهامداران، حداکثرسازی ذخایر قابل ثبت و حداقل کردن هزینه. با تغییر شرایط عملیاتی، این مدل با چالش‌های جدی روبه‌رو شد. شرکت‌های یادشده طی 25 سال پایانی قرن گذشته توانستند نجات یابند، اما نشانه‌هایی وجود دارد مبنی بر اینکه ضعف مدل کسب و کار آنها در حال نمایان شدن است.

تشریح مدل قدیمی کسب و کار

مدل کسب و کار IOCها که در اوایل دهه 1990 ظهور کرد بر بیشینه‌سازی ارزش شرکت استوار است. استراتژی دستیابی به این مهم، افزایش ذخایر قابل ثبت و تلاش برای کاهش هزینه‌ها بوده است.

NPV of upstream oil and gas production

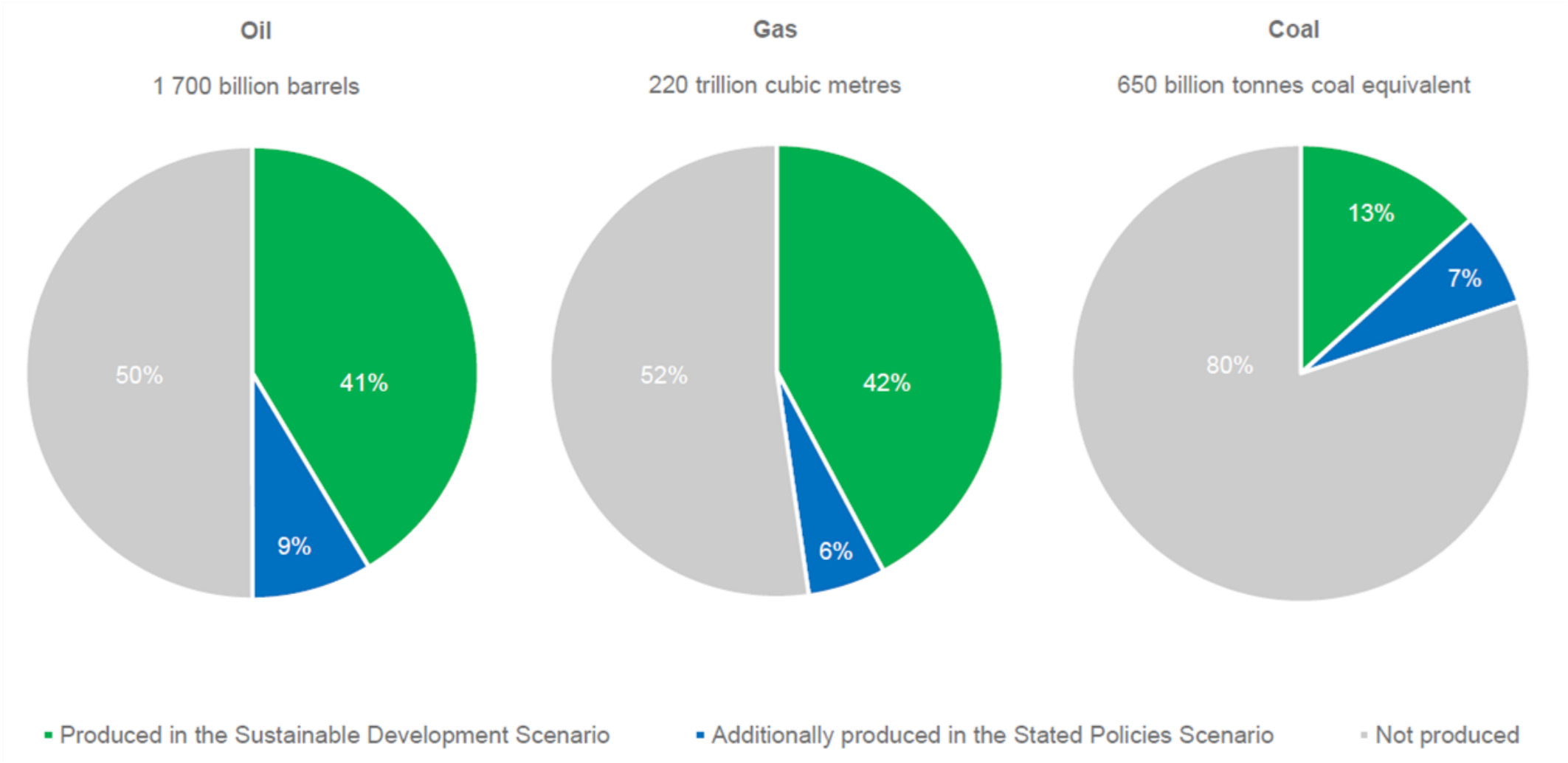


IEA. CC BY 4.0.

The value of the oil and gas industry diminishes sharply with increased climate ambition.

Notes: Values shown for NOCs and host governments are the sum of pre-tax discounted net income; for private companies it is the post-tax discounted net income. Uses a discount rate of 10%.

Stranded assets



References

- Nuclear energy and the fossil fuels by M. King Hubbert (1956)
- IEA ([1](#), [2](#))
- OPEC, World Oil Outlook
- Tejarat-e Farda, Volume 181

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17. Iran's energy profile
18. Iran's oil and gas

What is specific to gas compared to oil?

APPROXIMATE conversion factors for natural gas

Volume

- 1,000 cubic feet $\approx$ 28.3 cubic meters
- 1 cubic meters $\approx$ 35.3 cubic feet

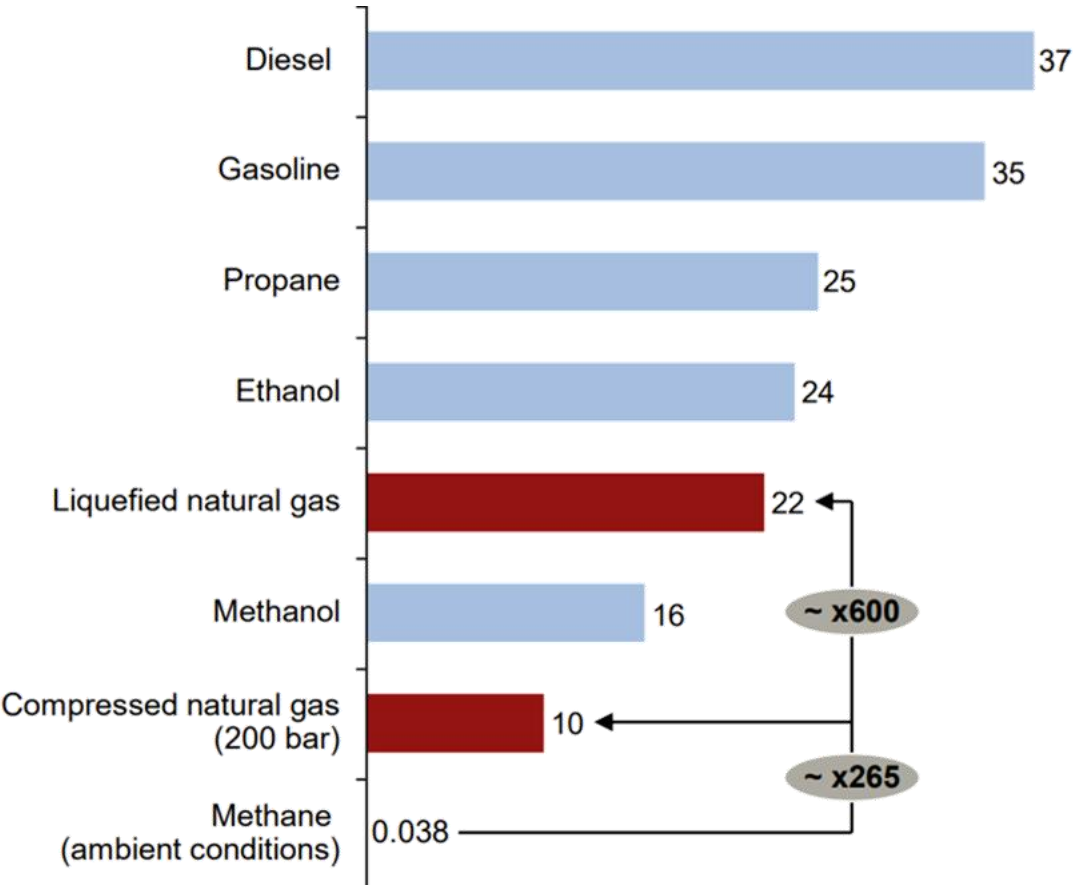
Weight

- 1 tons of LNG $\approx$ 48,000 cubic feet

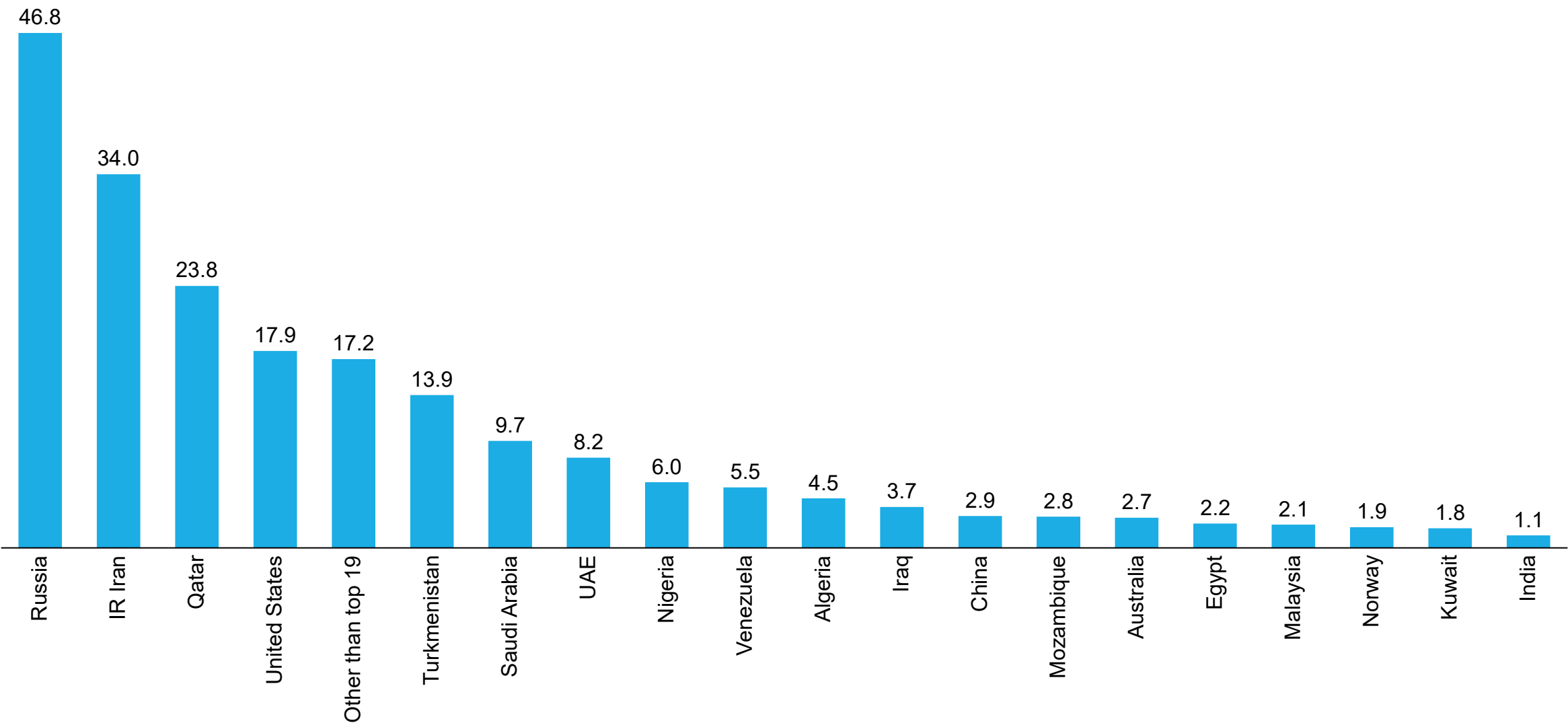
Energy

- 1,000 cubic feet $\approx$ 1,000,000 BTU
- 1,000 cubic meters $\approx$ 5.8 BOE
- 1 BOE $\approx$ 5,800,000 BTU $\approx$ 6,200,000 KJ
- 1 KCAL $\approx$ 4 BTU $\approx$ 4.2 KJ

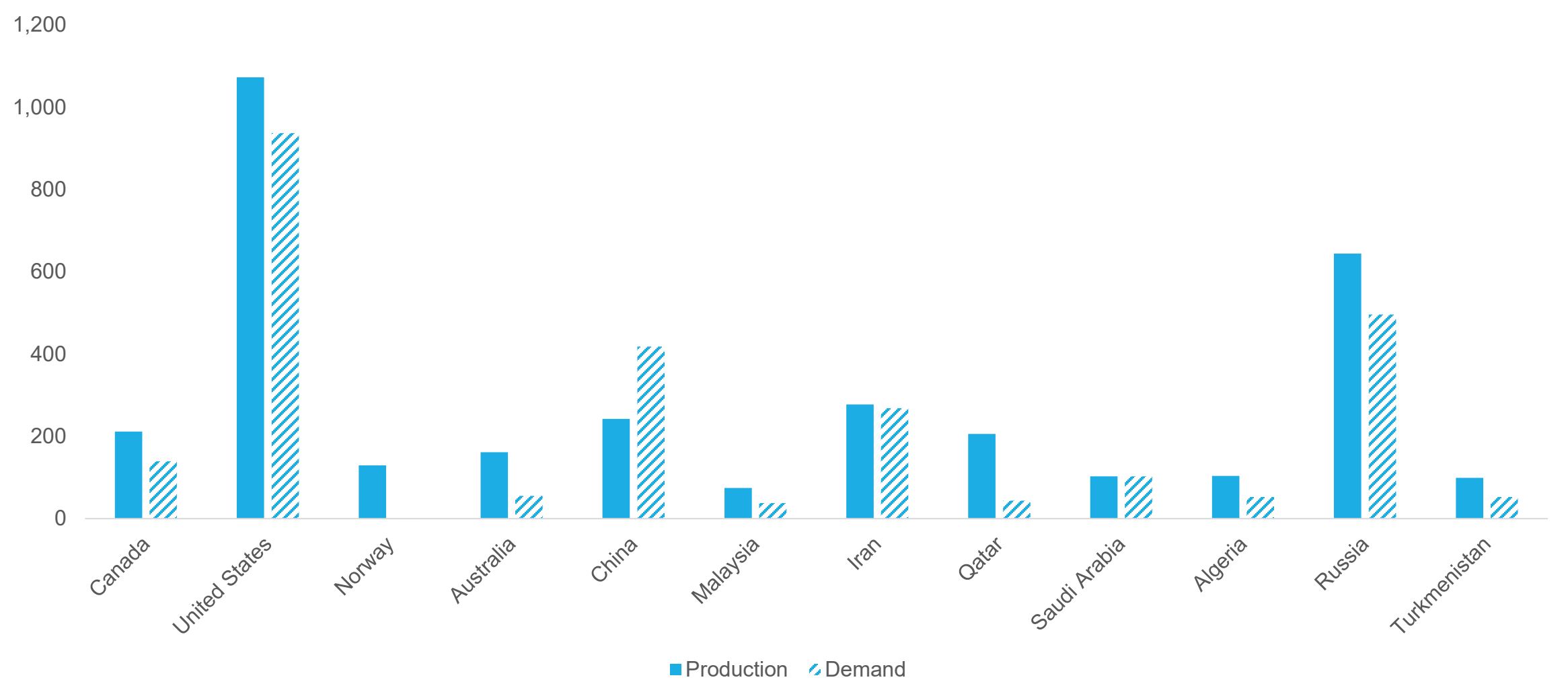
Volumetric energy density of fuels (MJ/liter)



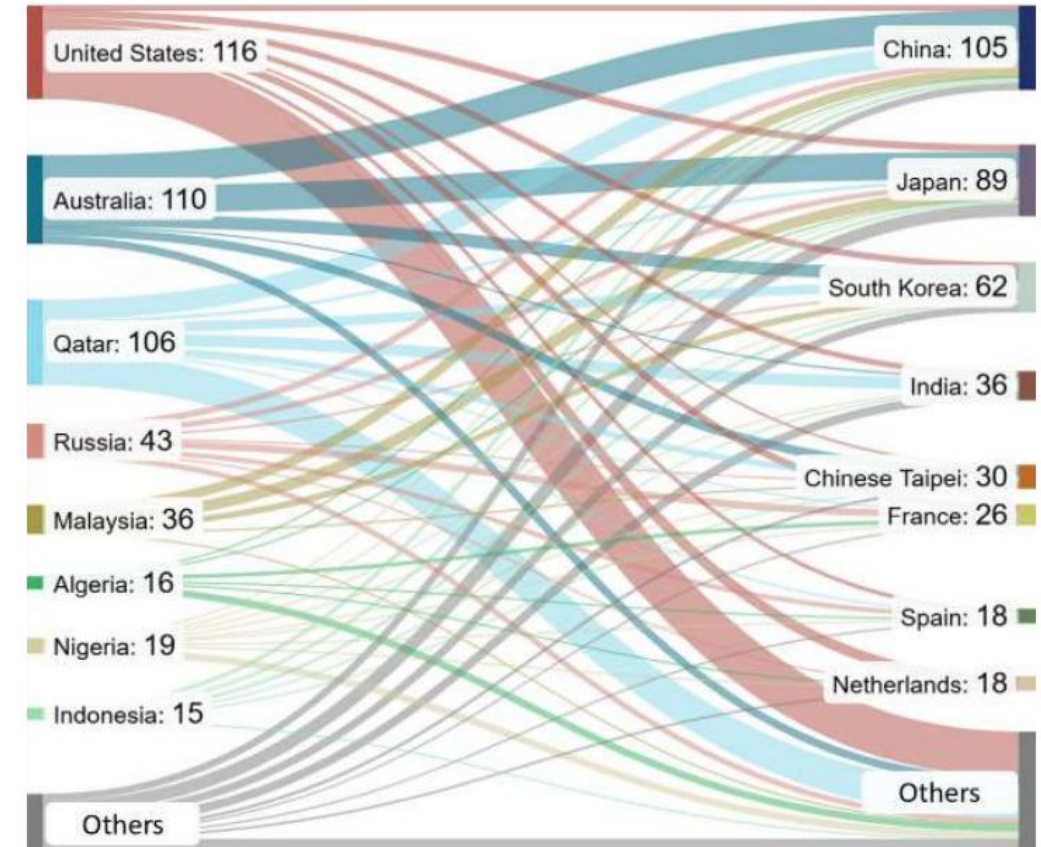
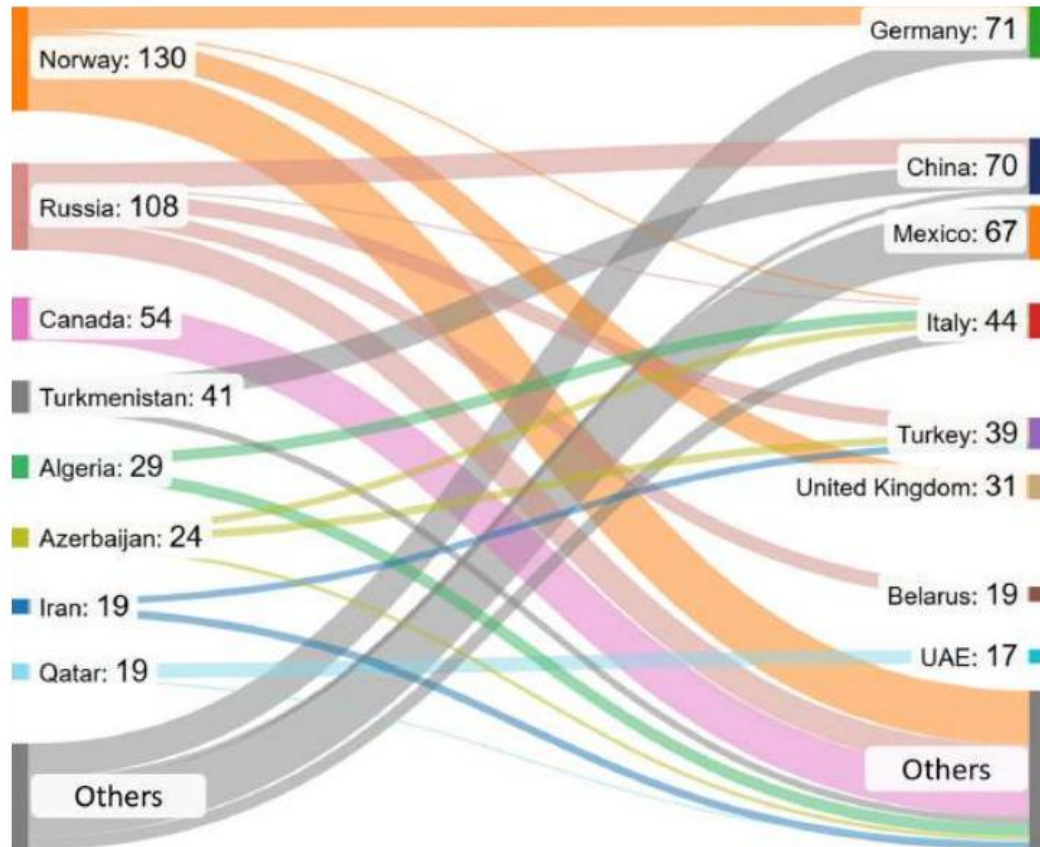
World gas reserves by country (TCM)



Gas production and demand (BCM)



Pipeline (left) and LNG (right) trade flows – top net importers/exporters



Pipeline versus LNG

Numbers excluding
intra-regional flows.

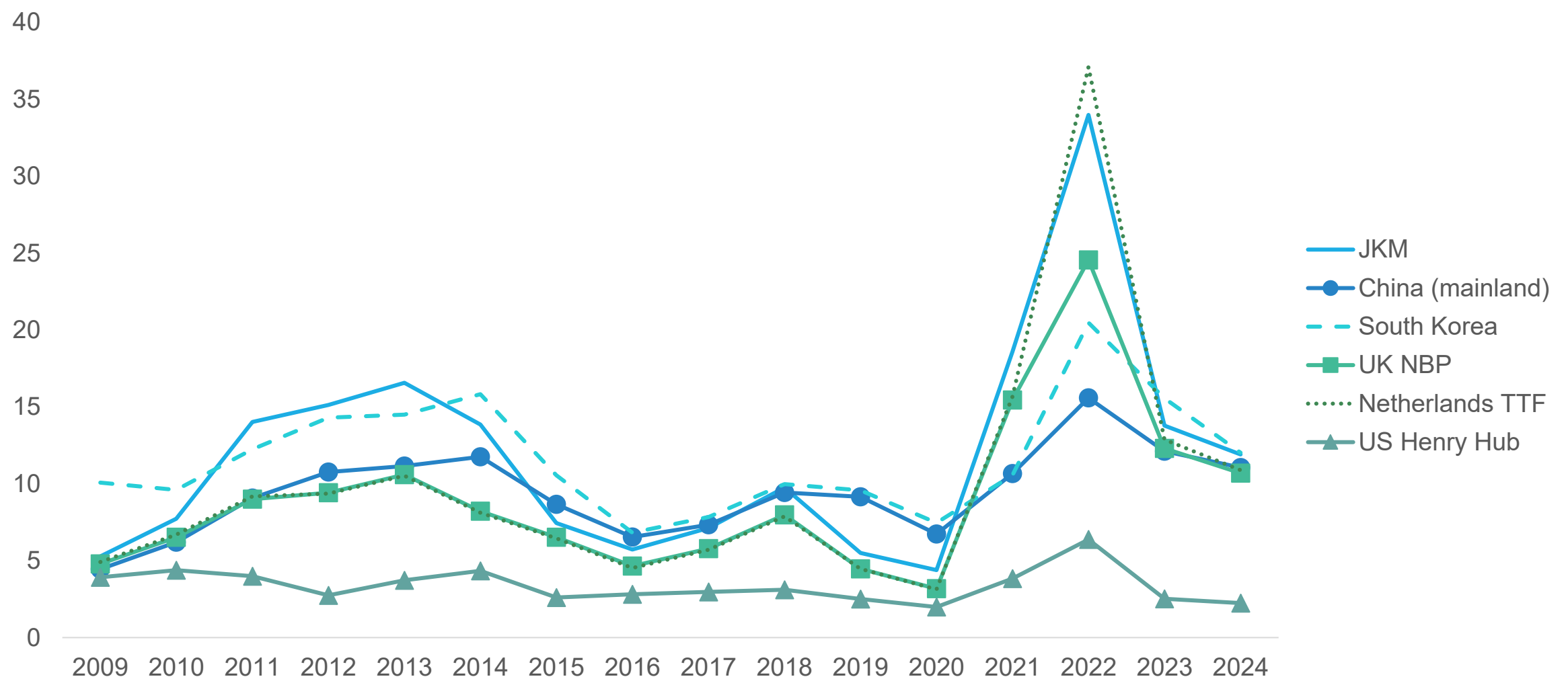
Pipeline
593 BCM

- Long-term
- Limited distance
- Less flexibility

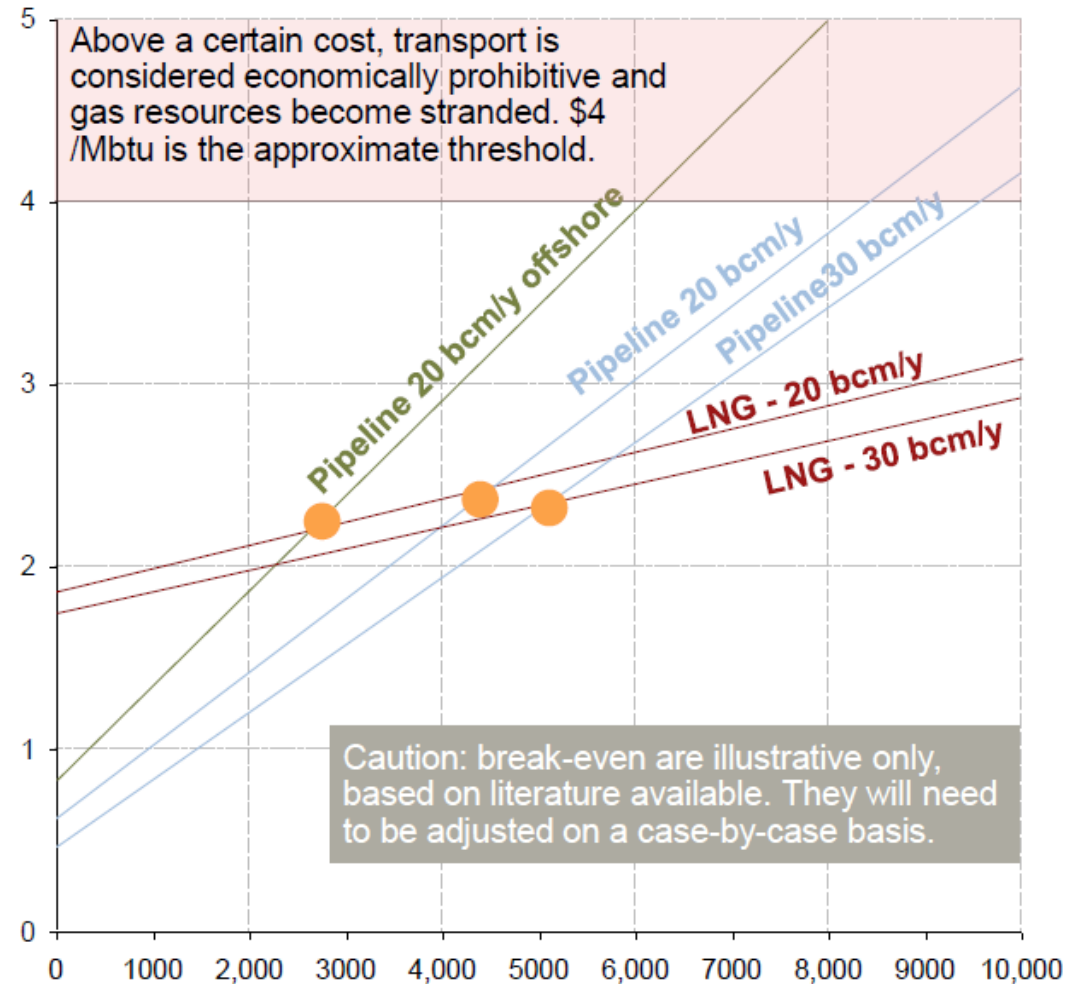
LNG
544 BCM

- Short-term/long-term
- All distances
- More flexibility

Gas prices (USD/MMBTU)

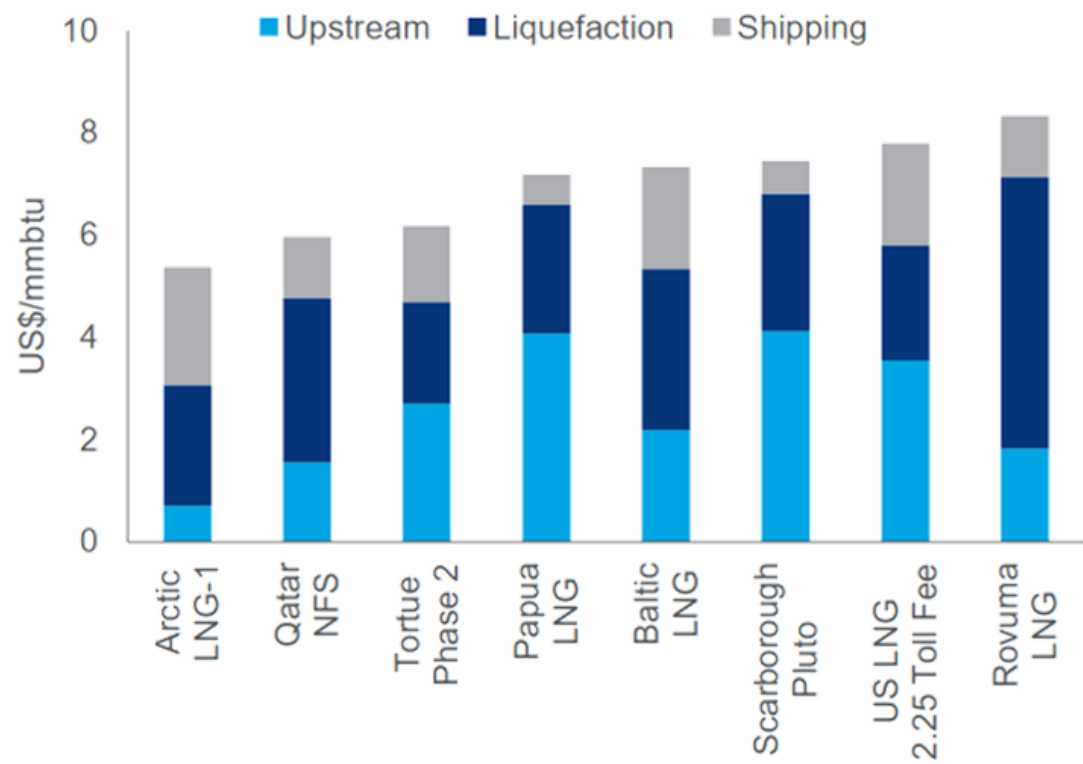


Cost of gas exports (OLD)



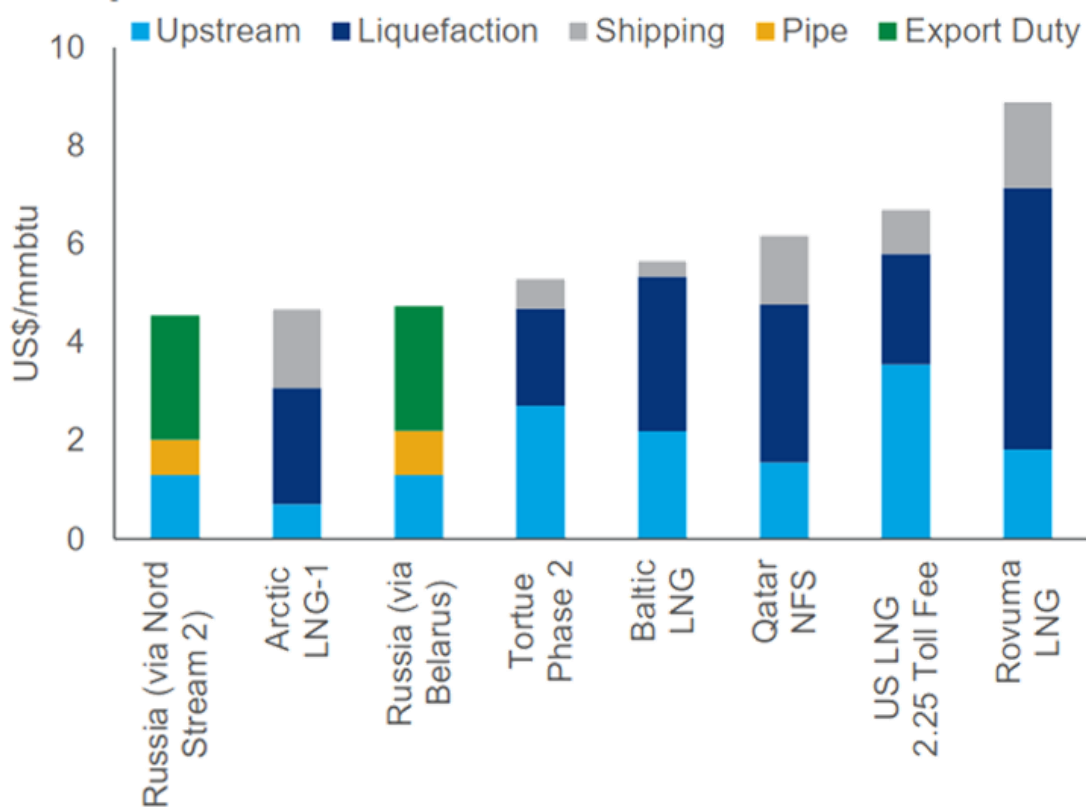
The breakeven prices of gas projects

LNG breakeven cost stack DES Northern Asia

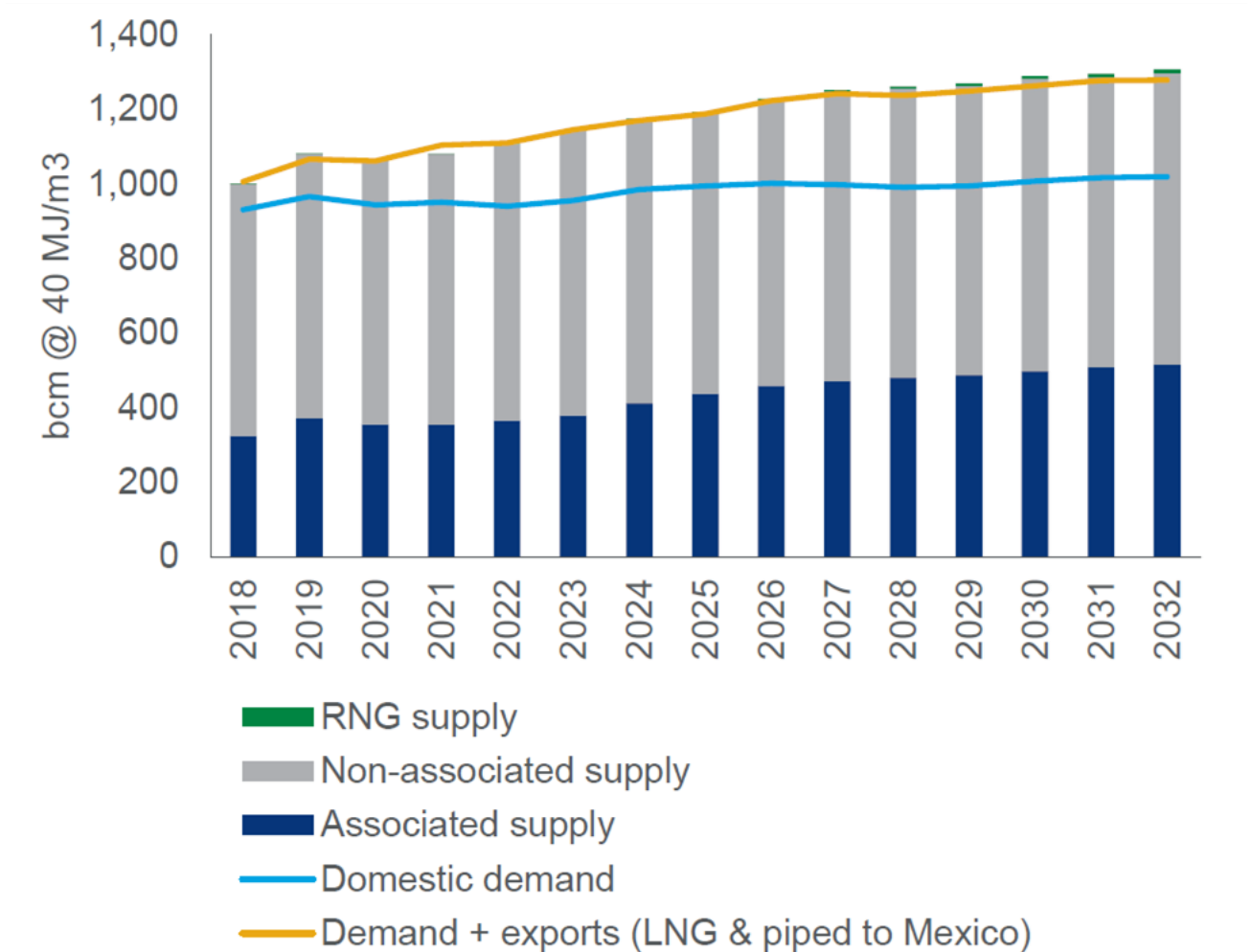


Source: Wood Mackenzie LNG Tool Q4 2021

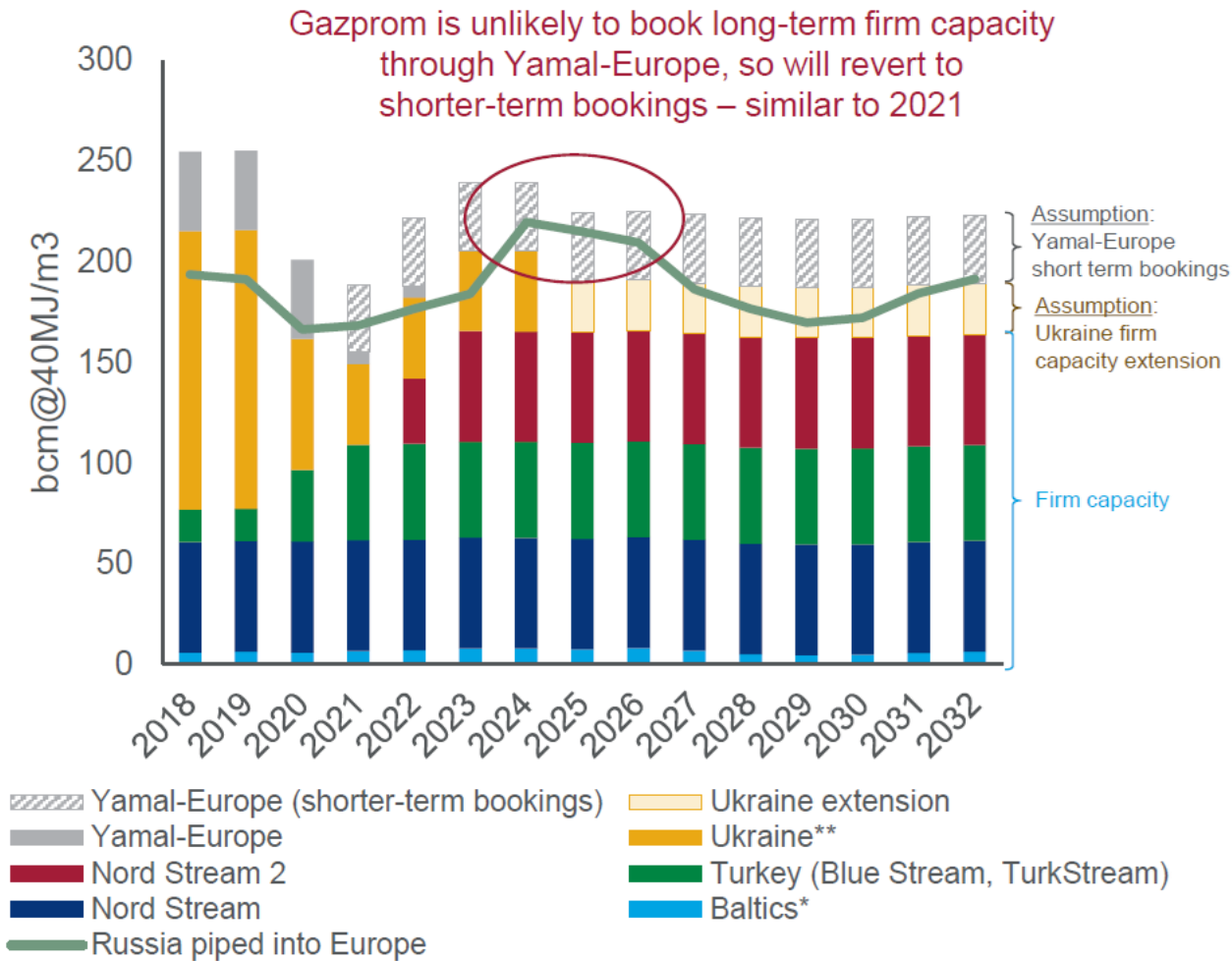
LNG and pipe breakeven cost stack DES NW Europe



North America gas balance

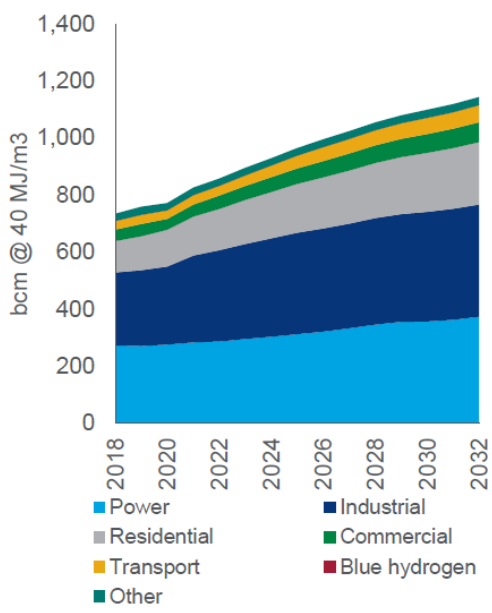


Russia piped capacity and flows to Europe

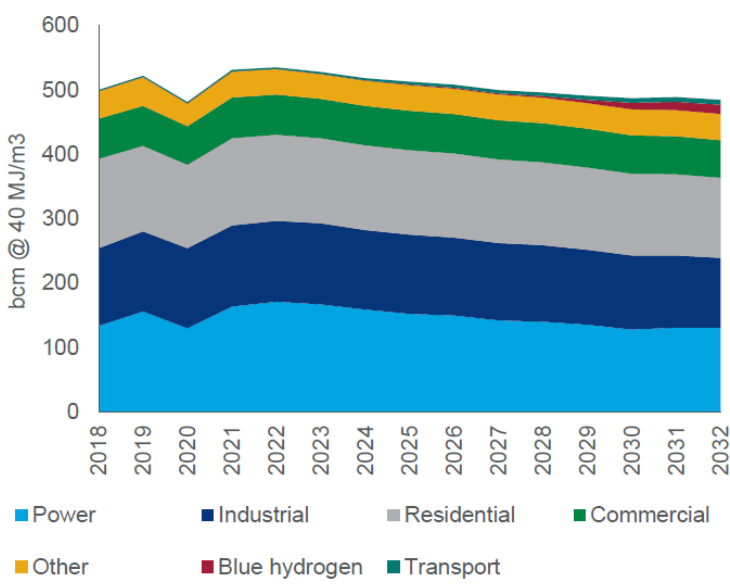


Regional gas demand by sector

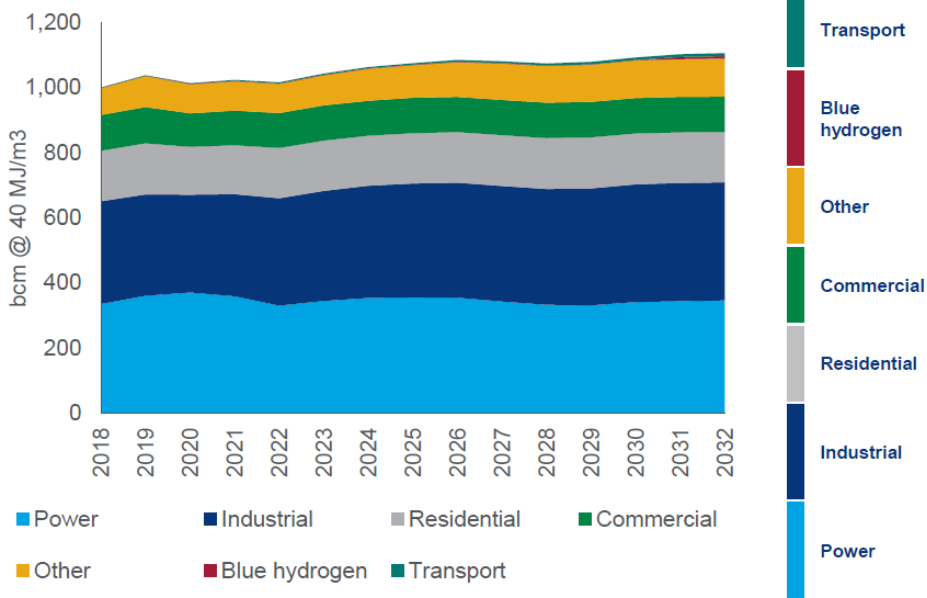
Asia gas demand by sector



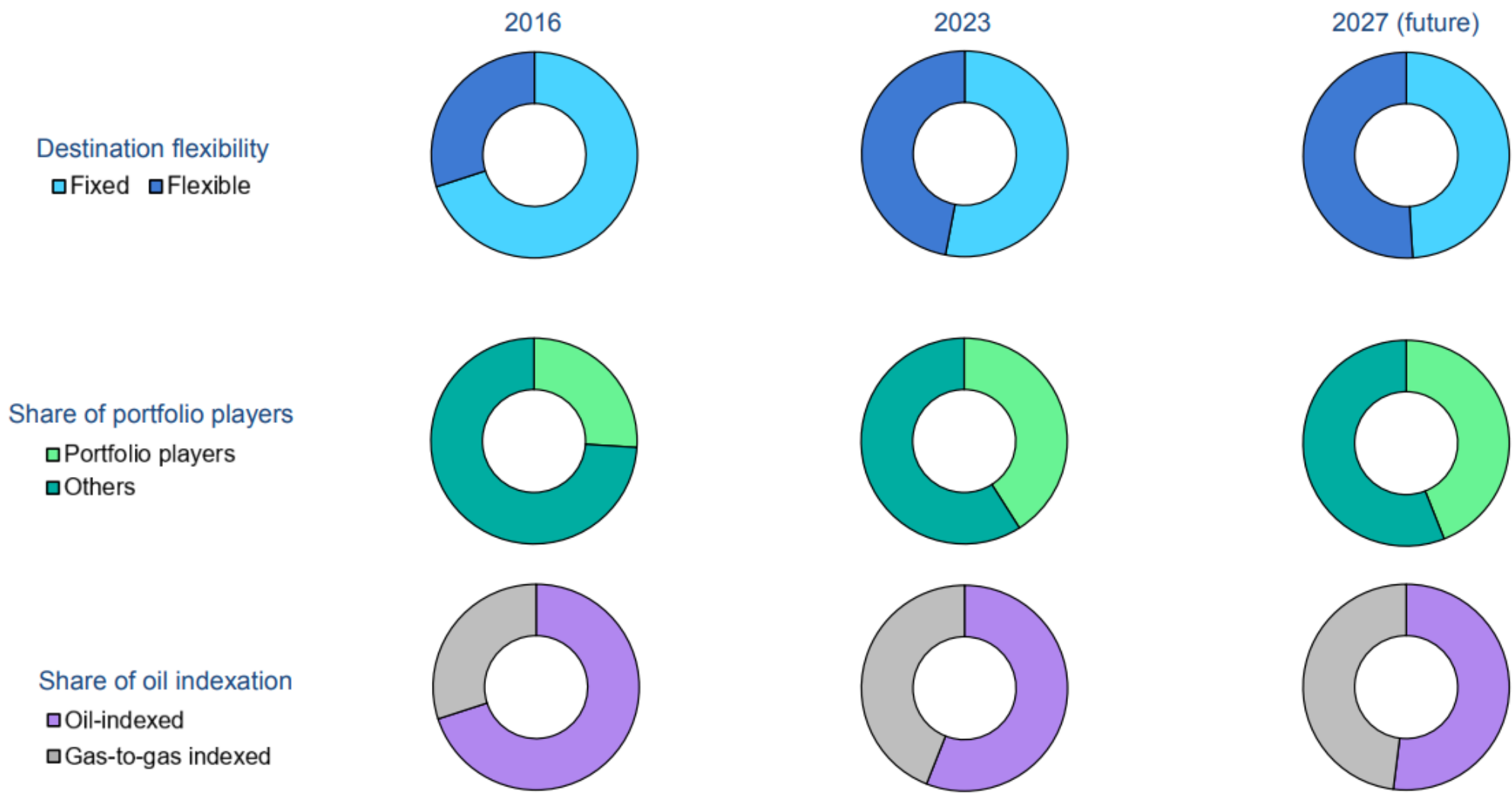
Europe gas demand by sector



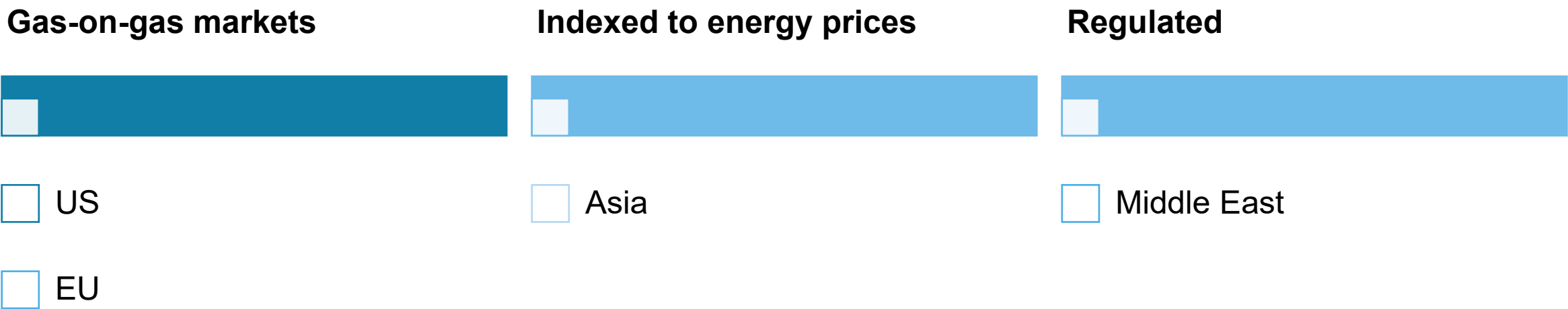
North America gas demand by sector



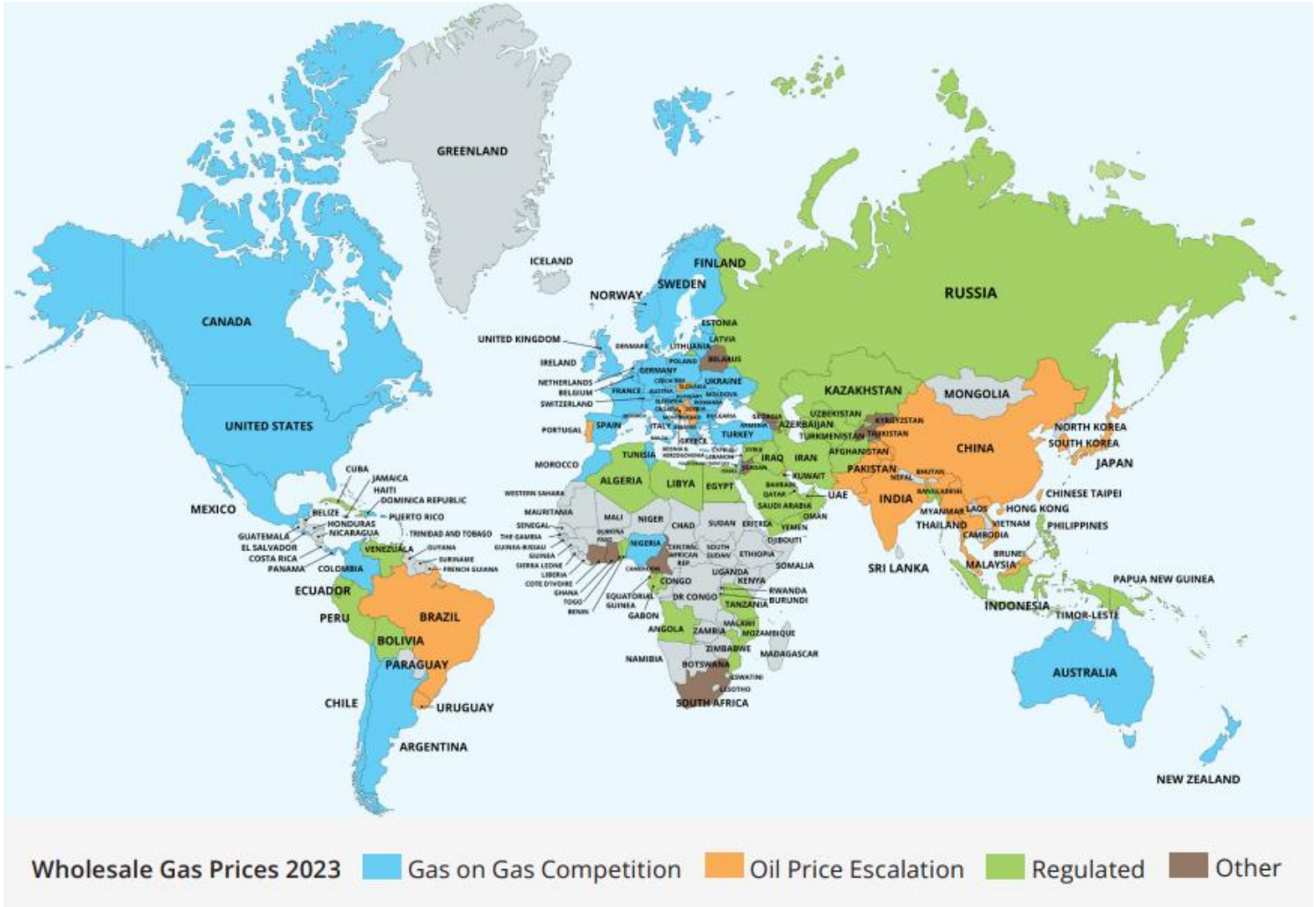
More flexible LNG markets



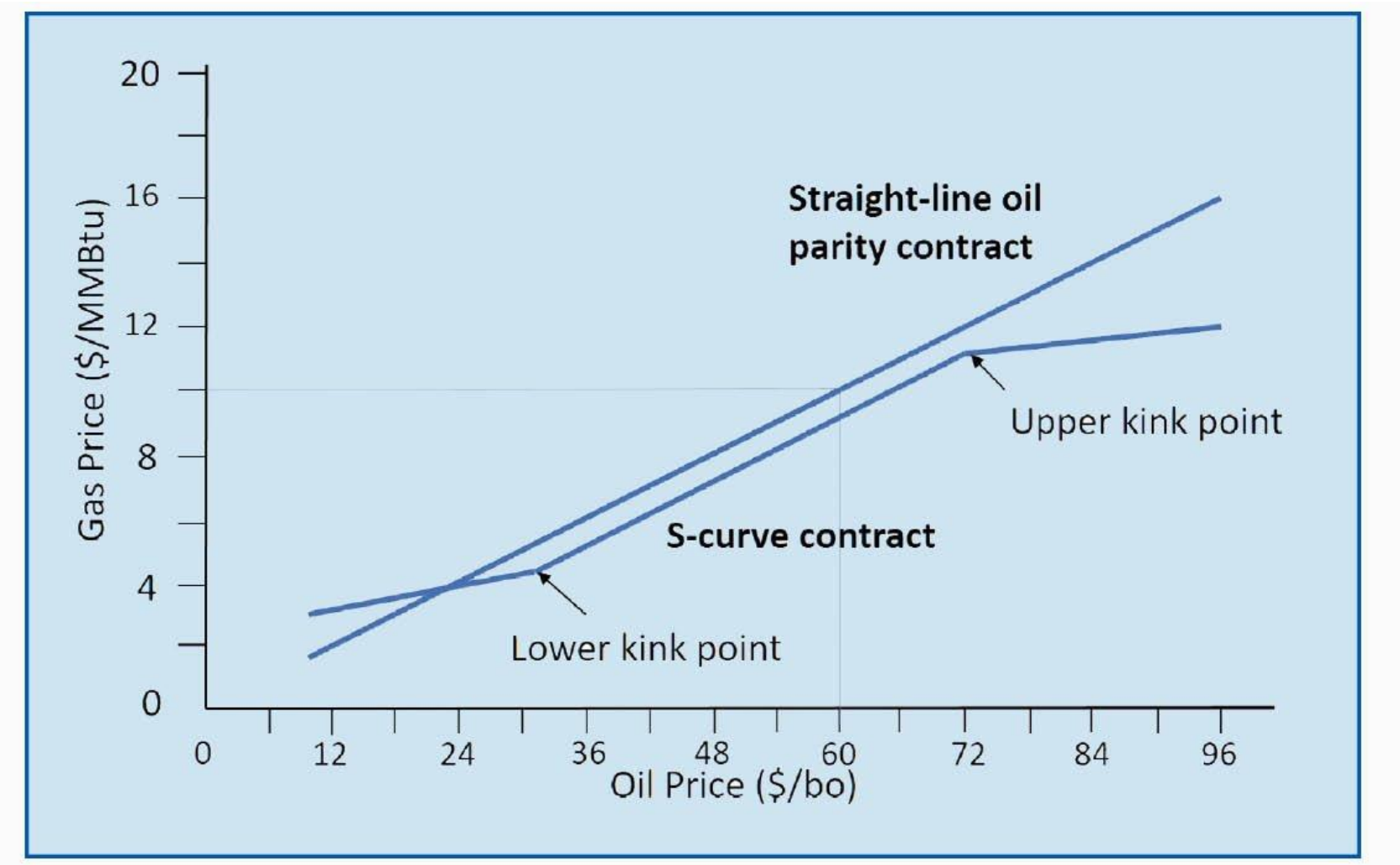
Major gas pricing mechanisms



Wholesale price formation mechanisms map

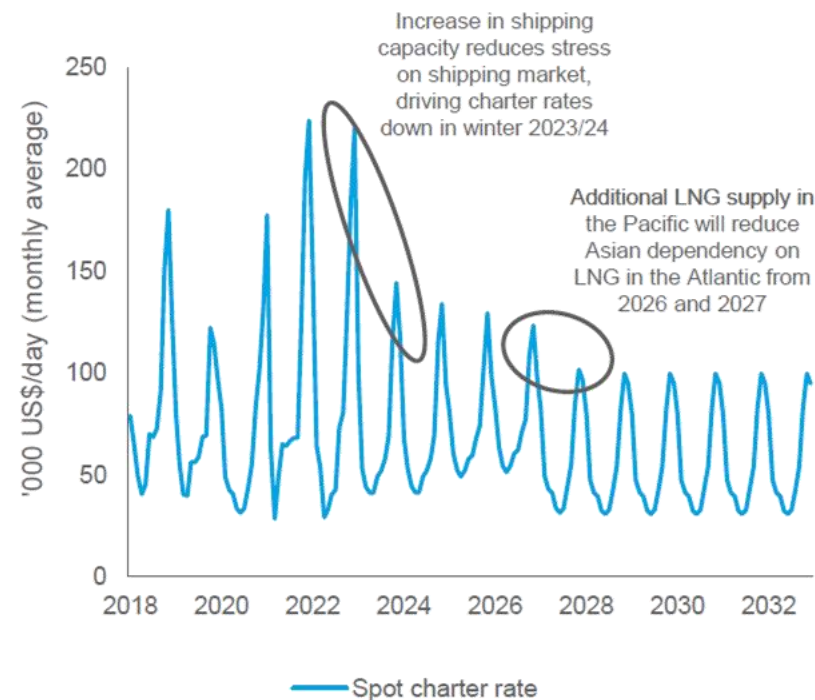


Oil parity curve

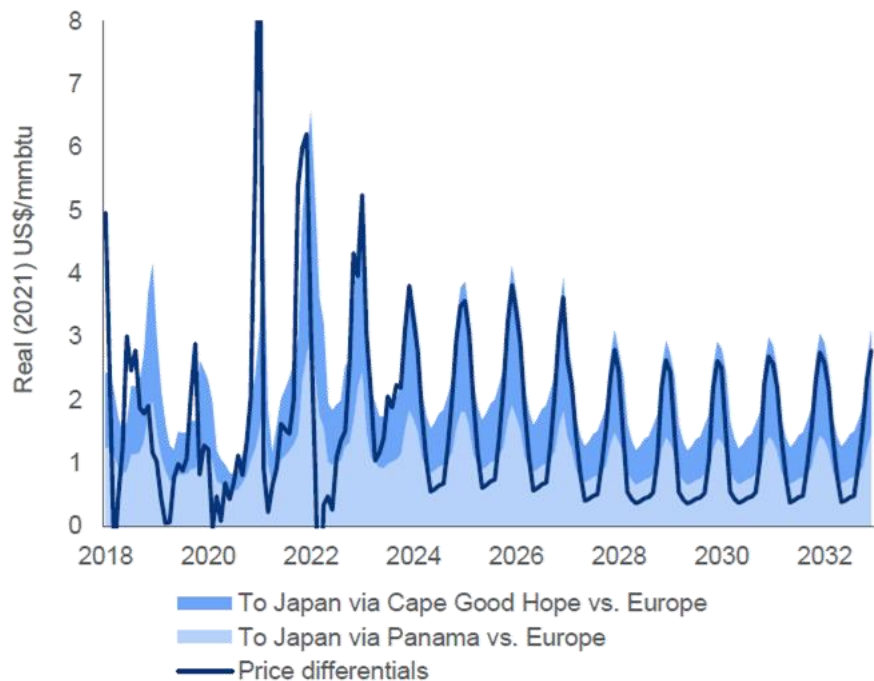


LNG Price Asia vs TTF

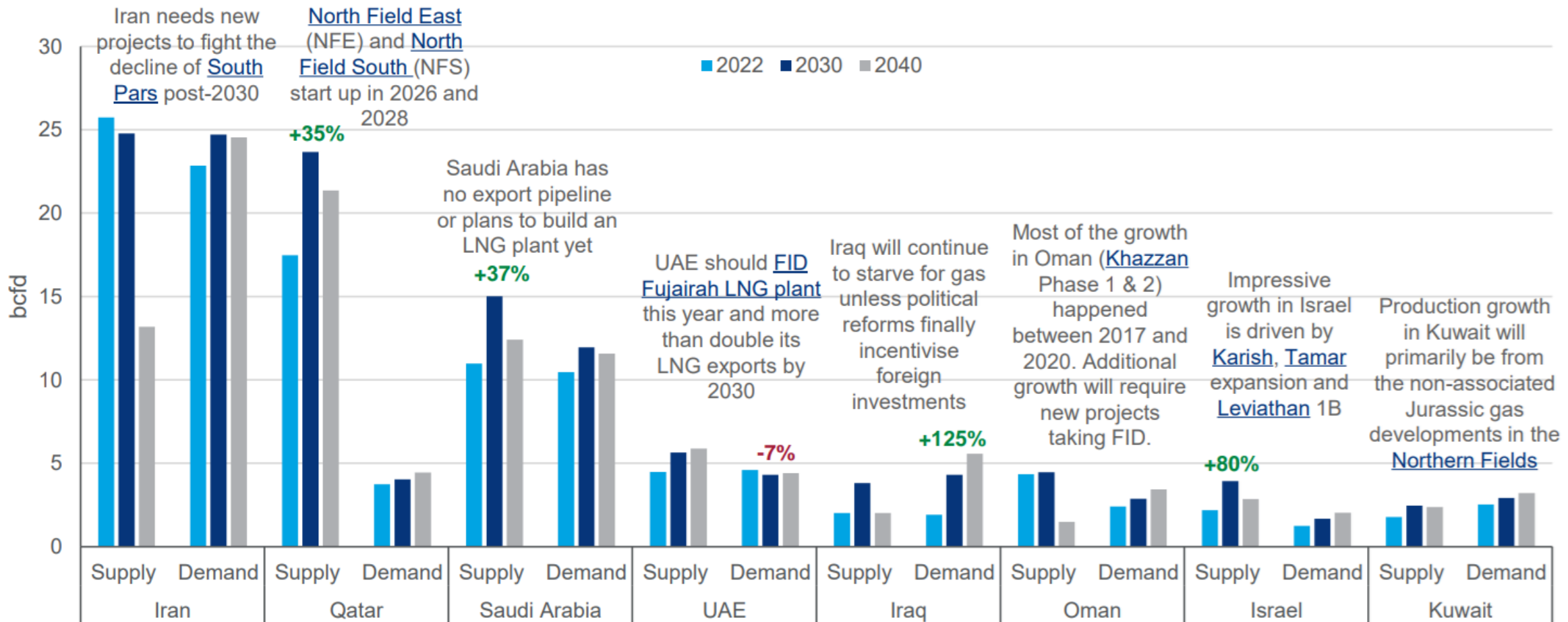
LNG shipping spot charter rates



Price differentials (Japan spot DES – TTF) vs shipping differentials (from the US)



Middle East supply-demand imbalances



Iran – major LNG projects announced around 2000

Pars LNG

Phase 11

Total, PETRONAS, and
NIGEC

10 mmtpa

Cancelled

Iran LNG

Phase 12

NIOC and OPIC

10.5 mmtpa

Delayed

Persian LNG

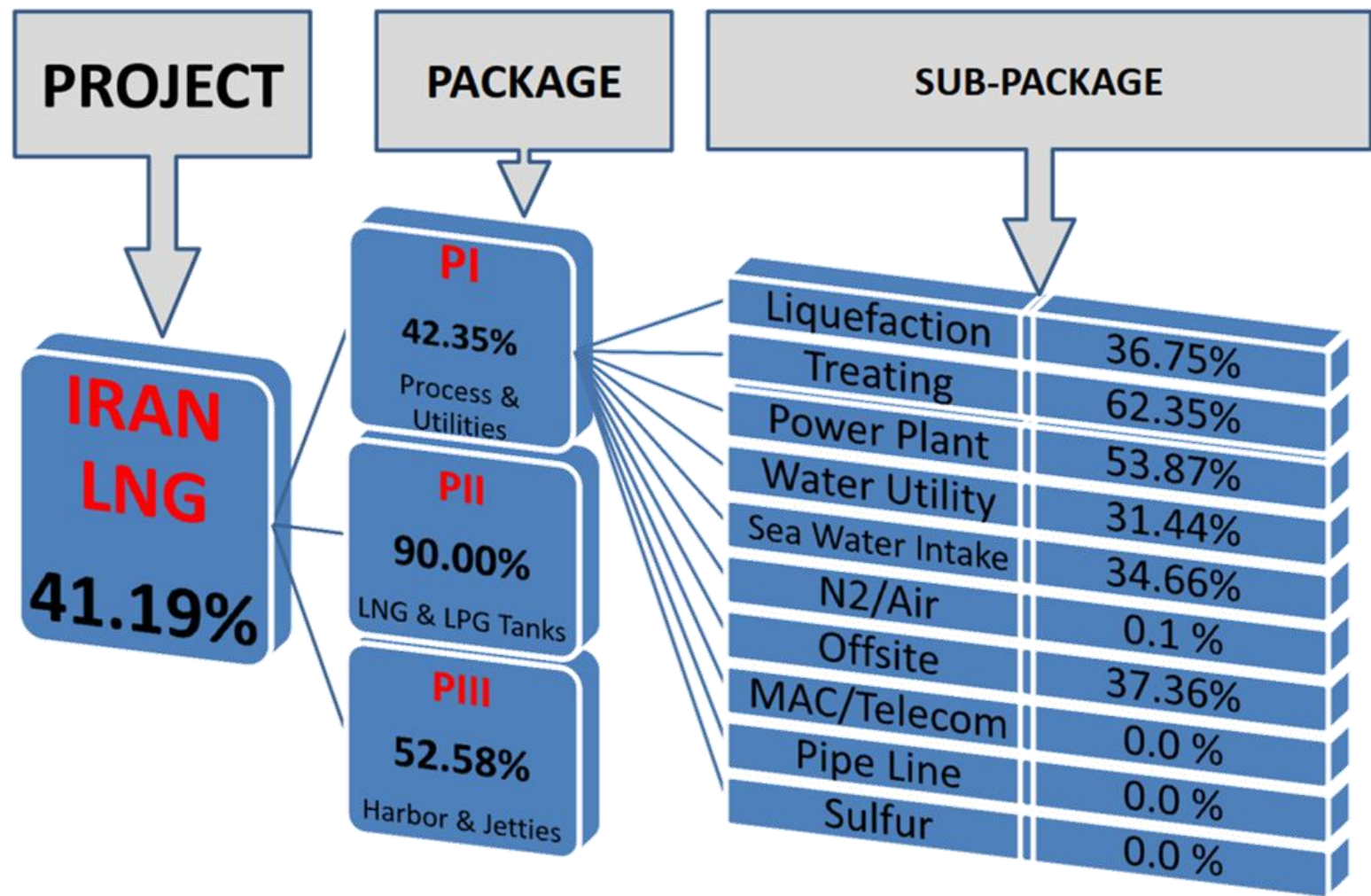
Phases 13 and 14

Shell, Repsol, and NIOC

16 mmtpa

Cancelled

Iran LNG update (2022)



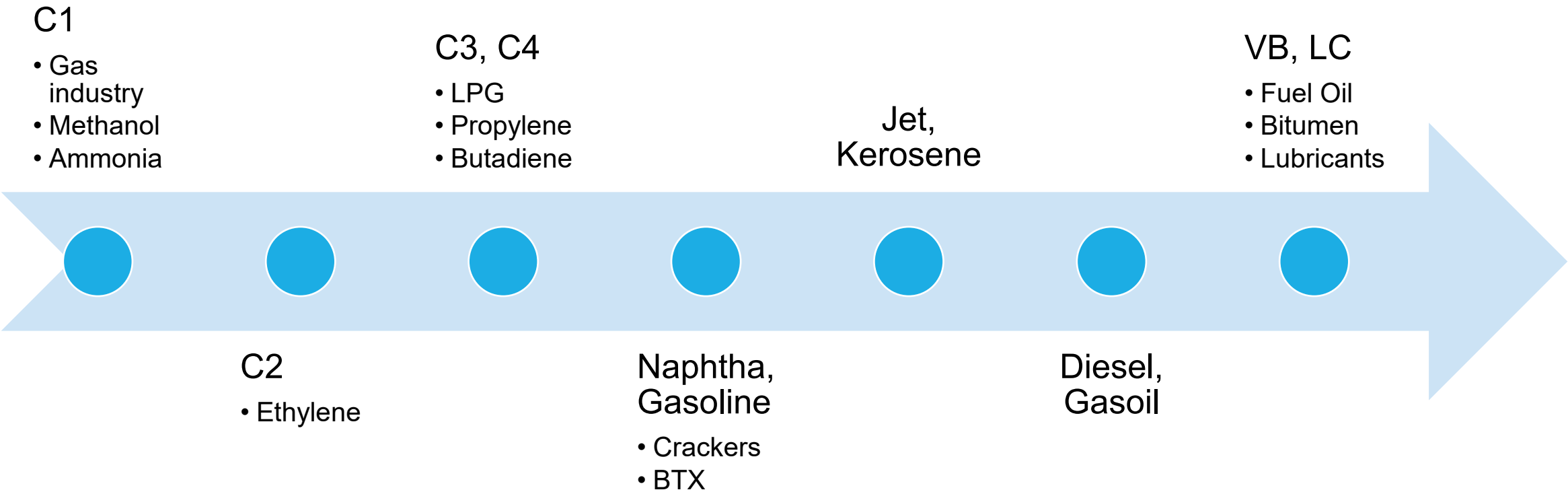
References

- Kearney, Introduction to Natural Gas
- OPEC, Annual Statistical Bulletin
- Energy Intelligence, Statistical Review of World Energy
- Wood Mackenzie
- [Geo Expro](#)

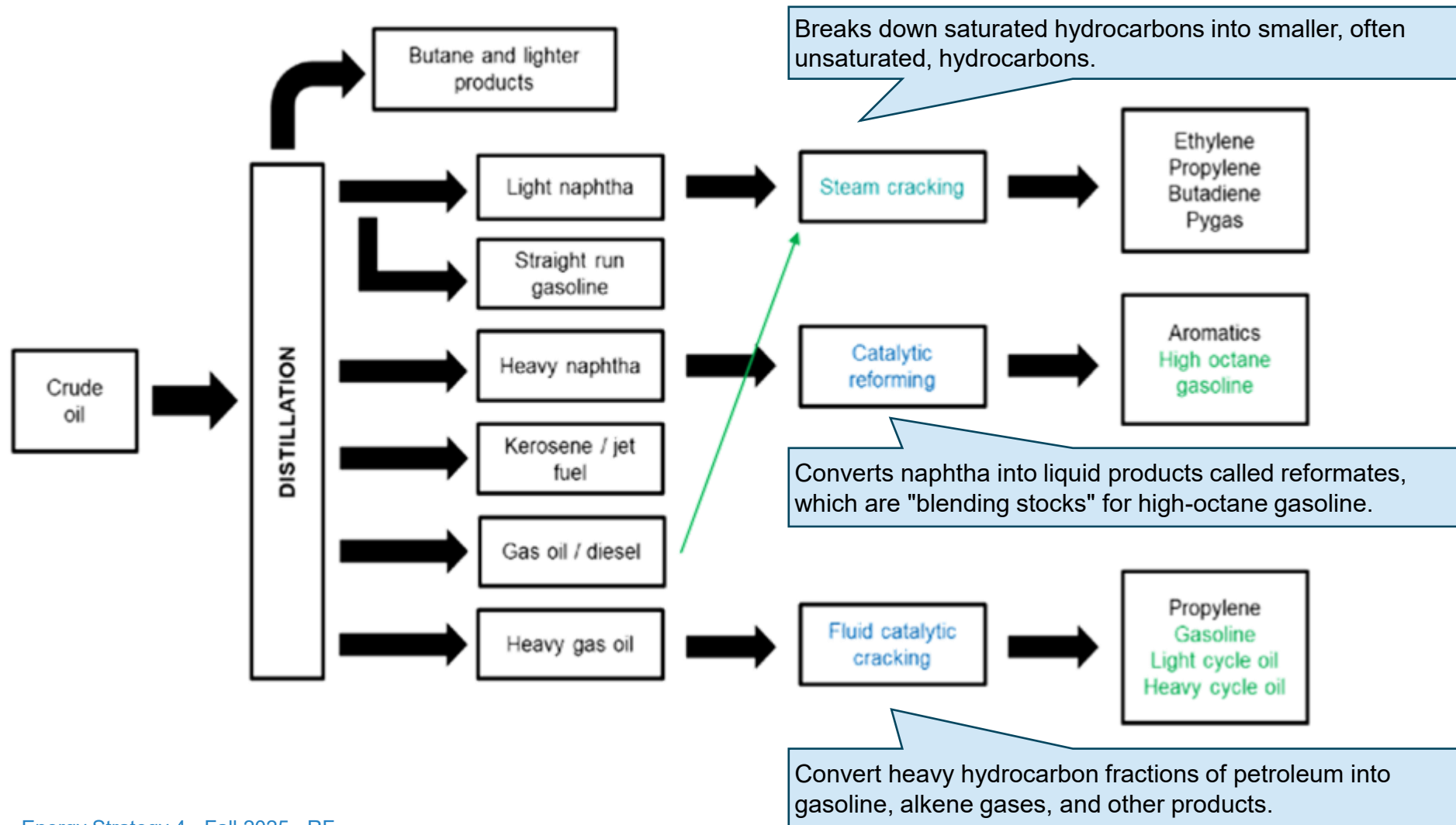
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9. Oil market
10. US shale oil
11. Peak oil
12. Gas and LNG
- 13. Refining and chemicals**
14. Energy companies
15. OFS companies
16. The Middle East
17. Iran's energy profile
18. Iran's oil and gas

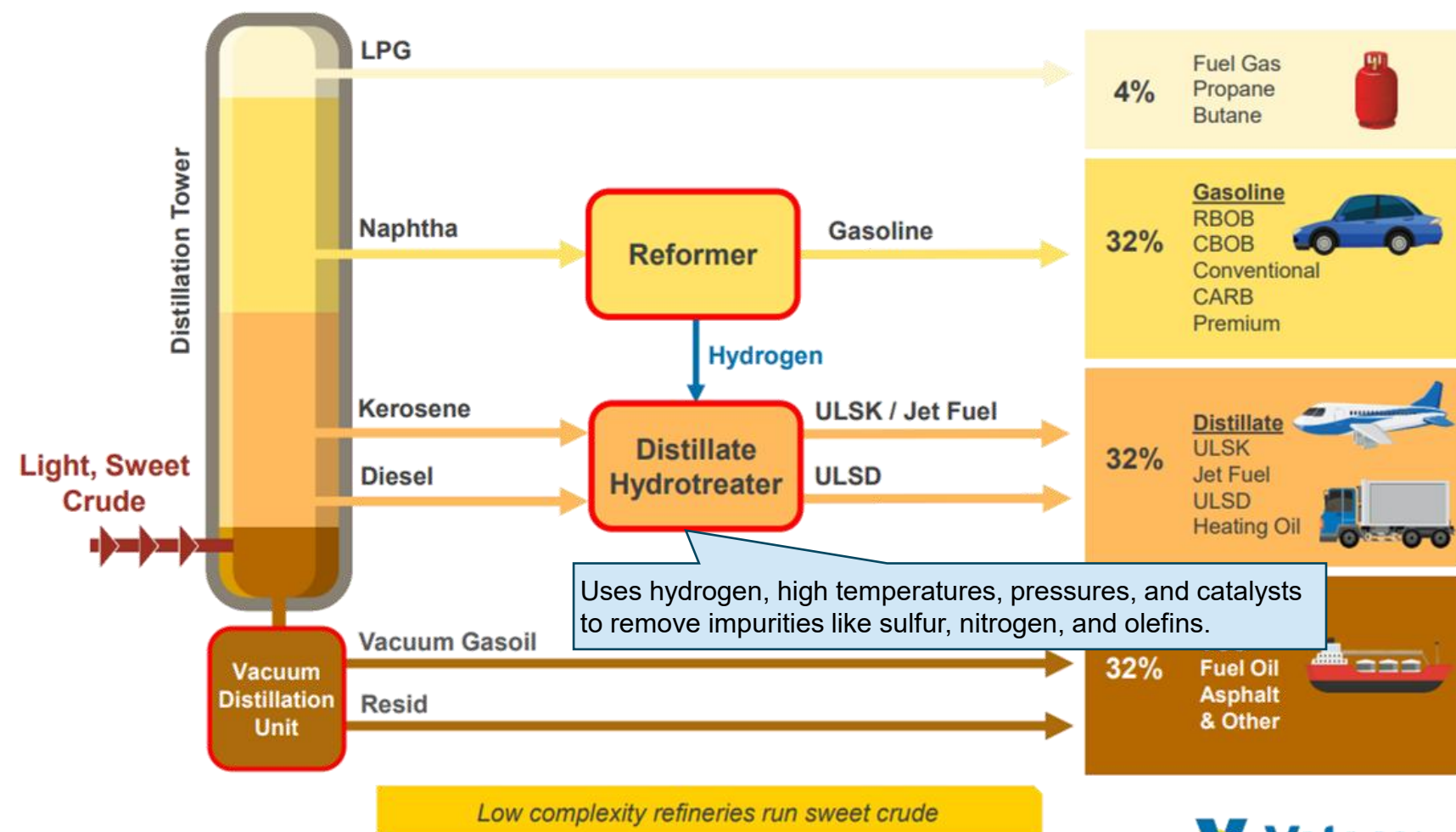
Overview of key hydrocarbons



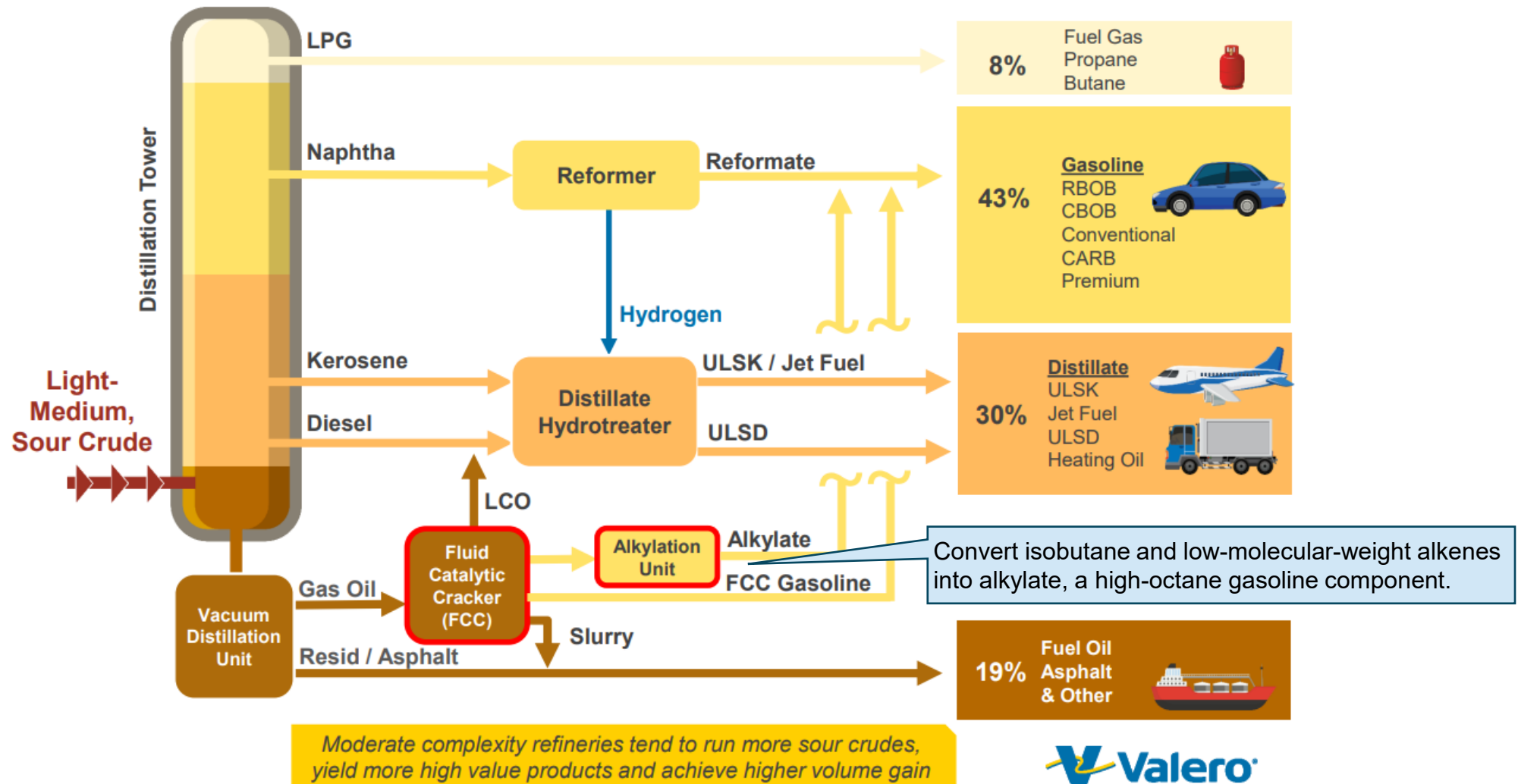
From crude oil to basic petrochemicals



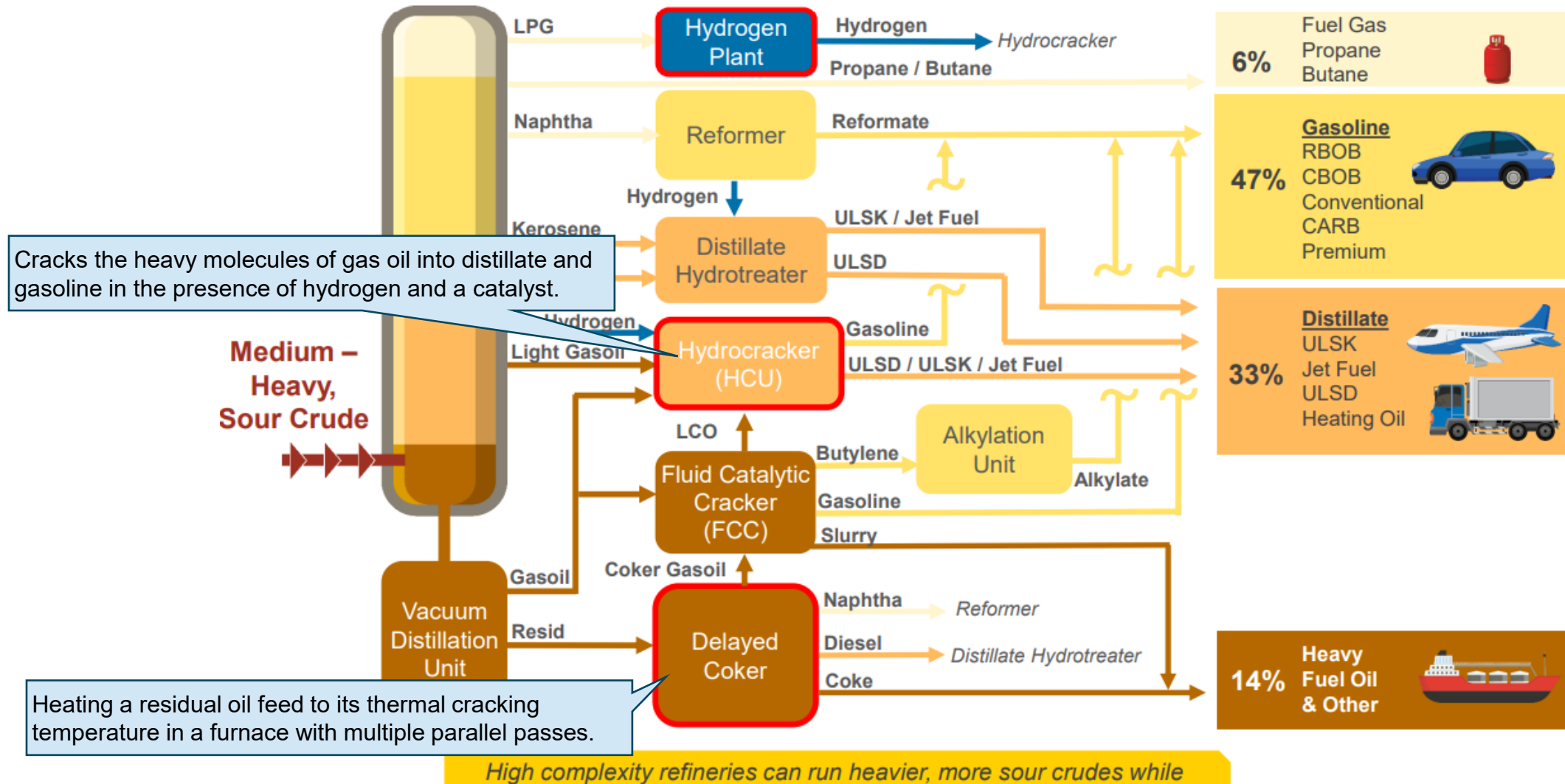
Refining: low complexity (Hydroskimming (Topping))



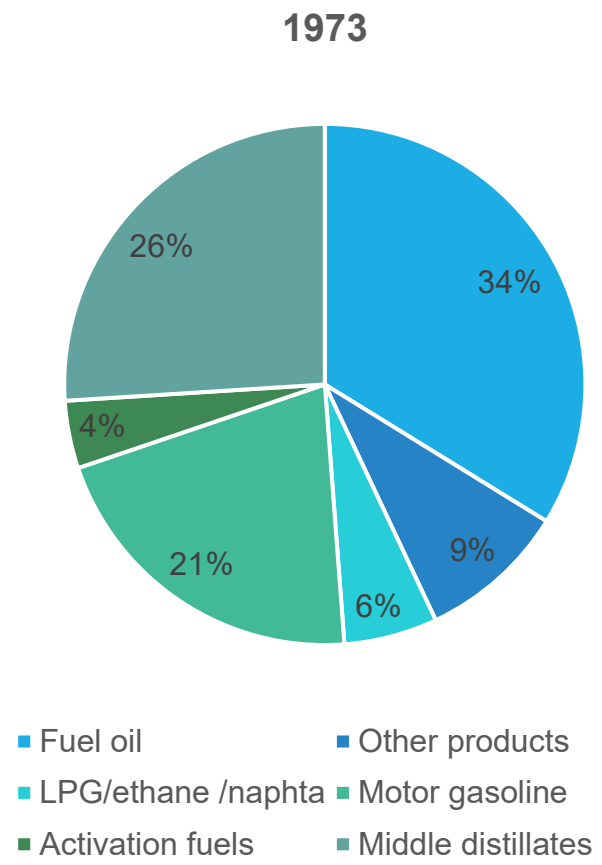
Refining: Medium Complexity (Catalytic Cracking)



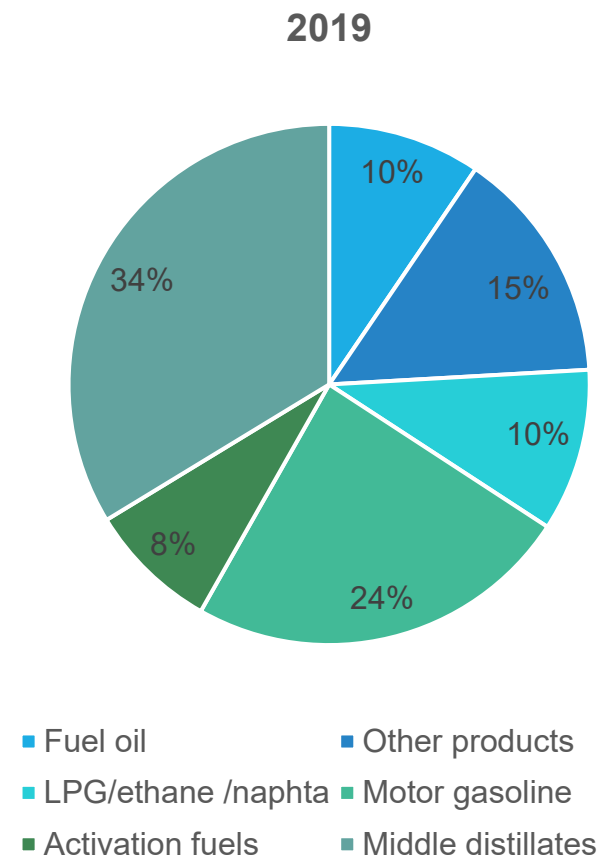
Refining: Coking / Resid Destruction



Refinery output by product

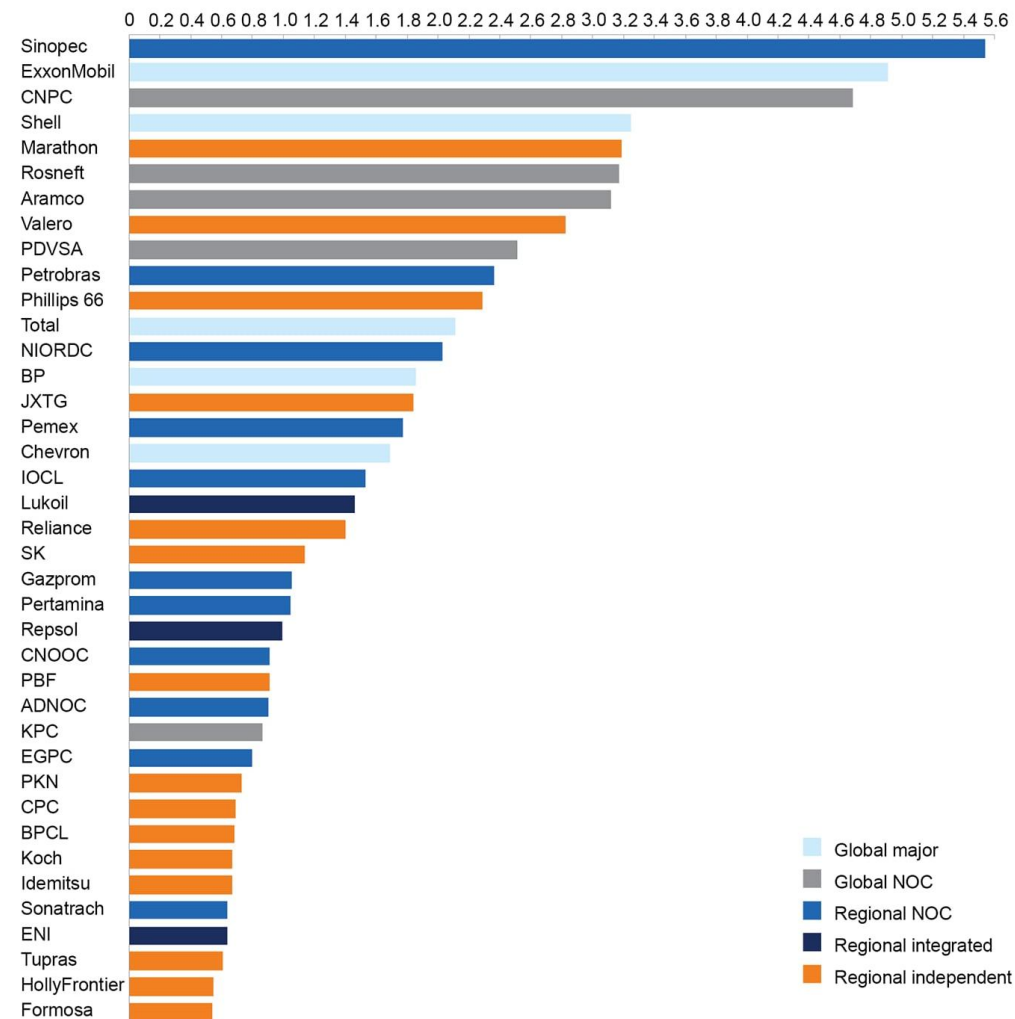


2 719 Mt

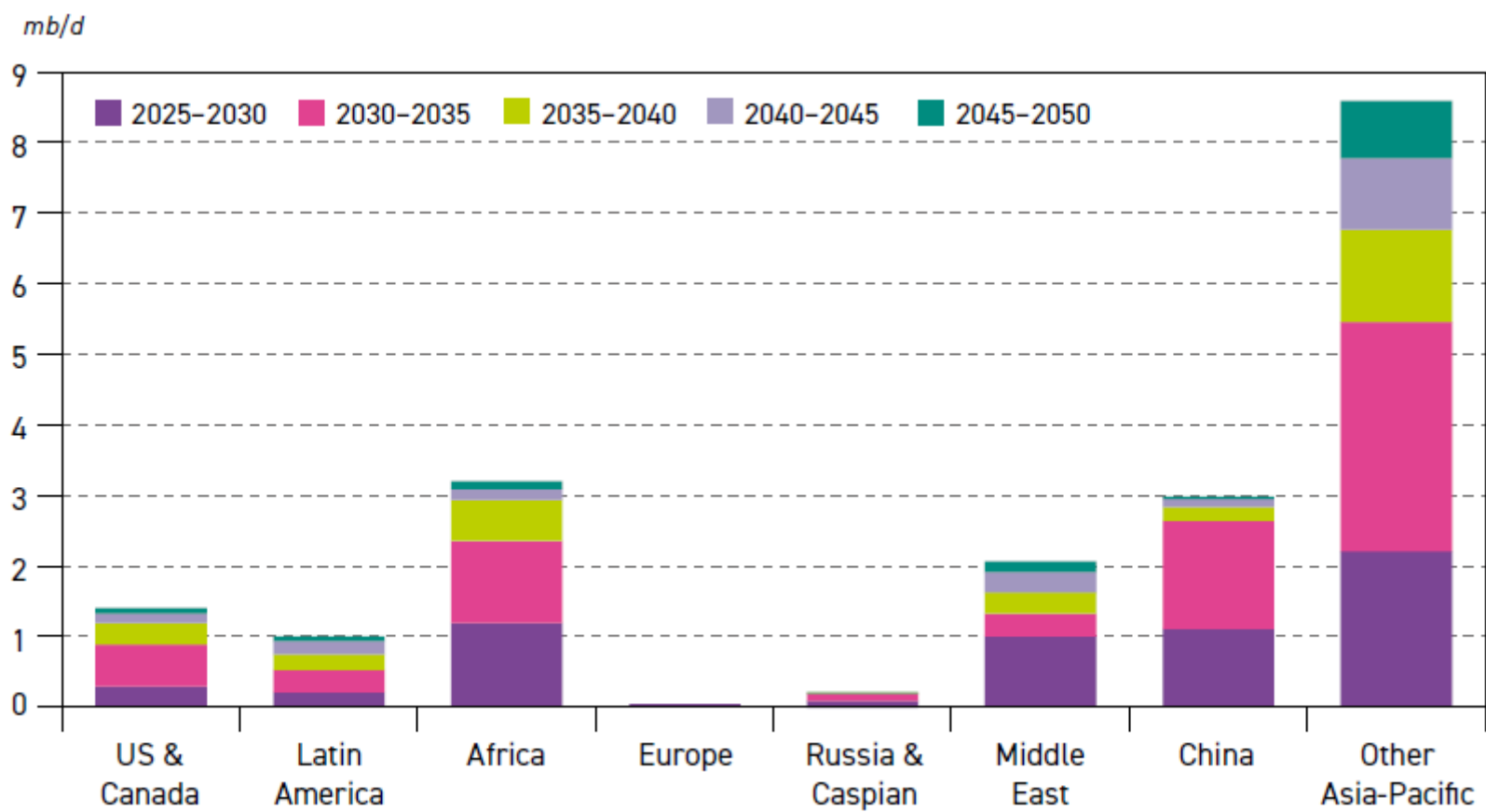


4 159 Mt

Top refining companies by capacity (million barrels per day)

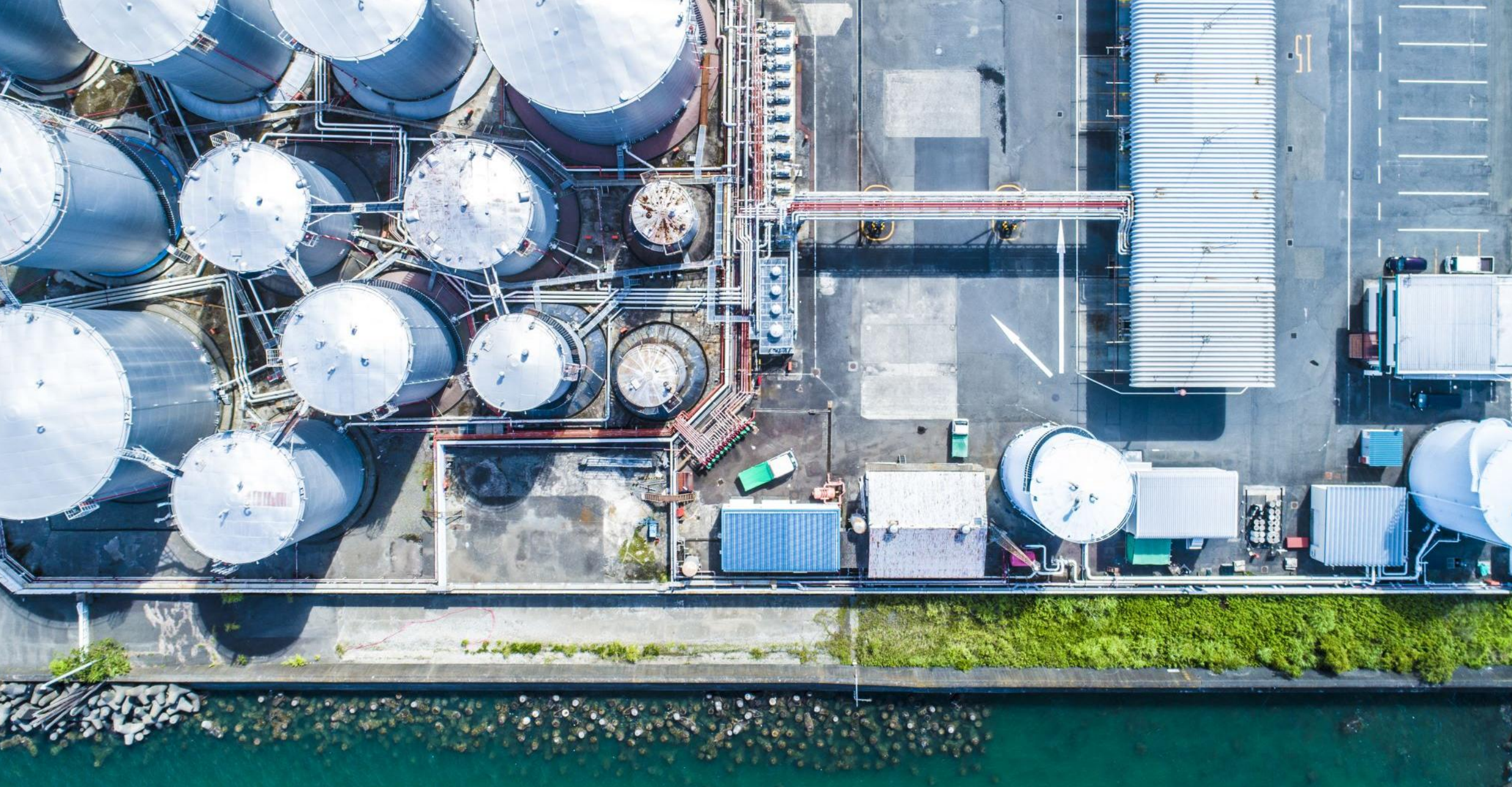


Crude distillation capacity additions over 2025–2050 (million barrels per day)



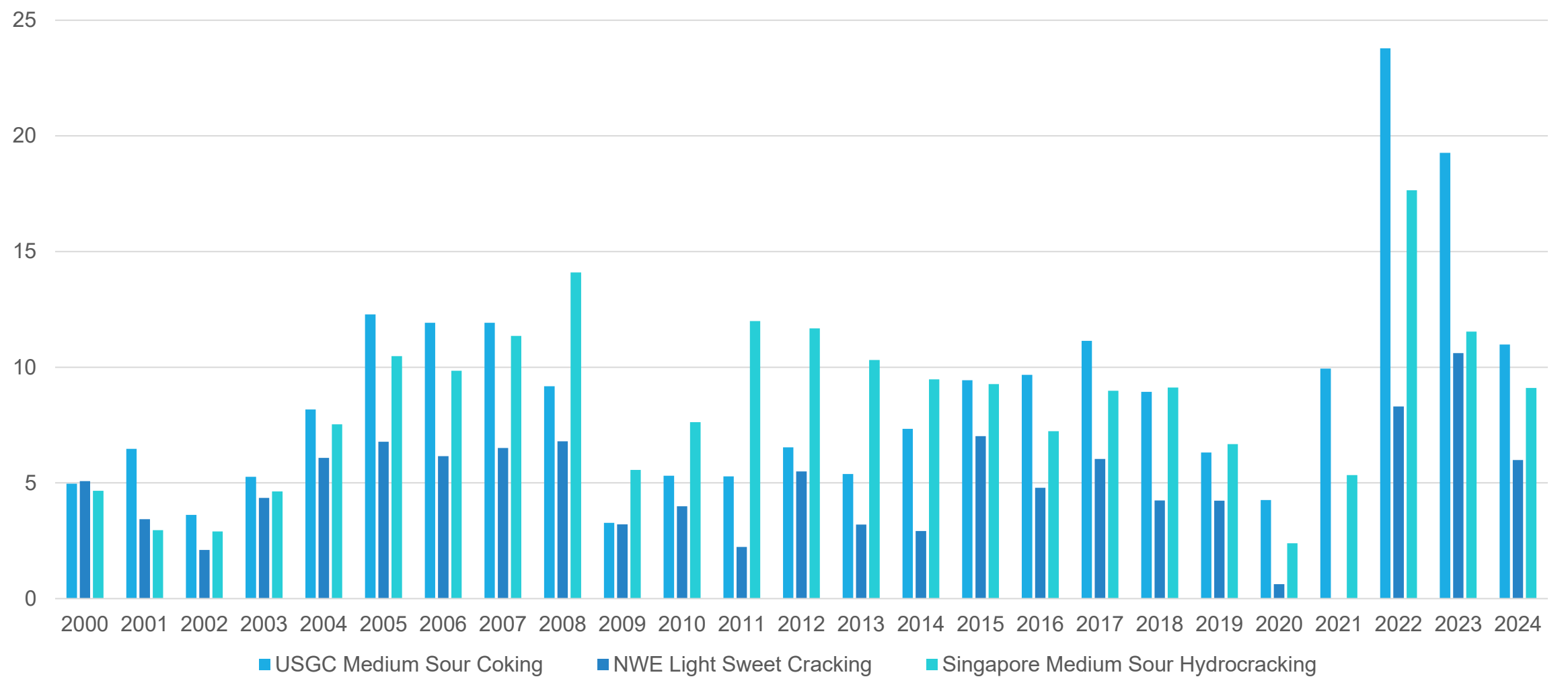
Global oil demand by over 2024–2050 (million barrels per day)

	2024	2030	2035	2040	2045	2050	Growth 2024–2050
Ethane/LPG	14.7	16.3	17.	17.5	17.9	18.3	3.6
Naphtha	6.9	8.0	8.6	9.0	9.4	9.6	2.7
Gasoline	27.2	28.9	29.6	29.9	30.1	30.3	3.1
Light products	48.8	53.2	55.1	56.5	57.4	58.2	9.4
Jet/kero	7.8	9.3	10.2	10.8	11.6	11.9	4.1
Gasoil/diesel	28.7	31.0	32.3	32.6	32.7	33.1	4.4
Middle distillates	36.5	40.3	42.4	43.4	44.3	45.1	8.6
Residual fuel	6.9	7.6	7.8	7.7	7.5	7.4	0.6
Other products	11.6	12.2	12.6	12.4	12.3	12.3	0.7
Heavy products	18.4	19.8	20.3	20.1	19.8	19.7	1.3
World	103.7	113.3	117.9	120.0	121.6	122.9	19.2



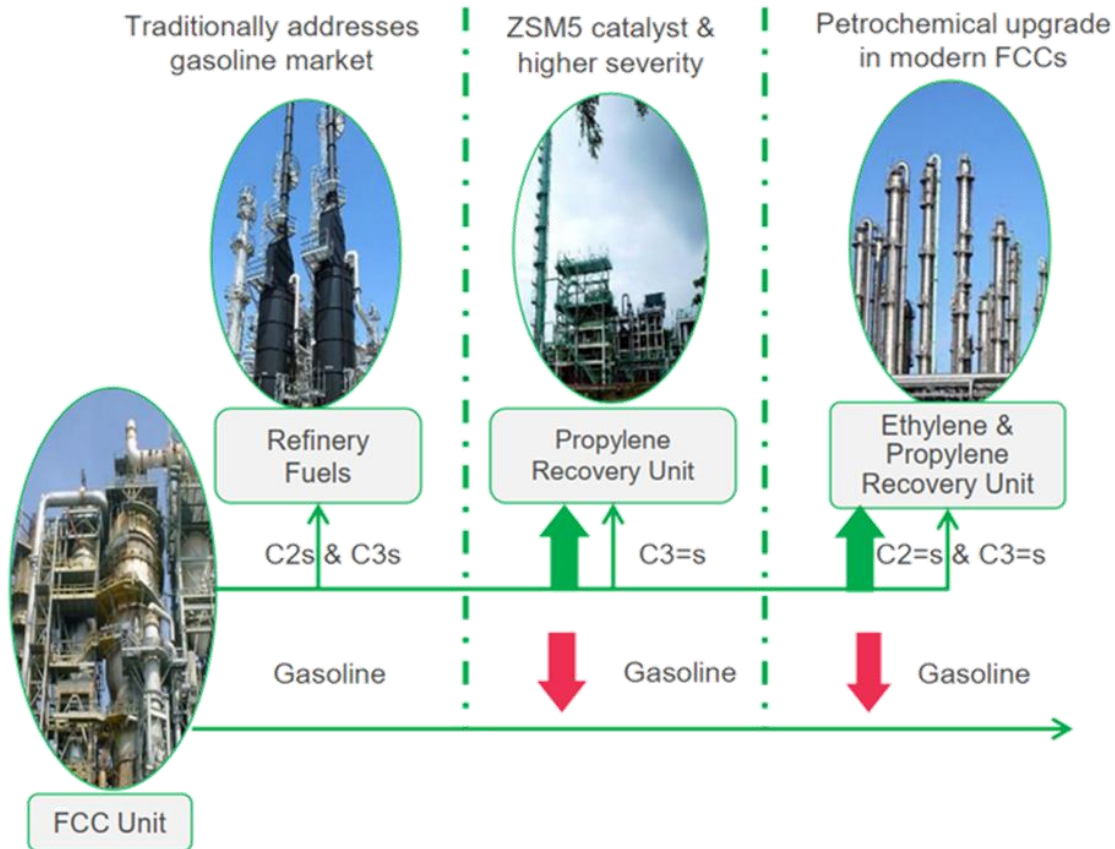
How profitable is refining business?

Regional refining margins (USD per barrel)

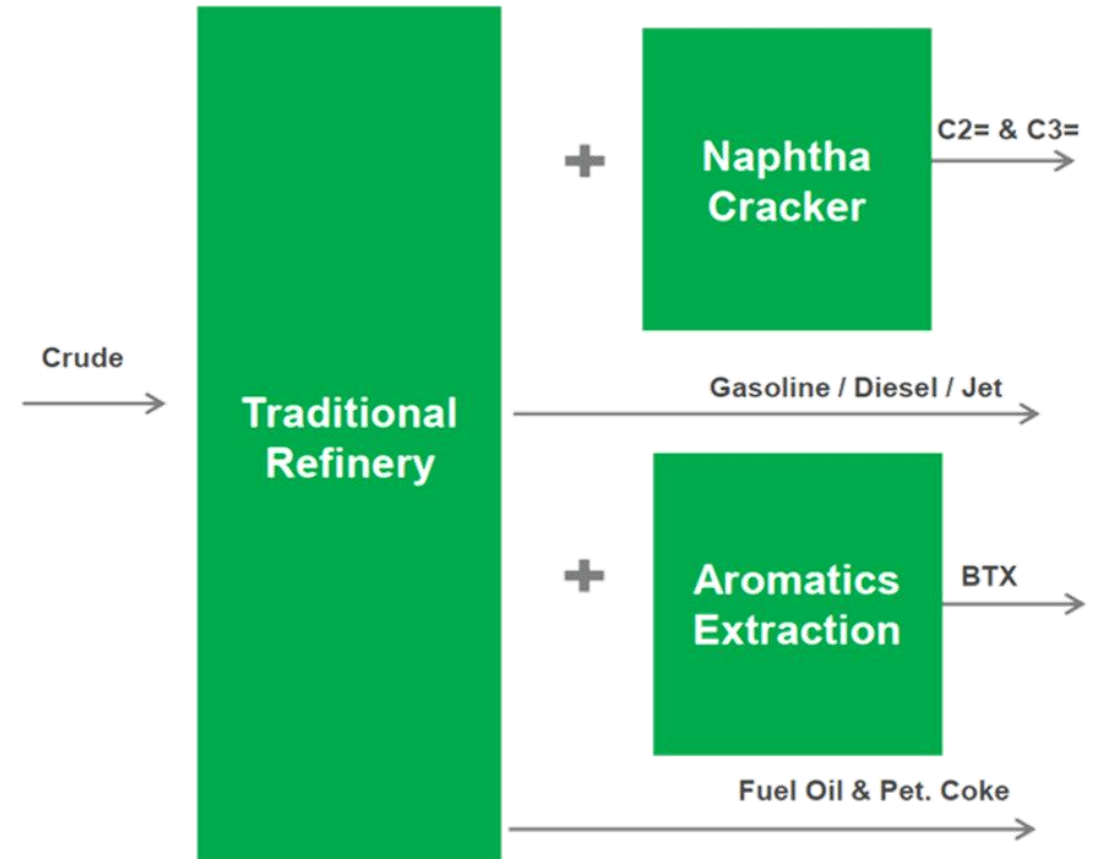


Refining petrochemical integration

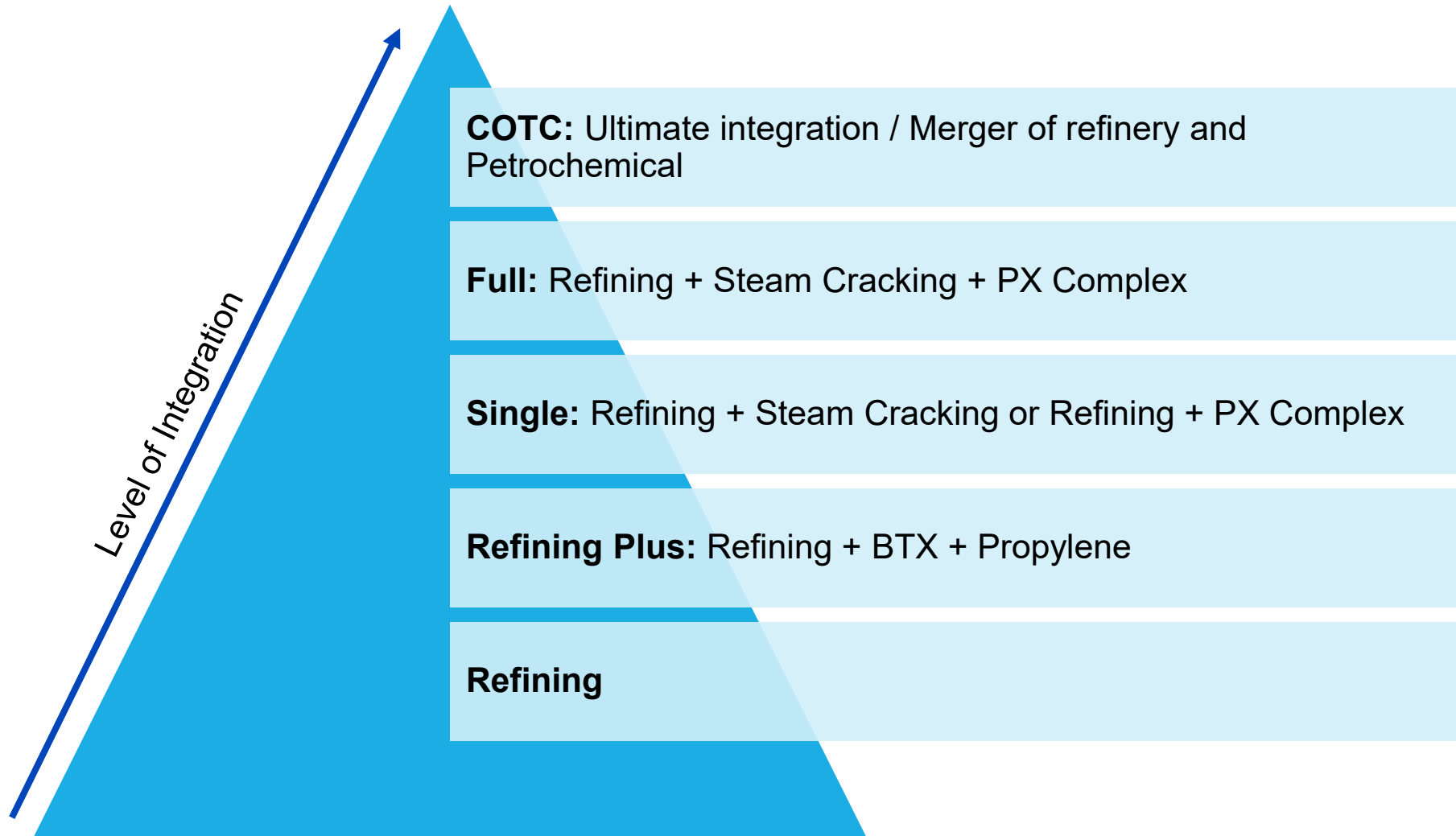
“Re-inventing” the FCC can potentially be the first move



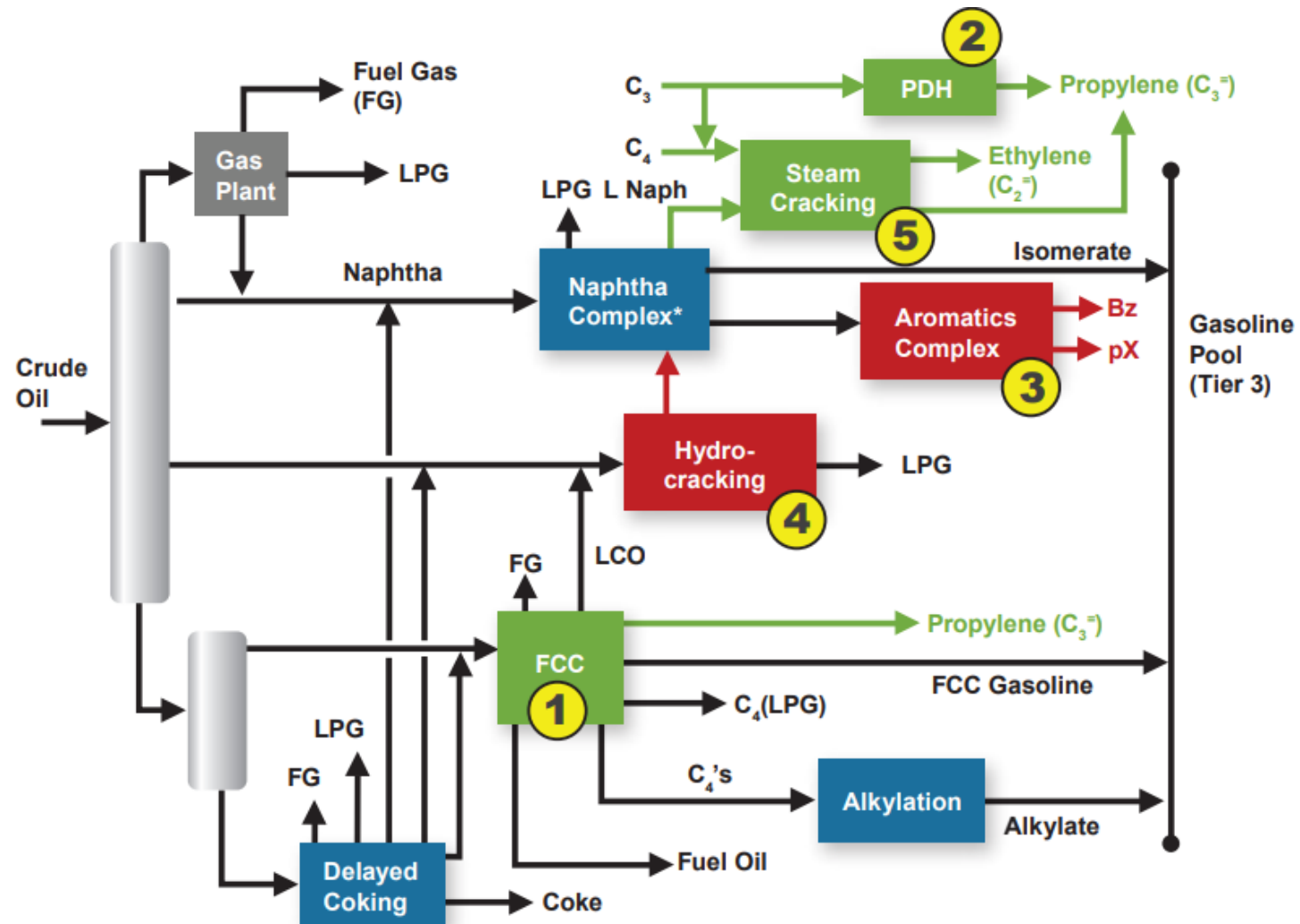
Long term plan to “bolt-on” petrochemical production



COTC configuration



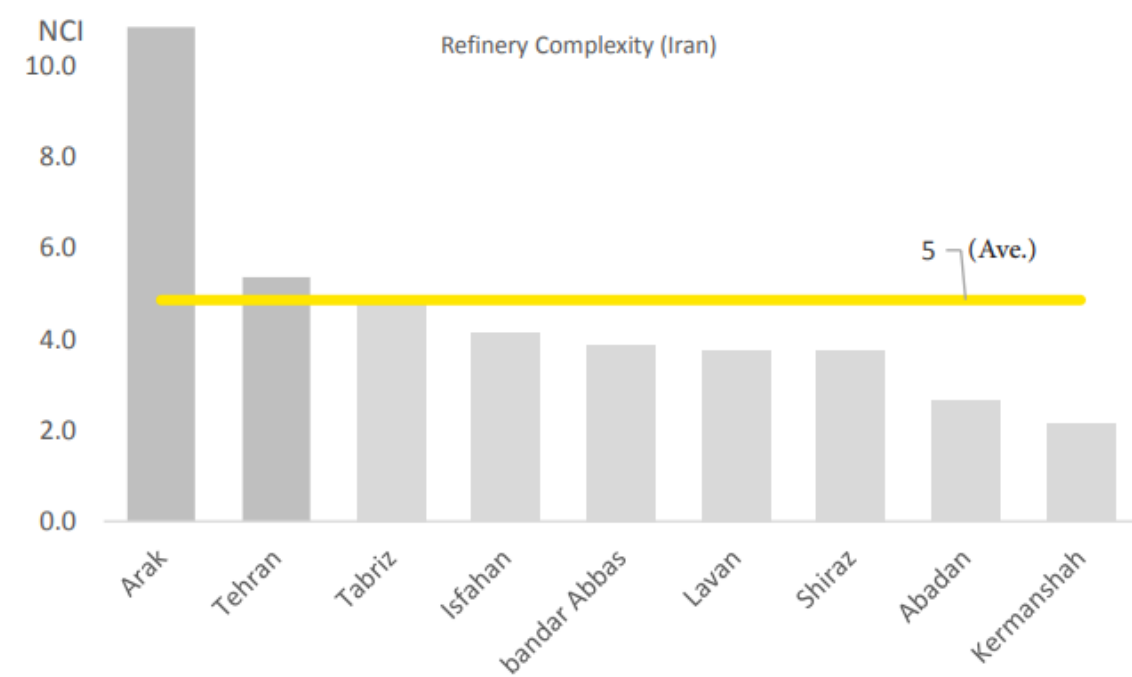
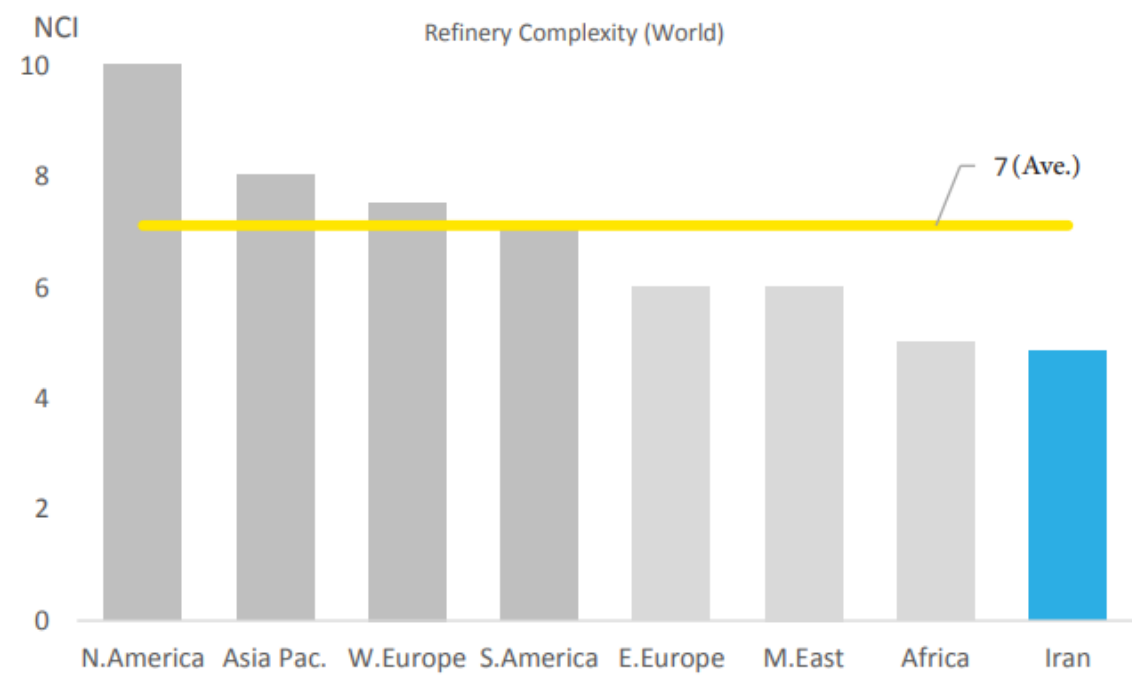
Fuels refinery integrated with petrochemicals (example)



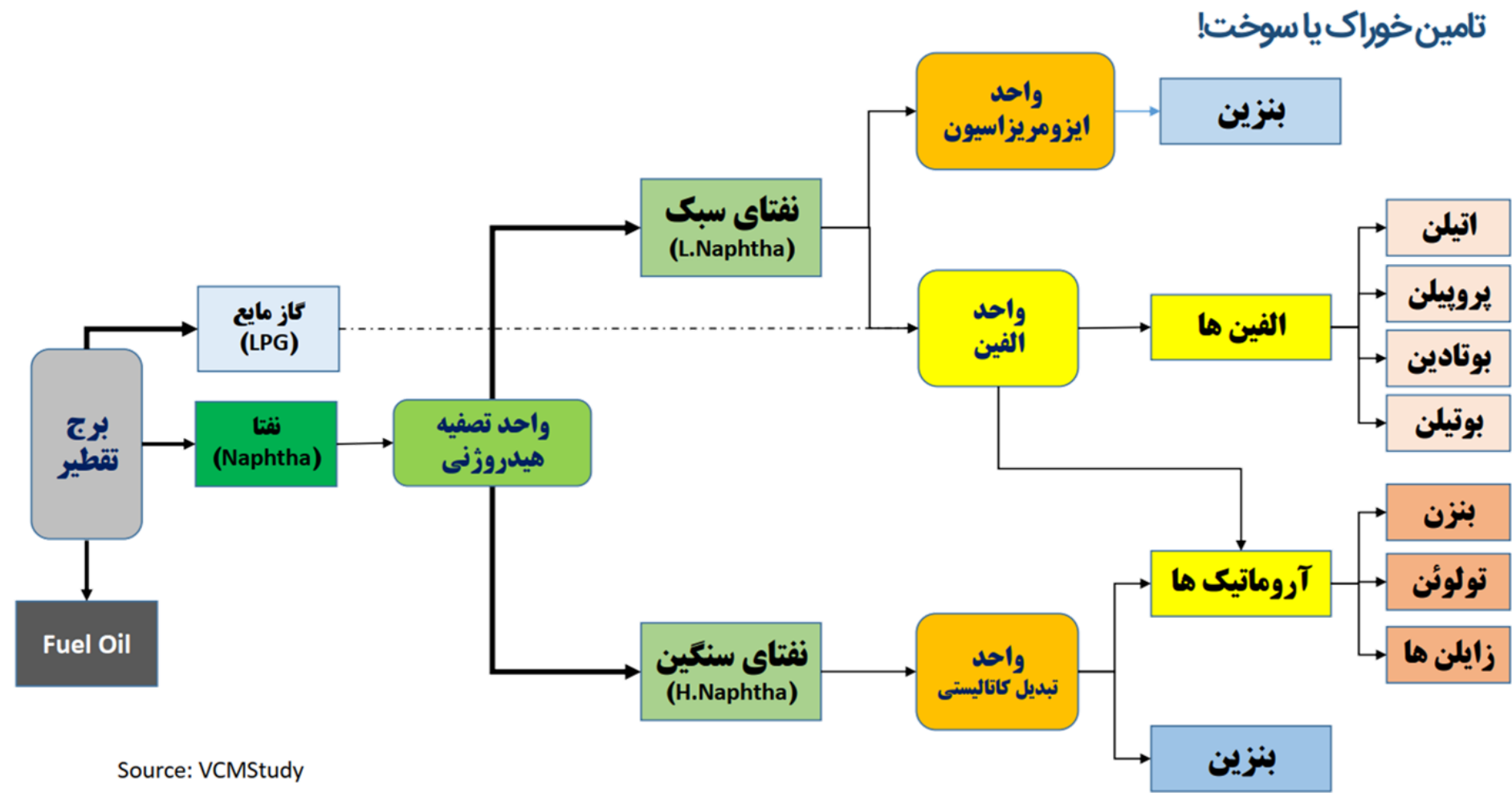
COTC complexes in operation or planned

Project Name / Owner	Location	Startup	Conversion to Chemicals	Investment
Zhejiang Petroleum and Chemical	Zhoushan, China	Phase I: 2019 Phase II: 2022	Phase I: ~45 percent Phase II: ~ 70 percent (combined with phase I)	Phase I: US\$ 12.0 billion Phase II: US\$ 12.0 billion
Hengyi Group	Pulau Muara Besar, Brunei	Phase I: 2019 Phase II: 2027	Phase I: ~40 percent Phase II: Unannounced	Phase I: US\$ 3.5 billion Phase II: US\$ 9.0 billion
Hengli Petrochemical	Dalian, China	2020	~40 percent	US\$ 11.4 billion
Shenghong Petrochemical	Lianyungang, China	2022	~60 percent	US\$ 11.0 billion
Shandong Yulong Petrochemical	Yulong Island, China	2024	~50 percent	US\$ 17.8 billion

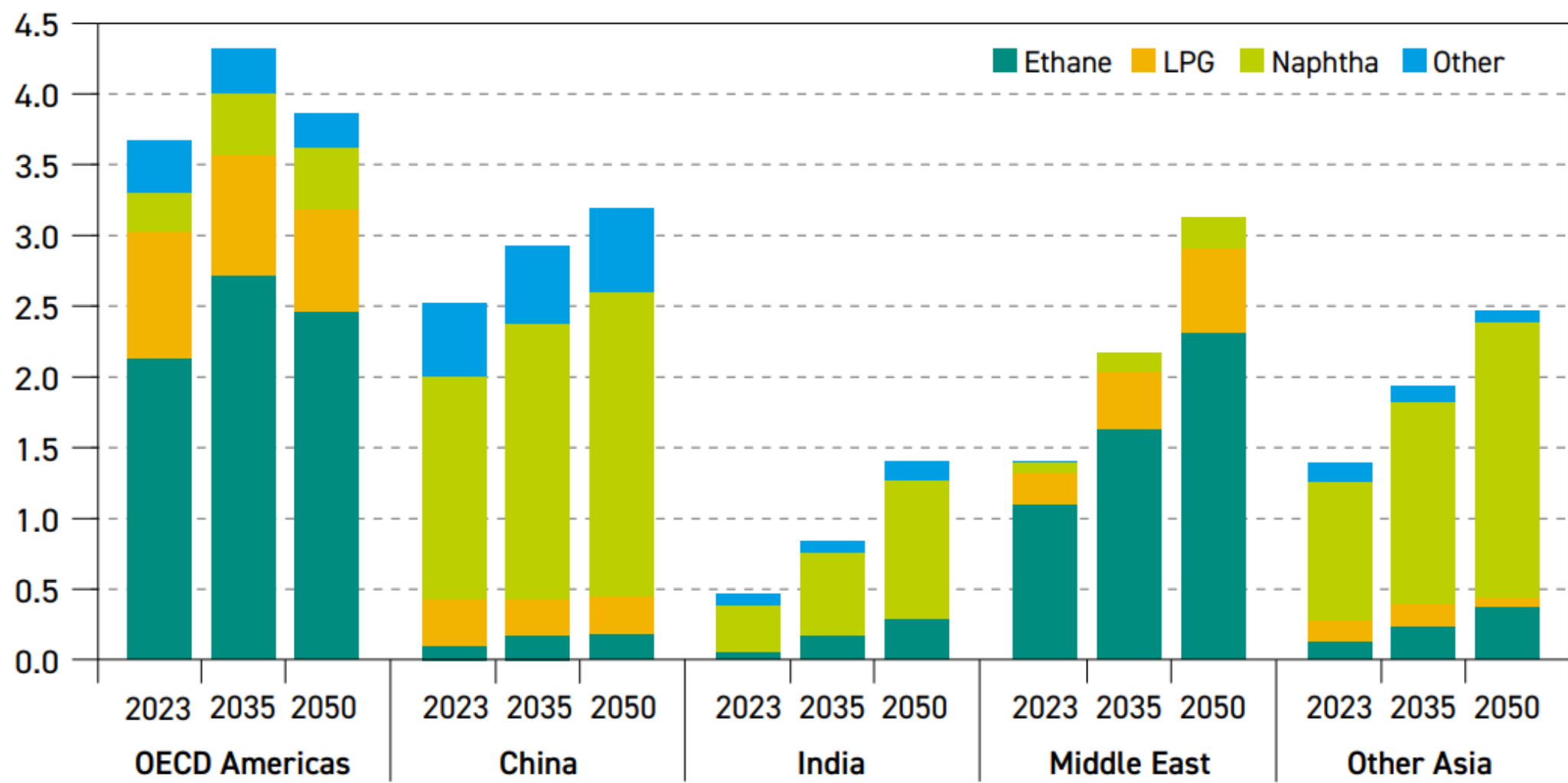
Nelson Complexity Index of Iranian refineries



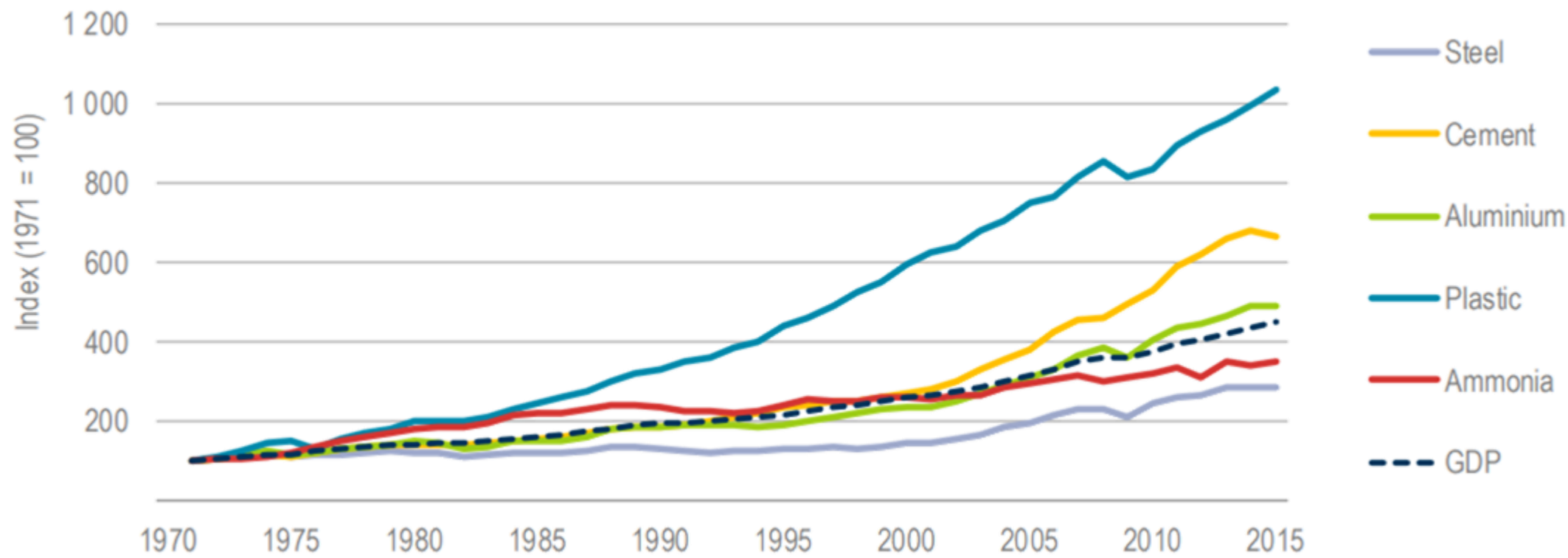
Iran refineries: fuel or feed



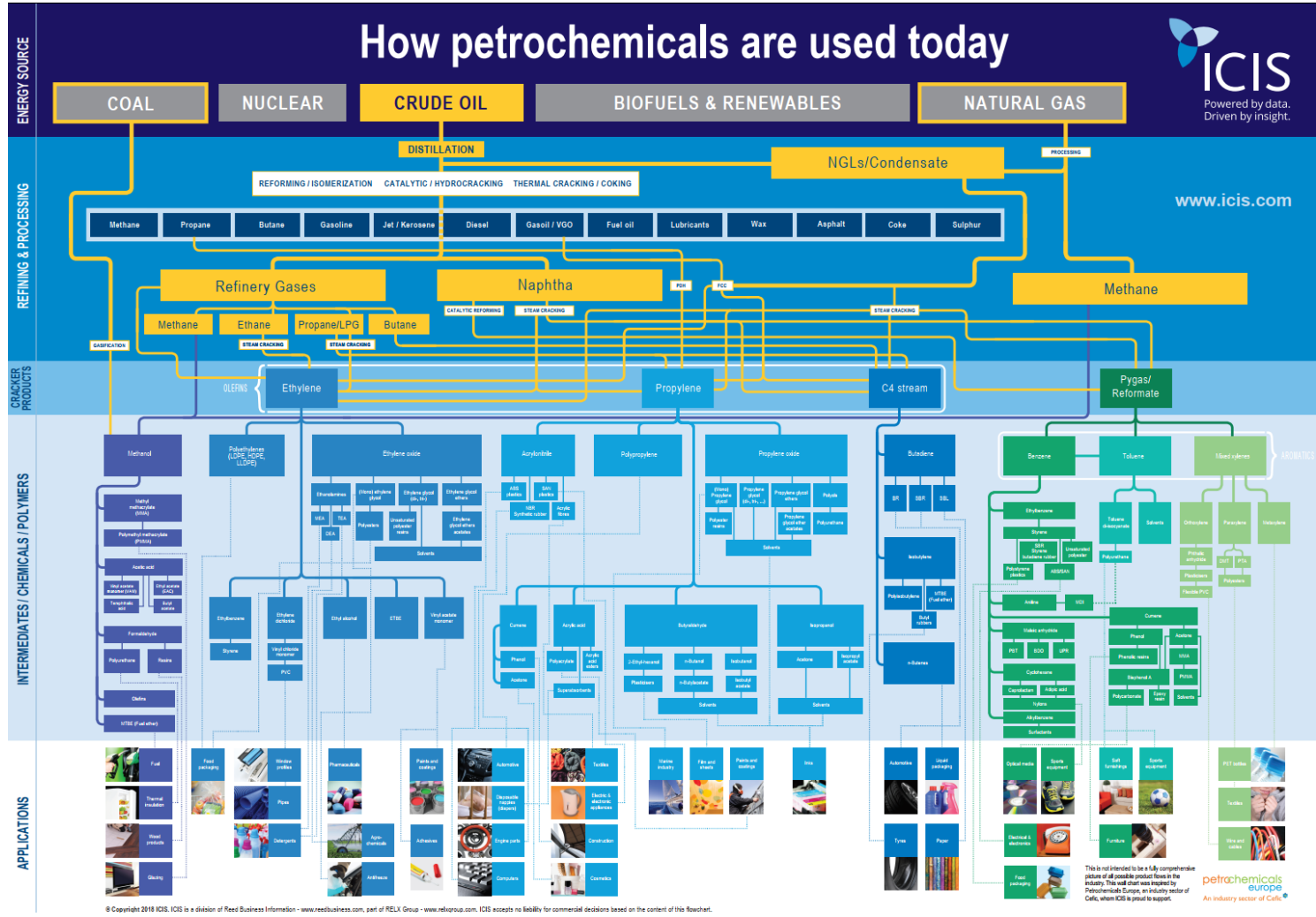
Oil demand in the petrochemical sector



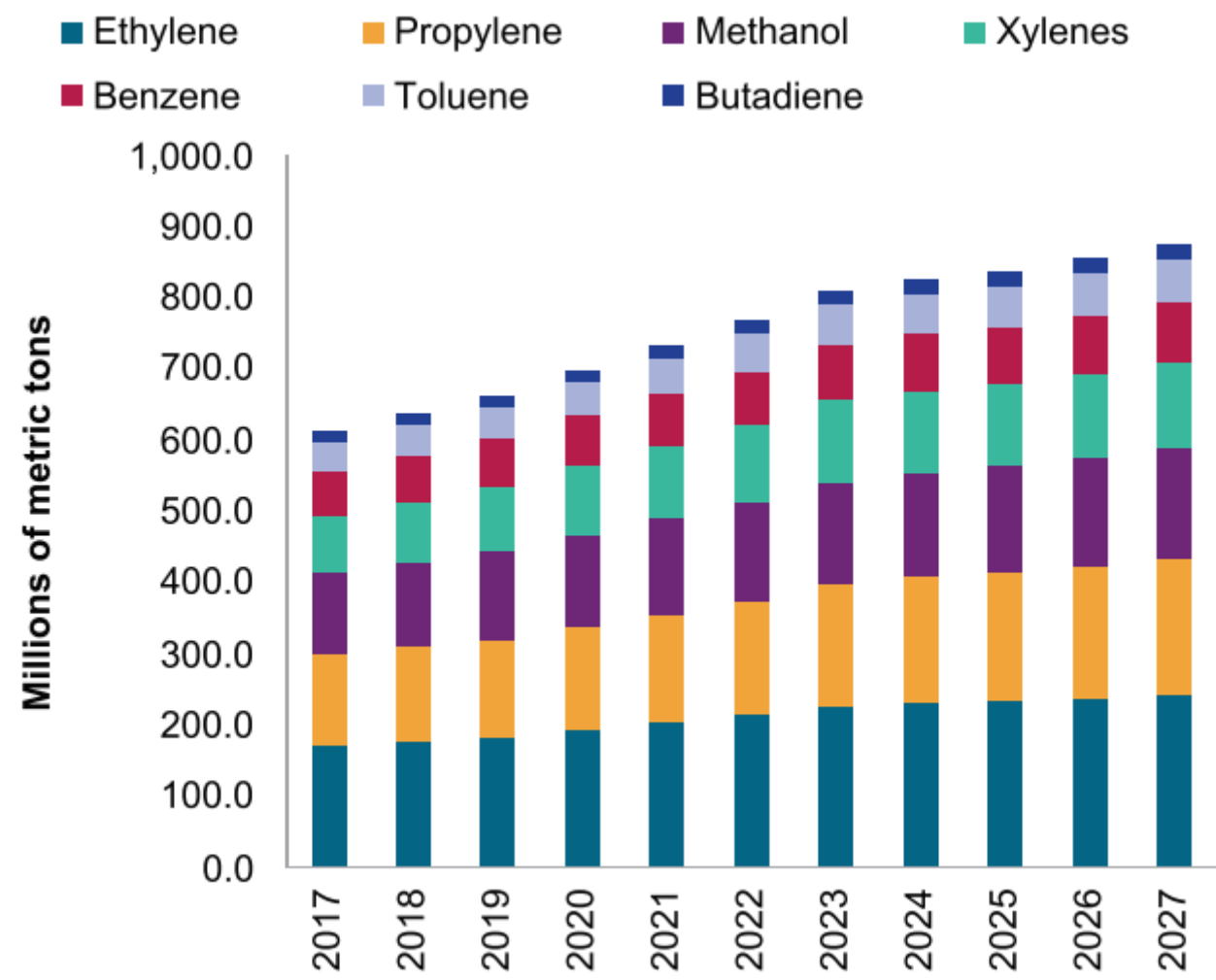
Production growth for selected bulk materials and GDP



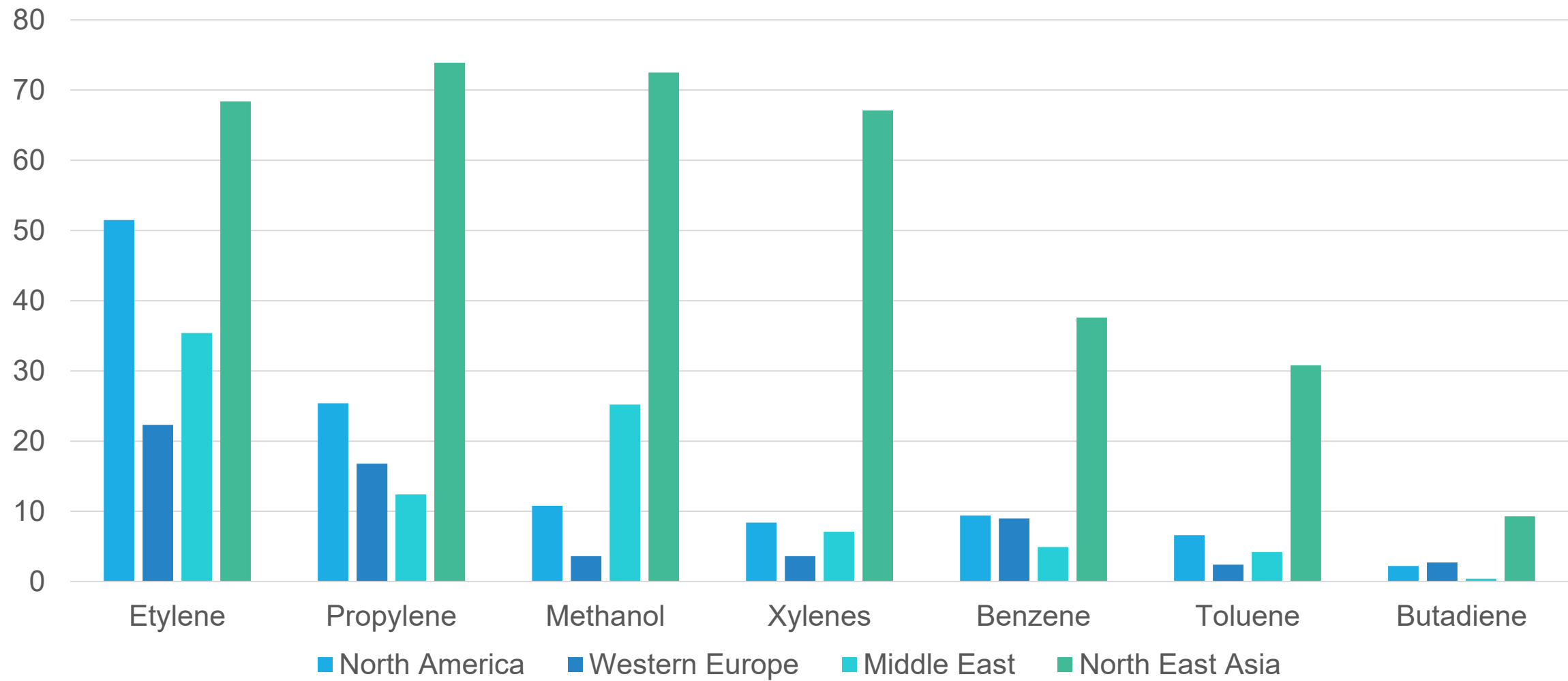
Petrochemical building blocks and products



World capacity for primary petrochemicals

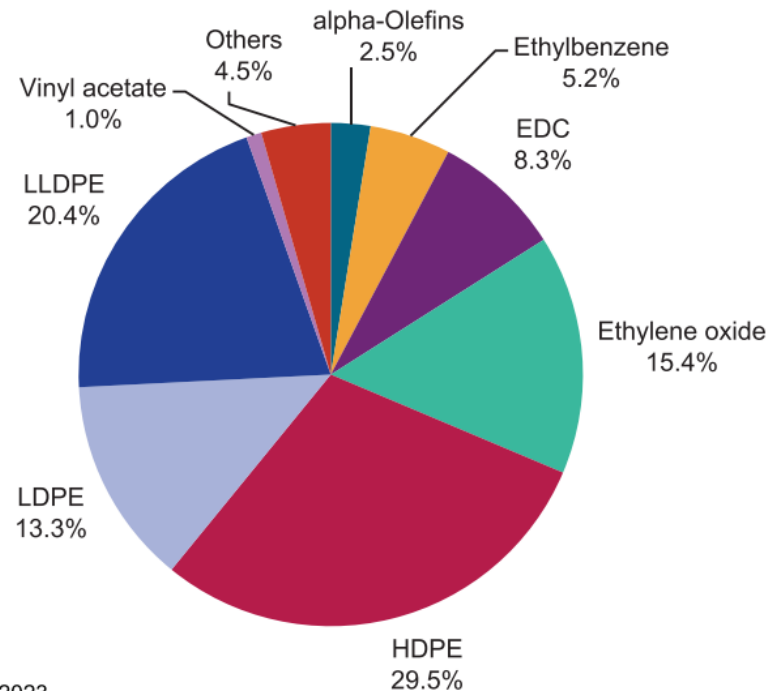


Production of primary petrochemicals by region



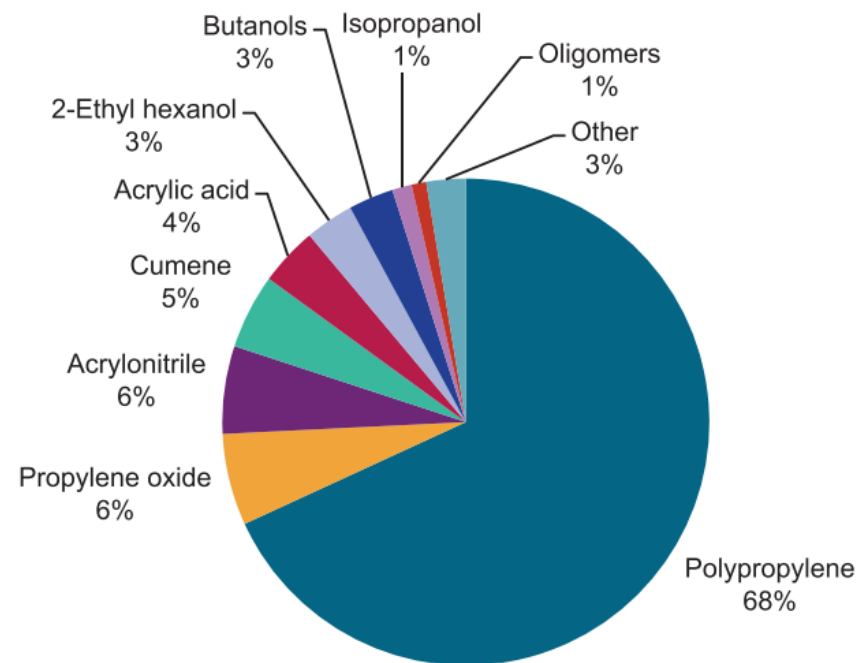
World consumption of base petrochemicals (1/4)

World consumption of ethylene — 2022



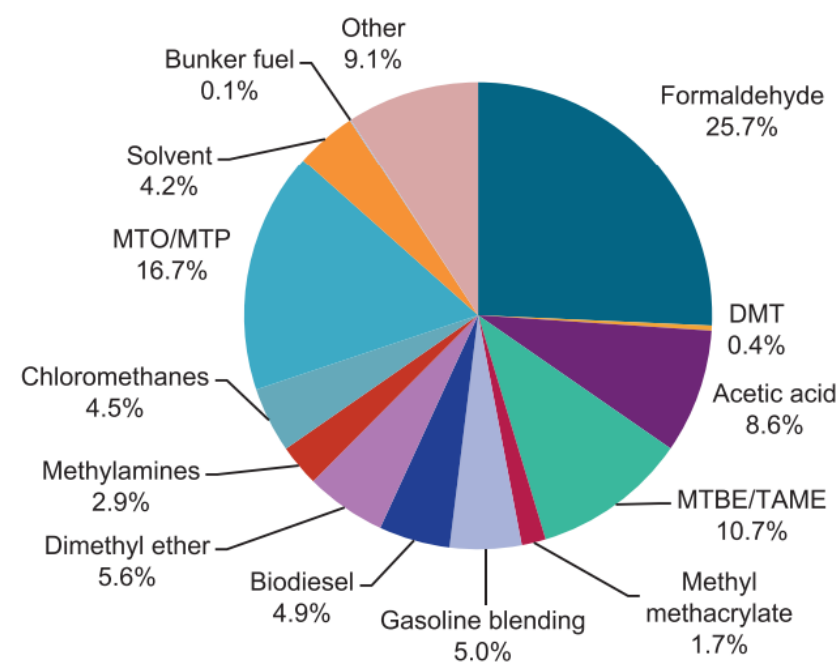
Data compiled Aug. 14, 2023.

World consumption of propylene — 2022

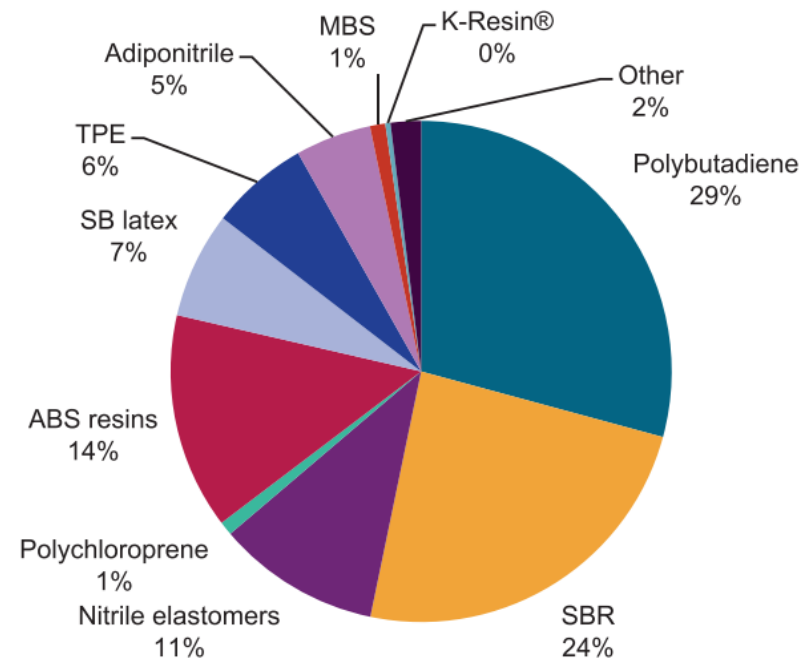


World consumption of base petrochemicals (2/4)

World consumption of methanol — 2022

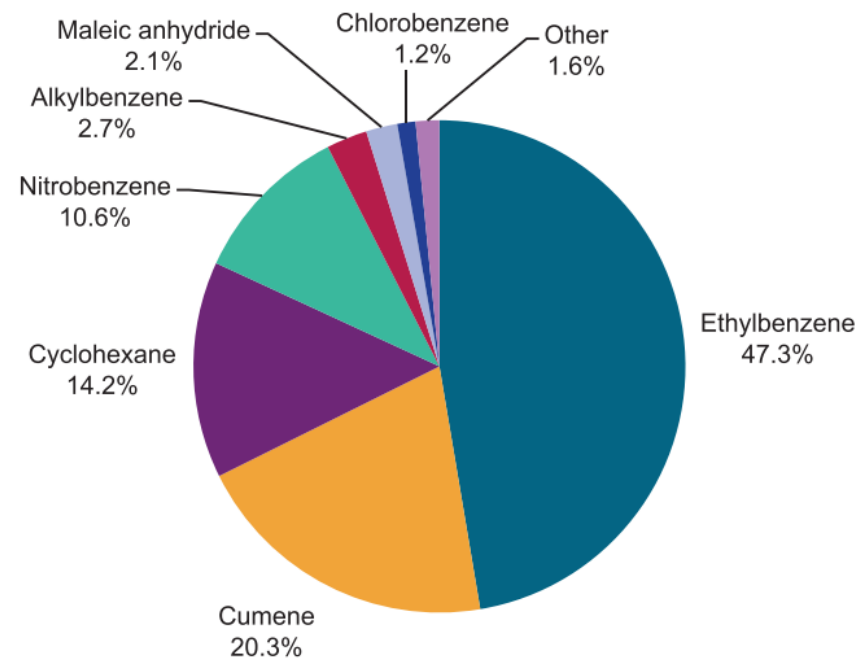


World consumption of butadiene — 2022

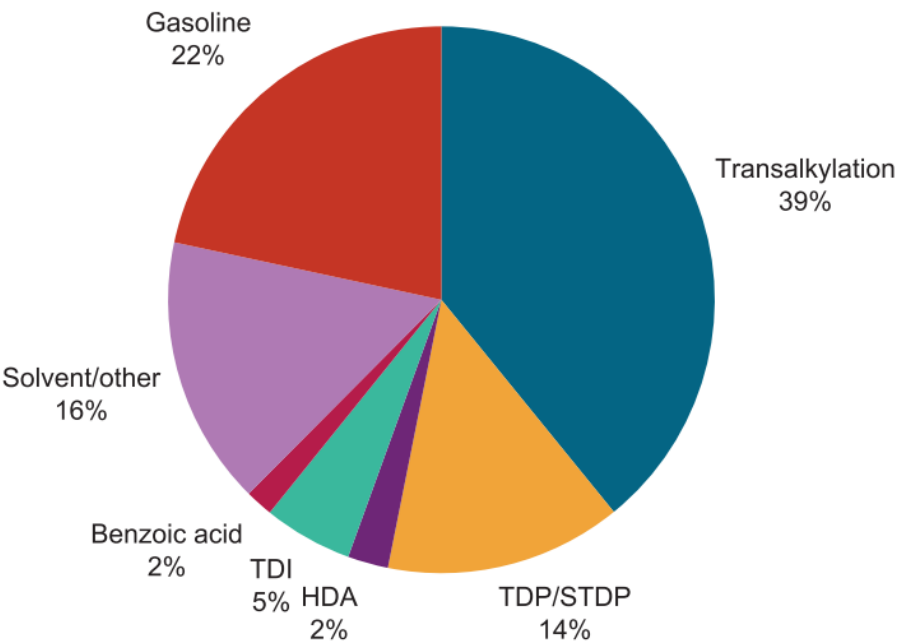


World consumption of base petrochemicals (3/4)

World consumption of benzene — 2022

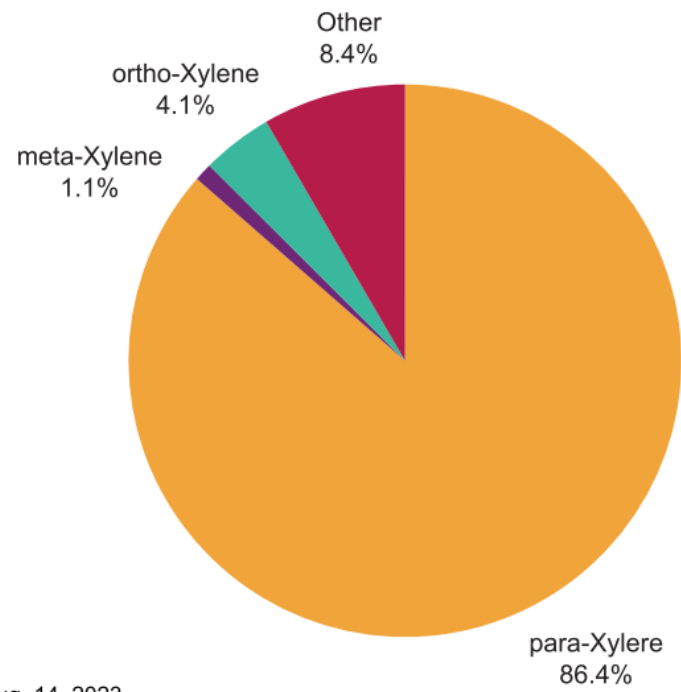


World consumption of toluene — 2022



World consumption of base petrochemicals (4/4)

World consumption of mixed xylenes — 2022

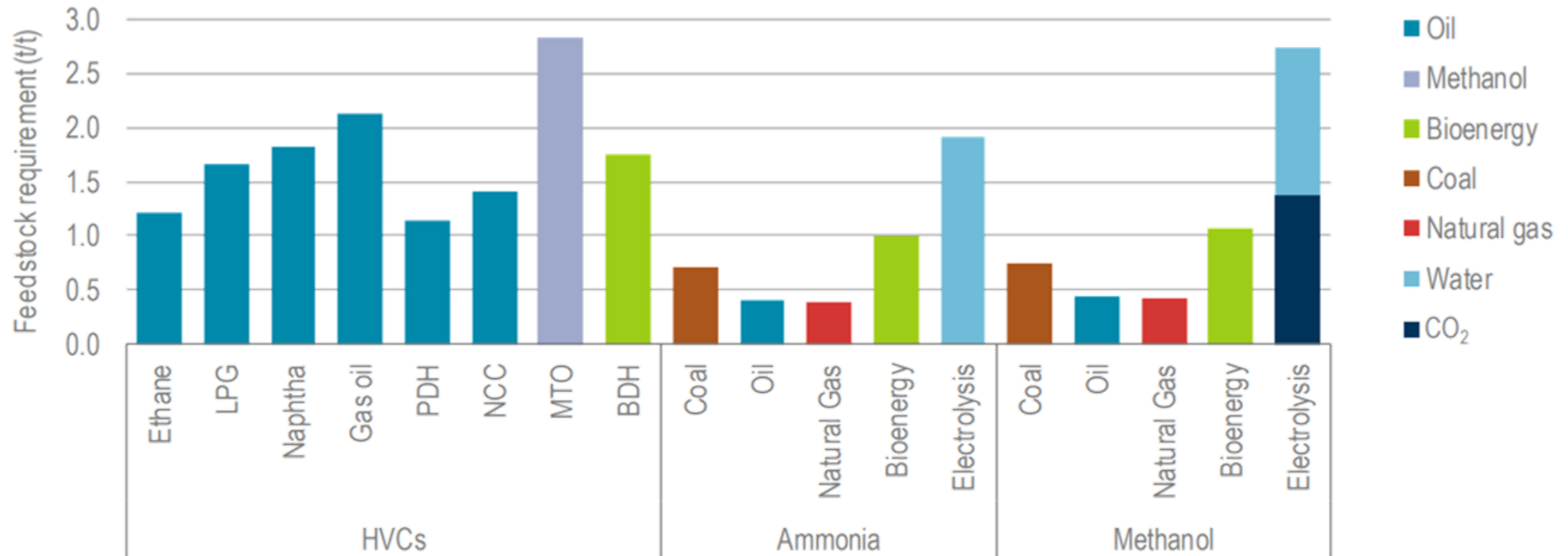


Data compiled Aug. 14, 2023.



How profitable is refining business?

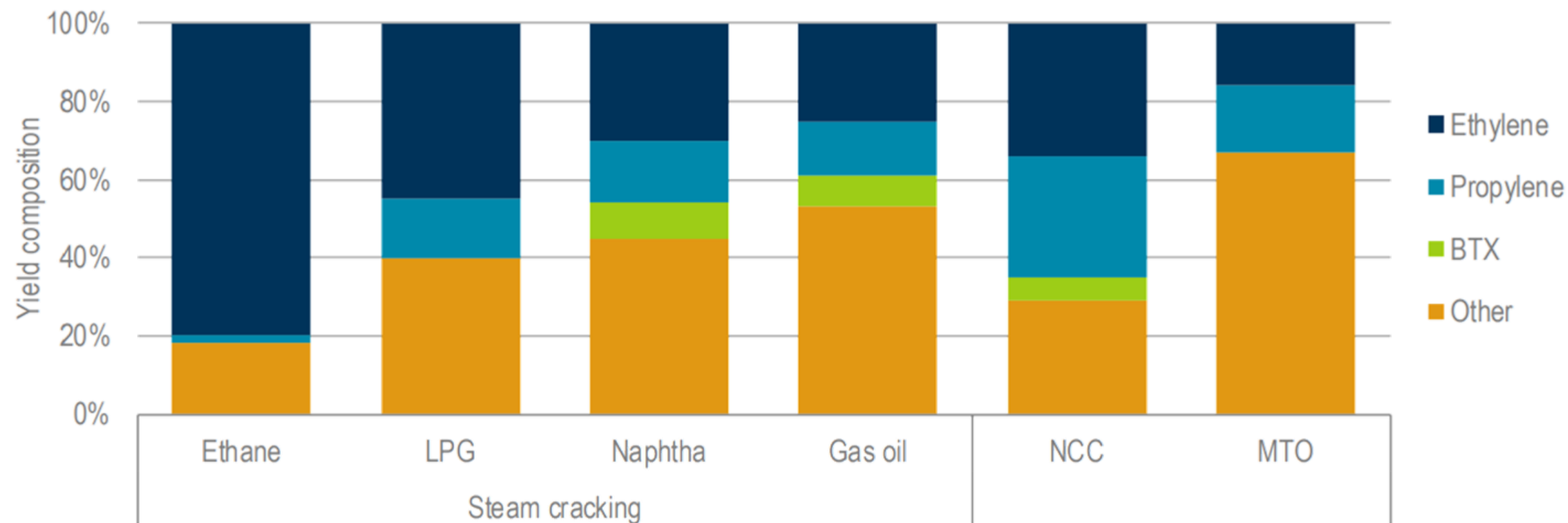
Feedstock options by chemical product



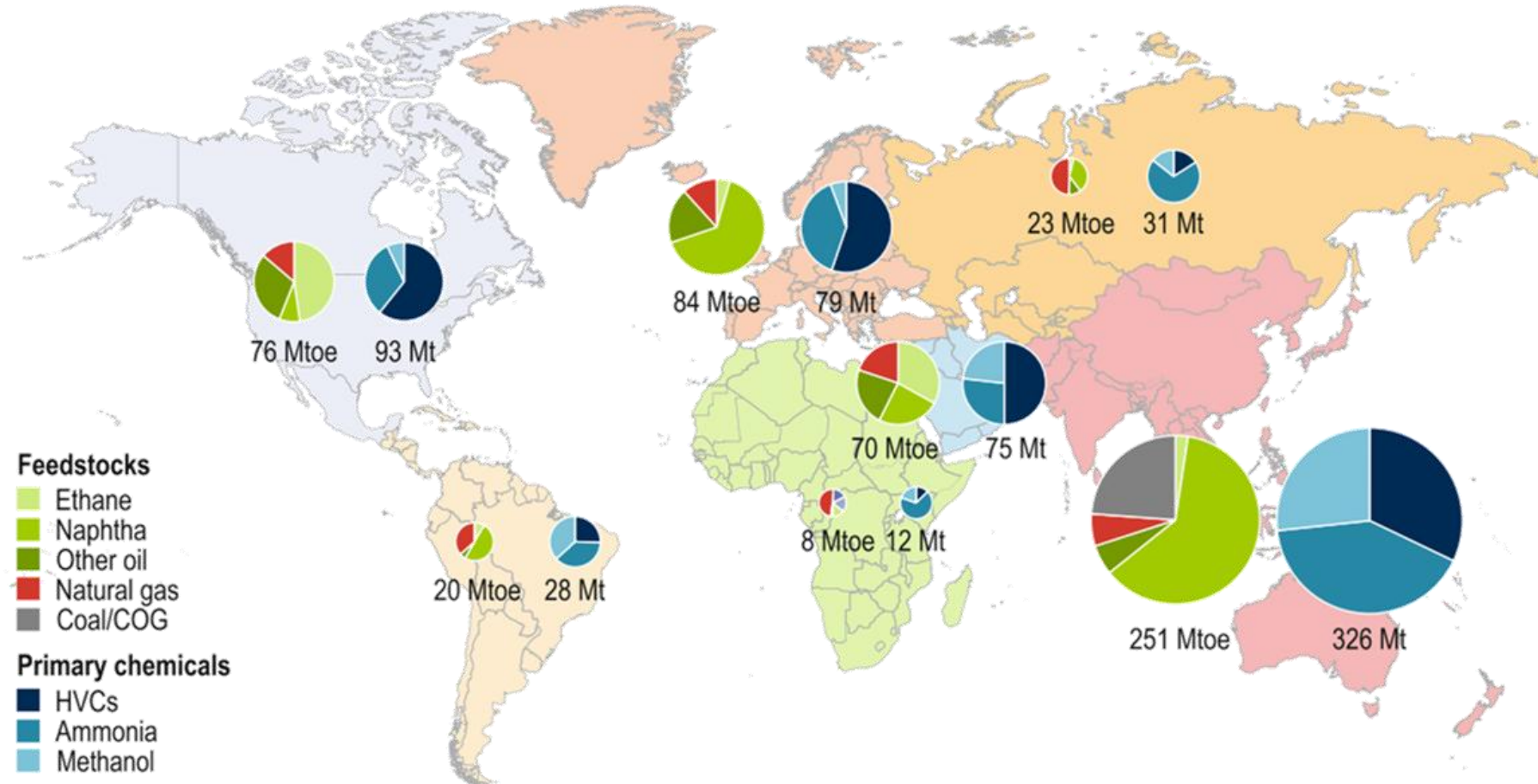
Notes: BDH = bioethanol dehydration; LPG = liquefied petroleum gas; NCC = naphtha catalytic cracking. The quantity pertaining to BDH is in terms of bioethanol.

Key message • Multiple feedstocks can be utilised to make the same product, but with significant variations between the amount of input required.

Yield of individual HVCs in multi-product processes



Primary feedstock use and chemical production by region



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

Notes: The left pie chart of the pair for each region displays feedstock usage, while the right pie chart displays primary chemical production. The pie charts are sized in proportion to the total quantity (Mtoe or Mt) in each case.

Source: IFA (2018), *International Fertilizer Association Database*, <http://ifadata.fertilizer.org/ucSearch.aspx>; expert elicitation.

ICIS top 100 chemical companies 2023 (billion dollars)

Rank 2023	Company	Sales 2023	% change	Operating profit 2023	% change	Net income 2023	% change	Total assets 2023	% change	Capex 2023	% change	R&D 2023	% change
\$m													
1	BASF	76,061	-21.1	2,473	-65.8	248	-	85,436	-8.4	5,956	23.3	2,351	-7.3
2	Sinopec ¹	71,269	-4.6	-1,447	-	-	-	-	-	7,755	-6.1	-	-
3	Dow	44,622	-21.6	1,173	-82.2	660	-85.8	57,967	-4.4	2,356	29.2	829	-2.6
4	LyondellBasell	41,107	-18.5	3,053	-40.2	2,121	-45.5	37,000	1.7	1,531	-19.0	130	4.8
5	ExxonMobil ¹	40,672	-14.4	-	-	4,351	-27.0	45,674	2.9	2,826	-4.4	-	-
6	INEOS	38,981	-27.0	424	-91.5	-	-	-	-	-	-	-	-
7	SABIC	37,744	-22.7	992	-83.8	-739	-	78,501	-6.0	2,797	2.6	505	2.0
8	Rongsheng Petrochemical ¹	26,727	5.9	-	-	-	-	-	-	-	-	-	-
9	Wanhua Chemical	24,709	5.9	-	-	2,369	3.6	35,654	26.0	-	-	575	19.3
10	Sherwin-Williams	23,052	4.1	3,502	18.5	2,389	18.3	22,954	1.6	888	37.7	197	65.5
11	SK Innovation ¹	21,267	-2.7	1,178	32.5	-	-	-	-	-	-	-	-
12	LG Chem ¹	19,474	-12.5	-	-	-	-	-	-	-	-	-	-
13	Mitsubishi Chemical ^{1,2}	19,172	-7.5	-79	-	-	-	19,269	7.1	661	-40.4	-	-
14	PPG	18,246	3.4	1,855	24.2	1,309	24.2	21,647	4.4	549	6.0	433	-3.3
15	PTT Global Chemical	18,162	-9.1	418	-	25	-	21,007	-0.1	572	-8.4	-	-
16	Toray ²	17,480	-1.0	409	-47.1	216	-62.3	24,586	8.5	-	-	-	-
17	Sumitomo Chemical ²	17,355	-15.5	-3,467	-	-3,301	-	27,908	-5.5	1,123	12.3	1,305	-5.9
18	Persian Gulf Petrochemical Industries Co (PGPIC)	17,340	3.7	3,040	3.6	3,053	-12.0	33,578	4.5	1,446	-13.2	130	5.7
19	Shin-Etsu Chemical ²	17,128	-14.0	4,972	-29.8	3,689	-26.6	36,512	8.8	2,886	27.9	467	-2.1
20	Evonik	16,853	-17.4	575	-61.4	-513	-	22,012	-8.6	875	-8.3	489	-3.7

ICIS top 100 chemical companies 2025 (billion dollars)

Rank 2024	Company	Sales 2024	% change	Operating profit	% change	Net profit 2024	% change	Total assets 2024	% change	Capex 2024	% change	R&D 2024	% change
\$ million													
1	Sinopec ¹	71,769	1.7	-1,370	-	-	-	36,767	5.1	6,119	-18.8	-	-
2	BASF	67,544	-5.3	2,104	-9.2	1,343	476.9	83,230	3.9	6,734	10.9	2,133	-3.2
3	ExxonMobil ¹	55,406	0.0	7,149	26.1	-	-	46,059	0.8	2,092	-26	-	-
4	Dow	42,964	-3.7	2,211	88.5	1,201	82	57,312	-1.1	2,940	24.8	810	-2.3
5	PetroChina ¹	42,176	6.4	432	361.4	-	-	-	-	-	-	-	-
6	INEOS ¹	37,646	3	271	-31.9	-	-	-	-	-	-	-	-
7	SABIC ¹	34,472	-1.3	722	1,270.20	-	-	66,575	-3.9	2,509	5.1	-	-
8	LyondellBasell ¹	32,222	0.9	1,724	-37.4	-	-	-	-	1,808	20.6	-	-
9	Rongsheng Petrochemical ¹	30,471	0.8	-	-	-	-	-	-	-	-	-	-
10	Wanhua Chemical	24,943	3.8	-	-	1,786	-22.5	40,187	15.9	-	-	-	-
11	Sherwin-Williams	23,099	0.2	3,857	10.1	2,681	12.2	23,633	3.0	1,070	20.5	217	10.2
12	Persian Gulf Petrochemical Industries Co (PGPIC)	19,561	12.8	5,631	85.2	5,302	73.7	35,207	4.9	1,629	12.7	138	6.2
13	LG Chem ¹	17,851	1.1	262	-15.1	-	-	-	-	-	-	-	-
14	PTT Global Chemical	17,709	-2.1	-243	-	-873	-	18,794	-10.2	461	-19.2	-	-
15	Toray ²	16,405	4.0	816	121.1	555	184.6	21,073	-5.0	1,147	33.6	466	4.9
16	Shin-Etsu Chemical ²	16,392	6.1	4,749	5.9	3,418	2.7	36,074	9.5	2,781	6.8	468	11.2
17	Mitsubishi Chemical ^{1,2}	16,098	-1.8	287	-	-	-	16,484	-9.3	1,182	27.4	-	-
18	Indorama Ventures	15,886	-0.1	-178	-	-558	-	15,759	-8.2	466	-33.2	35	-7.6
19	PPG	15,845	-2.4	1,916	6.6	1,149	-12.2	19,433	-10.2	721	39.7	423	-0.2
20	Evonik	15,687	-0.7	597	-	248	-	20,441	-1.0	869	5.9	475	3.6

References

- S&P Global Commodity Insights, Petrochemical Industry Overview
- IEA, Key World Energy Statistics
- OPEC, World Oil Outlook
- Valero, Basics of Refining and Optimization
- Energy Intelligence, Statistical Review of World Energy
- [FGE Nexant blog](#)
- McKinsey
- IHS, COTC
- IRAN's oil refinery report, a modernization necessity
- VCM Study
- IEA, The Future of Petrochemicals
- [Honeywell](#)

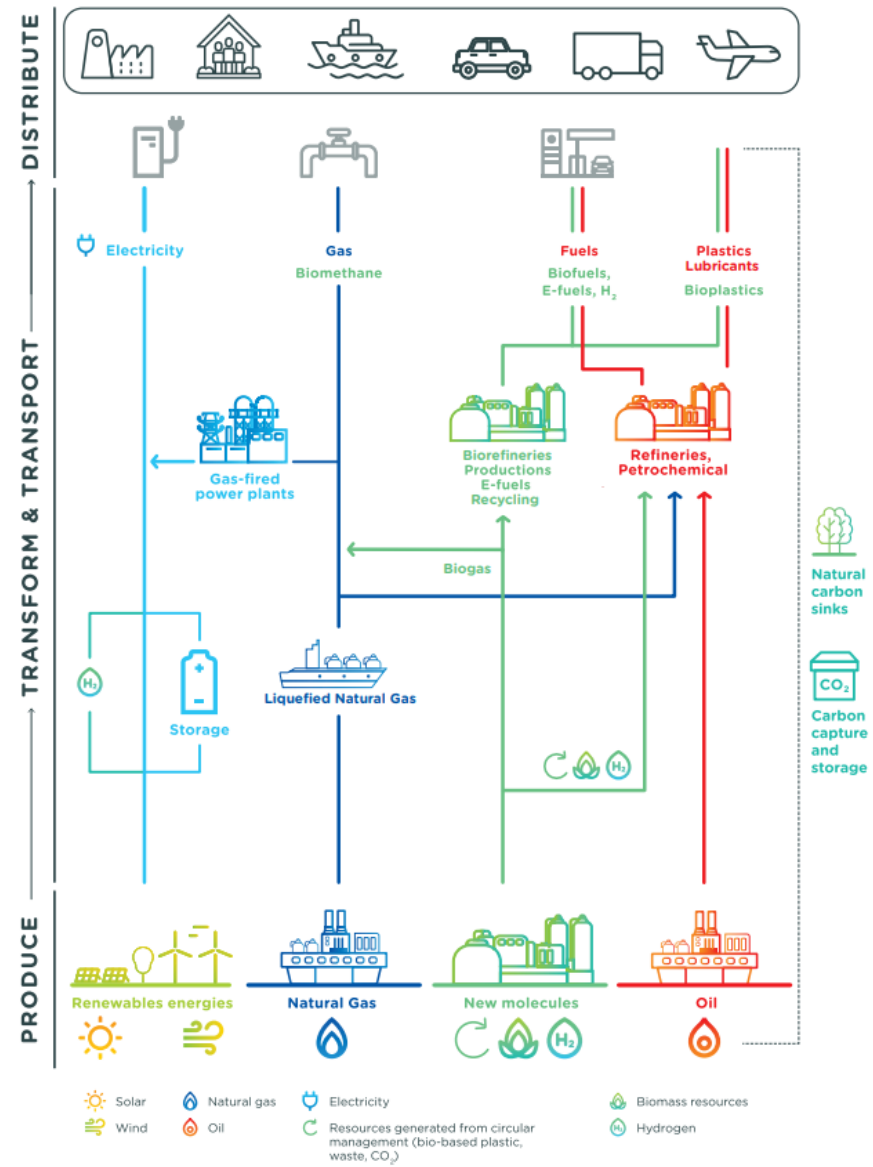
Agenda

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3. Energy efficiency
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5. Future scenarios
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12. Gas and LNG
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- 14. Energy companies**
15. OFS companies
16. The Middle East
17. Iran's energy profile
18. Iran's oil and gas

What is an energy/E&P/oil company?

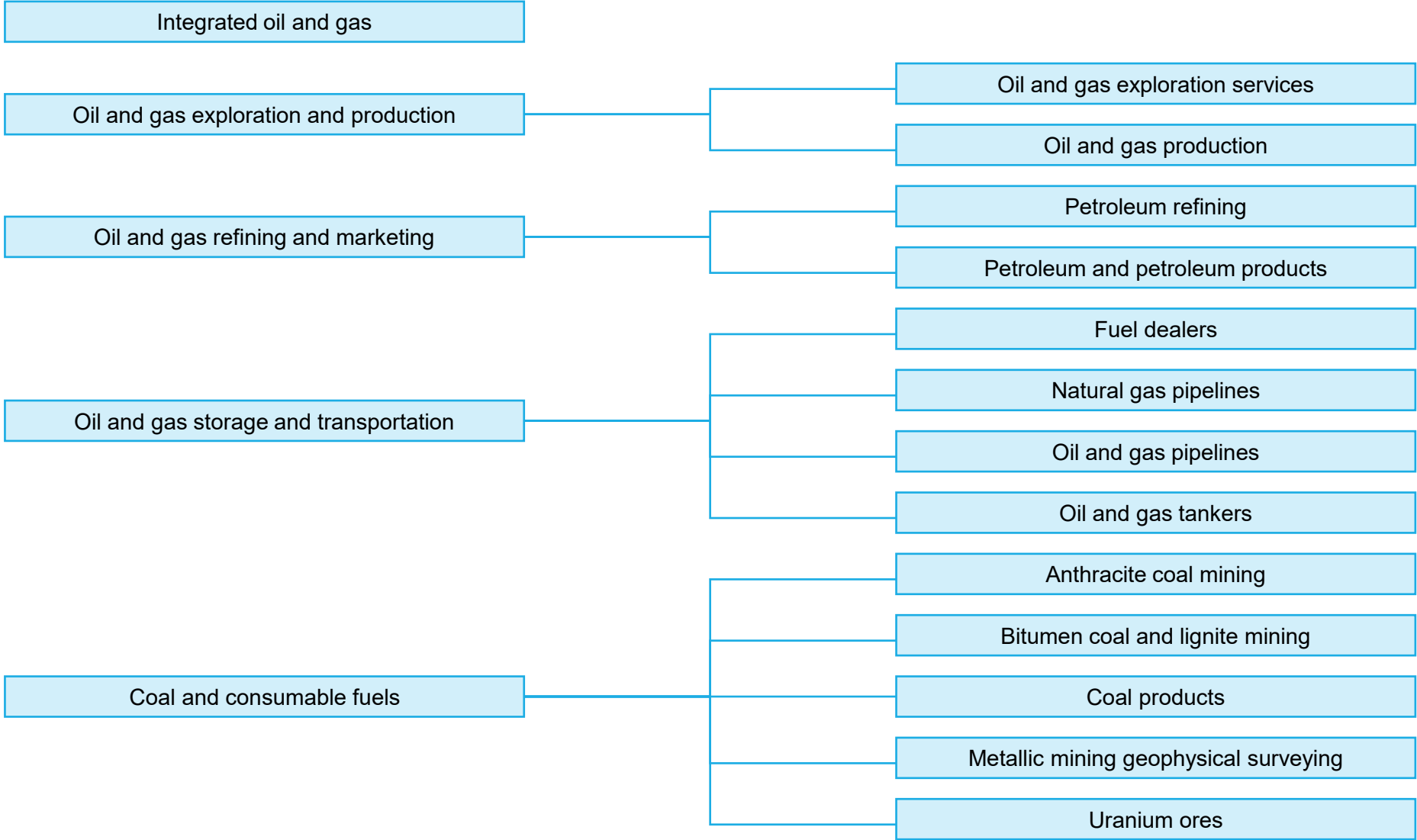


TotalEnergies business model



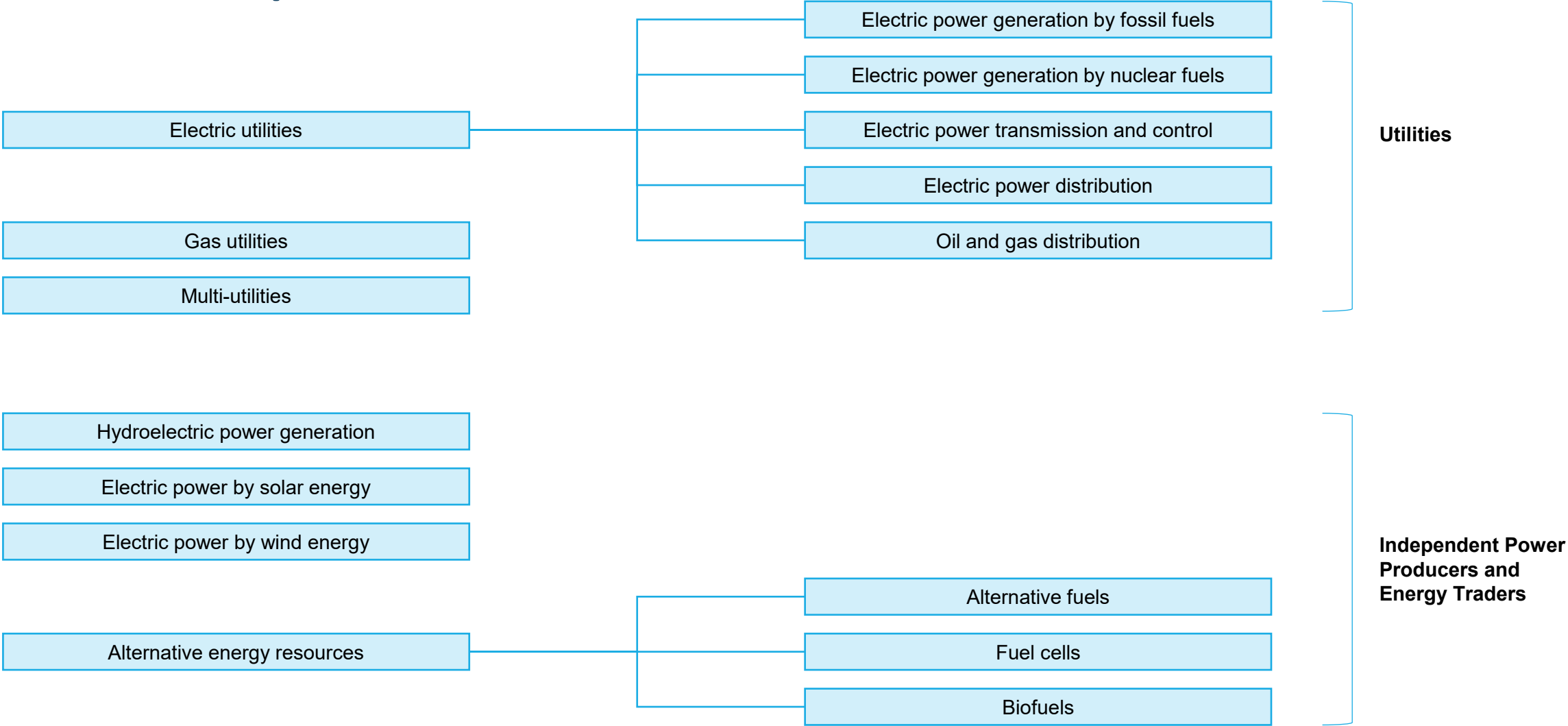
Classification of energy companies by S&P Global Capital IQ (1/2)

Oil, gas, and coal (excluding oilfield services)



Classification of energy companies by S&P Global Capital IQ (2/2)

Utilities and power



Oil and gas: upstream to downstream

Upstream

- Exploration
- Production

Midstream

- Transportation and storage
- Refining

Downstream

- Refining
- Chemicals
- Transportation and storage
- Retail and marketing

E&P / oil / energy

E&P

- Upstream (exploration and/or production)

Oil and gas

- E&P and midstream/downstream

Energy

- Oil and gas, sometimes plus other energy sources

Key players classification by IEA



National Oil Companies



أرامكو السعودية
saudi aramco



مؤسسة البترول الكويتية
Kuwait Petroleum Corporation



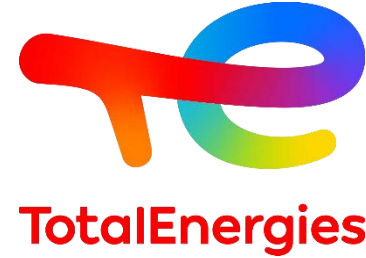
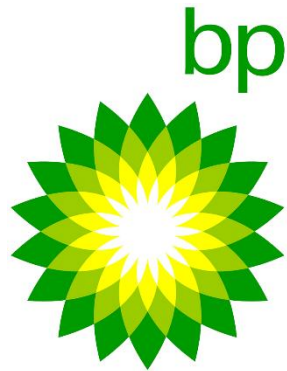
International National Oil Companies



Majors



ExxonMobil



Independents

 **ConocoPhillips**

 **eog resources**




Marathon Oil®

Oilfield Services Companies

Schlumberger



COSL

HALLIBURTON



Pure Downstream Companies



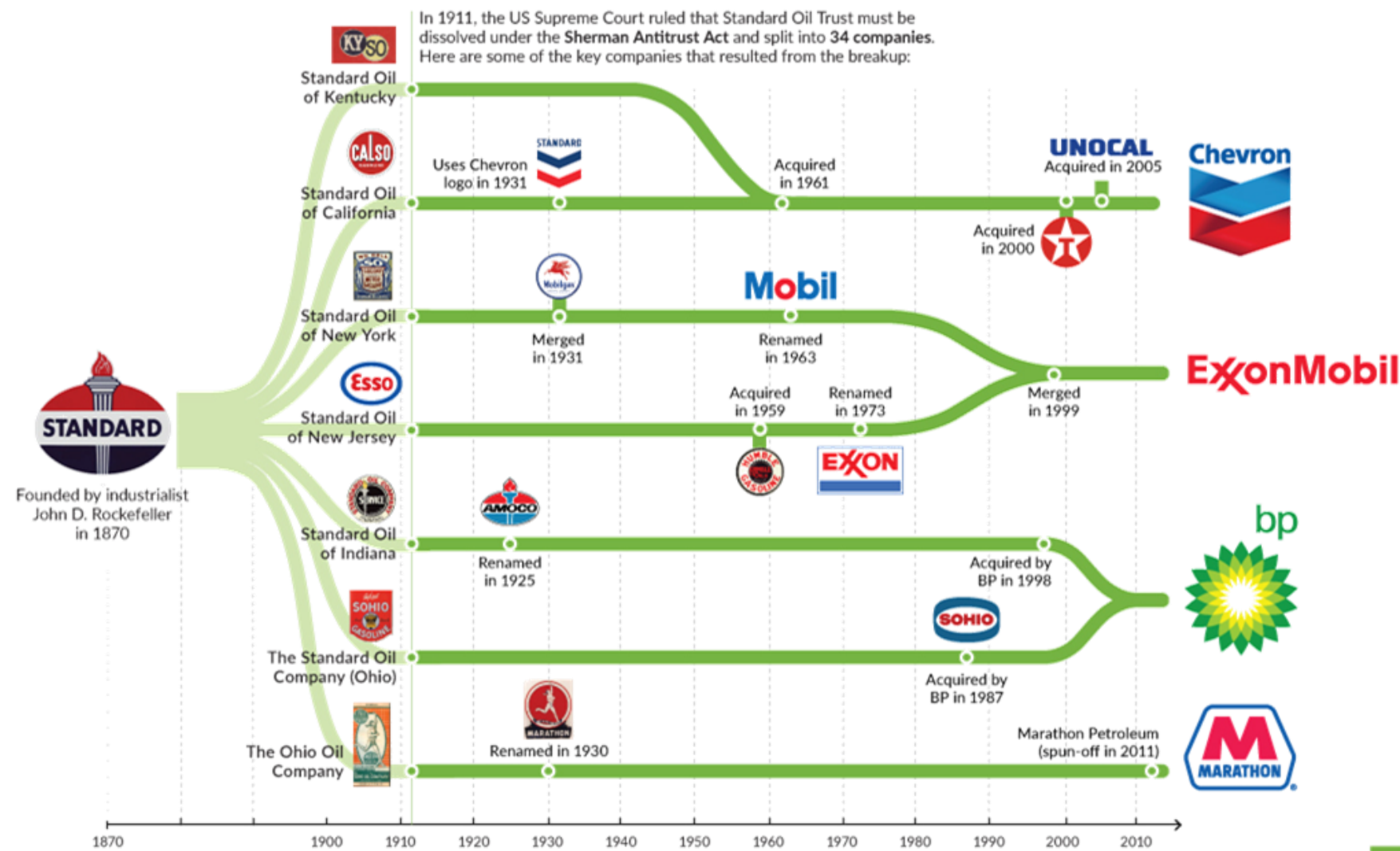
Trading Companies



GLENCORE



The Evolution of Standard Oil



Oil and new seven sisters

- The Old Seven Sisters

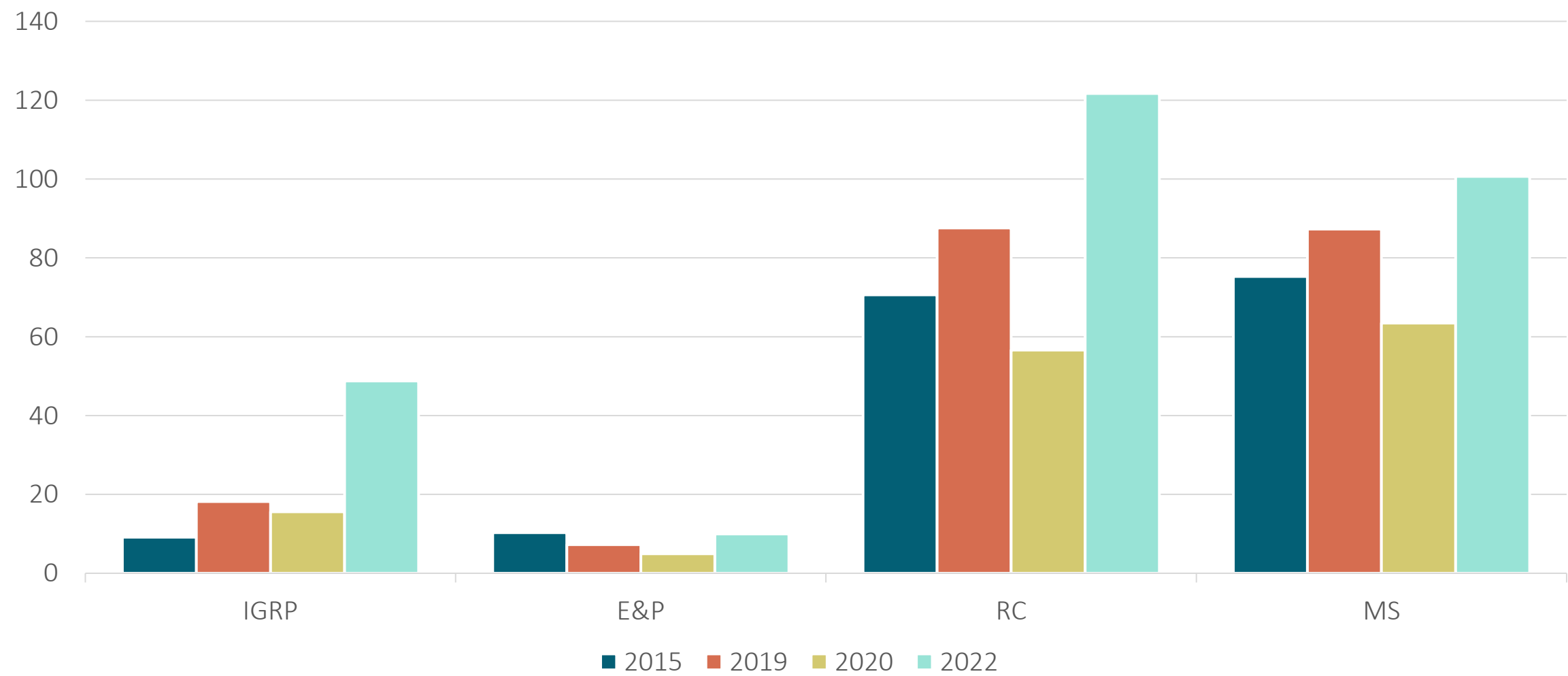


- The New Seven Sisters?!

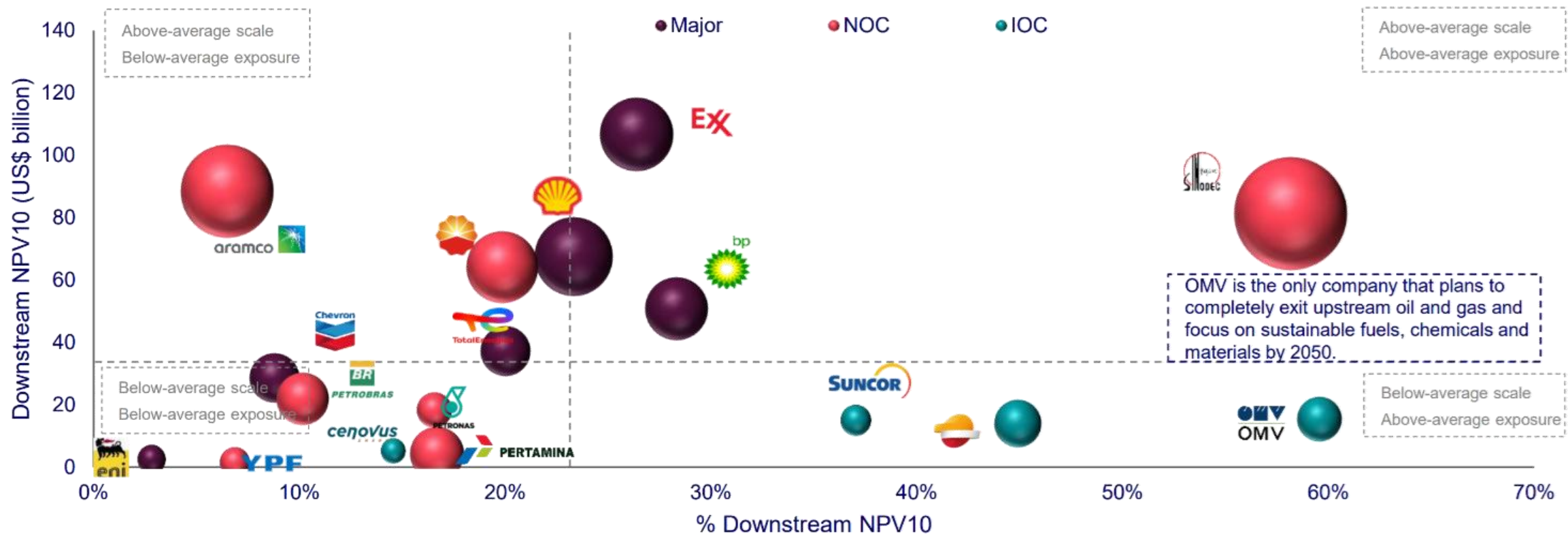
The concept did not become popular – but is taking off with names like ADNOC and ARAMCO.



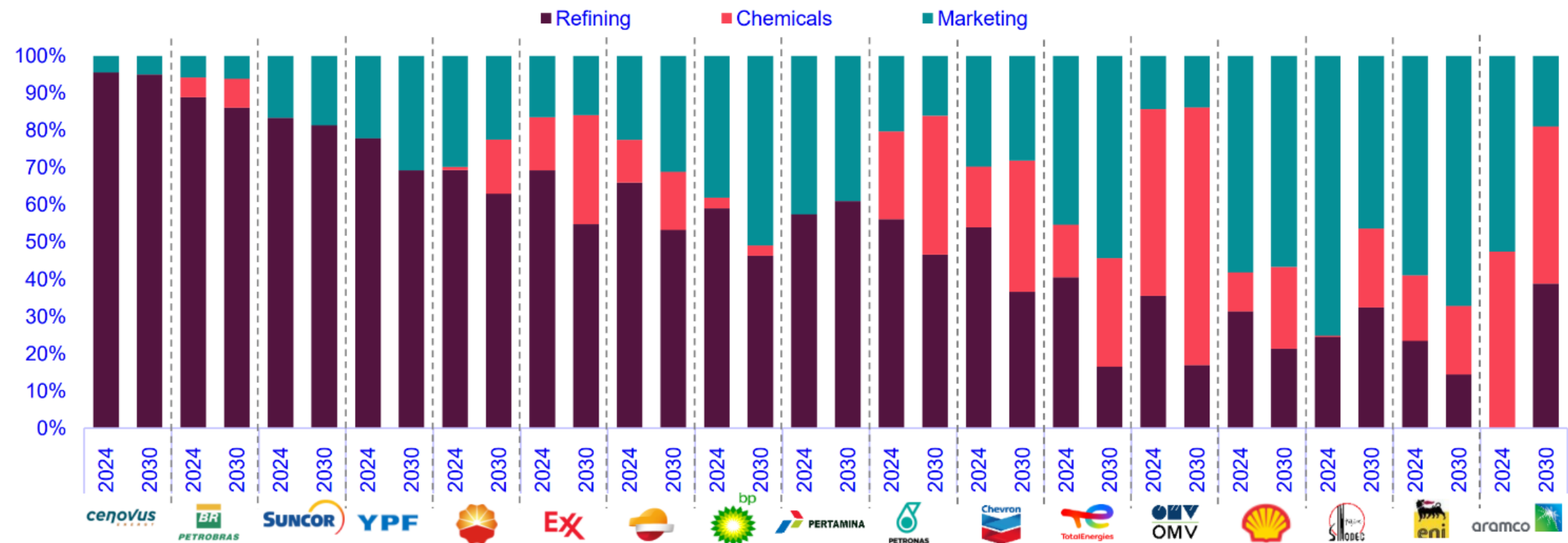
Total: sales excluding inter-segment sales (Billion USD)



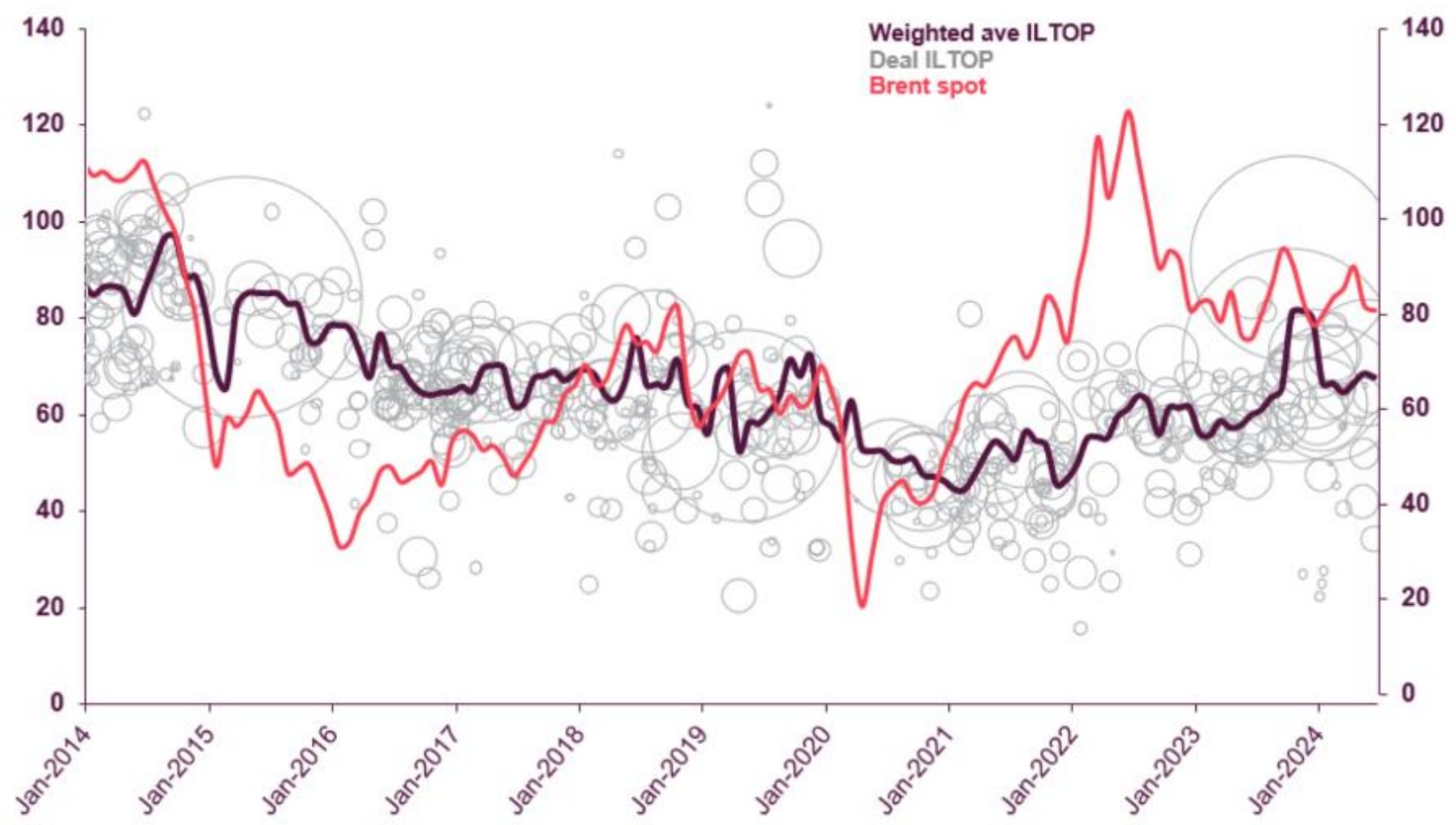
Downstream NPV10 and % of downstream NPV10 to total Corporate NPV



Breakdown of downstream EBITDA exposure by segment, 20230 vs 2024



Implied long-term oil price (USD per barrel), NPV10



Practical difficulties and setbacks with NOCs (The World Bank)

- Historical context and ideology
- Economic cost of political control
- Operational inefficiencies
- Lack of competition
- Subsidies and noncommercial objectives
- Weak corporate governance
- Funding strategy and requirements
- Conflict of interests and balance of control

NOC value creation index

Operational

- E&P production growth (%)
- Reserves replacement ratio (%)
- Refinery utilization (%)
- Output / total assets (boe)
- Output / employees (boe)

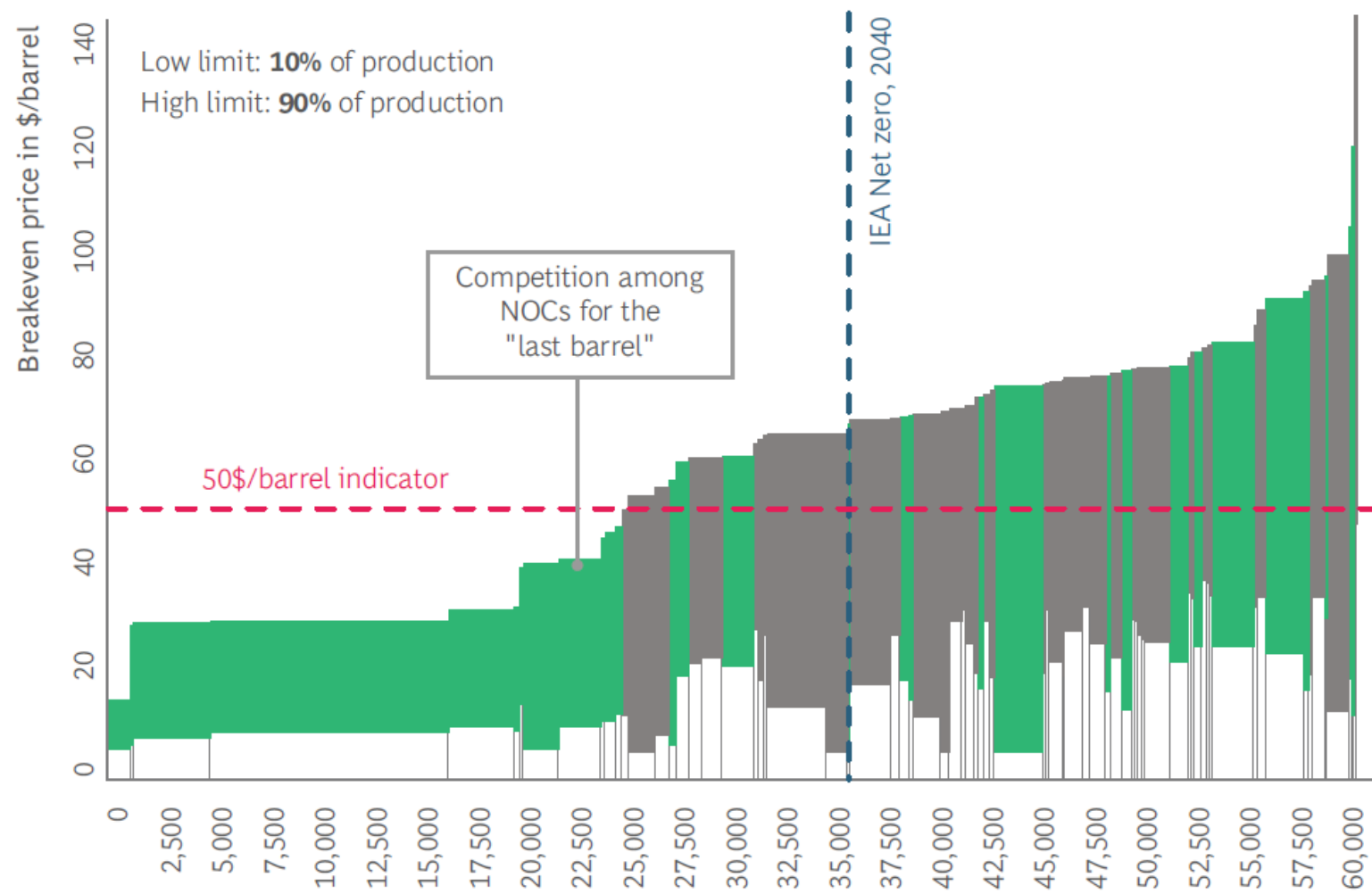
Financial

- EBIT / revenue (%)
- EBIT / total assets (%)
- Net cash flow from operations
- / CAPEX (%))

National mission

- Share of local content (%)
- Domestic output use (%)
- Share of nationals in NOC workforce (%)
- NOC employment share of country workforce (%))
- Employment growth (%)
- Non-commercial expenditure / total expenditure (%)
- Non-core commercial net income / total net income (%))
- Price subsidies / revenue (%)

Competition for the “last barrel”



References

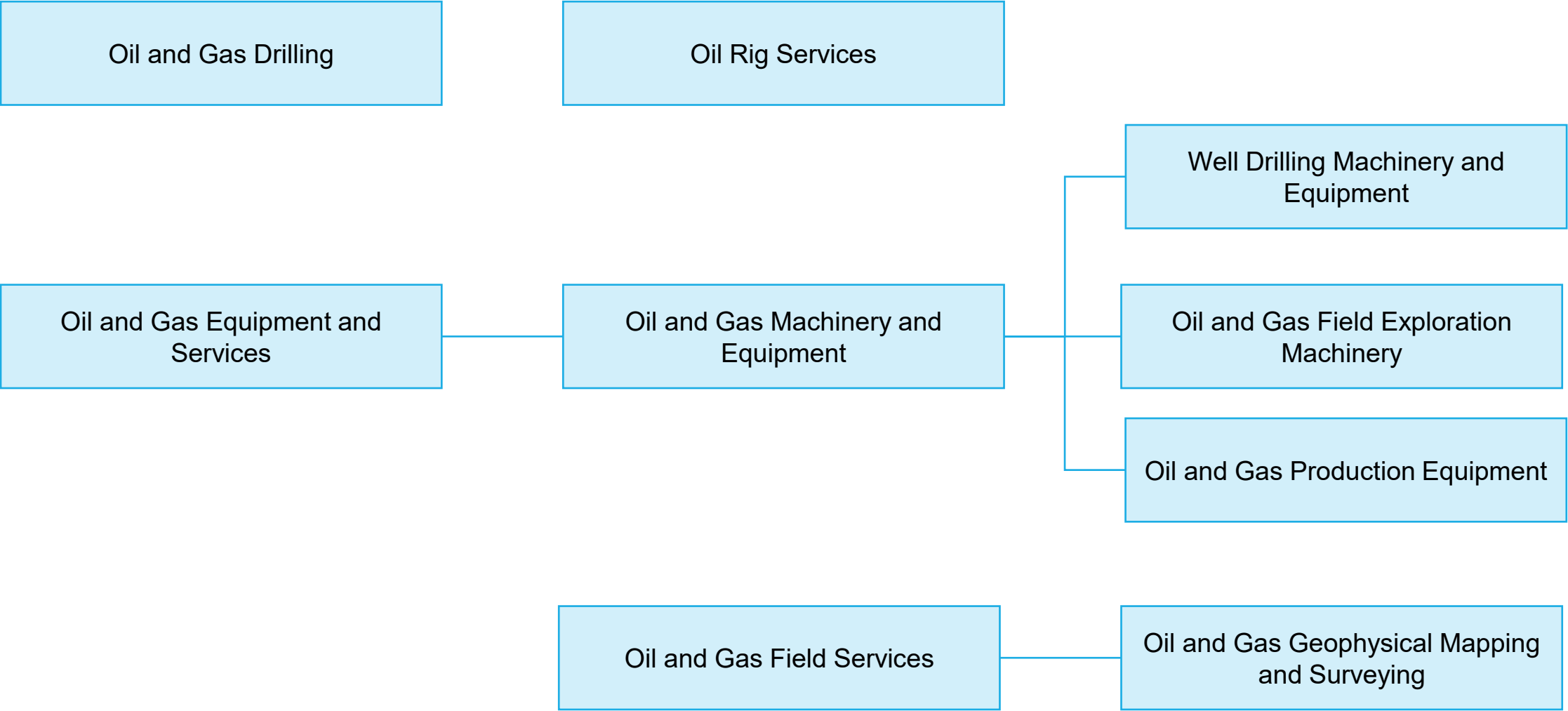
- TotalEnergies
- S&P Global Capital IQ
- [Financial Times](#)
- The World Bank, National Oil Companies and Value Creation
- BCG, Future Operating Model for National Oil Companies

Agenda

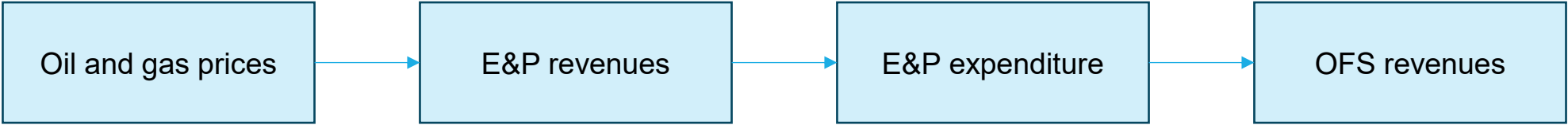
1. References
2. The energy cake
3. Energy efficiency
4. Electrification
5. Future scenarios
6. Emissions
7. Investment
8. Carbon
9. Oil market
10. US shale oil
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13. Refining and chemicals
14. Energy companies
- 15. OFS companies**
16. The Middle East
17. Iran's energy profile
18. Iran's oil and gas

Classification of energy companies by S&P Global Capital IQ

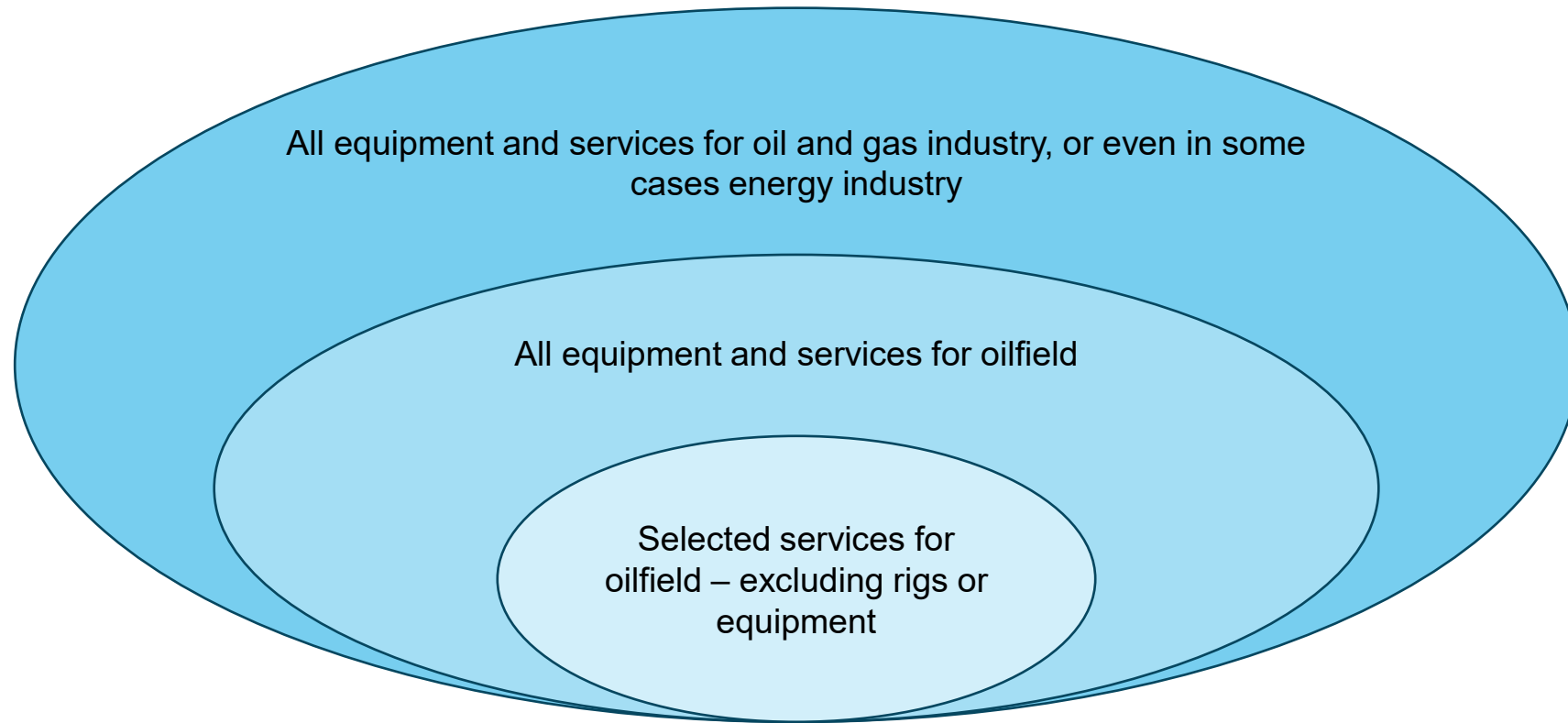
Oilfield services and equipment



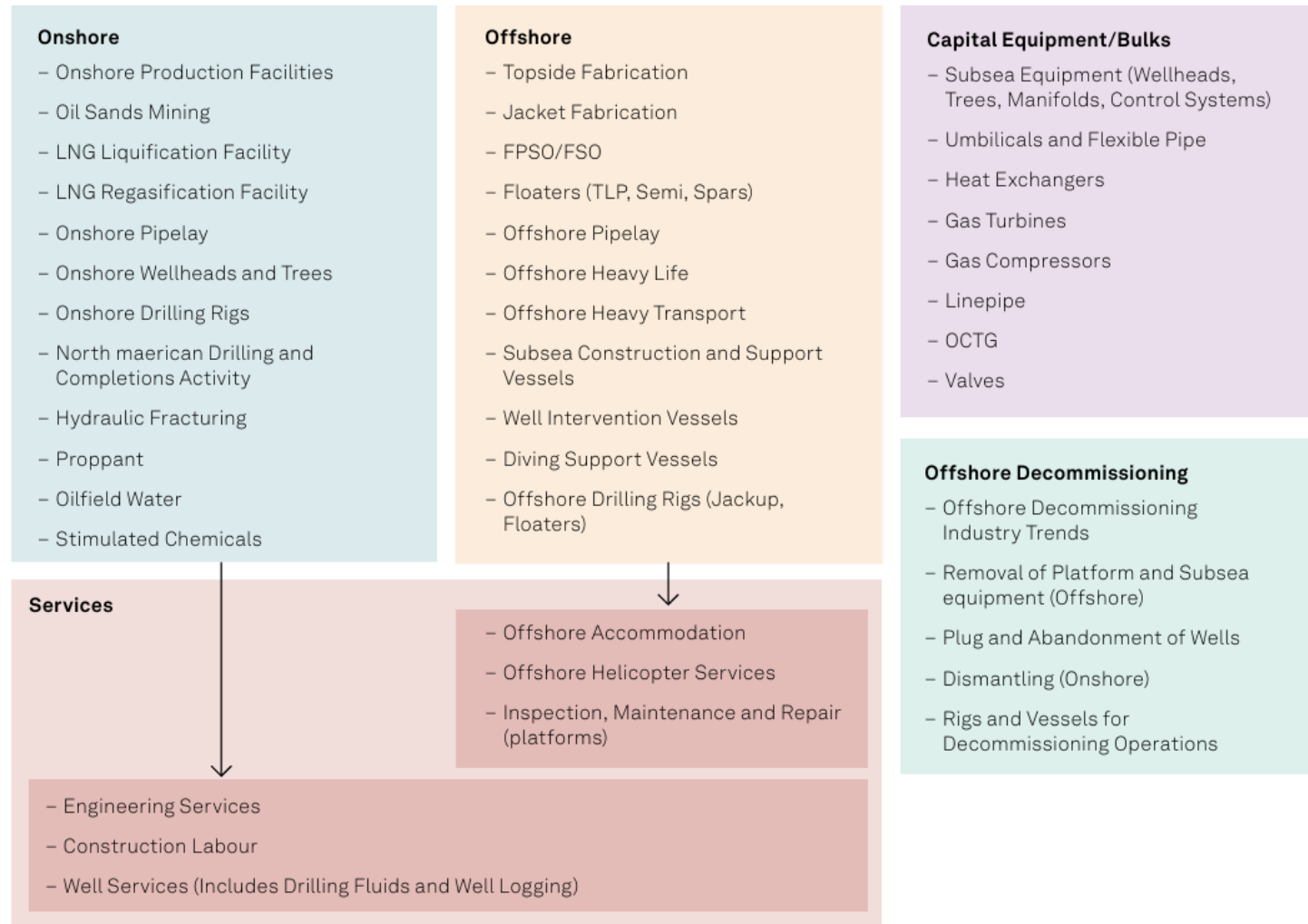
Oilfield market dynamics



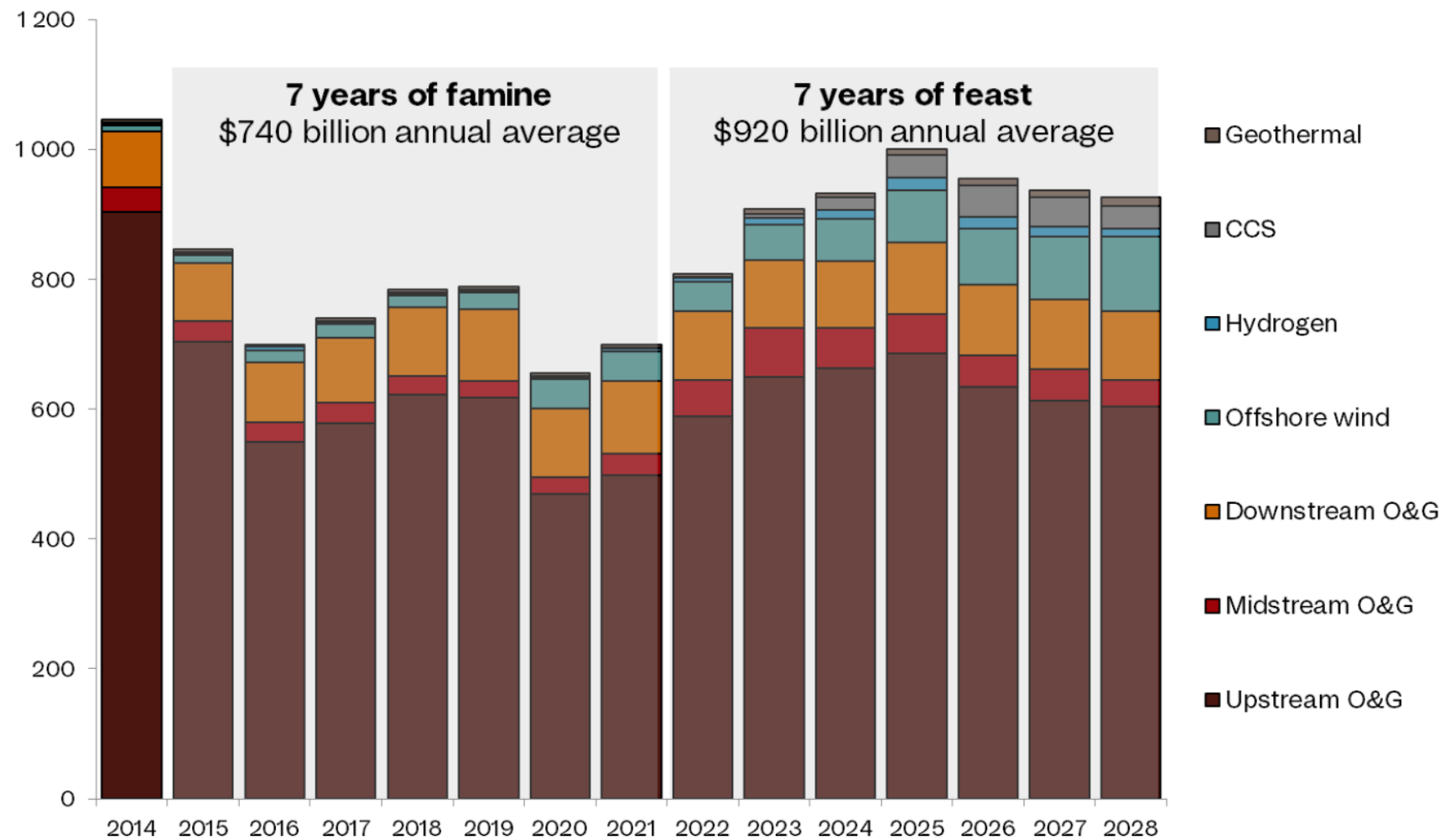
Different definitions for oilfield services



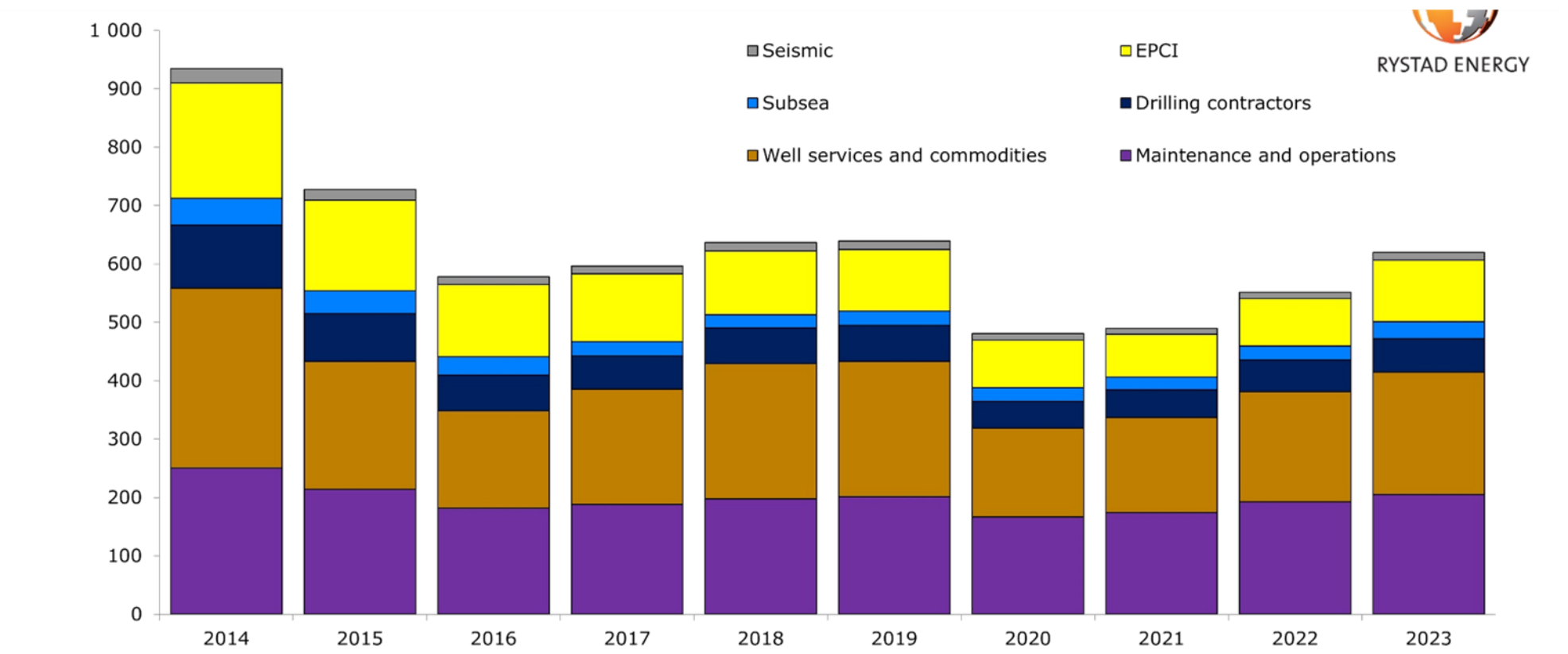
Oilfield equipment and services segmentation



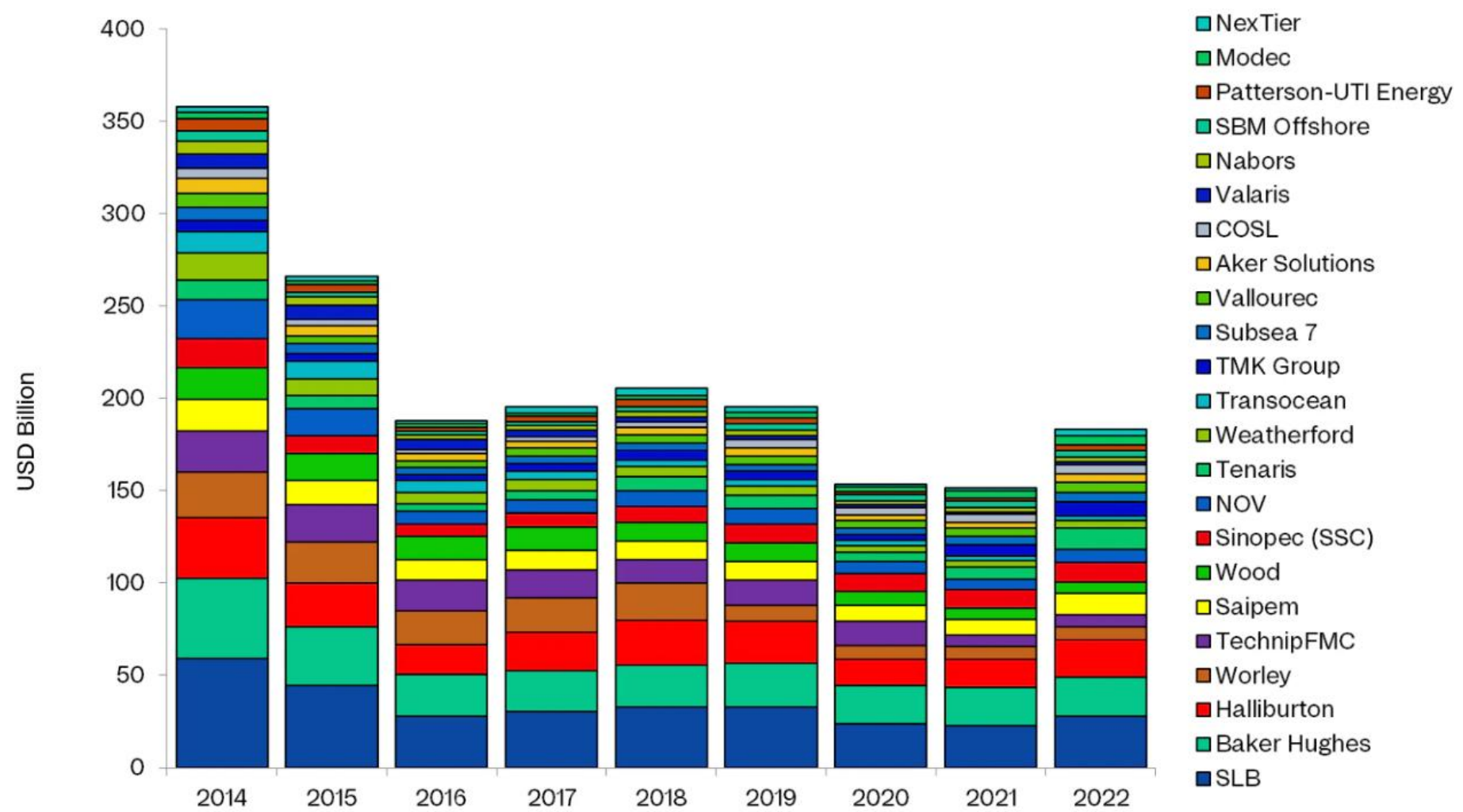
Service purchased by oil and gas companies (billion USD)



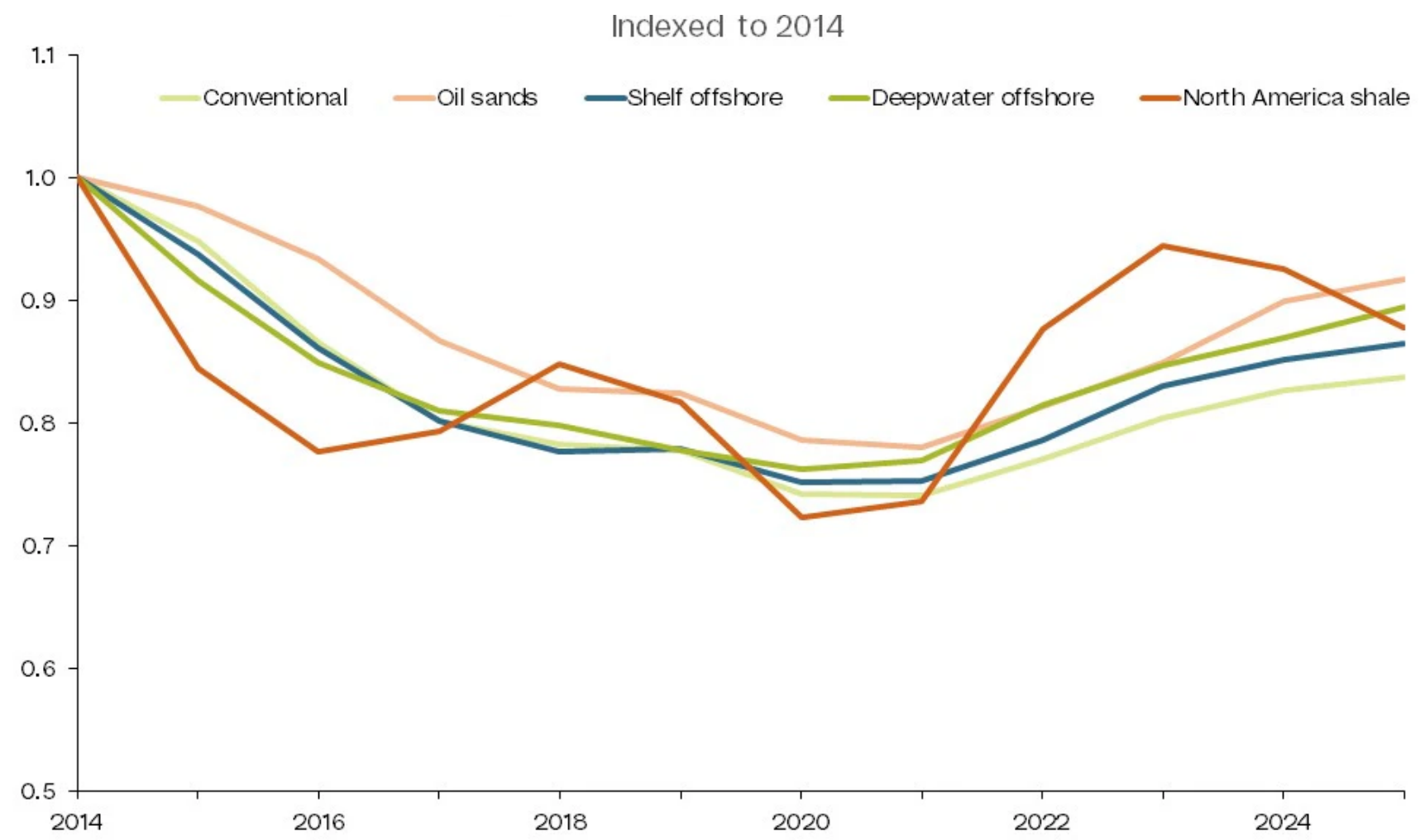
Oilfield services market by segment (billion USD)



Revenue of top oil and gas suppliers



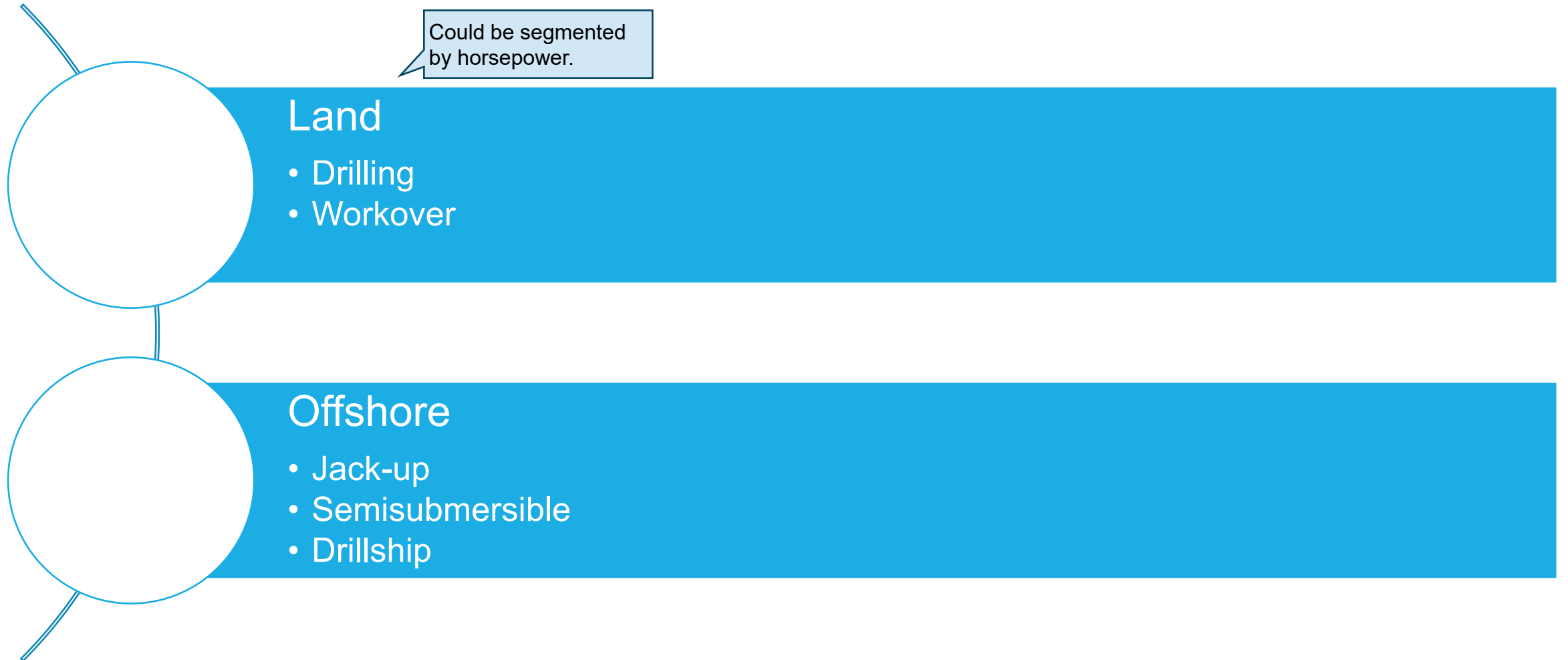
Change in unit price of oil



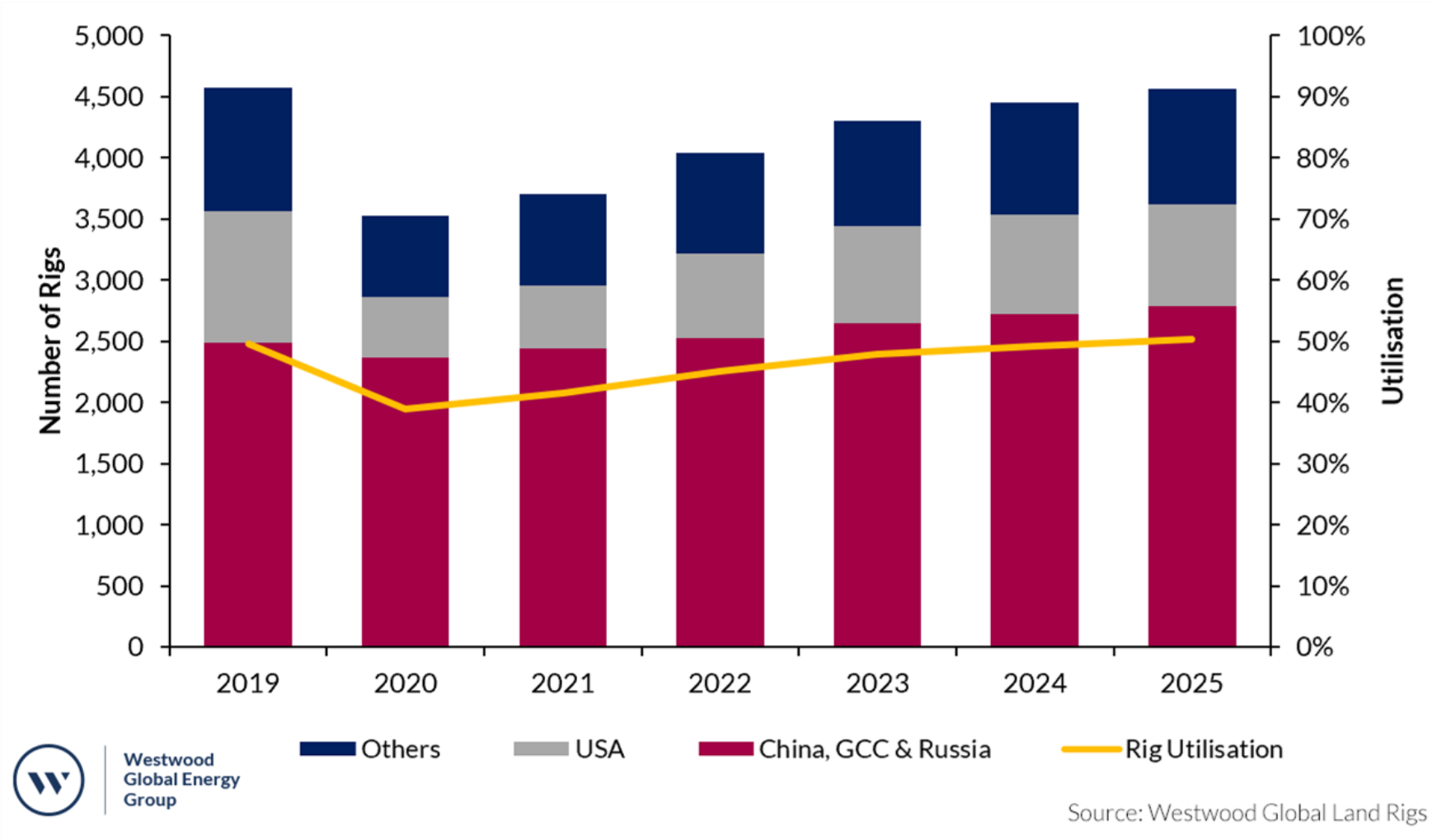
Oilfield services segments

Exploration	Drilling	Completion	Production	Capital equipment and offshore services
Geophysical	Offshore Contract Drilling	Hydraulic Fracturing	Artificial Lift	Offshore Construction Services
	Land Contract Drilling	Subsea Equipment	Specialty Chemicals	Rig Equipment
	OCTG	Wireline Logging	Well Servicing	Supply Vessels
	Directional Drilling Services	Completion Equipment & Services	Floating Production Services	Petroleum Aviation
	Drilling & Completion Fluids	Rental & Fishing Services	Contract Compression Services	Unit Manufacturing
	Cementing	Surface Equipment		Downhole Drilling Tools
	Drill Bits	Production Testing		
	LWD	Coiled Tubing Services		
	Solids Control & Waste Management			
	Casing & Tubing Services			
	Surface Data Logging			
	Inspection & Coating			

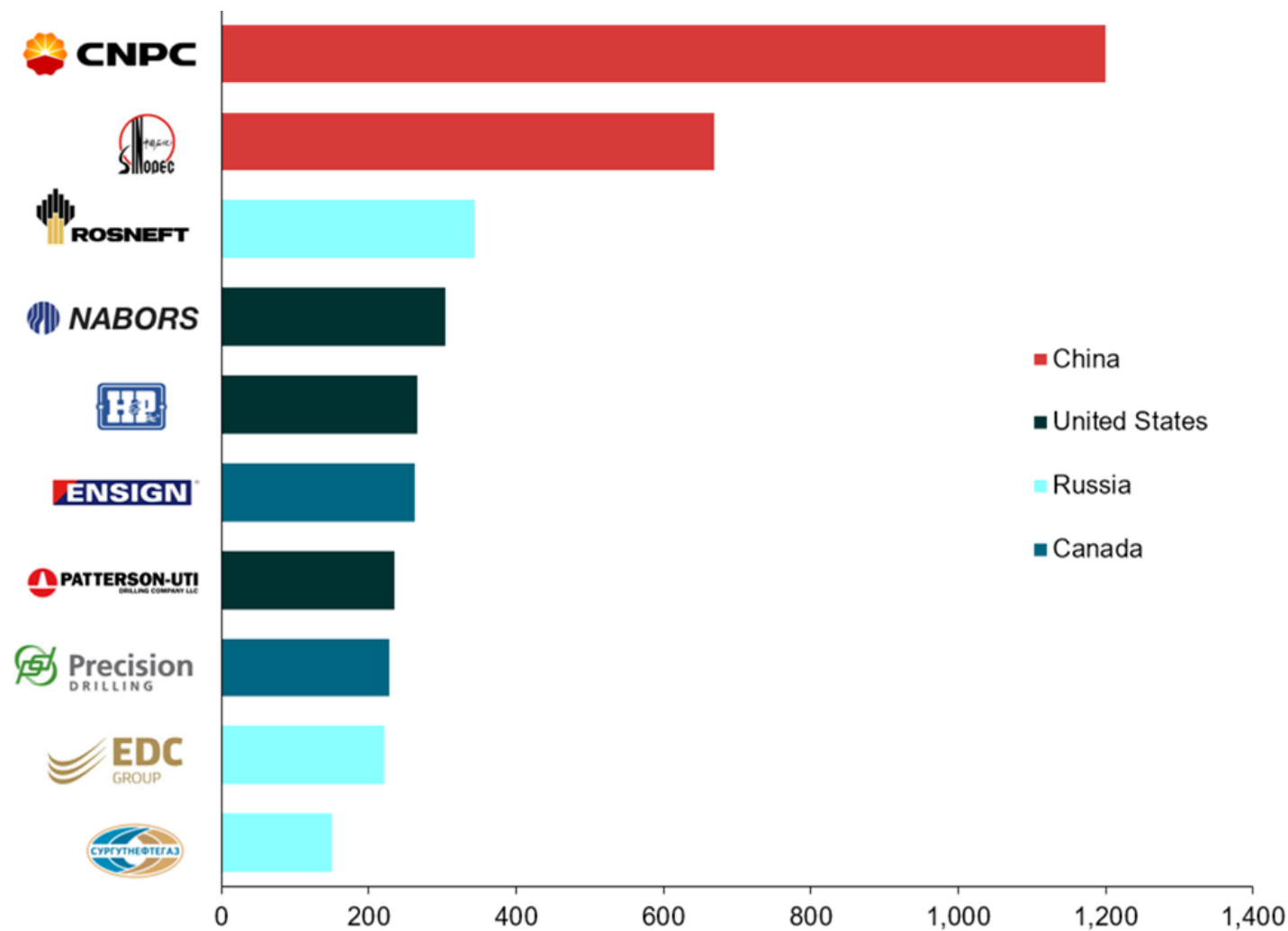
Rigs market



Average number of rigs operational and global rig utilization



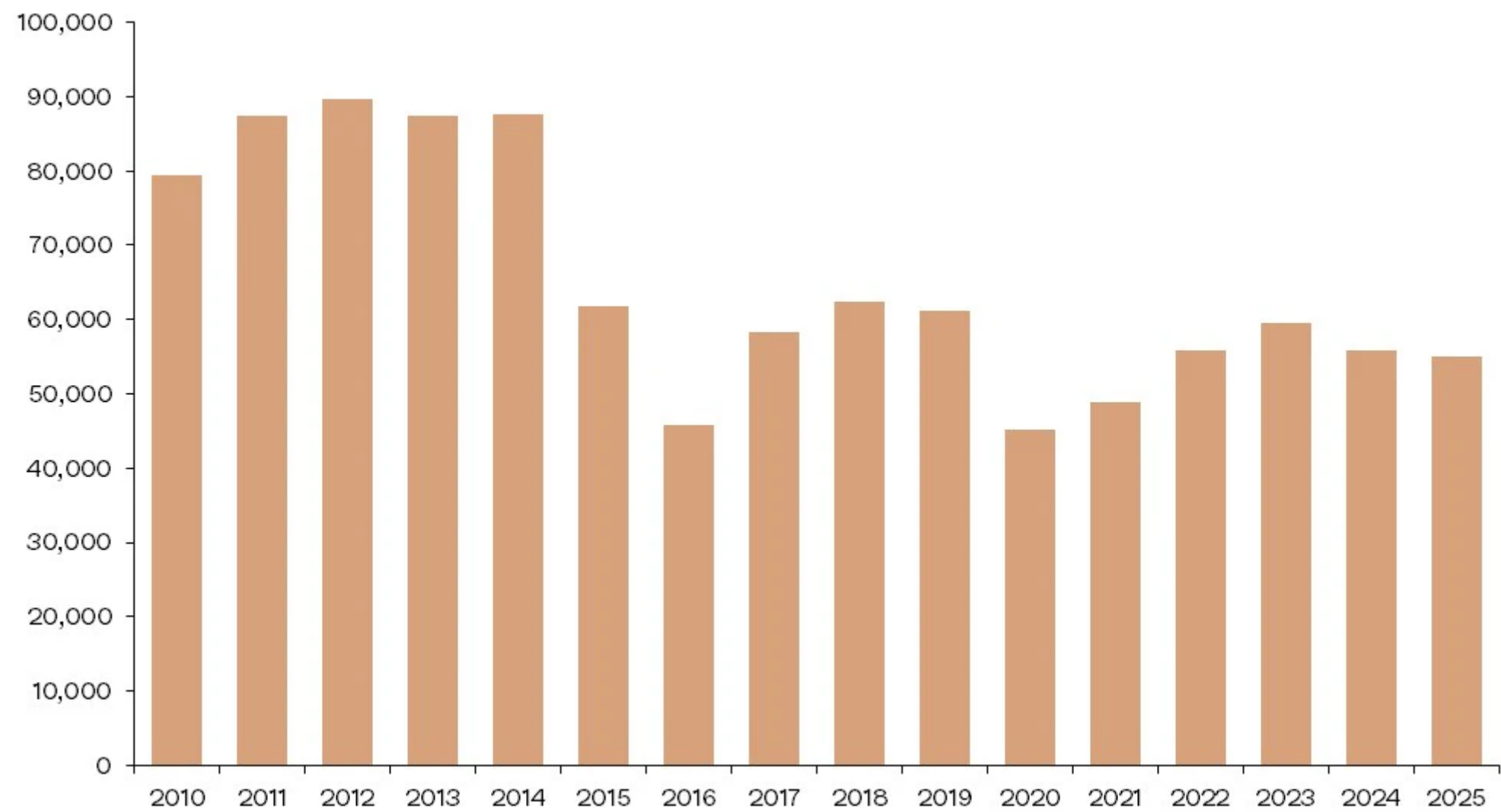
Top 10 land drilling contractors



Top offshore rig drillers (2023)

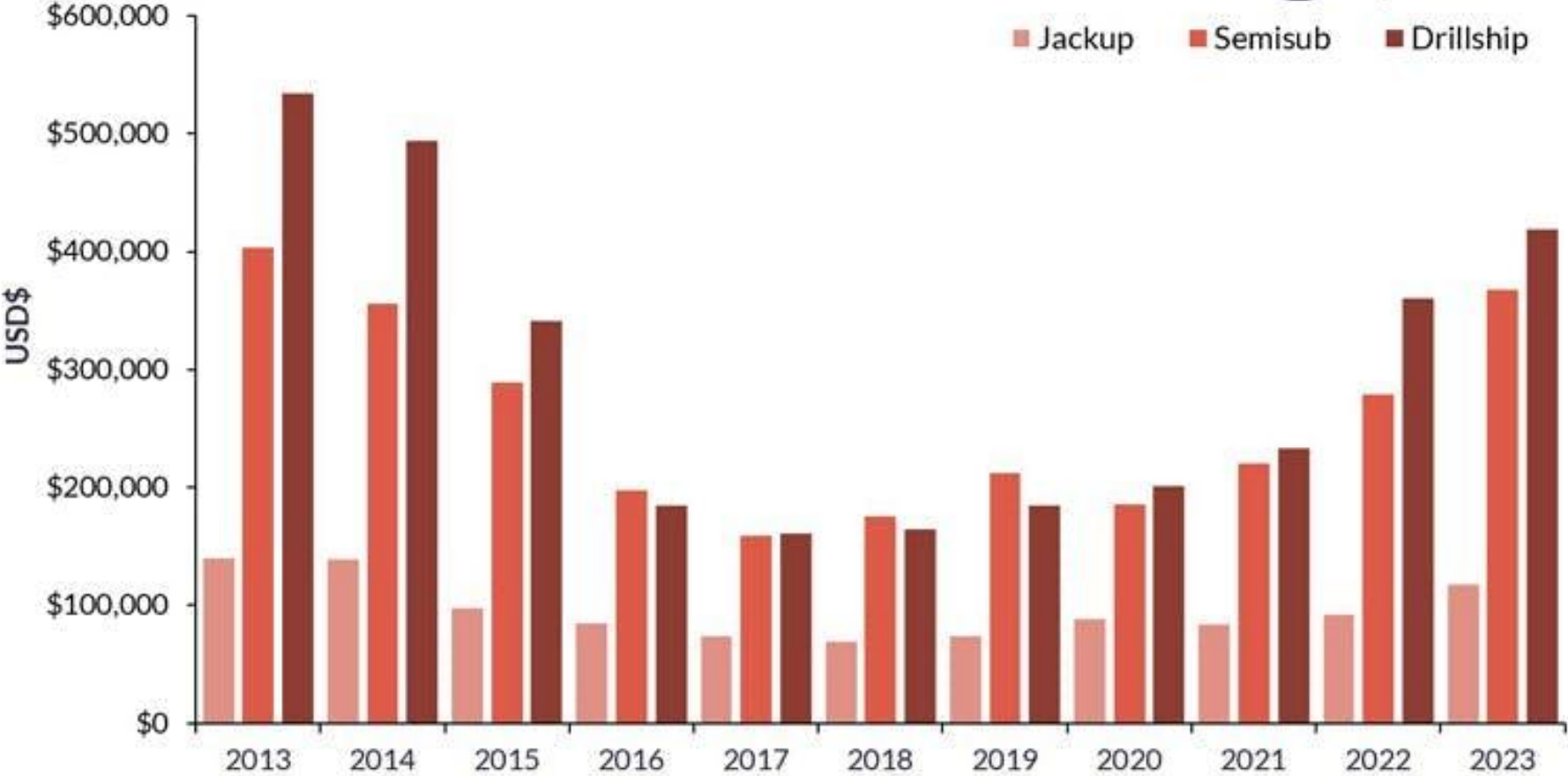
RIG MANAGER	WORKING	OTHER STATUSES	UNDER CONSTRUCTION	TOTAL RIGS	USGOM	LATIN AMERICA	NORTH SEA	WEST AFRICA	MIDDLE EAST	ASIA PACIFIC	OTHER REGIONS
China Oilfield Services Ltd.	58	8	1	67	0	1	3	1	11	51	0
Advanced Energy Systems (ADES)	46	0	0	46	0	0	0	0	43	2	1
Valaris	27	18	0	45	9	7	11	5	4	7	2
Transocean	22	17	0	39	10	6	6	1	0	7	9
Shelf Drilling	32	4	0	36	0	0	4	6	13	11	2
ADNOC Drilling	32	4	0	36	0	0	0	0	35	1	0
Noble Drilling	20	11	0	31	4	7	11	5	1	3	0
Borr Drilling	22	0	2	24	0	7	1	3	5	8	0
ARO Drilling	13	3	1	17	0	0	0	0	17	0	0
Enterprise Offshore Drilling	6	10	0	16	15	0	0	0	0	0	1
Top Ten Total	278	75	4	357	38	28	36	21	129	90	15
Entire Fleet	495	198	35	728	47	97	61	43	204	218	58
Top Ten % of Total	56.2%	37.9%	11.4%	49.0%	80.9%	28.9%	59.0%	48.8%	63.2%	41.3%	25.9%

Completed wells

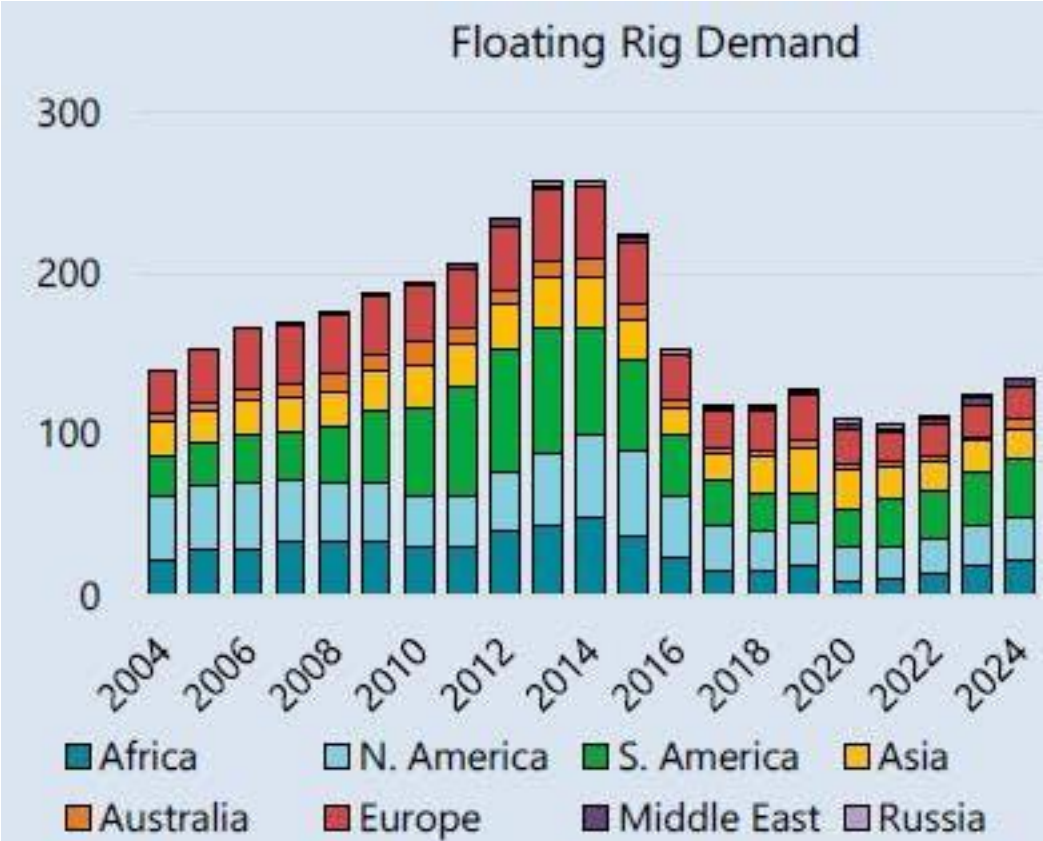


Offshore rigs day rates

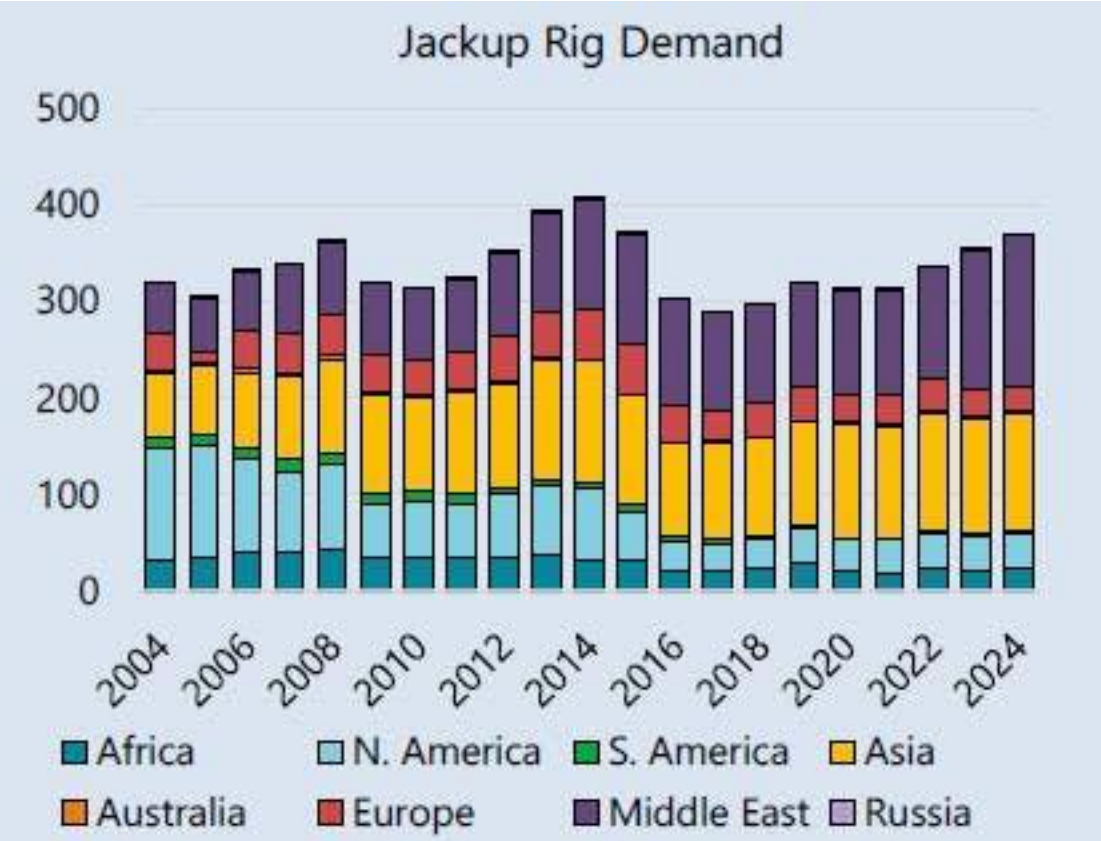
Offshore Drilling Rig Average Leading-Edge Dayrates
Fixed From 2013-2023



Offshore rigs demand



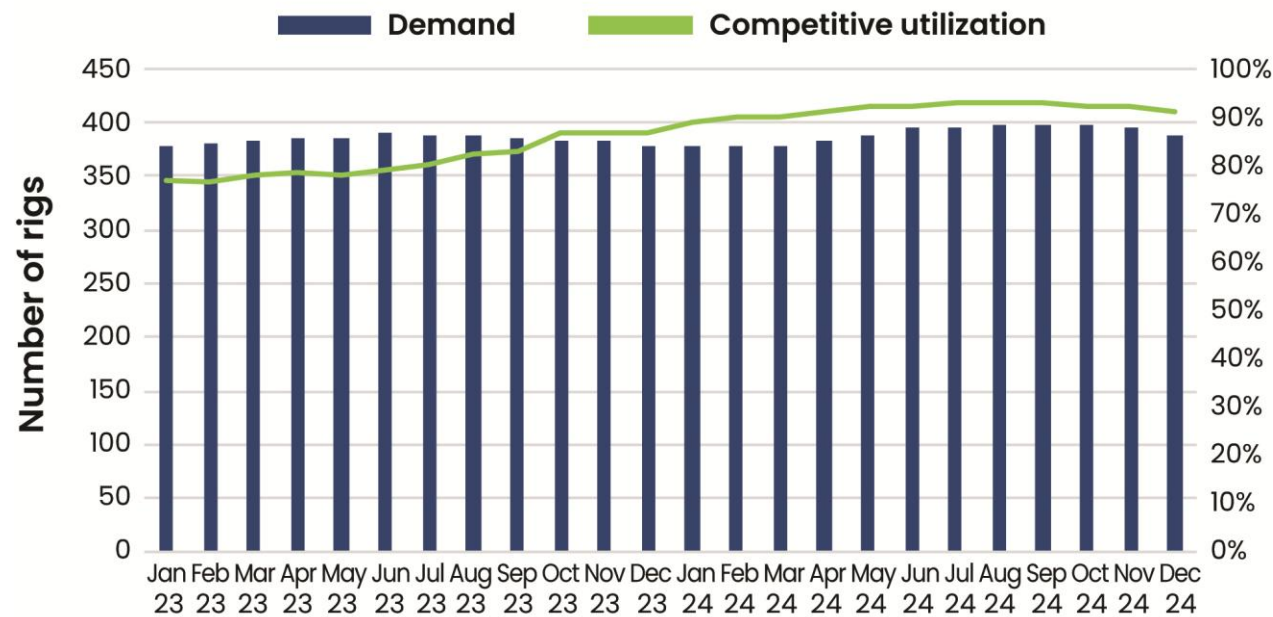
Source: Rystad Energy Offshore Rig Demand Dashboard.



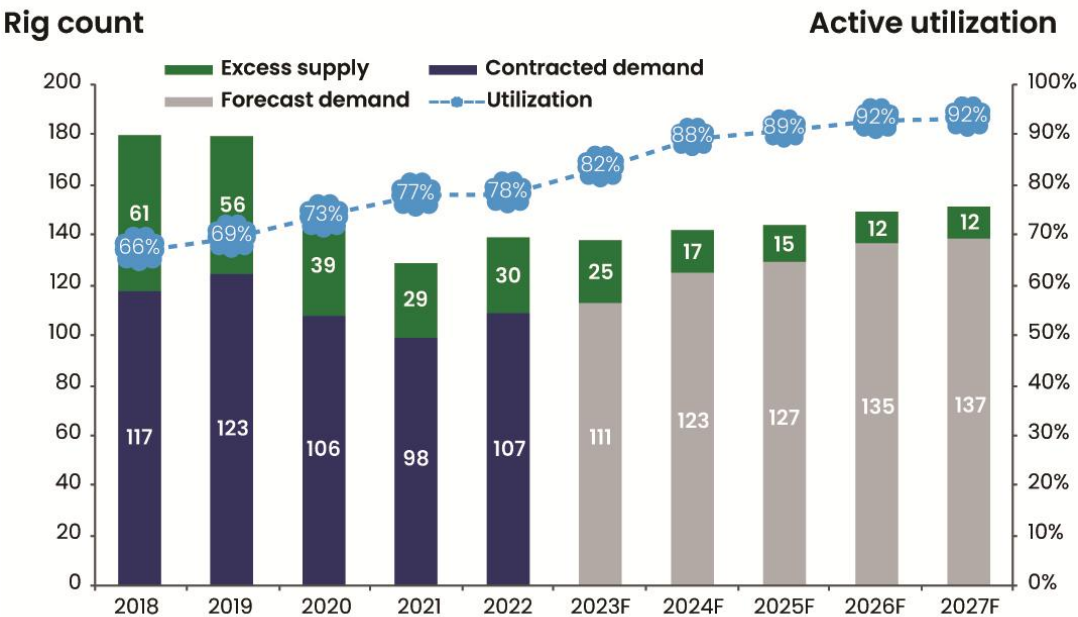
Source: Rystad Energy Offshore Rig Demand Dashboard.

Offshore rigs utilization

Global jackup activity and forecast

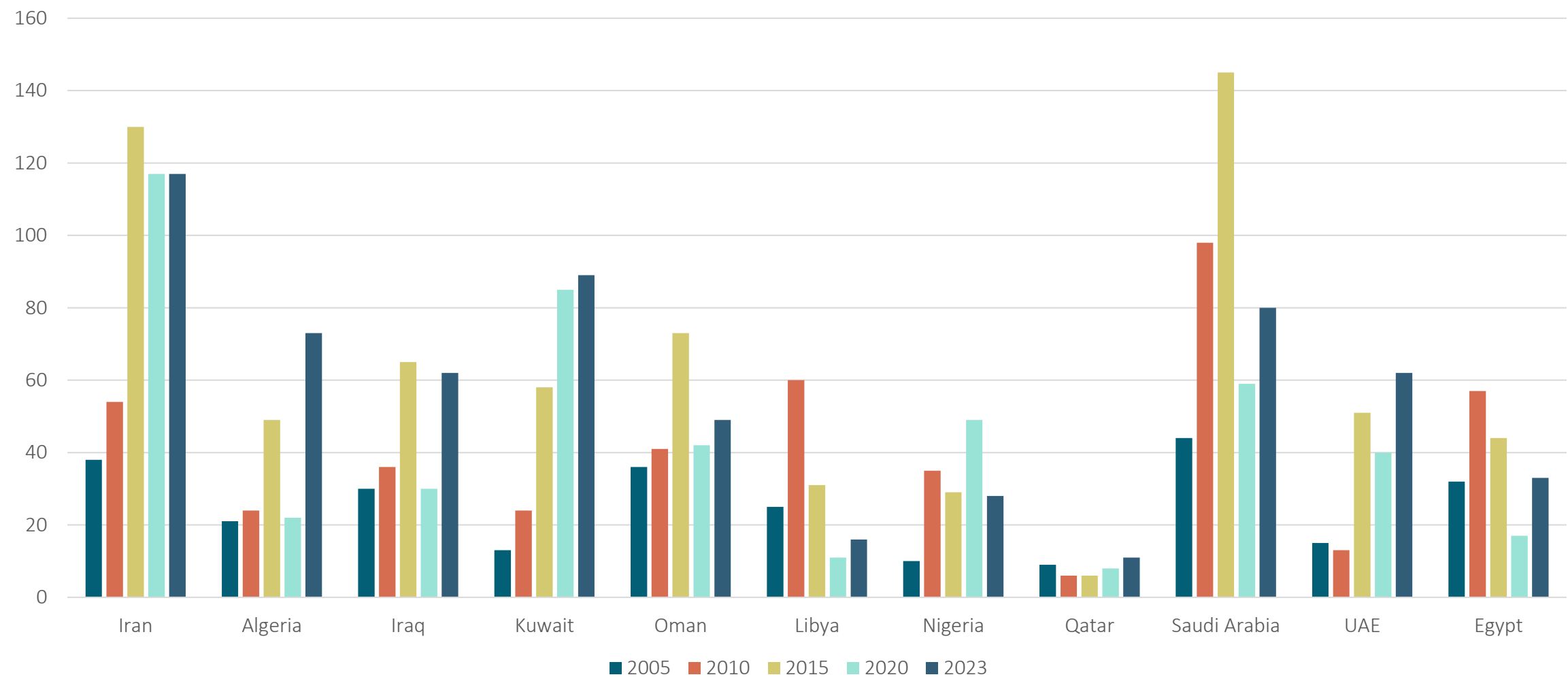


Global floating rig utilization



Source: Wood Mackenzie

Active rigs in MENA



References

- S&P Global Capital IQ
- Rystad Energy
- Westwood Energy
- Spears and Associates
- OPEC, Annual Statistical Bulletin

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Which country has been successful in developing its oil and gas sector? Why?

Overview of five countries

Subject	KSA	UAE	Qatar	Iraq	Oman
Population (million inhabitants)	35.3	11	2.8	46.1	5.5
GDP at market prices (Billion USD)	1237	552	218	279	107
GDP per capita (000' USD)	35	50	73	6	20
Proven crude oil reserves (Billion barrels)	267	113	25	145	4.8
Proven natural gas reserves (Trillion cubic meters)	9.7	8.2	24	3.7	Less than 1
Crude oil production (000' bbl/d)	~9	~3	Less than 1	~4	Less than 1
Refinery capacity (000' bbl/d)	3.3	1.2	Less than 0.4	1.2	Over 0.5

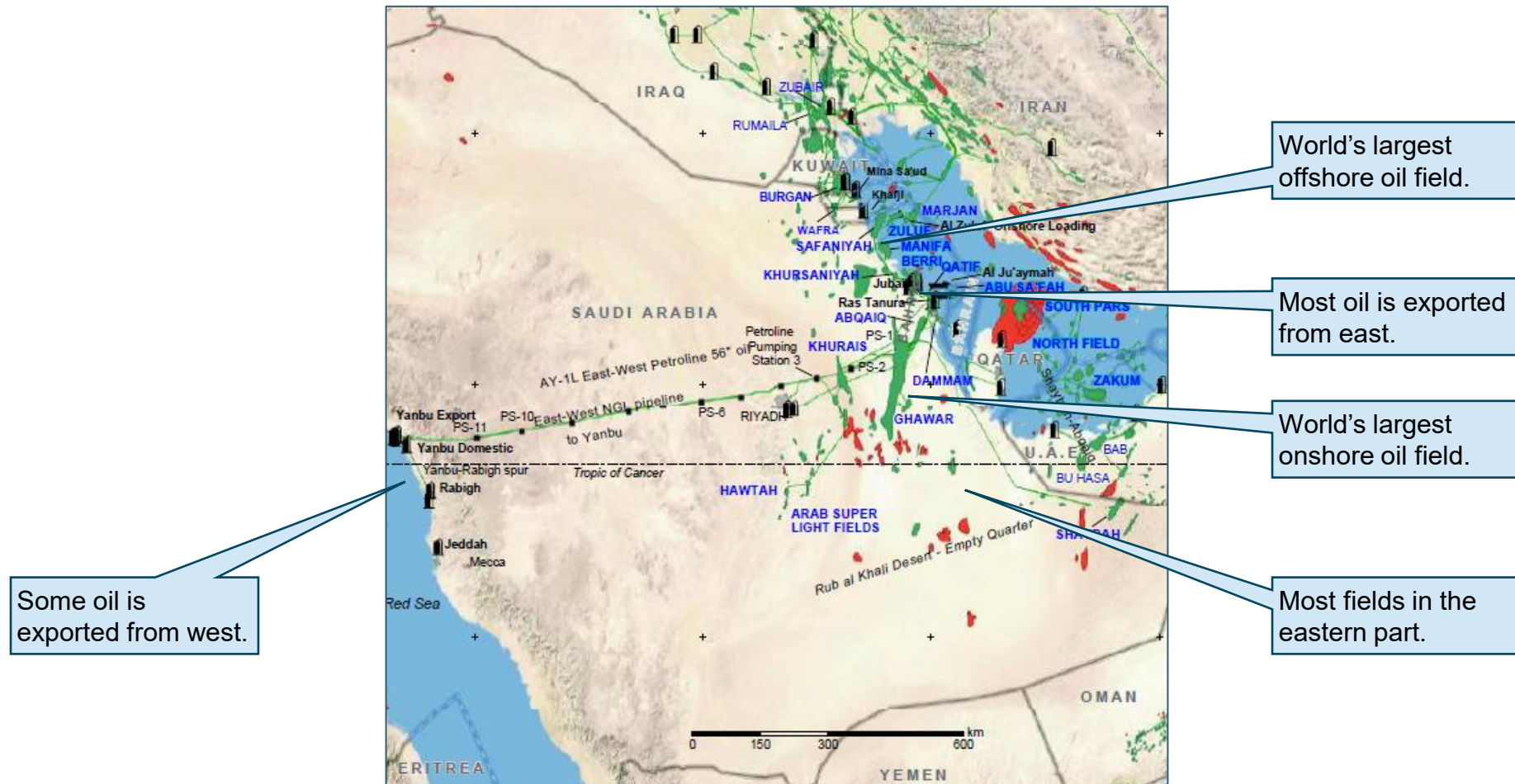
KSA

Overview

- World's largest oil exporter and OPEC's most influential member
- Oil production comes mostly from onshore fields and is dominated by the Ghawar field – the world's largest
- National oil company Saudi Aramco is responsible for nearly all oil and gas production
- Saudi exports 7-8 million barrels per day with the remainder going to local refineries and power stations
- During the hotter summer months, demand for power generation increases, which increases crude burn
- The Government has awarded Aramco a concession (40 + 20 + 40 years), with a few exceptions. Including Chevron in the neutral zone

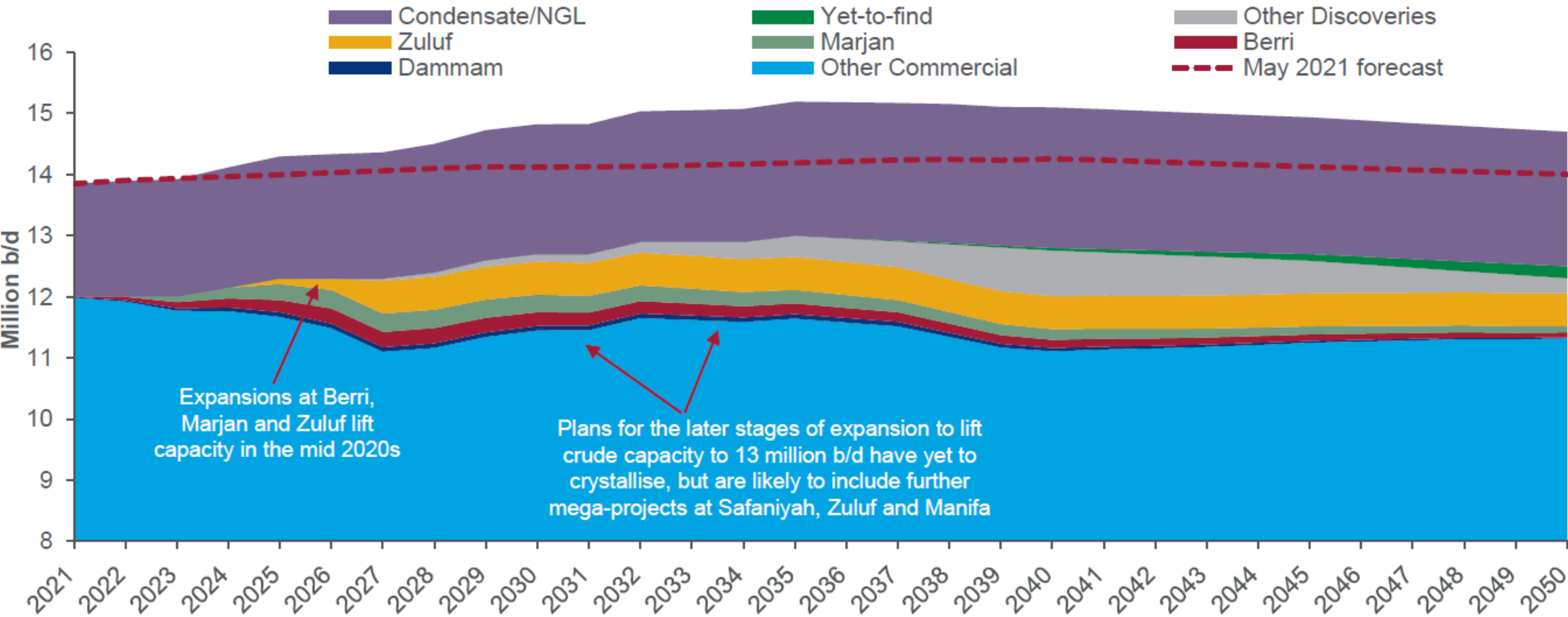
KSA

Oil and gas fields and infrastructure



KSA

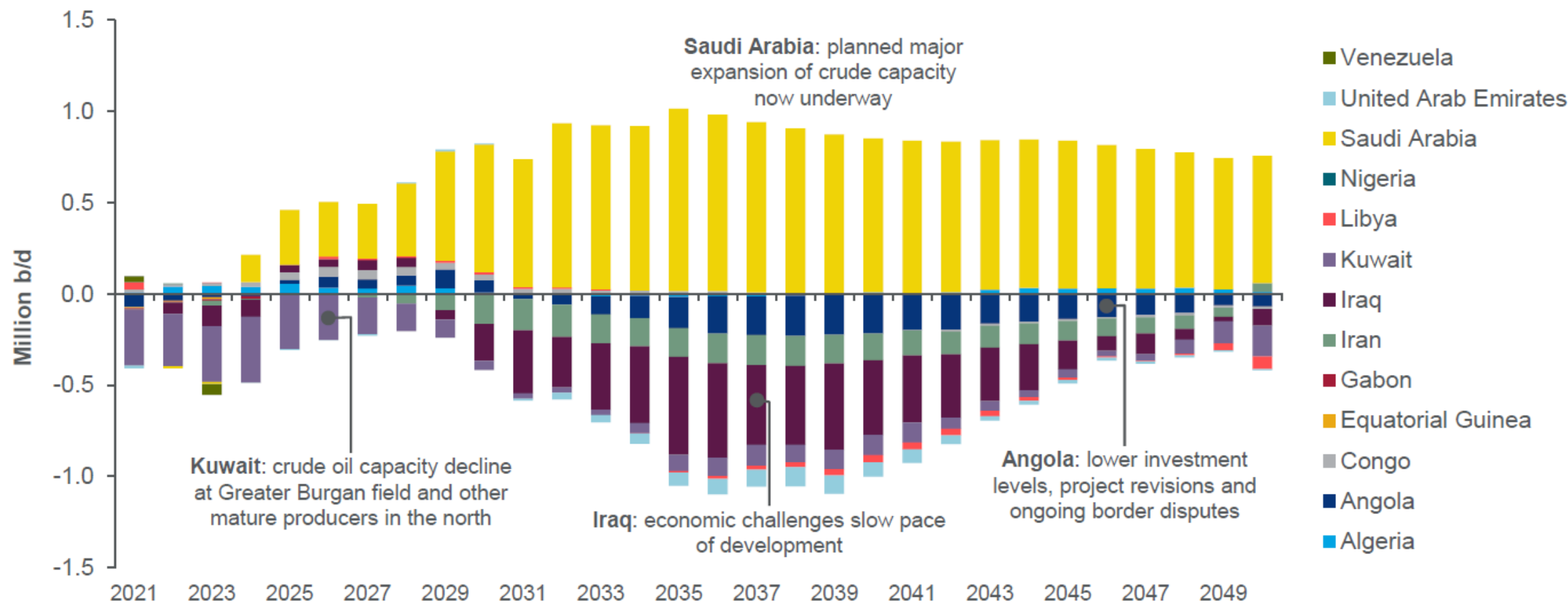
Liquids capacity



KSA

Long-term capacity provider

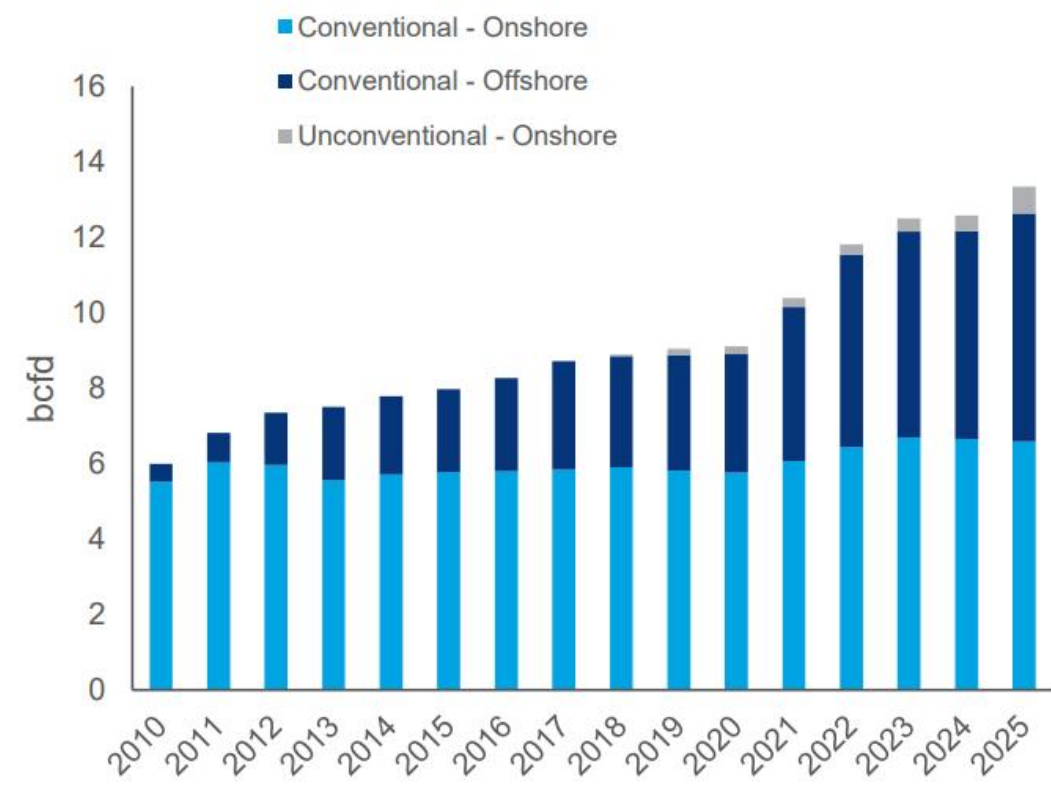
OPEC liquids capacity change from May 2021



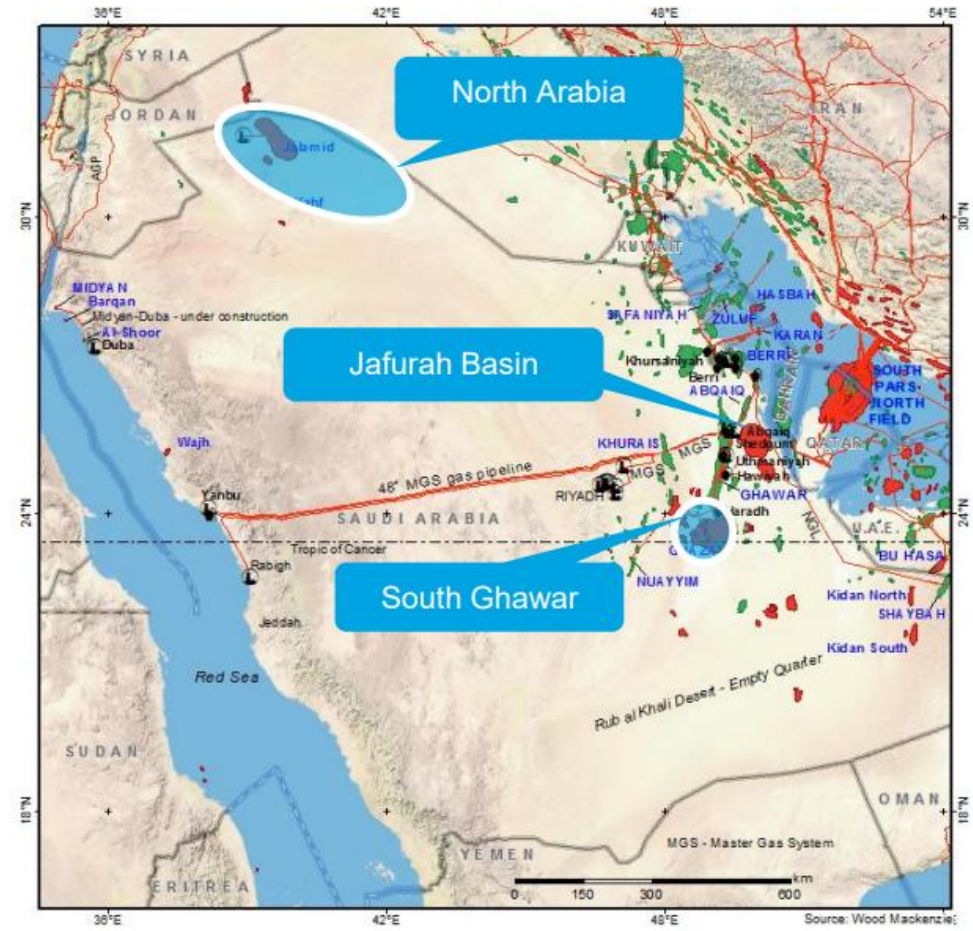
KSA

Gas supply

Sales gas production



Unconventional gas target regions



KSA

Jafurah

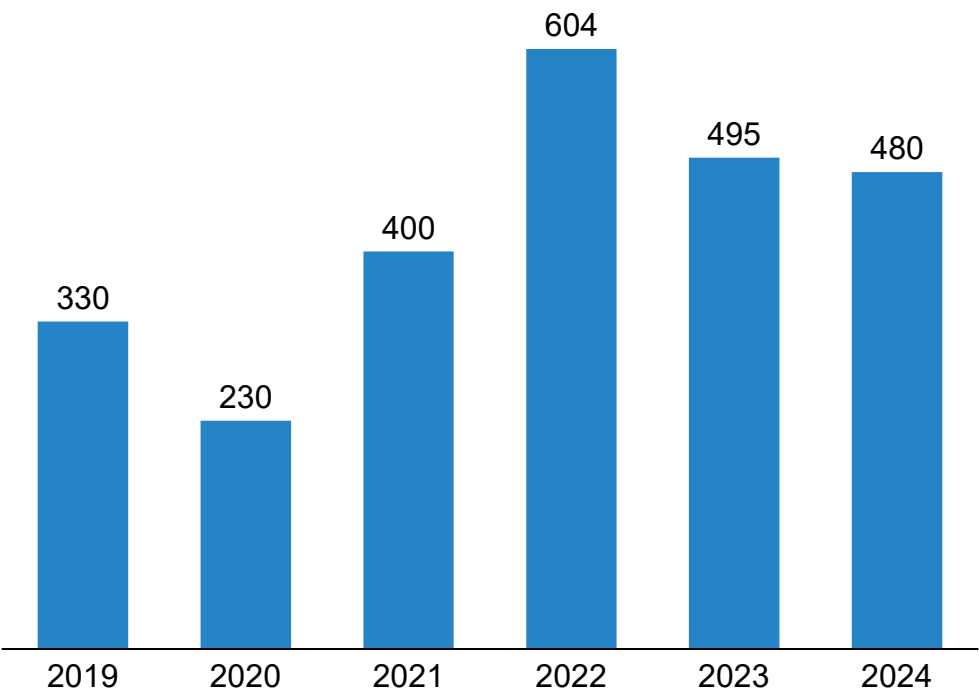
- 229 tcf gas and 75 billion barrels of condensate in place
- 100 BUSD investment plan
- 11 BUSD pipeline deal with GIP
- Production plan: 200 mcf/d in 2025, 650 mcf/d in 2026 and 2 bcf/d in 2030

Aramco IPO involved companies

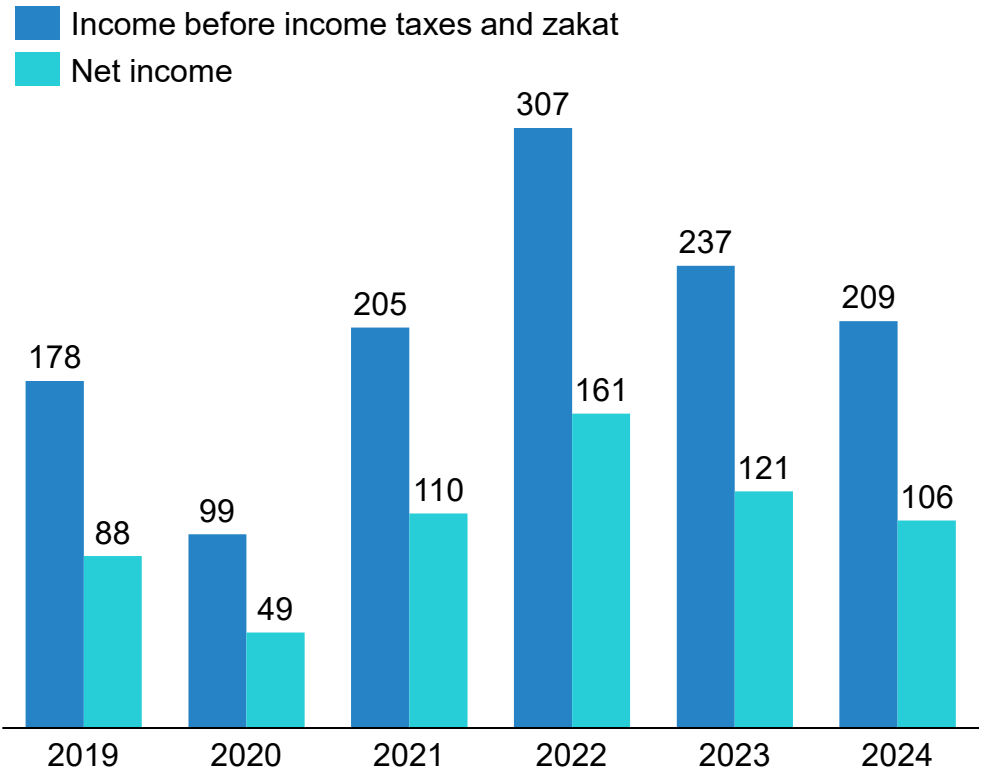


Aramco financials (1/2)

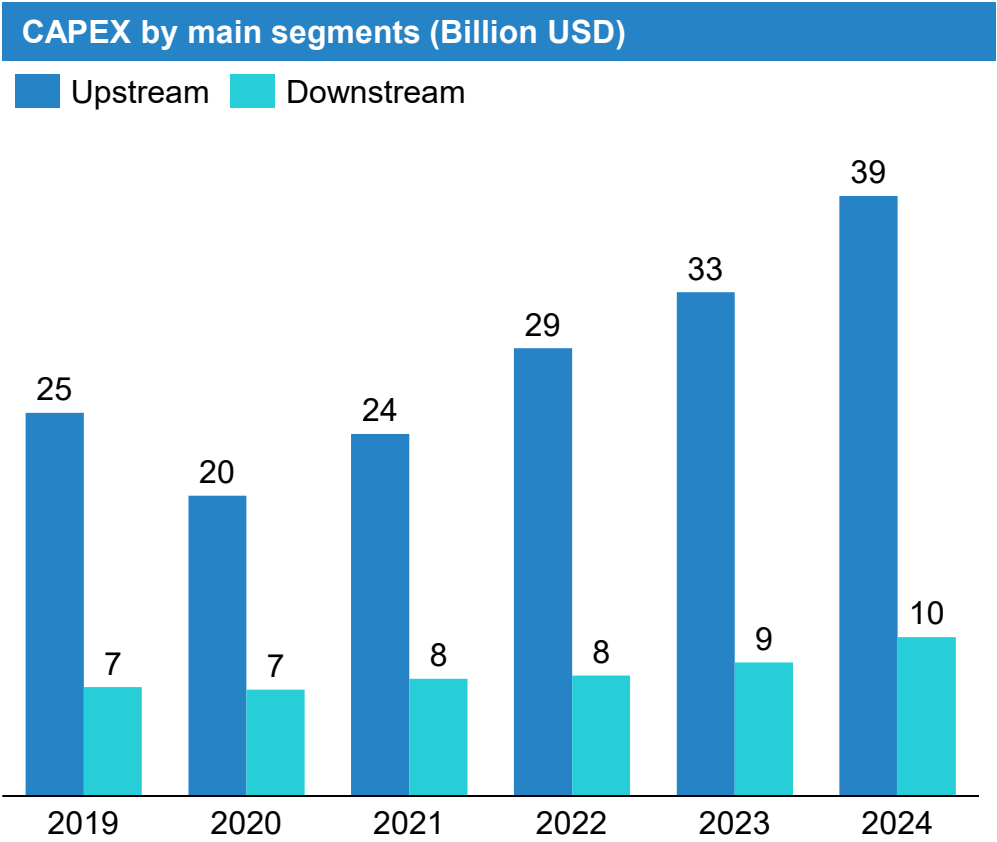
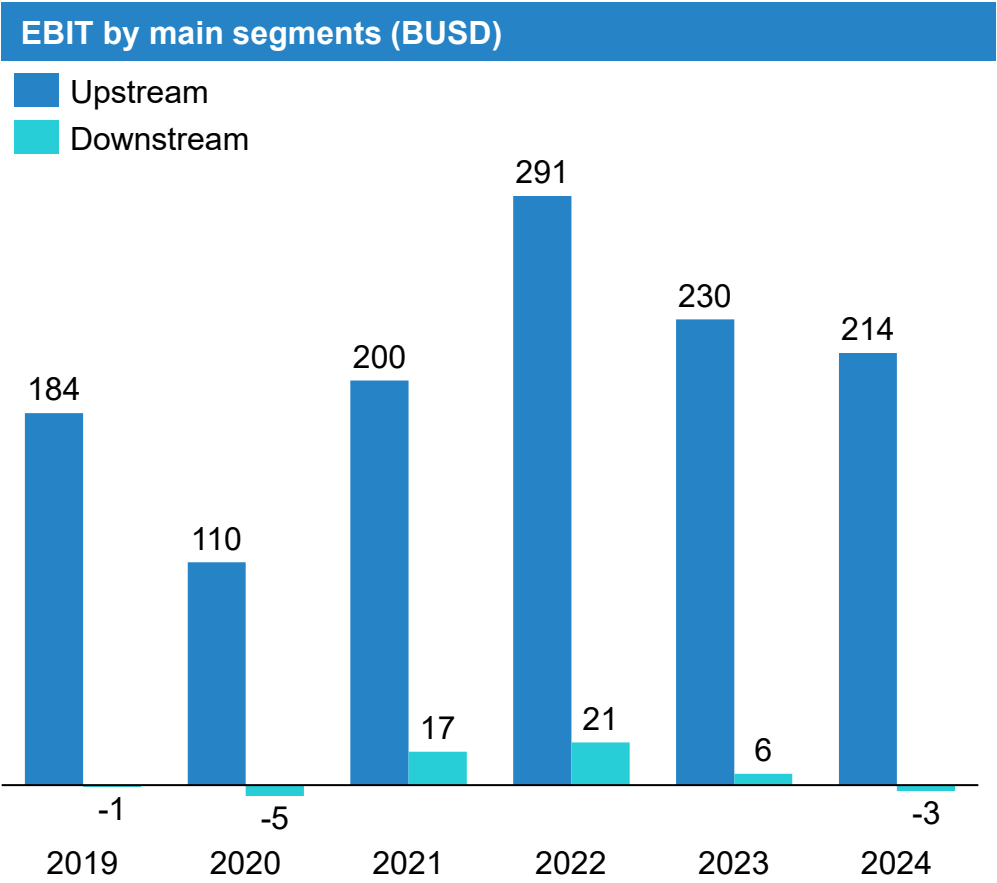
Revenue and other income related to sales (Billion USD)



Income (Billion USD)



Aramco financials (2/2)



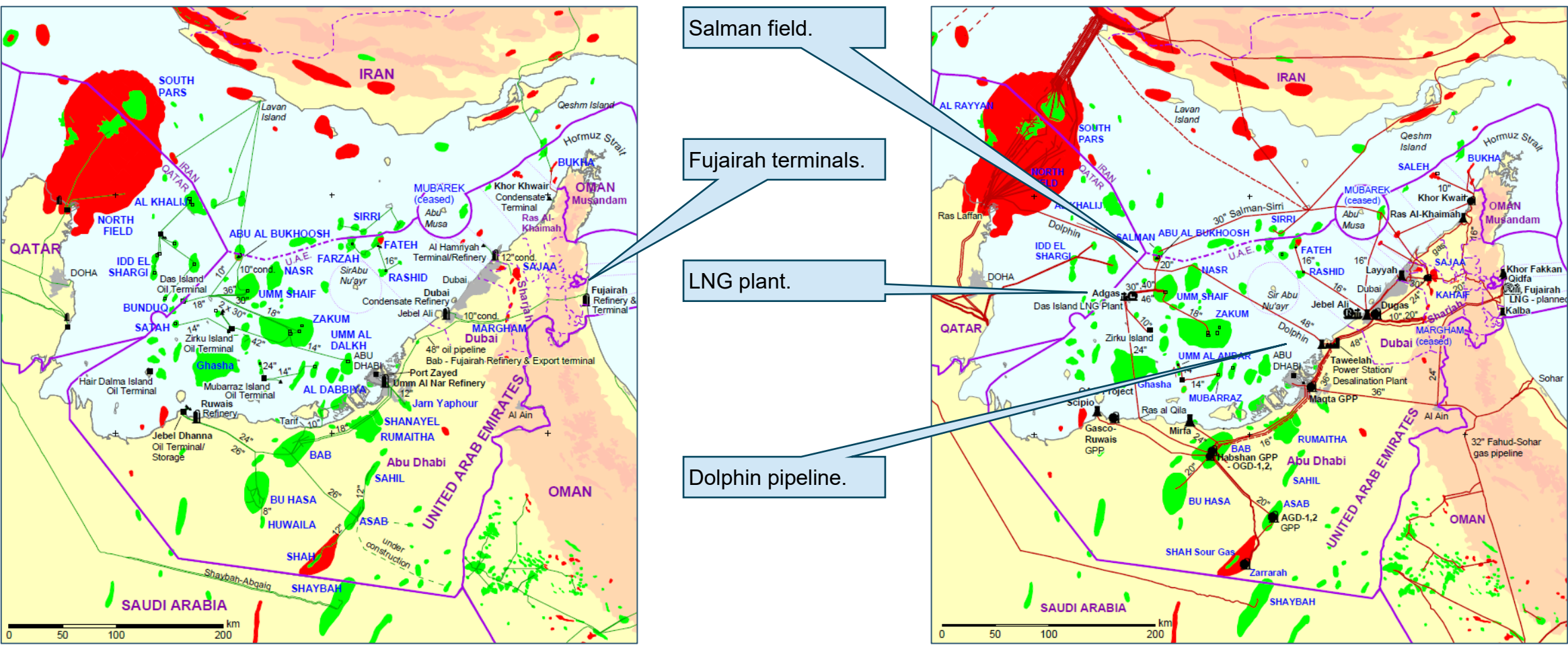
UAE

Overview

- Most of the UAE's oil and gas production (>95%) is in Abu Dhabi – five fields account for more than 85% of the total oil production
- Started LNG exports in 1970's
- Pipeline gas imports from Qatar – Dubai was the first emirate to begin LNG imports, followed by Abu Dhabi
- ADNOC is the sole owner of gas, and can take up to 60% in all concessions
- ADNOC is major shareholder in the main existing concessions (offshore and onshore)
- Gas available for the domestic market is limited due to the continued reliance on gas re-injection for oil recovery
- Most contracts in the UAE are in the form of concession agreements and contractors are liable to pay royalty and income tax
- Activities outside Abu Dhabi is limited, mostly in Sharjah and Dubai – oil infrastructure exists in Fujairah

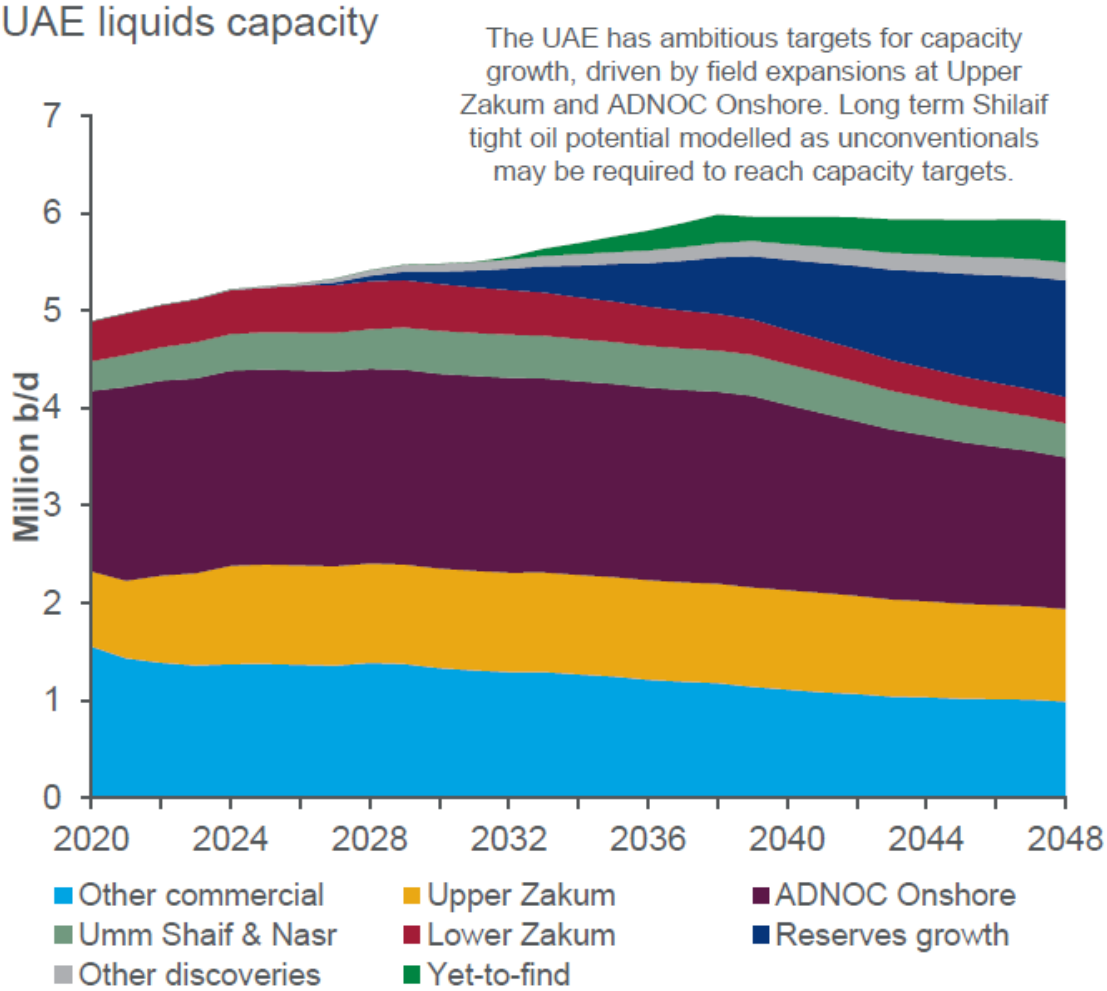
UAE

Oil and gas fields and infrastructure



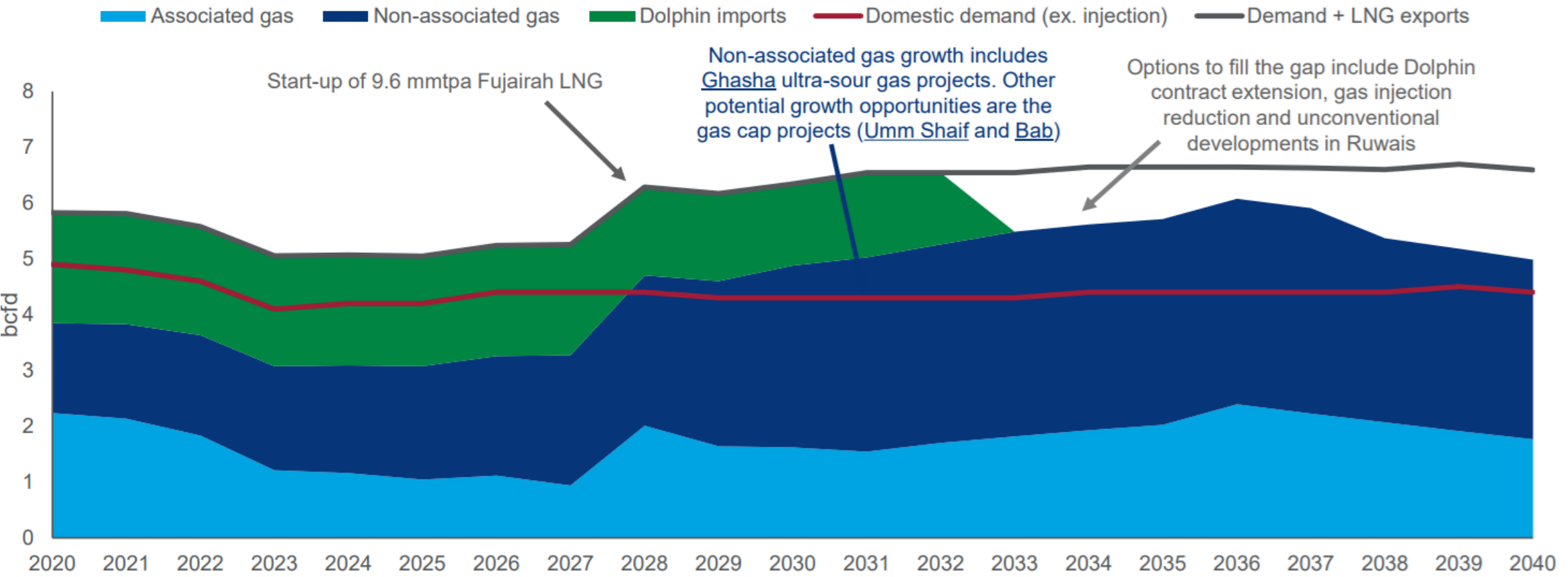
UAE

Liquids supply



UAE

Gas balance



UAE

Abu Dhabi sovereign wealth funds

Name	Area	AUM (billion USD)	Note
ADIA	Abu Dhabi	1100	Main sovereign wealth fund, highly diversified with many non-controlling investments.
Mubadala	Abu Dhabi	330	Ownes ADIC, Mubadala Energy, Mamoura Diversified Global Holding (previously known as Mubadala Development Company), CEPSA. IPIC merged into it.
ADQ	Abu Dhabi	250	Ownes TAQA and ENEC.

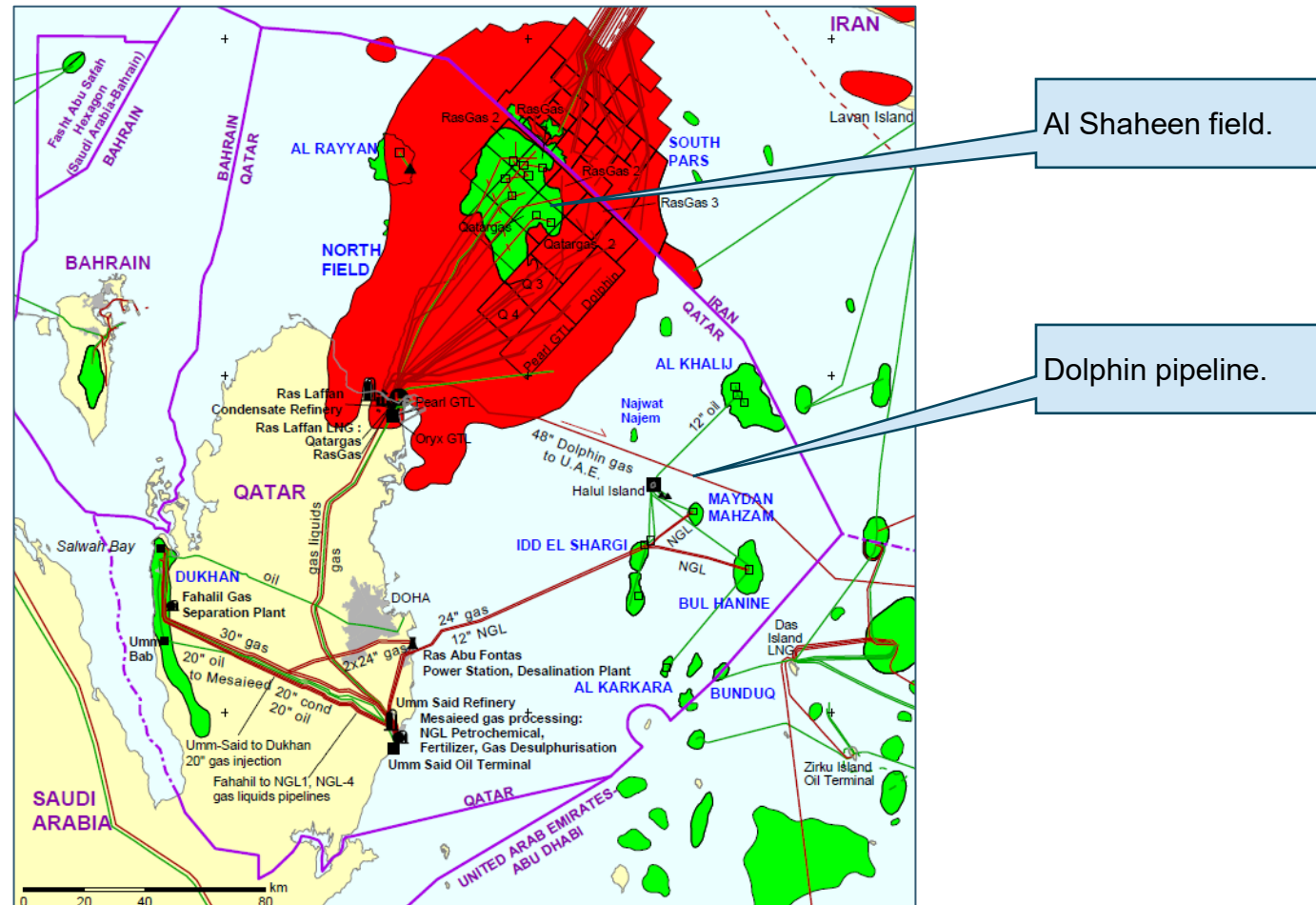
Qatar

Overview

- A global gas and LNG player, with huge reserves in the North Field (shared with Iran, where it is known as South Pars)
- LNG production capacity of 77 mmtpa, to be increased to 140+ mmtpa by 2031 by NFW, NFE, and NFS projects
- Upstream sector managed by Qatar Energy
- Key partners are ExxonMobil and Shell, followed by other companies like TotalEnergies, ConocoPhillips, Eni, SINOPEC and CNPC
- North Field Production Sustainability project to maintain production capacity by compressors
- 60% of liquids production is condensate and NGLs, and the rest mostly comes from Al Shaheen and Dukhan
- The integrated LNG projects under concession terms (tax/royalty) and the rest under PSC

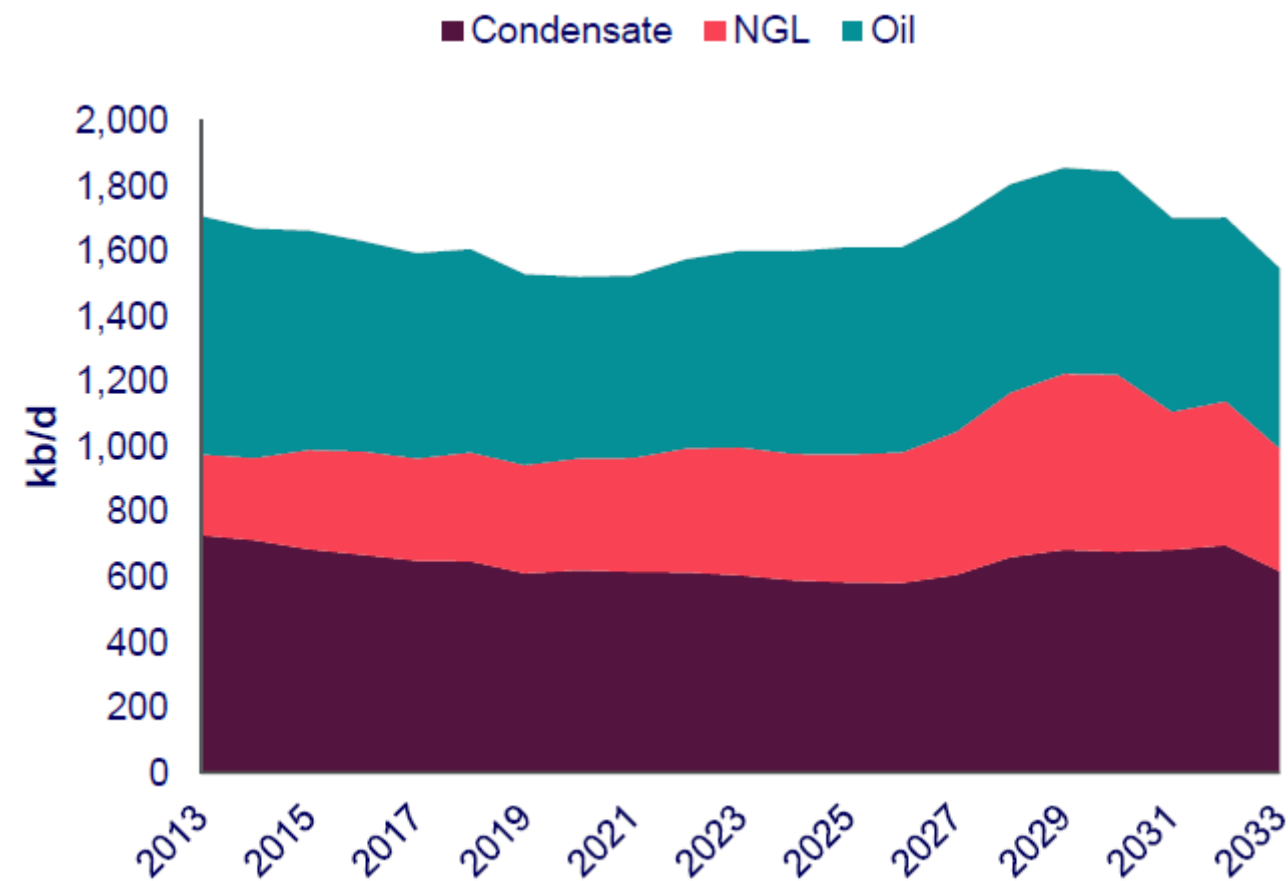
Qatar

Oil and gas fields and infrastructure



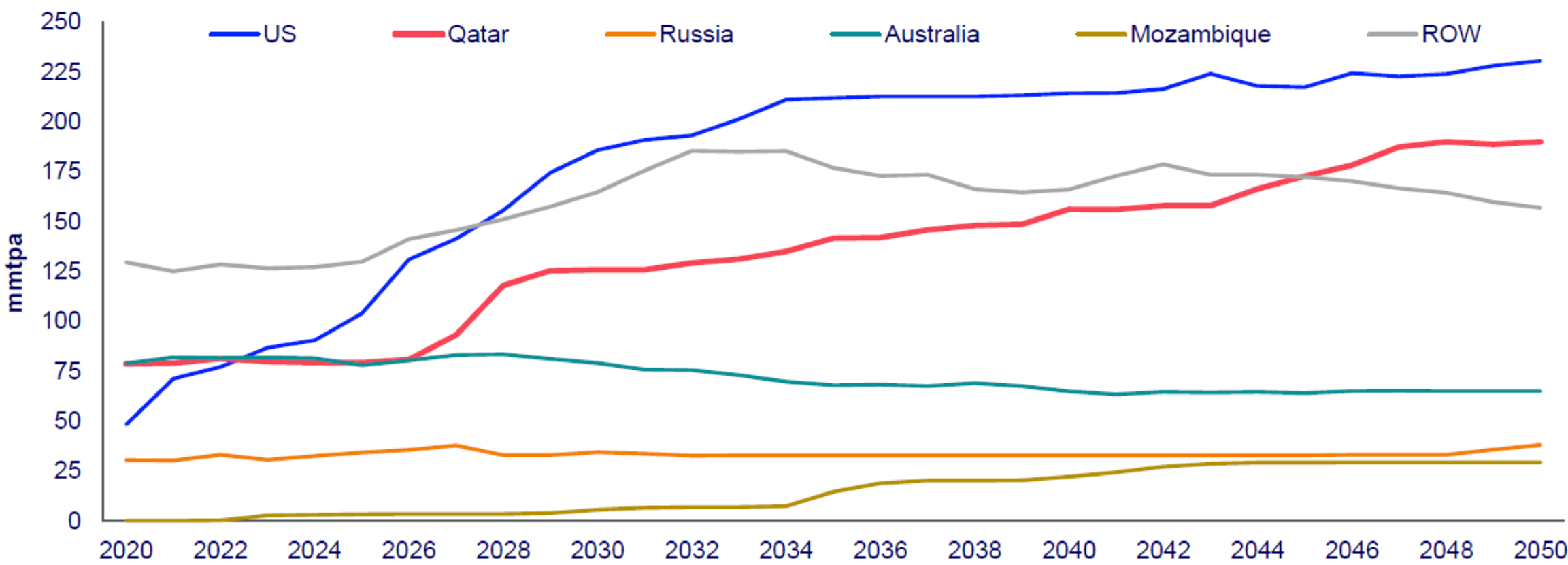
Qatar

Liquids supply



Qatar

A major LNG player



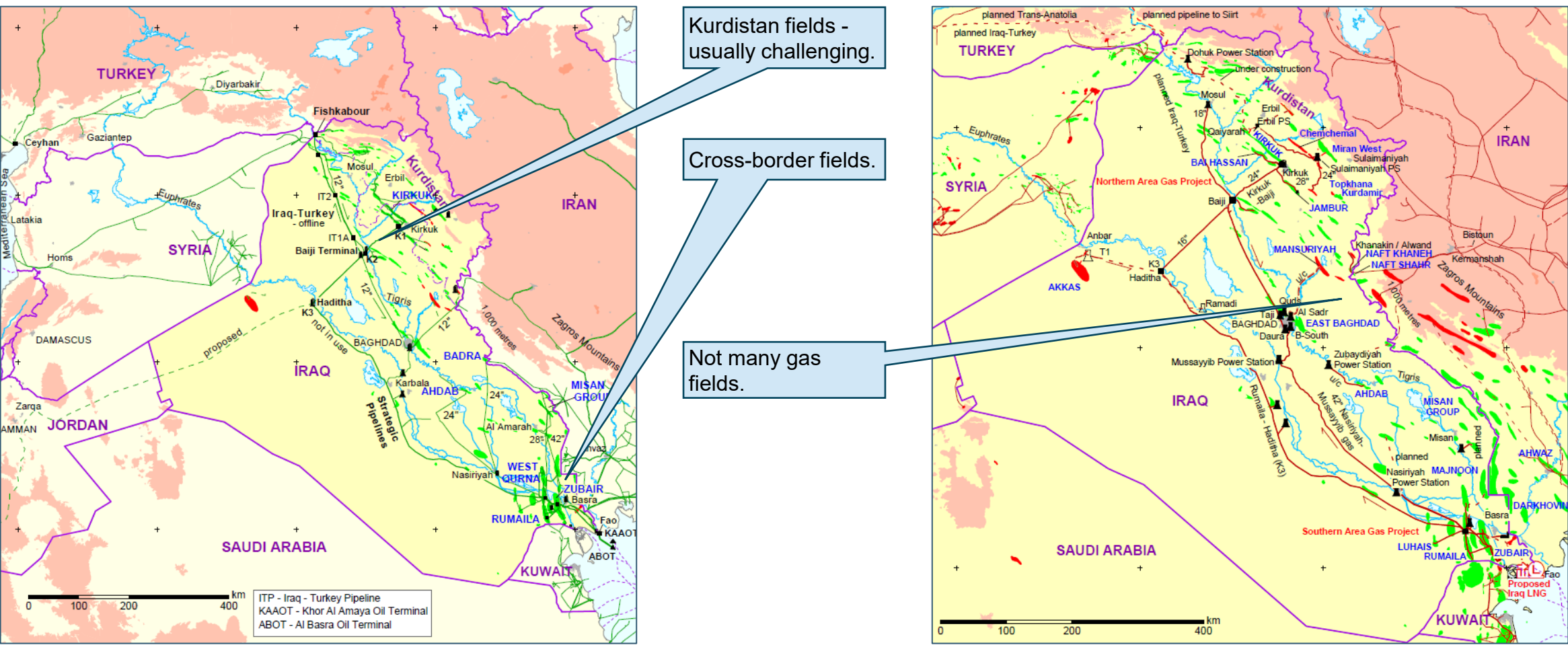
Iraq

Overview

- Huge upside potential from new explorations
- Production capacity increased from 2.4 mbpd in 2010 to around 5 mbpd – 85% from southern fields
- 110 tcf of gas resources, mostly associated
- Issues in relationship between Kurdistan and federal governments
- PSC in Kurdistan, TSC Iraq (rounds 1-4) and profit-sharing (round 5 onwards)

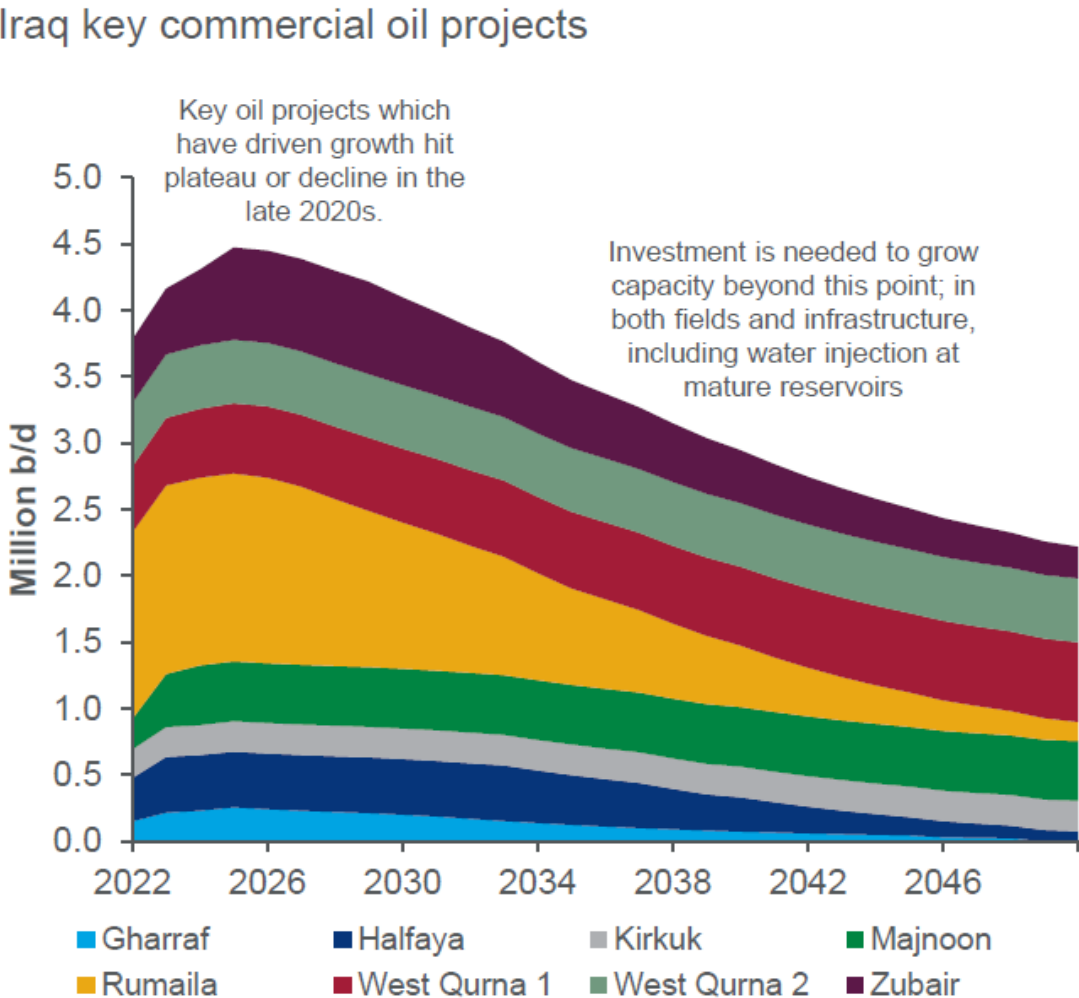
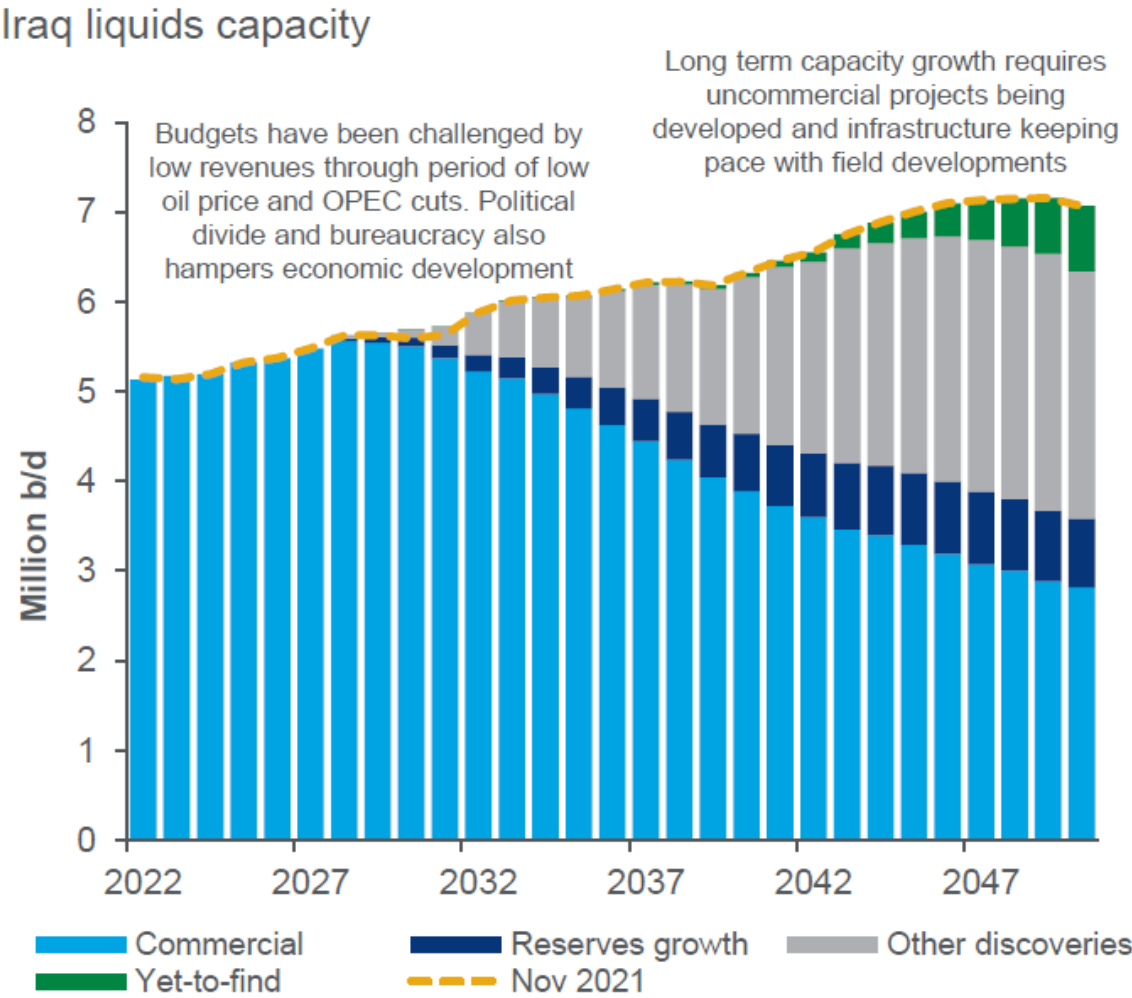
Iraq

Oil and gas fields and infrastructure



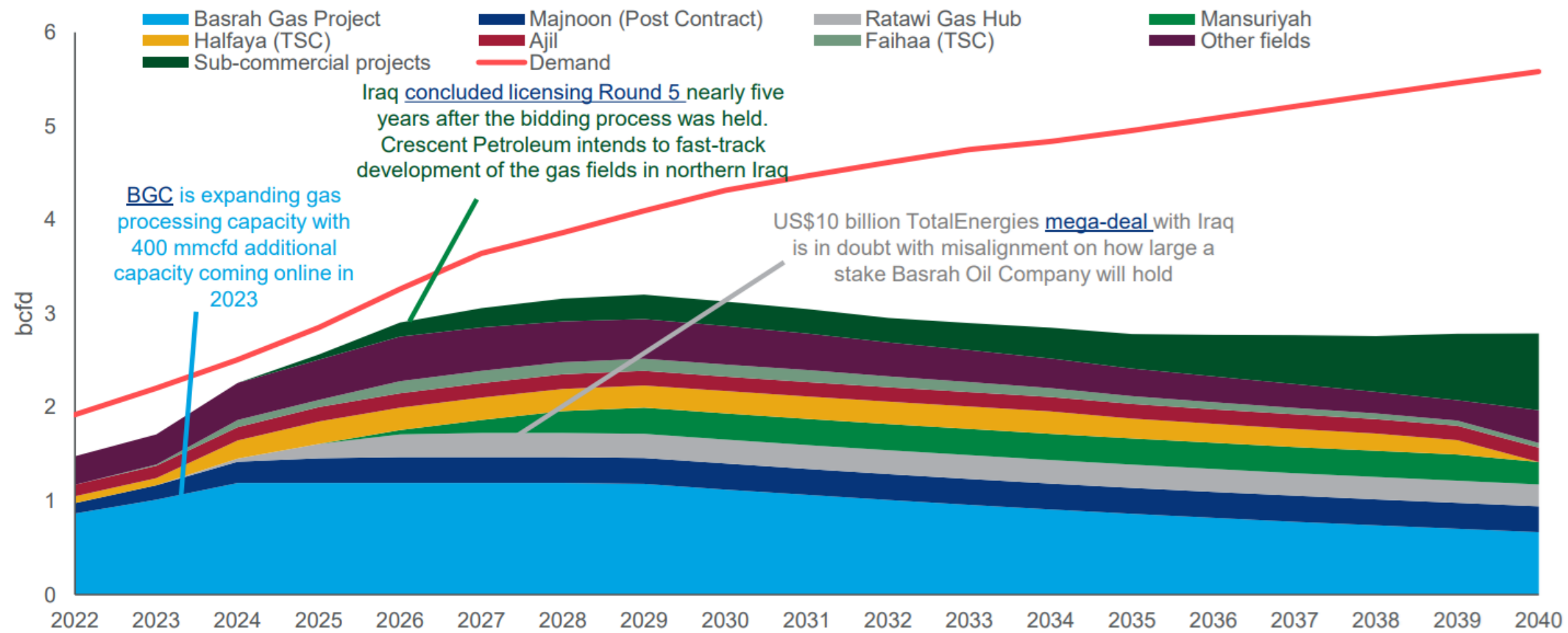
Iraq

Liquids capacity



Iraq

Gas balance



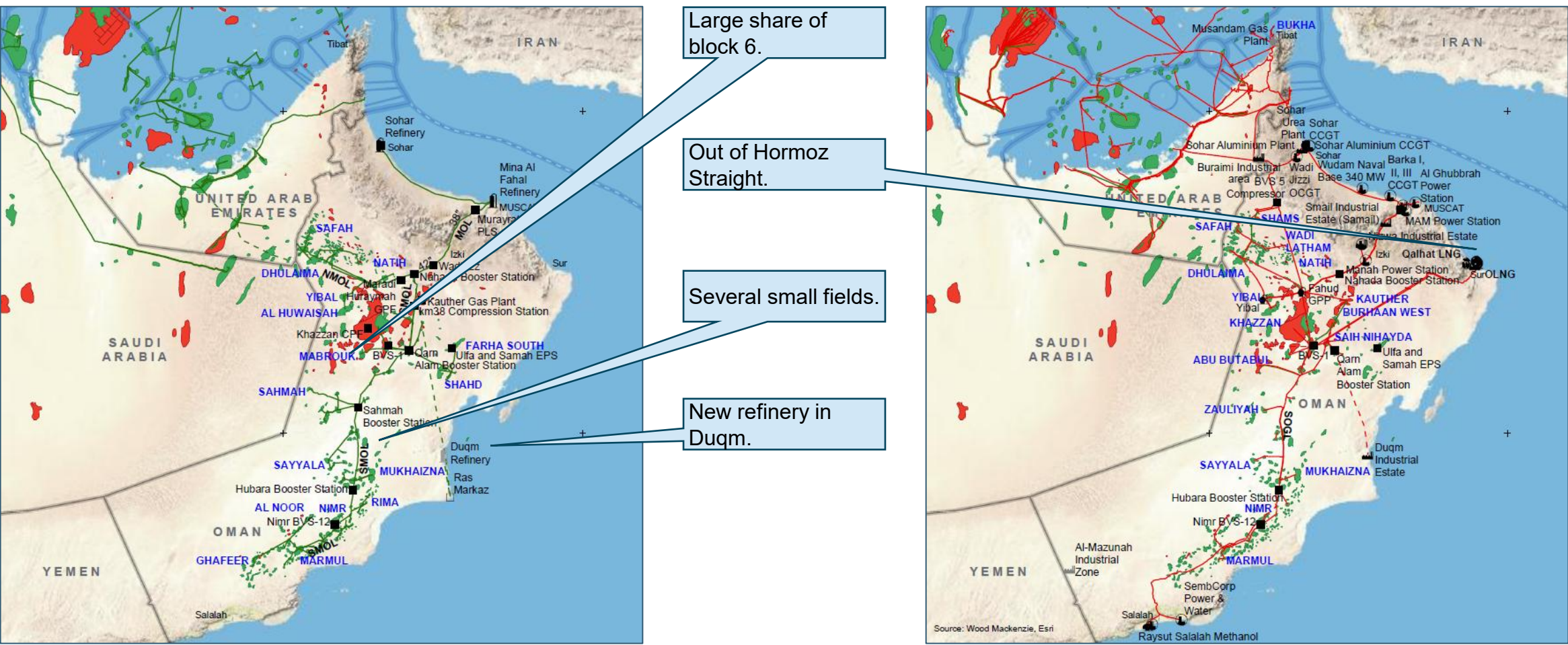
Oman

Overview

- The largest non-OPEC oil producer in the Middle East
- Challenging geology and requirement for EOR technology – steam flood, miscible gas and polymer injection projects
- EDO is formed in 2020 and owned by the government – main owner of PDO
- Presence of Occidental, BP, and smaller global/local E&Ps
- EPSA contracts – Block 6 (PDO) under concession
- Oman Oil has participation right up to 30%

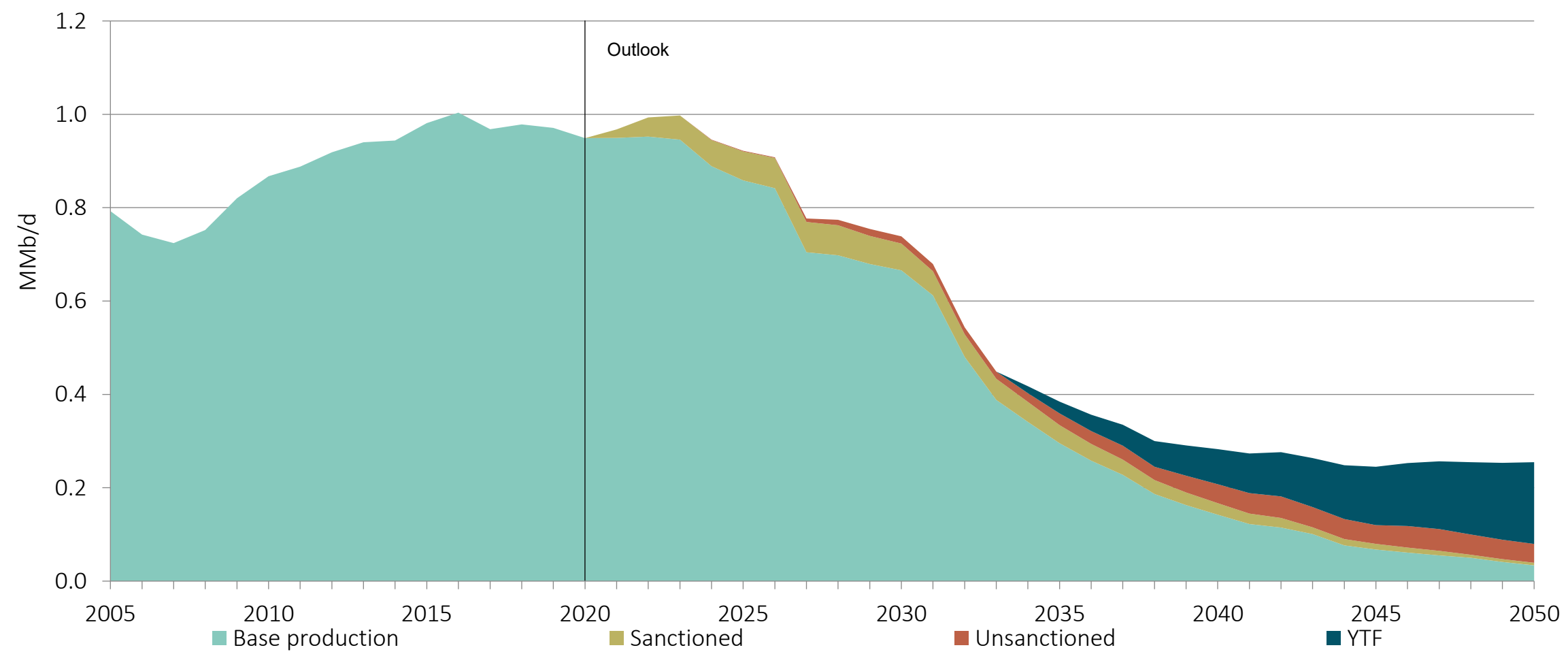
Oman

Oil and gas fields and infrastructure



Oman

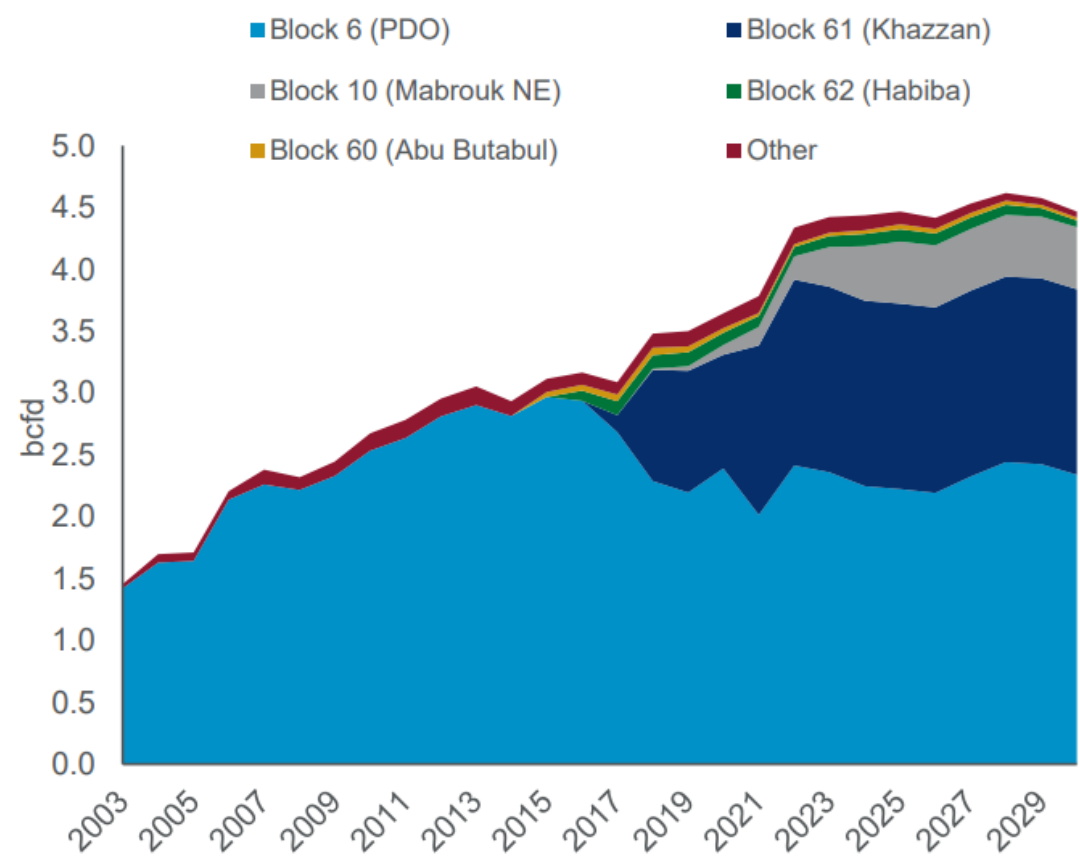
Liquids supply



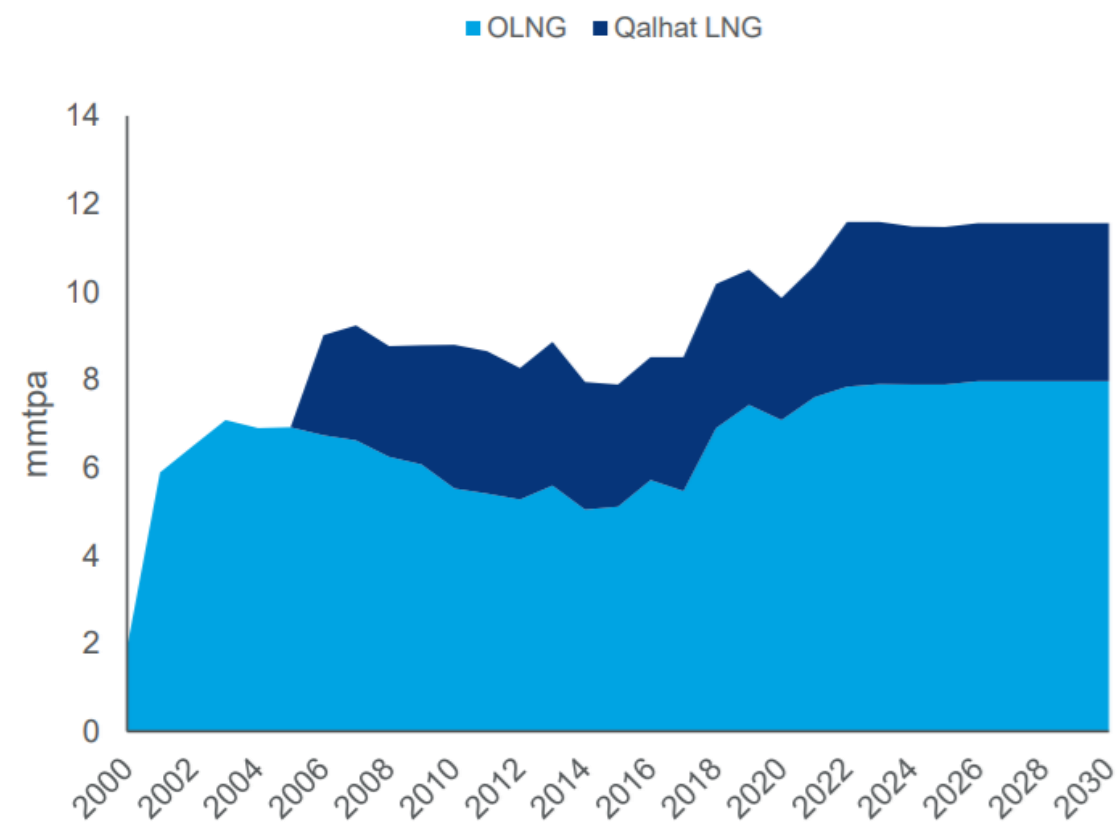
Oman

Gas supply

Gas production by project



LNG exports



Oman

OQ

100% Shareholding Wholly Owned Companies



OQ Refineries and Petroleum Industries Company (OQ RPI)



OQ Base Industries (OQBii)



OQ Alternative Energy (OQ AE)



OQ Trading Limited (OQT)



Majis Industrial Services SAOC



Oman Tank Terminal Company (OTTCO)



Oman Aluminium Rolling Company LLC (OARC)



Sohar Paper Cores LLC (SPC)

Publicly Listed Companies



OQ Exploration & Production (OQEP)
Shareholding 75%



OQ Gas Networks (OQGN)
Shareholding 51%



Abraj Energy Services SAOG
Shareholding 51%



Oman Oil Marketing Company SAOG (OOMCO)
Shareholding 49%



Musandam Power Company SAOG
Shareholding 42%



Muscat Gases Company SAOG
Shareholding 32.6%

Joint Ventures



Dugni Refinery and Petrochemical Industries Company (OQ8)
Shareholding 50%



Sohar Aluminium LLC
Shareholding 40%



Centralised Utilities Company LLC (Marafiq)
Shareholding 51%



Oman India Fertilizer Company SAOG (OMIFCO)
Shareholding 50%



GS EPS
Shareholding 30%



Advirio Oman LLC
Shareholding 25%



Orient Power (Pvt) Ltd (OPC)
Shareholding 42.8%



Saggas
Shareholding 7.5%

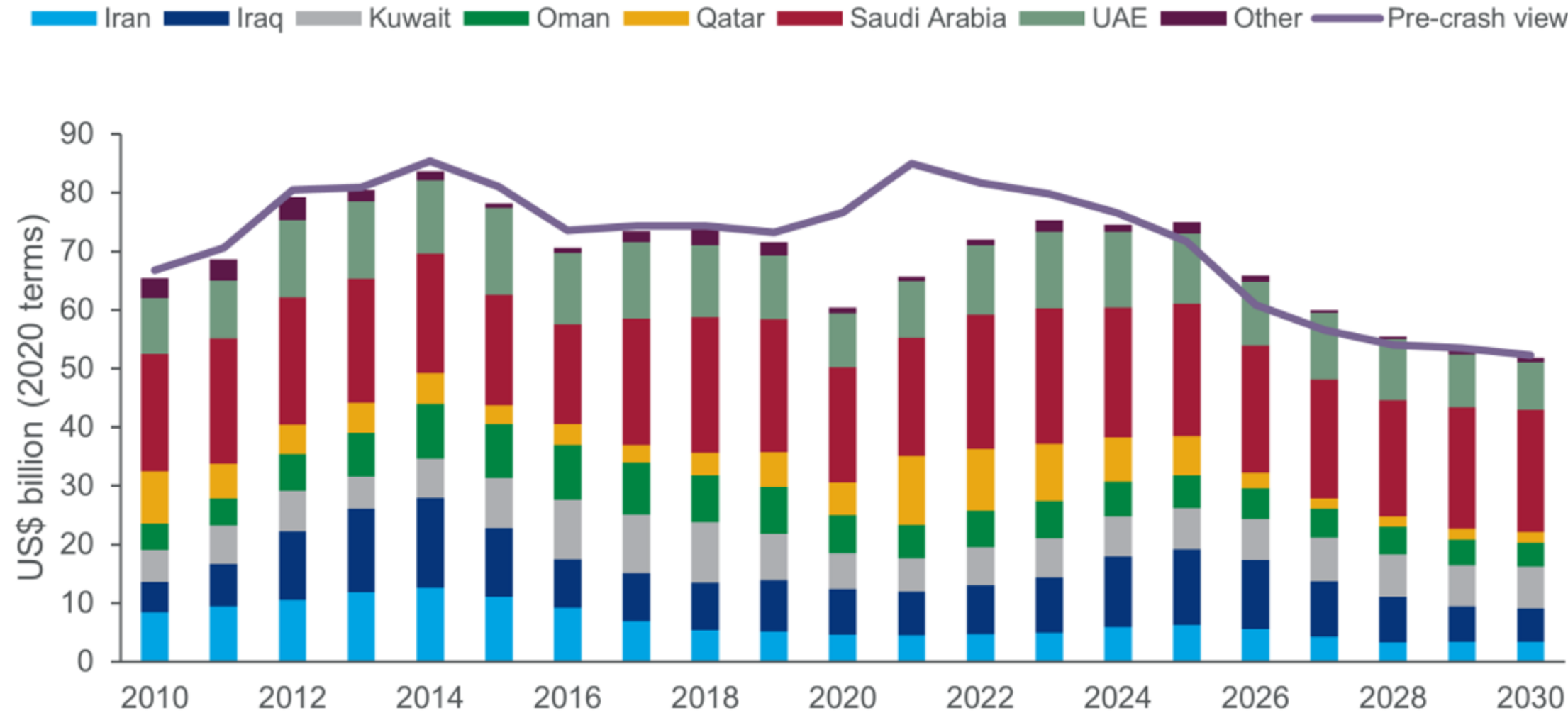


Sohar Sulphur Fertilizers LLC
Shareholding 68.75%



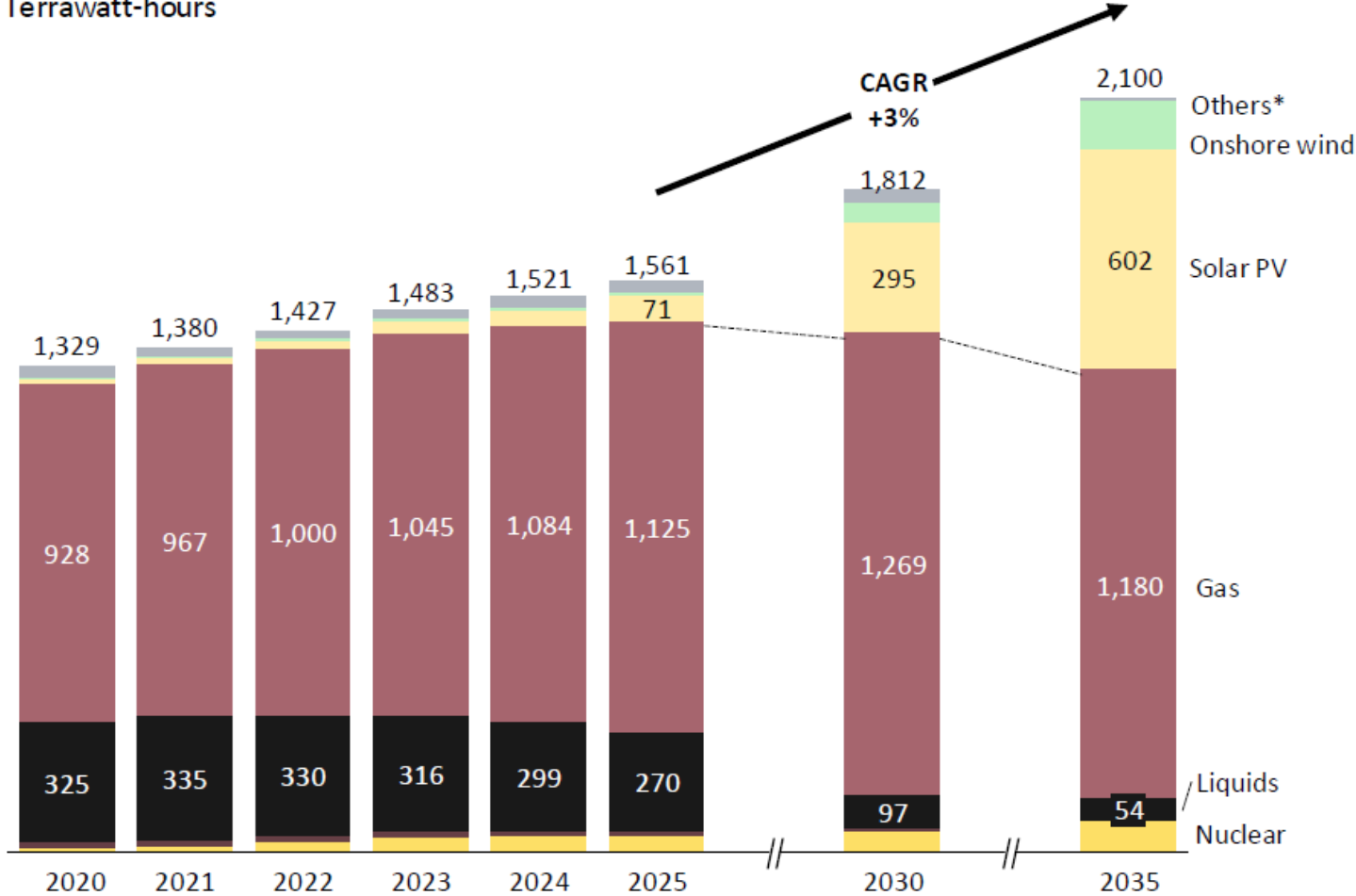
Oman Blending Services LLC
Shareholding 10%

Middle East upstream investment

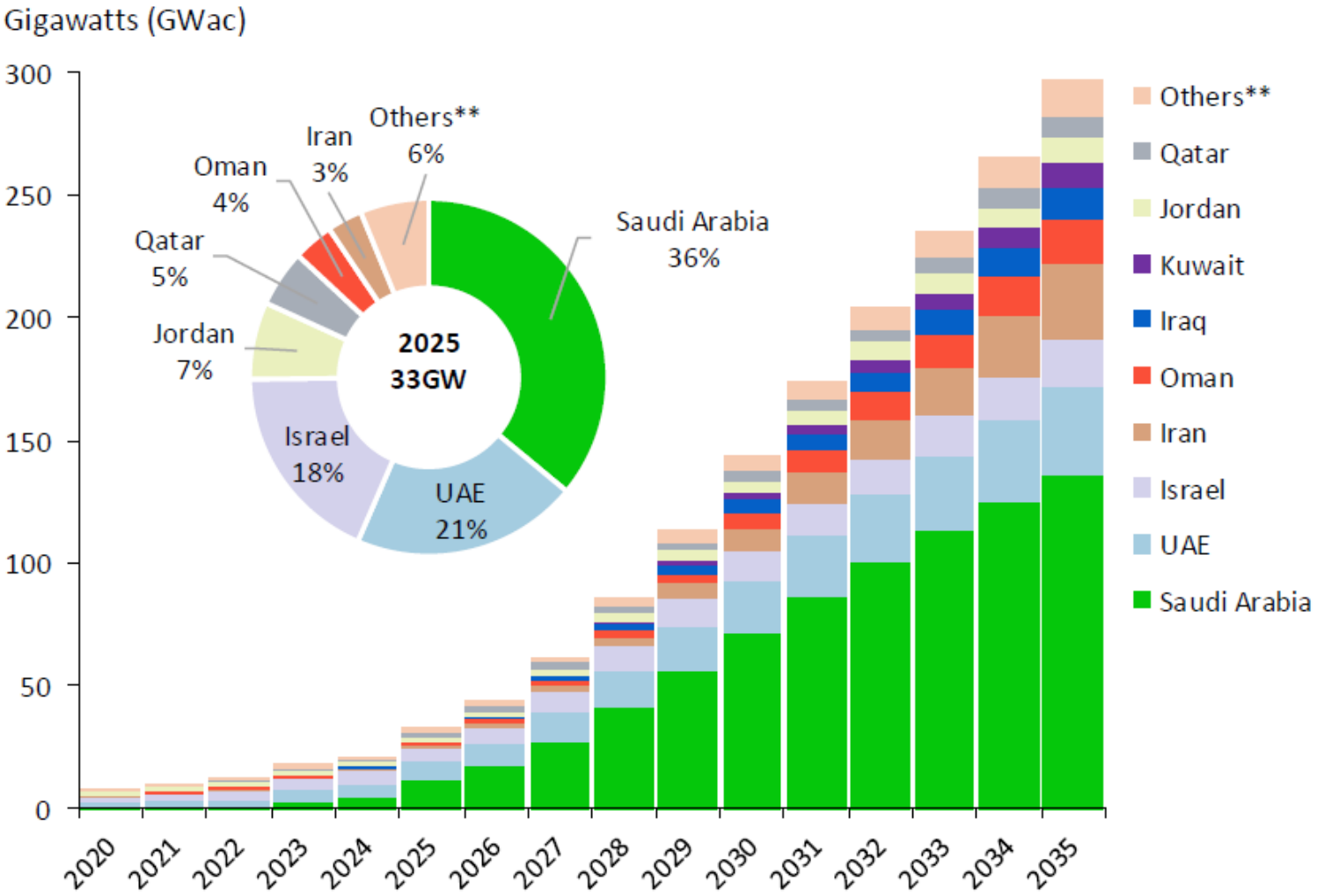


Middle East power mix forecast

Middle East power mix forecast by energy source
Terrawatt-hours



Middle East solar PV installed capacity by country



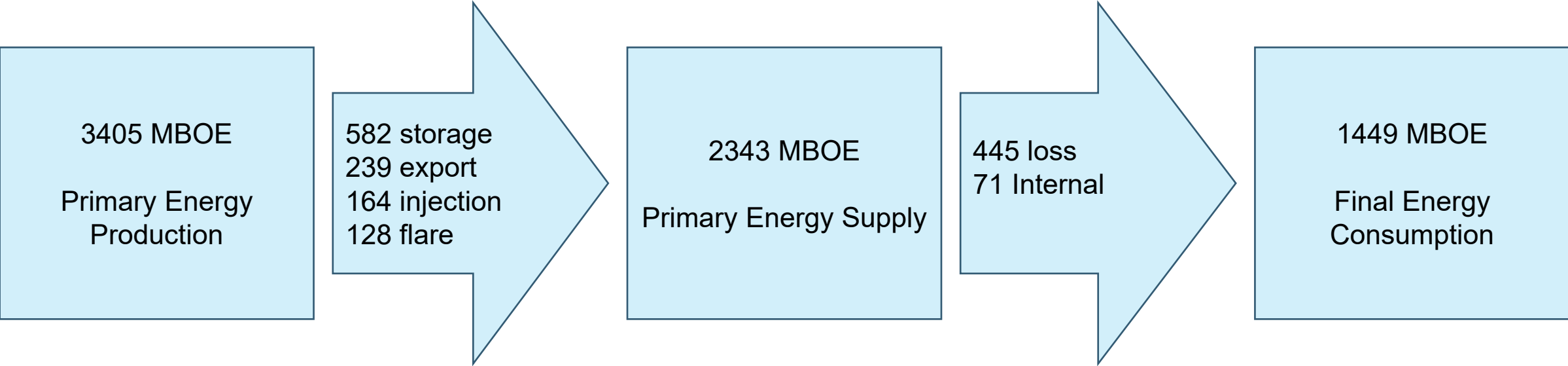
References

- OPEC, Annual Statistical Bulletin
- IHS Markit, Asia Pacific and Middle East crude and condensate production outlook
- Wood Mackenzie, country reports and upstream summaries
- Wood Mackenzie, Macro oils long-term 2021 outlook to 2050
- Aramco, Data book and financial statements
- Rystad Energy
- Companies' websites
- [Argus](#)

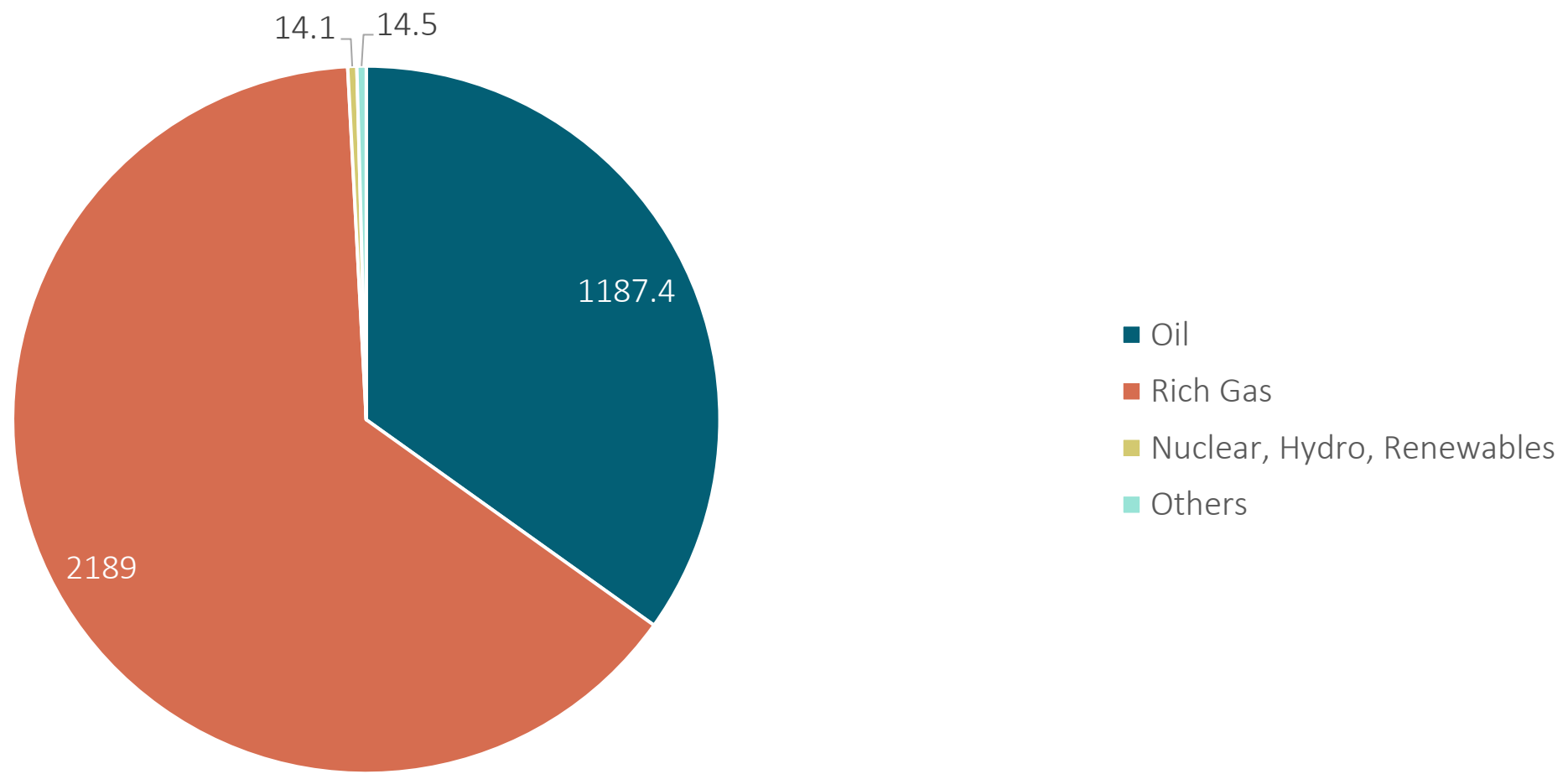
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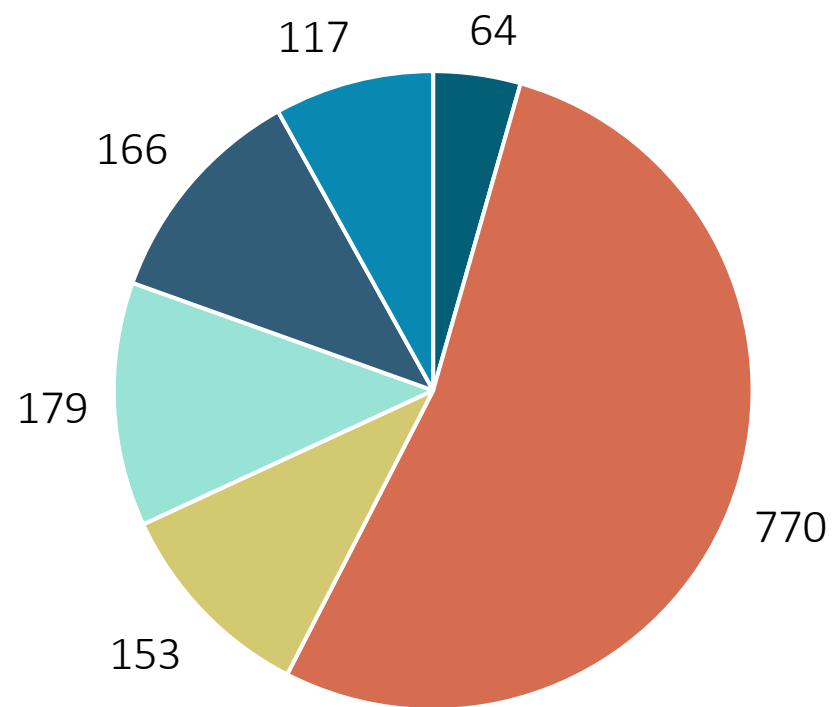
Energy flow summary



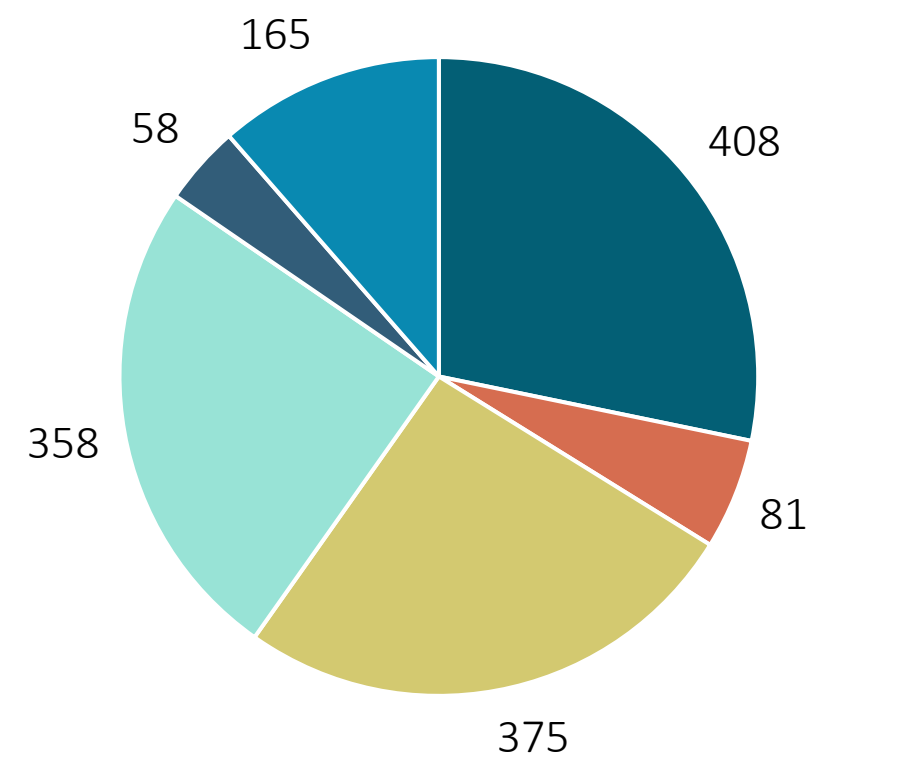
Primary Energy Production (MBOE)



Final Energy Consumption by fuel and sector (MBOE)

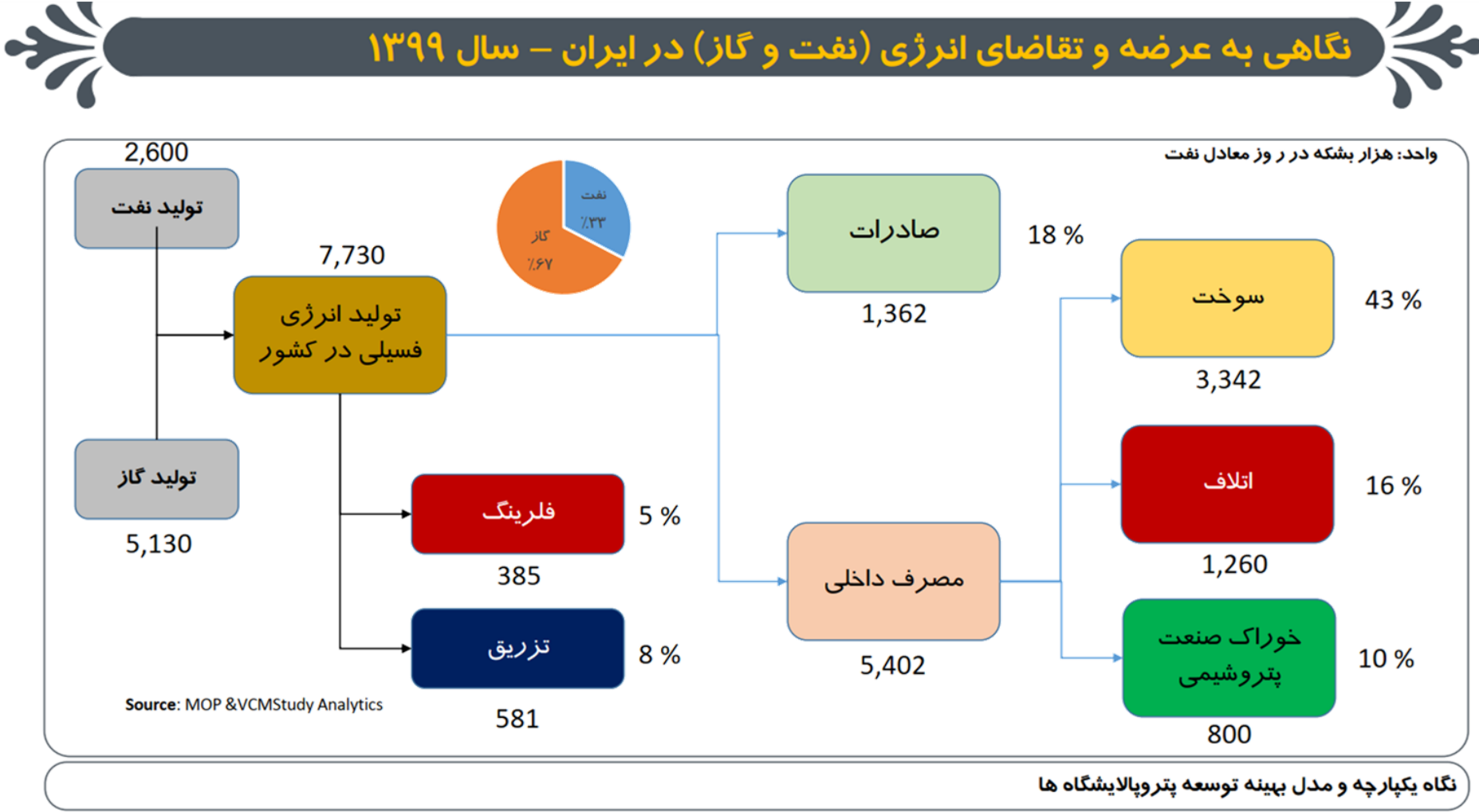


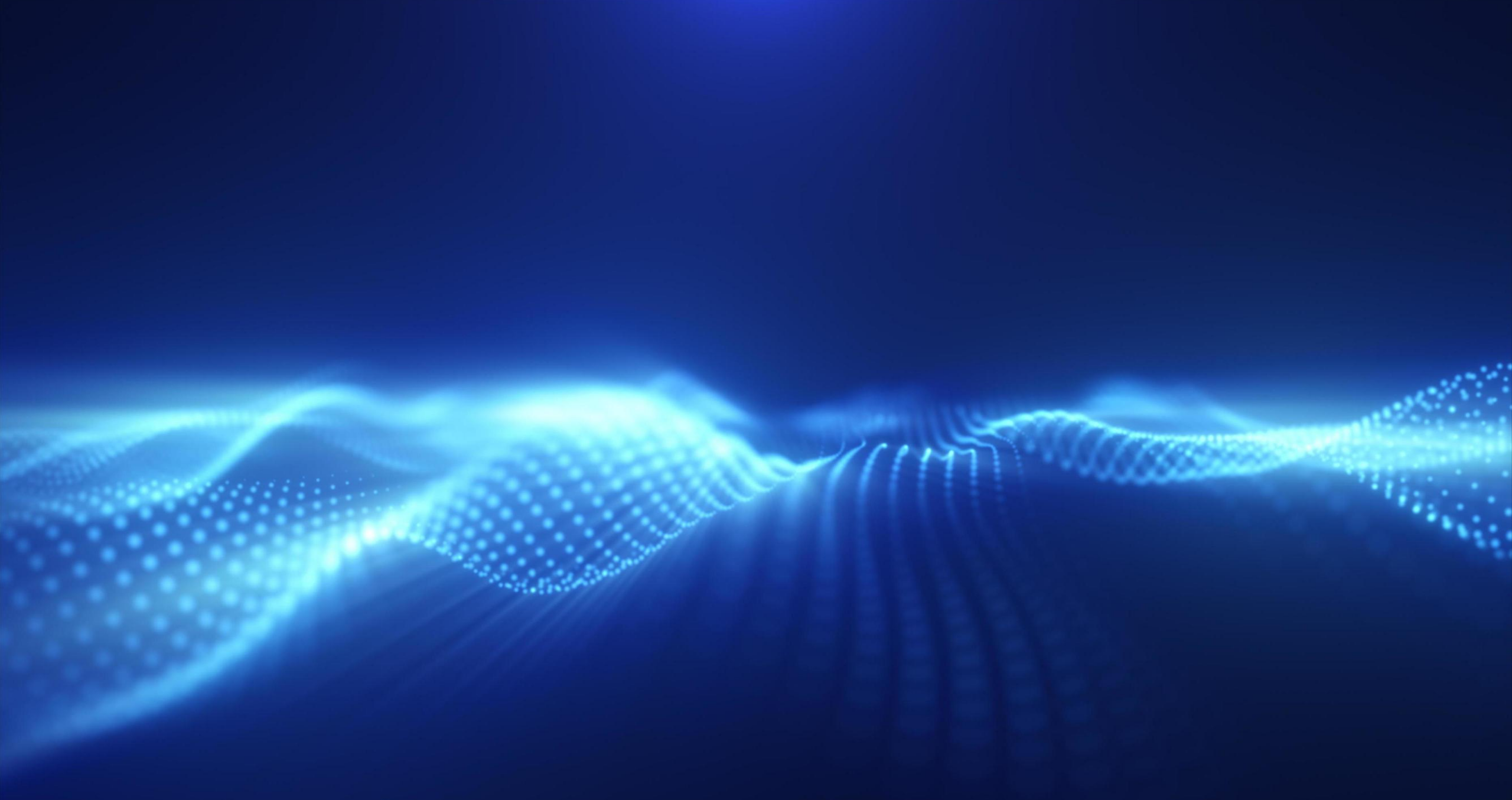
- Condensate & NGL
- Gas
- Power
- Gasoline
- Gasoil
- Others



- Residential
- Commercial
- Industrial
- Transport
- Agriculture
- Petrochemicals Feed

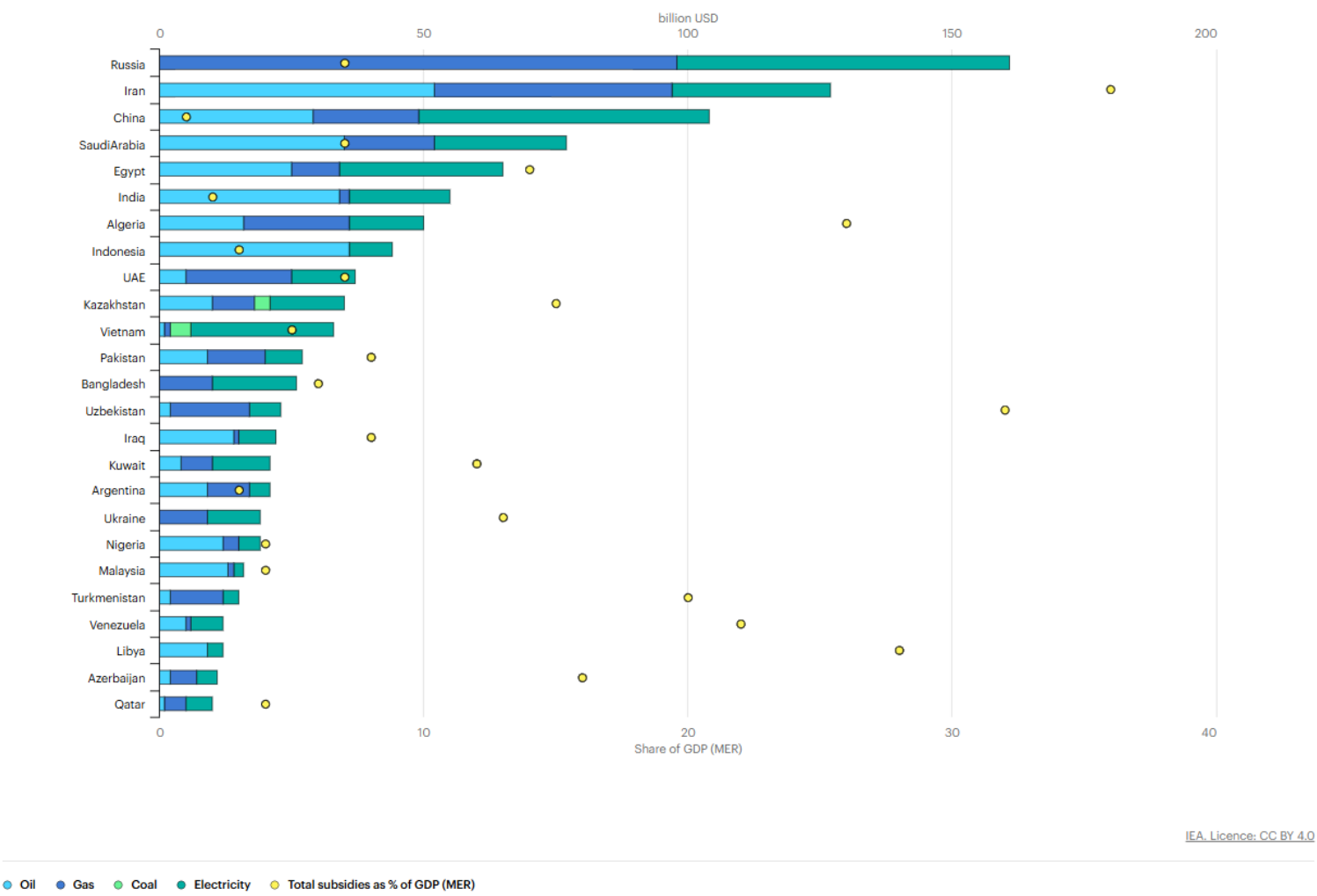
Iran Energy Flow (1399)





What is your opinion about energy subsidies in Iran?

Fossil fuel subsidies



IEA, Licence: CC BY 4.0

References

- IIES, Iran's hydrocarbon balance 1397
- VCM Study
- IEA

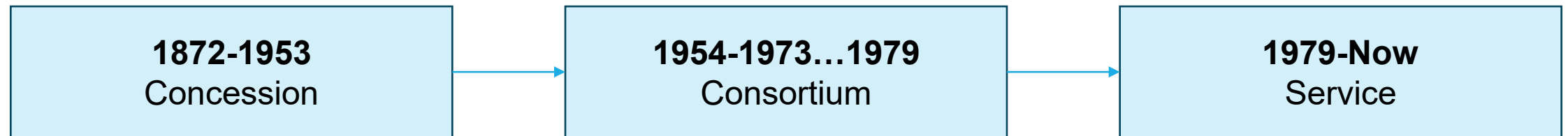
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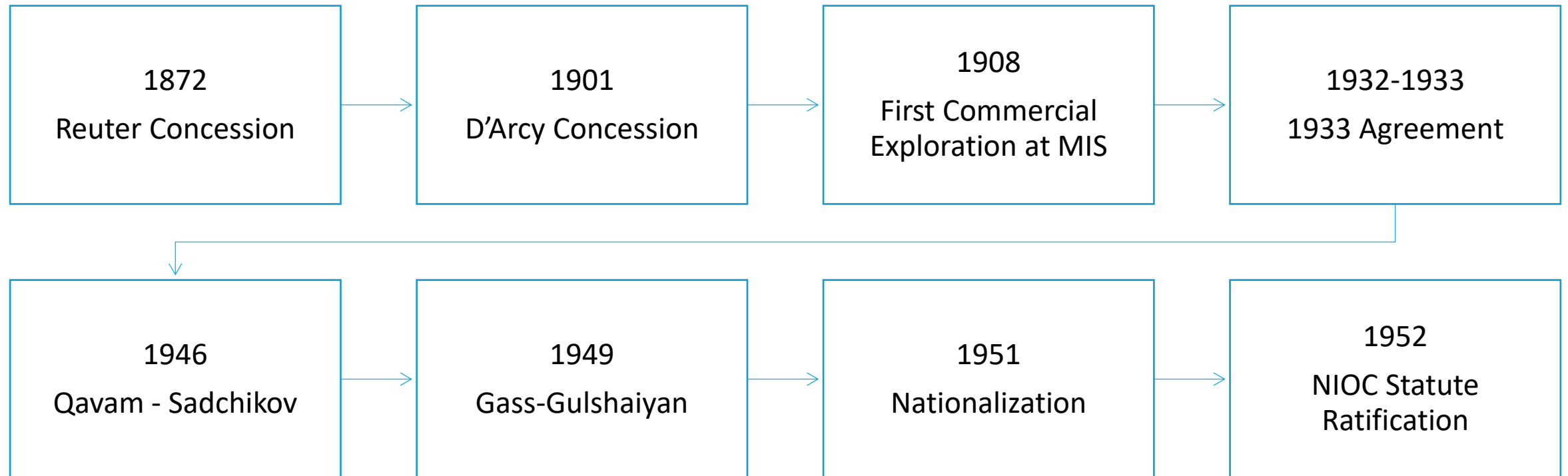
What is your judgment about D'Arcy Concession?



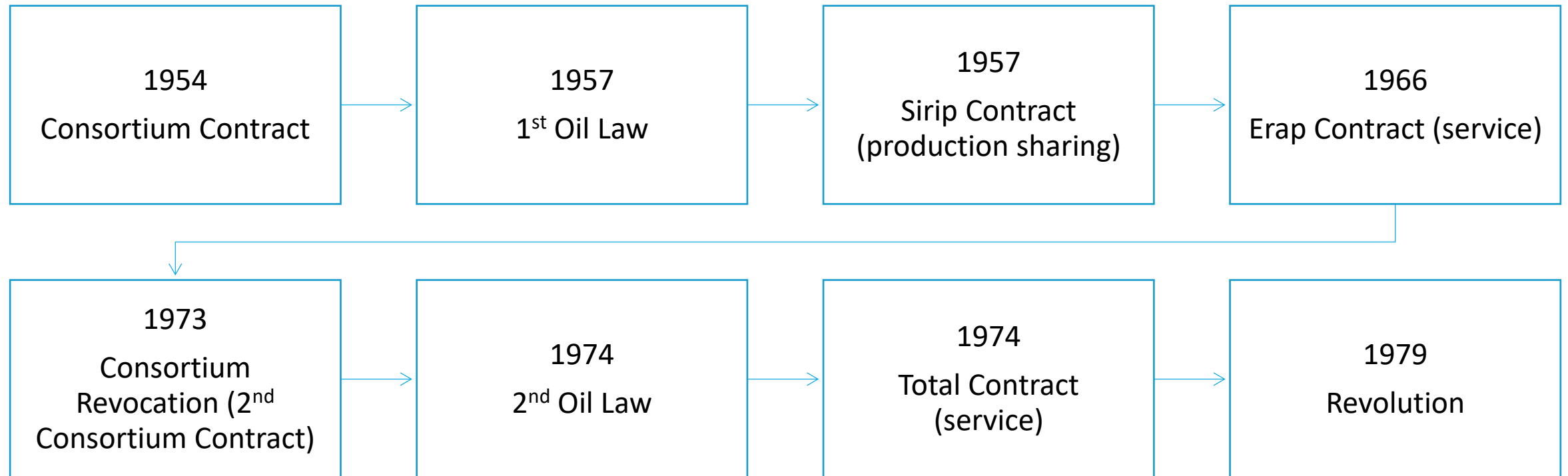
3 periods of oil history



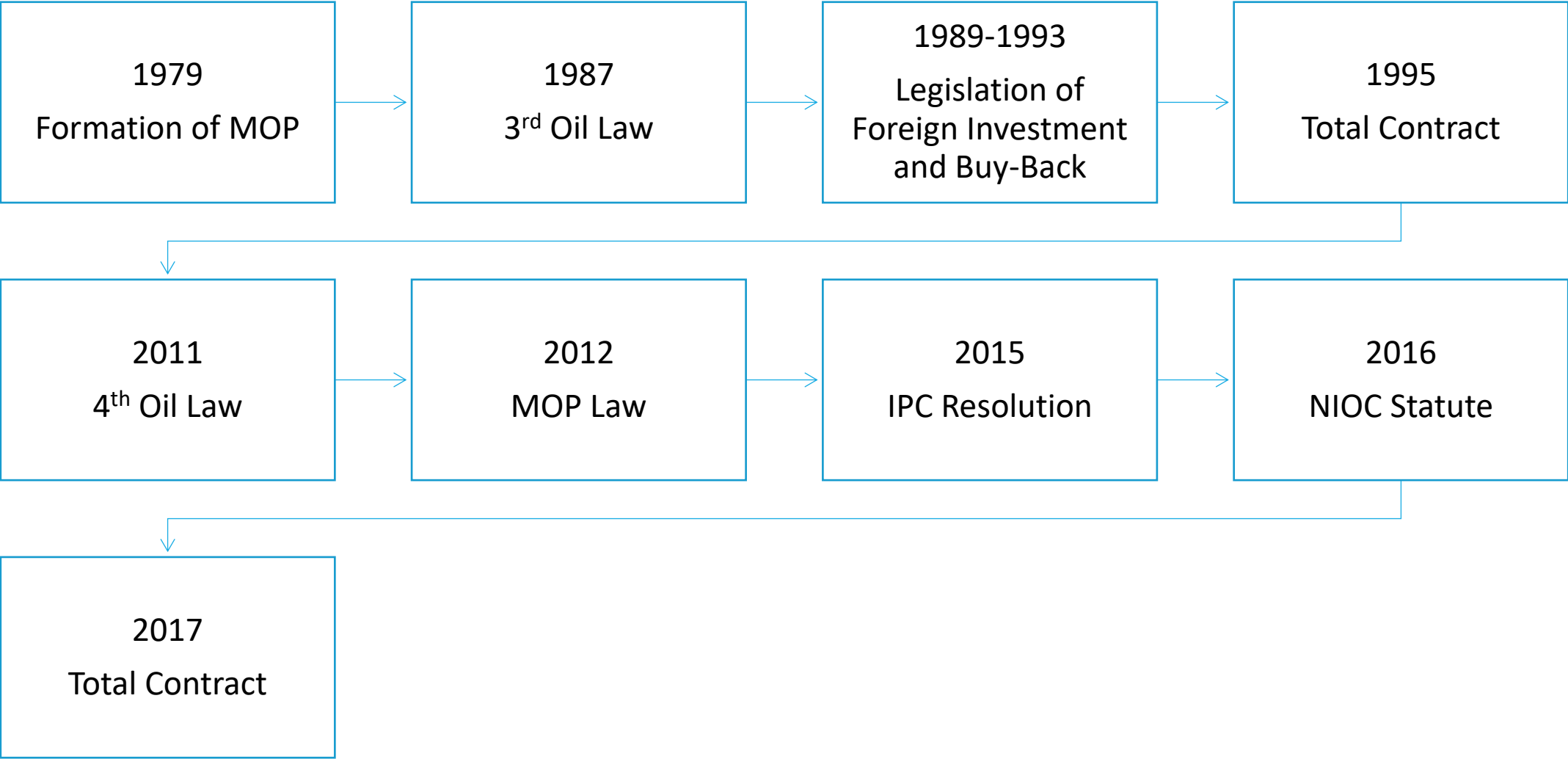
Period 1: Concession



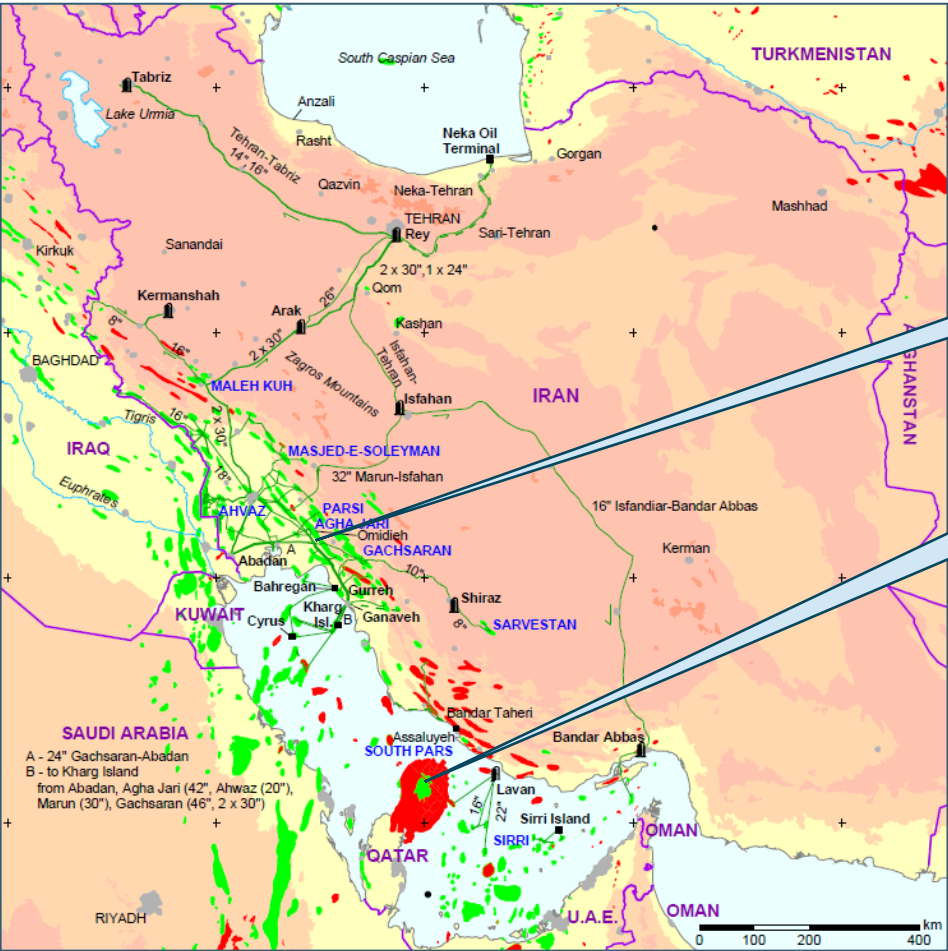
Period 2: Consortium



Period 3: Service



Iran oil and gas infrastructure

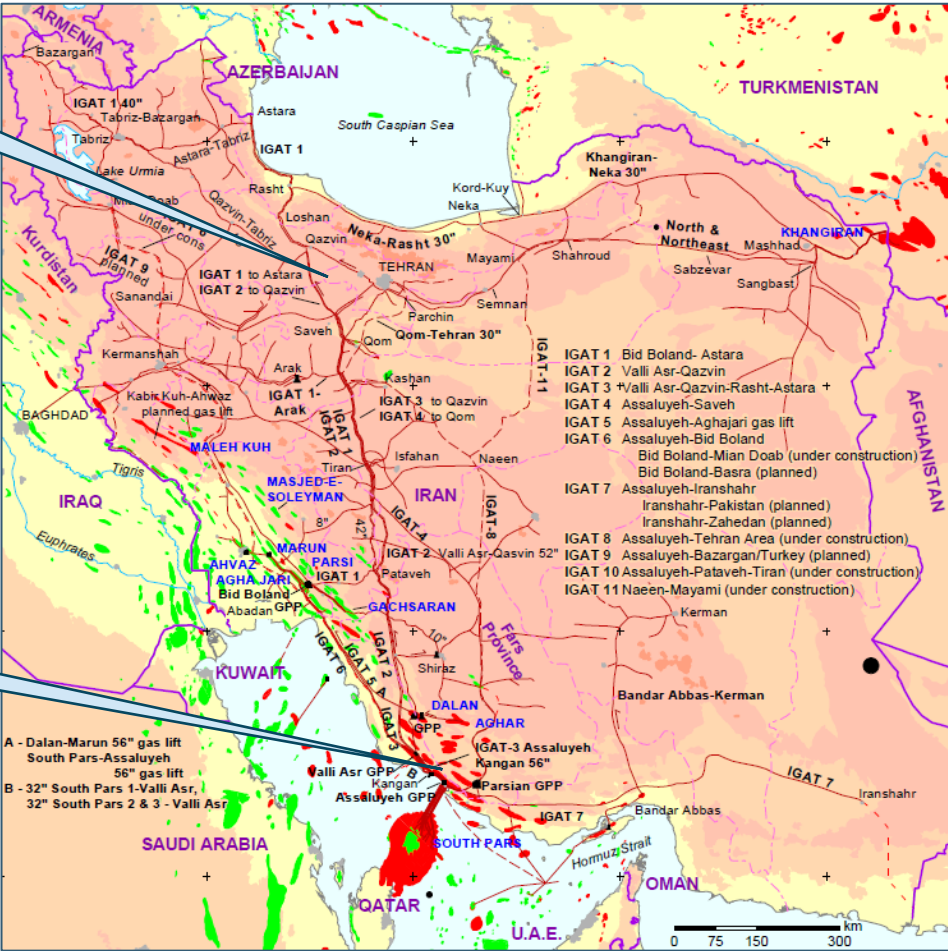


Huge gas network.

Most oilfields in Southwest.

Shared fields with Qatar.

Most gas fields in Fars and Bushehr.



Classification of companies active in Iran's energy sector

Investment

E&P	Chemicals	Refining	Power & Utilities
• NIOC • Dana Energy	• Arya Sasol • Jam	• Tehran • Abadan	• Mahtab Gostar • Mapna

Supply Chain

EPC	OFS	Manufacturing	Consultants
• Jahan Pars • Kayson	• NIDC • NDCO	• OTCC • LulehGostar	• Monenco • TEC

Post JCPOA E&P Players in Iran

European majors	Favoured by NIOC for their technology and know-how 
European mid-caps	Specific expertise can be a plus for specific mid-size projects 
Asians	Political relations and Iran's will to secure market share will help, but technical reputation can disserve some 
Russians	Political relations and part of Moscow's strategy to increase its influence in MENA oil and gas 

Iranian E&P companies

Government

- PetroPars
- PetroGohar
- Tenco
- Petro Iran
- IDRO
- Persia
- Sina

Public

- MAPNA
- OIEC
- Sarvak Azar
- IOEC
- IGC
- Pasargad

100% private

- Ofogh
- Pars Kayhan
- Dana Energy
- Kayson
- Marunkaran-Sealand
- WSI-Arvand
- Axone-Asmari
- Hirbodnirro-KPS

Iran's oil production potential

✓ این اسلایدی از ارائه من در کنگره E&P است که تولید کشورها را طی حدود 60 سال اخیر نشان می‌دهد. از جزئیات، بگذریم و حدود تولید کشورها را در نظر بگیریم.

✓ روزگاری نه چندان دور، ایران همپای عربستان یک تولیدکننده بزرگ بود. اما اکنون ظرفیت تولید ایران حدود یک‌سوم عربستان است.

✓ ظرفیت تولید روسیه با ذخایر دوسوم ایران و آمریکا با ذخایر یک‌سوم ایران، حدود سه‌برابر ایران است.

✓ حتی عراق با حضور غول‌های نفتی، در تولید از ایران پیشی گرفته و سال بعد 5 میلیونی خواهد شد.

✓ تولید ایران با هیچ معیاری متناسب با ذخایر نیست و متأسفانه در نتیجه سال‌ها انحصار داخلی و تحریم خارجی، اکنون به بازیگری هم‌رده کویت و امارات تنزل یافته است. با این تفاوت که آنها صادراتی بیش از ایران دارند.

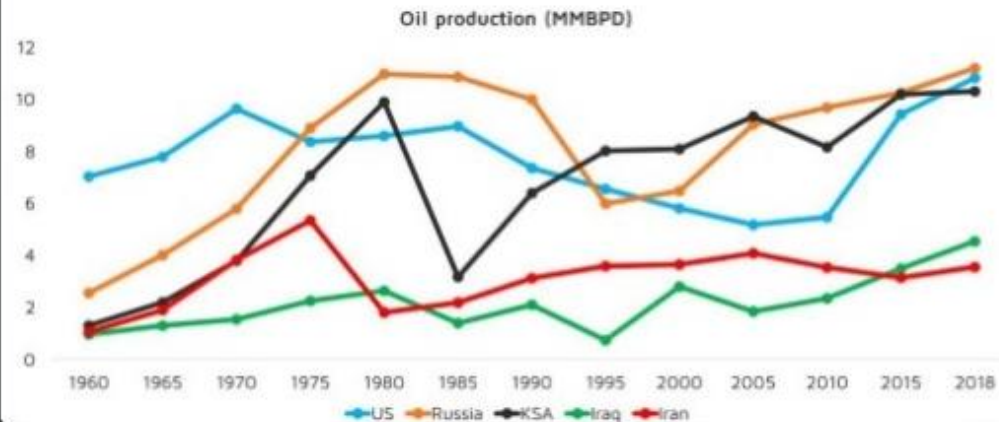


اقتصاد و نفت

2.5K subscribers

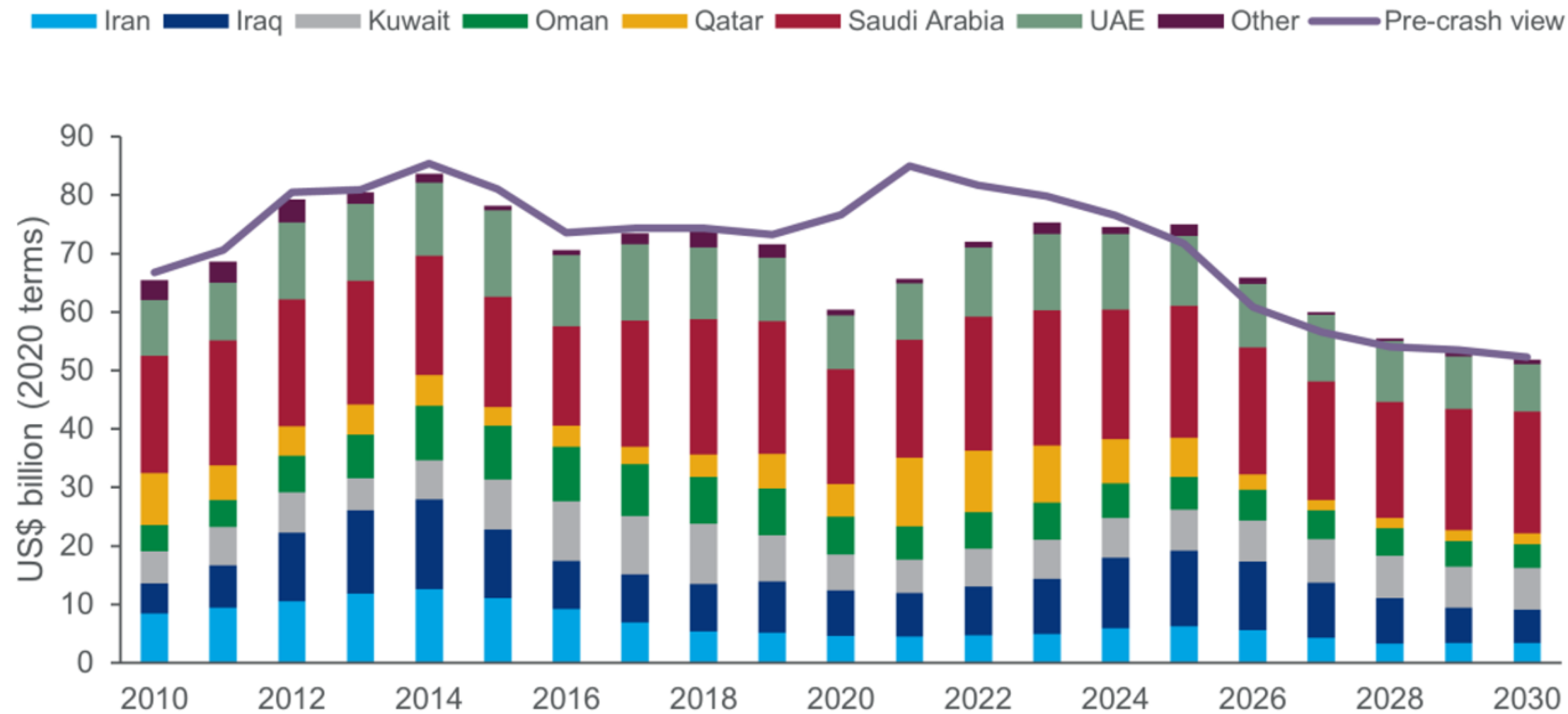
February 25, 2019

Trends in crude oil production

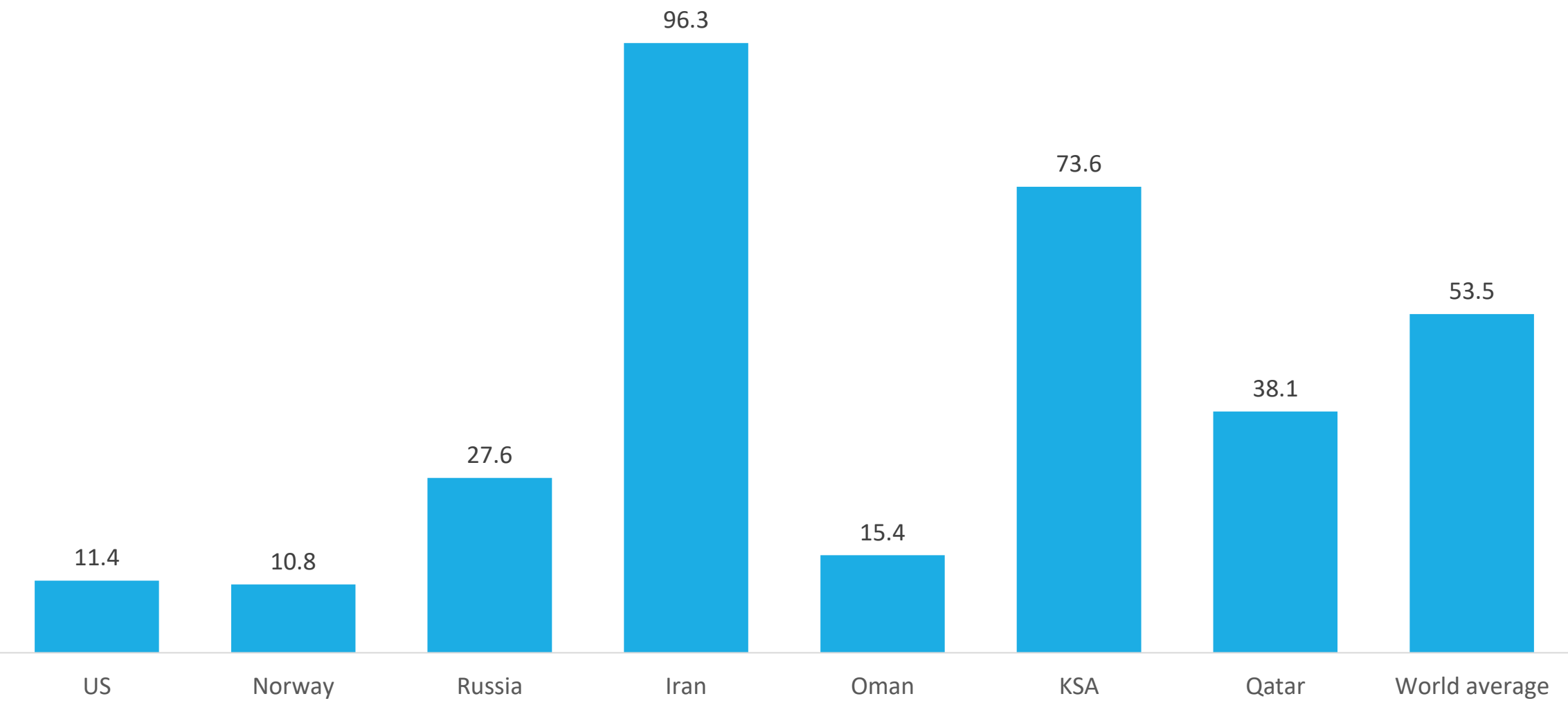


ایران و ظرفیت تولید 8 میلیونی

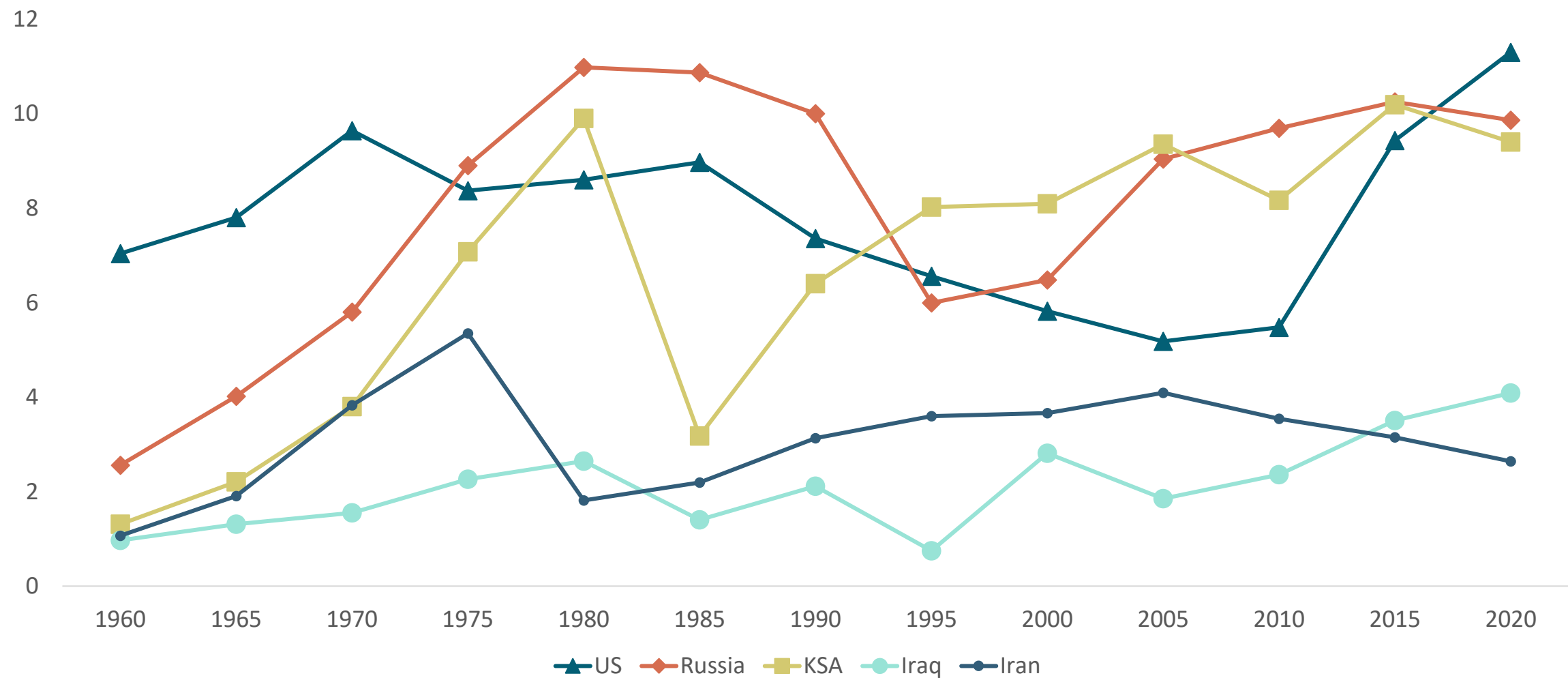
Middle East upstream investment



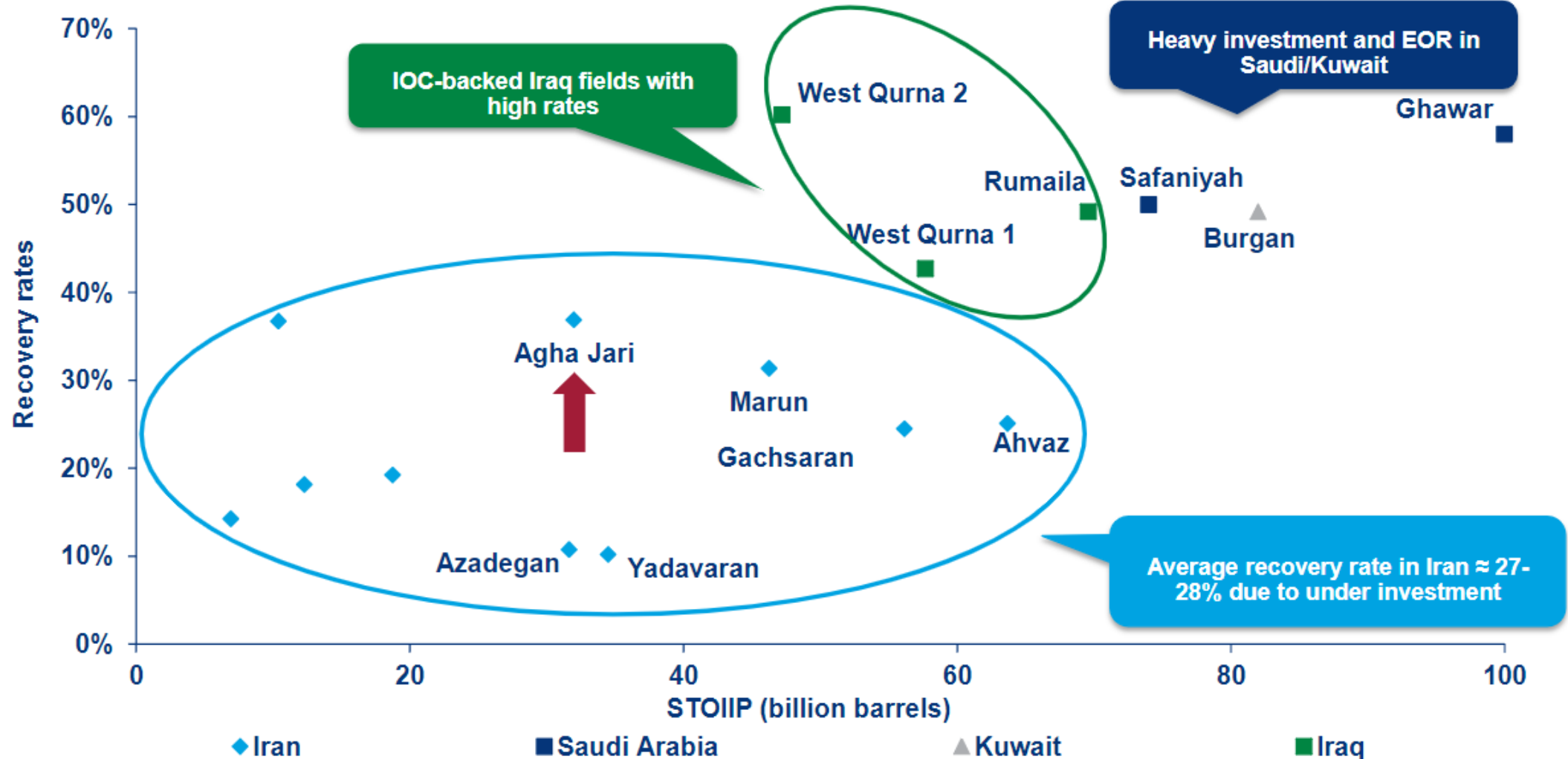
Reserve to production ratio (years)



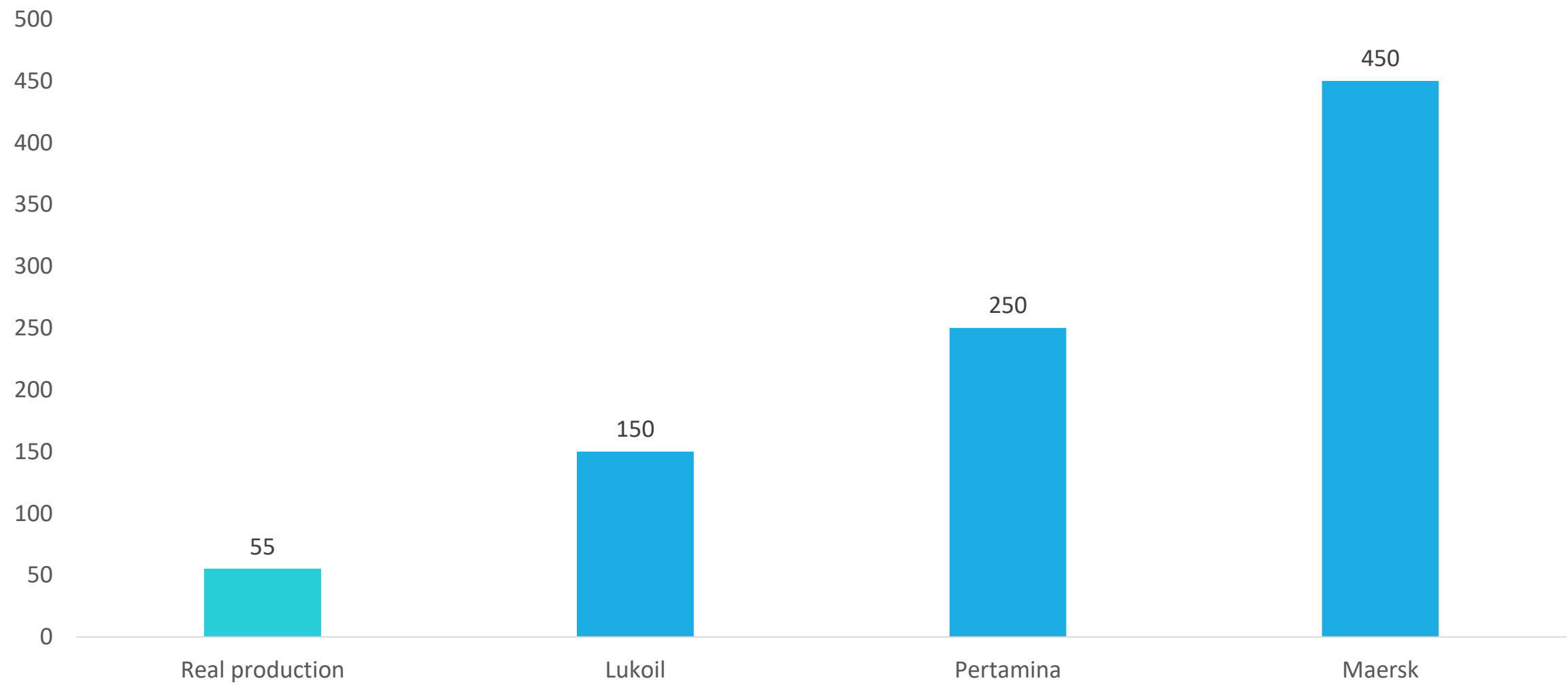
Oil production of Iran and competitors (million barrels per day)



Recovery factor in selected countries



Ab Teymour example (thousand barrels per day)



Iran's oil strategy in January 1973

پیدا خواهد کرد و شرکتهای فعلی در آن ردیف بلندی که بعد خواهد ایستادومشتری نفت ایران خواهد بود بدون هیچ مزایایی مثل دیگری باید بیایندصفبکشند. «کفزدنهای شدید با فریادهای جاوید شاه».

یا اینکه از موقع امضاء قرارداد جدیدی، تمام مسئولیتها و هرچه که امروز در دست ما نیست، تمام برگردد بایران و شرکتهای عامل فعلی مشتری طویل‌المدت ما باشند و ما نفت را به آنها برای مدت طولانی، به قیمت خوب، با تخفیفی که هرکسی به یکمشتری خوبی میدهد خواهیم فروخت و این تنها راه اینست که آن بداند که تا هر موقع که قرارداد طول کشید ۲۰ سال ۲۵ سال نفت به او میرسد در صورتیکه در آن مرحله دیگری را من آنقدر مطمئن نیستم که آن نفتها به همان سادگی بخارج از هر مملکتی صادر بشود.

اگر گازهایی را که لازم هست دومرتبه در جاه برگردانند، بقول اصطلاح فنی «آثرکسیون» بکنند، نکنند، این حفظ منافع مملکت نیست و این کارها در مملکت ما نشده است. راهی که برای ما باقی میماند دو راه است. بخون مردمانی هستیم که با امضاء خودمان که تا سال ۱۹۷۹، یعنی شش سال دیگر کمپانیهای موجود بکار خودشان ادامه بدهند بشرطیکه درآمد هر بشکه نفتی که بما میرسد از درآمد ممالک هم حوزه ما کمتر نباشد. بشرطیکه قدرت صادراتی ایران به هشت میلیون بشکه در روز برسد و اگر فاصله‌ای که حالا تا آن رقم هست برنشود، خود ما خواهیم کرد، و خود ما می-دانیم که با این نفت اضافی چه بکنیم، در ۱۹۷۹ قرارداد خانم

8 MBPD exports (9 MBPD production).

میشود، نمیتواند بدون صوابدید مملکت صاحب ثروت مورد بهره برداری قرار بگیرد، یعنی هیچ کمپانی نمیتواند بگوید که من میخواهم مثلا از نفت سالی اینقدر استخراج بکنم، مثلا یک استخراج معقولانه‌ای که بگوئیم، فقط محض خاطر ذکر یک رقمی، یک میلیون بشکه، معقولانه باشد به نسبت ذخائر اگر آن کمپانی بگوید من دویست هزار بشکه بیشتر برنمیدارم یا اینکه بعکس بگوید من دو میلیون بشکه برنمیدارم، این حق را باو نداده است. «کف زدنه‌های شدید و بی‌دری».

صنعت نفت، صنعت پیچیده‌ایست. یکجایی را اگر بیش از مقدار معینی استخراج بکنید، درواقع آن‌جا را شما میکشید. اگر باز یافت مجدد، چون حرف فنی است، اصطلاح انگلیسی آنرا میگویم: "secondary recovery" «باز یافتی مجدد» یا «دوم» نکنند، این حفظ منافع آن مملکت نیست.

به بهترین وجهی حفظ خواهند کرد. مادلانی داریم که اینکار نشده است. در قرارداد ۵۴ سه دوره تعدید پنجساله در نظر گرفته بوده‌اند که ضمنا شرط شده بود که منافع ایران حفظ بشود. ما دلائل کافی داریم که مطابق حتی همین قرارداد ۵۴ قرارداد نفت خود را با کنسرسیون در سال ۱۹۷۹ دیگر به هیچ وجه تعدید نکنیم «کف‌زدن های شدید و فریادهای جاویدشاه که دقیقی بطول انجامید» البته میدانید که حقوق حاکمیت هر مملکتی با اجازه میدهد که بر ثروت طبیعی خود نظارت کامل داشته باشد و اصول منشور ملل متحد و قطعنامه‌های بخصوصی در این مورد تصریح دارد که فقط ثروت هر مملکتی، زیرزمینی و روی زمینی هر مملکت، مال اوست، ولی حتی قرارداد هائی که با کمپانیهای خارجی برای بهره‌برداری و استخراج بسته

R/P ratio is key.

IOR/EOR deployment.

آینده نفت ایران

و اما گفتیم به آتی فکر میکنیم. ملت ایران را در جریان وقایعی که برای ما اهمیت دارد باید بگذاریم برای اینکه یک قسمت از کارهای ما، آینده ما، پیشرفت‌های ما منوط بدین است. مدتها است. ما در موضوع نفت با شرکتهای عامل یعنی کنسرسیون نفتی که در ایران کار میکند، چون شاید پنج شش شرکت دیگری هم هست که با ما کار میکند، ولی البته آنها در یک محدوده بسیار کوچکتری هستند، مشغول مذاکره بوده‌ایم. مذاکرات نه قطع شده است و نه بجائی رسیده است. اینست که امروز بدون ورود در جزئیات خطوط کلی آنرا باید برای شما بگویم. موقعیکه در ۱۹۵۴ ما قرارداد نفتی را امضاء کرده‌ایم که شاید در آنروز بیشتر از اینهم نمیتوانستیم بدست بیاوریم، یکی از مواد قرارداد این بود که شرکتهای عامل، منافع ایران را

References

- Wood Mackenzie reports
- Ettelaat Newspaper
- MOP, list of E&P companies
- Economics and Oil Telegram Channel
- [Masoud Derakhshan, Desired Properties in Oil Contracts: Economic and Historical Approach in the Performance of Iranian Oil Contracts](#)

“The Stone Age did not end for lack of stone, and the Oil Age will end long before the world runs out of oil.”

Sheikh Zaki Yamani

