Energy Strategy Master Class

Ramin Forouzandeh | Feb 23-24, 2022

PetroView

موسسه مطالعات انرژی سبحان

References

Global References

Institutions	PRA / News / Consultancy	Data Tech	Management Consulting	Financial Services
IEA	S&P Global Platts	Refinitiv	McKinsey	EY
EIA	Argus	Vortexa	BCG	Deloittte
OPEC	IHS Markit	Kpler	Bain	KPMG
GECF	FGE			PWC
OIES	Wood Mackenzie			
IRENA	Rystad Energy			
	ICIS			
	Energy Intelligence			

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 Agency's successful "open door" policy allowed the IEA to deepen its collaboration with eight new countries through the Association progamme: Brazil, China, India, Indonesia, Morocco, Thailand, Singapore, and South Africa. The IEA family now represents about 75% of global energy consumption, up from 40% in 2015.

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 to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment.

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, Angola, Congo, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, United Arab Emirates, and Venezuela.

Gas Exporting Countries Forum

- The origins of the Gas Exporting Countries Forum (GECF) can be traced to the First Meeting of Ministers held in Tehran, Islamic Republic of Iran, on May 19-20, 2001. This 1st 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.

- With the current number of members, the GECF has a strong position on global energy markets and among international energy organizations. Together, the coalition represents 71% of the world proven natural gas reserves, 43% its marketed production, 58% of LNG exports and 52% of pipeline trade of the source across the globe.

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.

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 on 26 January 2009. This was a milestone for renewable energy and a clear sign that the global energy paradigm was changing, due to the accelerating commitment from governments.
- 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.

Platts

S&P Global
Platts

- 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 our 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.

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.
- Argus is an independent media organization with over 1,100 staff. It is headquartered in London and has 26 offices in the world's principal commodity trading and production centers.
- Argus produces price assessments and analysis of international energy and other commodity markets, and offers bespoke consulting services and industry-leading conferences. Companies in 140 countries around the world use Argus data to index physical trade and as benchmarks in financial derivative markets as well as for analysis and planning purposes.

IHS Markit

- In 1959 Information Handling Services was founded 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. Our global information expertise spans numerous industries, including leading positions in finance, energy and transportation.
- IHS Markit partners with hundreds of leading solution providers to deliver information and insight to customers throughout global financial, resources, transportation and other sectors. Our customers benefit as we develop complementary products and services that are backed by our combined reputations for excellence.

FGE

- FGE was incorporated as Fesharaki Associates Consulting & Technical Services (FACTS) in 1983 by Dr. Fereidun Fesharaki. 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 market.

- 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. In addition, its extensive industry contacts and convening power through flagship conferences and briefings further support its client base.

- FGE is a preeminent global energy consultancy that provides leading independent research, analysis, consultation and advisory services on the oil, gas/LNG and NGLs markets to a large a diverse client base across the world. Furthermore, FGE distinguishes itself through its ability to provide transparency to often opaque markets.

Wood Mackenzie

- Wood Mackenzie was founded in 1923 as a small, relatively unknown, Edinburgh-based stockbroker. By the 1970s, we had become one of the top three stockbrokers in the UK, renowned for the quality of its equity research. In 1973, our equity analysts published the first oil report, and since then we have gone on to build out our global research and consultancy business alongside the needs of our customers.

- As a global research and consultancy business, we partner with organizations and governments to inspire better decision making. For nearly 50 years, Wood Mackenzie has been providing quality data, analytics, and insights used to power the natural resources industry.

- With dedicated oil, gas & LNG, power & renewables, chemicals, and metals & mining sector teams located around the world, we place intelligence at the heart of changing markets. And our quality research and consultancy are trusted to provide our customers with first-mover advantage.

- In 2015, we were acquired by Verisk, making us part of a global powerhouse in analytics solutions.

Rystad Energy

- Jarand Rystad founded Rystad Energy in 2004 and has, since its inception, managed the company. We are 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.
- Our high-end capabilities within energy fundamentals, oil and gas markets, supply chains, renewables and energy transition strengthen the insight and expertise of our clients, thereby assuring quality decisions.
- We continuously collect and combine data from thousands of available sources and use these to build up, adjust, and calibrate our own outside-in perspective on the industry. Our main sources are governmental databases and archives, company presentations, professional and scientific reports, media as well as user feedback. We aim for multiple sources for each datapoint. Proprietary rules and calibration are used to fill and forecast data.

ICIS

- ICIS – Independent Commodity Intelligence Services – connects data, markets and customers to create a comprehensive trusted view of global commodities markets, enabling smarter business decisions that help optimize the world's resources. For decades, our prices have been the backbone of thousands of transactions around the world.

- At ICIS, we help businesses across the chemical and energy markets strategic decisions, mitigate risk and capitalize on new opportunities. A trusted source and benchmark for price information and insight across key commodities markets worldwide, our independent, transparent market intelligence informs thousands of quality decisions every day- taking the pressure out of negotiations and giving customers space for more innovative thinking.

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.

- Energy Intelligence is the leading energy information company. We understand what it takes to bring energy to the world, and have delivered objective reporting and analysis on the sector for over 70 years. Our long history, combined with our team of experts and extensive connections, gives us an unparalleled view on what's shaping the energy sector. Whether you specialize in the energy transition, oil markets, LNG, geopolitical risk or competitive intelligence, we tailor our news, analysis, research and data to fit your business – we call this tailored intelligence.

Refinitiv

REFINITIV

- Refinitiv, an LSEG (London Stock Exchange Group) business, is one of the world's largest providers of financial markets data and infrastructure. With $6.25 billion in revenue, over 40,000 customers and 400,000 end users across 190 countries, Refinitiv is powering participants across the global financial marketplace.
- We provide information, insights, and technology that enable customers to execute critical investing, trading and risk decisions with confidence. By combining a unique open platform with best-in-class data and expertise, we connect people to choice and opportunity – driving performance, innovation and growth for our customers and partners.

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.
- Technology breakthroughs such as reusable rocket launching, lower-cost satellites, cloud-scale computational power and a step-change in machine learning modelling, has provided us with a vast amount of new information about the state and flow of energy on Earth.

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, we have expanded our portfolio of solutions to more than 40 types of commodities and to new segments of the commodity value chain, while offering our users multiple ways to access and visualize our data.

- Today, Kpler is the biggest commodity data platform available across the industry. Kpler is a success story. We have grown from a start-up to a global group of 150 people, serving more than 600 accounts in 65 countries.

Big Three

Big Four

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Sobhan

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GPTT

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SolutiEn

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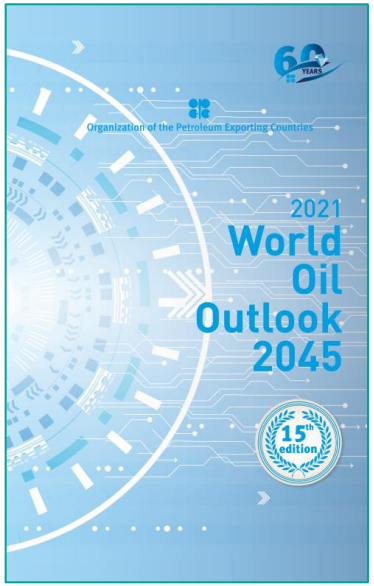
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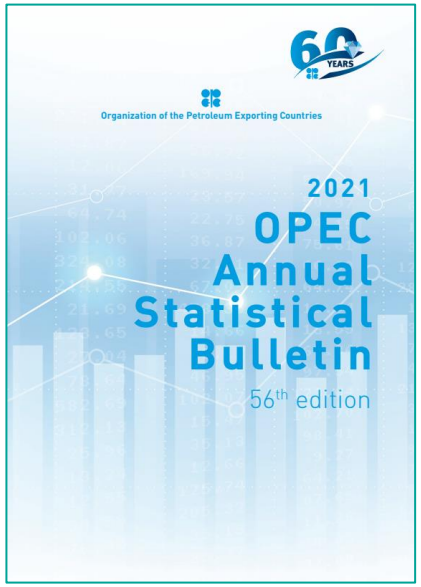
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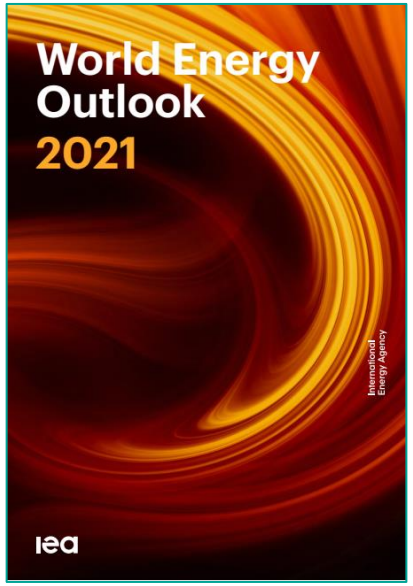
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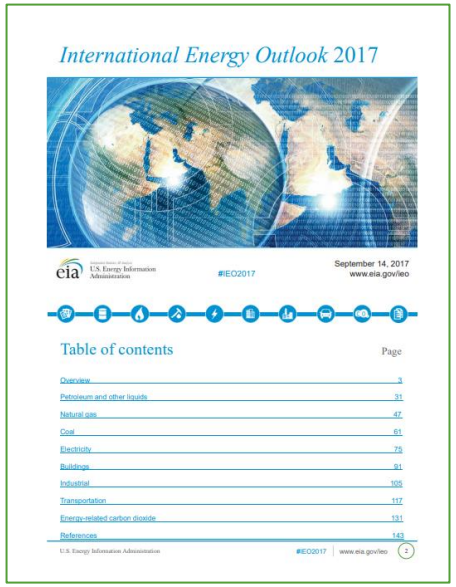
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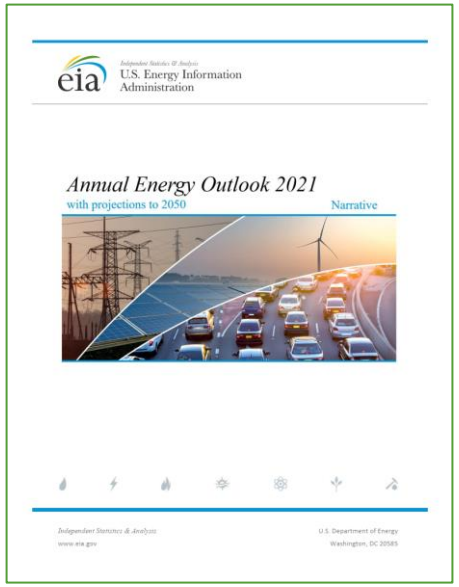
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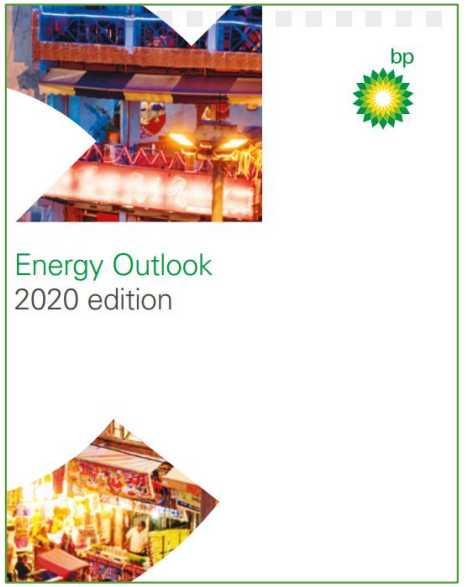
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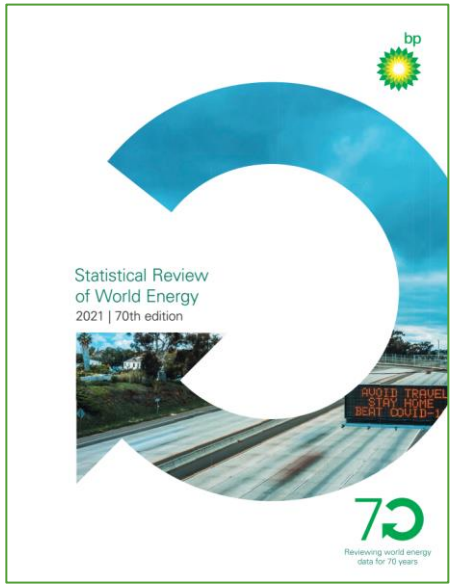
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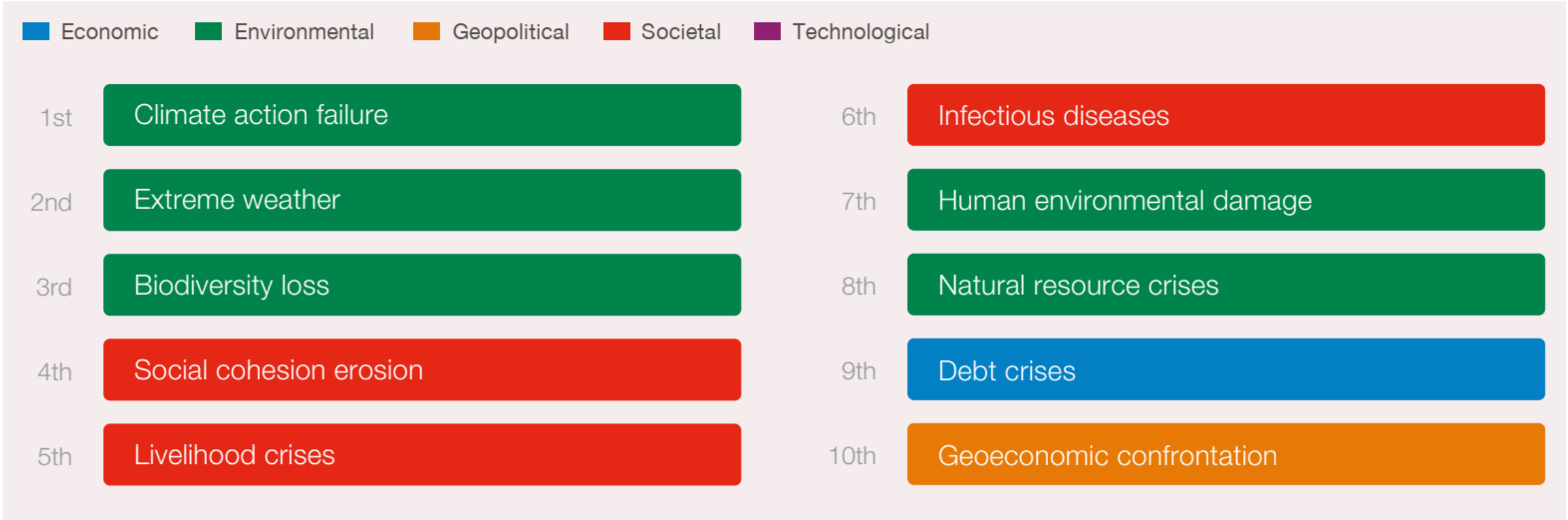
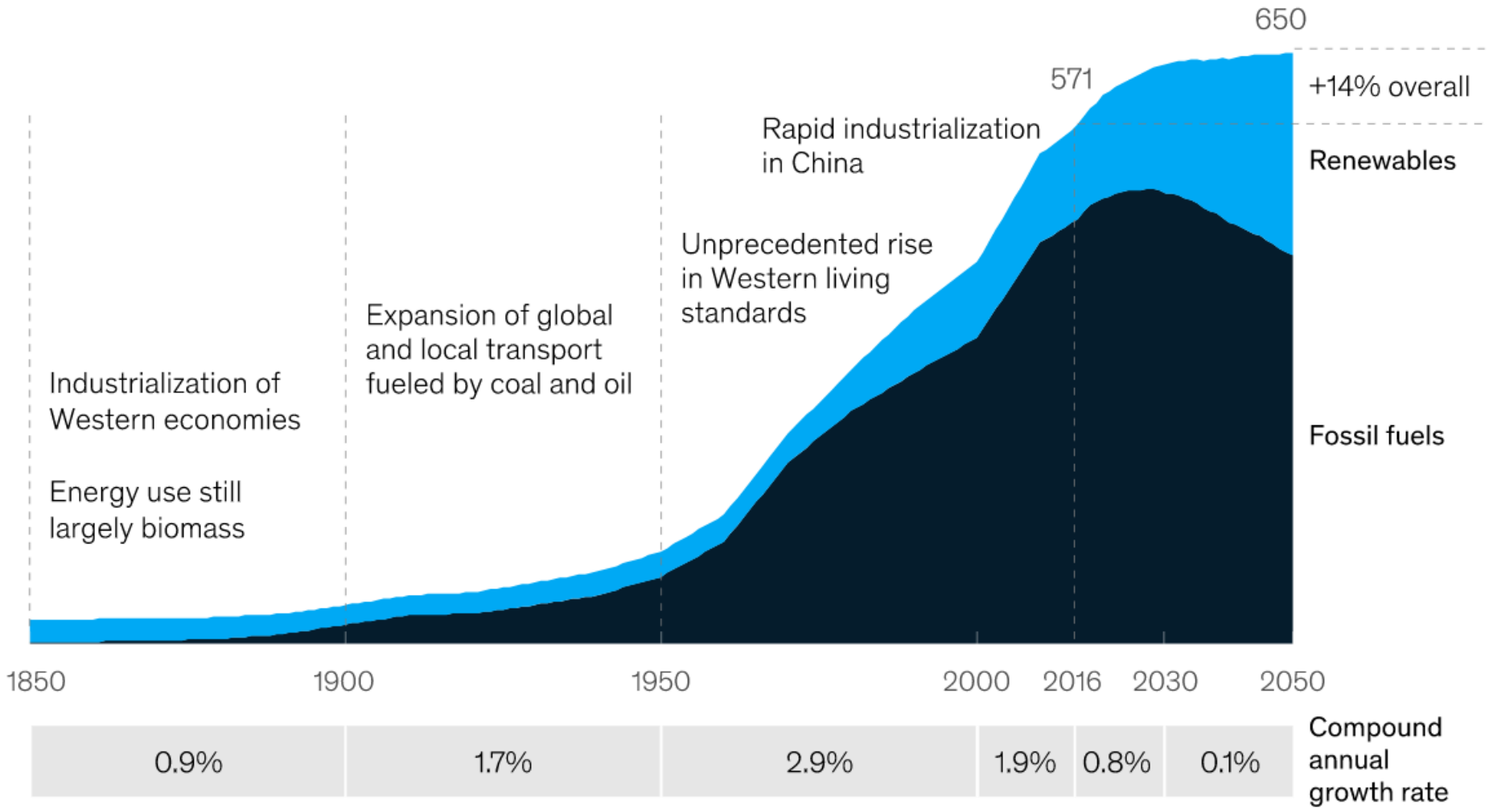
AVOID TRAVEL
STAY HOME
BEAT COVID-19
70
Reviewing world energy data for 70 years

The Energy Cake

The Most Severe Risks On A Global Scale Over The Next 10 Years



Global Primary Energy Demand (Million TJ)



Illustrative Example Of Energy Model

30 sectors

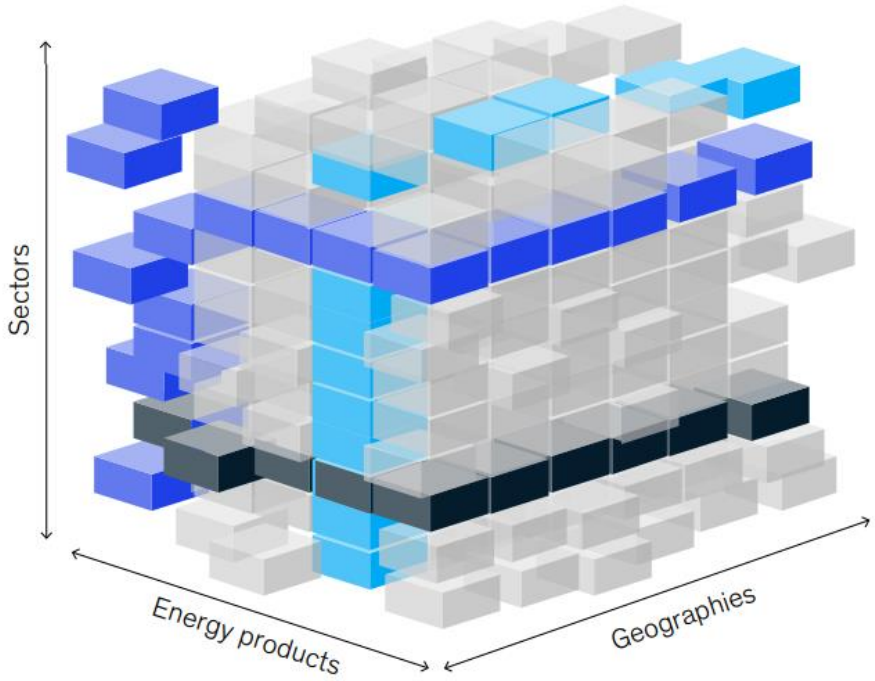
Transport
- Road transport (including buses, trucks, and cars)
- Rail
- Aviation
- Marine
- Other transport

Buildings
- Residential buildings
- Commercial buildings

Heat

Industry
- Iron and steel
- Chemicals
- Manufacturing
- Construction
- Mining
- Agriculture
- Refining
- Other industry

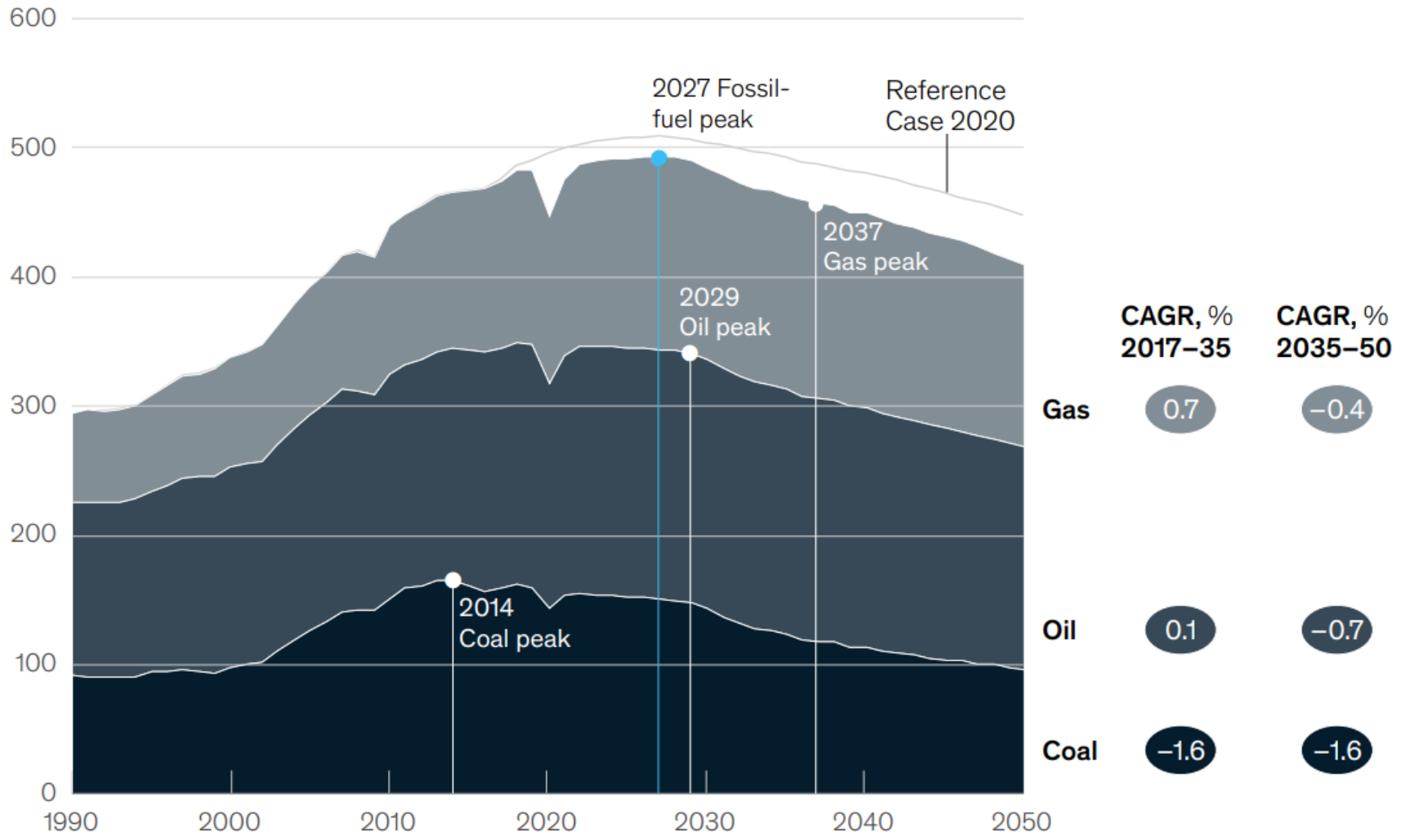
Power
- Electricity generation
- Hydrogen production



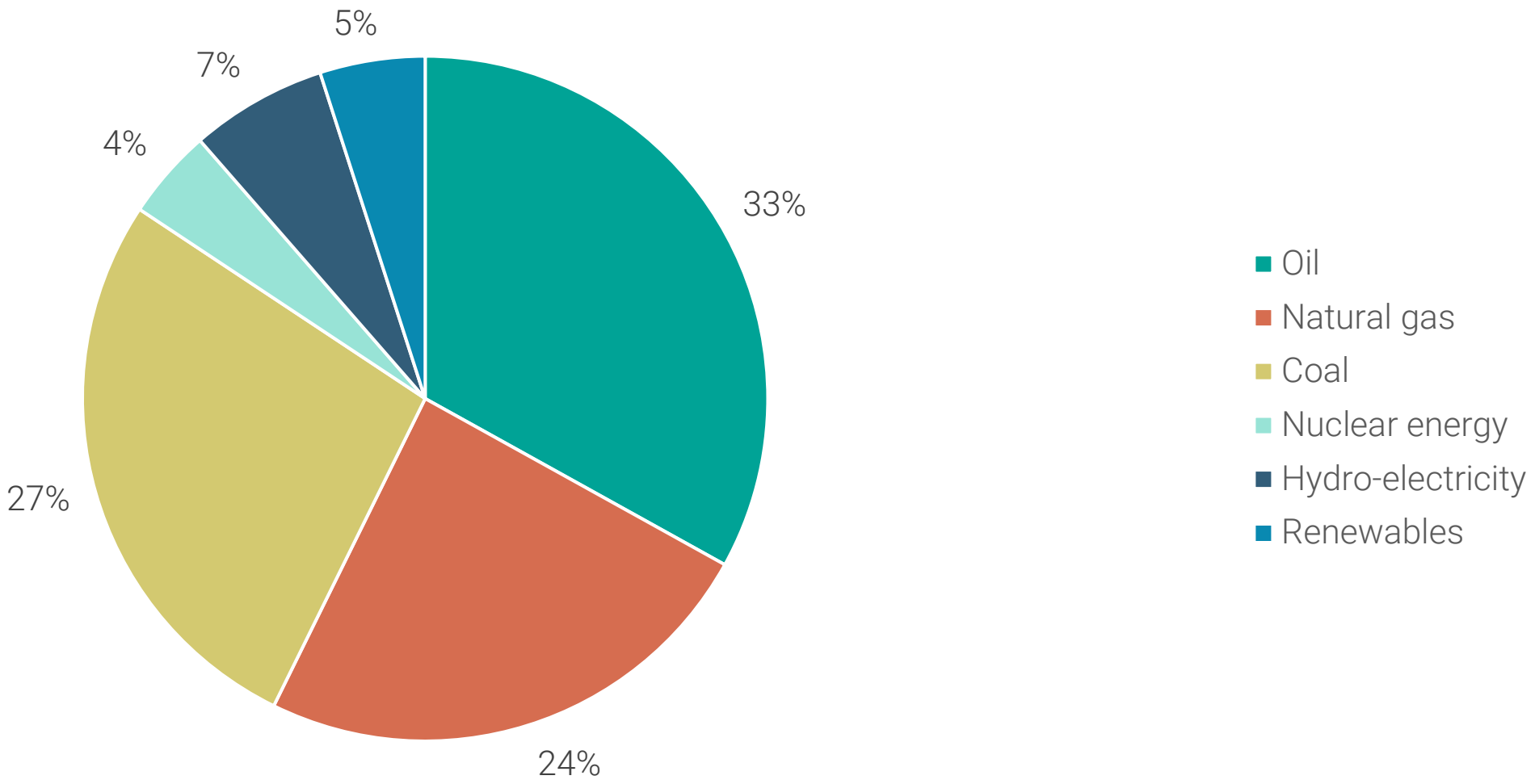
55 energy products
- Natural gas
- Coal
- Electricity
- Hydrogen
- Oil products (including gasoline, diesel, and HFO)
- *Renewable resources* (solar, wind, and hydro)

146 countries
- 45 in Asia
- 43 in Europe
- 31 in Africa
- 27 in Americas

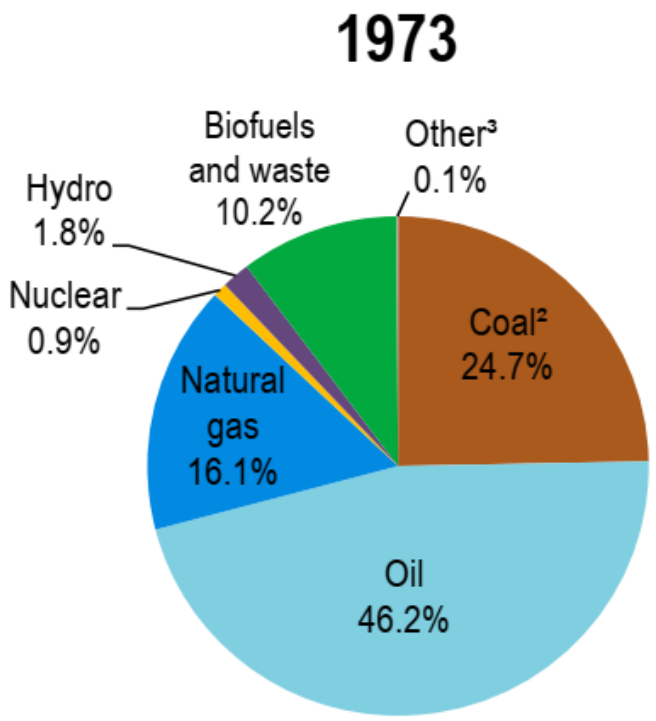
Primary Energy Demand Per Fossil Fuel (Million TJ)



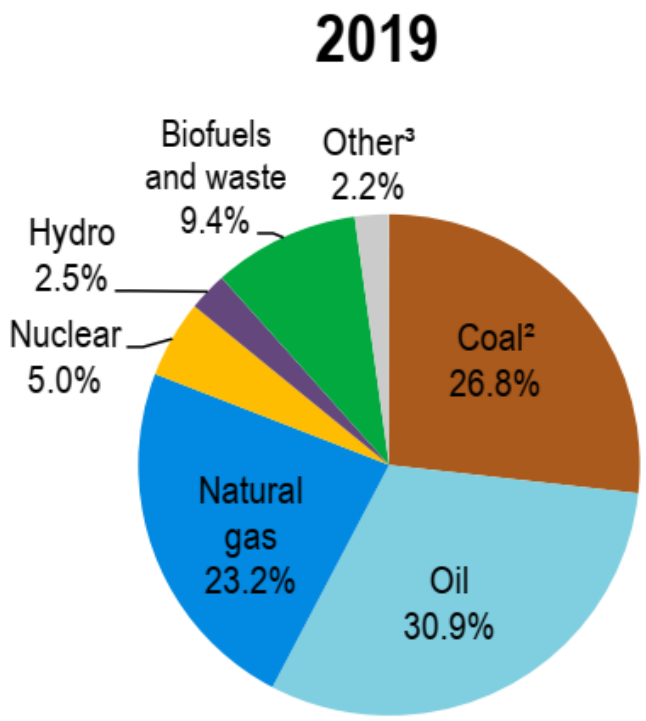
Fuels Share of Primary Energy Consumption (Exajoules)



World Total Energy Supply by Source

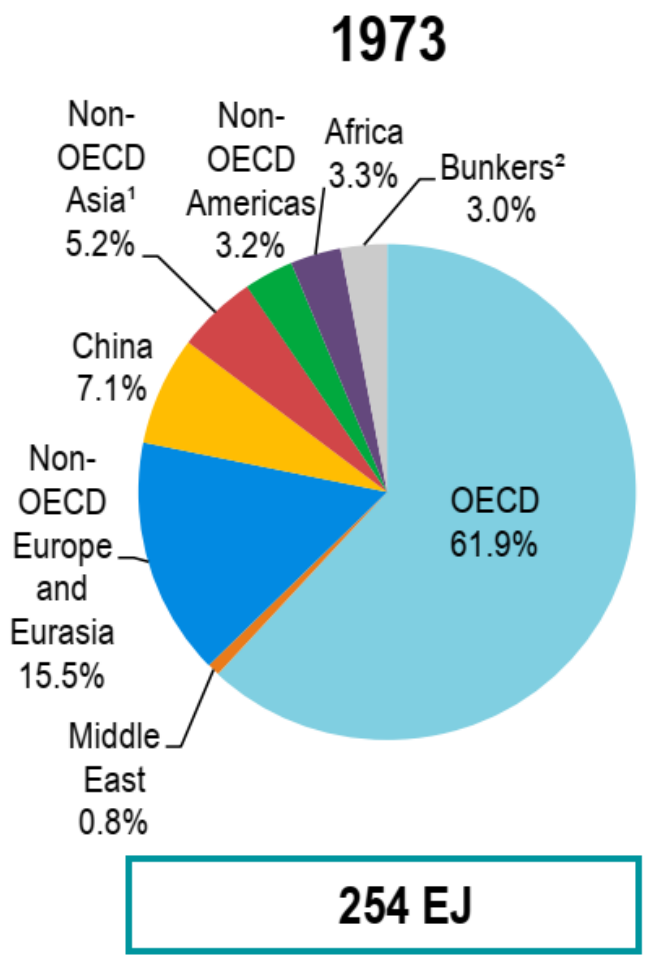


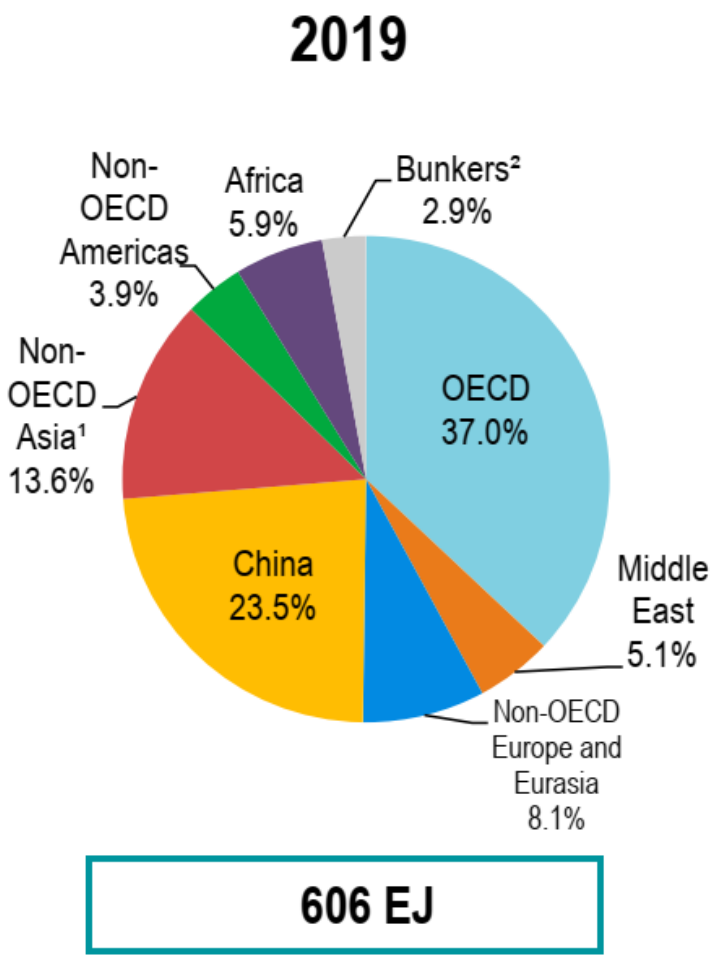
254 EJ



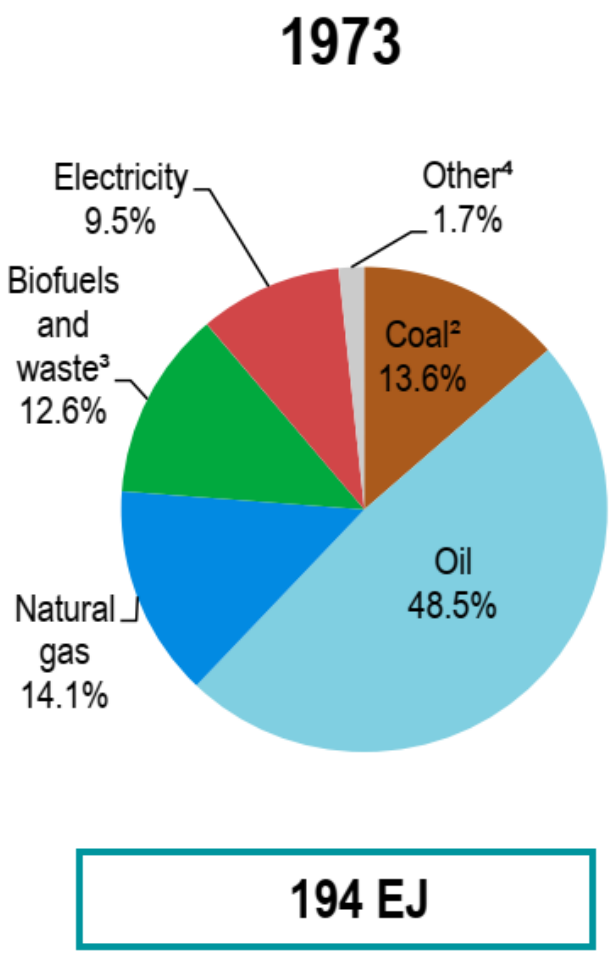
606 EJ

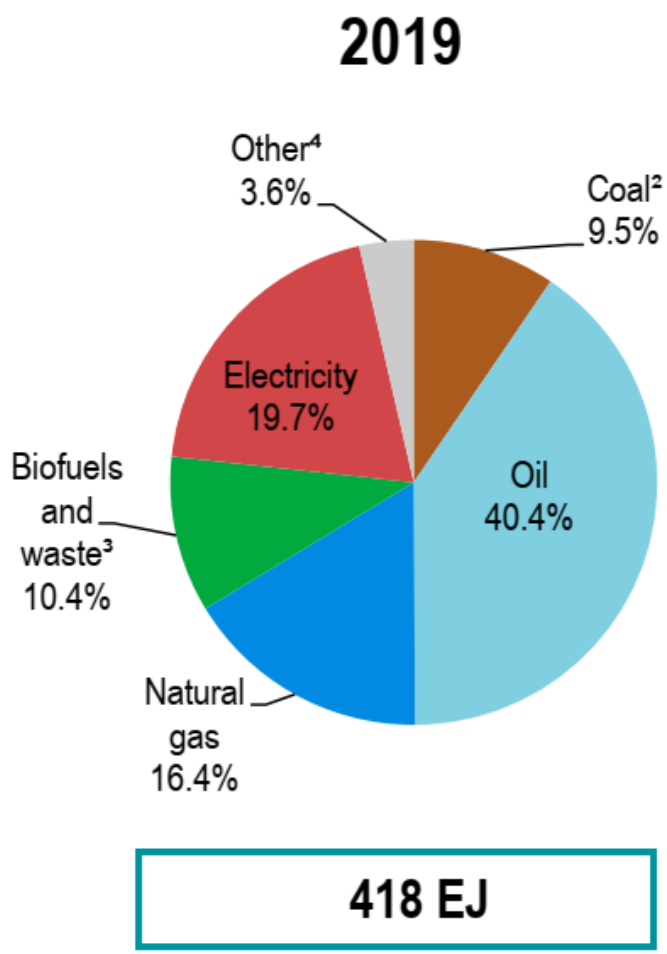
World Total Energy Supply by Region



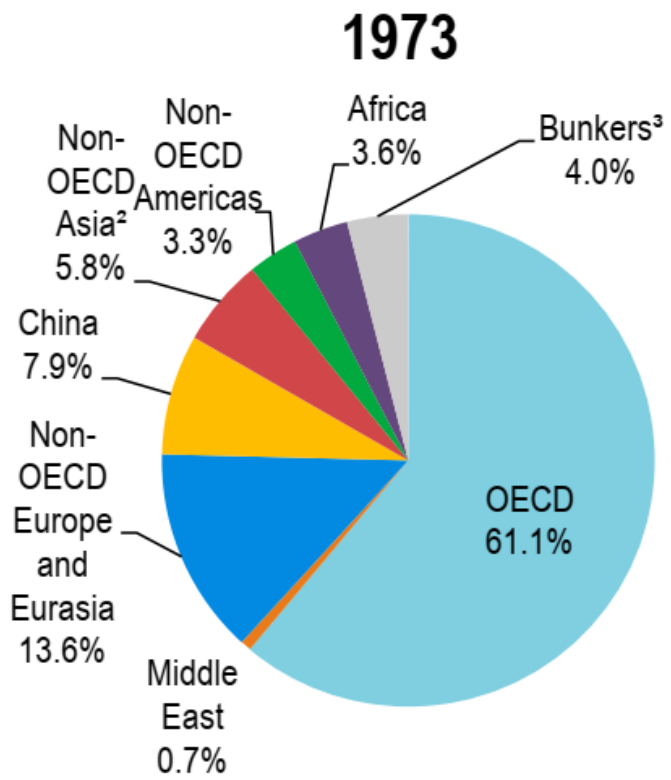


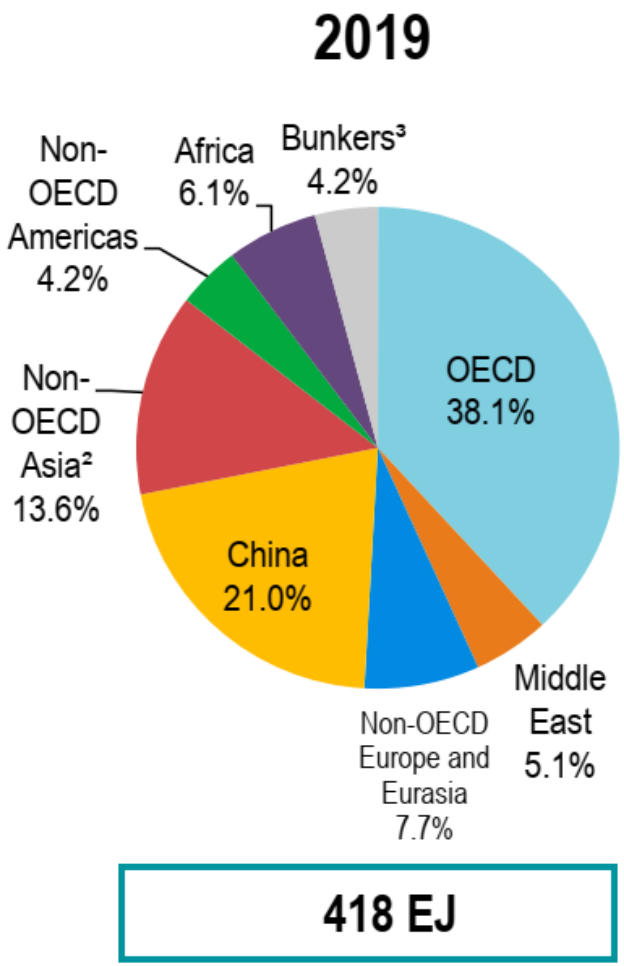
World Total Final Consumption by Source





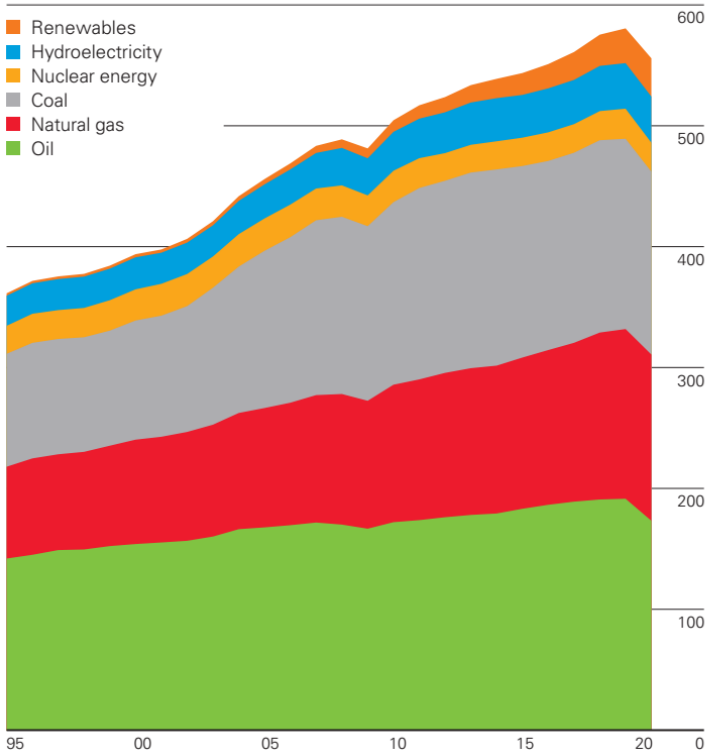
World Total Final Consumption by Region





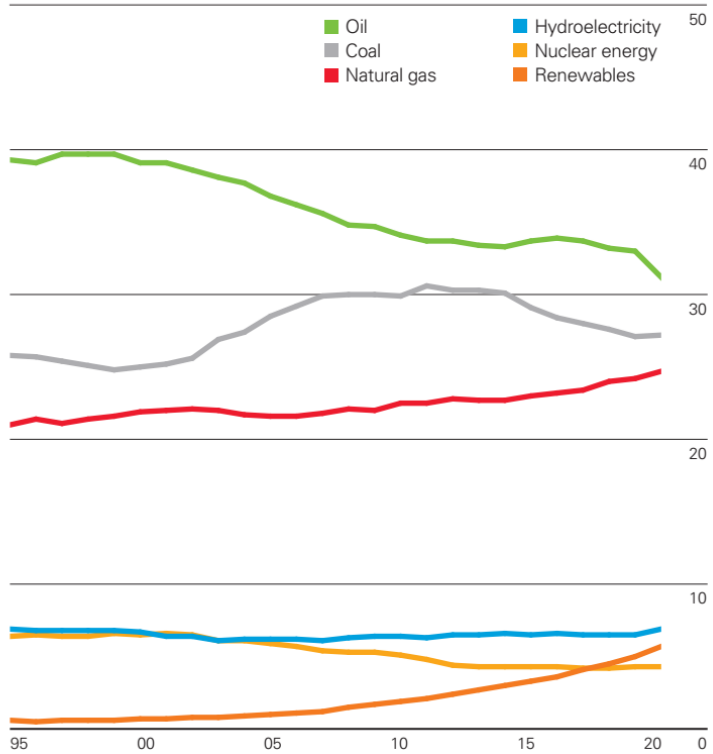
World Energy Consumption

World consumption
Exajoules



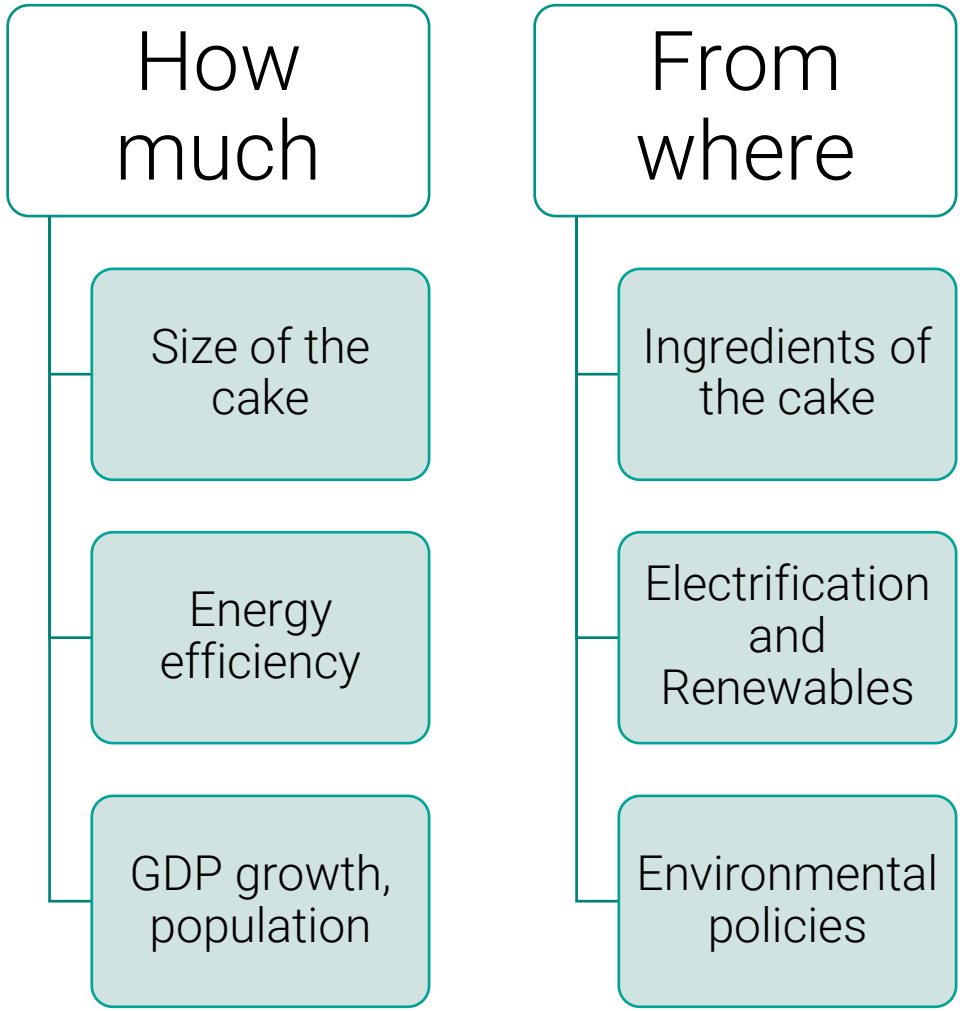
Primary energy consumption decreased by 4.5% last year, the first decline in energy consumption since 2009. The decline was driven largely by oil (-9.7%), which accounted for almost three quarters of the decrease. Consumption for all fuels decreased, apart from renewables (+9.7%) and hydro (+1.0%). Consumption fell across all the regions, with the largest declines in North America (-8.0%) and Europe (-7.8%). The lowest decrease was in Asia-Pacific (-1.6%) due to the growth in China (+2.1%), the only major country where energy consumption increased in 2020. In the other regions, the decline in consumption ranged between -7.8% in South and Central America to -3.1% in the Middle East.

Shares of global primary energy
Percentage



Oil continues to hold the largest share of the energy mix (31.2%). Coal is the second largest fuel in 2020, accounting for 27.2% of total primary energy consumption, a slight increase from 27.1% in the previous year. The share of both natural gas and renewables rose to record highs of 24.7% and 5.7% respectively. Renewables has now overtaken nuclear which makes up only 4.3% of the energy mix. Hydro's share of energy increased by 0.4 percentage points last year to 6.9%, the first increase since 2014.

Aspects of the Cake



Decoupling Energy Demand From Economic Growth

a steep decline in energy intensity of GDP

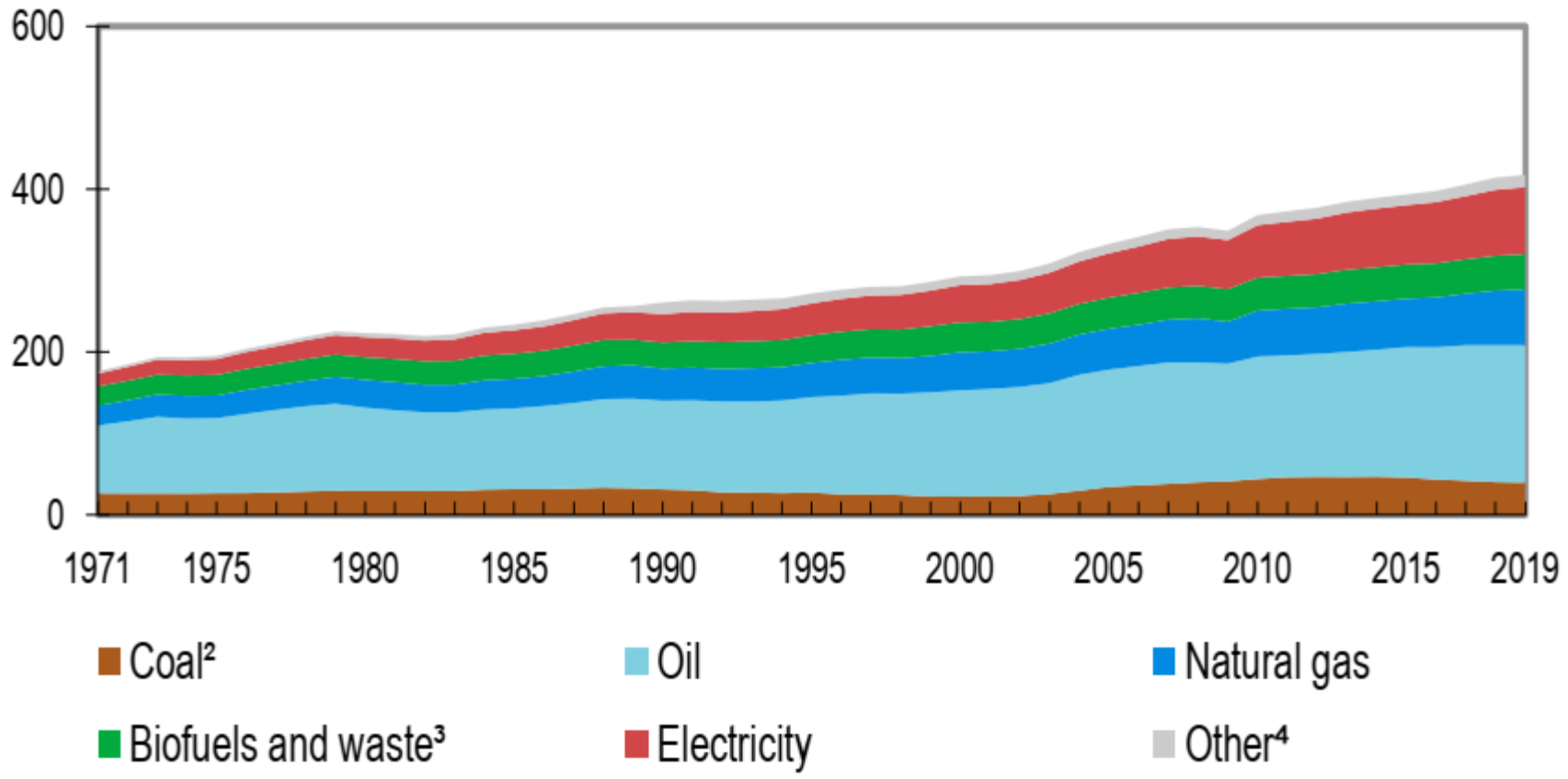
a marked increase in energy efficiency

the rise of electrification

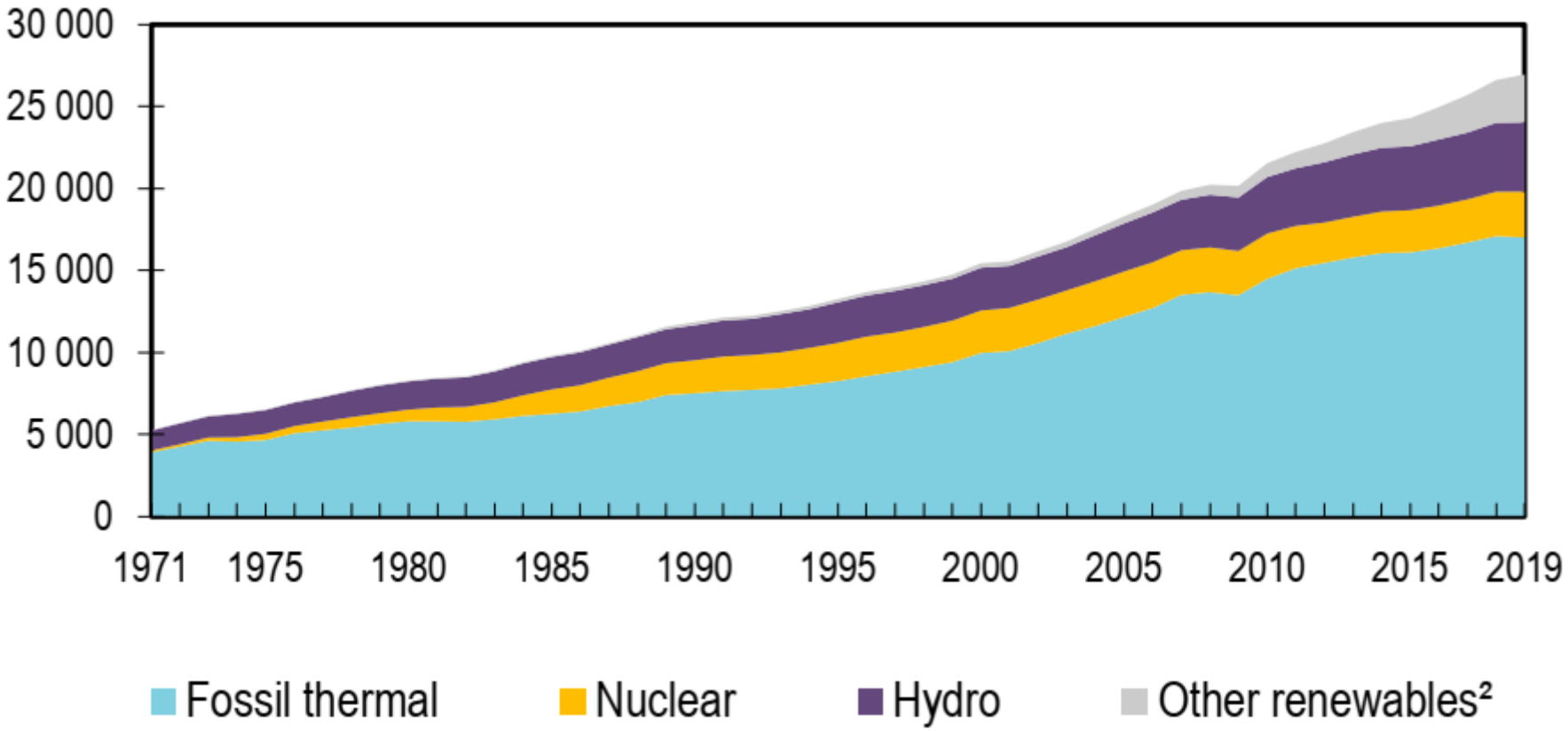
the growing use of renewables

Trend 1: Electrification

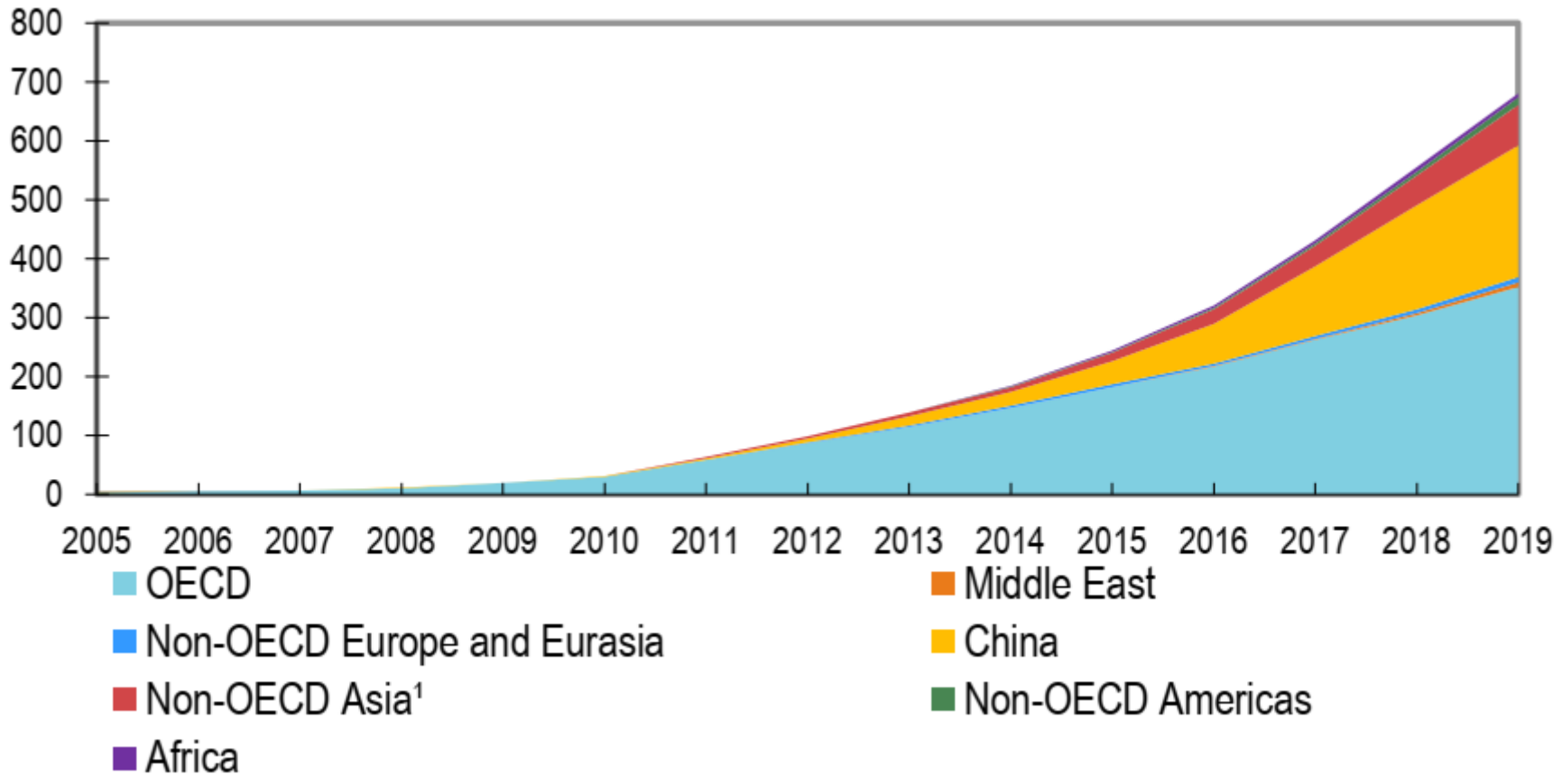
World Total Final Consumption by Source (EJ)



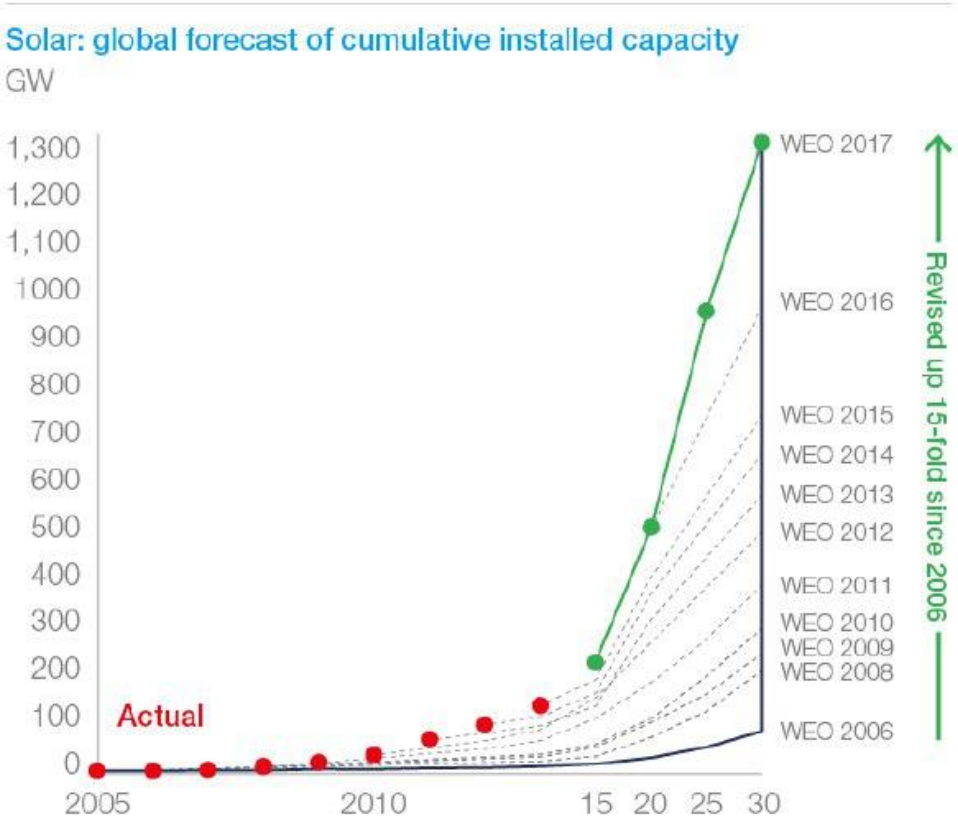
World Electricity Generation By Source (Twh)

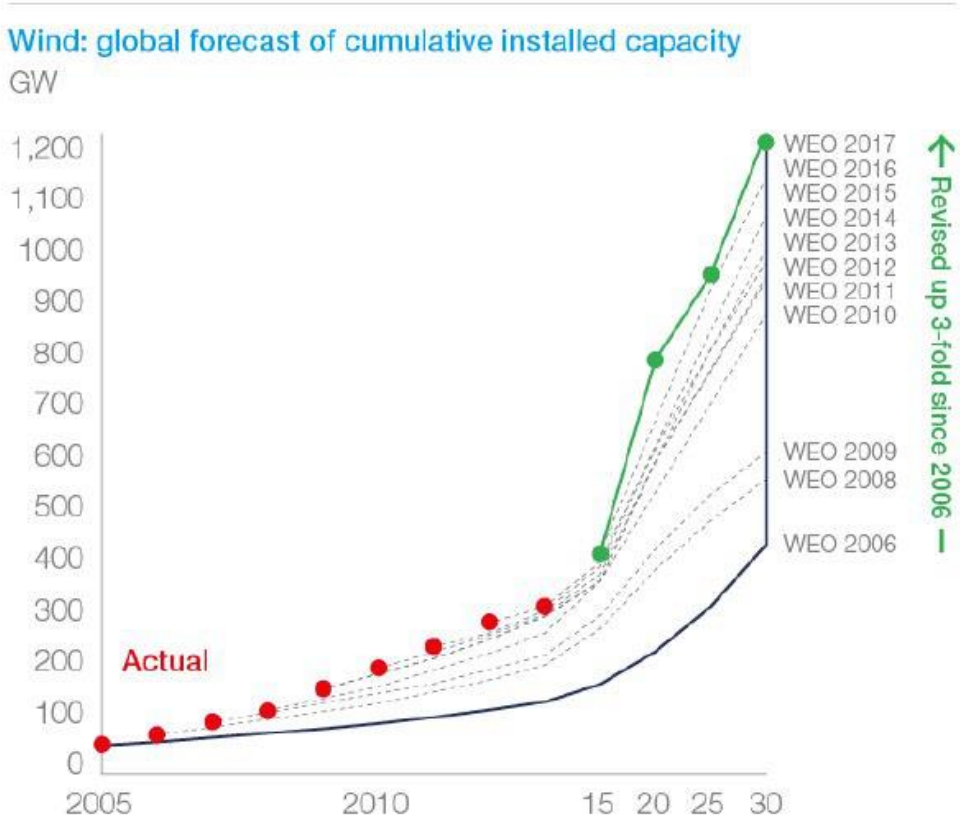


World Solar PV Electricity Production by Region (Twh)



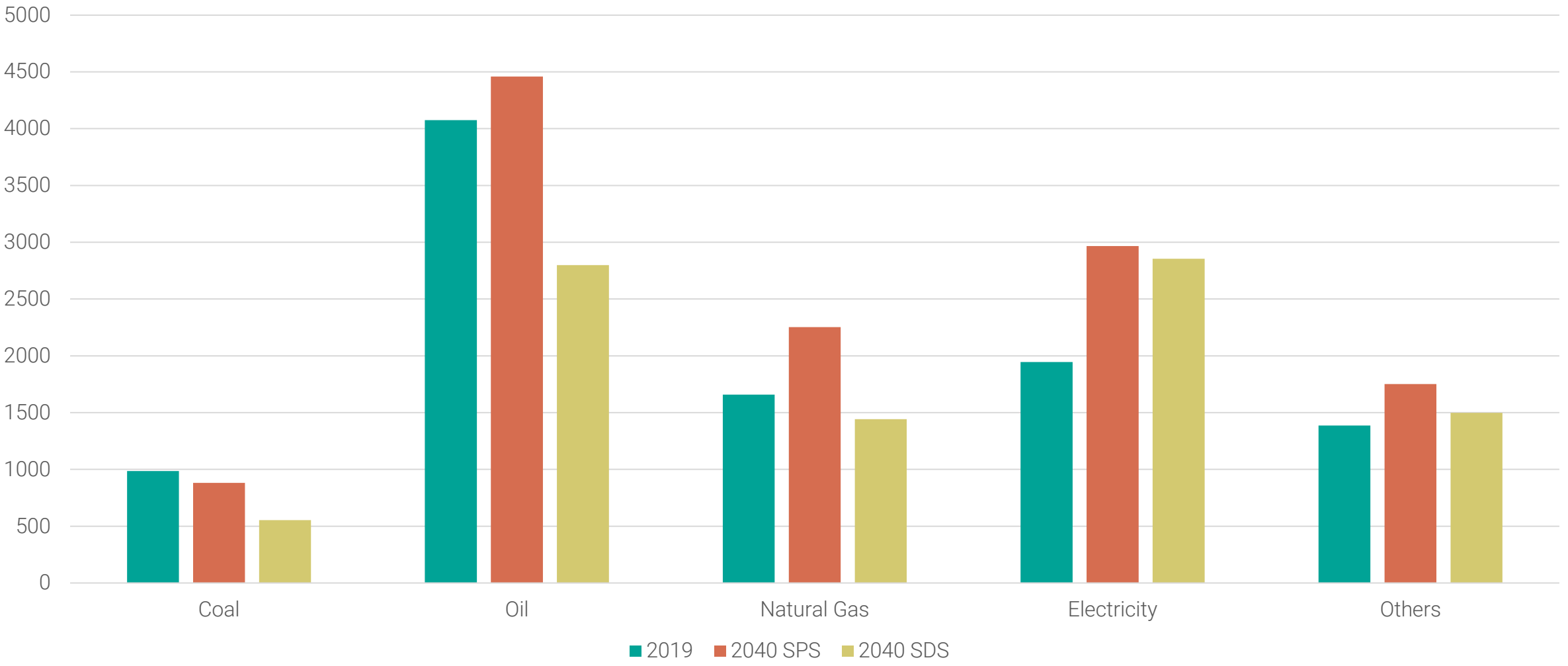
Underestimating Renewables



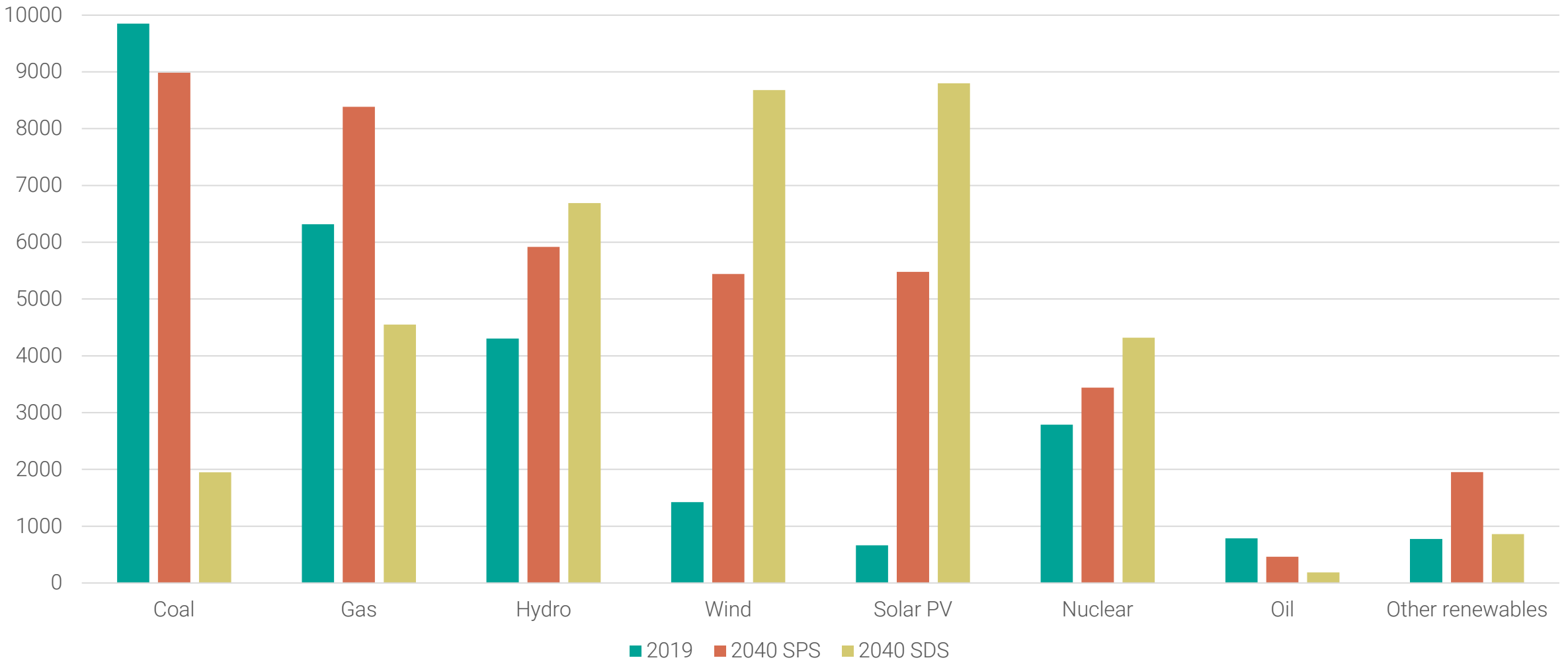


Source: IEA World Energy Outlook – New Policy Scenario

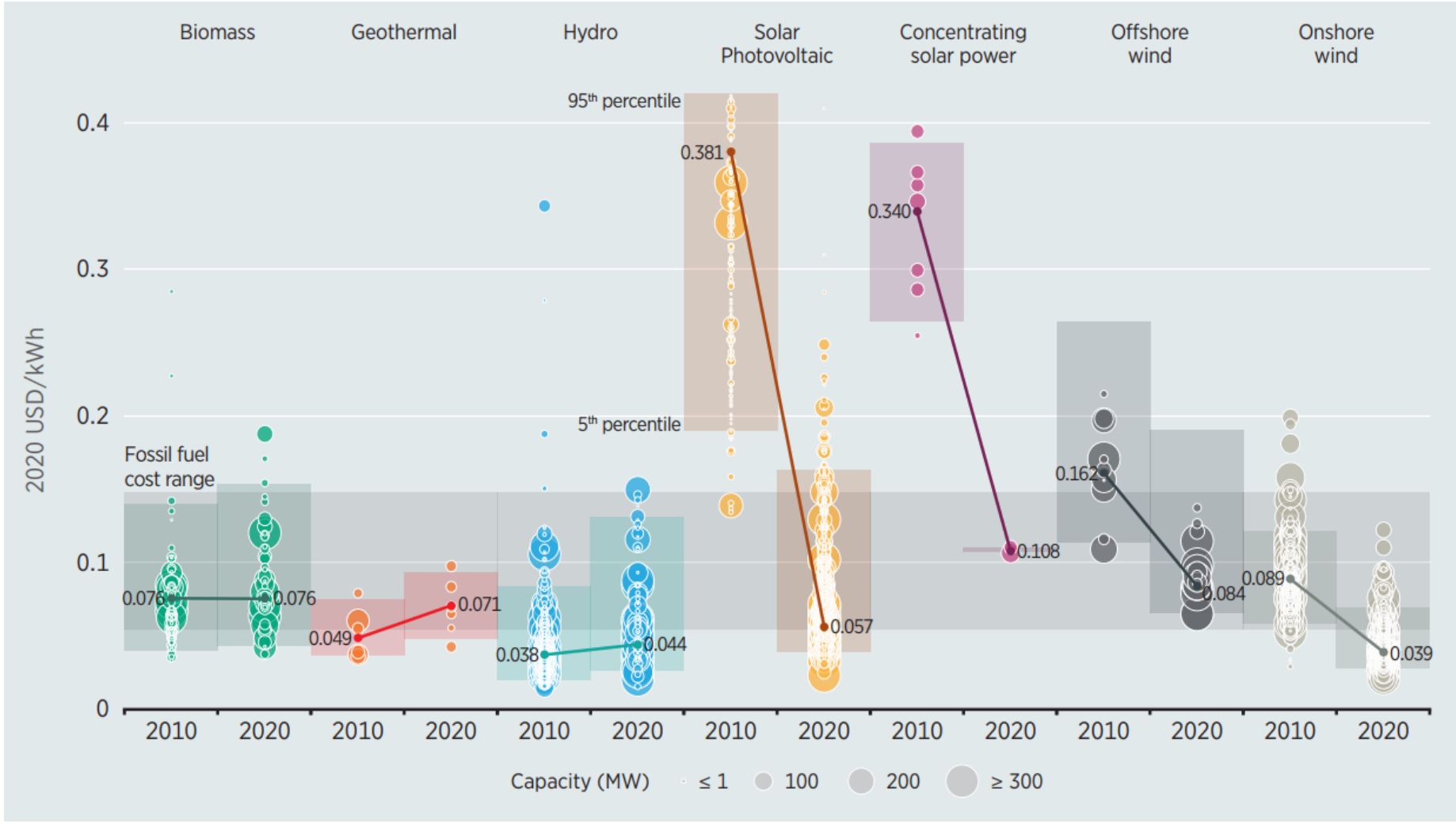
Total Final Consumption (Mtoe)



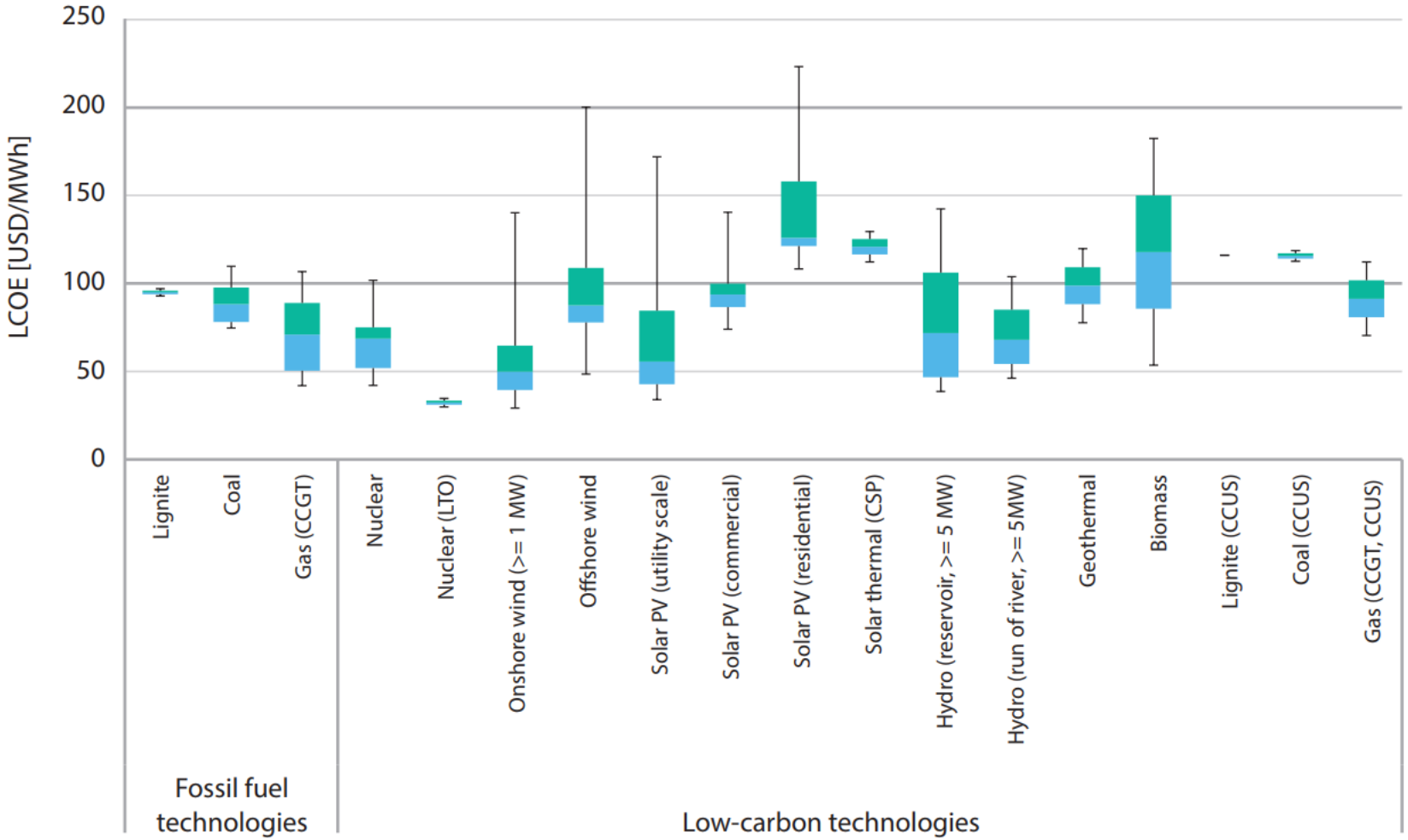
Electricity Generation (TWh)



Global LCOEs From Utility-scale Power Generation Technologies



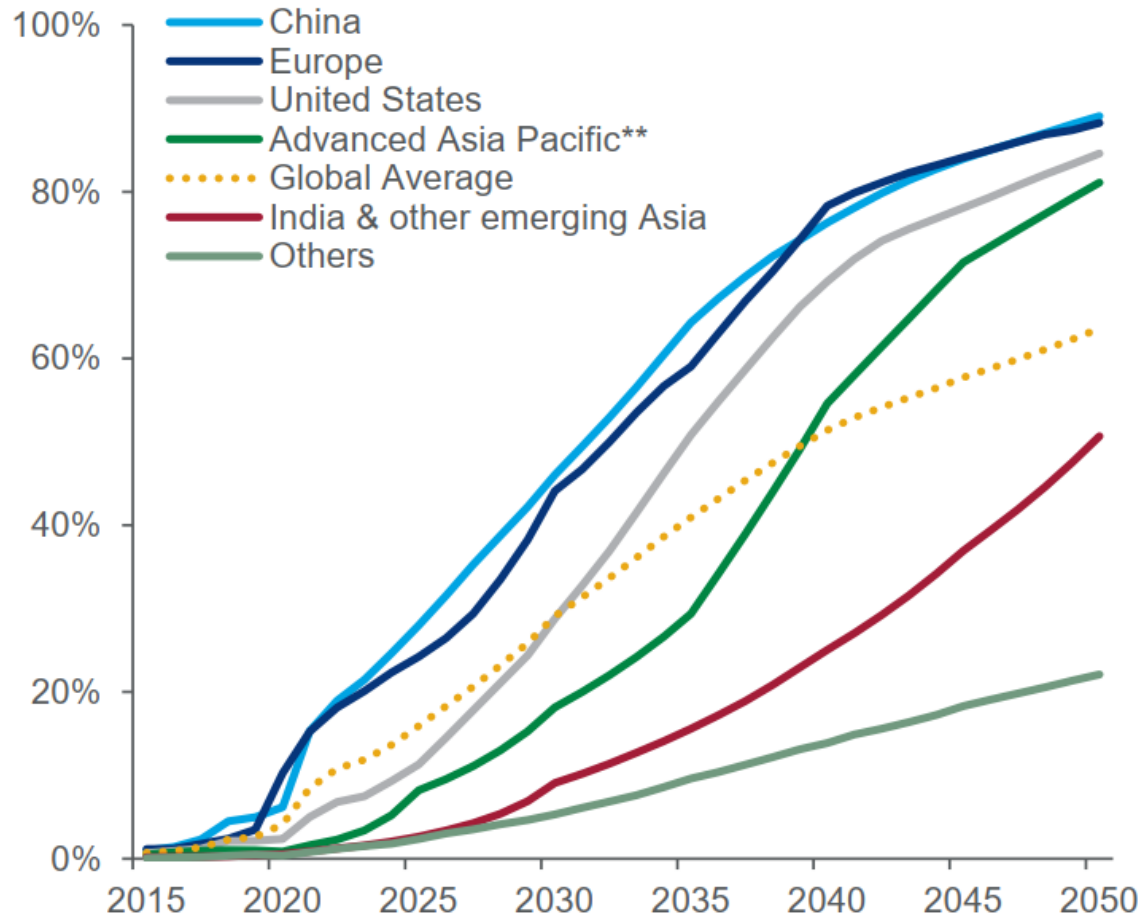
LCOE By Technology



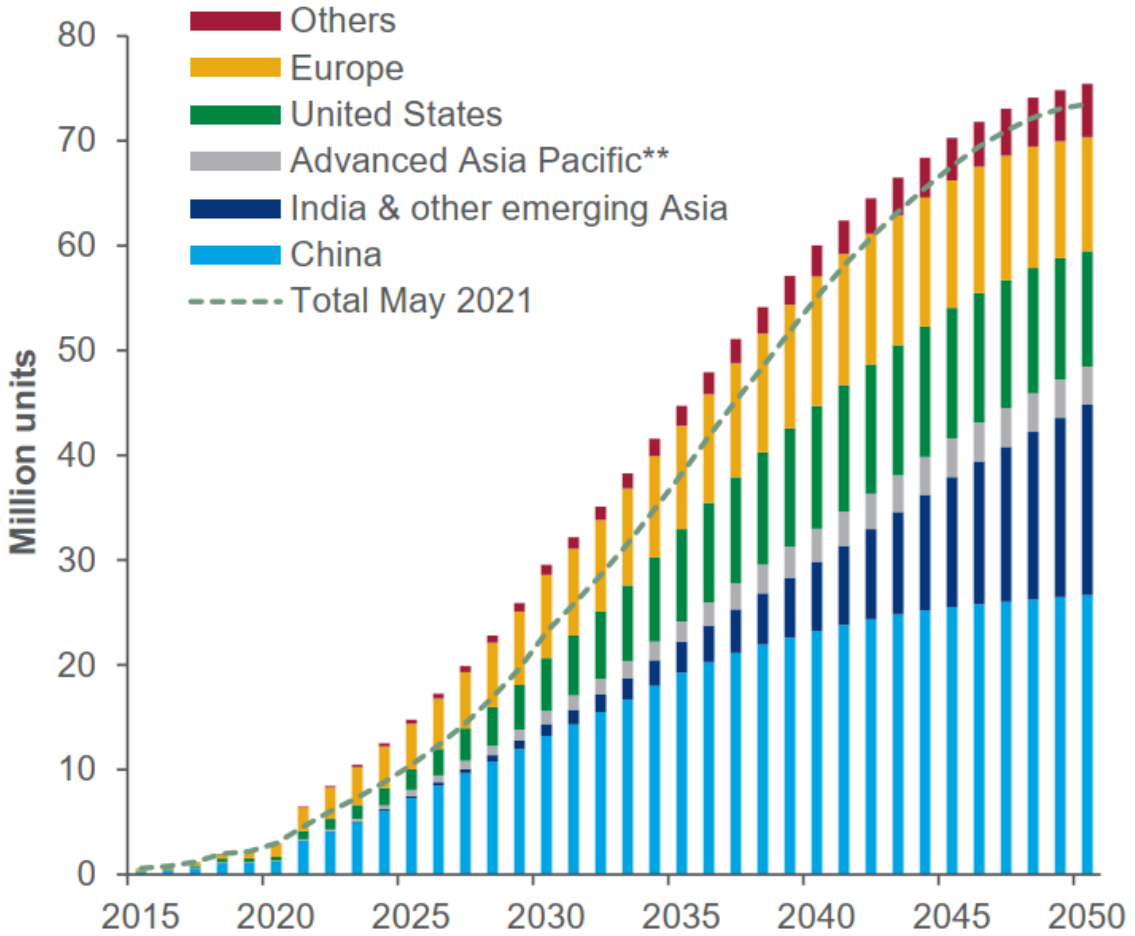
Key Metrics

Global EV Sales

EV* share of light vehicles sales



Global EV* sales

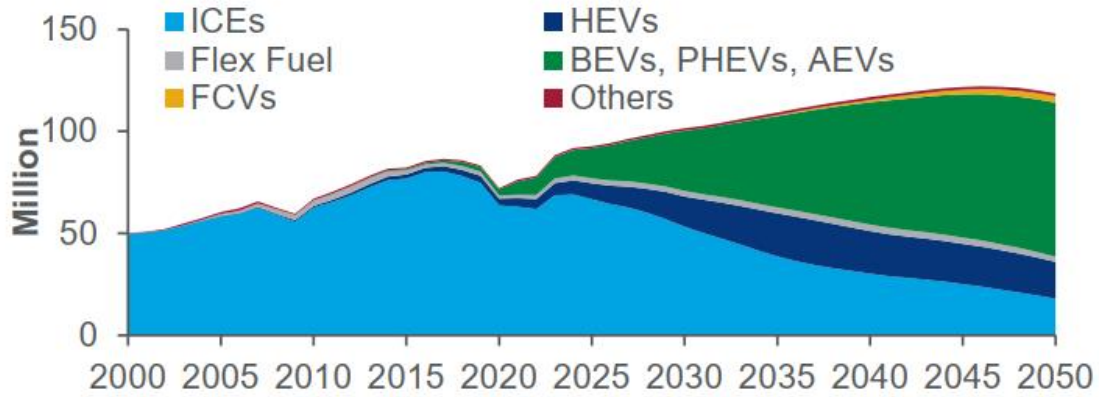


The Key Differences Between Electric Cars

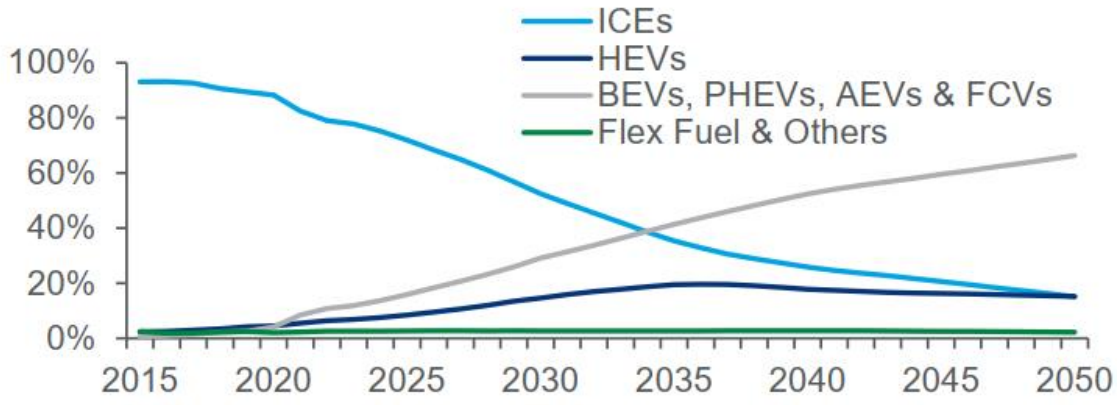
- AEV: All-Electric Vehicle. Run only on electricity, either from a battery (BEV) or a fuel cell (FCEV).
- BEV: Battery Electric Vehicle. A PEV that uses only a battery and electric motor to power the EV.
- EV: A generic term for a vehicle that gets some or all of its power from an electric motor. Sometimes used to mean PEV, BEV, AEV, FCEV, and occasionally HEV.
- FCEV: Fuel Cell Electric Vehicle. An AEV that is powered by a fuel cell rather than a battery. These are not covered in this resource kit, which addresses only PEVs.
- HEV: Hybrid Electric Vehicle. These vehicles do not plug in, but have a large battery on board that is charged by the vehicle's braking. The energy stored by this battery assists the ICE in moving the car, significantly improving the gas mileage.
- PEV: Plug-in Electric Vehicle. An EV that plugs in to an external source to charge an on-board battery that provides the electricity for the electric motor.
- PHEV: Plug-in Hybrid Electric Vehicle. PHEVs use both an ICE and an electric motor with a battery that recharges by plugging into an external source.

Light Vehicles Sales and Stock

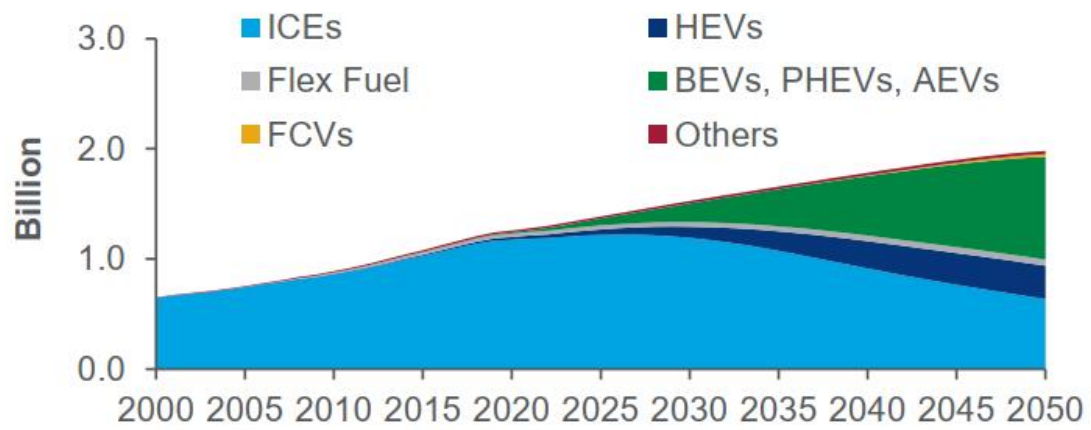
Global light vehicles sales



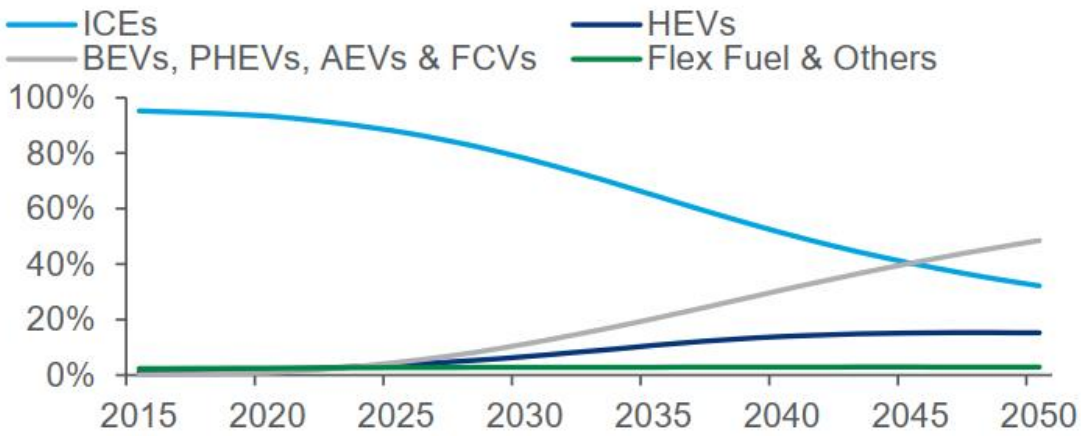
Share% in light vehicles sales



Global light vehicles stock

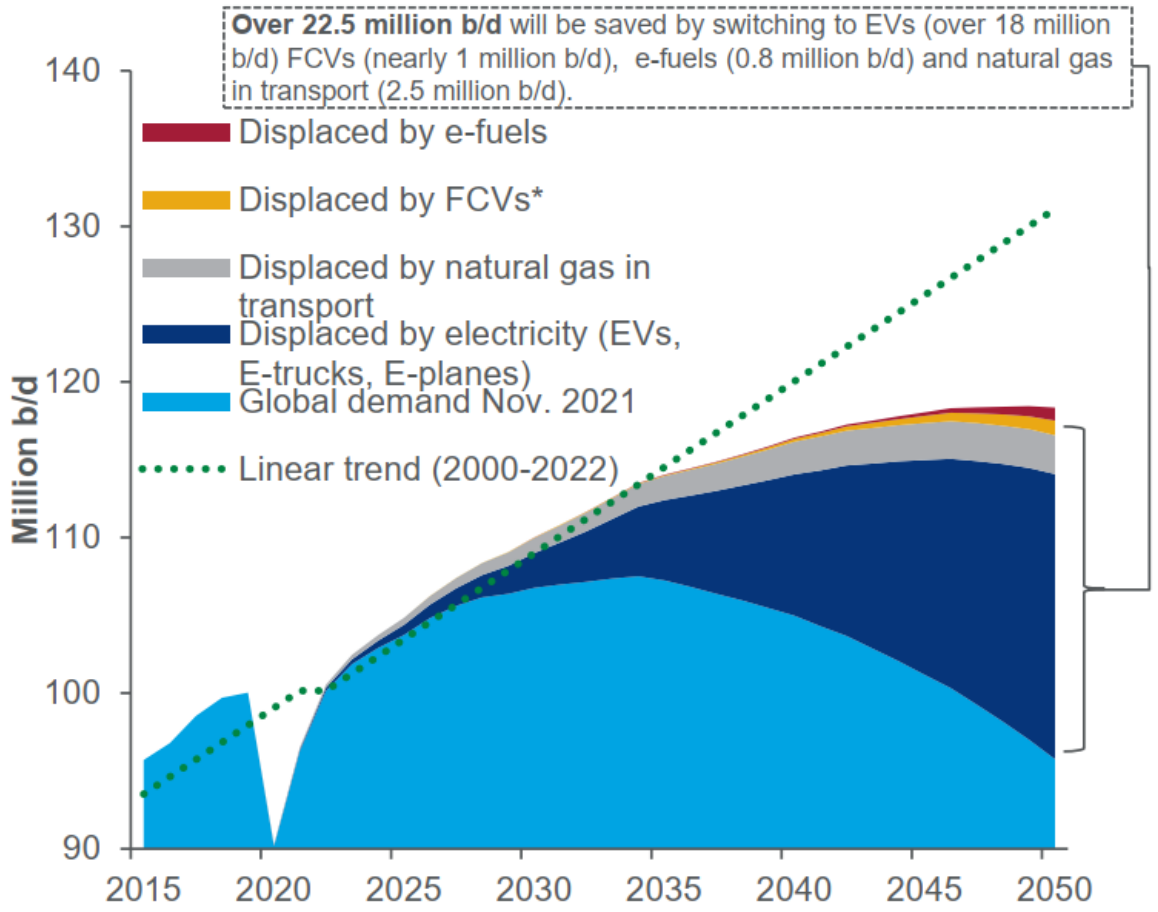


Share% in light vehicles stock

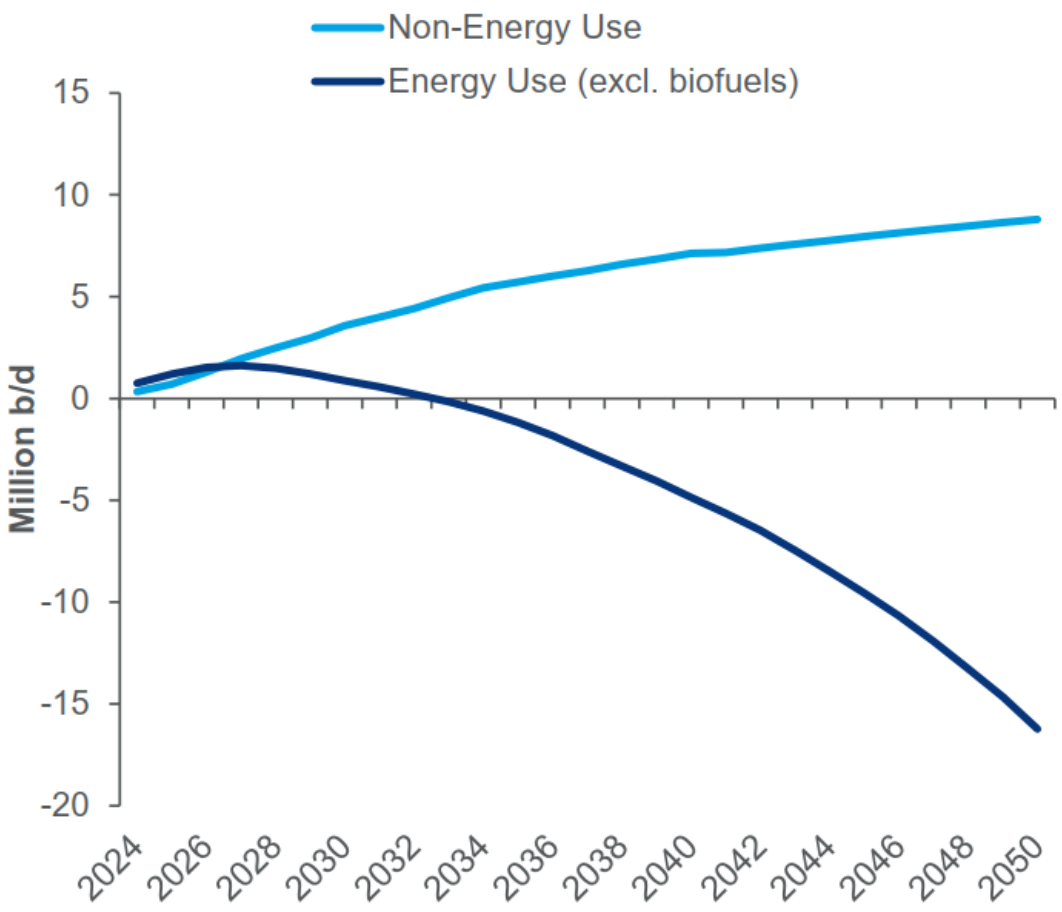


The Displacement Effects From EVs, FCVs And Natural Gas In Transport

Global liquids demand and the displacement effects from EVs, FCVs and natural gas in transport

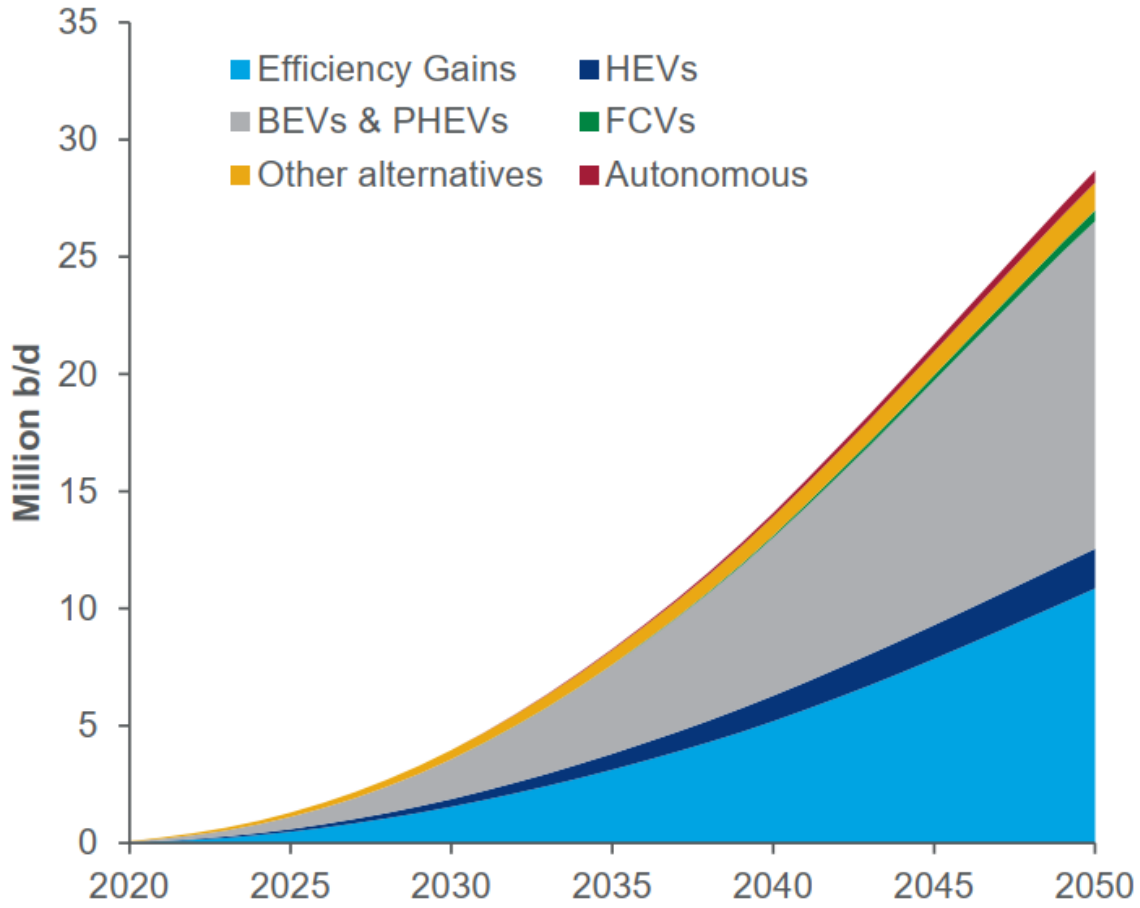


Accumulated change in global liquids demand after 2023

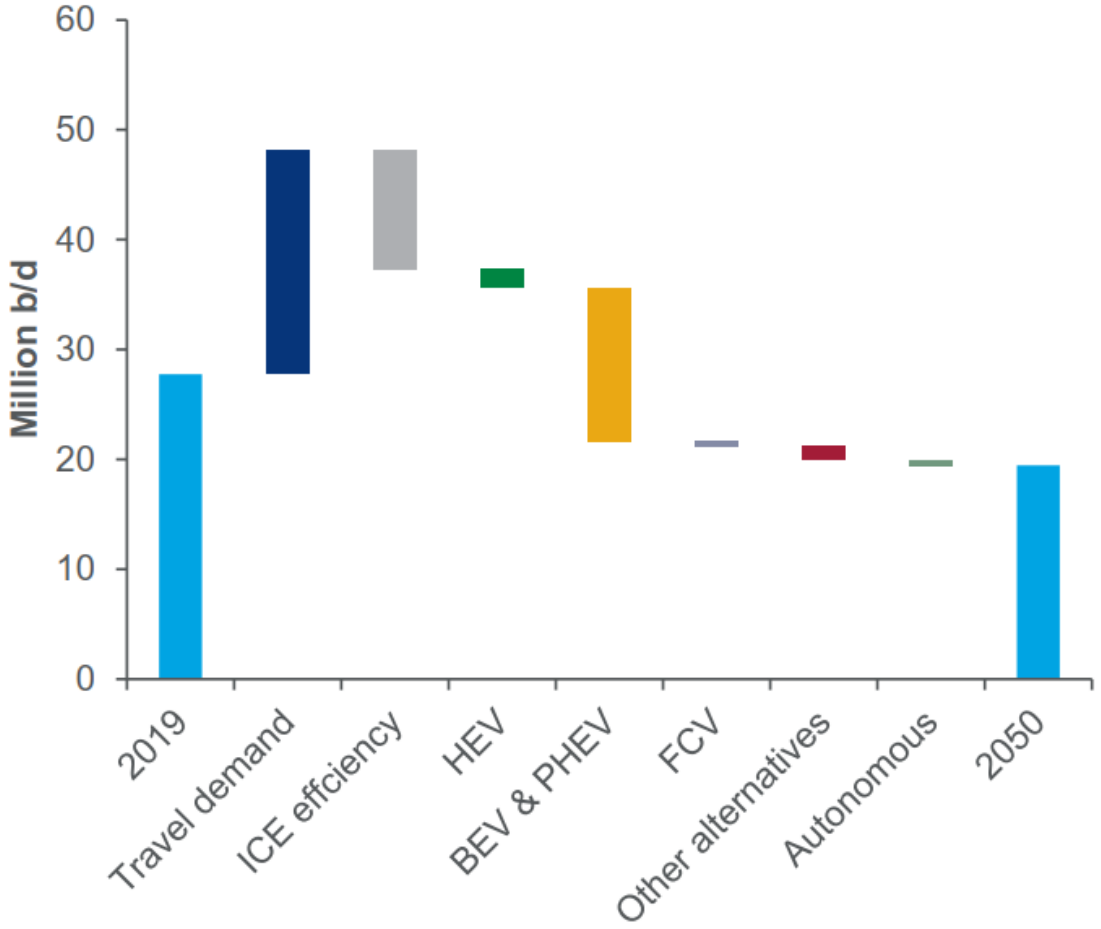


Changes in Liquids Demand From Light Vehicles

Oil saved in the global light vehicles sector

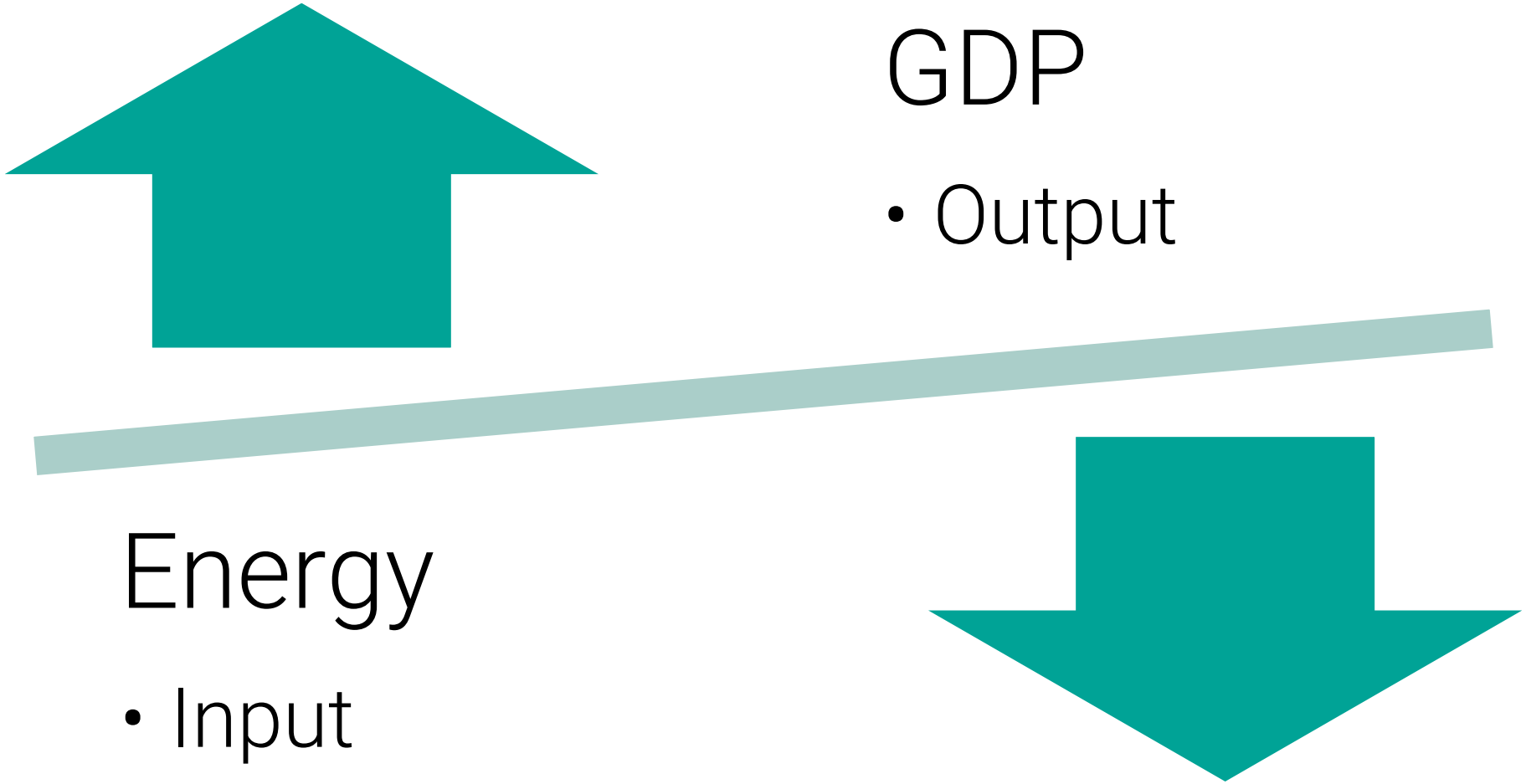


Global liquids demand for light vehicles

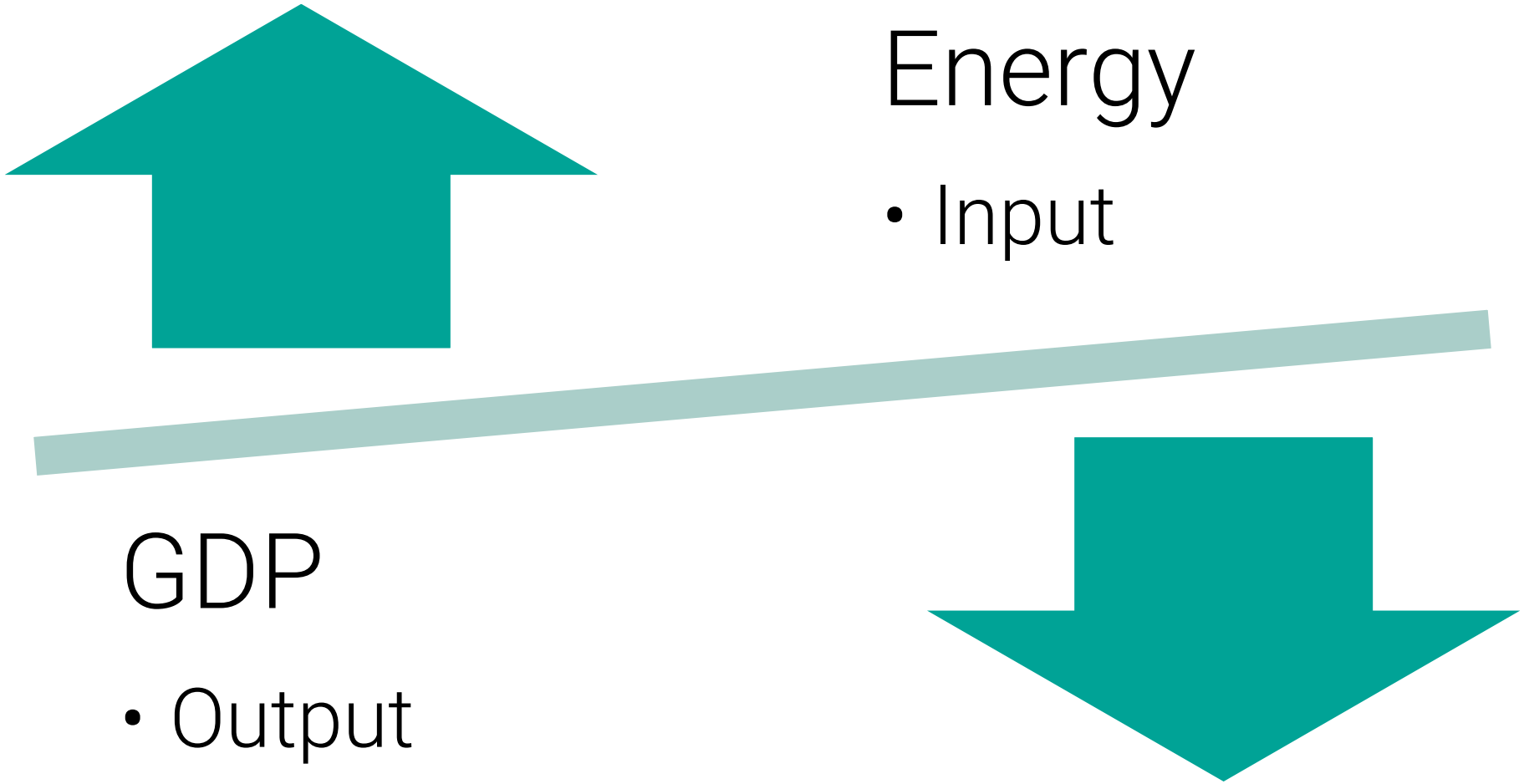


Trend 2: Efficiency

Productivity Increase



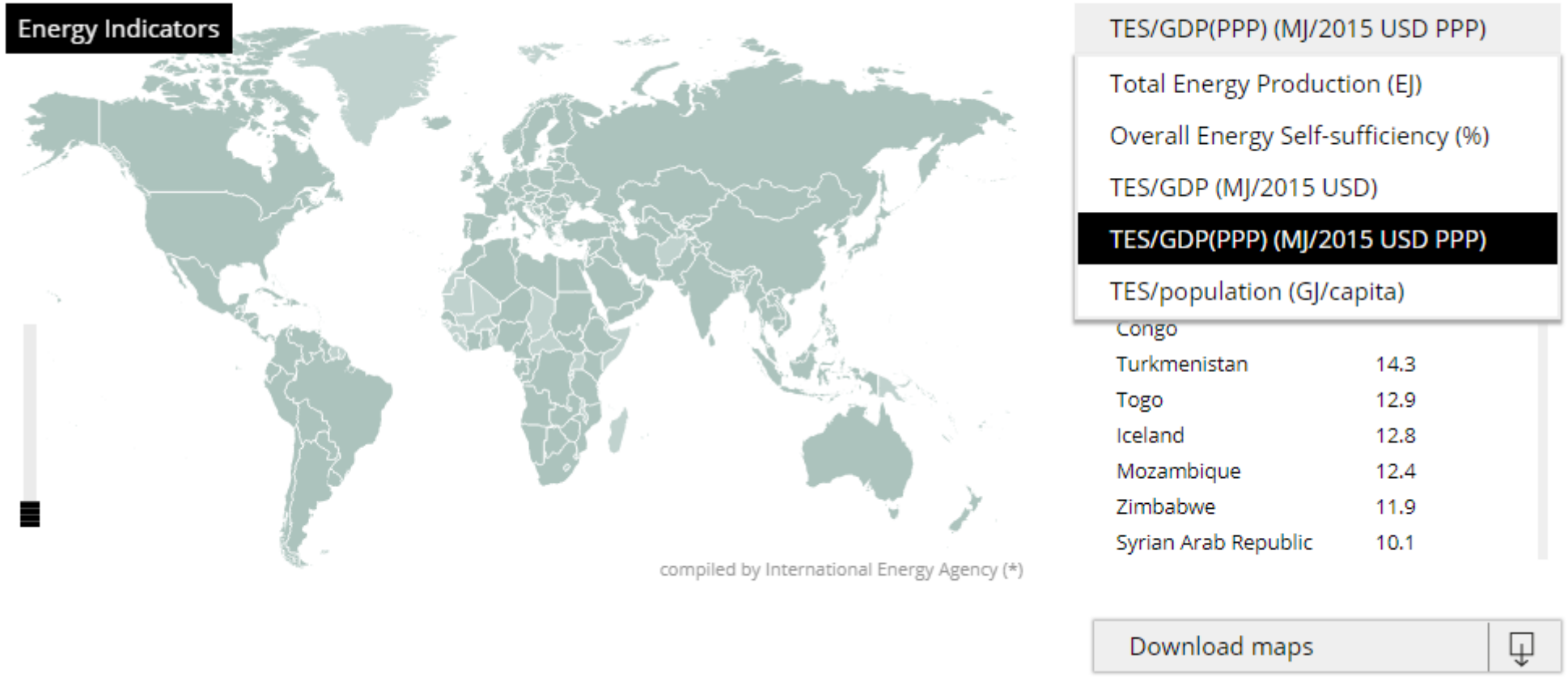
Energy Intensity



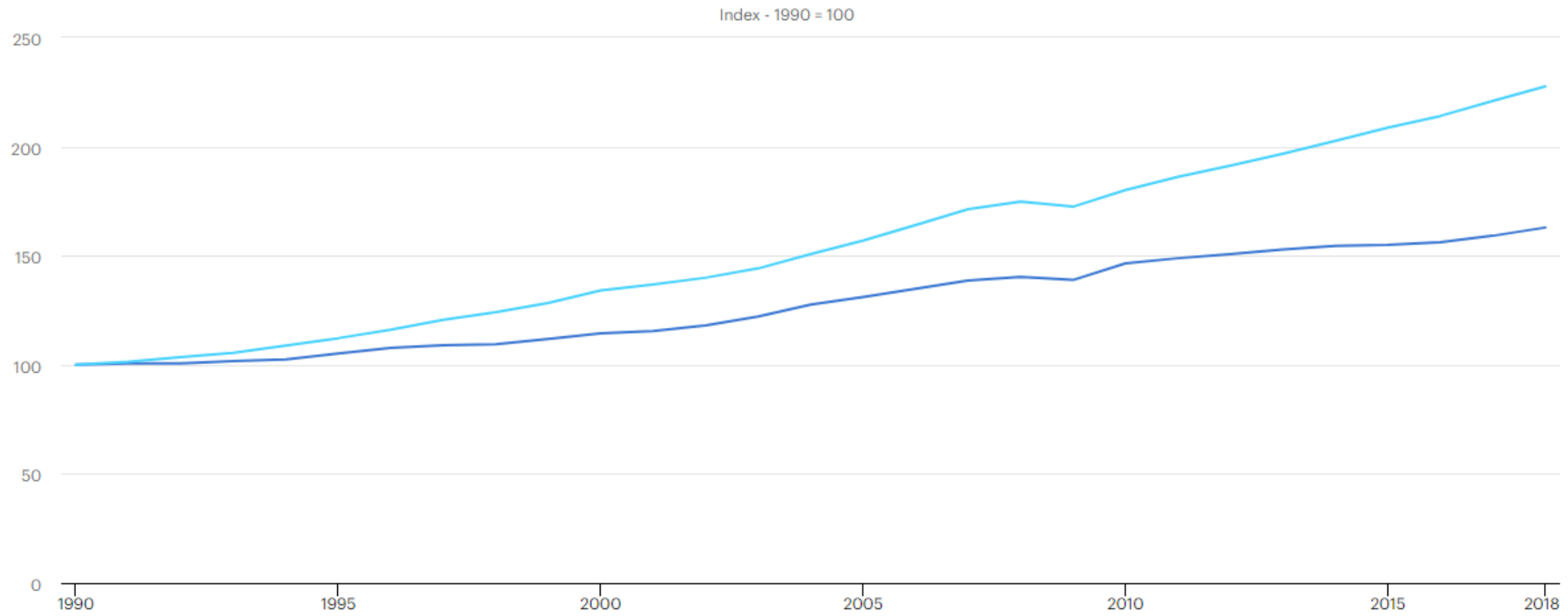
Energy Efficiency and Energy Intensity

- **Energy Intensity** is measured by the quantity of energy required per unit output or activity, so that using less energy to produce a product reduces the intensity.
- **Energy Efficiency** improves when a given level of service is provided with reduced amounts of energy inputs or services are enhanced for a given amount of energy input.
- Declines in energy intensity are a proxy for efficiency improvements, provided:
  - a) energy intensity is represented at an appropriate level of disaggregation to provide meaningful interpretation, and
  - b) other explanatory and behavioral factors are isolated and accounted for.

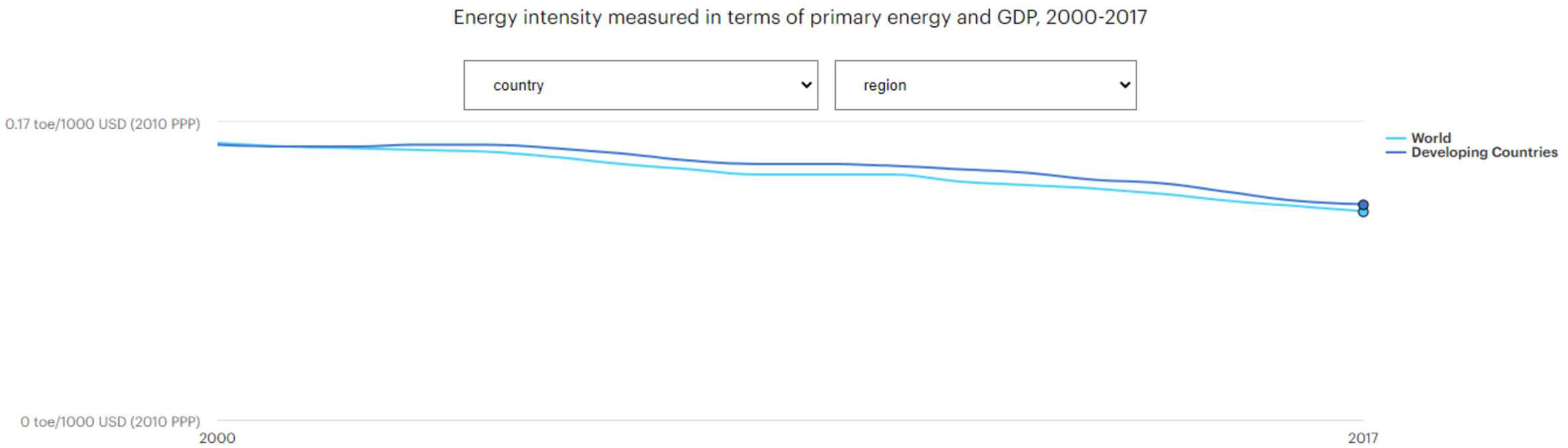
IEA Energy Atlas



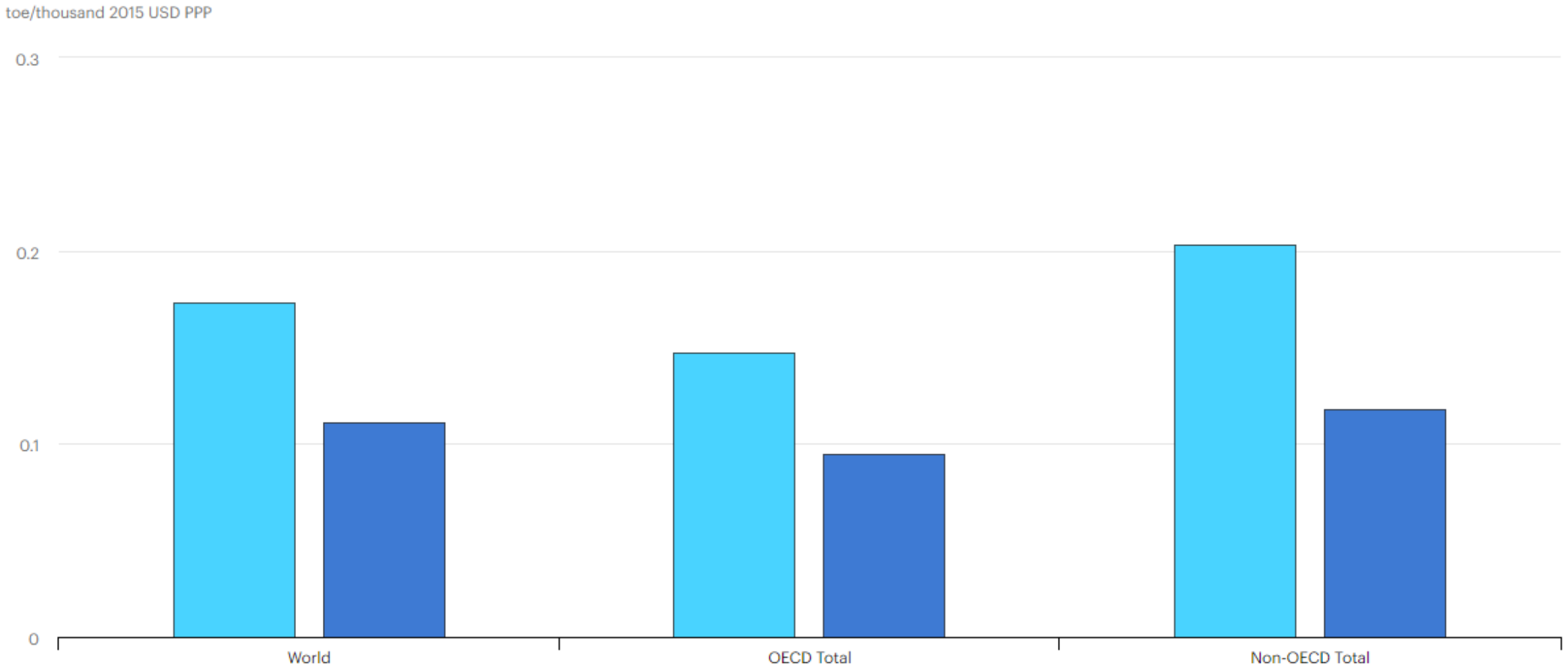
World GDP and TES trends, 1990-2018



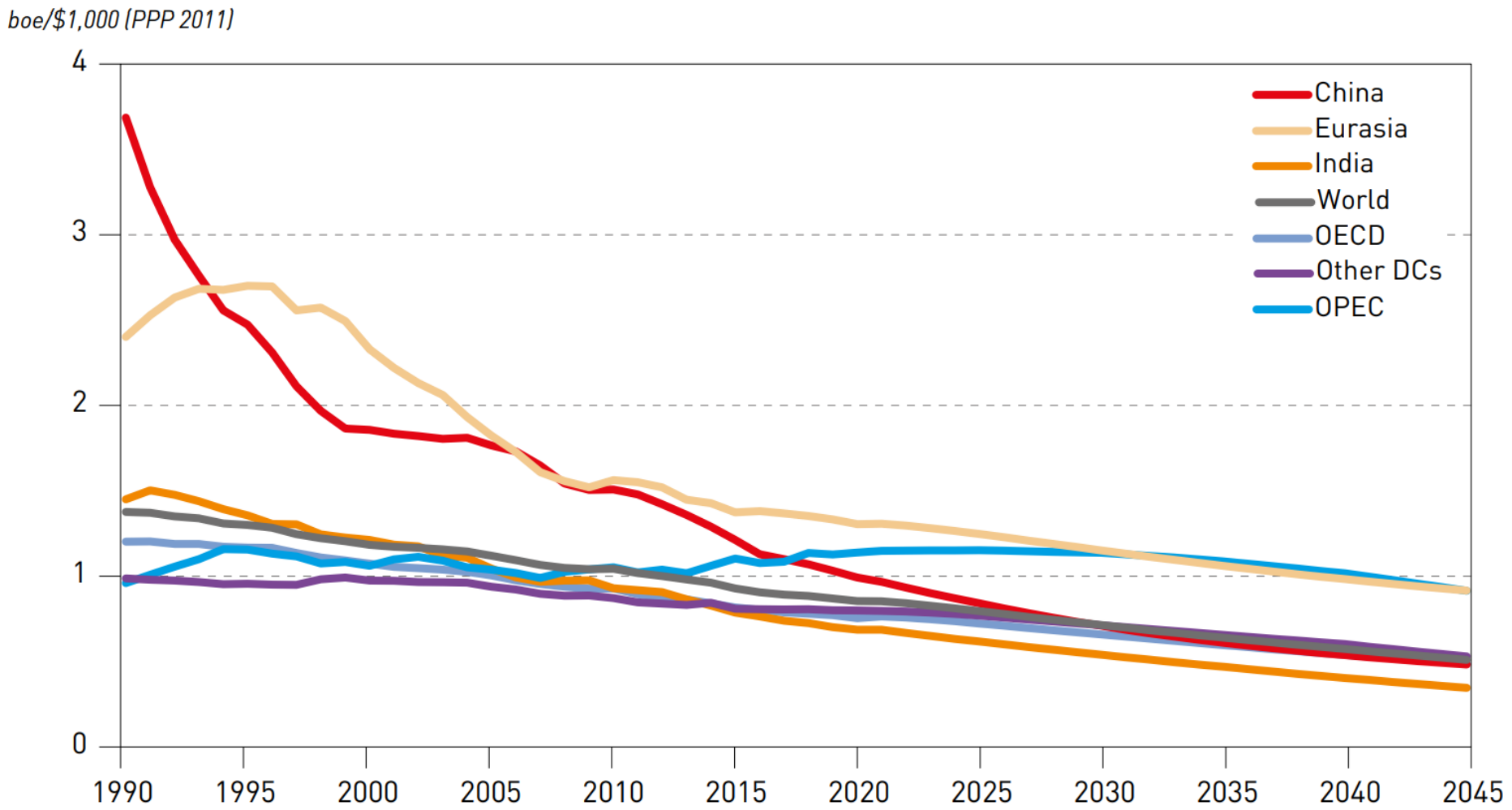
Energy Intensity



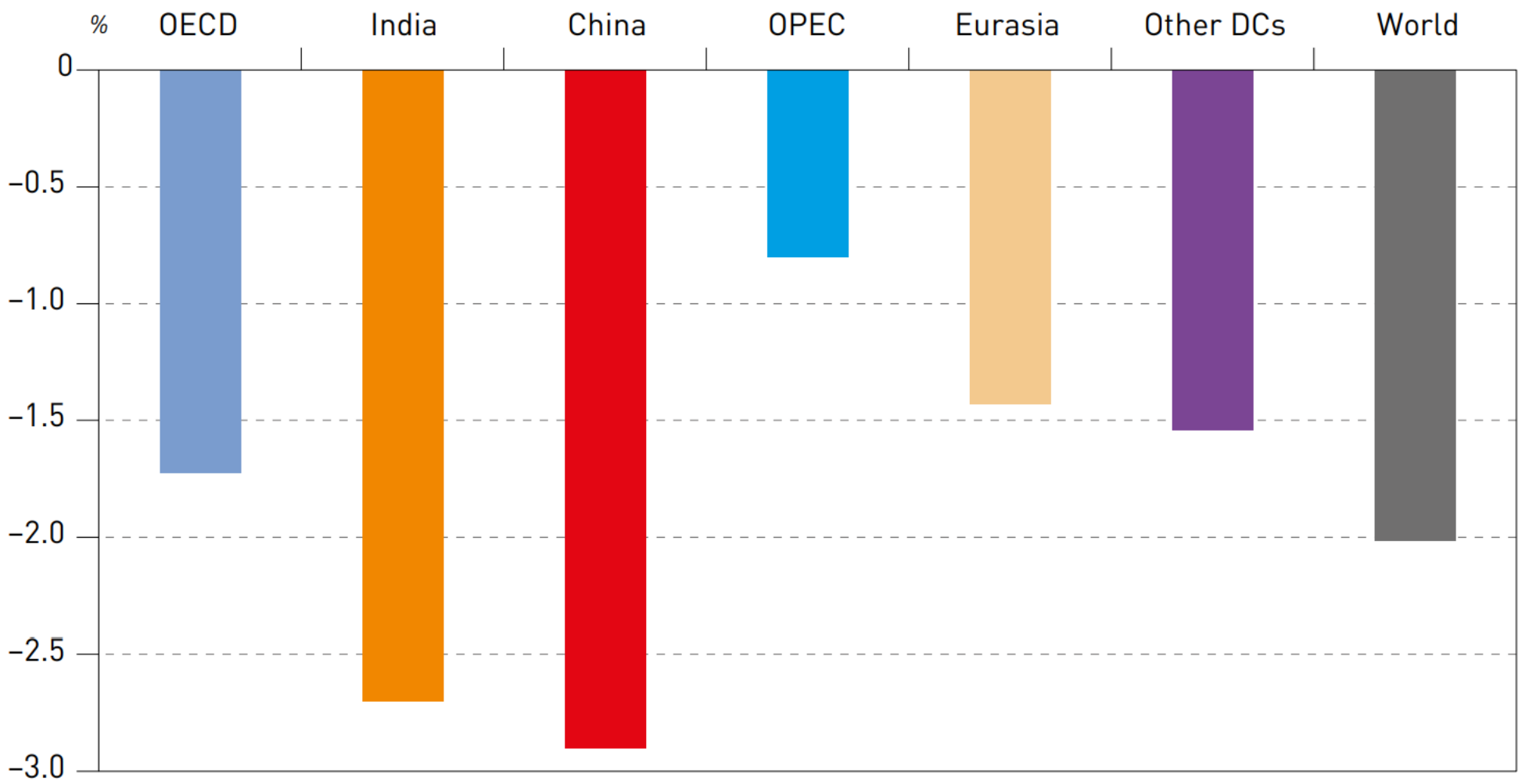
Global energy intensity, 1990 compared to 2018



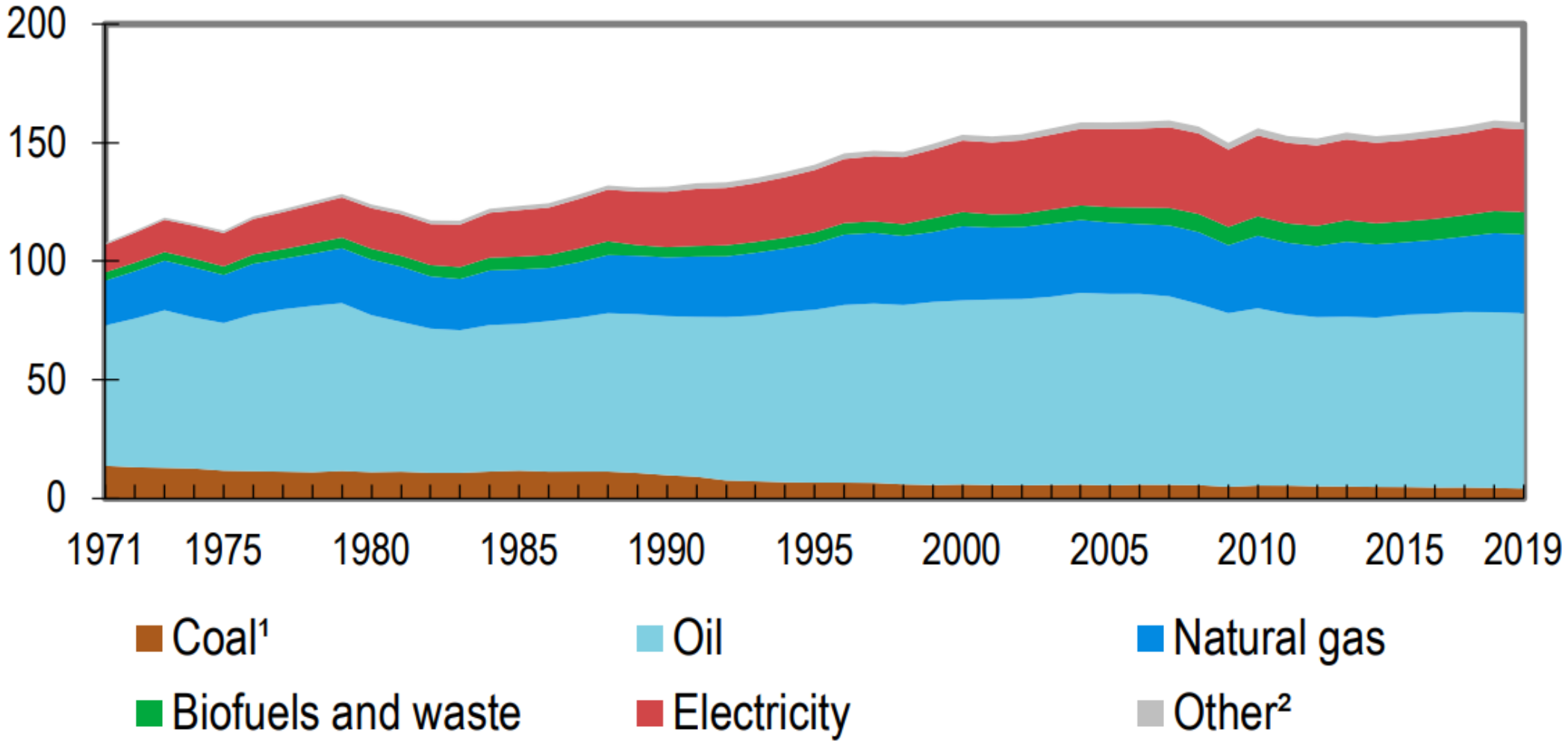
Energy Intensity



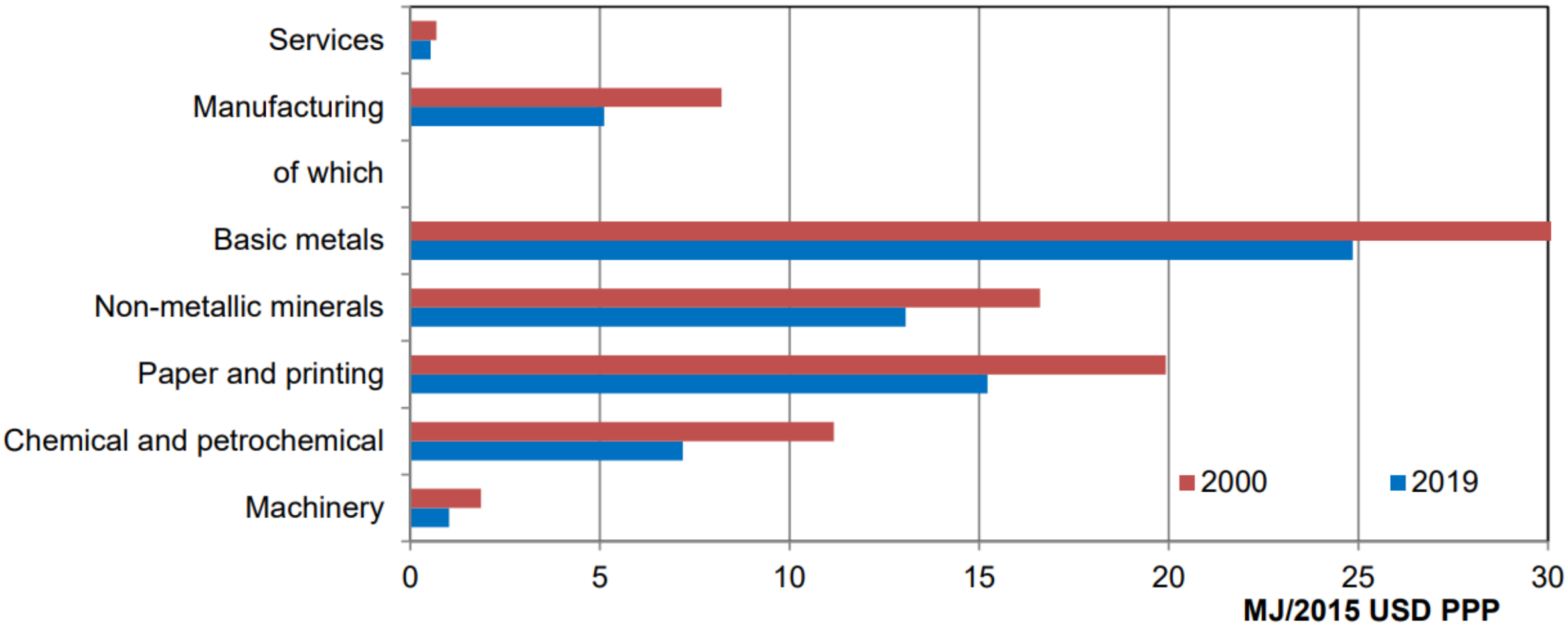
Average Annual Rate of Improvement in Energy Intensity



OECD Total Final Consumption By Source (EJ)

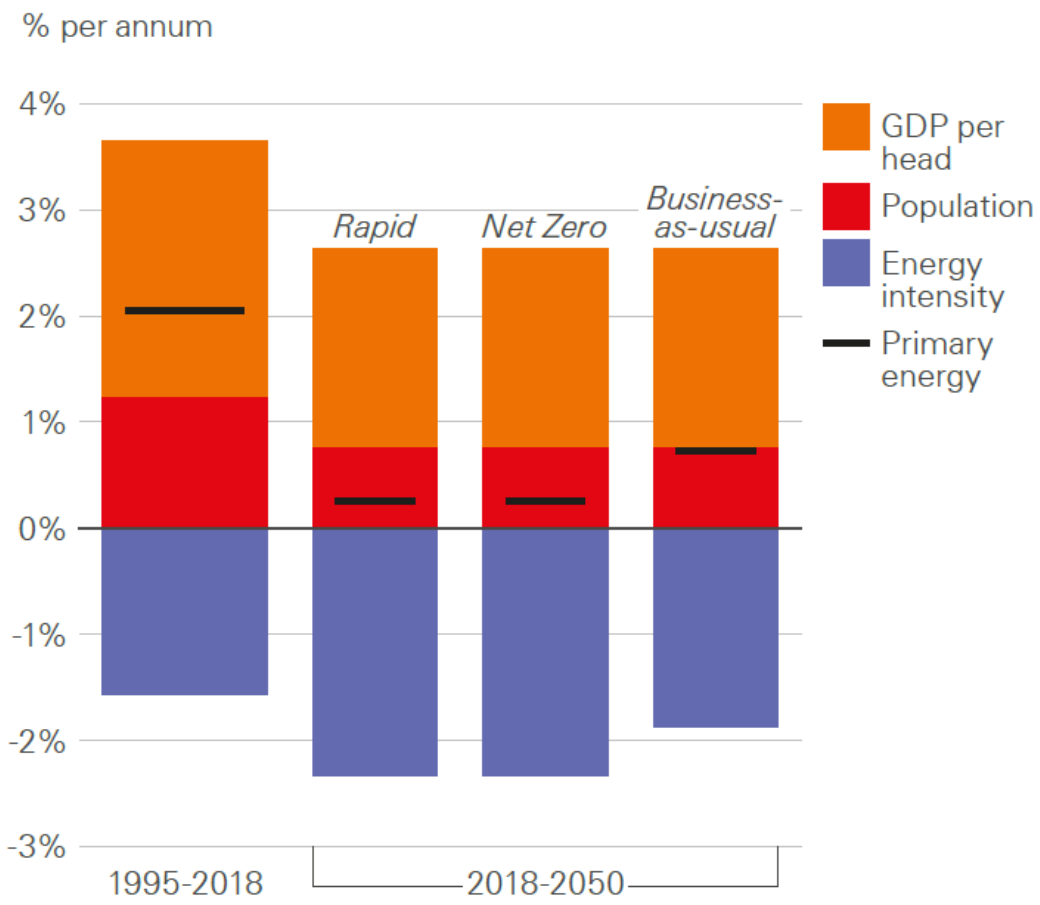


Services And Manufacturing In Selected IEA Countries: Energy Per Value Added

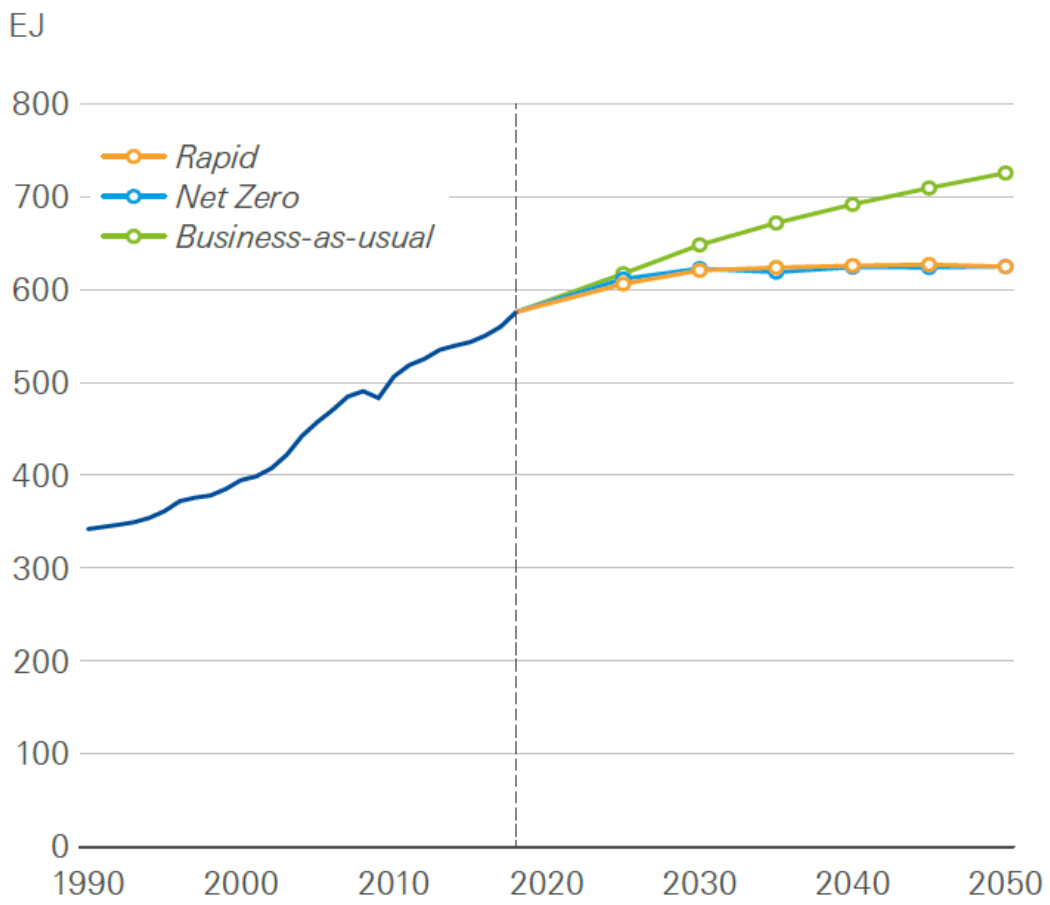


Primary Energy Demand

Contribution to primary energy demand growth

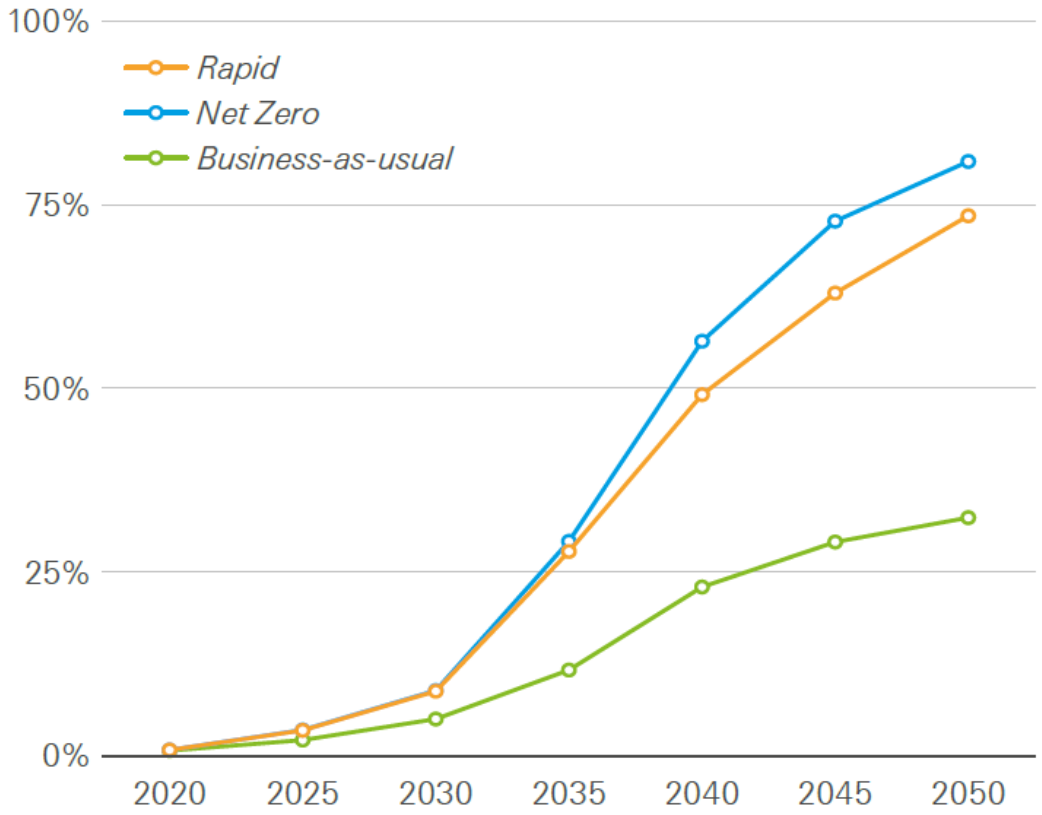


Global primary energy demand

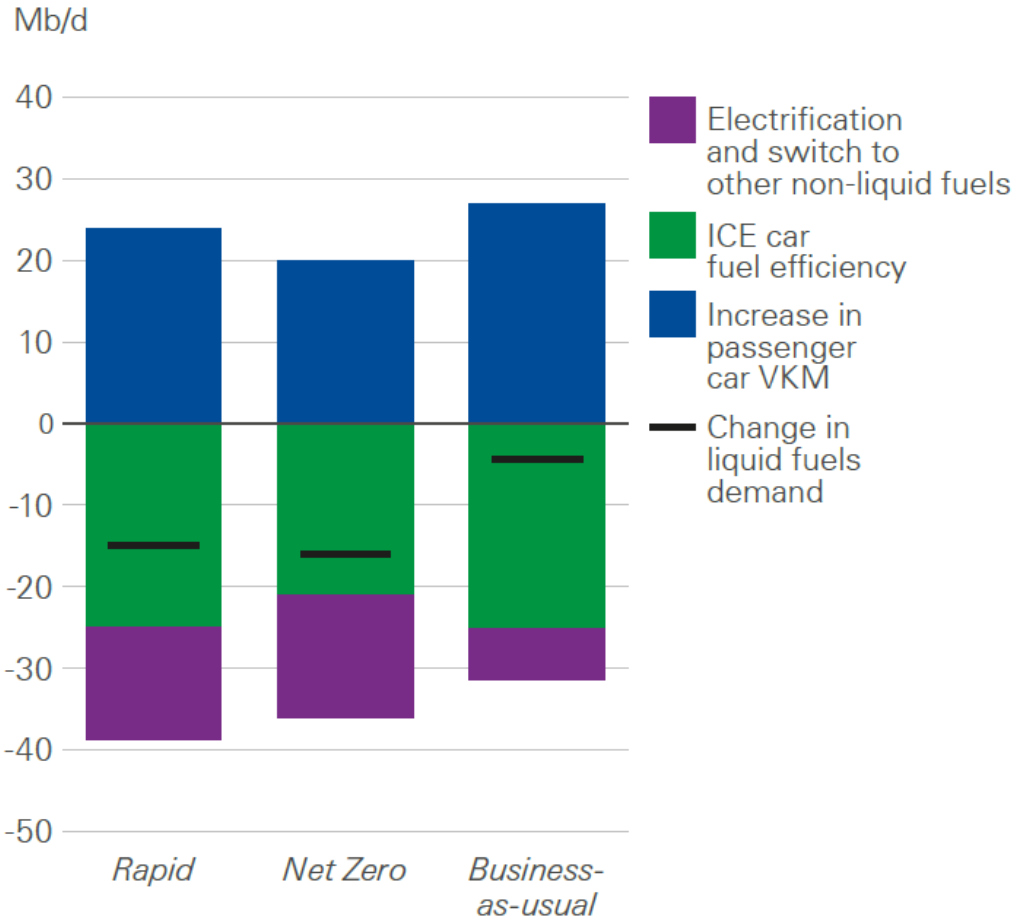


Energy Use in Road Transport

Share of car and truck vehicle kilometres electrified*



Factors impacting passenger car liquid fuels demand over the outlook



Trend 3:
Peak Oil

Peak Oil

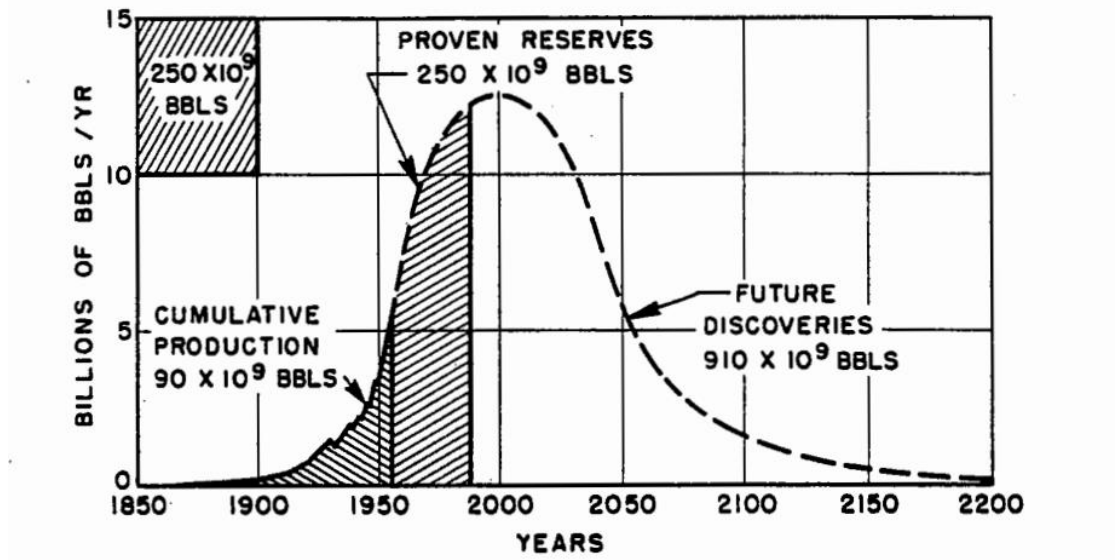


Figure 20 – Ultimate world crude-oil production based upon initial reserves of 1250 billion barrels.

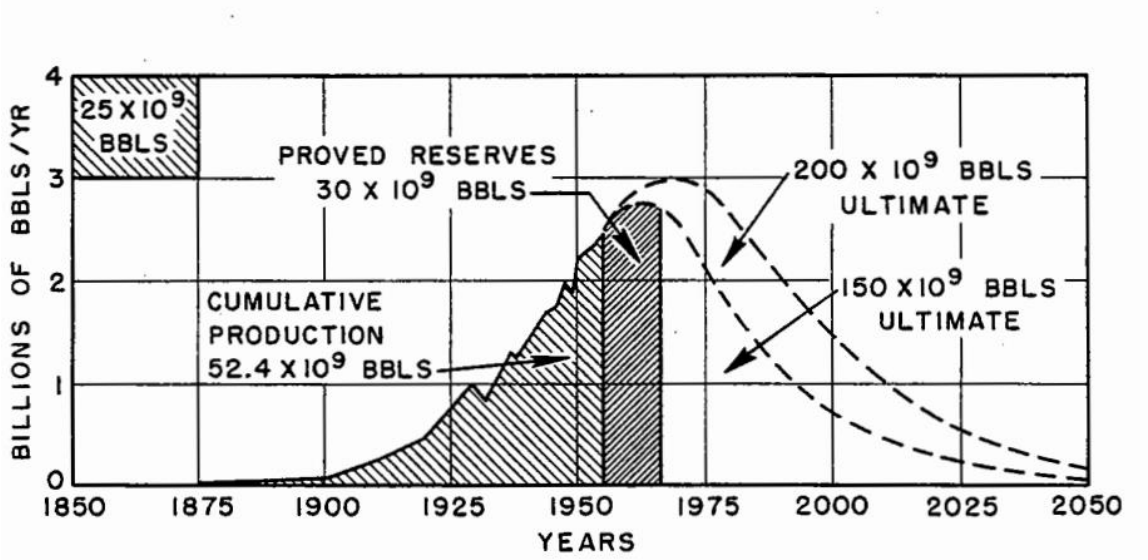
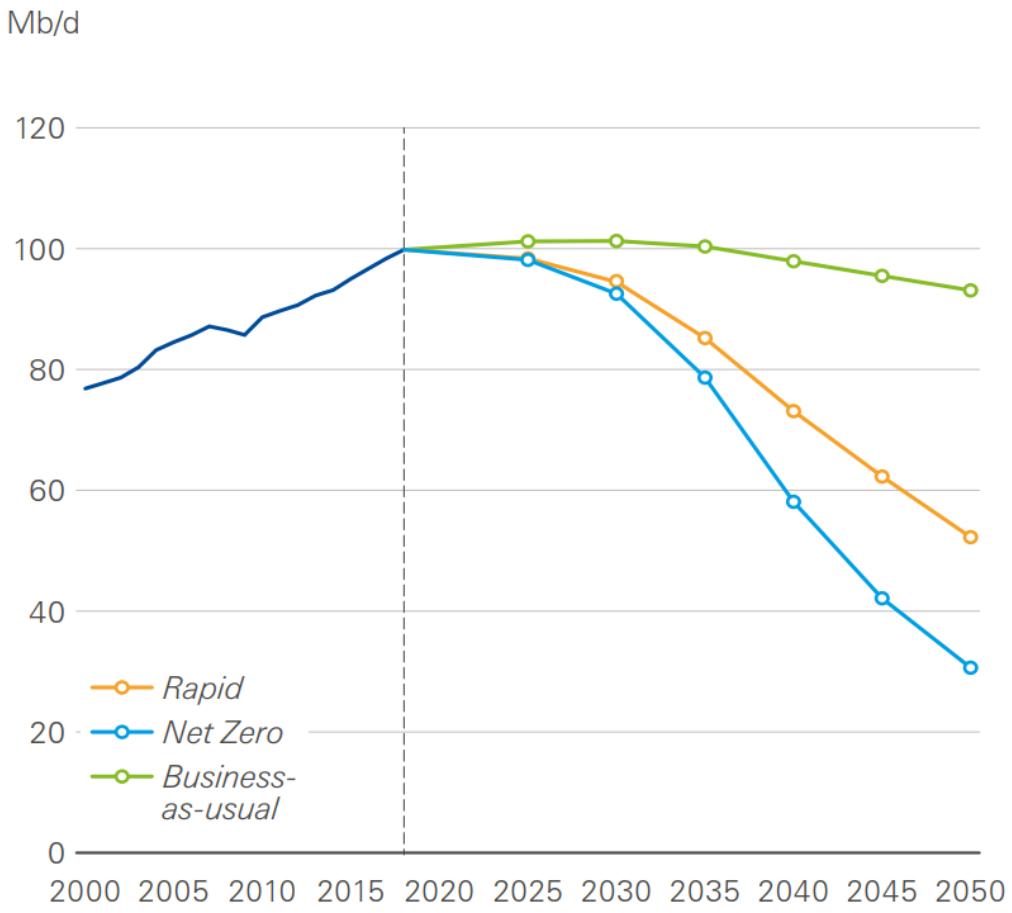


Figure 21 – Ultimate United States crude-oil production based on assumed initial reserves of 150 and 200 billion barrels.

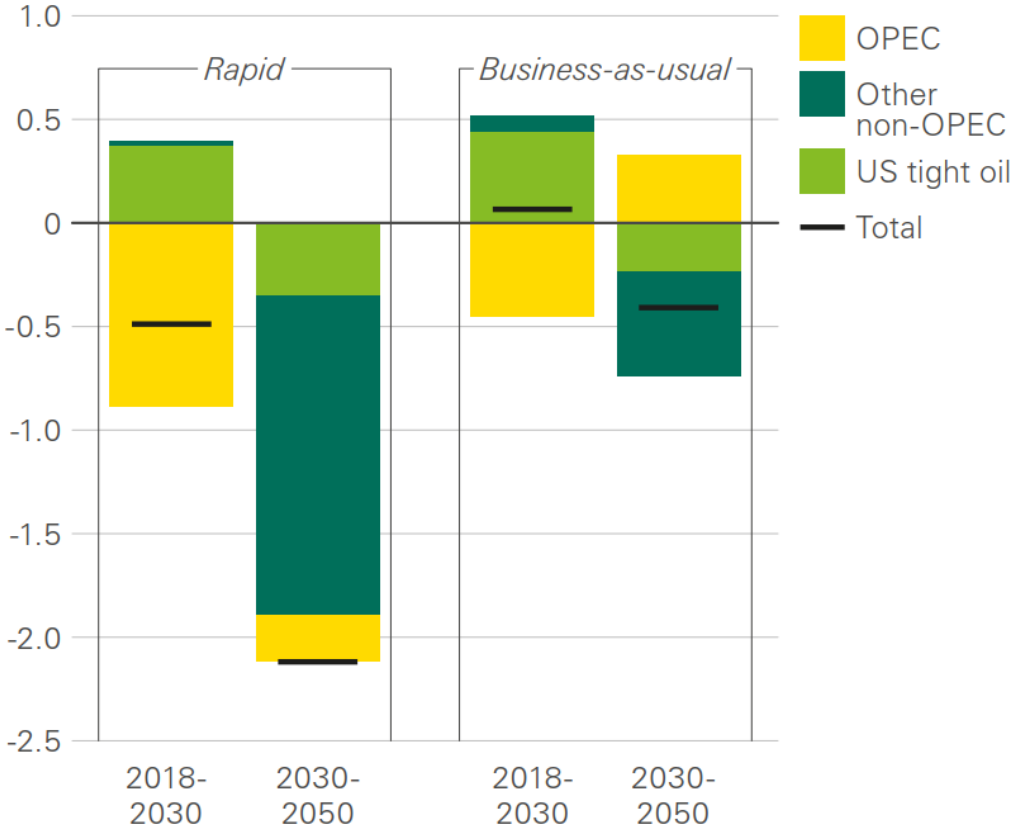
Nuclear Energy and the fossil fuels by M. King Hubbert, 1956

Liquid Fuels Demand & Supply

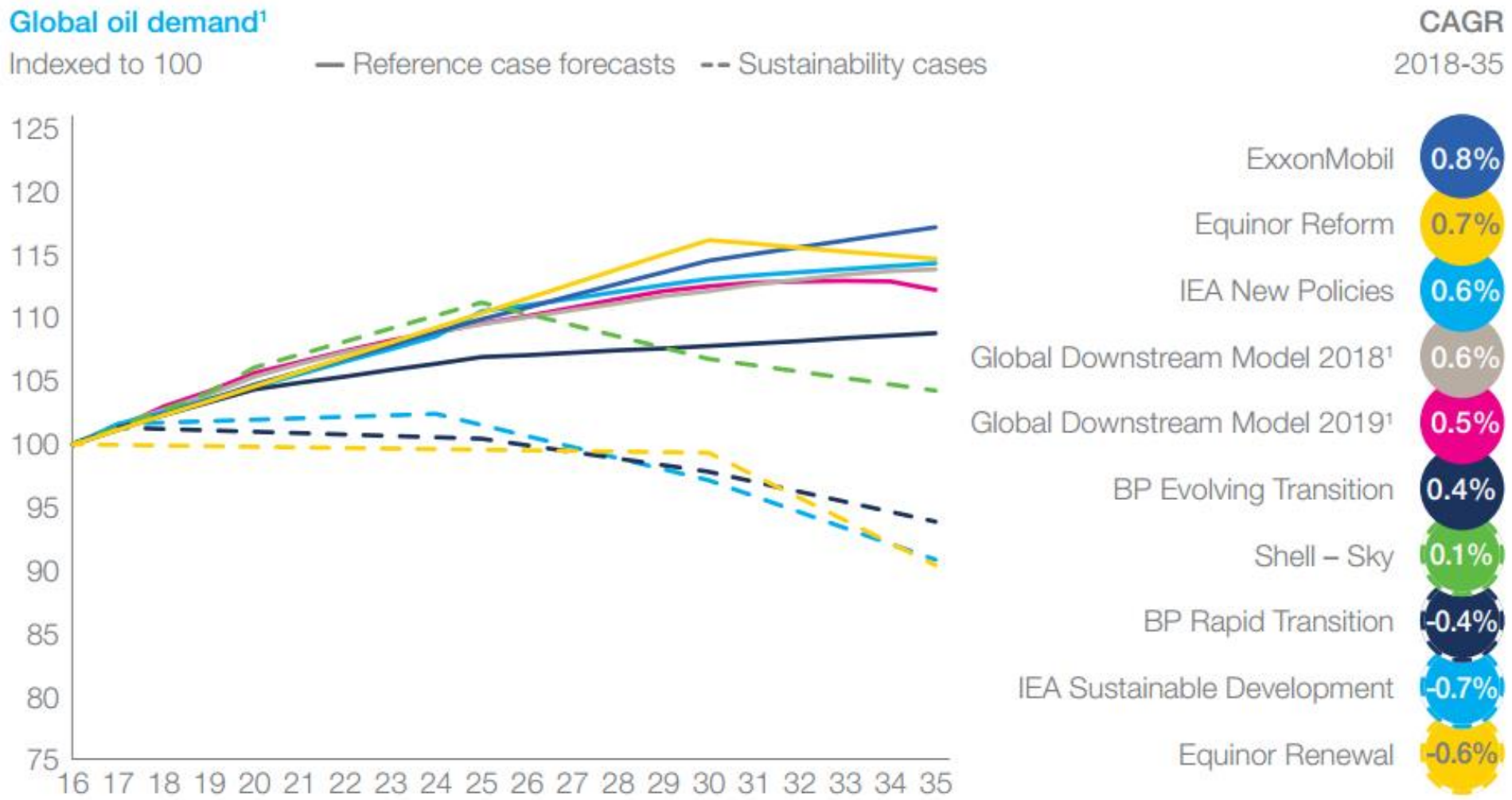
Liquid fuels consumption



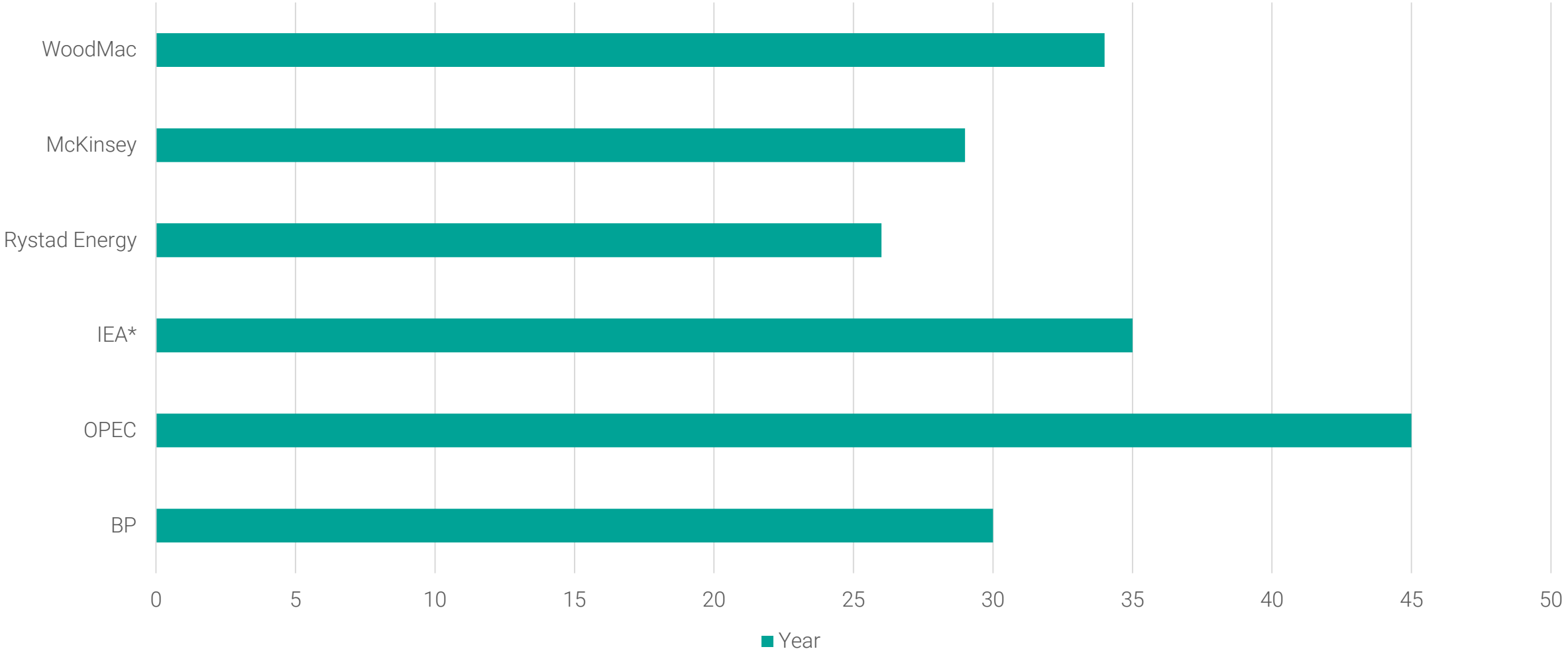
Liquid fuels supply growth



Peak Oil Scenarios



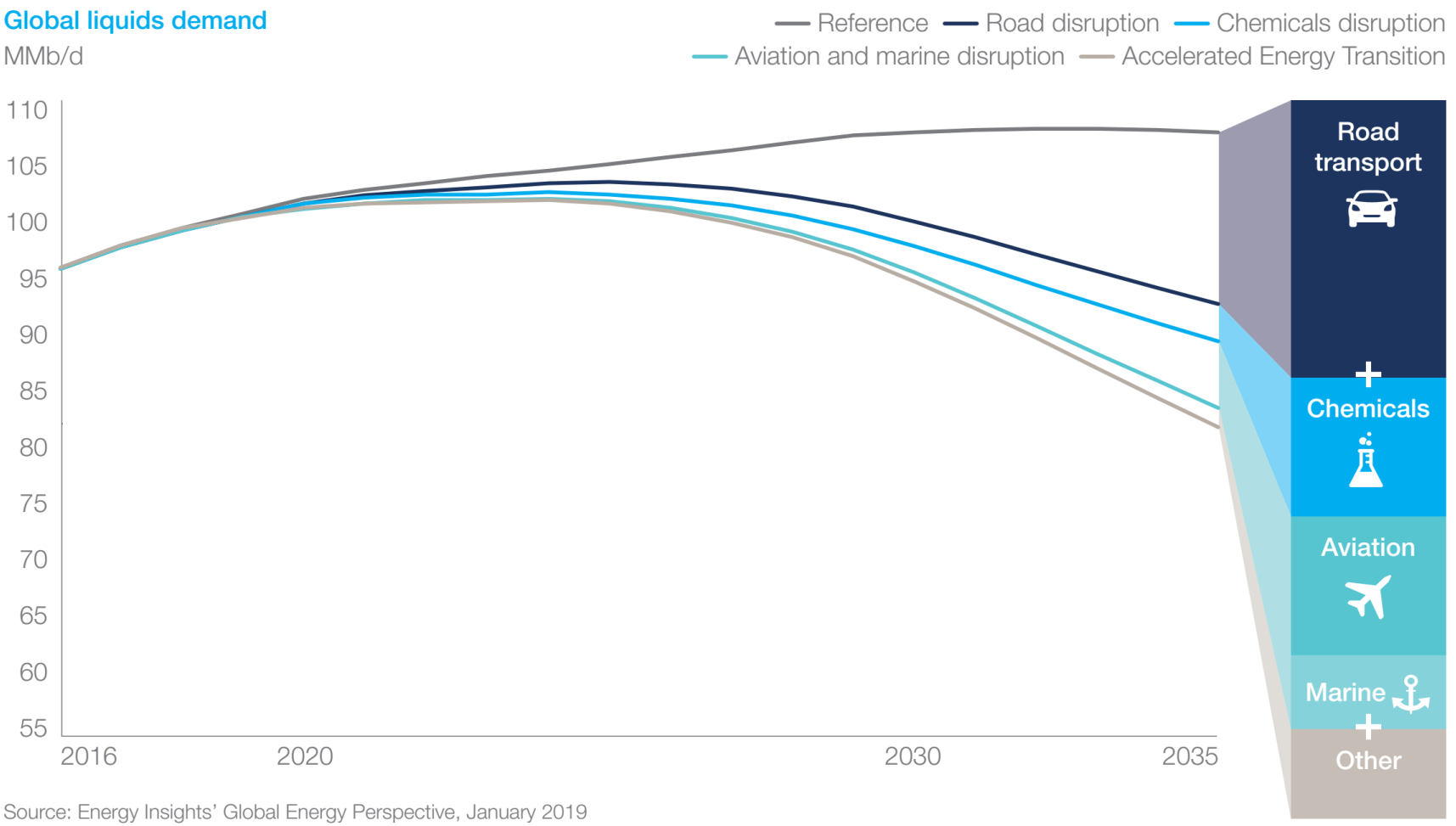
Peak Oil Demand Year (Base Case)



Global Liquids Demand

Global liquids demand

MMb/d



Source: Energy Insights' Global Energy Perspective, January 2019

Reference Case ■ Additional in Accelerated Energy Transition case

EV passenger car penetration

EVs as % of global new passenger car sales

2018	1		
2035	46	33	78

EV commercial vehicle penetration

EVs as % of global new truck car sales

2018	<1		
2035	26	22	49

Plastics recycling

% polyethylene from recycled feedstock

2018	4		
2035	10	13	23

Alternative fuels uptake

% biofuels, natural gas, and electricity in the fuel mix

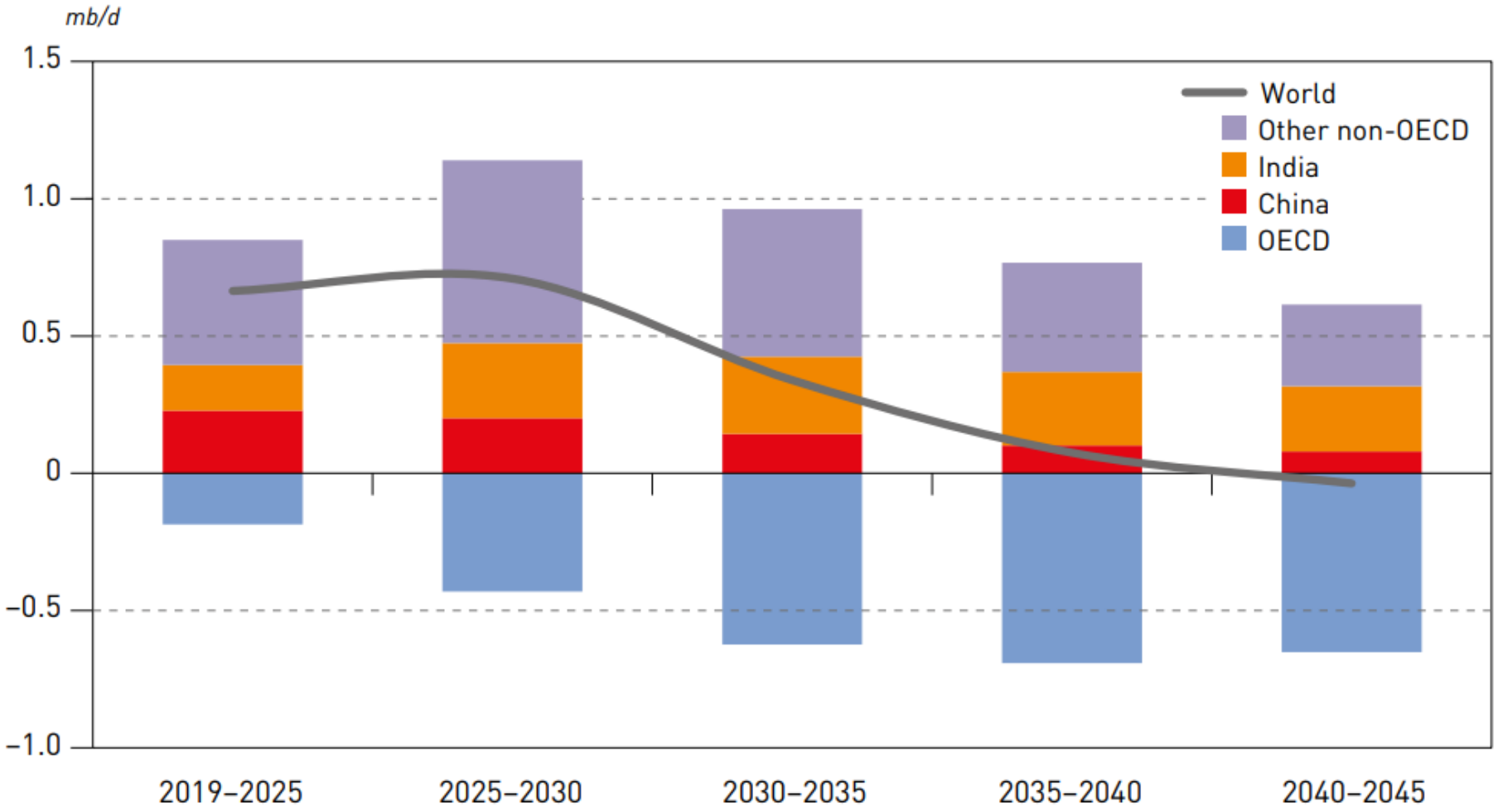
2018	0		
2035		31	

2018	0		
2035	27	14	42

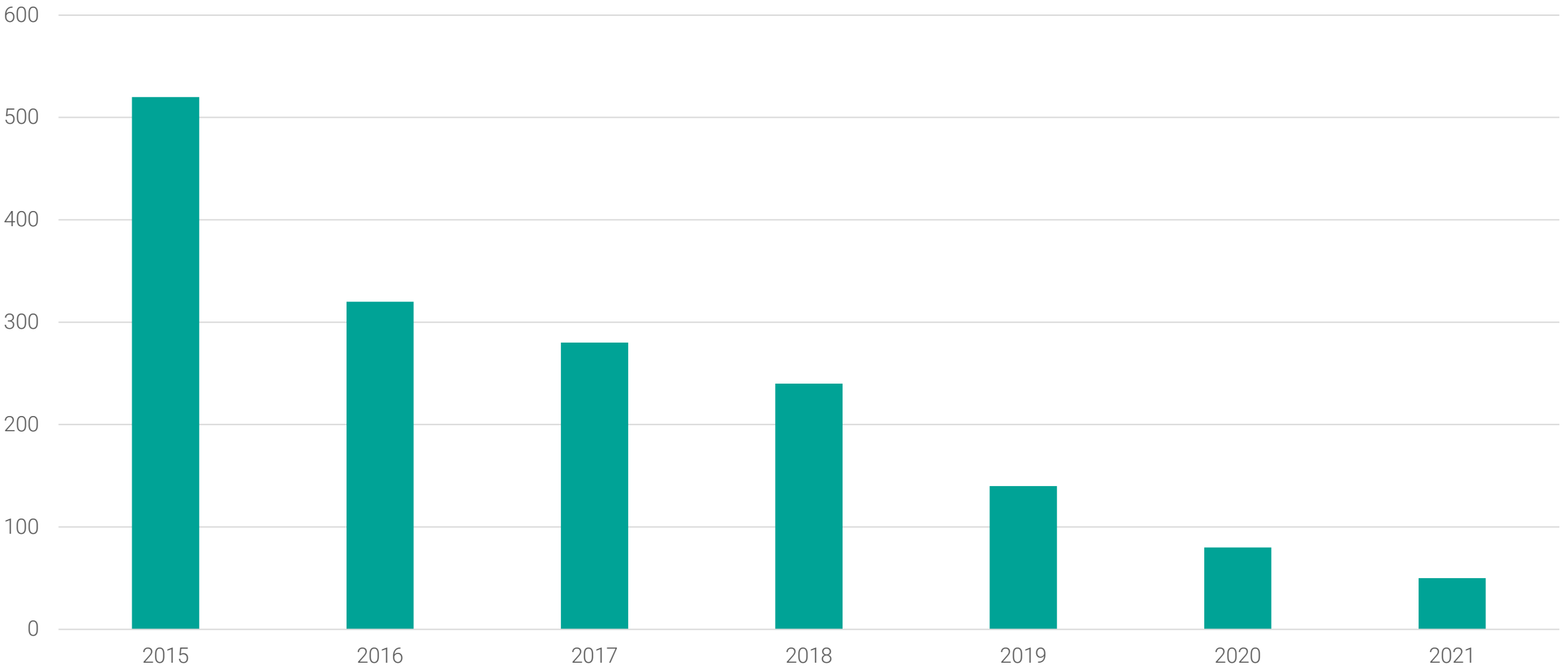
Other

Heat and cooking electrification; industry electrification; and other transport and other energy sectors

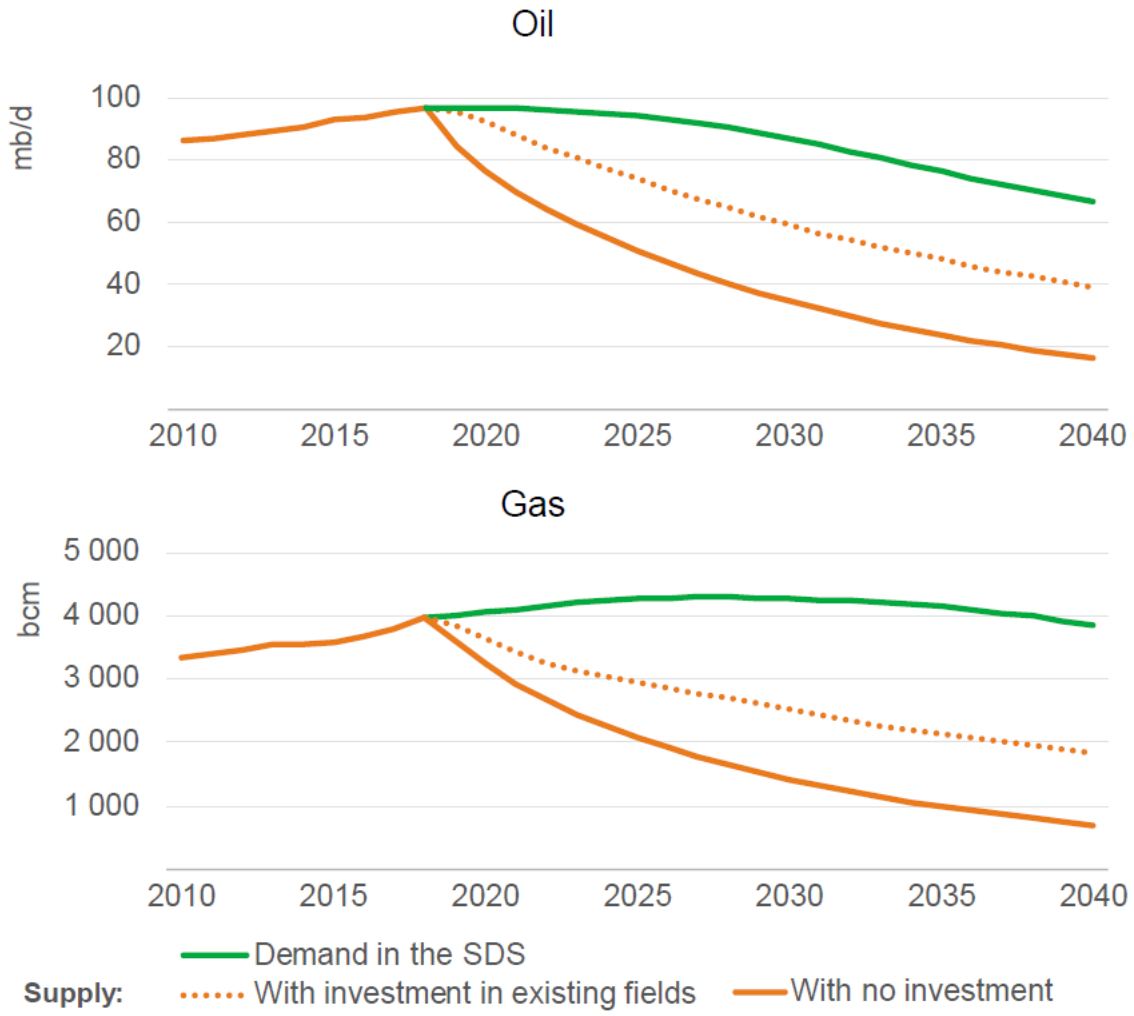
Average Annual Oil Demand Growth



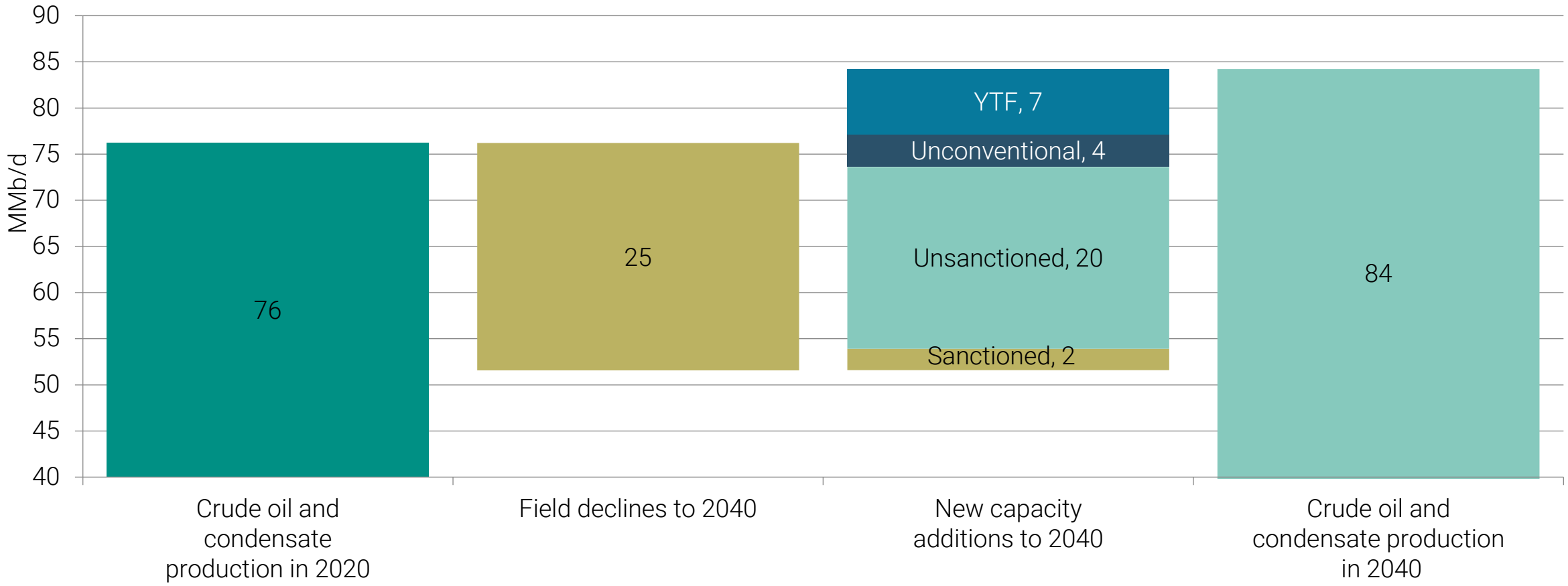
Average Annual Oil Demand Growth in OPEC WOO for Period 2035–2040



Required Investments

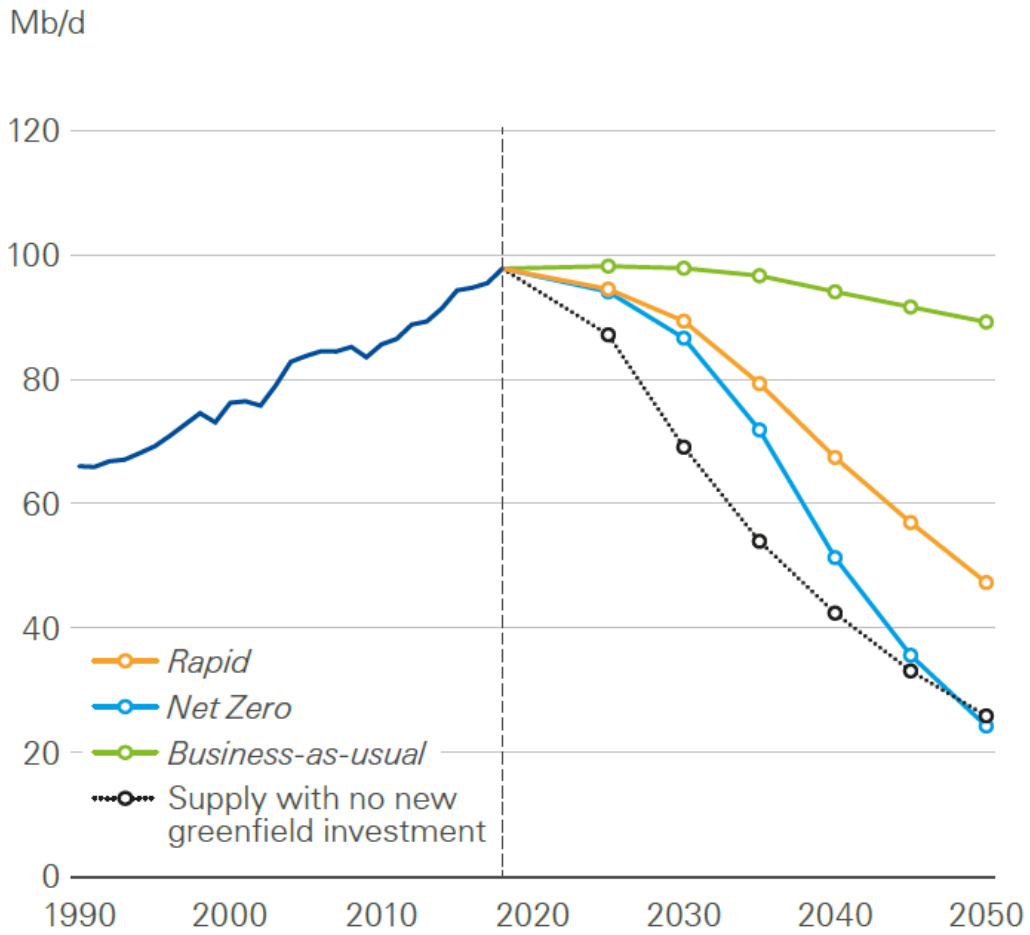


Global Crude Oil And Condensate Outlook Balance In 2040

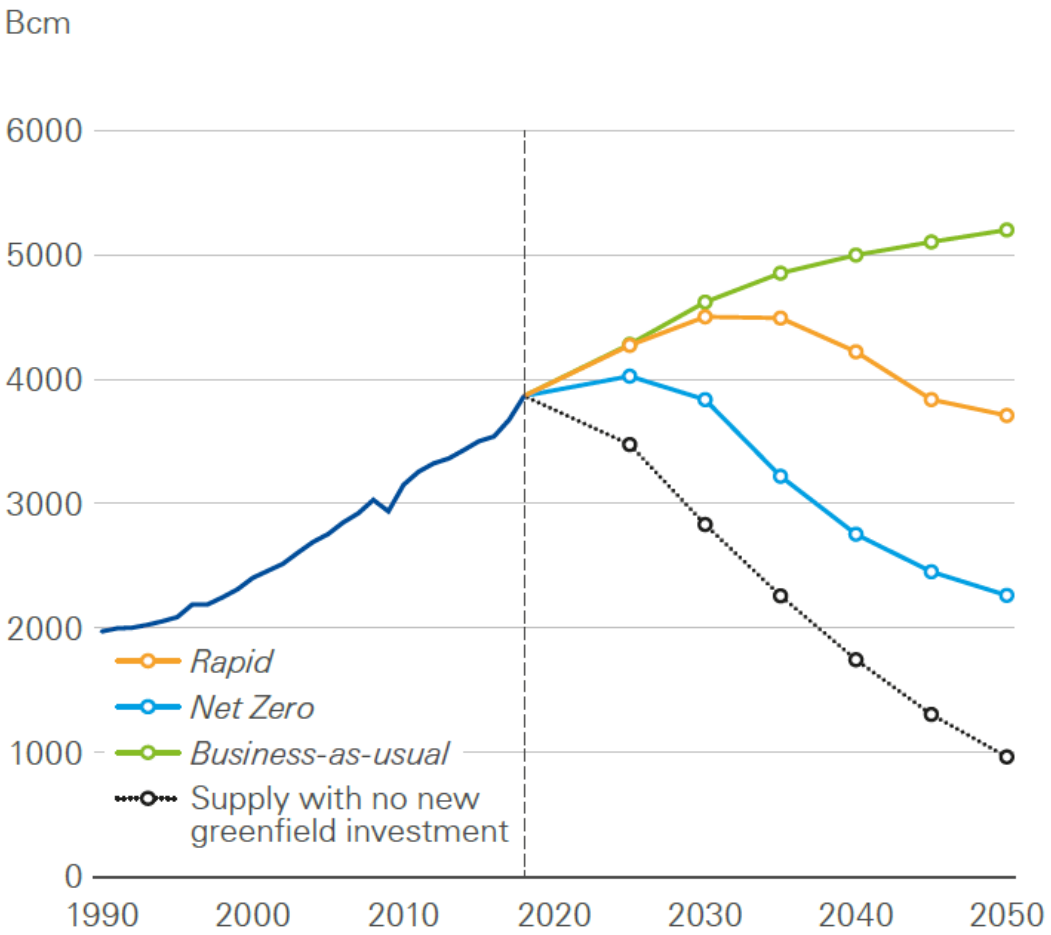


Uncertain Demand

Consumption and production of oil

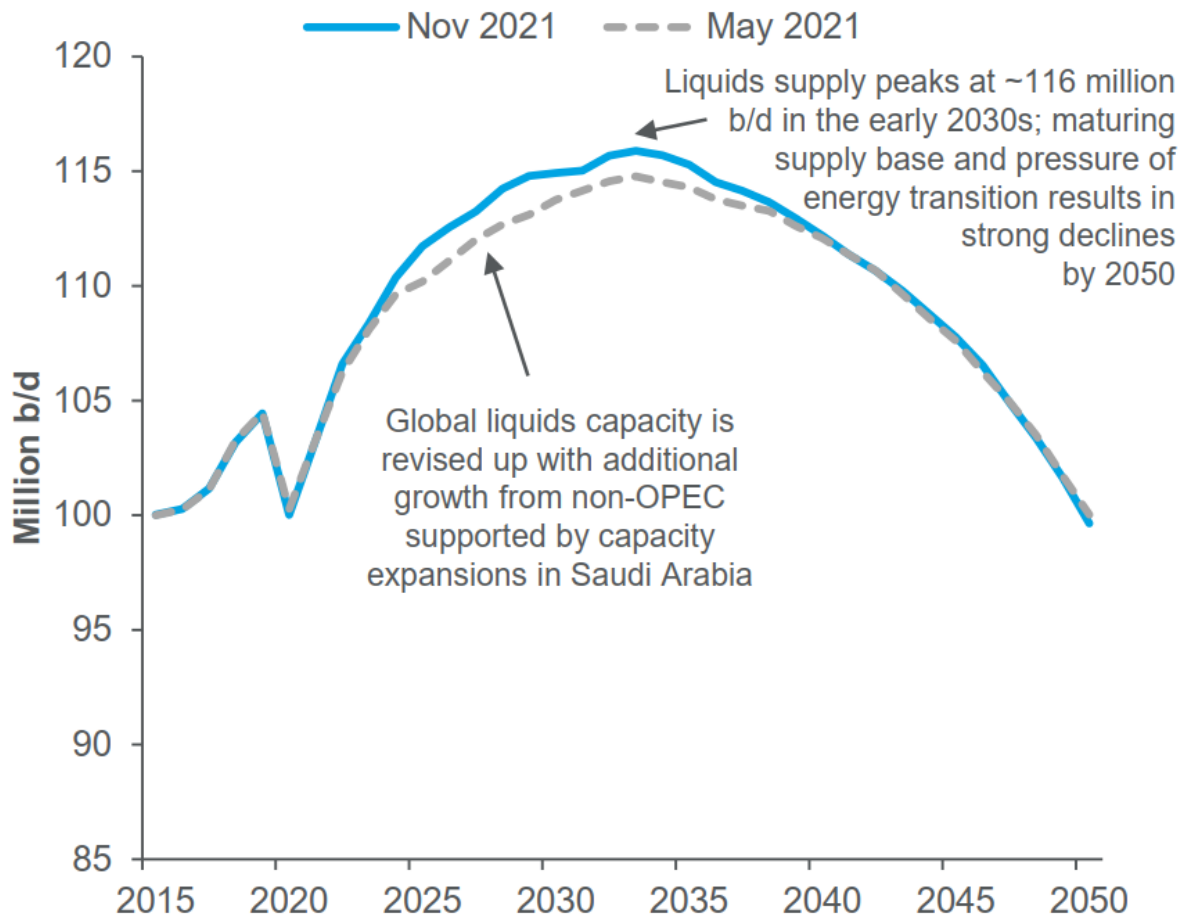


Consumption and production of natural gas

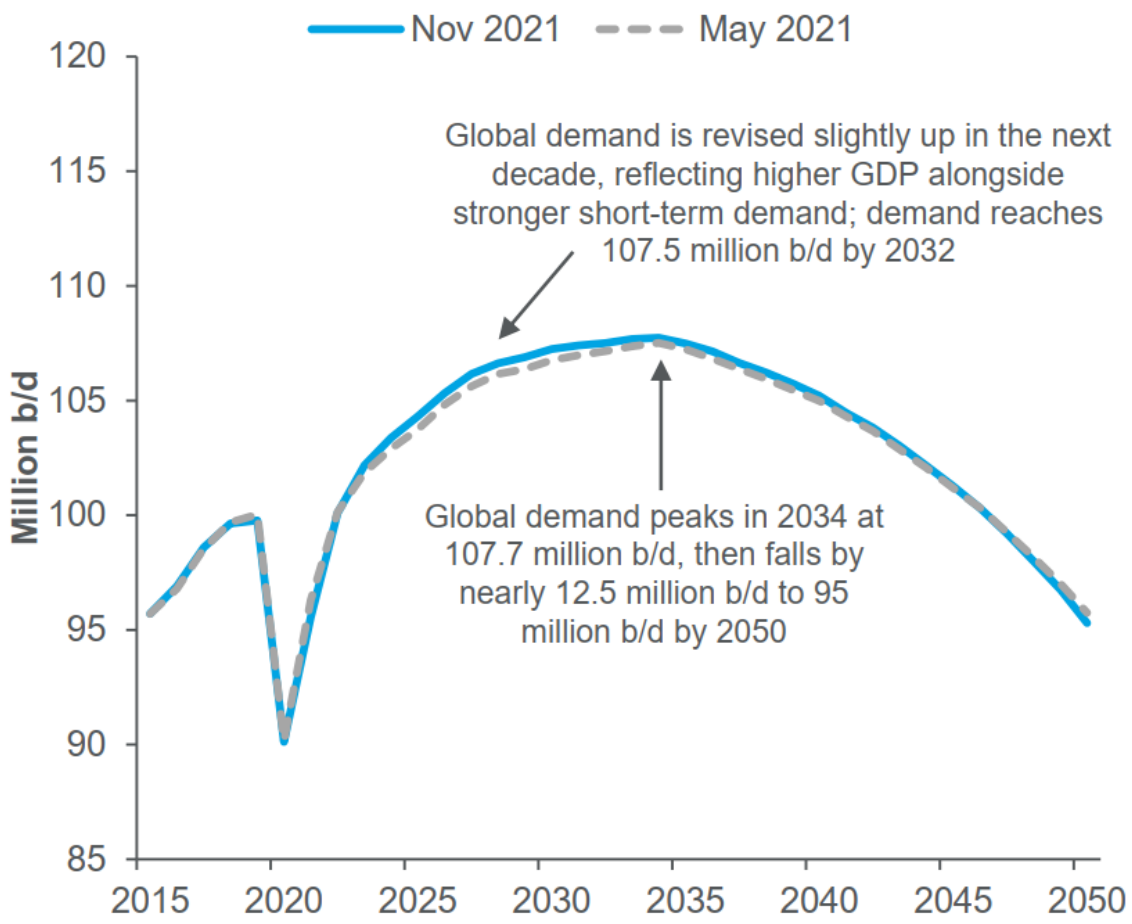


Global Liquids Supply & Demand

Global liquids capacity*

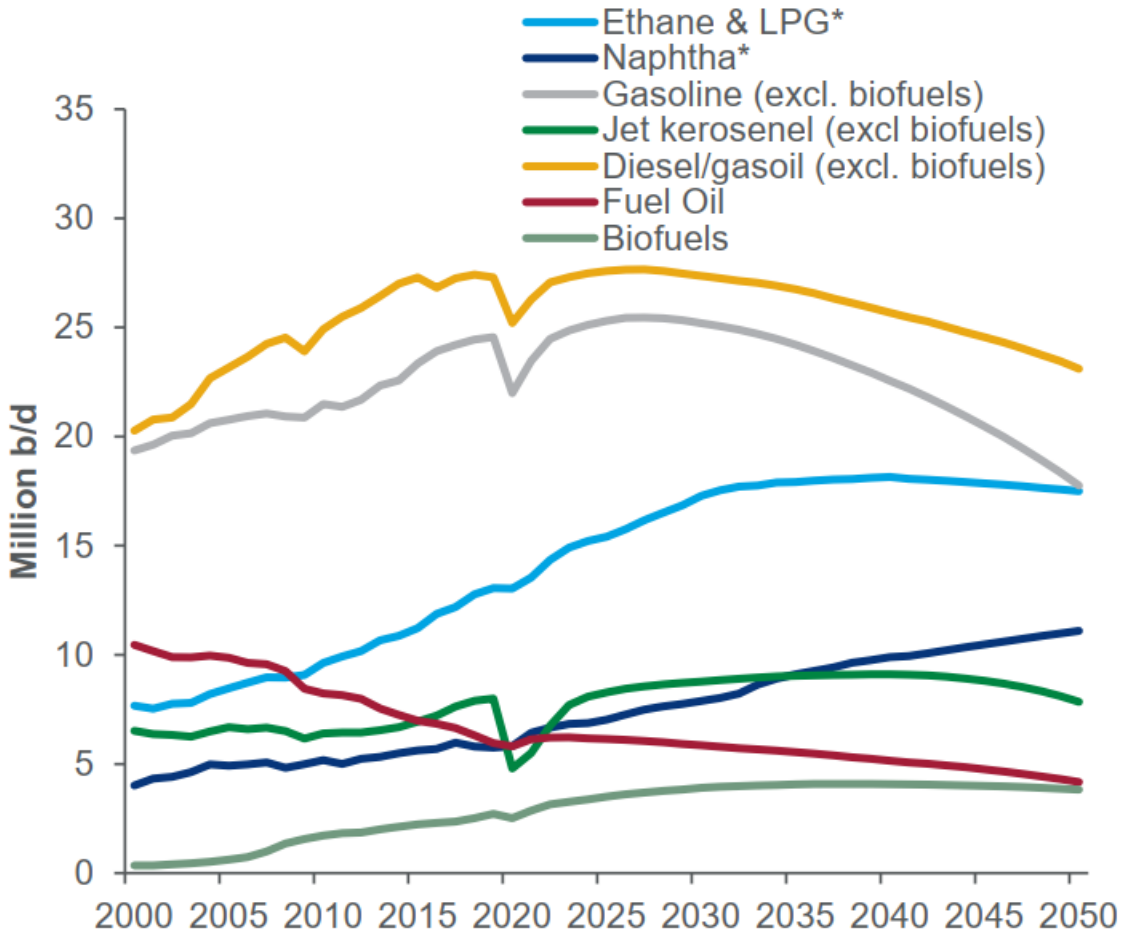


Global liquids demand

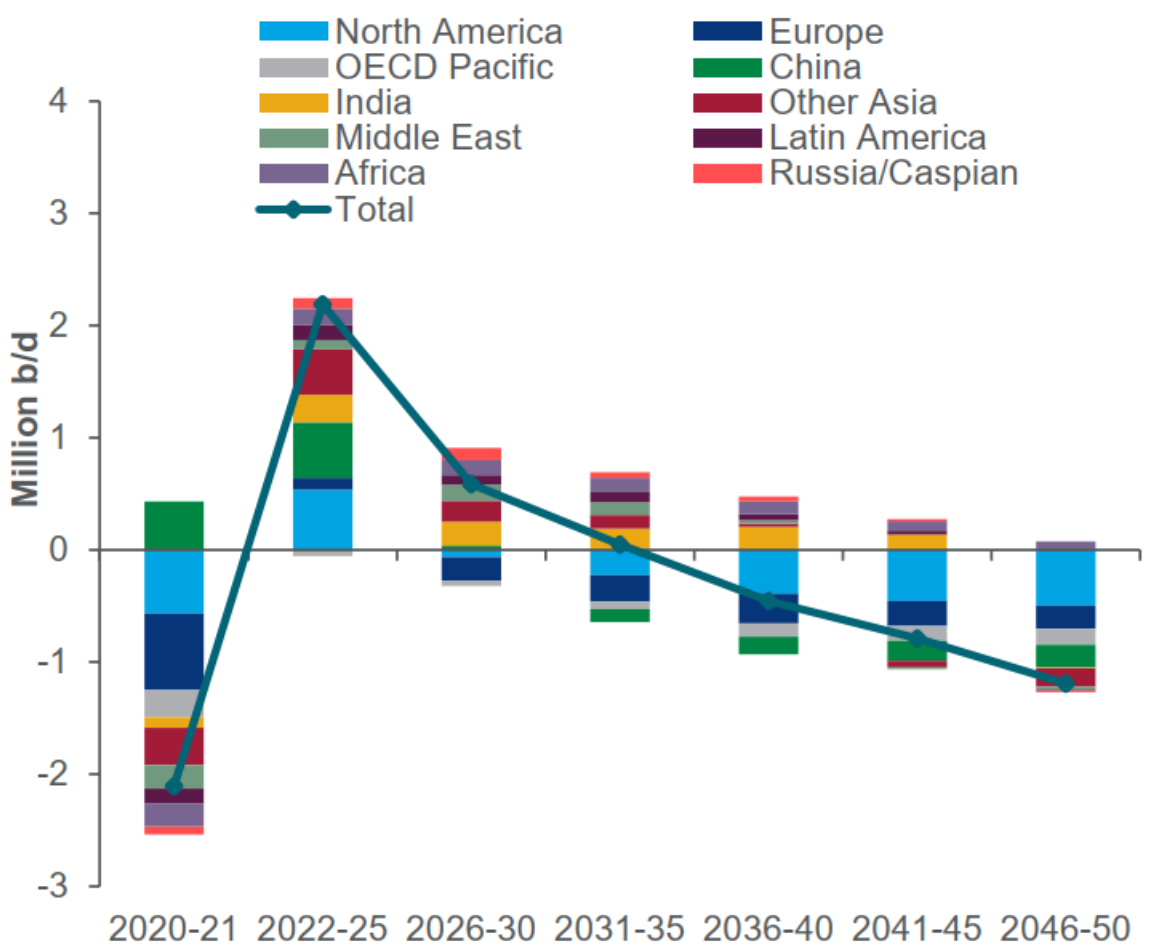


Demand Peak By Product And Region

Global products demand

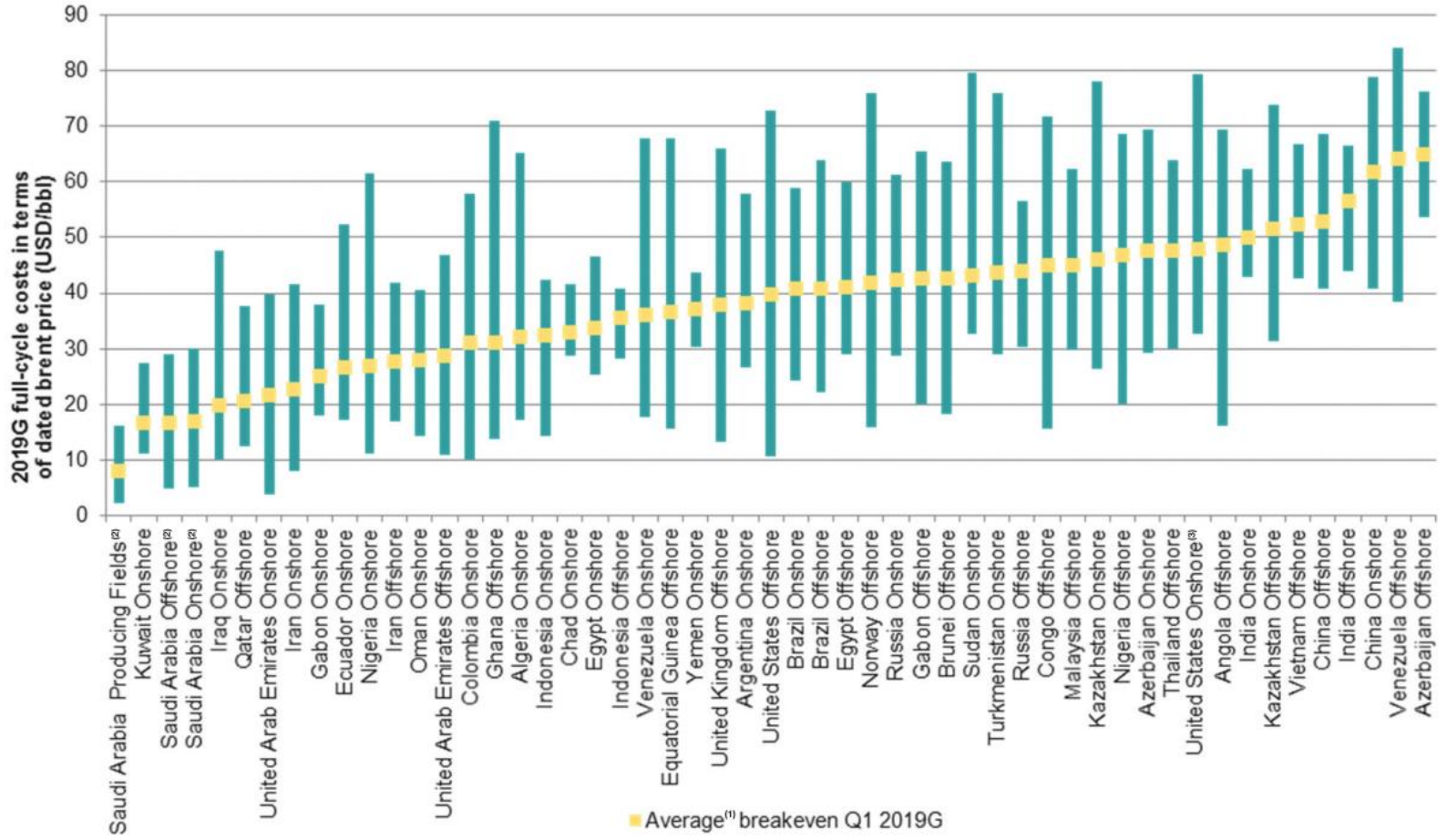


Average YoY change in total liquids demand by region

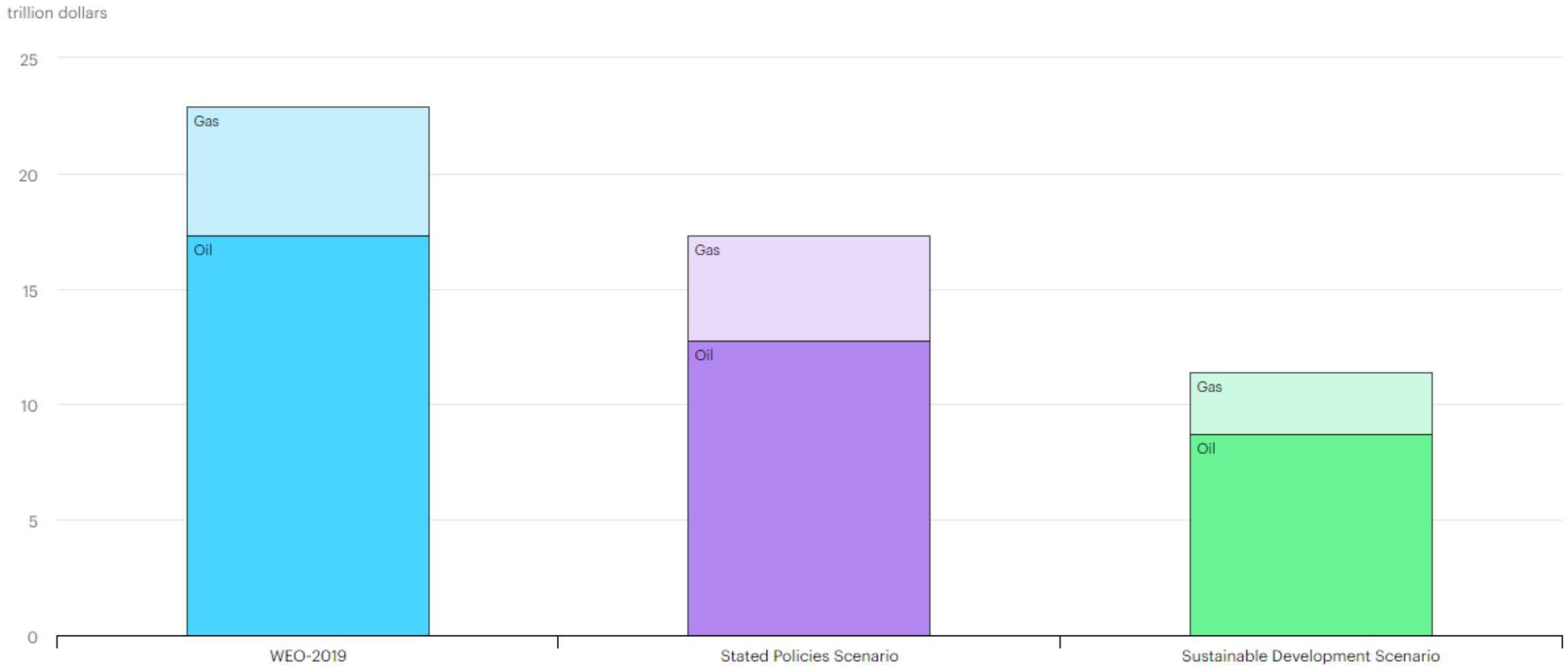


Breakeven Cost for New Oil Projects

Exhibit 6: Post-tax breakeven costs for new oil projects at a 10% rate of return by country through 2030G



Estimated Present Value of Future Oil and Natural Gas Production to 2040



Unburnable Carbon

مجله ی 181 - آن که گفت آری، آن که گفت نه اخبار بین الملل (اقتصاد)

تاریخ انتشار: هنبه ۲۹ خرداد ۱۳۹۵

مرگ مدل قدیمی کسب و کار شرکتهای بینالمللی نفتی

پایان غول‌ها

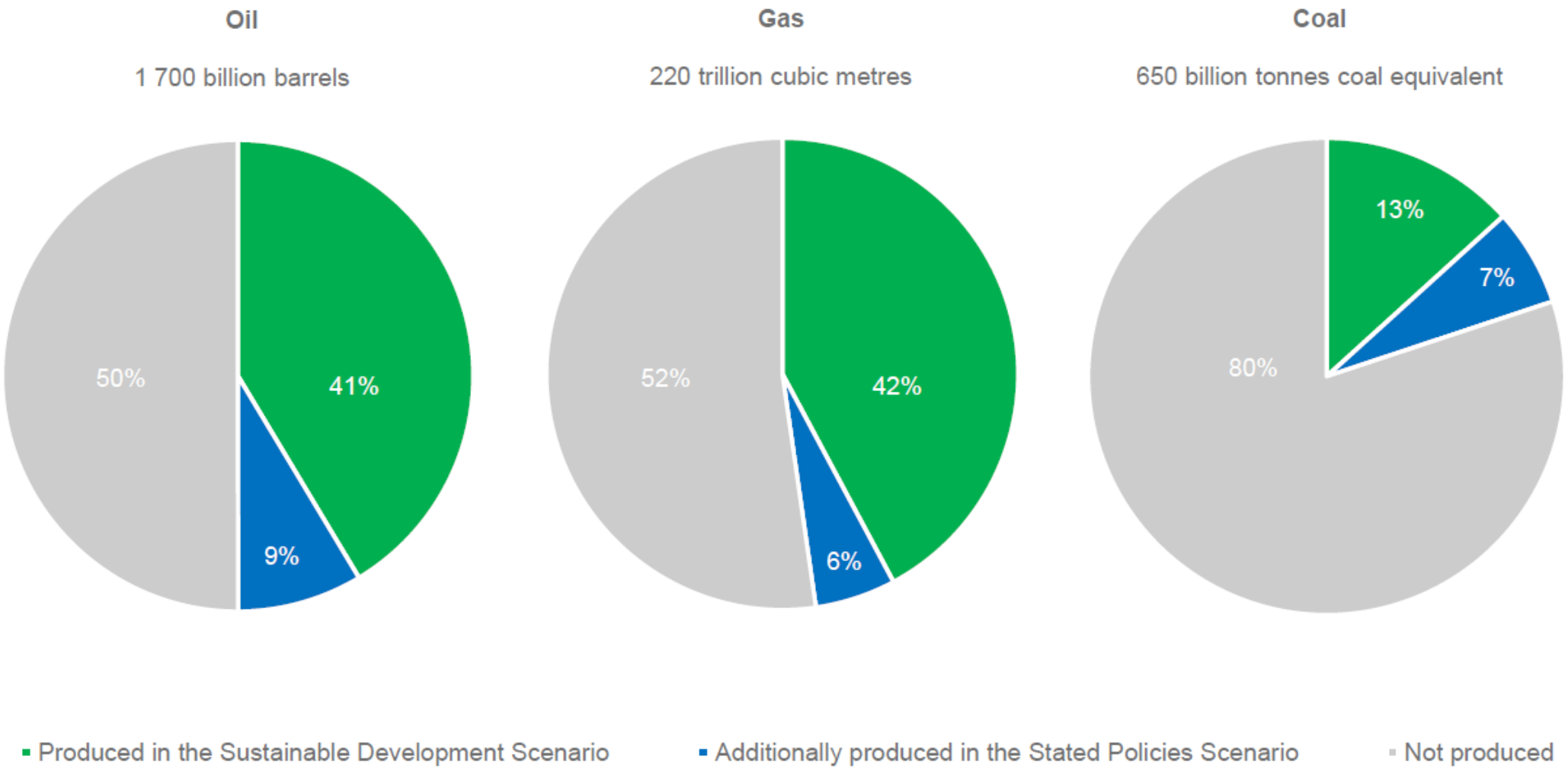
آینده شرکت‌های نفتی بزرگ بین‌المللی(IOCها)، شامل بی‌پی، شورون، اگزون موبیل، شل و توتال، در هاله‌ای از تردید قرار دارد. مدل کسب و کار که طی قرن بیستم موجب بقای آنها شد، اکنون دیگر برای دستیابی به اهداف مناسب به نظر نمی‌رسد. در نتیجه این شرکت‌ها با دو انتخاب مواجه هستند: مدیریت نزولی آرام از طریق کوچک‌سازی؛ 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

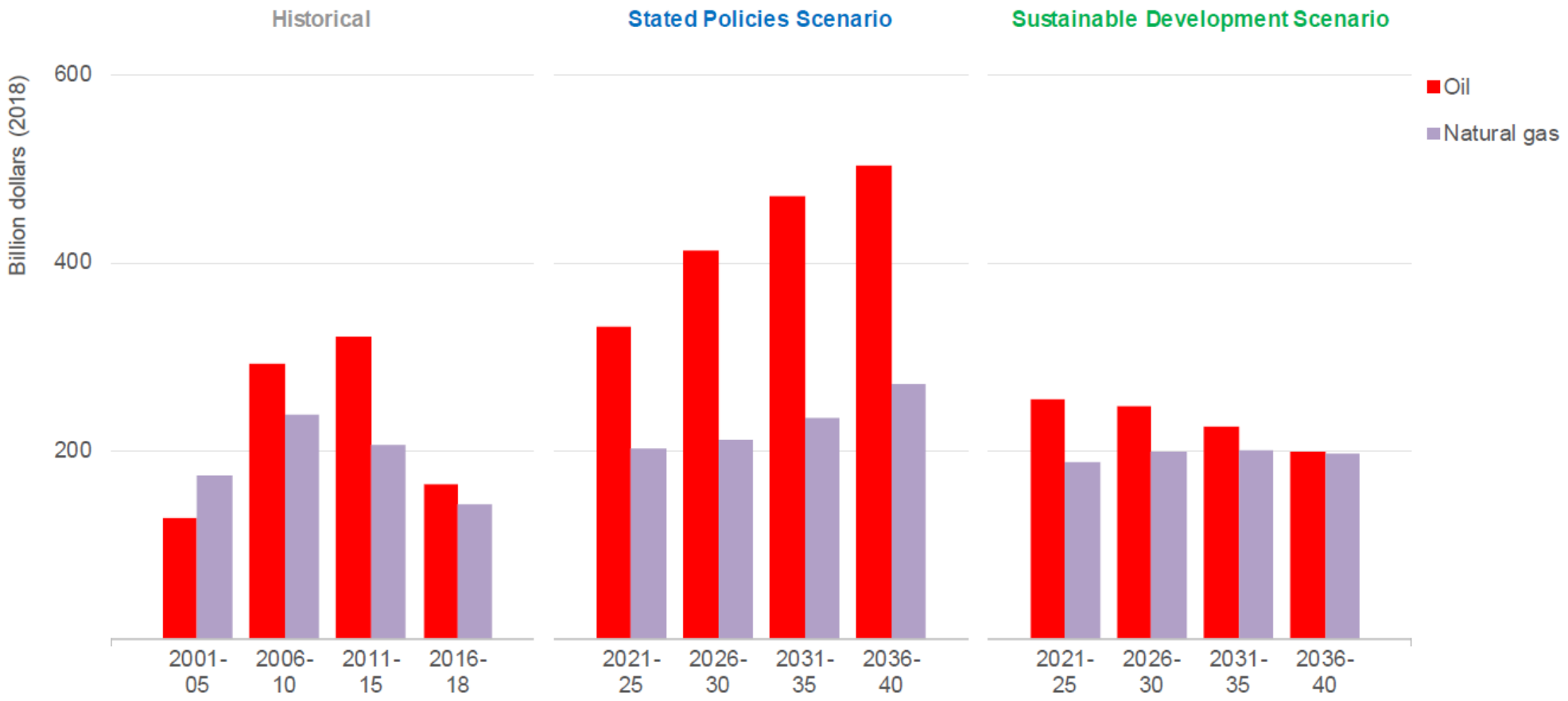
آینده شرکت‌های نفتی بزرگ بین‌المللی (IOCها)، شامل بی‌پی، شورون، اگزون موبیل، شل و توتال، در هاله‌ای از تردید قرار دارد. مدل کسب و کار که طی قرن بیستم موجب بقای آنها شد، اکنون دیگر برای دستیابی به اهداف مناسب به نظر نمی‌رسد. در نتیجه این شرکت‌ها با دو انتخاب مواجه هستند: مدیریت نزولی آرام از طریق کوچک‌سازی؛ 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.

Stranded Assets

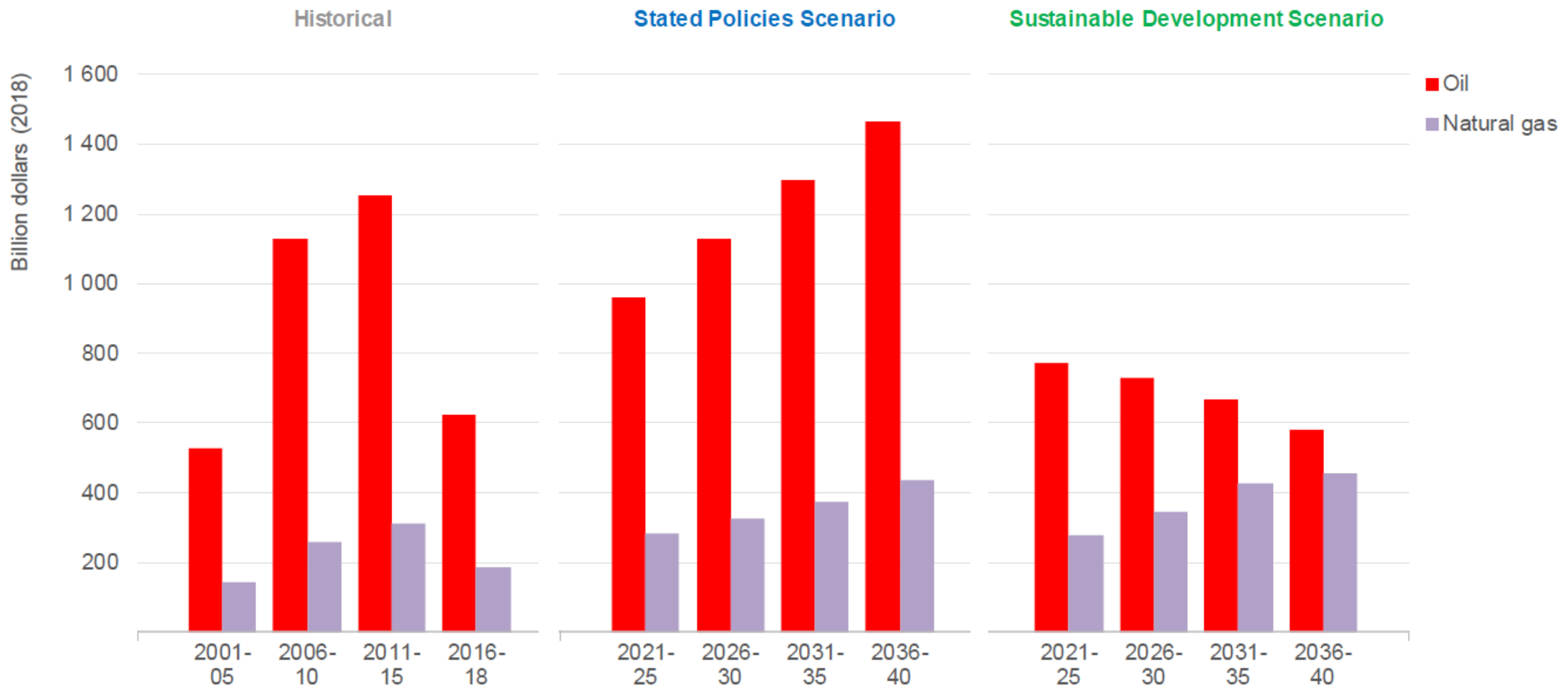


Average Annual Net Income for Private Companies



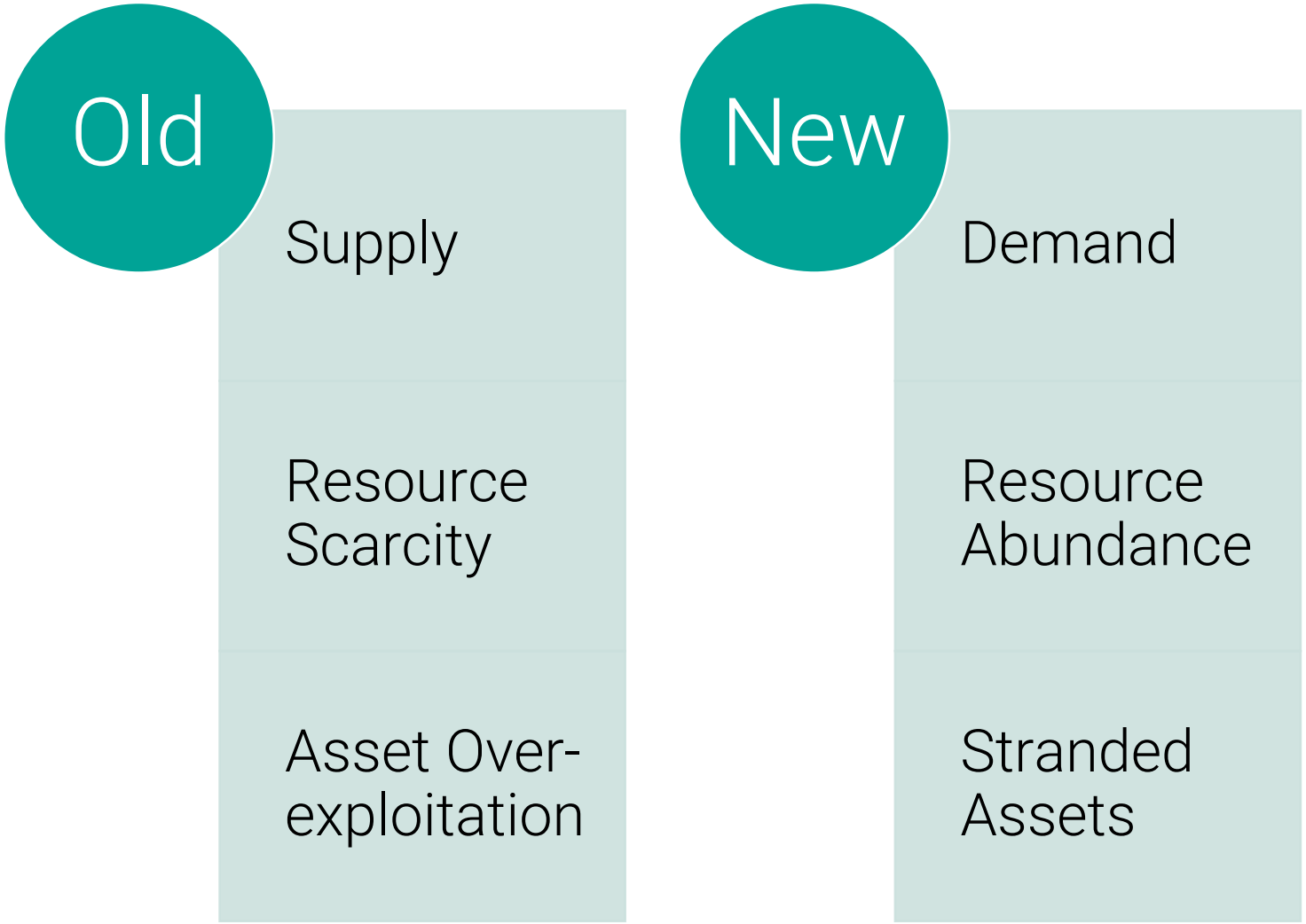
Notes: Net income is revenue minus finding and development costs, operating costs, and government taxes. Estimates are for all private oil and gas companies (Majors and Independents), and are derived from country-level data using a field-by-field database that classifies asset ownership by type of company along with assumptions about the ownership of future discoveries. Assumes no changes in fiscal terms.

Average Annual Net Oil and Gas Income Before Tax of all NOCs and INOCs



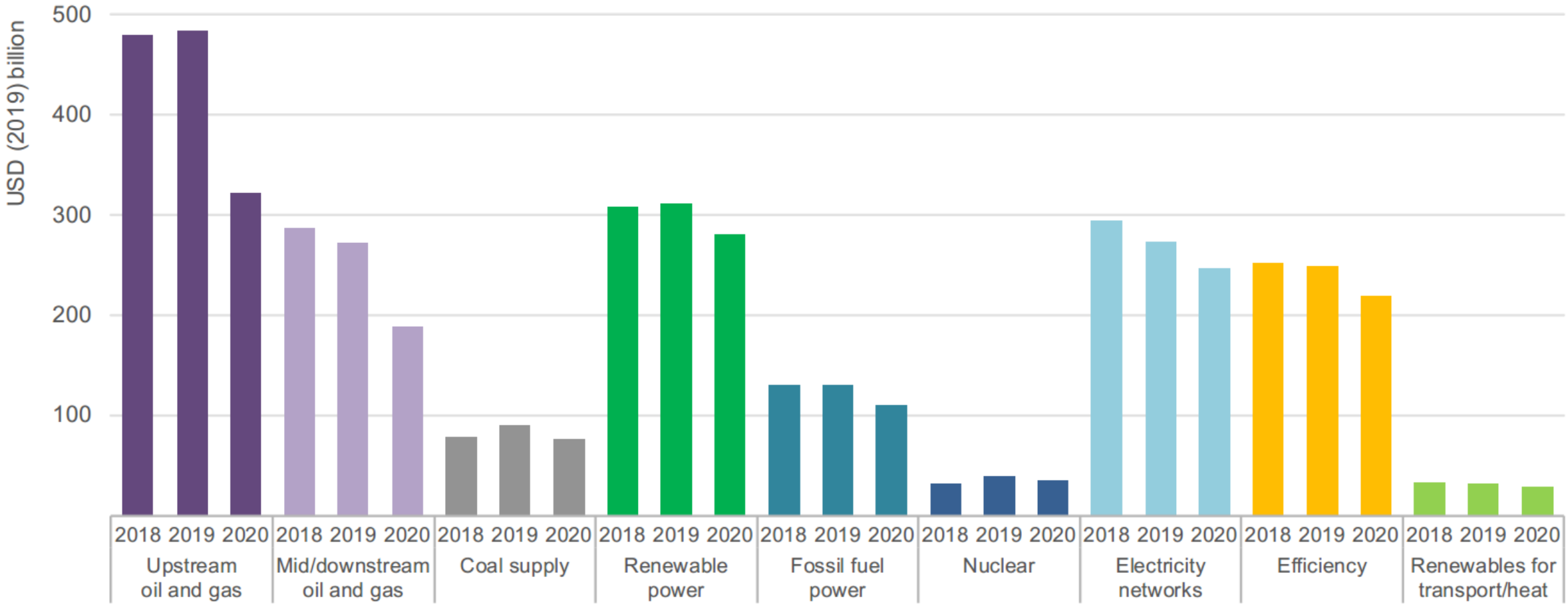
Note: Net income before tax = revenue minus finding and development costs and operating costs.

New Versus Old Peak Oil

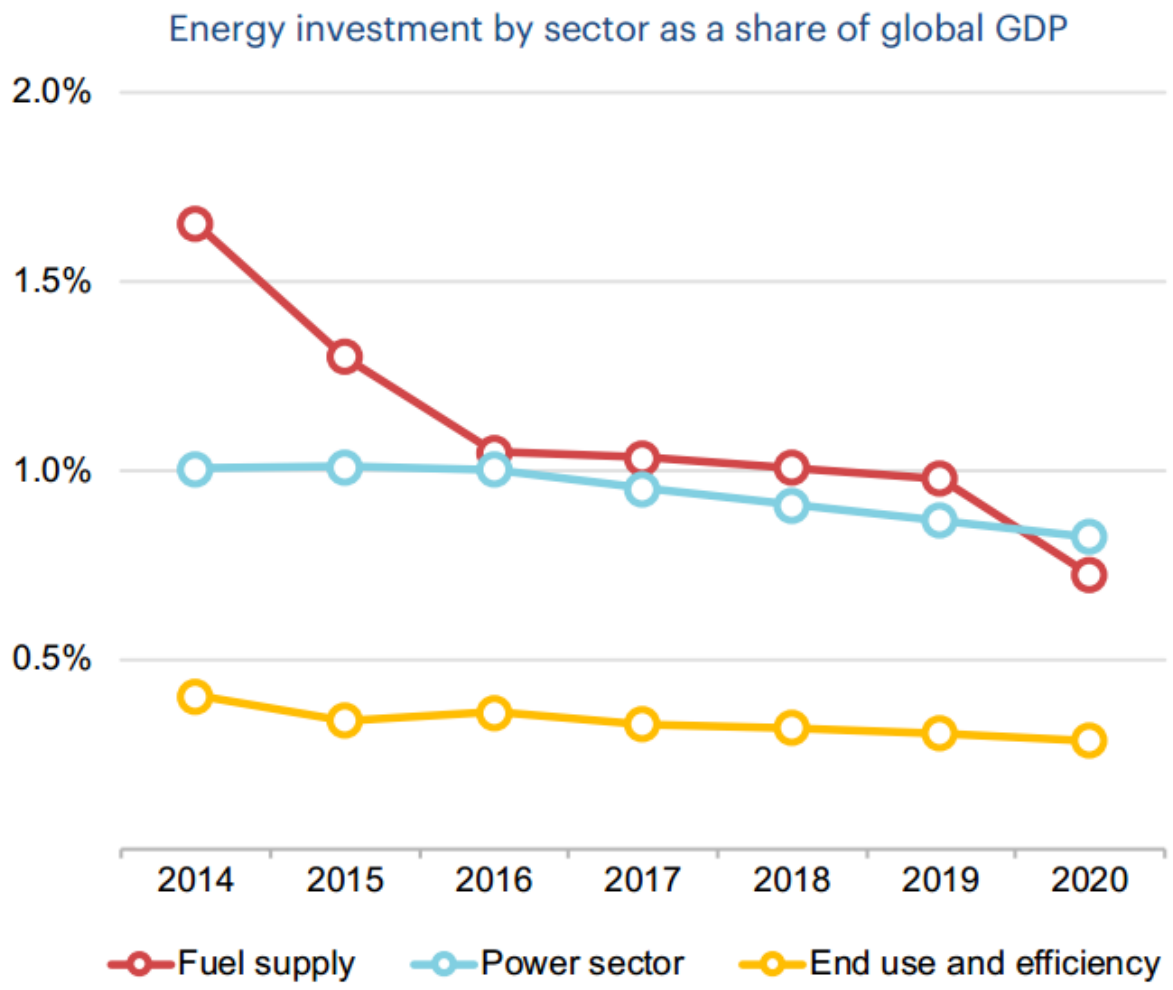


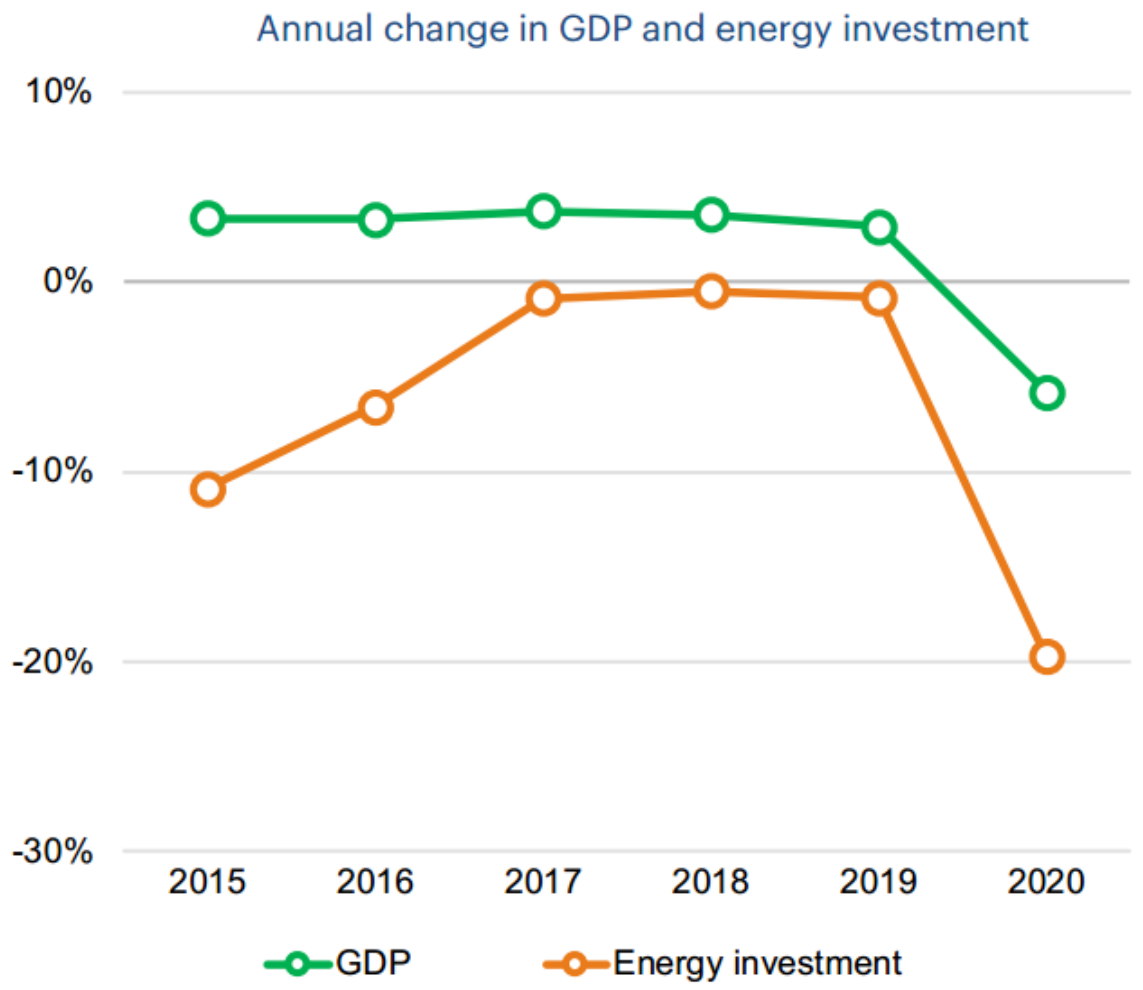
Trends in Investment & Finance

World Energy Investment By Sector

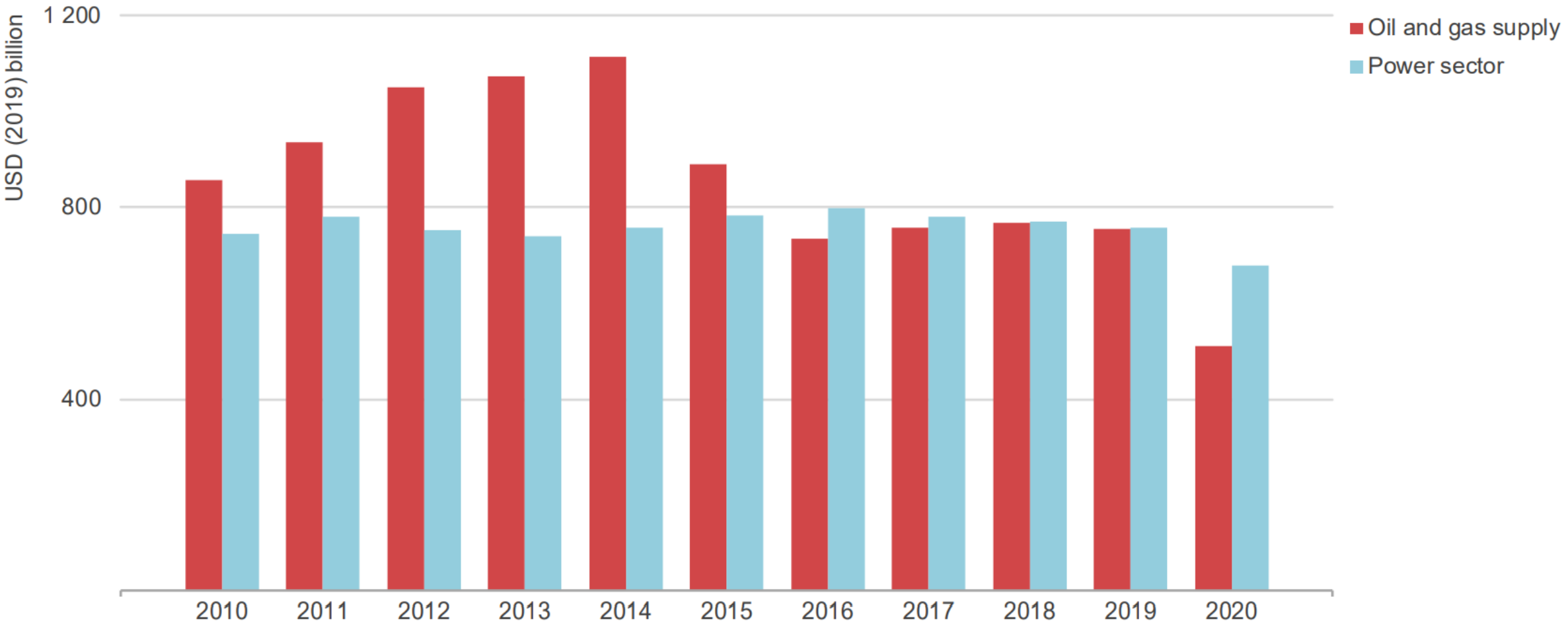


Energy Investment and GDP

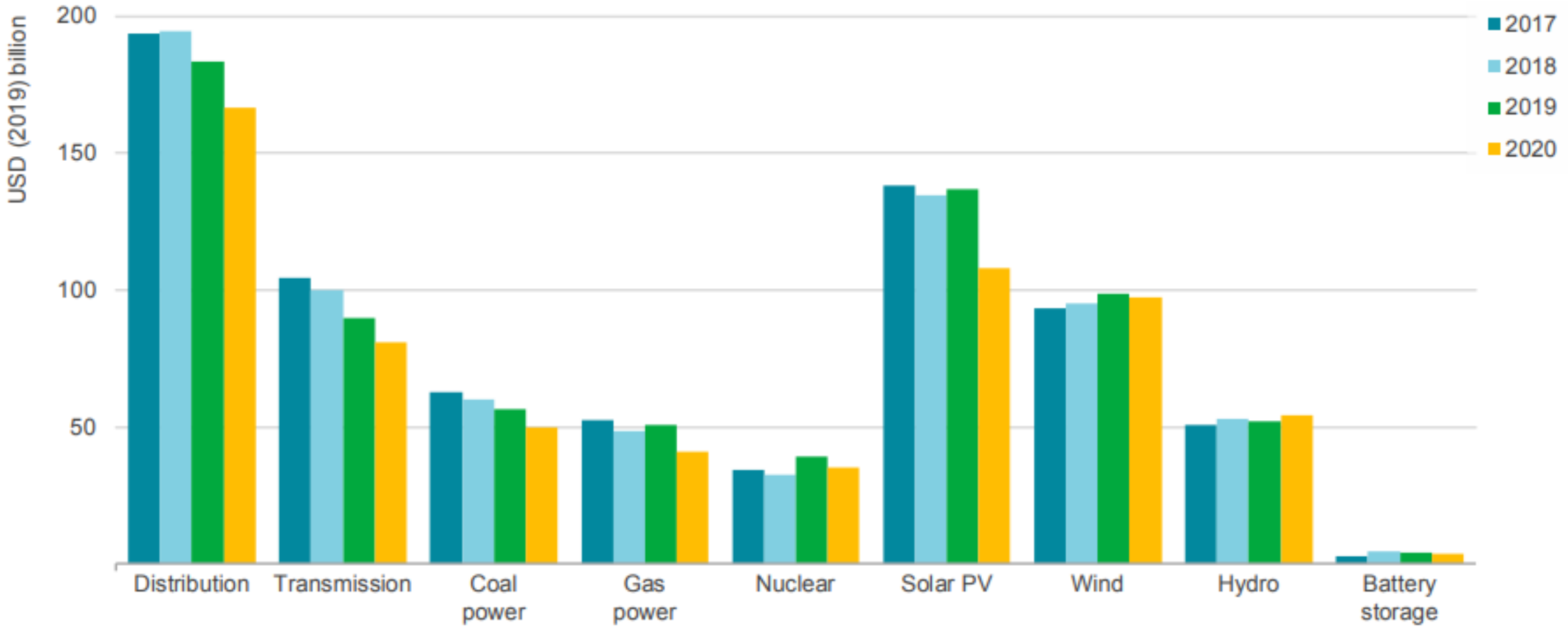




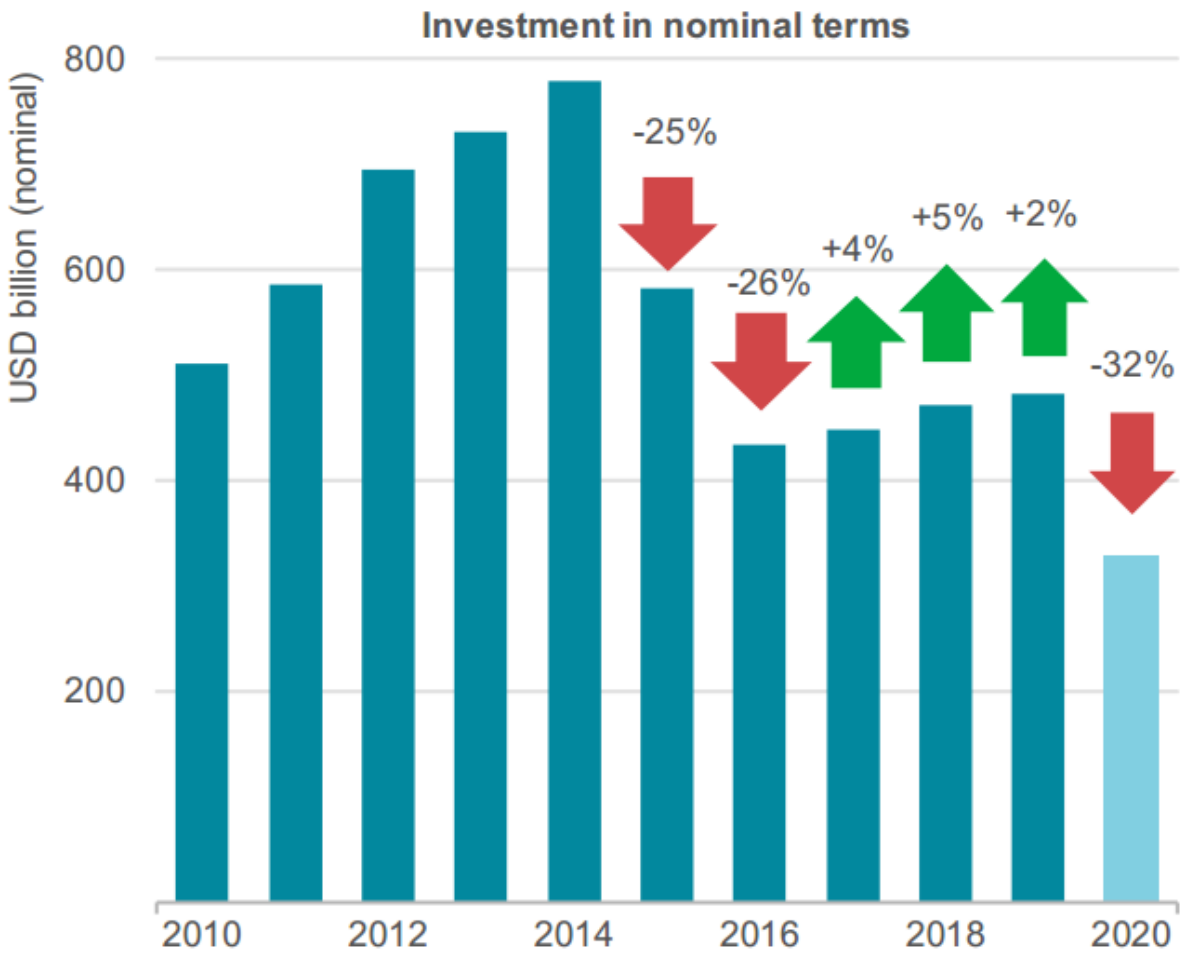
Global Investment in Energy Supply

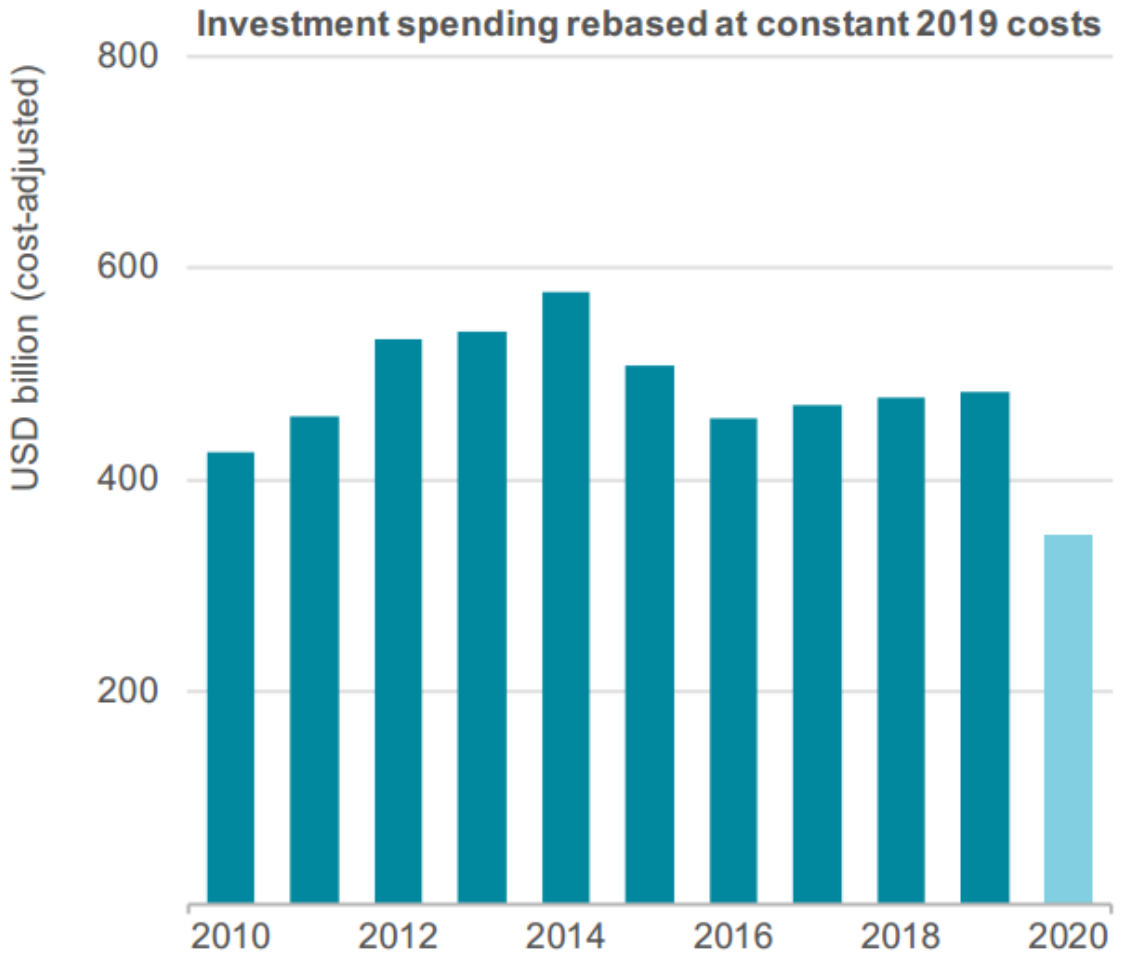


Global Investment in the Power Sector

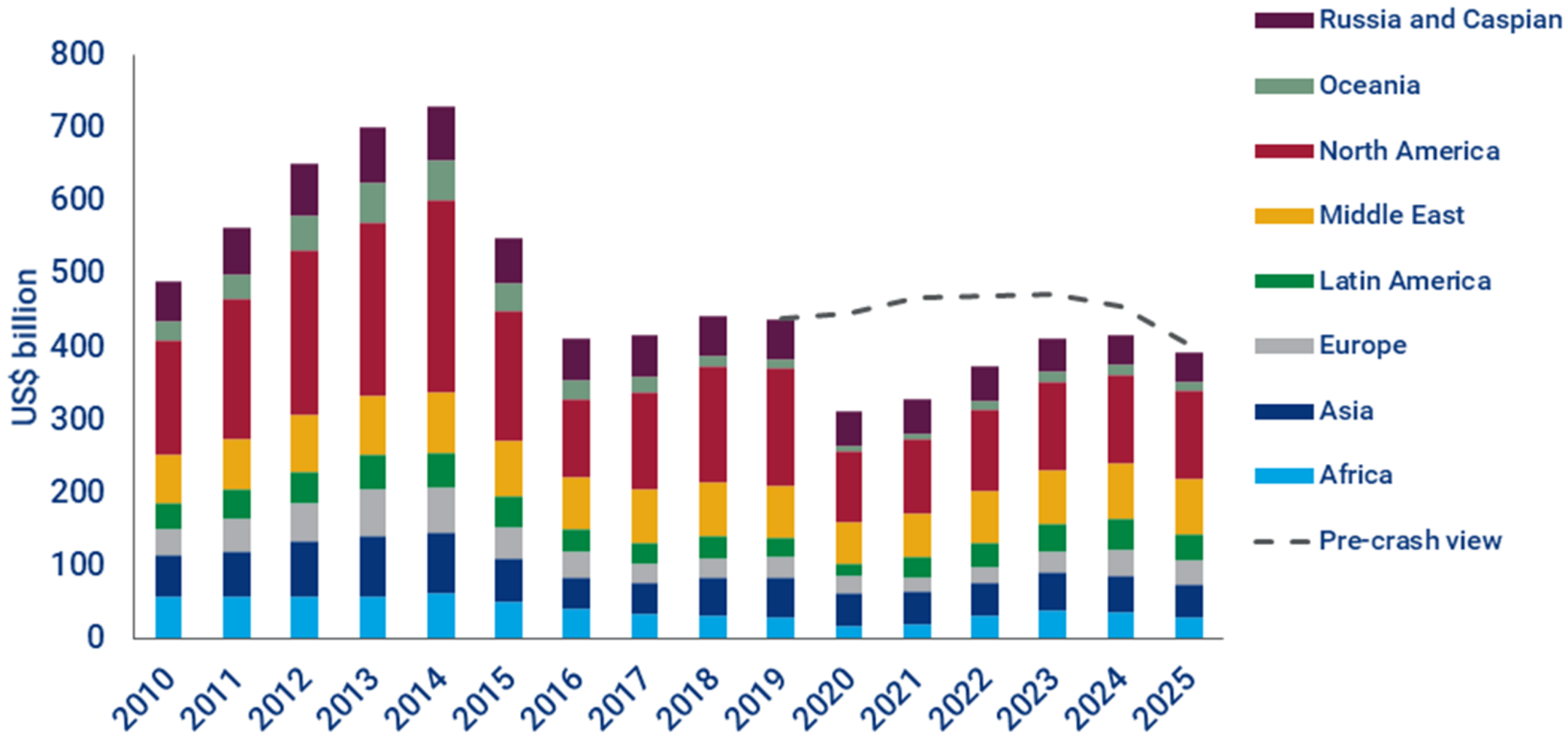


World Upstream Investment

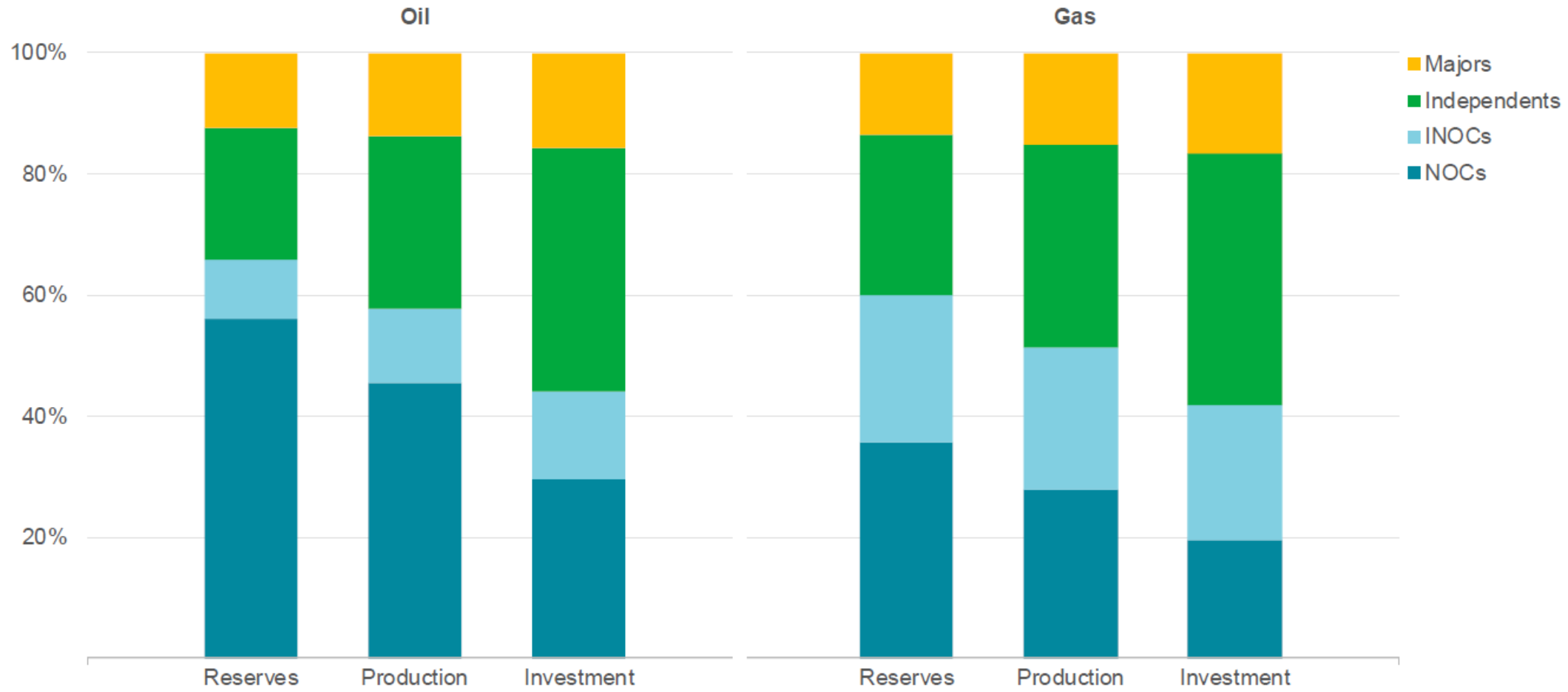




World Upstream Investment

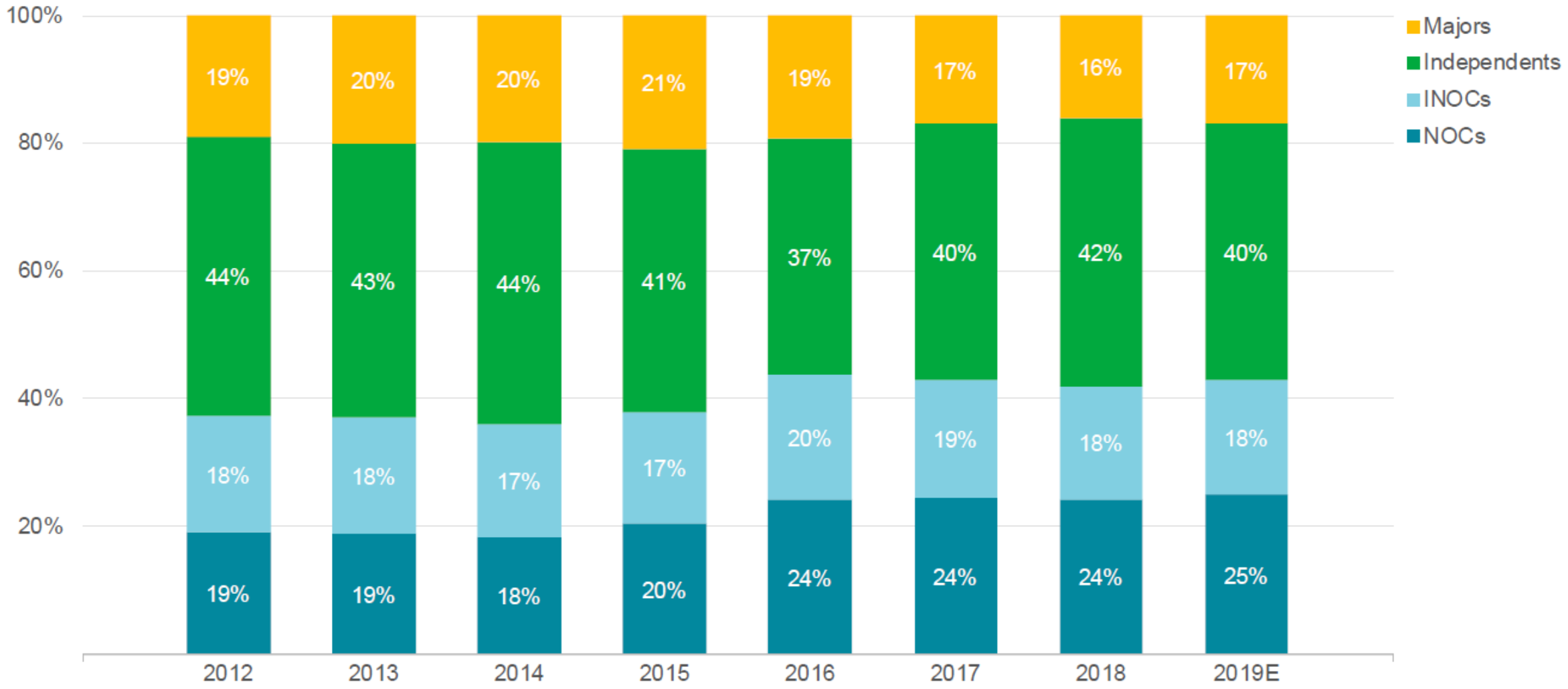


Ownership, Production & Investment

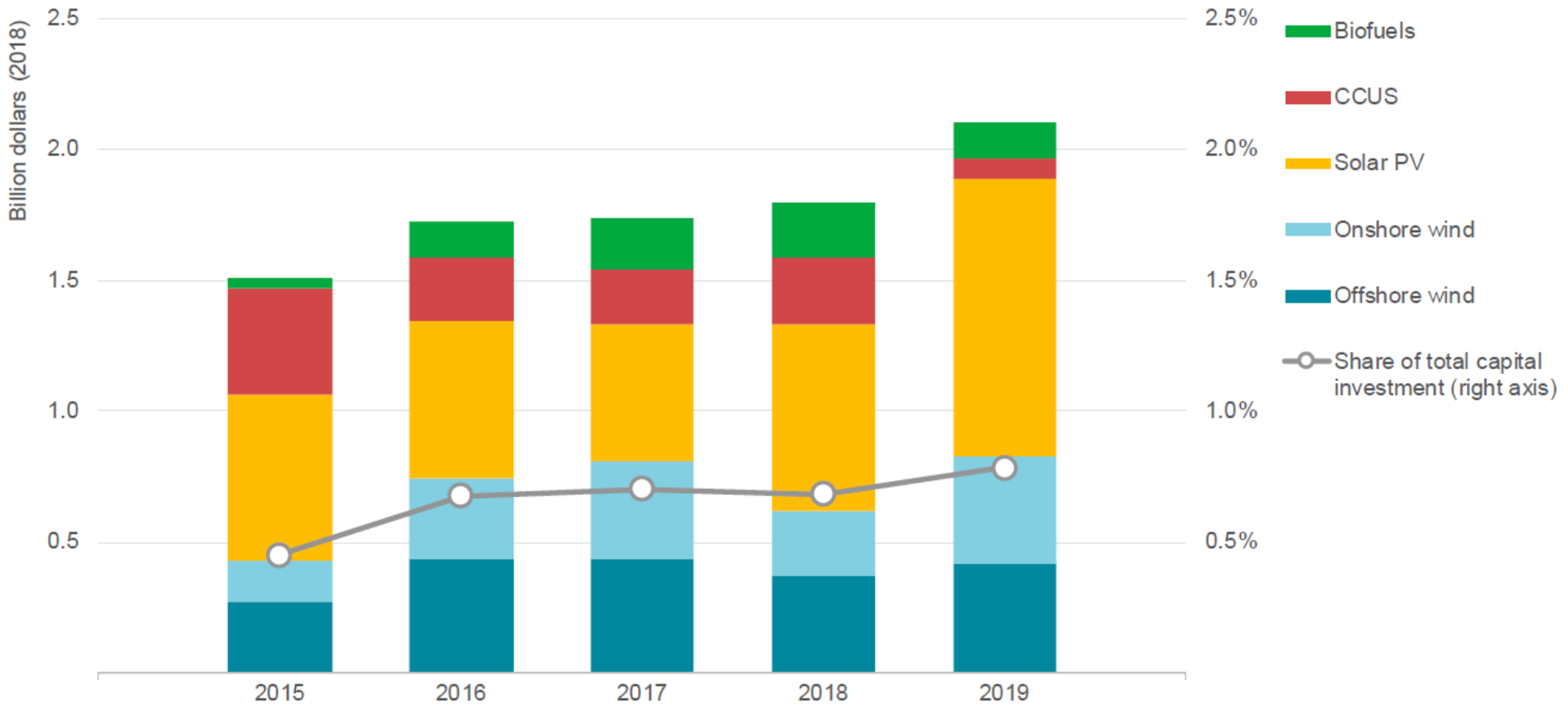


ote: *Oil* includes crude oil, condensate and natural gas liquids (NGLs).

Global Upstream Investment

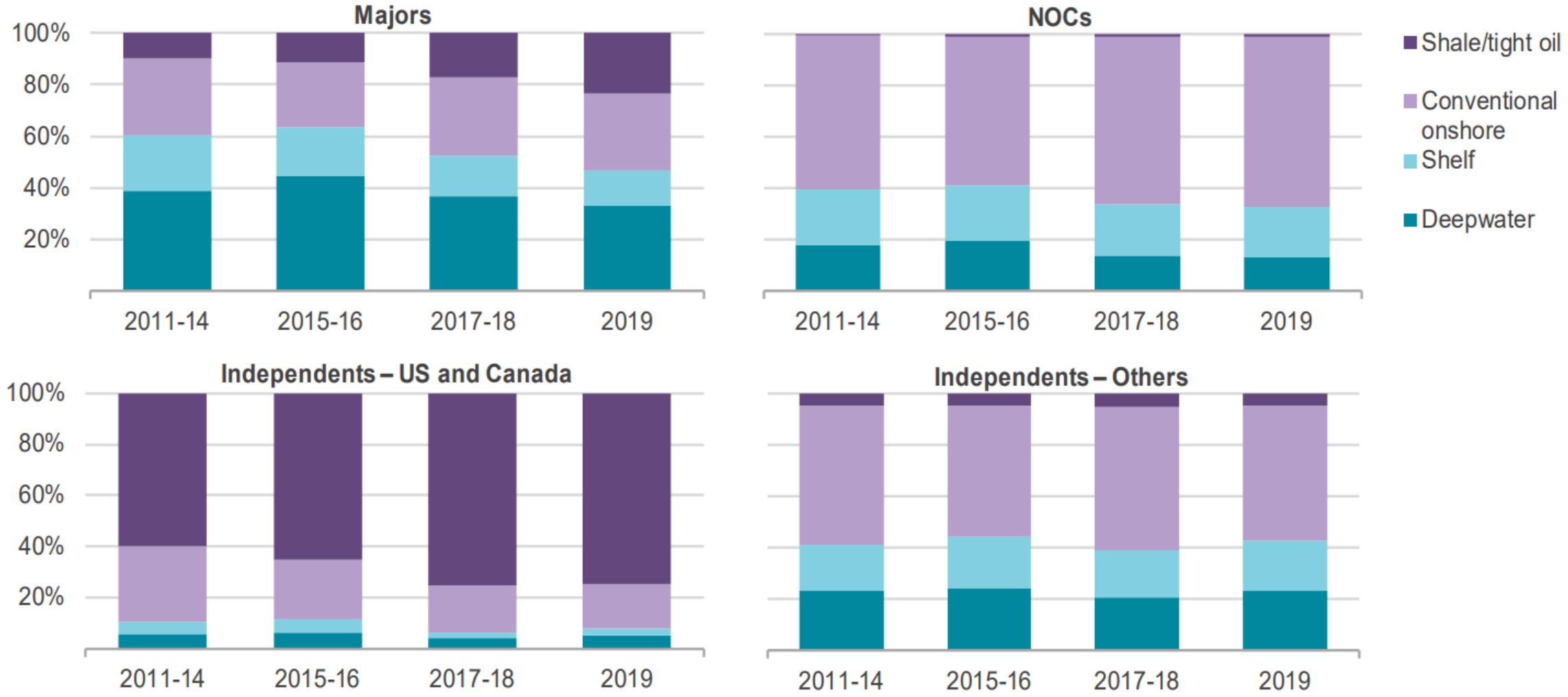


Capital Investment in Renewables by Large Oil and Gas Companies

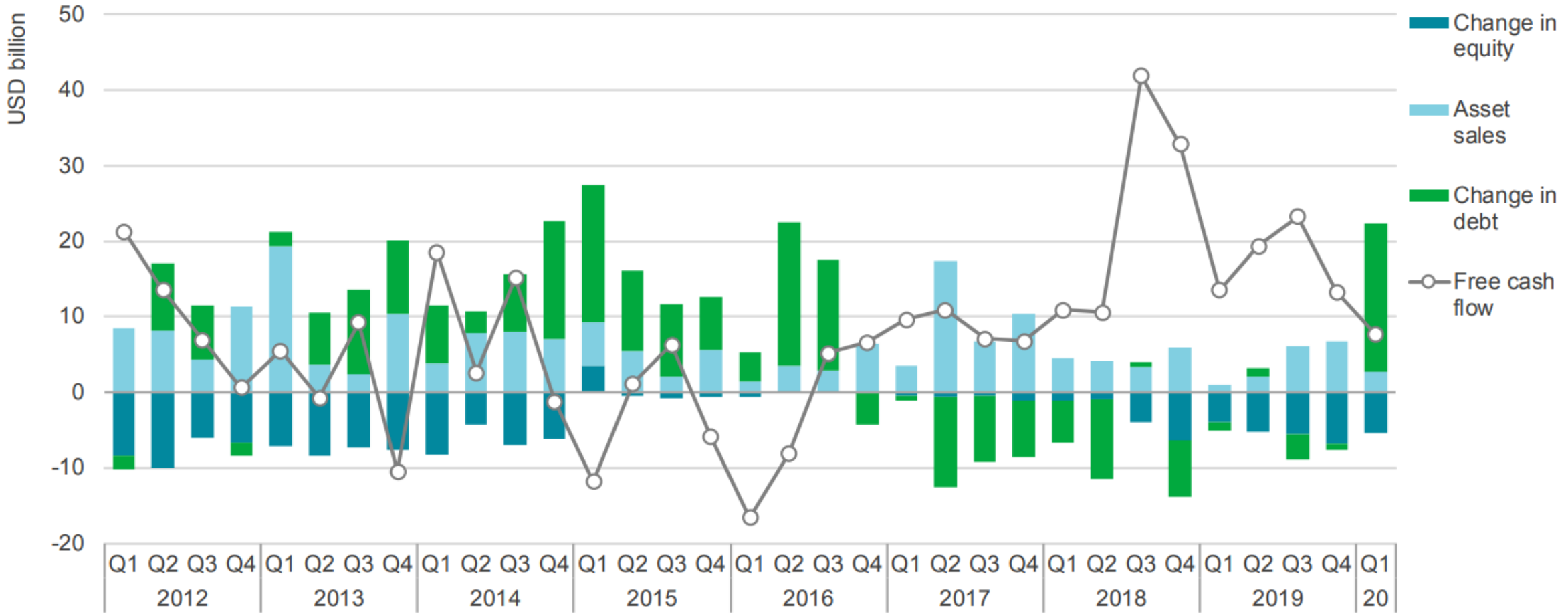


Notes: Capital investment is measured as the ongoing capital spending in new capacity from when projects start construction and are based on the owner's share of the project. Companies include the Majors and selected others (ADNOC, CNPC, CNOOC, Equinor, Gazprom, Kuwait Petroleum Corporation, Lukoil, Petrobras, Repsol, Rosneft, Saudi Aramco, Sinopec, Sonatrach). CCUS investment is in large-scale facilities; it includes developments by independent oil and gas companies in Canada and China and capital spend undertaken with government funds.

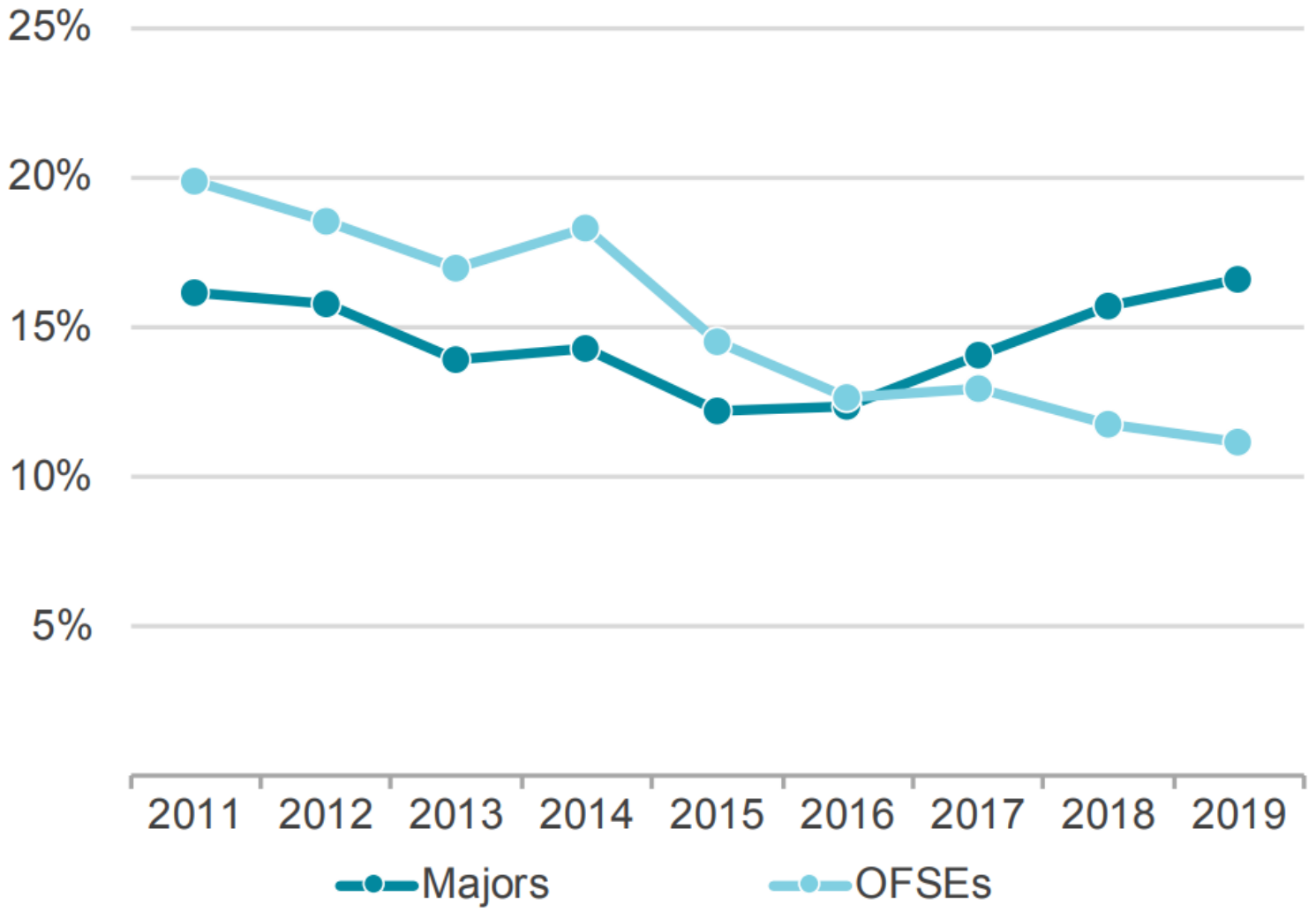
Allocation of Upstream Investment by Resource Type and Company Type



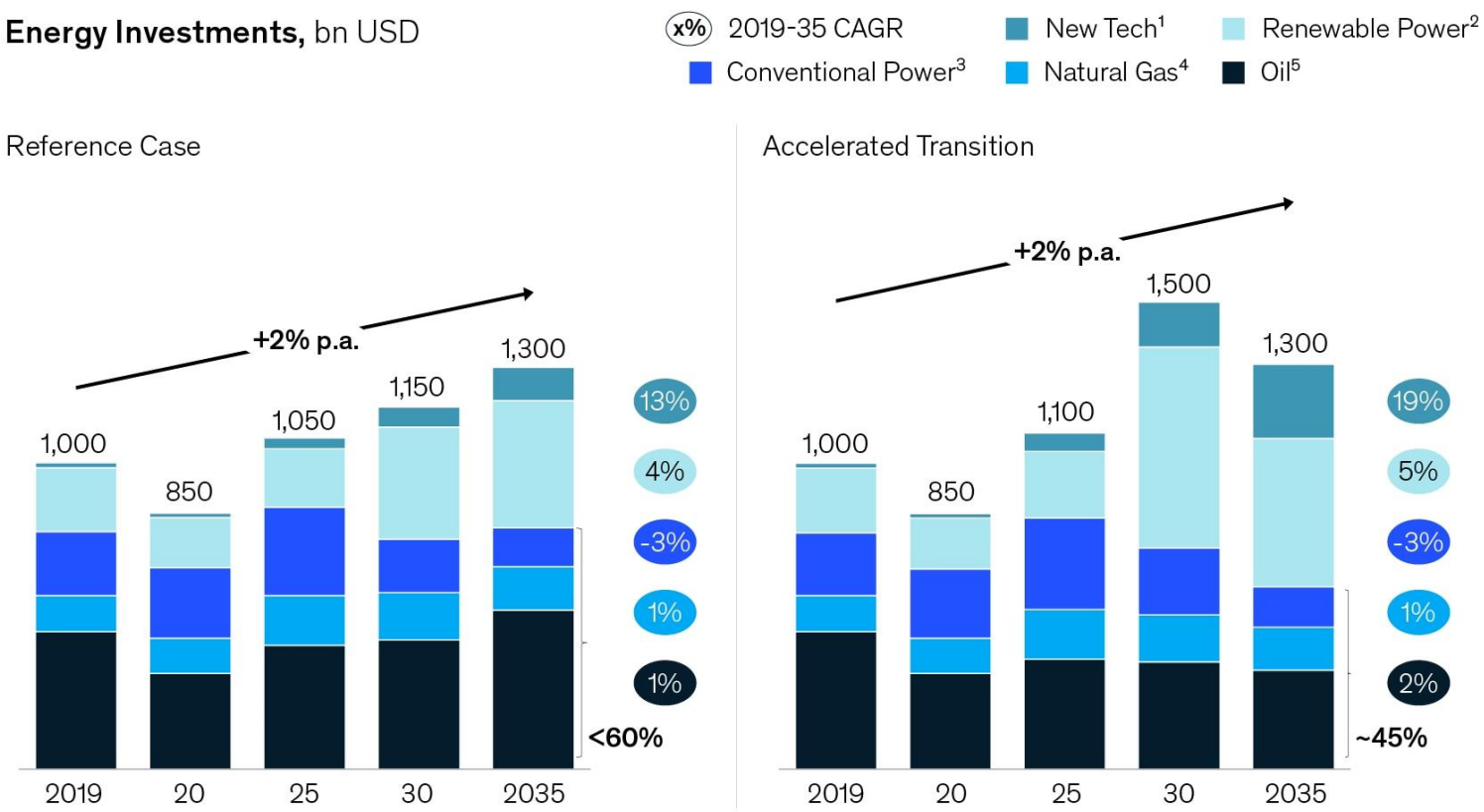
Majors' Indicative Sources of Finance and FCF



EBITDA Margins by Oil and Gas Company Type

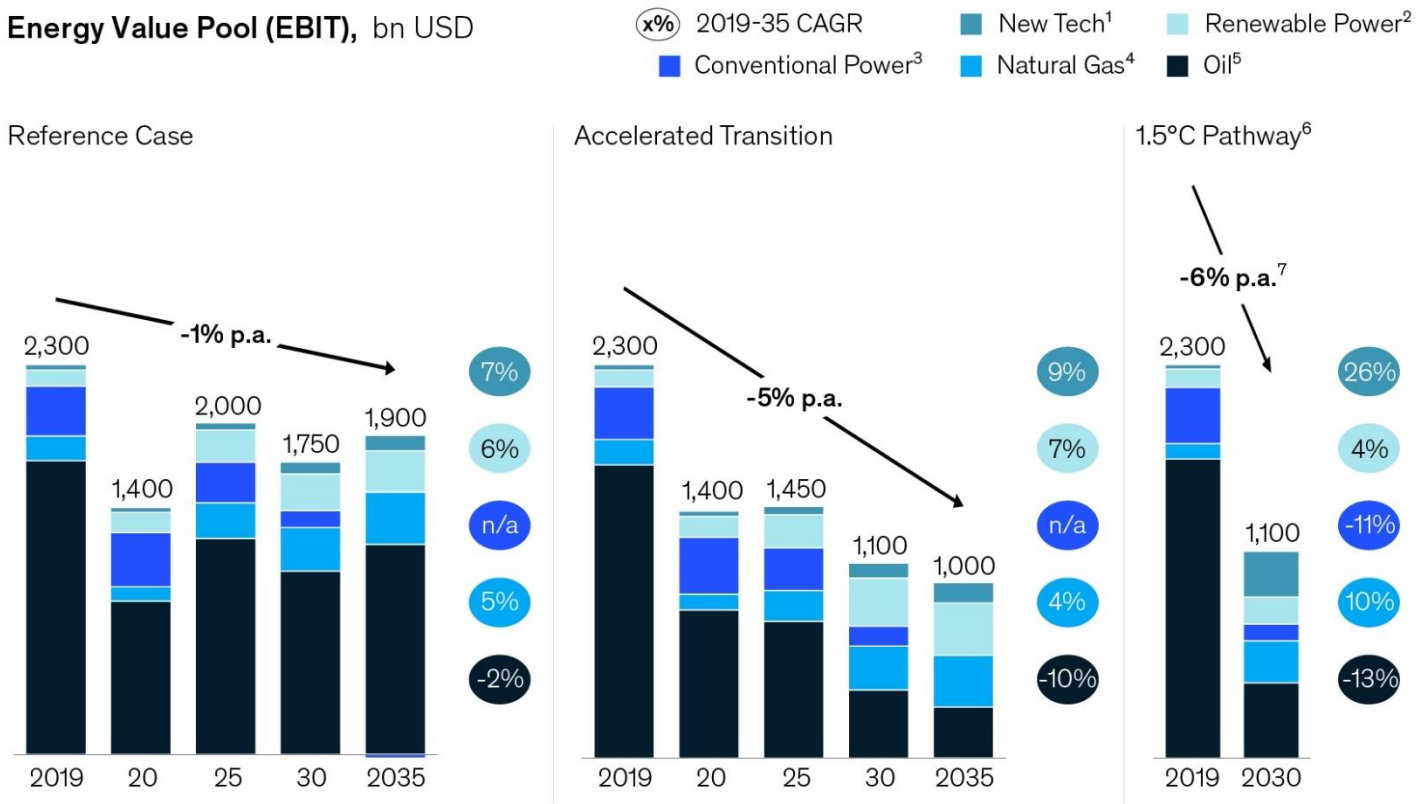


Energy Investments by Technology



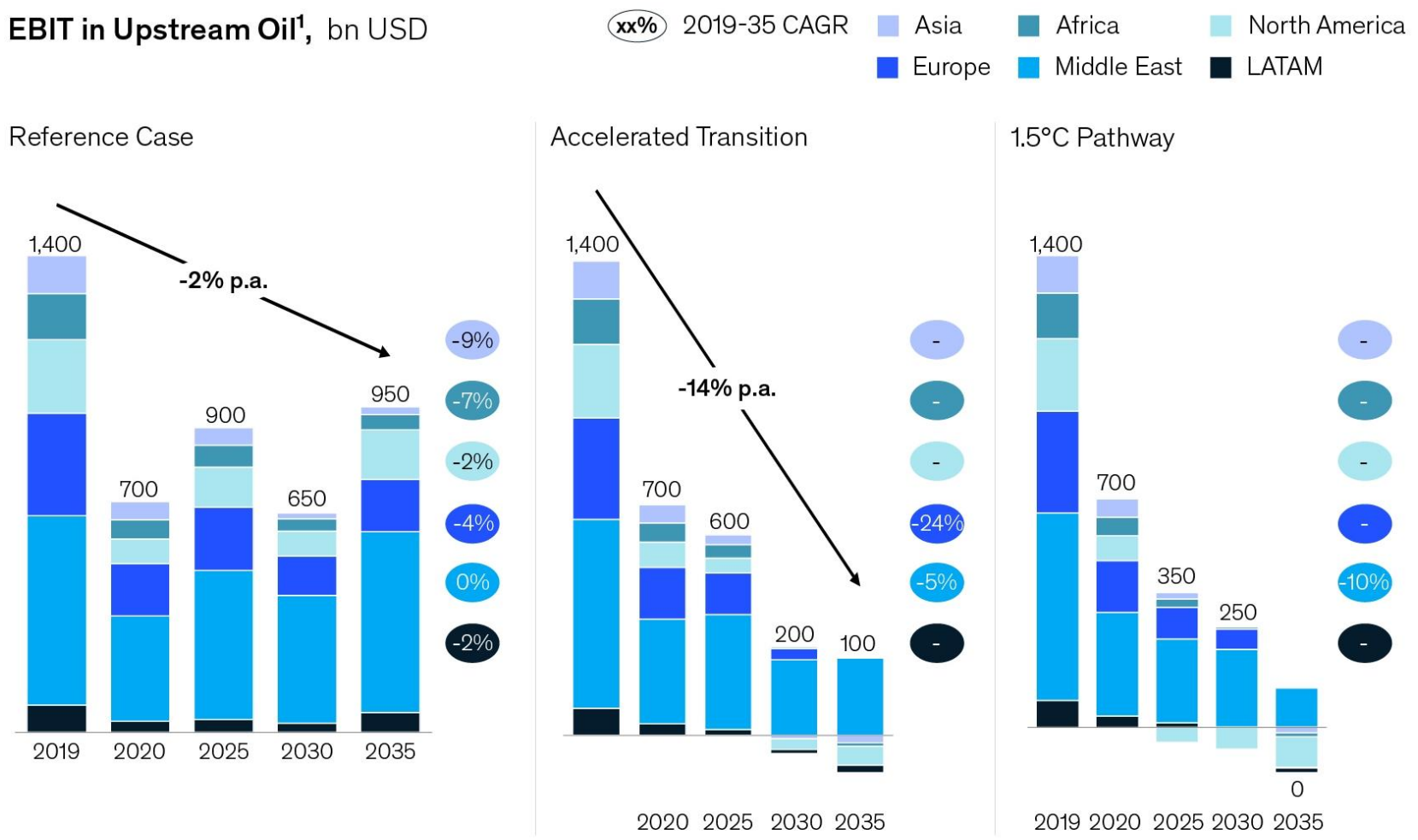
[1]Includes Biofuels, Hydrogen production, EV Charging, and NBS
[2]Includes Solar, Onshore Wind, and Offshore Wind
[3]Includes Coal, Gas, Nuclear, Hydro, Other
[4]Includes Upstream gas, and LNG
[5]Includes Upstream Oil, Oil Refining, Specialty Chemicals, PetChem (only for Reference Case), Lubricants (only for Reference Case), and Retail.
Source: McKinsey Energy Insights Energy Value Pools Model

Energy Value Pool by Technology



[1]Includes Biofuels, Hydrogen production, CCUS, EV Charging, and NBS
[2]Includes Solar, Onshore Wind, and Offshore Wind
[3]Includes Coal, Gas, Nuclear, Hydro, Other
[4]Includes Upstream gas, and LNG
[5]Includes Upstream Oil, Oil Refining, Specialty Chemicals, PetChem (only for Reference Case), Lubricants (only for Reference Case), and Retail
[6]EV Charging, NBS, and Specialty Chemicals components based on Accelerated Scenario values
[7]CAGR values in 1.5C pathway are 2019-2030.
Source: McKinsey Energy Insights Energy Value Pools Model

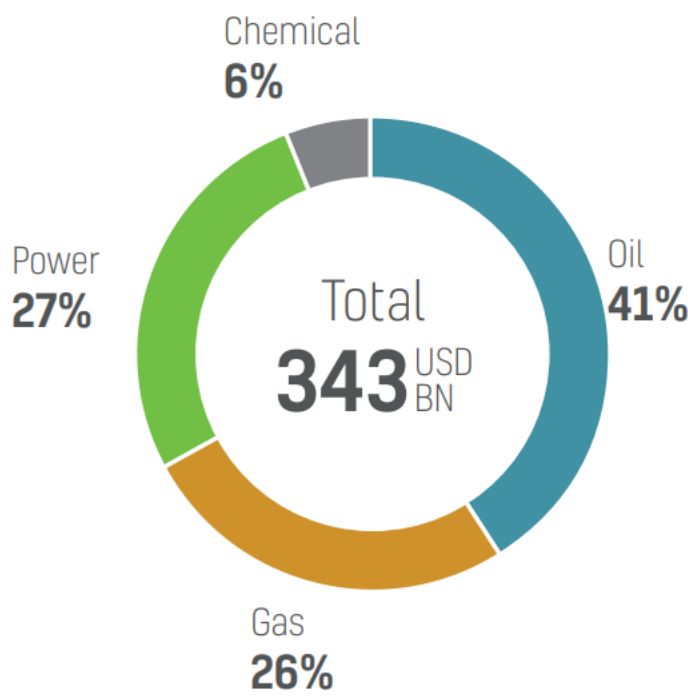
EBIT in Upstream Oil



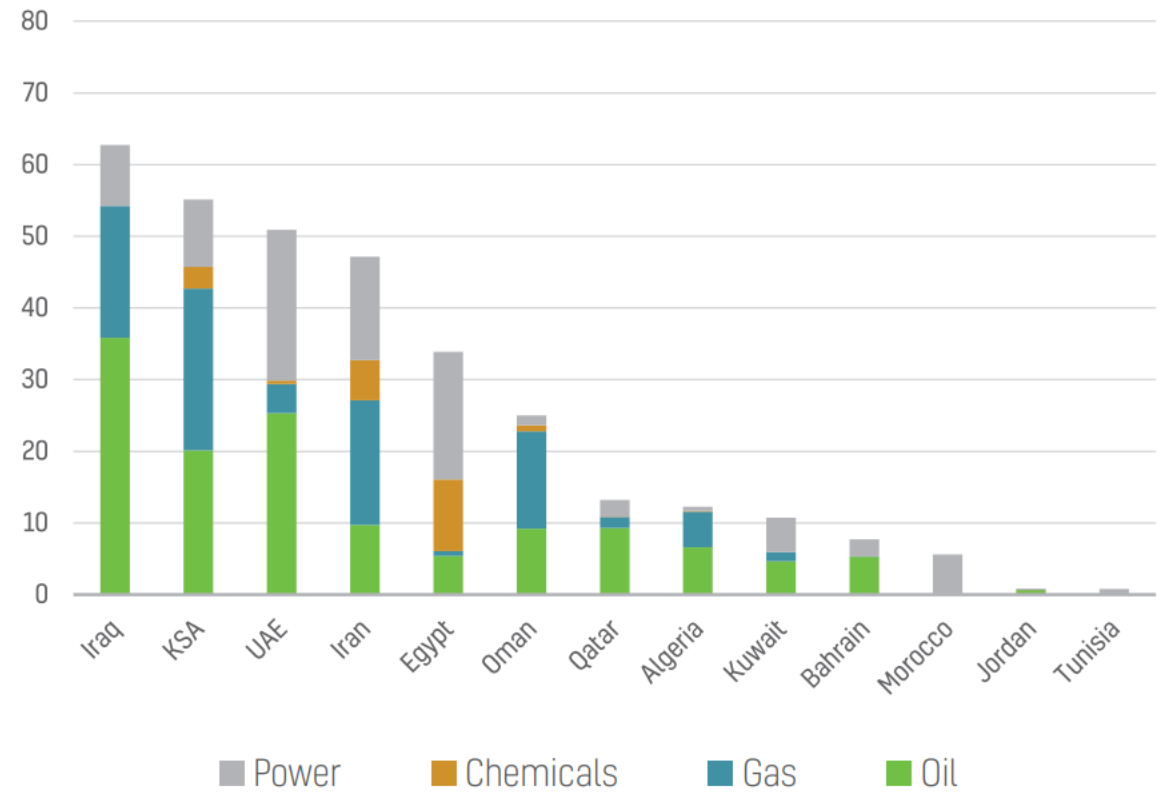
[1]Includes government take

MENA Energy Investment

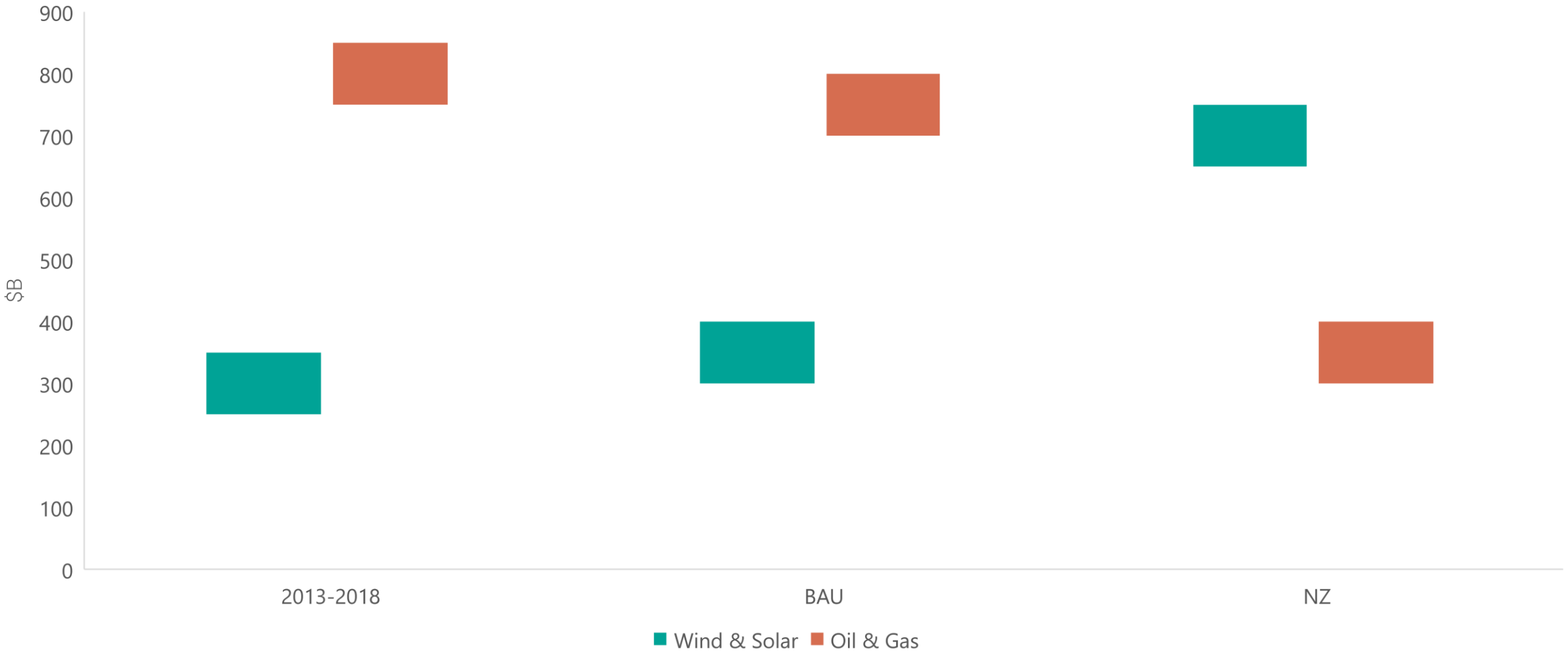
MENA 2020-24 Committed Projects by Industry



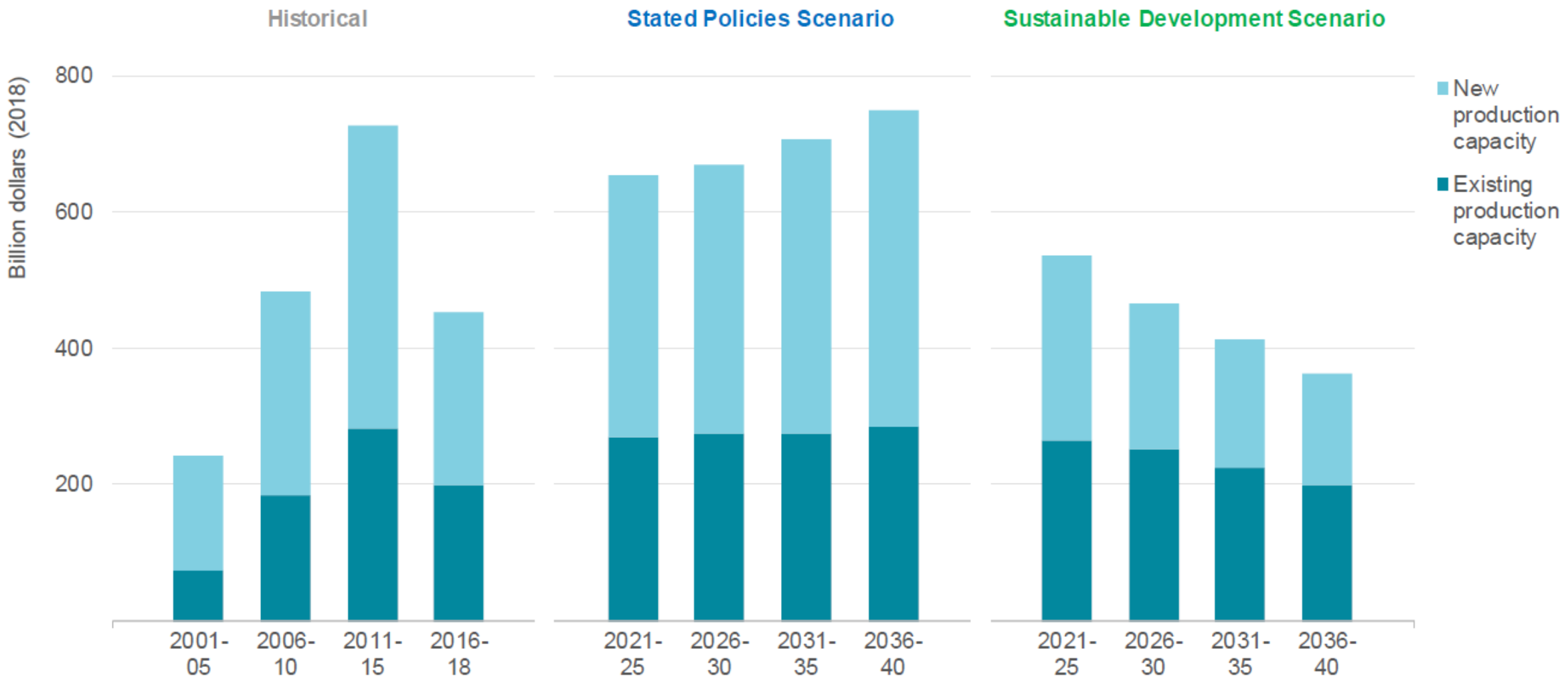
Committed MENA Energy Investment (USD Bn)



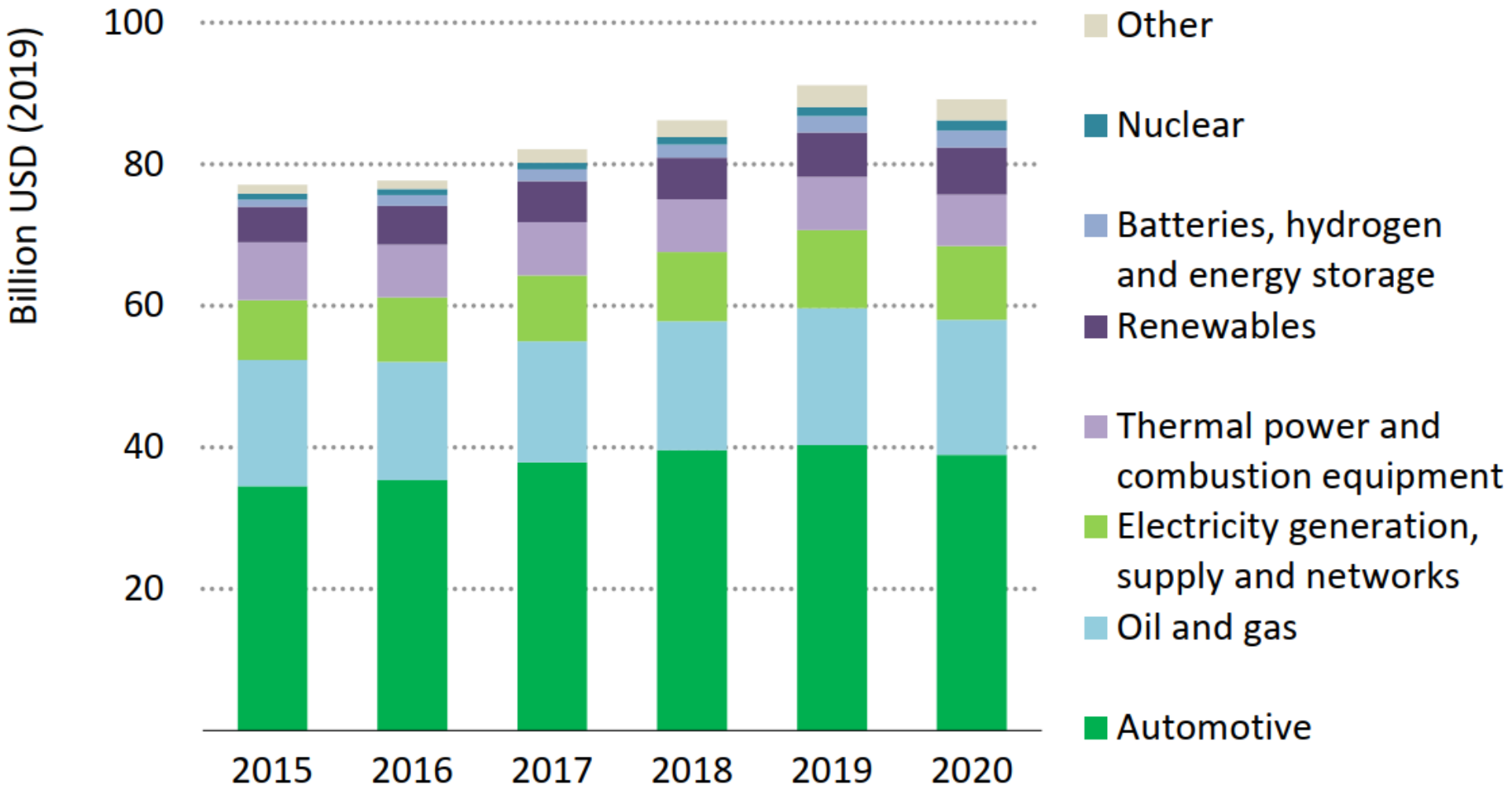
Energy Investment Scenarios



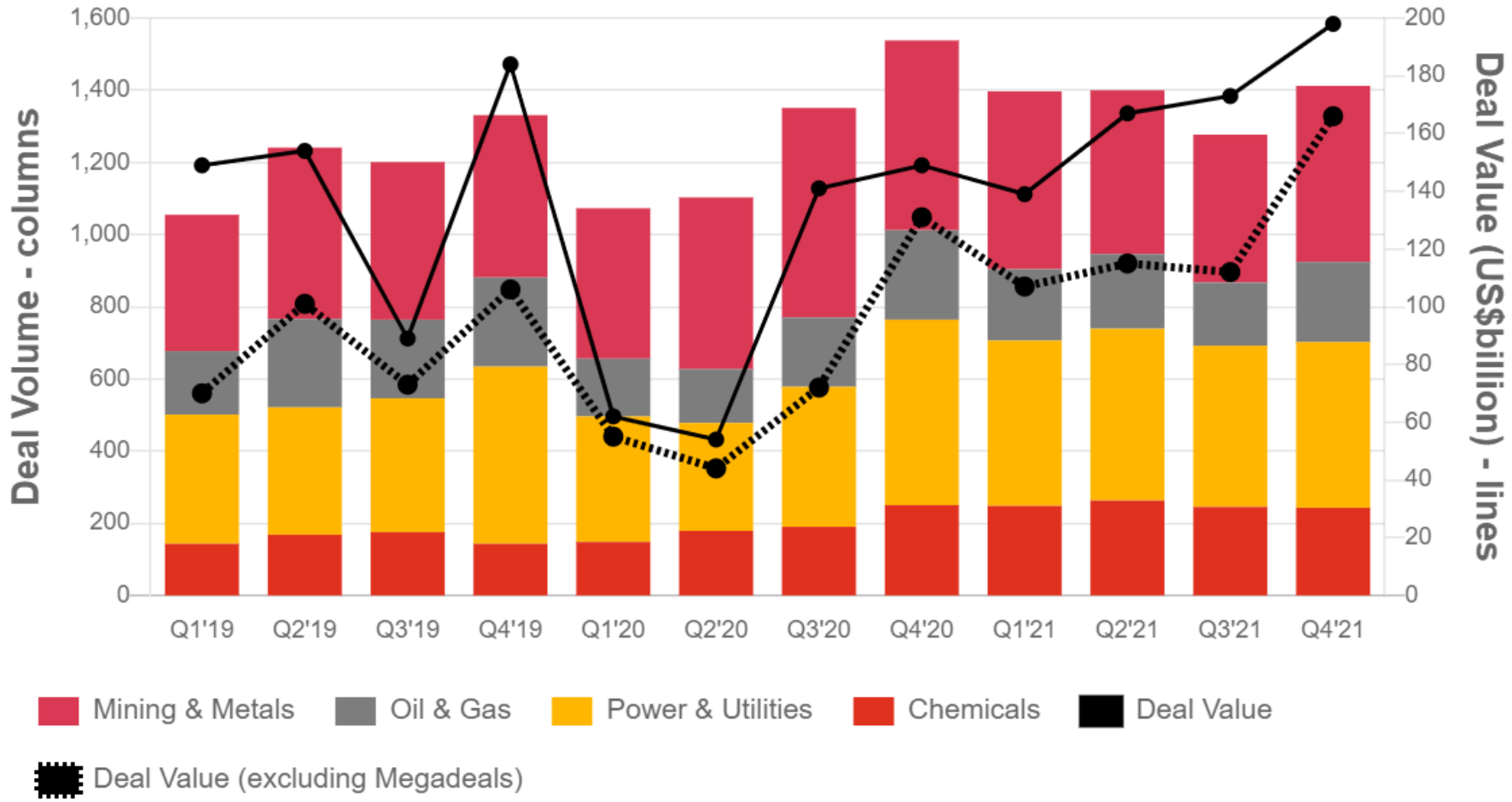
Average Annual Upstream Investment



Spending on Energy R&D by Globally Listed Companies

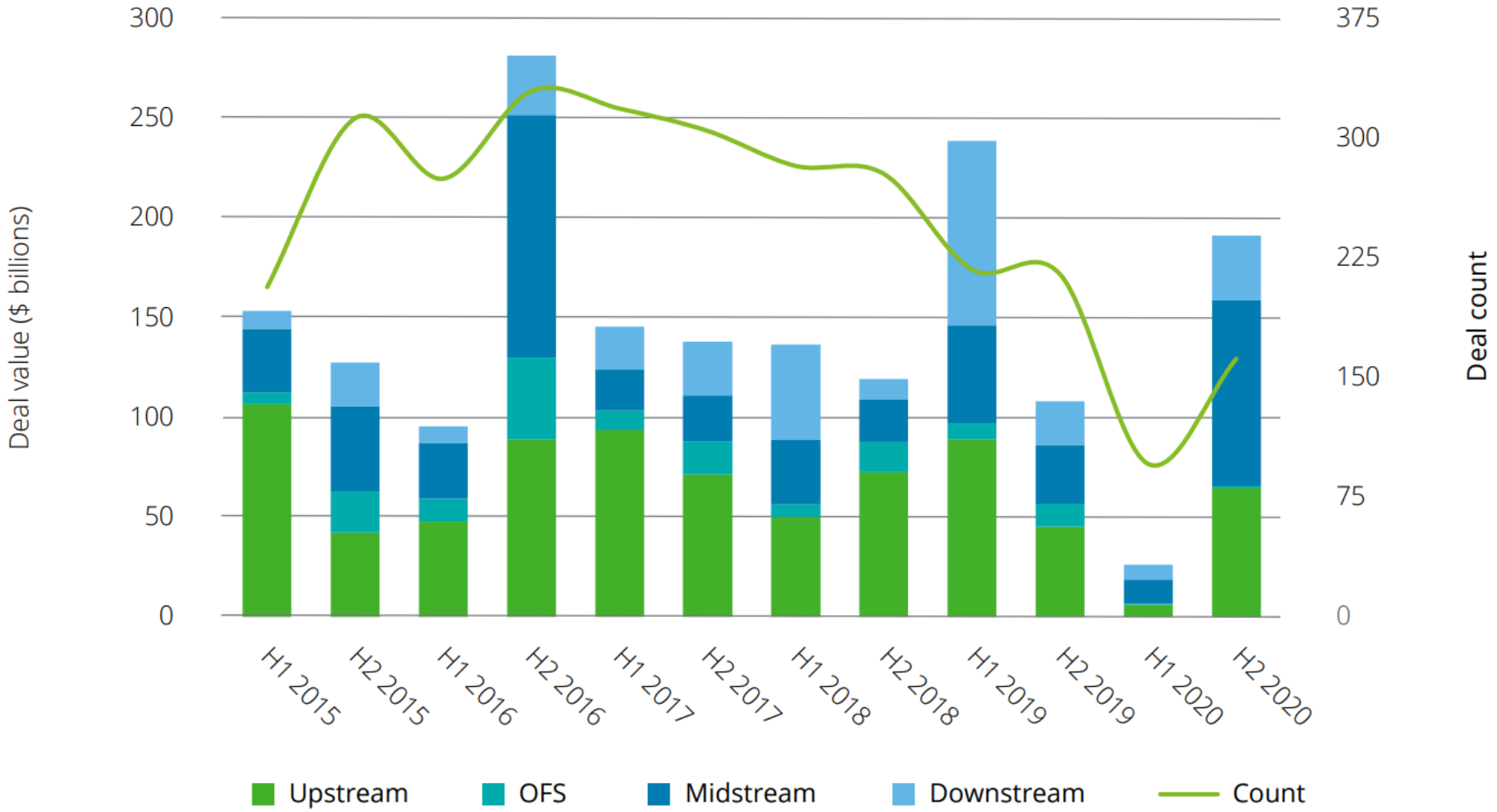


Energy, Utilities And Resources Deal Volumes And Values



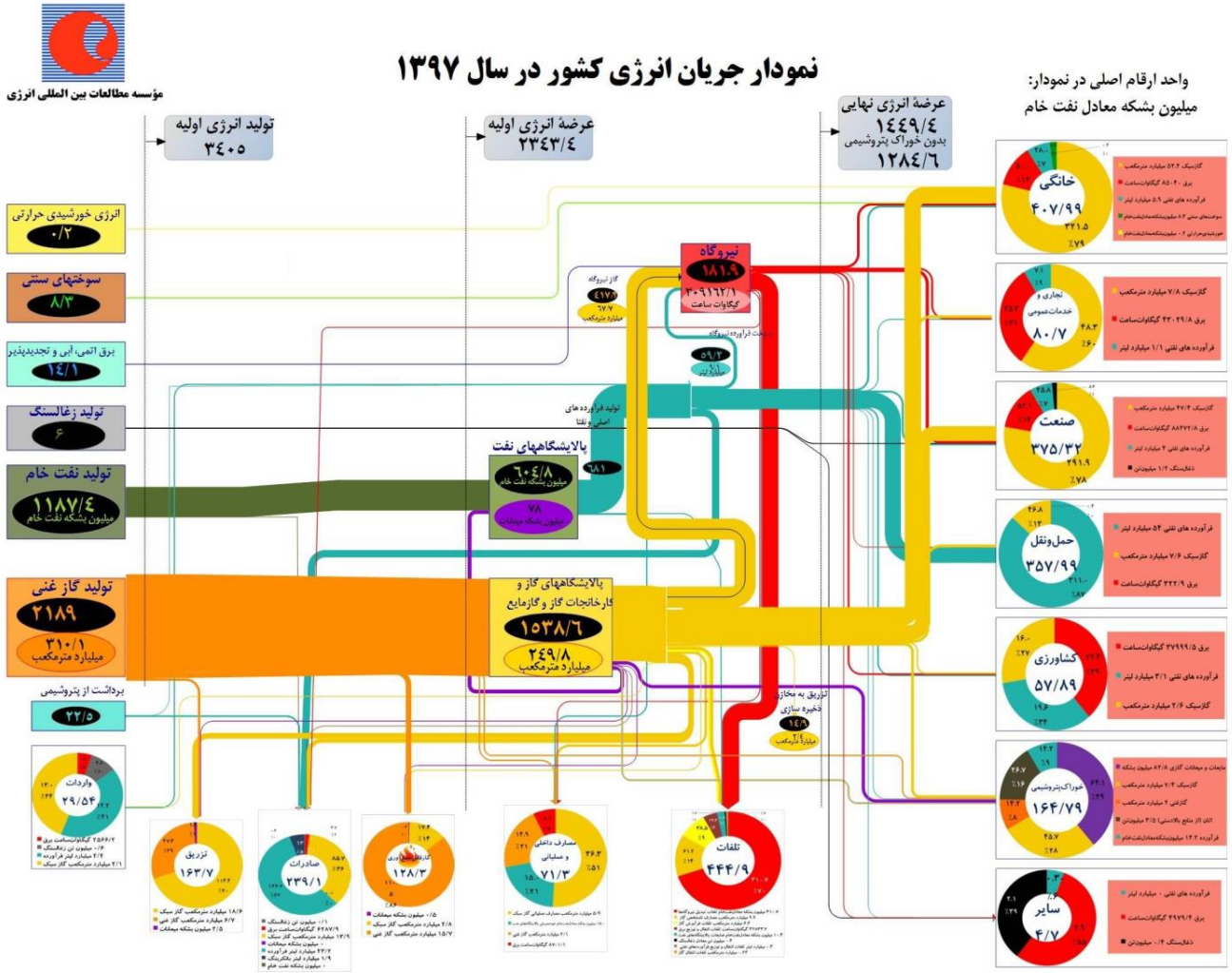
Sources: Refinitiv, Dealogic and PwC analysis

M&A in Oil and Gas Industry



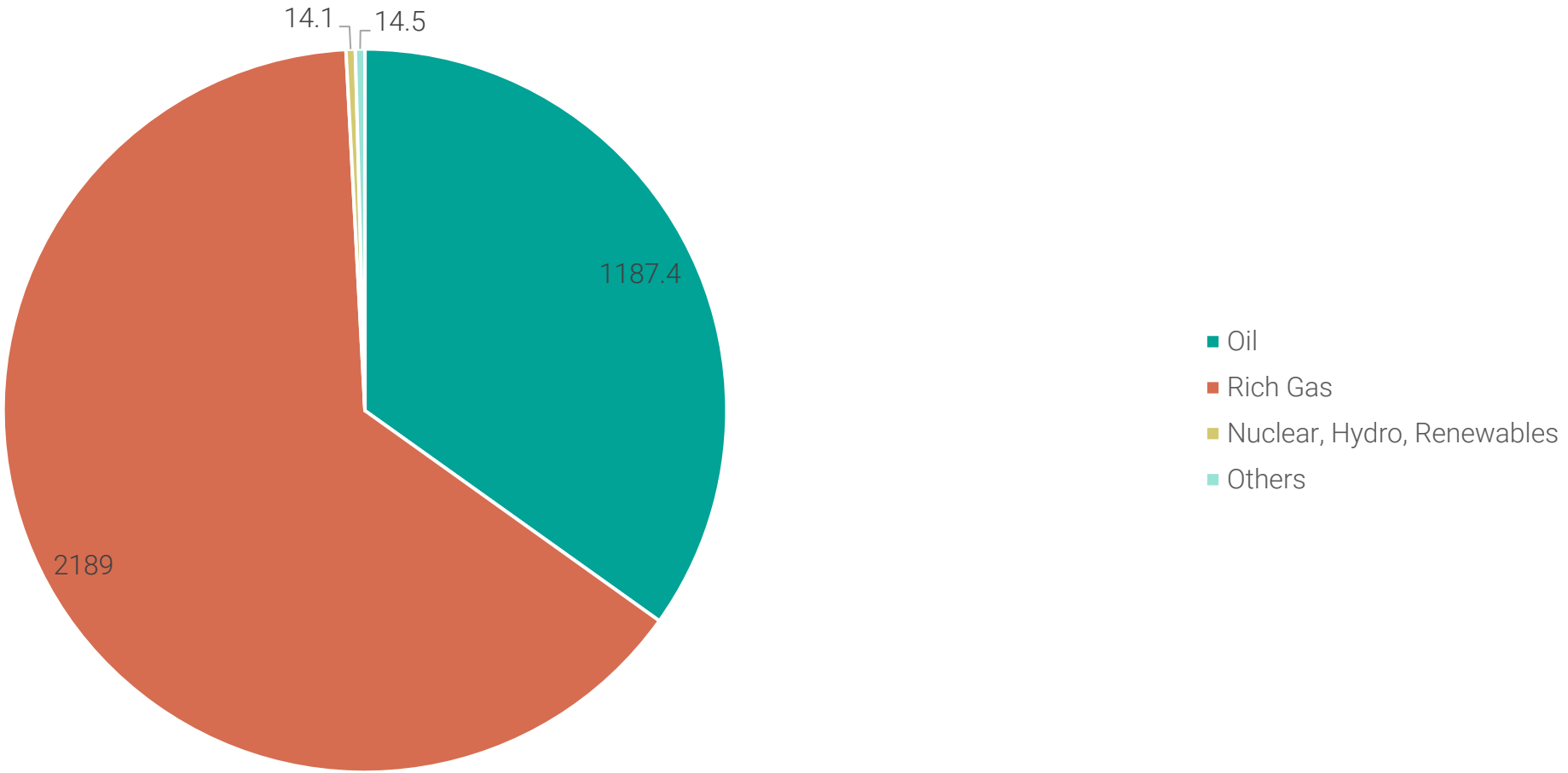
Focus: Iran

Energy Flow - 1397

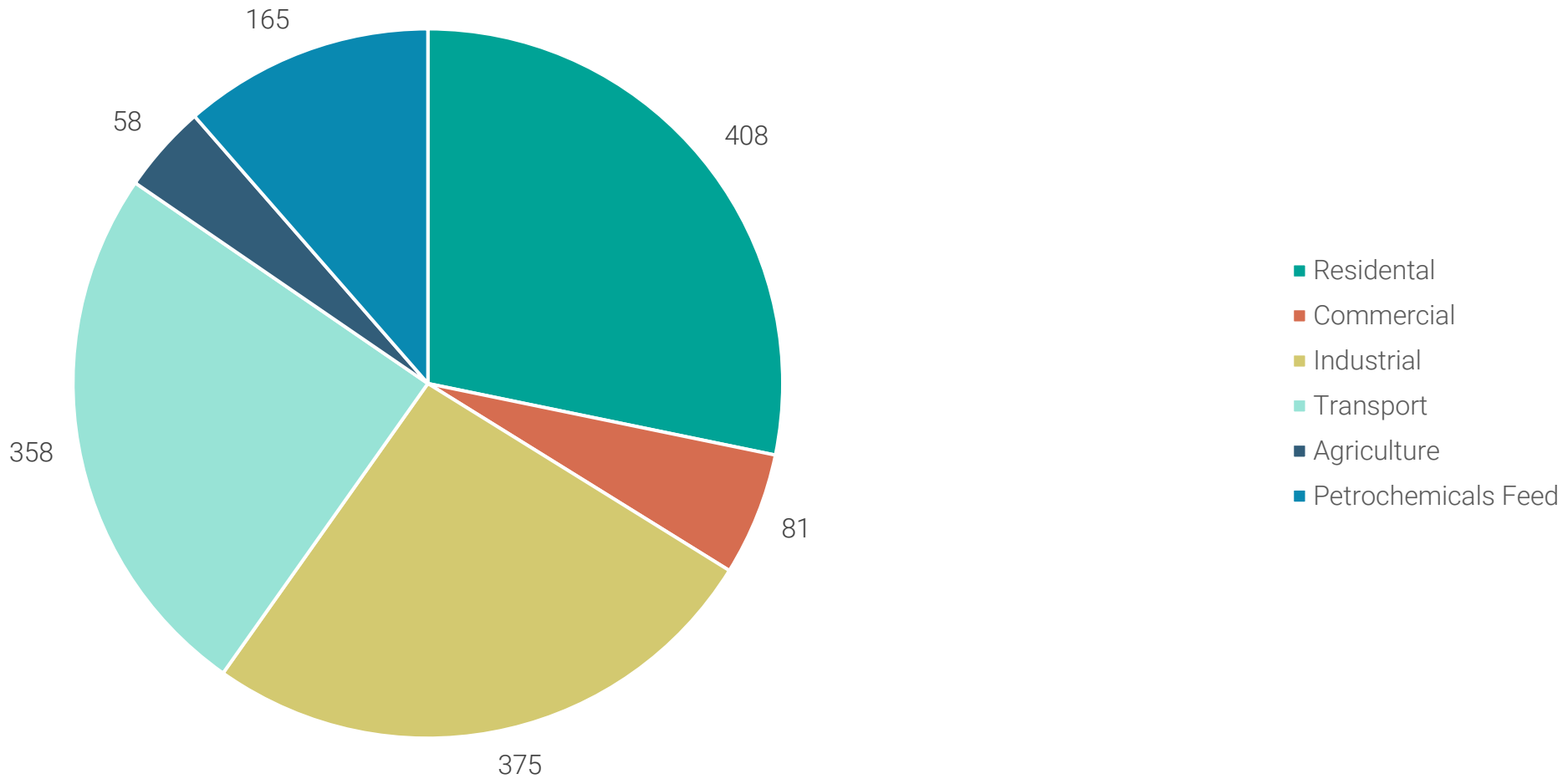


Energy Flow Summary

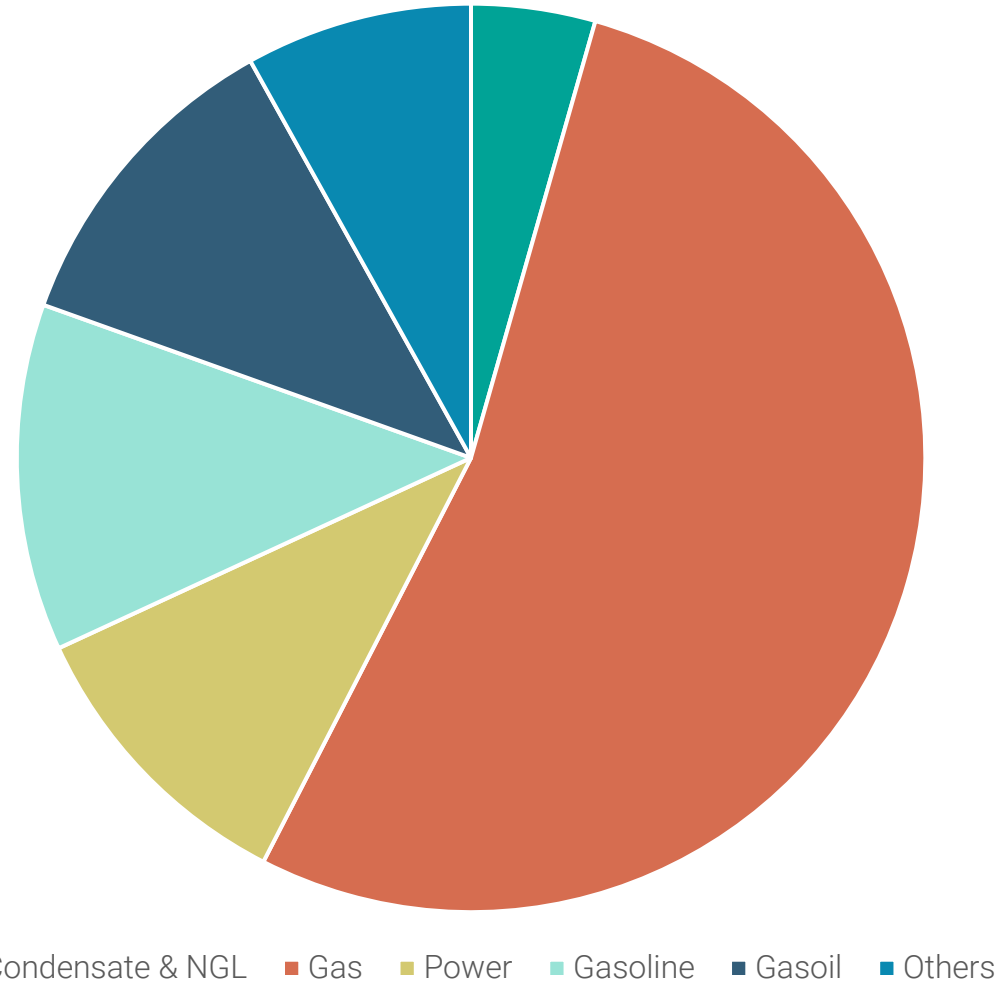
Primary Energy Production (MBOE)



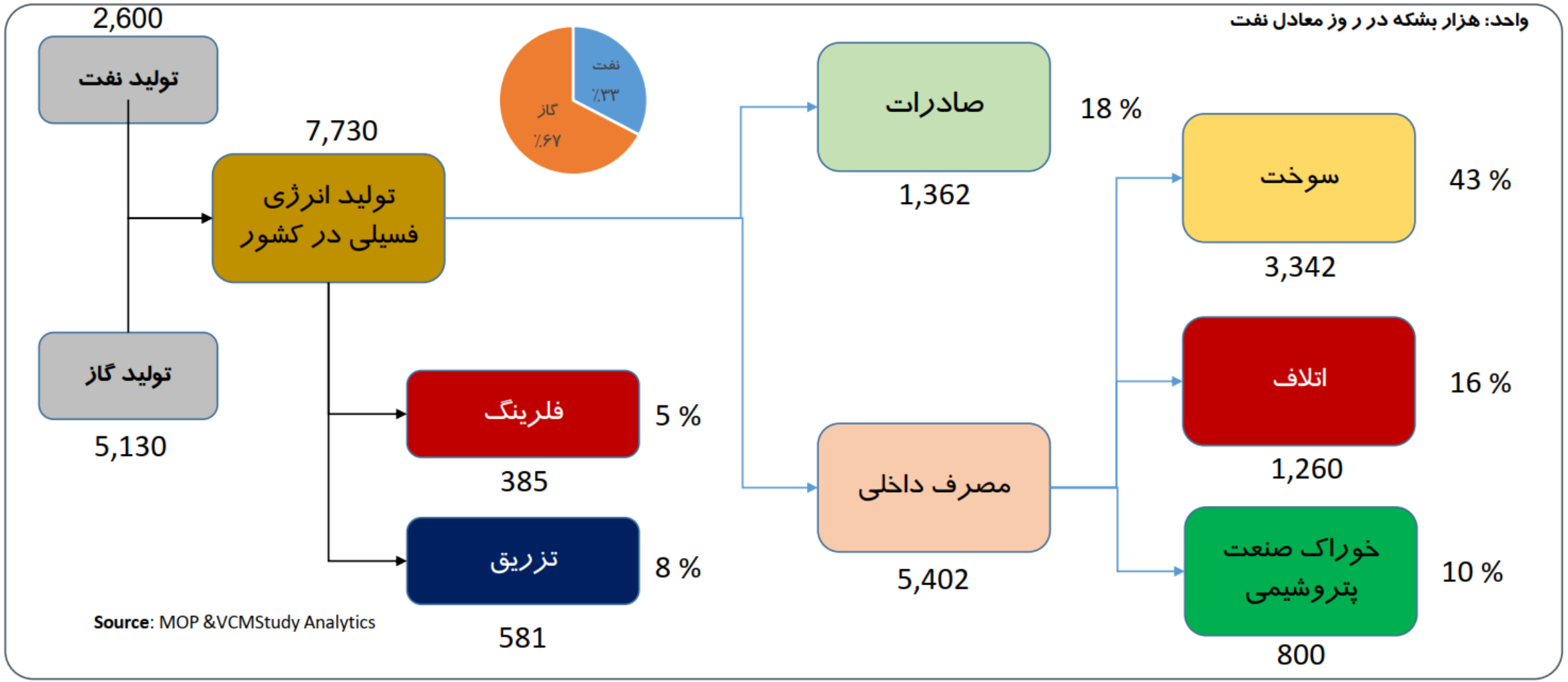
Final Energy Consumption by Sector



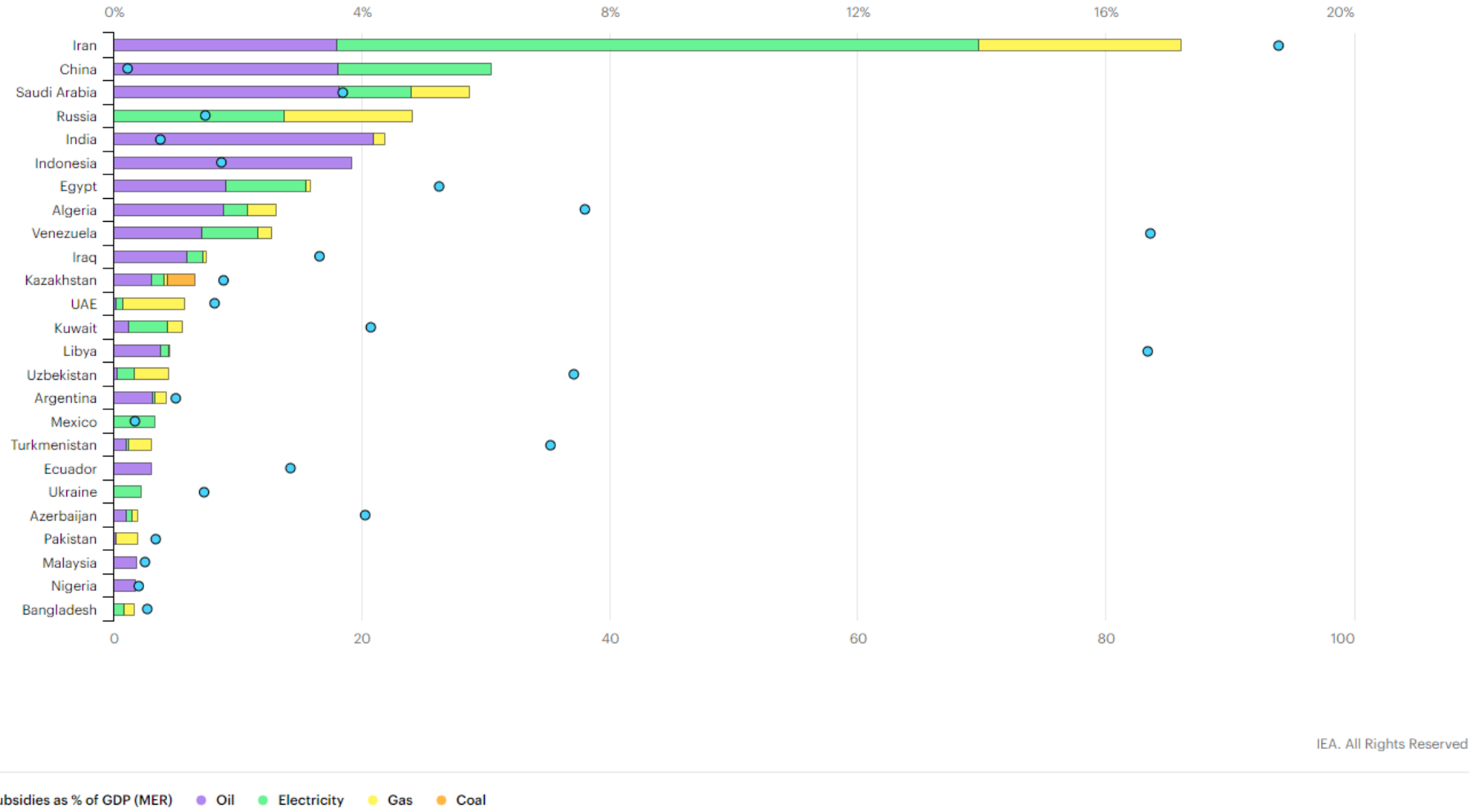
Final Energy Consumption by Fuel



Iran Energy Flow (1399)

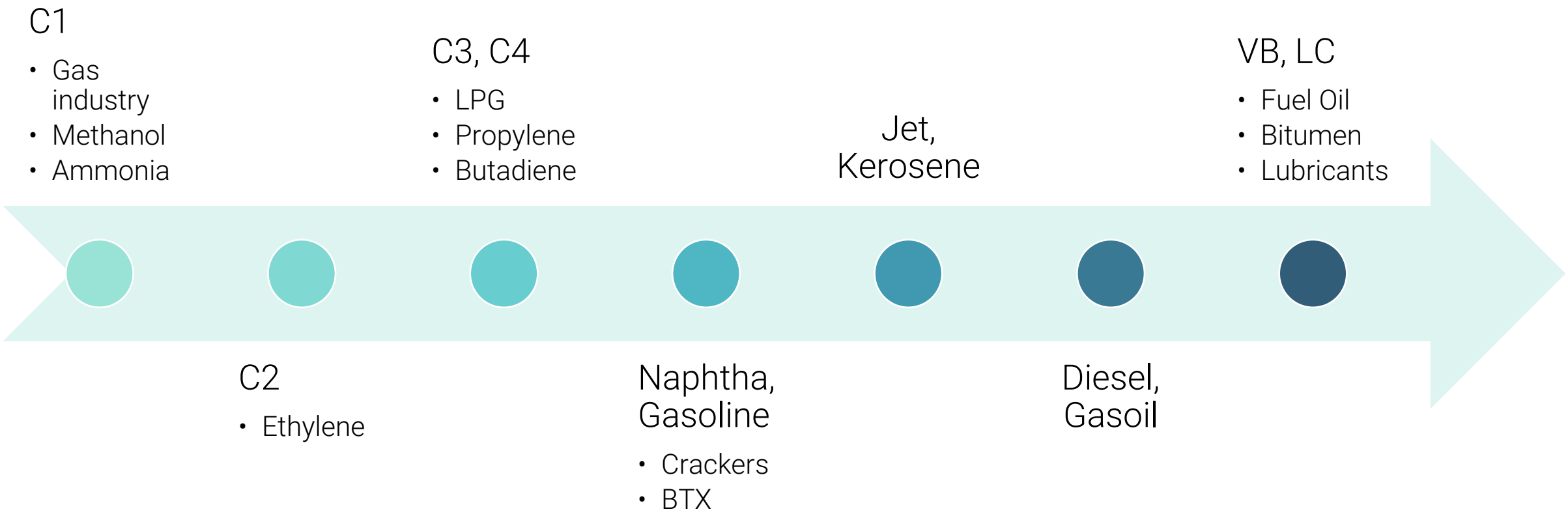


Value of fossil-fuel subsidies by fuel in the top 25 countries, 2019



Carbon

A Simplified Overview



Gas-related Abbreviations

CNG

- Compressed Natural Gas (Cars in Iran)

LNG

- Liquified Natural Gas (Power Sector)

NGL

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

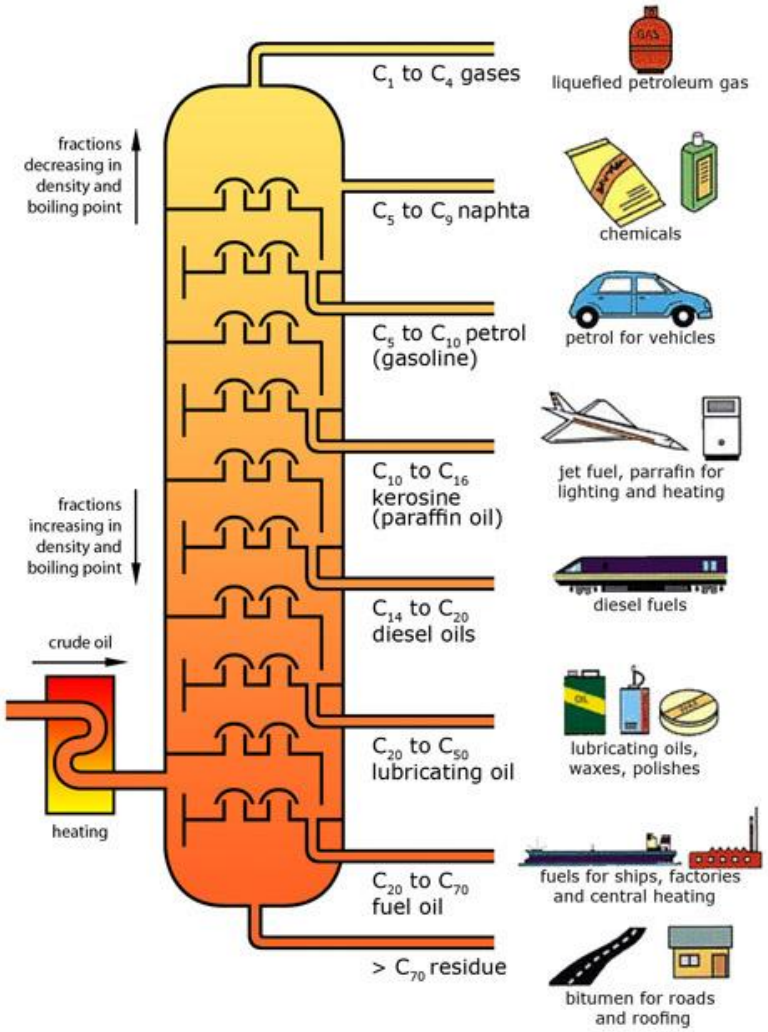
LPG

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

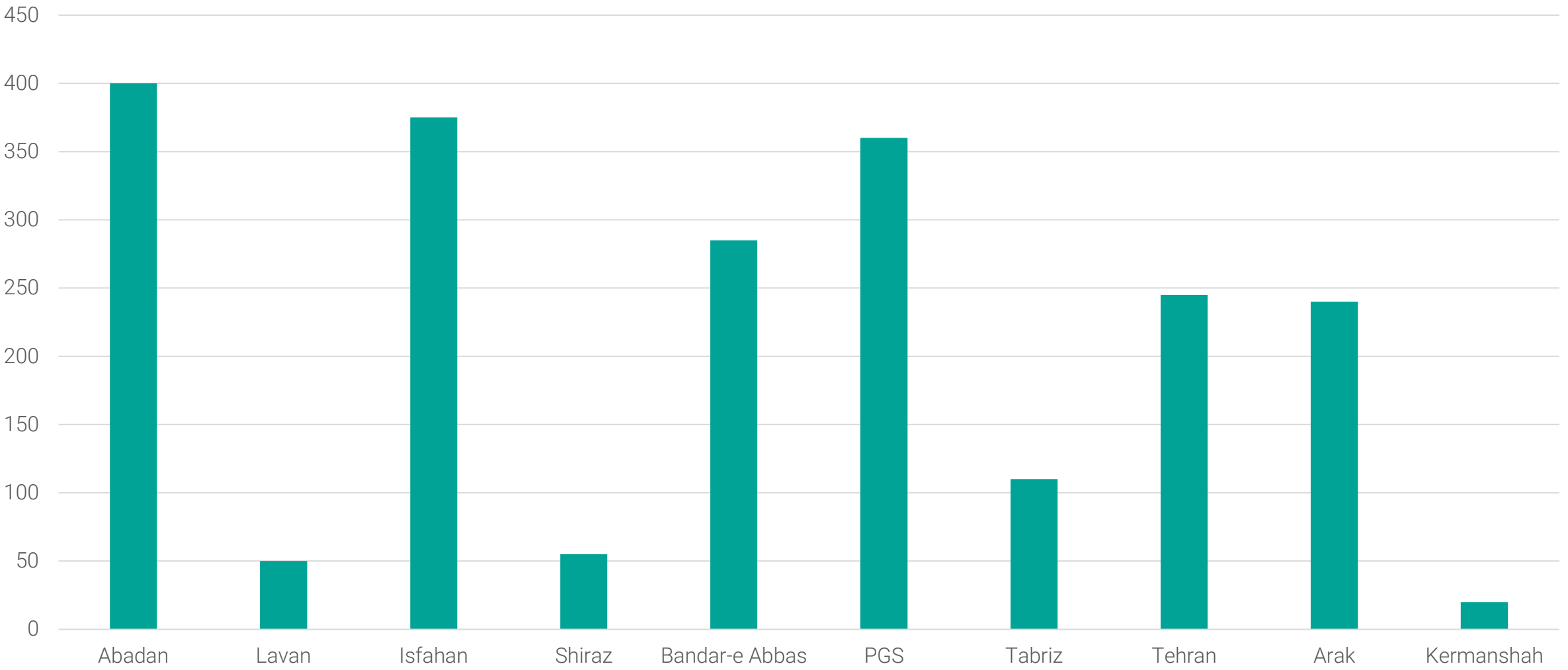
GTL

- Gas to Liquid (Convert C1 to Products)

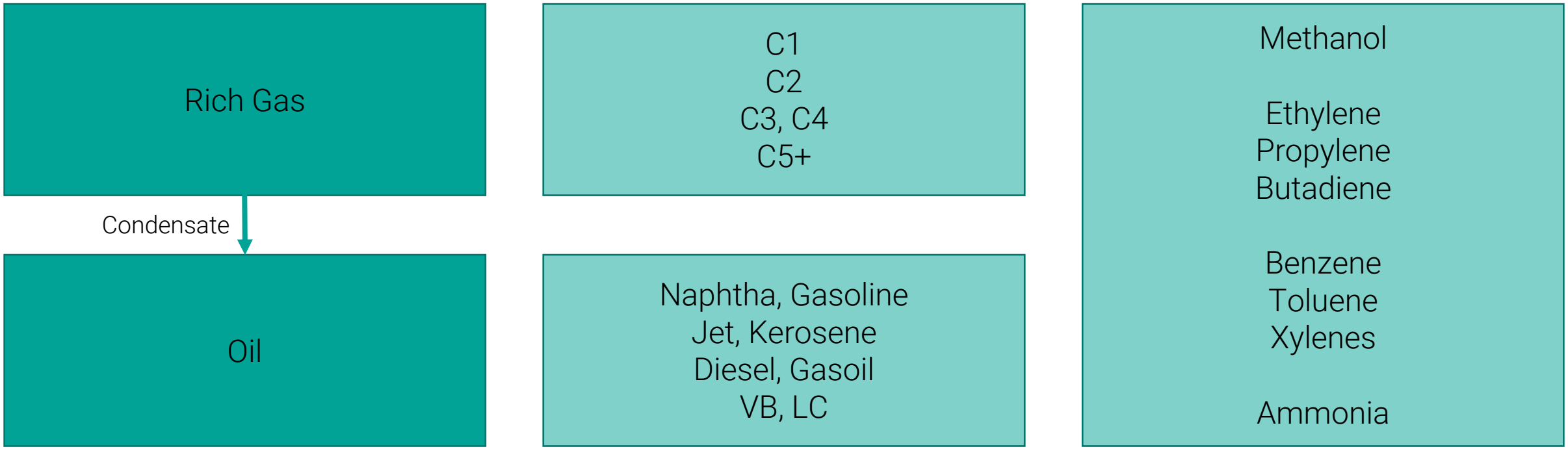
Distillation Tower



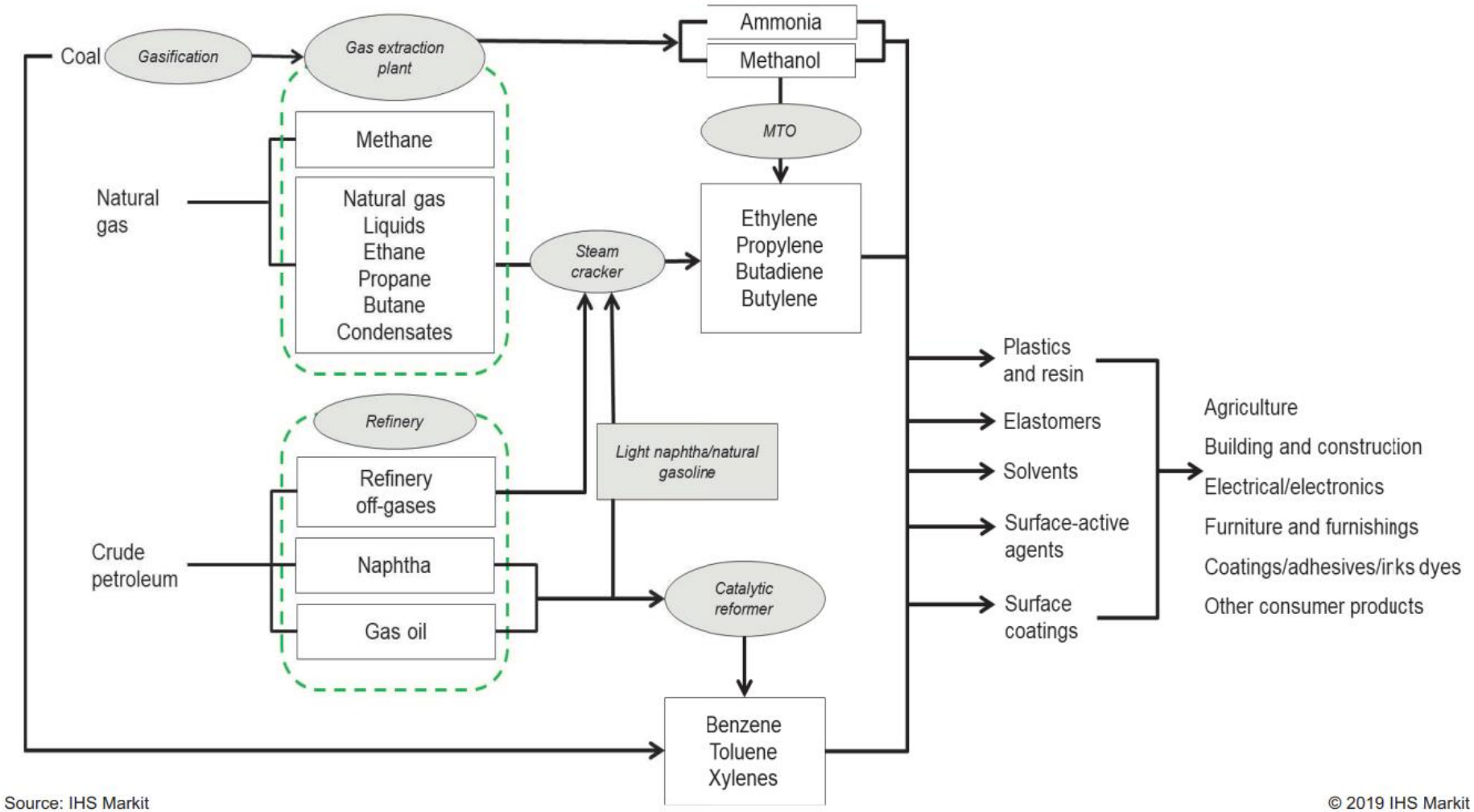
Iran Oil Refineries



Industry Flow

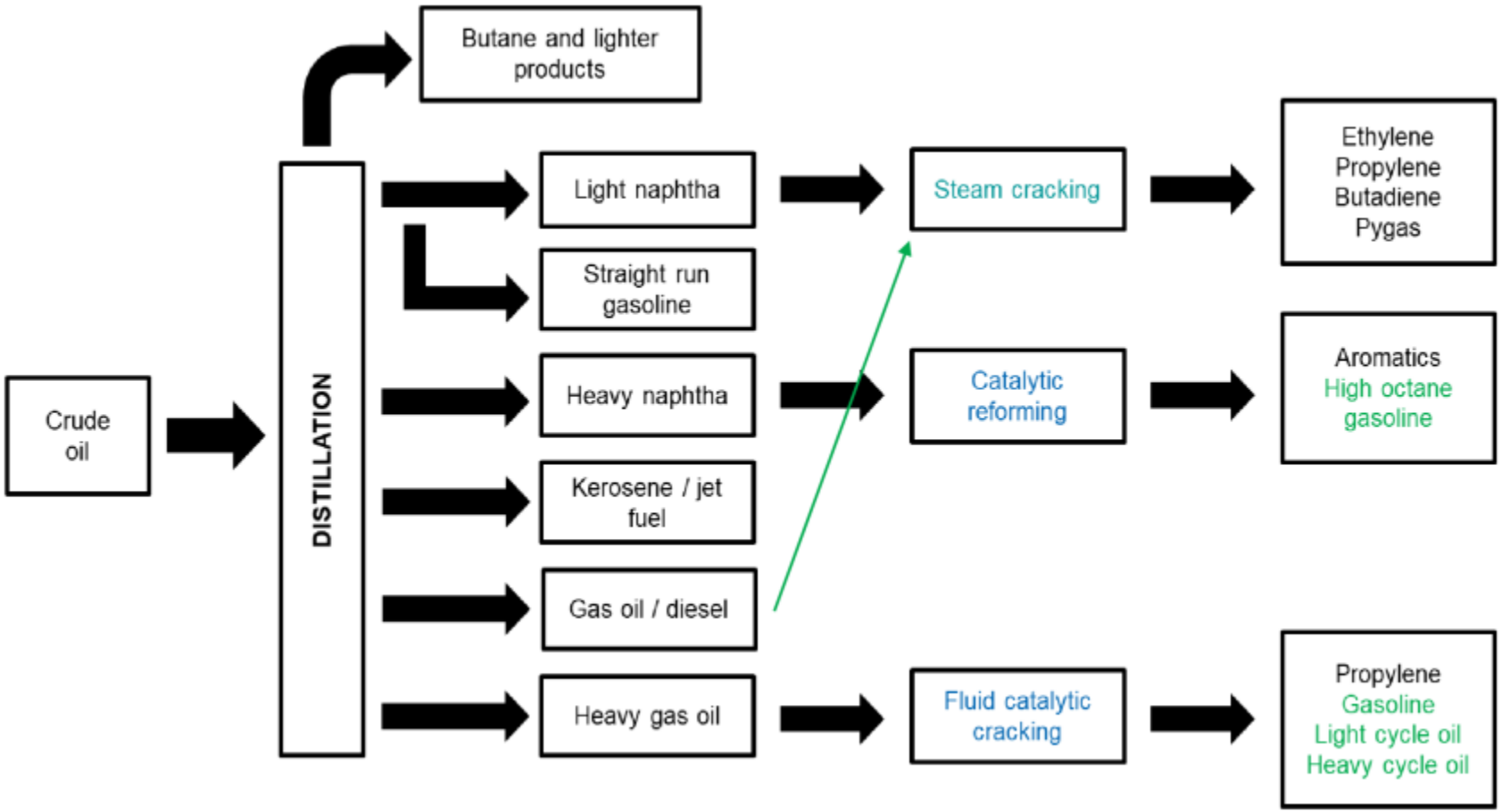


Petrochemical Feedstock and Derivatives

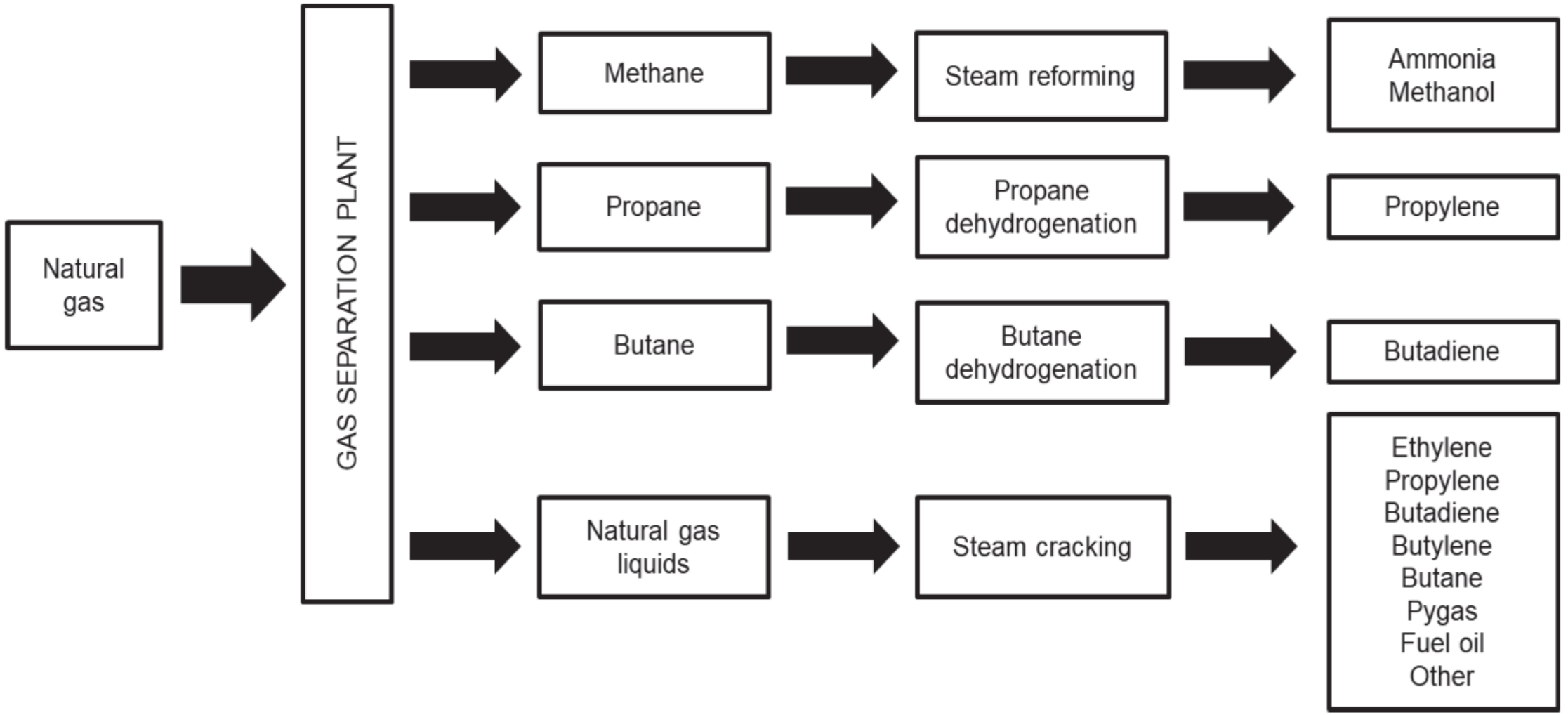


Source: IHS Markit

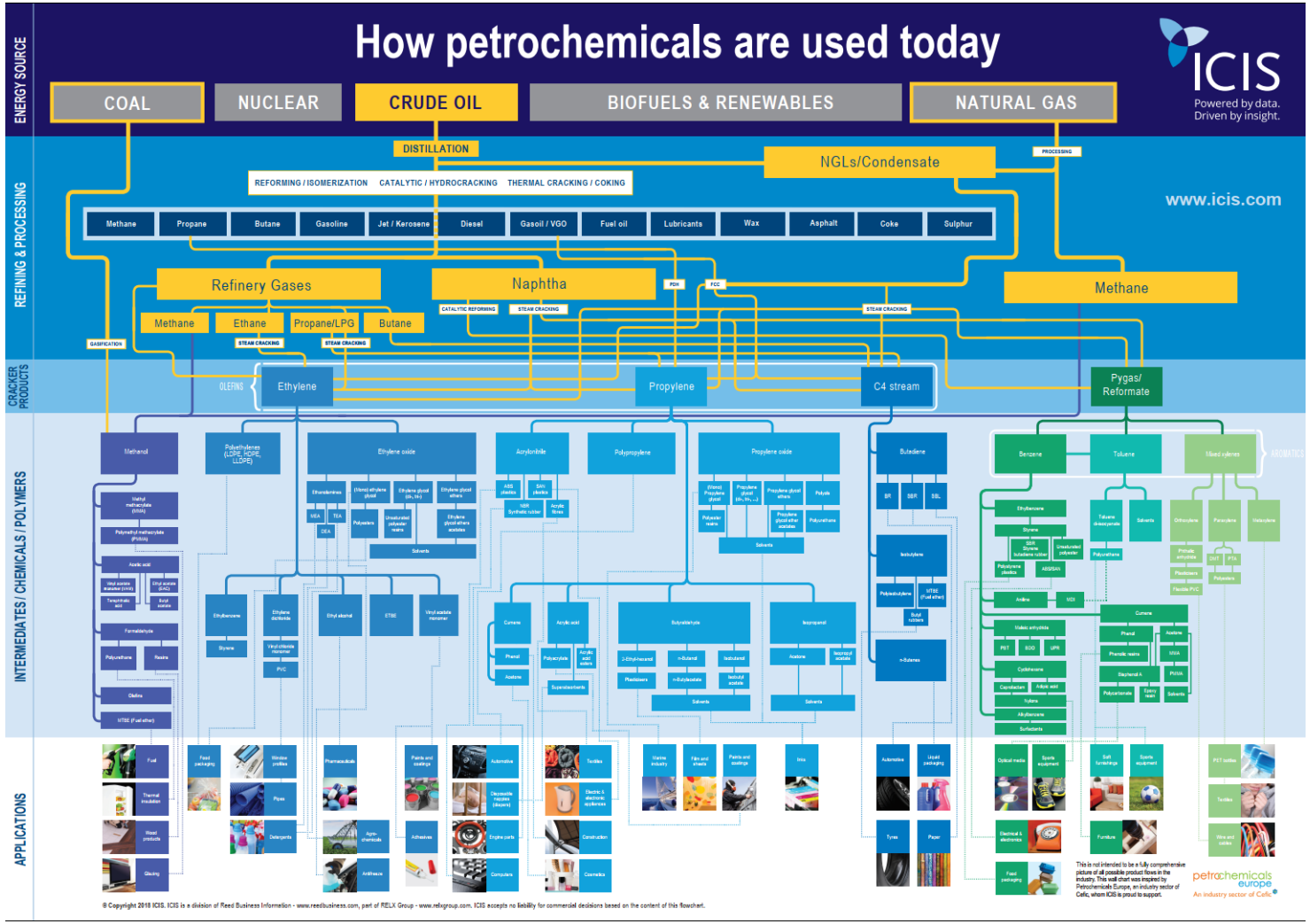
From Crude Oil to Basic Petrochemicals



From Natural Gas to Basic Petrochemicals



Chemicals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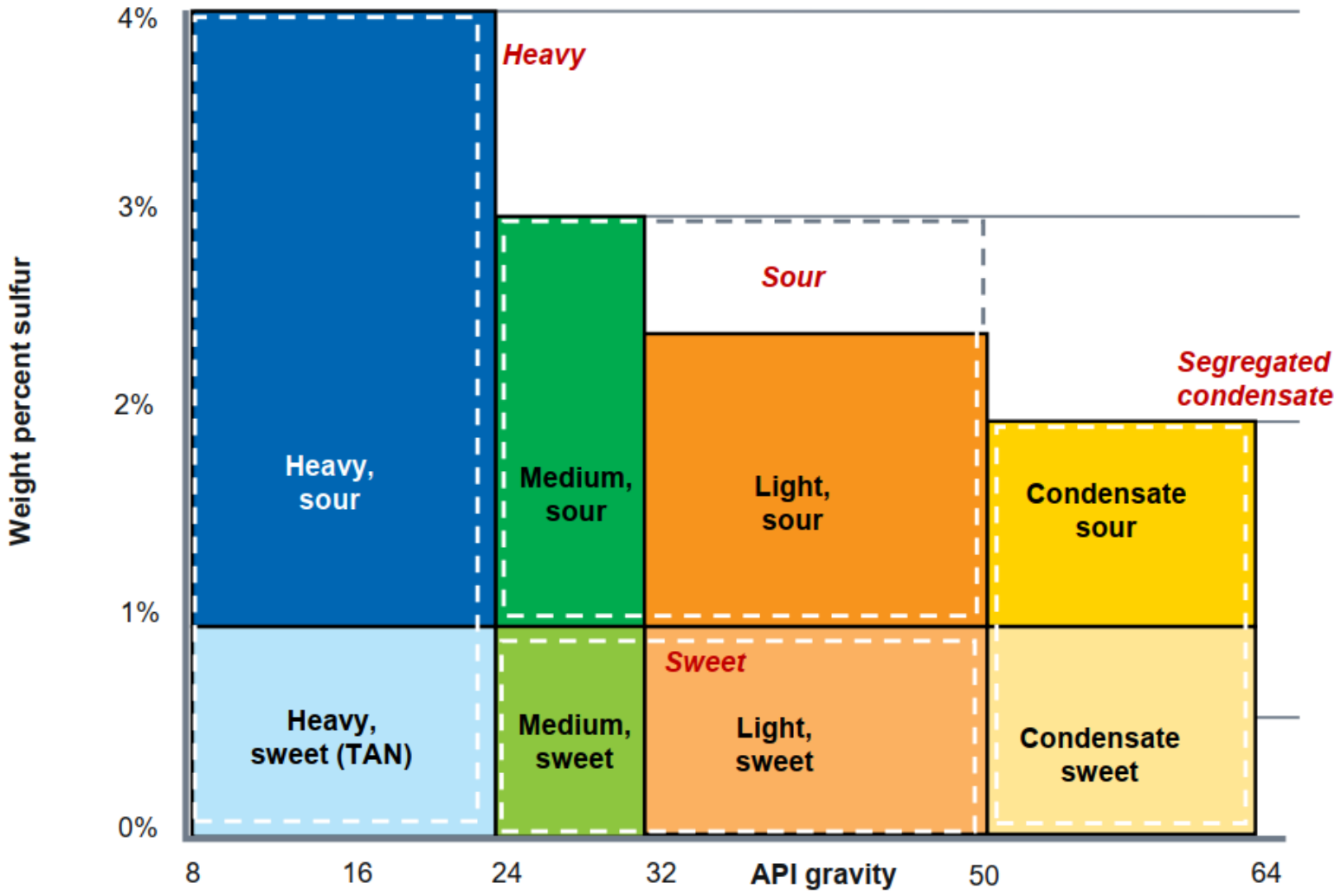
CATALYTIC / HYDROCRACKING
THERMAL CRACKING / COKING
NGLs/Condensate
Methane
Propane
Butane
Gasoline
Jet / Kerosene
Diesel
Gasoil / VGO
Fuel oil
Lubricants
Wax
Asphalt
Coke
Sulphur
Refinery Gases
Naphtha
Methane
Ethane
Propane/LPG
Butane
Methane
CRACKER PRODUCTS
OLEFINS
Ethylene
Propylene
C4 stream
Pygas/ Reformate
INTERMEDIATES / CHEMICALS / POLYMERS
AROMATICS
APPLICATIONS
petrochemicals europe
An industry sector of Cefic

Iran Petrochemical Plants (Examples)

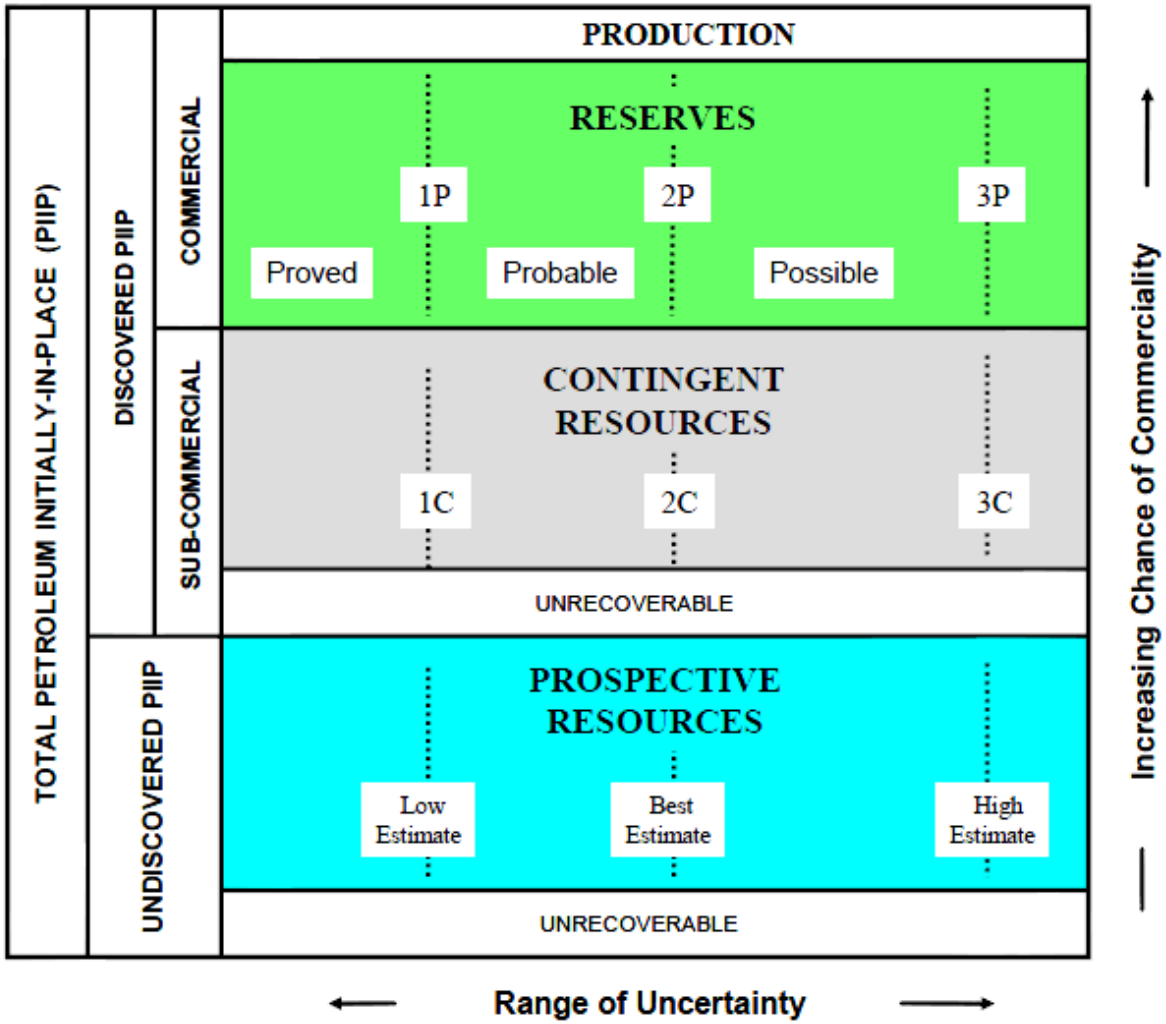
Methanol	Urea	Olefin	BTX
Zagros	Pardis	Arya Sasol	Nouri
Fanavaran	Khorasan	Arak	Bu Ali

The Oil Market

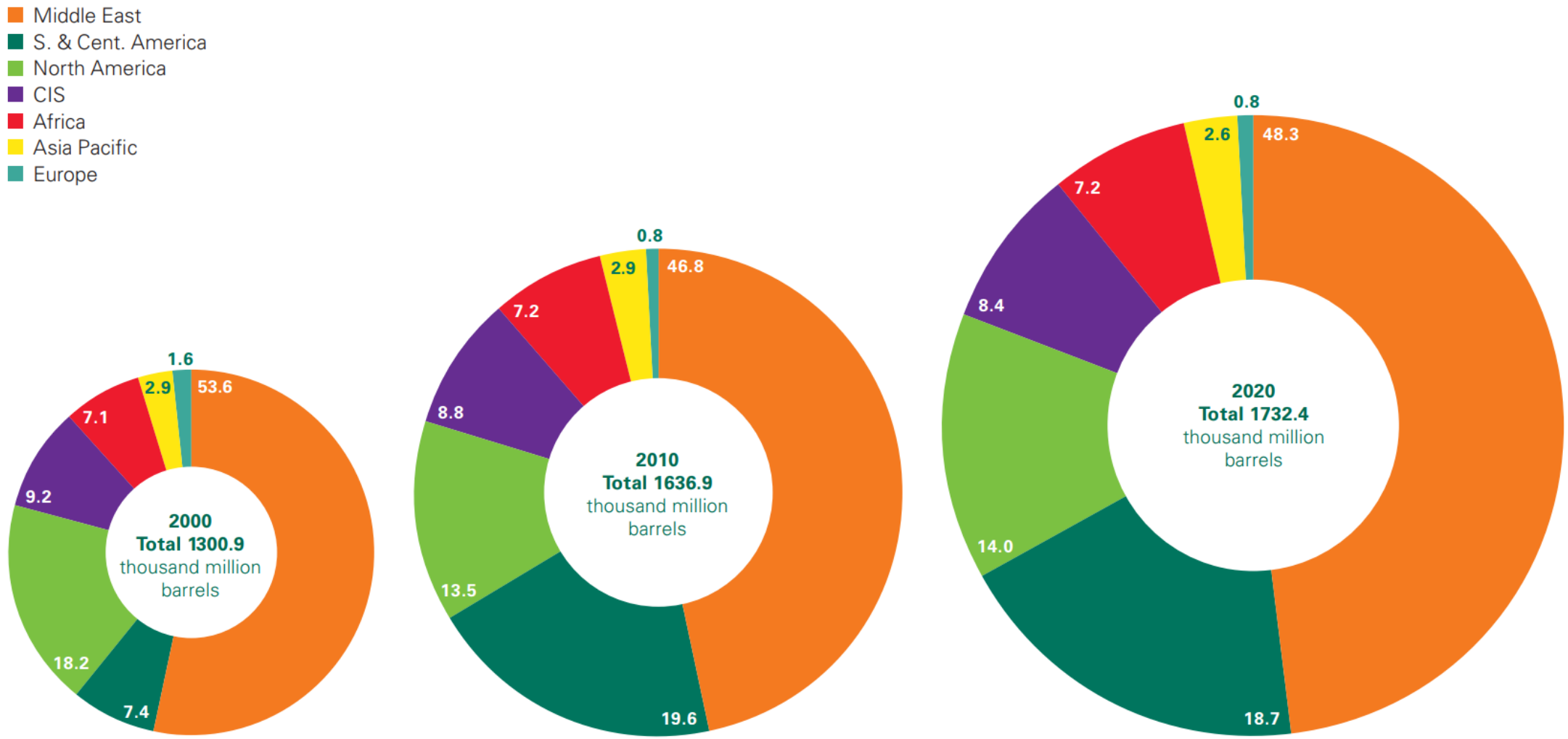
IHS Markit Oil Markets And Downstream Crude Oil Grade Map (General)



SPE Classification Of Reserves



Distribution Of Proved Reserves



Top Oil Producers, Net Exporters and Net Importers

Producers	Mt	% of world total
United States	706	17.0
Russian Federation	512	12.4
Saudi Arabia	511	12.3
Canada	255	6.2
Iraq	201	4.9
People's Rep. of China	195	4.7
United Arab Emirates	174	4.2
Brazil	153	3.7
Kuwait	131	3.2
Islamic Rep. of Iran	130	3.1
Rest of the world	1 173	28.3
World	**4 141**	**100.0**

2020 provisional data

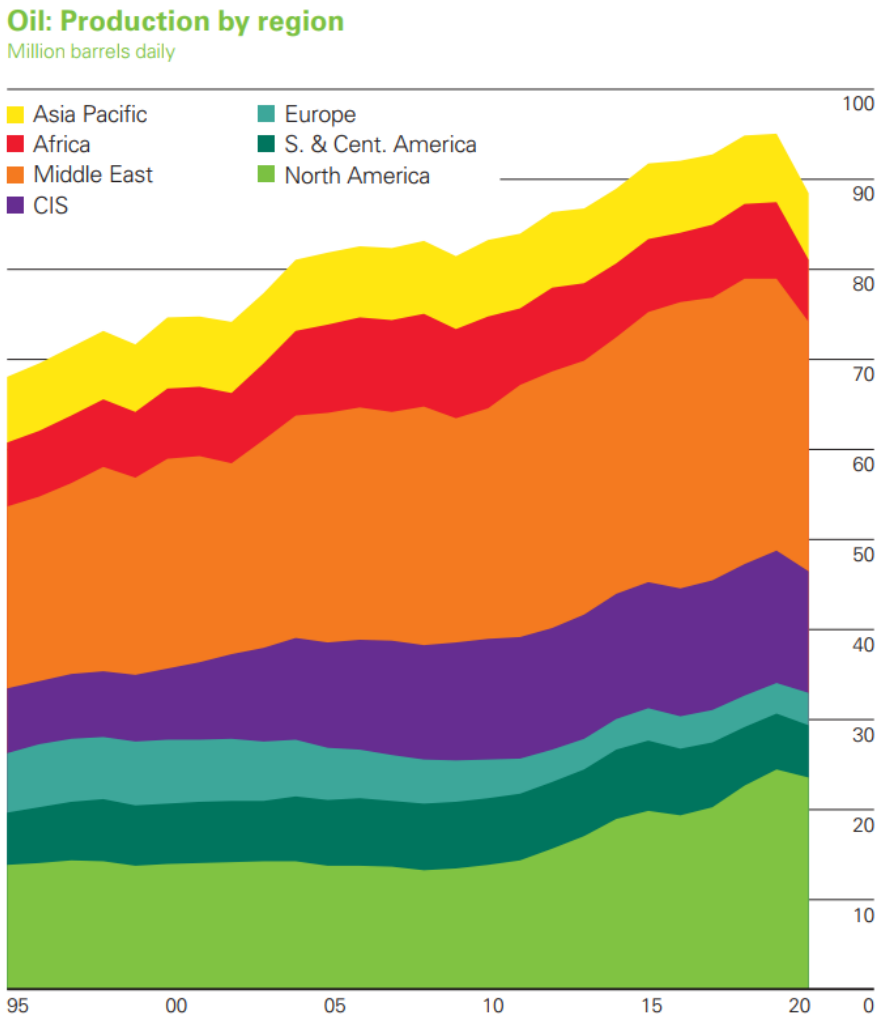
Net exporters	Mt
Saudi Arabia	352
Russian Federation	269
Iraq	195
Canada	154
United Arab Emirates	148
Kuwait	102
Nigeria	99
Kazakhstan	70
Angola	63
Mexico	59
Others	531
Total	**2 042**

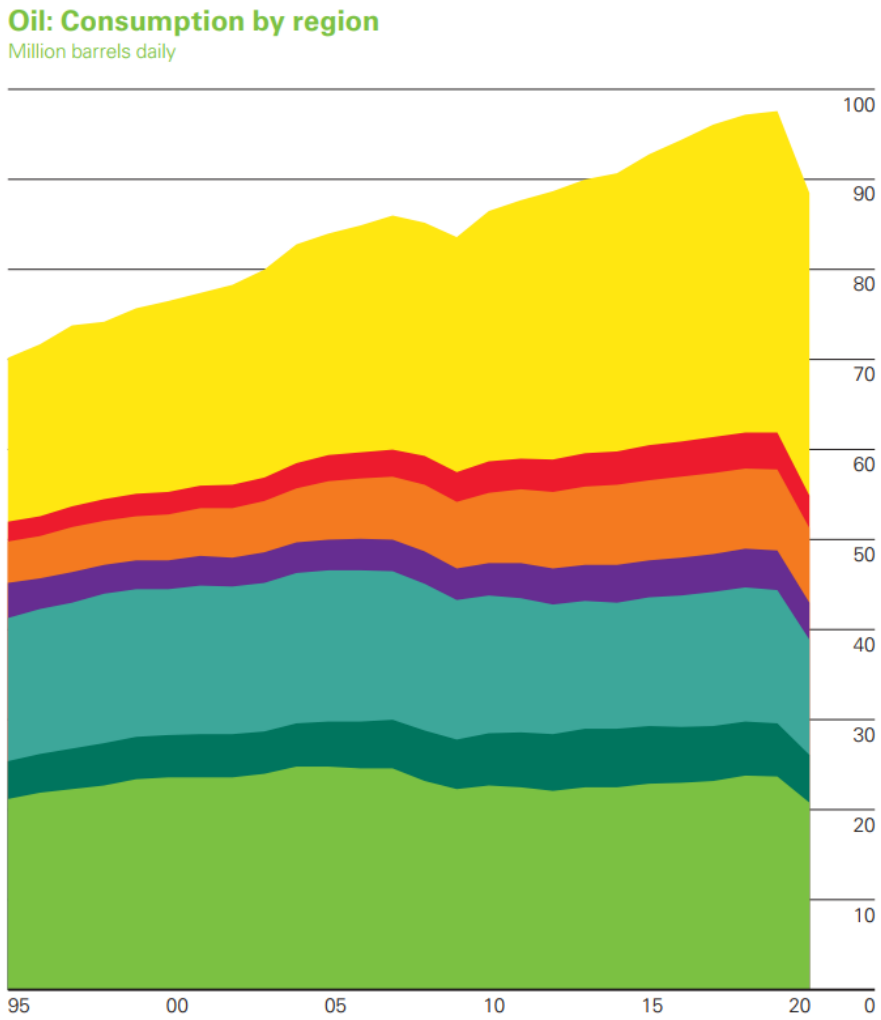
2019 data

Net importers	Mt
People's Rep. of China	505
India	227
United States	202
Japan	149
Korea	145
Germany	86
Spain	66
Italy	65
Netherlands	62
Singapore	53
Others	509
Total	**2 069**

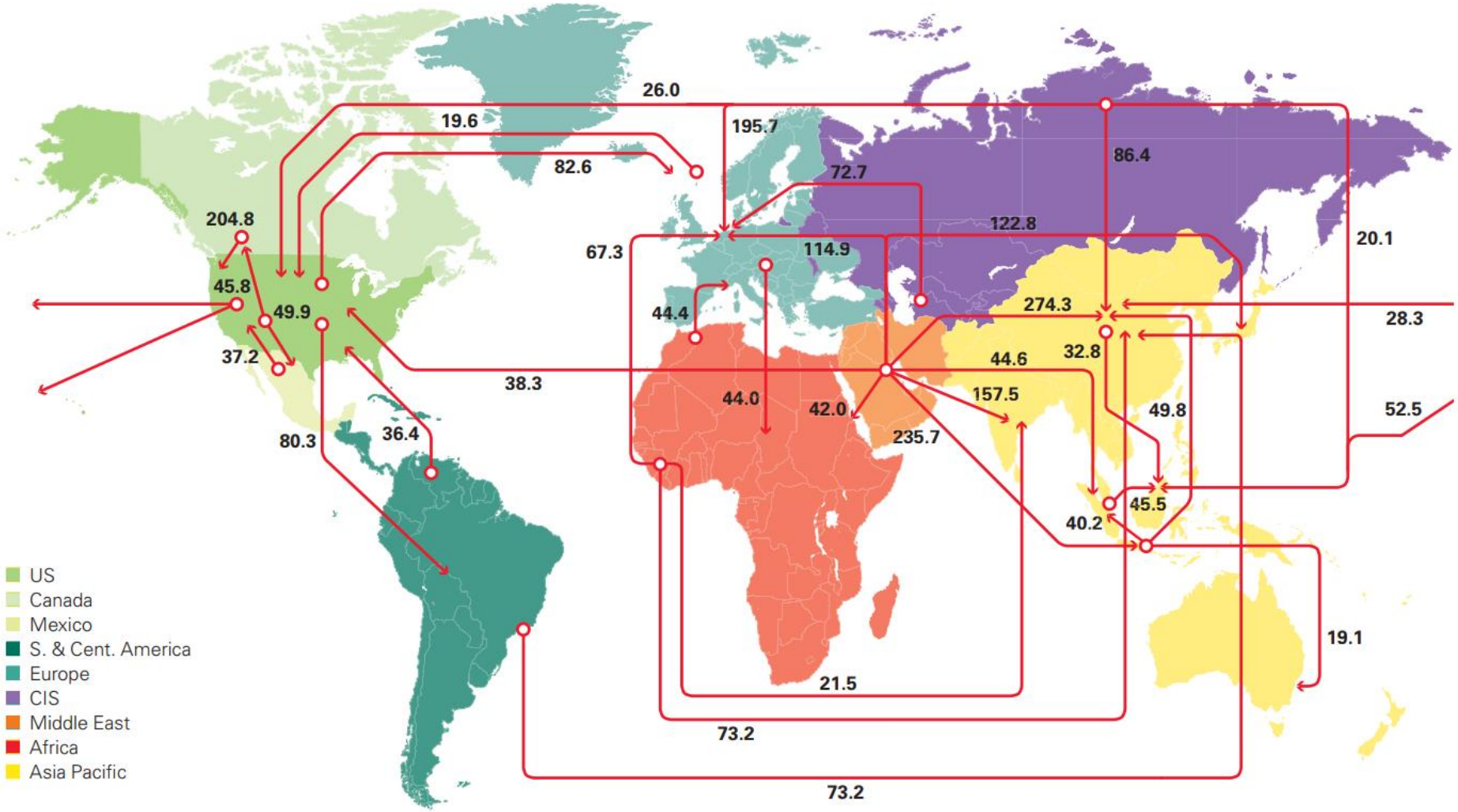
2019 data

The Geopolitics of Oil

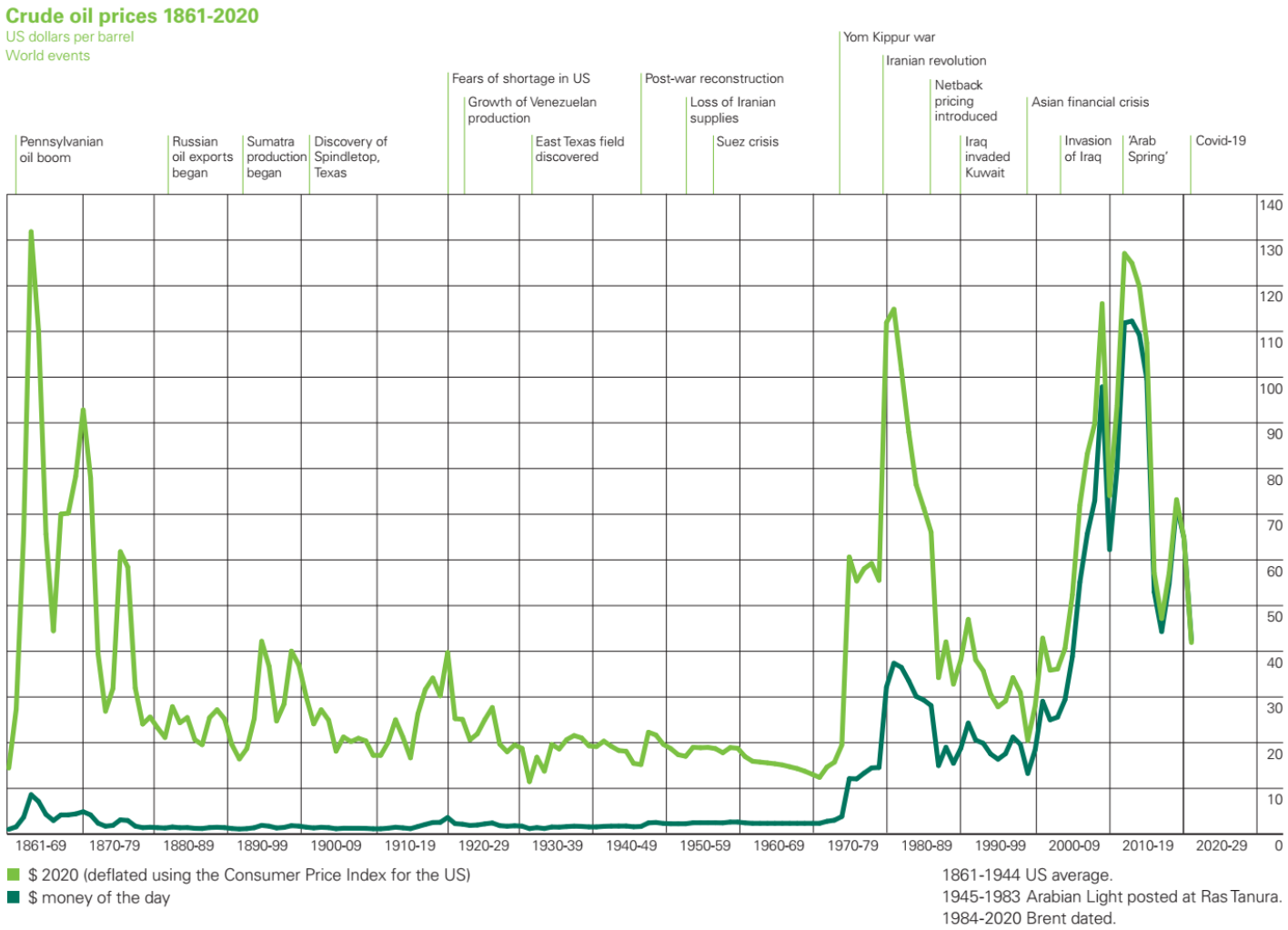




Major Trade Movements 2020



Crude Oil Prices (Nominal and Real)



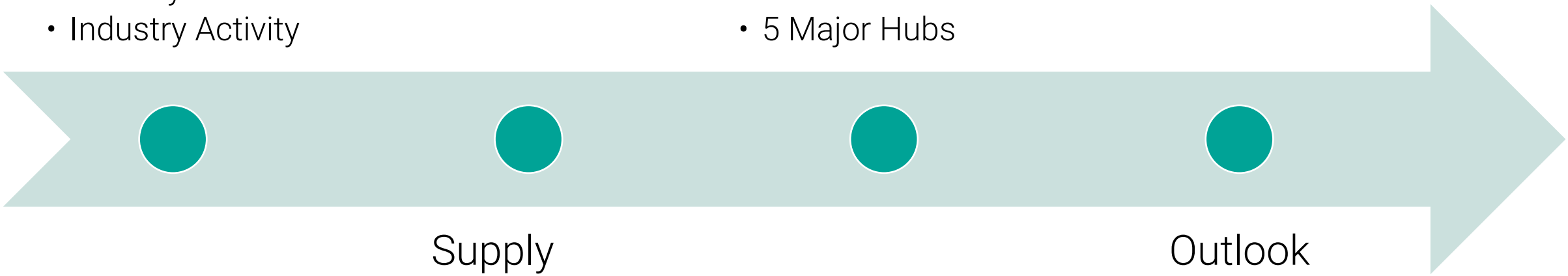
Short-to-medium Term Oil Price Forecast Methodology

Demand

- GDP Growth
- Mobility
- Industry Activity

Stocks

- OECD Commercial Stocks
- SPR
- 5 Major Hubs

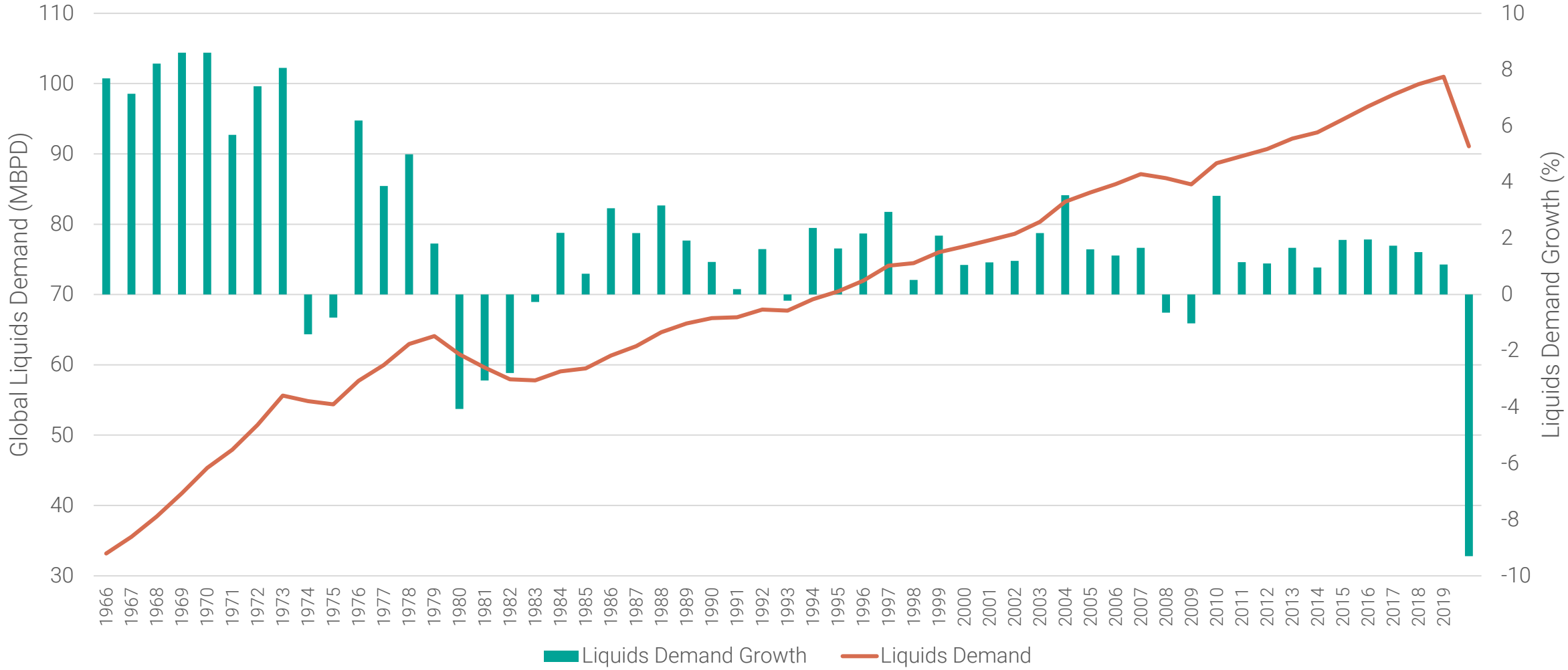


Supply

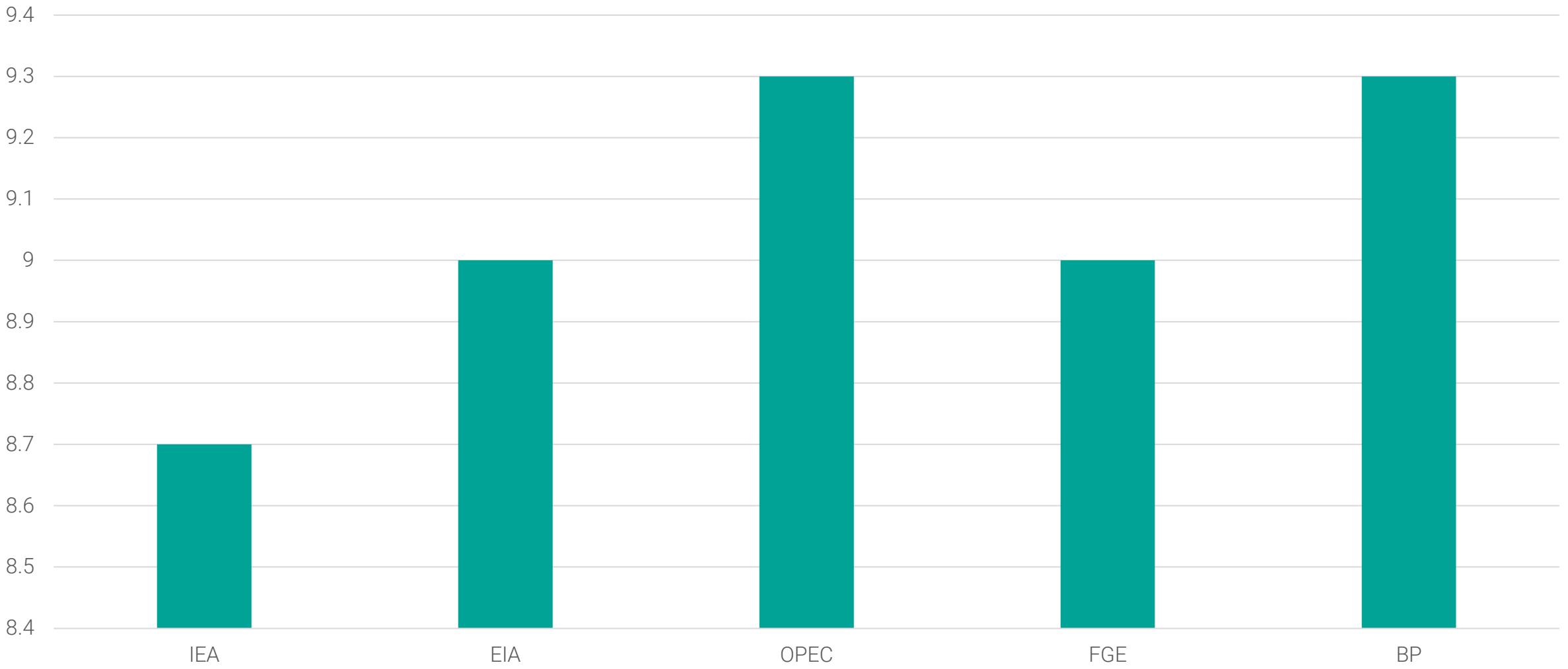
- Non-OPEC+
- Shale Oil
- OPEC+

Outlook

Global Liquids Demand



Demand Destruction In 2020 (MBPD)



World Oil Demand (MBPD)

World oil demand	2021	1Q22	2Q22	3Q22	4Q22	2022	Change 2022/21 Growth	Change 2022/21 %
Americas	24.19	24.04	25.42	25.77	25.70	25.24	1.06	4.37
of which US	*19.96*	*19.69*	*21.07*	*21.36*	*21.28*	*20.86*	*0.90*	*4.50*
Europe	13.02	12.63	13.22	14.49	14.16	13.63	0.61	4.72
Asia Pacific	7.39	7.91	7.22	7.25	7.83	7.55	0.17	2.26
Total OECD	**44.59**	**44.58**	**45.86**	**47.50**	**47.69**	**46.43**	**1.84**	**4.12**
China	14.52	14.64	15.44	15.00	15.65	15.18	0.66	4.57
India	4.79	5.48	4.82	4.97	5.44	5.18	0.39	8.16
Other Asia	8.63	9.25	9.59	8.93	8.95	9.18	0.55	6.38
Latin America	6.30	6.49	6.33	6.61	6.51	6.48	0.18	2.85
Middle East	7.99	8.30	8.01	8.49	8.22	8.26	0.27	3.34
Africa	4.25	4.54	4.21	4.27	4.53	4.39	0.14	3.23
Russia	3.61	3.75	3.47	3.68	3.81	3.68	0.07	1.81
Other Eurasia	1.21	1.30	1.29	1.12	1.32	1.26	0.05	3.72
Other Europe	0.75	0.80	0.73	0.74	0.81	0.77	0.02	2.18
Total Non-OECD	**52.06**	**54.55**	**53.90**	**53.82**	**55.23**	**54.37**	**2.32**	**4.45**
Total World	**96.65**	**99.13**	**99.75**	**101.32**	**102.92**	**100.80**	**4.15**	**4.30**
Previous Estimate	96.63	99.13	99.75	101.28	102.90	100.79	4.15	4.30
Revision	0.01	0.00	0.00	0.03	0.02	0.01	0.00	0.00

Non-OPEC Liquids Production

Non-OPEC liquids production	2021	1Q22	2Q22	3Q22	4Q22	2022	Change 2022/21 Growth	Change 2022/21 %
Americas	25.17	26.14	26.11	26.48	26.86	26.40	1.23	4.87
of which US	*17.76*	*18.48*	*18.68*	*18.83*	*19.14*	*18.79*	*1.03*	*5.77*
Europe	3.77	3.87	3.75	3.81	4.13	3.89	0.12	3.08
Asia Pacific	0.50	0.54	0.54	0.53	0.53	0.53	0.03	5.86
Total OECD	**29.45**	**30.55**	**30.39**	**30.82**	**31.53**	**30.82**	**1.37**	**4.66**
China	4.30	4.31	4.31	4.35	4.43	4.35	0.04	1.02
India	0.75	0.73	0.75	0.78	0.80	0.77	0.01	1.59
Other Asia	2.42	2.44	2.41	2.39	2.38	2.41	-0.01	-0.39
Latin America	5.96	6.25	6.20	6.14	6.35	6.23	0.27	4.61
Middle East	3.24	3.34	3.34	3.36	3.36	3.35	0.11	3.40
Africa	1.34	1.29	1.27	1.25	1.22	1.25	-0.09	-6.38
Russia	10.80	11.49	11.83	11.88	11.88	11.77	0.98	9.05
Other Eurasia	2.93	3.10	3.13	3.17	3.22	3.15	0.22	7.61
Other Europe	0.11	0.11	0.11	0.10	0.10	0.10	-0.01	-6.90
Total Non-OECD	**31.85**	**33.05**	**33.34**	**33.42**	**33.74**	**33.39**	**1.54**	**4.83**
Total Non-OPEC production	61.30	63.60	63.73	64.24	65.27	64.21	2.91	4.75
Processing gains	2.28	2.39	2.39	2.39	2.39	2.39	0.11	4.91
Total Non-OPEC liquids production	**63.58**	**65.99**	**66.13**	**66.63**	**67.66**	**66.61**	**3.02**	**4.75**
Previous estimate	63.65	66.01	66.19	66.70	67.74	66.66	3.02	4.74
Revision	-0.06	-0.02	-0.07	-0.07	-0.08	-0.06	0.00	0.01

OPEC Crude Oil Production (Secondary Sources)

Secondary sources	2020	2021	2Q21	3Q21	4Q21	Nov 21	Dec 21	Jan 22	*Change* Jan/Dec
Algeria	897	908	886	922	954	954	965	970	*5*
Angola	1,255	1,120	1,109	1,106	1,124	1,087	1,164	1,155	*-9*
Congo	288	265	261	258	268	261	272	255	*-17*
Equatorial Guinea	115	100	106	99	91	85	103	96	*-6*
Gabon	195	186	186	186	187	185	199	185	*-14*
IR Iran	1,988	2,405	2,440	2,480	2,480	2,473	2,482	2,503	*21*
Iraq	4,049	4,024	3,940	4,053	4,219	4,242	4,271	4,245	*-27*
Kuwait	2,430	2,415	2,356	2,445	2,528	2,531	2,551	2,579	*27*
Libya	367	1,148	1,151	1,154	1,114	1,137	1,053	1,008	*-45*
Nigeria	1,579	1,380	1,424	1,349	1,335	1,381	1,317	1,398	*81*
Saudi Arabia	9,182	9,091	8,502	9,536	9,860	9,871	9,945	9,999	*54*
UAE	2,802	2,718	2,644	2,762	2,854	2,852	2,880	2,924	*44*
Venezuela	500	558	513	538	667	669	718	668	*-51*
Total OPEC	**25,648**	**26,319**	**25,520**	**26,886**	**27,682**	**27,727**	**27,918**	**27,981**	***64***

OPEC Crude Oil Production (Direct Communications)

Direct communication	2020	2021	2Q21	3Q21	4Q21	Nov 21	Dec 21	Jan 22	*Change* Jan/Dec
Algeria	899	911	886	924	958	959	966	977	*11*
Angola	1,271	1,124	1,125	1,114	1,122	1,110	1,150	1,193	*43*
Congo	300	267	265	266	260	253	257	275	*18*
Equatorial Guinea	114	94	99	94	79	71	85	88	*3*
Gabon	207	181	179	180	183	188	189	..	..
IR Iran	..	..	..	..	..	..	..	..	..
Iraq	3,997	3,971	3,890	3,979	4,167	4,208	4,225	4,162	*-63*
Kuwait	2,438	2,415	2,355	2,447	2,528	2,532	2,549	2,584	*35*
Libya	389	1,207	1,213	1,220	1,182	1,211	1,092	1,075	*-18*
Nigeria	1,493	1,312	1,343	1,270	1,233	1,275	1,197	1,399	*202*
Saudi Arabia	9,213	9,125	8,535	9,565	9,905	9,912	10,022	10,145	*123*
UAE	2,779	2,718	2,645	2,758	2,854	2,852	2,878	2,924	*46*
Venezuela	569	636	556	635	817	824	871	755	*-116*
Total OPEC	..	..	..	..	..	..	..	..	..

OPEC Secondary Sources

Platts

Argus

Energy Intelligence

IHS Markit

IEA

EIA

Market Balance by OPEC

	2020	1Q21	2Q21	3Q21	4Q21	2021	Change 2021/20
(a) World oil demand	**90.97**	**93.83**	**95.43**	**97.44**	**99.77**	**96.65**	***5.67***
Non-OPEC liquids production	62.97	62.49	63.26	63.60	64.96	63.58	*0.61*
OPEC NGL and non-conventionals	5.05	5.10	5.12	5.17	5.18	5.14	*0.10*
(b) Total non-OPEC liquids production and OPEC NGLs	**68.02**	**67.59**	**68.38**	**68.77**	**70.14**	**68.73**	***0.71***
Difference (a-b)	**22.95**	**26.23**	**27.05**	**28.67**	**29.63**	**27.92**	***4.96***
OPEC crude oil production	**25.65**	**25.15**	**25.52**	**26.89**	**27.68**	**26.32**	***0.67***
Balance	**2.69**	**-1.08**	**-1.53**	**-1.79**	**-1.95**	**-1.60**	***-4.29***

*Note: * 2021 = Estimation. Totals may not add up due to independent rounding. Source: OPEC.*

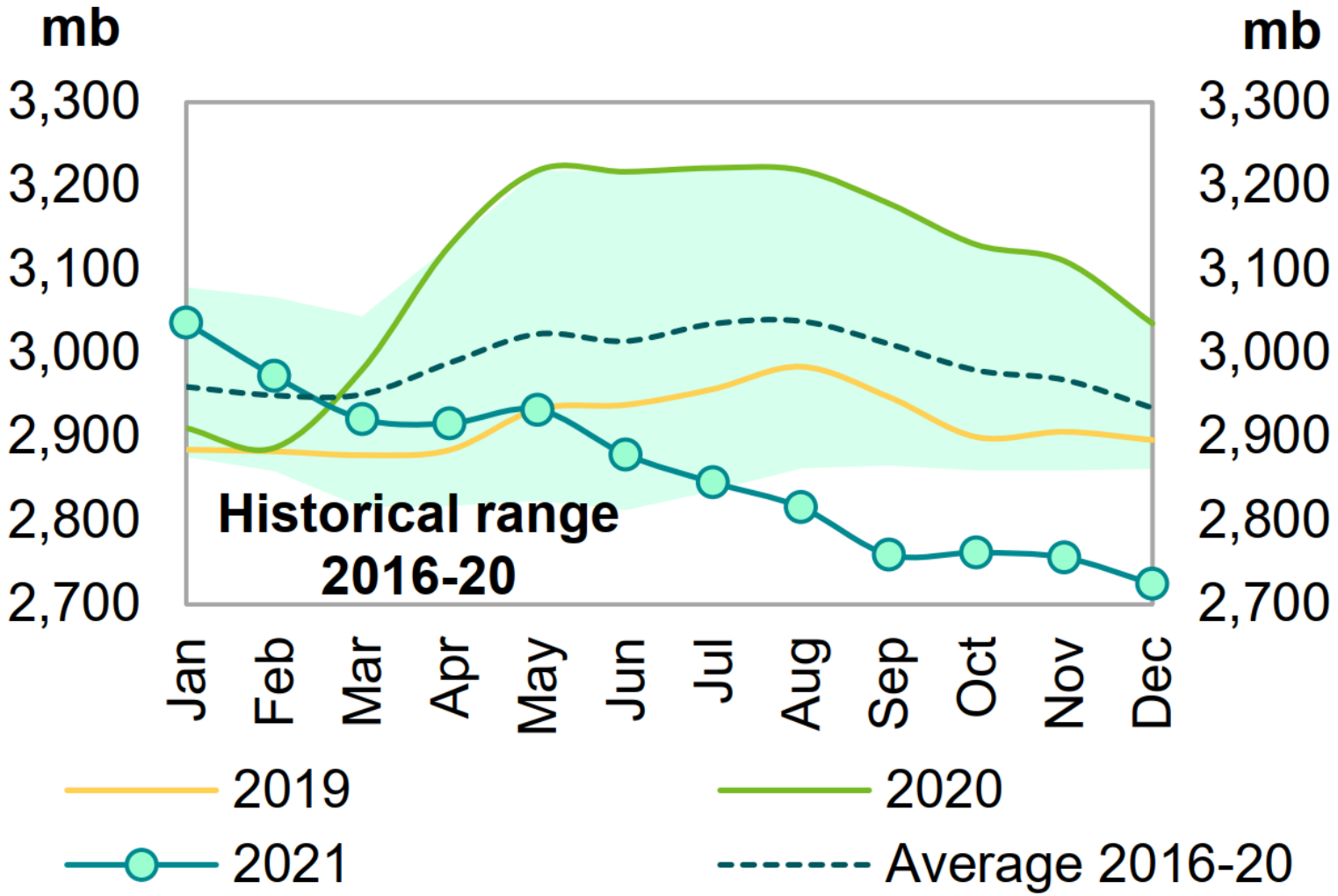
	2021	1Q22	2Q22	3Q22	4Q22	2022	Change 2022/21
(a) World oil demand	**96.65**	**99.13**	**99.75**	**101.32**	**102.92**	**100.80**	***4.15***
Non-OPEC liquids production	63.58	65.99	66.13	66.63	67.66	66.61	*3.02*
OPEC NGL and non-conventionals	5.14	5.23	5.26	5.29	5.31	5.27	*0.13*
(b) Total non-OPEC liquids production and OPEC NGLs	**68.73**	**71.22**	**71.38**	**71.92**	**72.97**	**71.88**	***3.15***
Difference (a-b)	**27.92**	**27.91**	**28.37**	**29.40**	**29.94**	**28.92**	***1.00***

Market Balance by IEA

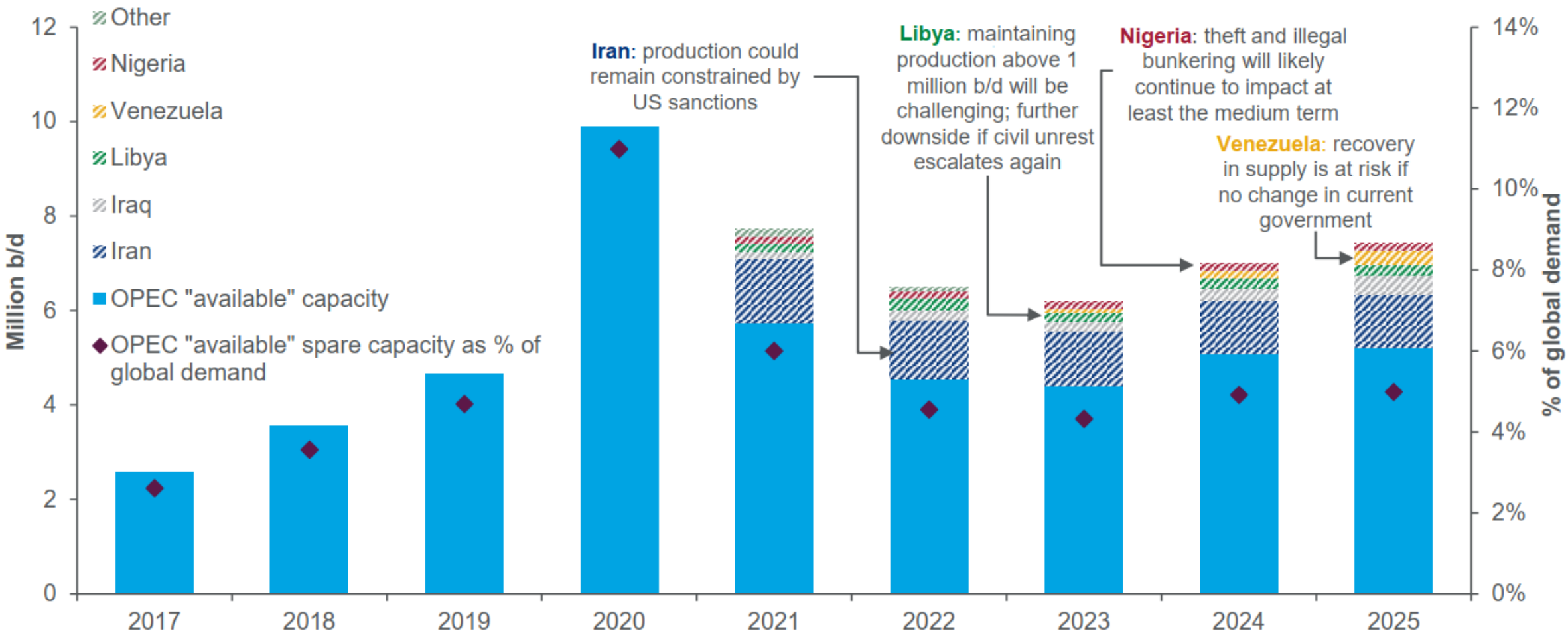
World oil demand and supply (mb/d)

	2019	1Q20	2Q20	3Q20	4Q20	2020	1Q21	2Q21	3Q21	4Q21	2021	2022	2023	2024	2025	2026
DEMAND																
Total OECD	47.7	45.4	37.6	42.3	43.1	42.1	43.3	43.8	45.4	46.5	44.7	45.8	46.2	46.2	46.0	45.8
Total Non-OECD	52.0	48.3	45.3	50.4	51.7	48.9	50.7	51.1	52.3	52.7	51.7	53.7	55.0	56.1	57.2	58.3
Total Demand[1]	99.7	93.8	82.9	92.7	94.7	91.0	93.9	94.9	97.7	99.2	96.5	99.4	101.2	102.3	103.2	104.1
SUPPLY																
Total OECD	28.5	29.9	26.9	27.1	27.8	27.9	27.8	28.1	28.3	28.7	28.2	29.0	29.6	29.9	29.9	29.7
Total Non-OECD	32.0	32.3	30.0	29.7	29.9	30.5	30.3	30.8	30.8	30.7	30.6	31.5	32.0	32.0	32.1	32.1
Processing Gains[2]	2.4	2.3	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.4	2.4	2.4	2.5	2.5
Global Biofuels	2.8	2.2	2.5	3.1	2.6	2.6	2.3	2.9	3.2	2.9	2.8	3.0	3.1	3.2	3.3	3.3
Total Non-OPEC[3]	65.6	66.7	61.3	61.9	62.4	63.1	62.5	63.9	64.5	64.6	63.9	66.0	67.1	67.5	67.7	67.6
OPEC																
Crude	29.5	28.2	25.6	24.1	24.9	25.7										
OPEC NGLs	5.4	5.4	5.2	5.1	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.5	5.5	5.6	5.6	5.7
Total OPEC[3]	34.9	33.6	30.8	29.2	30.0	30.9										
Total Supply	100.5	100.2	92.1	91.1	92.4	93.9										
Memo items:																
Call on OPEC crude + Stock ch.[4]	28.7	21.7	16.4	25.7	27.2	22.8	26.2	25.7	27.9	29.3	27.3	28.0	28.6	29.2	29.9	30.8

OECD Commercial Stocks



OPEC Spare Capacity



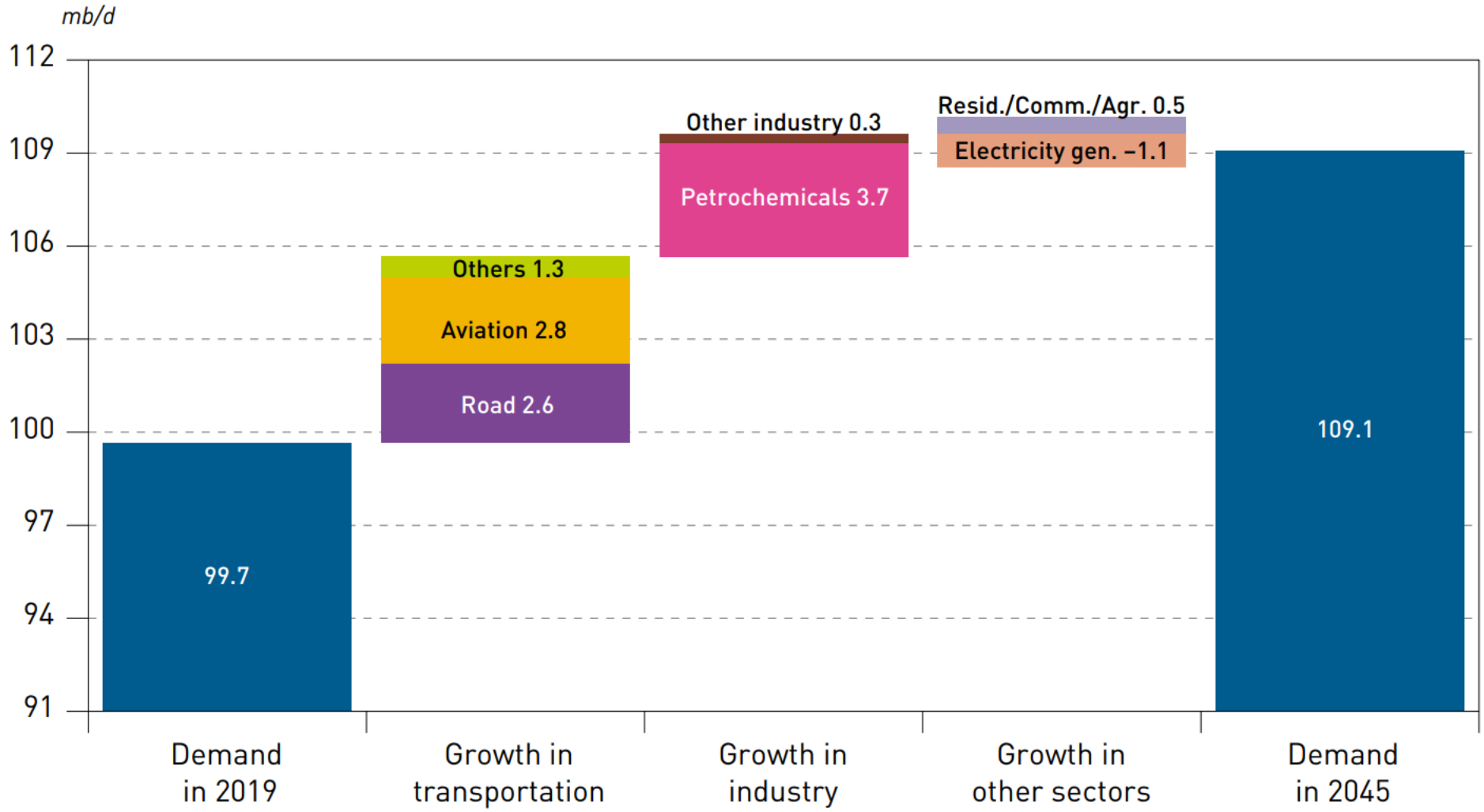
Long-term Oil Demand Outlook by Region

	2019	2020	2025	2030	2035	2040	2045	Growth 2019–2045
OECD Americas	25.6	23.3	25.7	24.8	23.1	21.2	19.3	–6.3
OECD Europe	14.3	12.6	13.7	12.9	12.0	11.1	10.2	–4.1
OECD Asia Oceania	7.9	7.1	7.4	6.9	6.4	5.8	5.2	–2.7
OECD	**47.9**	**43.0**	**46.8**	**44.6**	**41.5**	**38.0**	**34.8**	**–13.1**
Latin America	6.2	5.8	6.6	7.1	7.4	7.6	7.9	1.6
Middle East & Africa	4.3	3.9	4.8	5.5	6.2	6.9	7.6	3.3
India	4.8	4.3	5.8	7.2	8.6	9.9	11.1	6.3
China	13.1	12.1	14.4	15.5	16.2	16.7	17.1	4.0
Other Asia	9.0	8.5	9.9	10.9	11.7	12.4	13.0	3.9
OPEC	8.7	8.2	9.5	10.5	11.3	11.7	11.7	3.0
Russia	3.6	3.2	3.7	3.8	3.8	3.8	3.7	0.1
Other Eurasia	2.0	1.8	2.1	2.2	2.3	2.3	2.3	0.2
Non-OECD	**51.8**	**47.8**	**56.9**	**62.6**	**67.4**	**71.2**	**74.3**	**22.5**
World	**99.7**	**90.7**	**103.7**	**107.2**	**108.9**	**109.3**	**109.1**	**9.4**

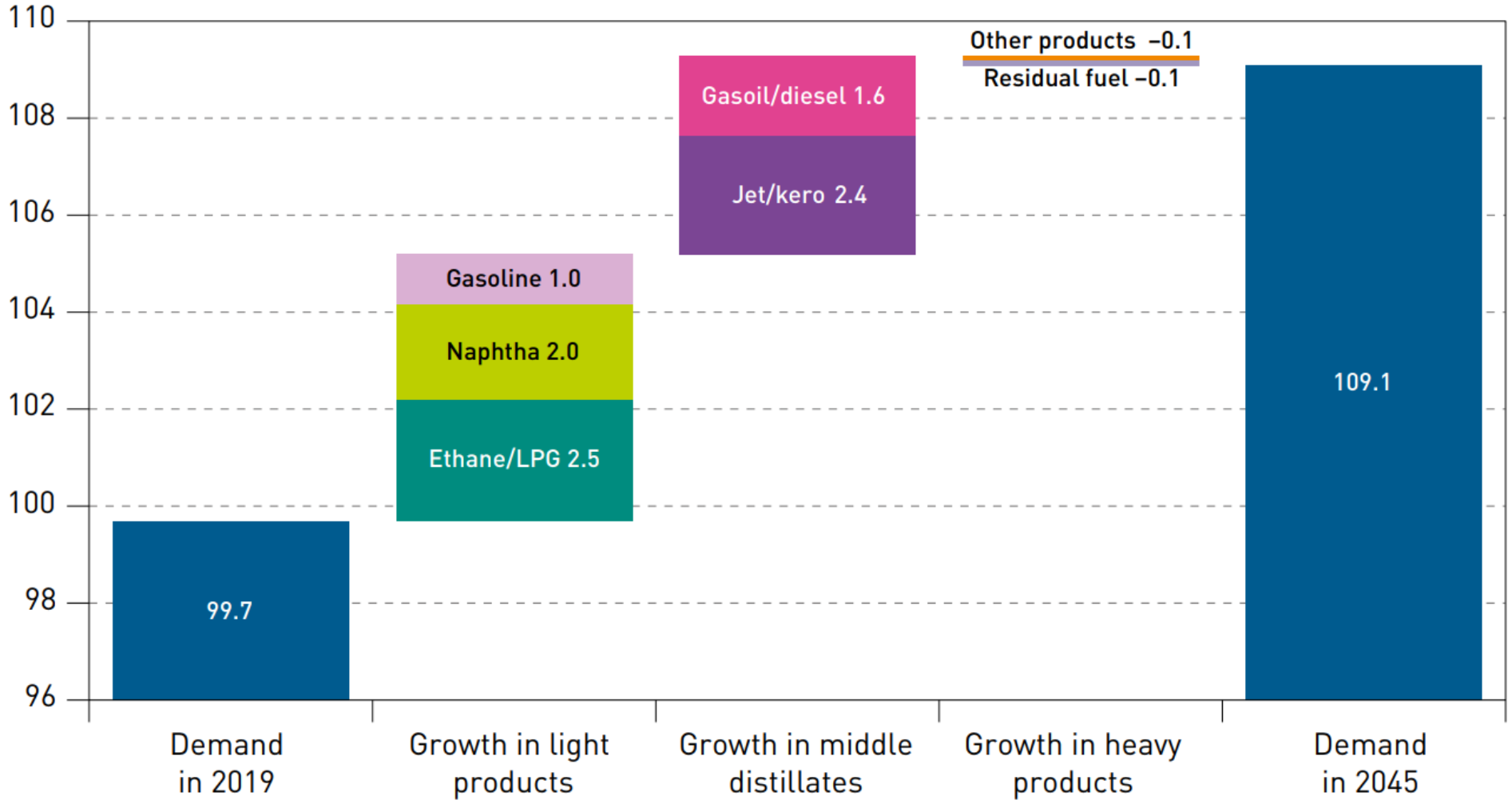
Long-term Oil Demand Outlook by Sector

	2019	2020	2025	2030	2035	2040	2045	Growth 2019–2045
Road	44.4	40.1	46.3	46.9	47.1	47.1	47.0	2.6
Aviation	6.7	3.5	7.1	7.7	8.4	8.9	9.4	2.8
Rail/waterways	1.9	1.8	1.9	2.0	2.1	2.1	2.0	0.2
Marine bunkers	4.2	4.0	4.4	4.6	4.7	4.7	4.6	0.5
Transportation	**57.2**	**49.4**	**59.7**	**61.2**	**62.2**	**62.8**	**63.2**	**6.0**
Petrochemicals	13.7	12.9	14.7	15.9	16.7	17.0	17.3	3.7
Other industry	12.8	12.7	13.0	13.5	13.5	13.3	13.1	0.3
Industry	**26.5**	**25.6**	**27.8**	**29.4**	**30.2**	**30.3**	**30.4**	**4.0**
Resid./Comm./Agric.	11.1	10.8	11.4	12.0	12.2	12.1	11.6	0.5
Electricity generation	4.9	4.9	4.8	4.6	4.3	4.1	3.9	–1.1
Other uses	**16.0**	**15.7**	**16.1**	**16.6**	**16.5**	**16.1**	**15.5**	**–0.5**
World	**99.7**	**90.7**	**103.7**	**107.2**	**108.9**	**109.3**	**109.1**	**9.4**

Oil Demand Growth By Sector



Demand Growth By Product Category

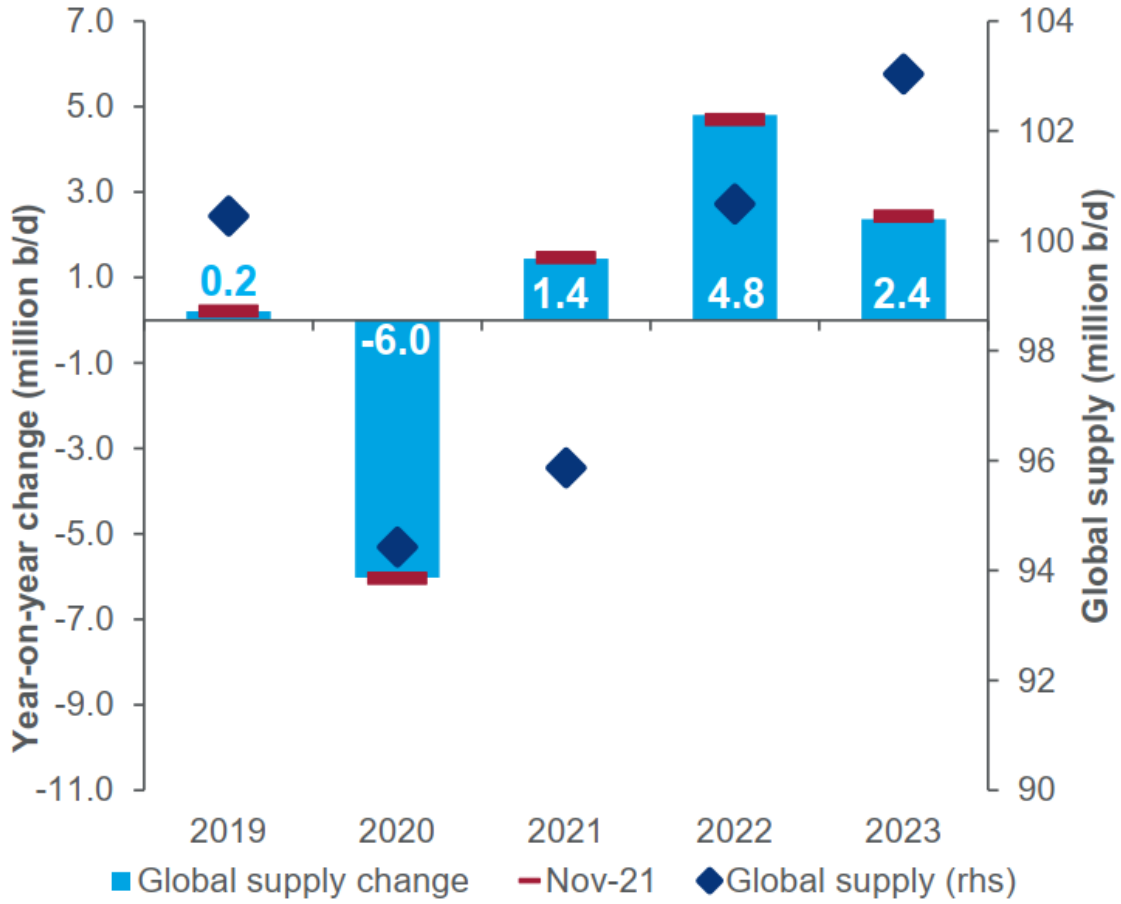


Long-term Global Liquids Supply Outlook

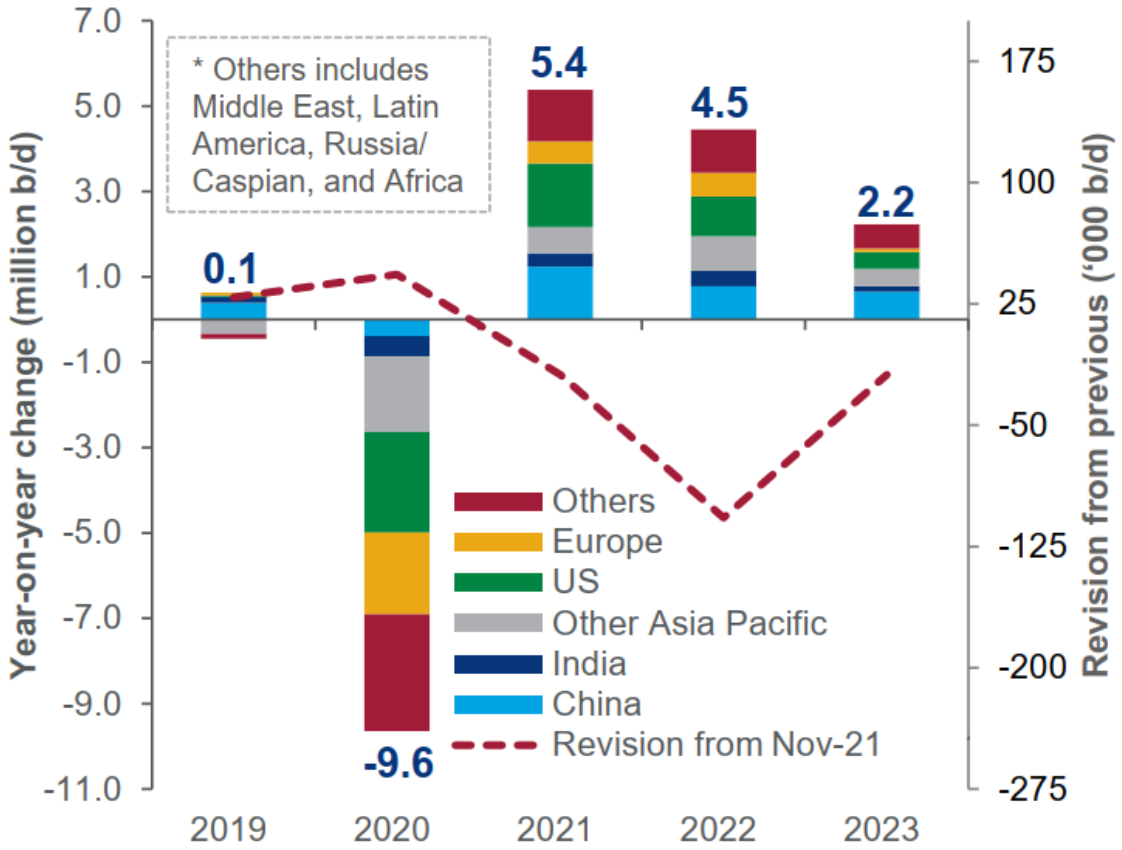
	2019	2020	2025	2030	2035	2040	2045	Change 2019–2045
OECD	30.0	28.5	32.5	32.3	30.8	29.1	27.7	–2.3
of which: US	*18.4*	*17.0*	*19.8*	*20.3*	*19.1*	*17.7*	*16.6*	*–1.8*
of which: tight liquids	*11.7*	*10.9*	*14.5*	*15.8*	*15.4*	*14.3*	*13.3*	*1.6*
Non-OECD	32.8	31.2	35.9	36.7	36.5	35.7	34.7	2.0
Processing gains	2.3	2.1	2.4	2.6	2.7	2.8	3.0	0.7
Non-OPEC	**65.0**	**61.8**	**70.7**	**71.5**	**69.9**	**67.6**	**65.4**	**0.4**
of which: crude*	*45.9*	*43.5*	*50.0*	*48.9*	*46.0*	*43.0*	*40.3*	*–5.6*
NGLs	*10.5*	*10.3*	*11.3*	*12.5*	*13.0*	*13.2*	*13.2*	*2.7*
global biofuels	*2.5*	*2.3*	*2.8*	*3.1*	*3.3*	*3.5*	*3.6*	*1.0*
other liquids	*3.8*	*3.6*	*4.3*	*4.6*	*4.9*	*5.1*	*5.4*	*1.6*
Total OPEC liquids	**33.8**	**30.7**	**33.2**	**35.9**	**39.2**	**41.9**	**43.9**	**10.1**
World	**98.9**	**92.4**	**103.9**	**107.4**	**109.1**	**109.5**	**109.3**	**10.4**

Demand And Supply Growth

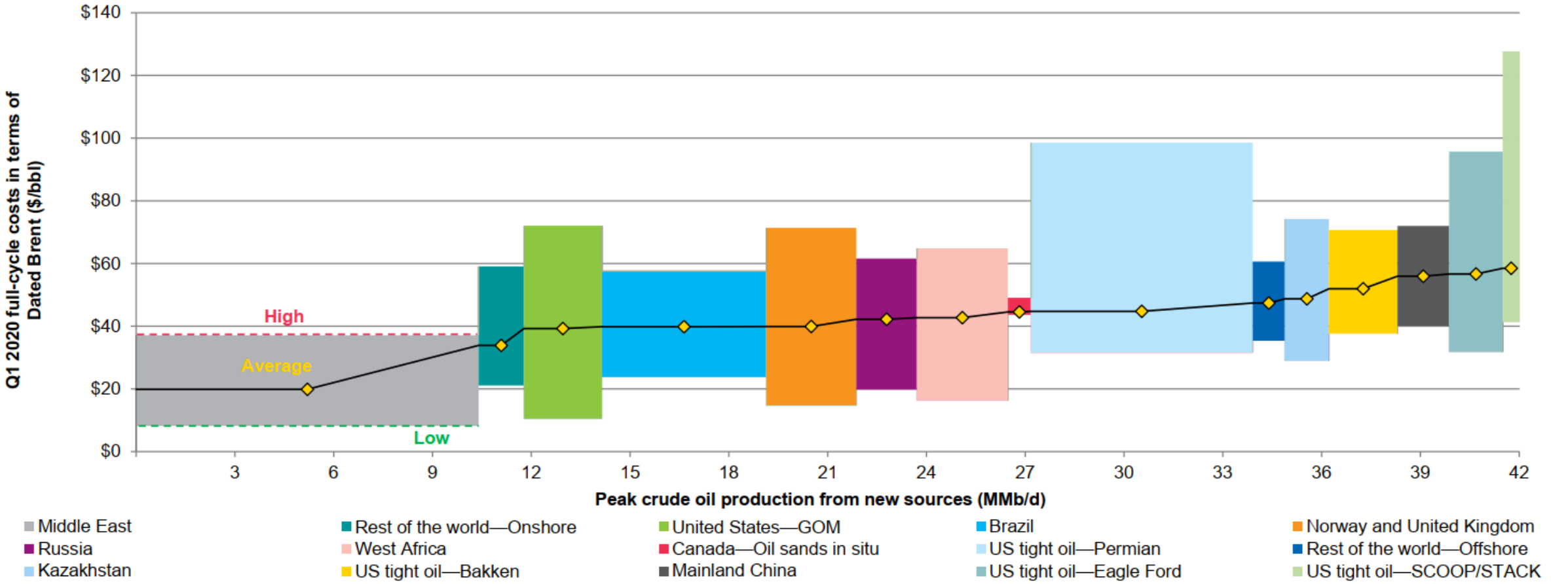
Global liquids supply



Global liquids demand

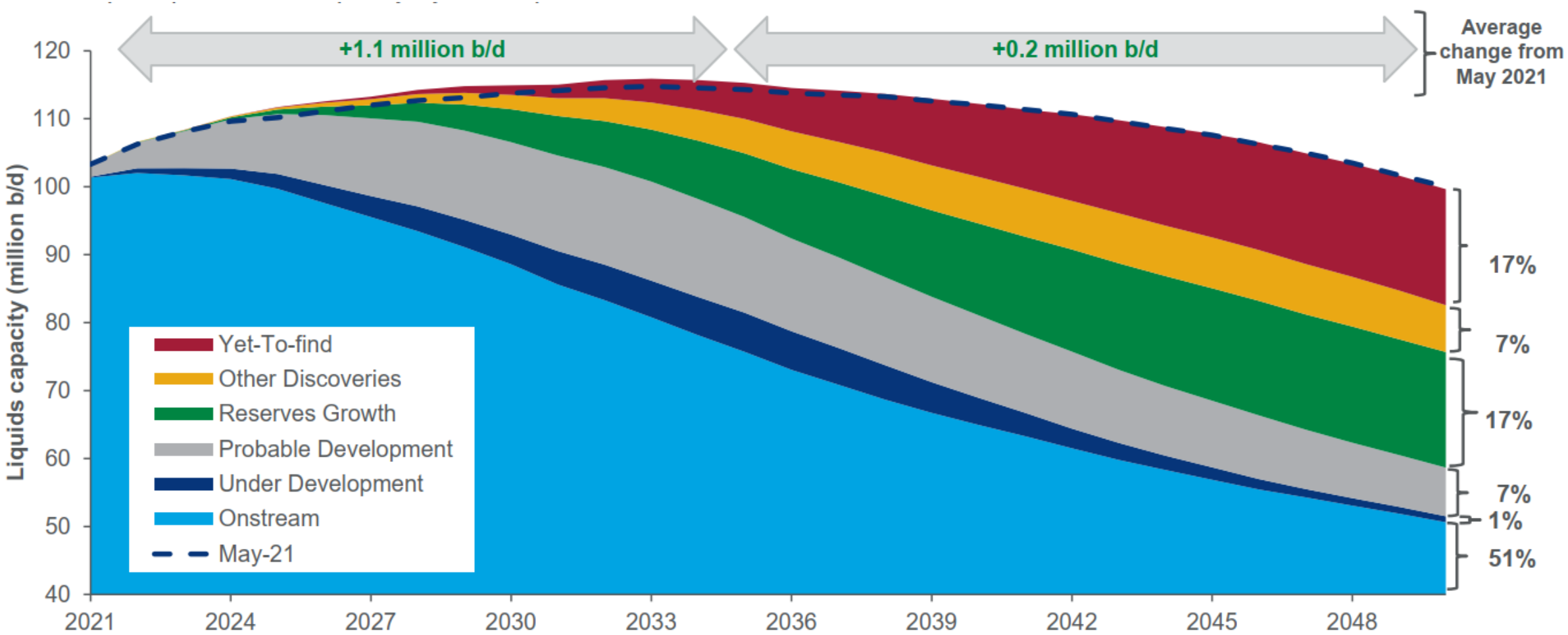


Cost Curve Of New Global Crude Oil Supply In Select Areas To 2040

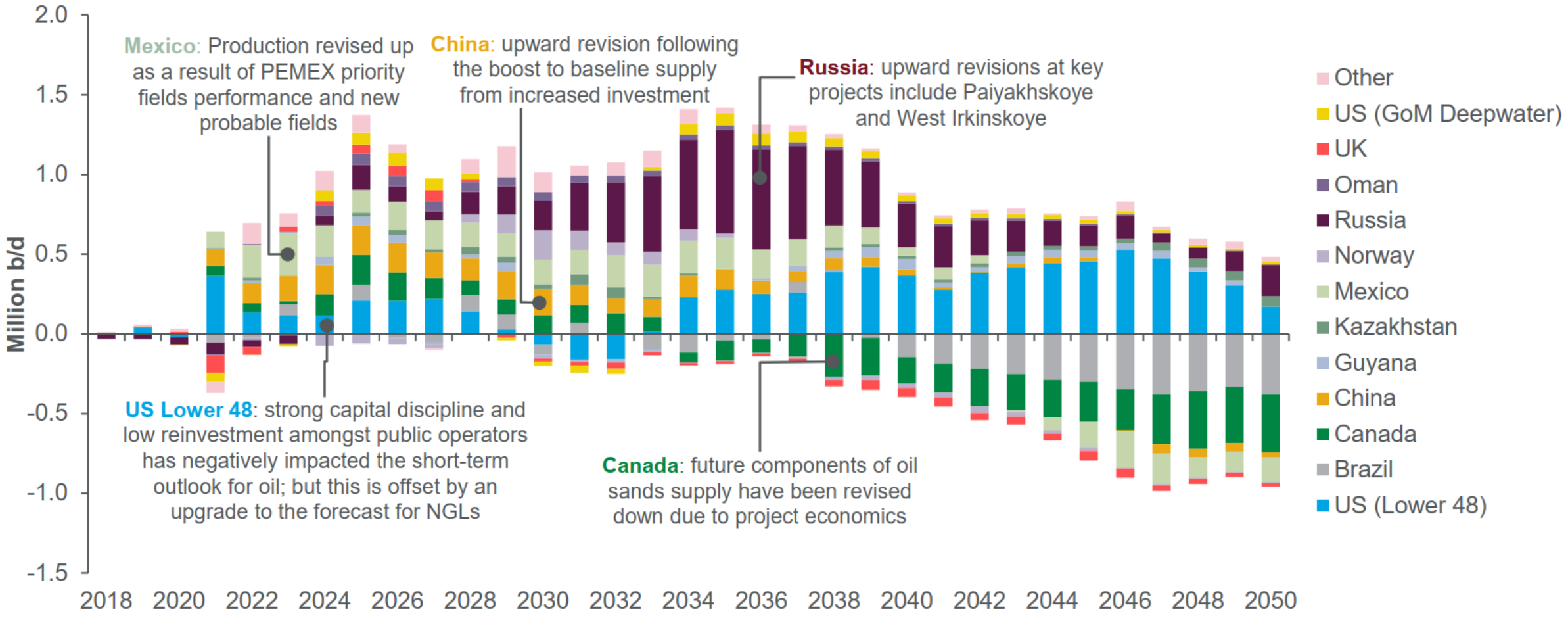


Note: Details about the methodology behind the curve are provided in slides 84–85 in the Appendix in this slide deck.
Source: IHS Markit

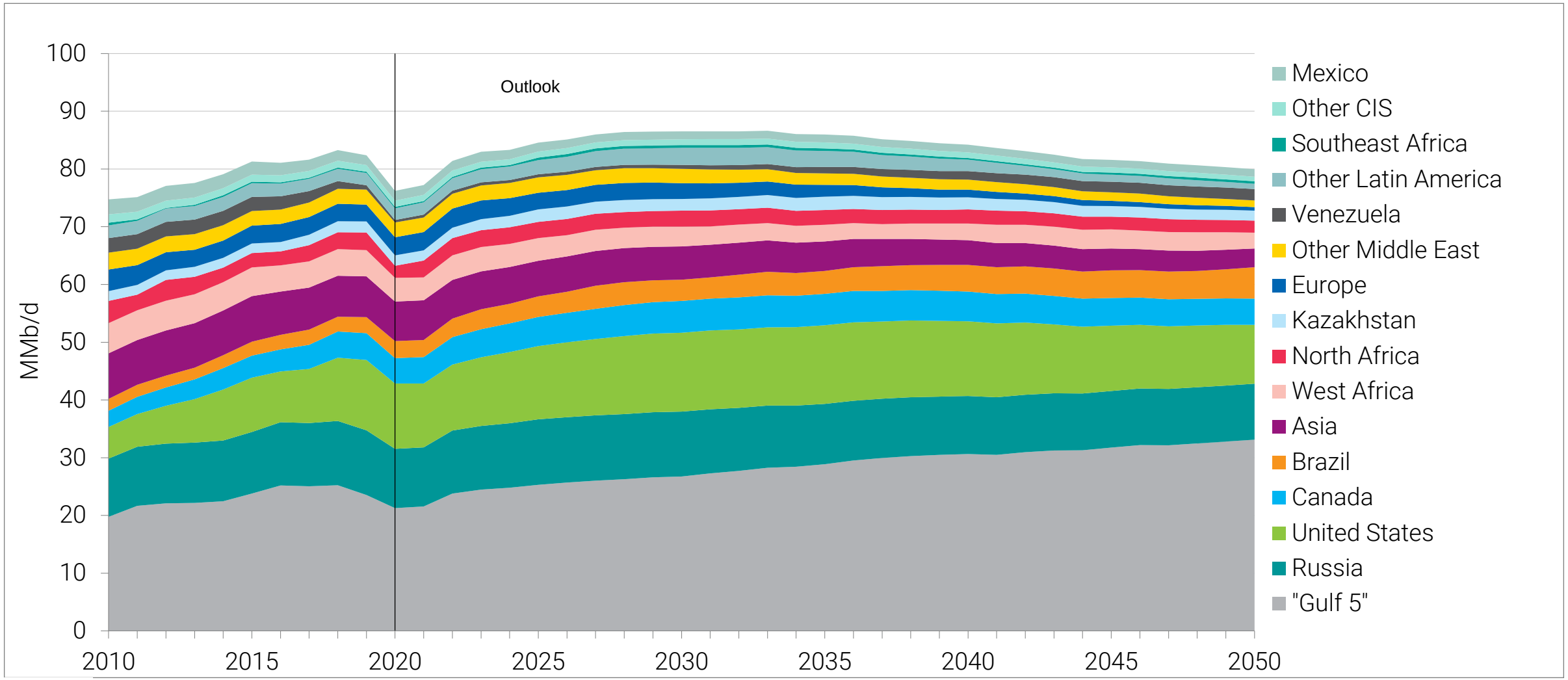
Global Liquids Production Capacity



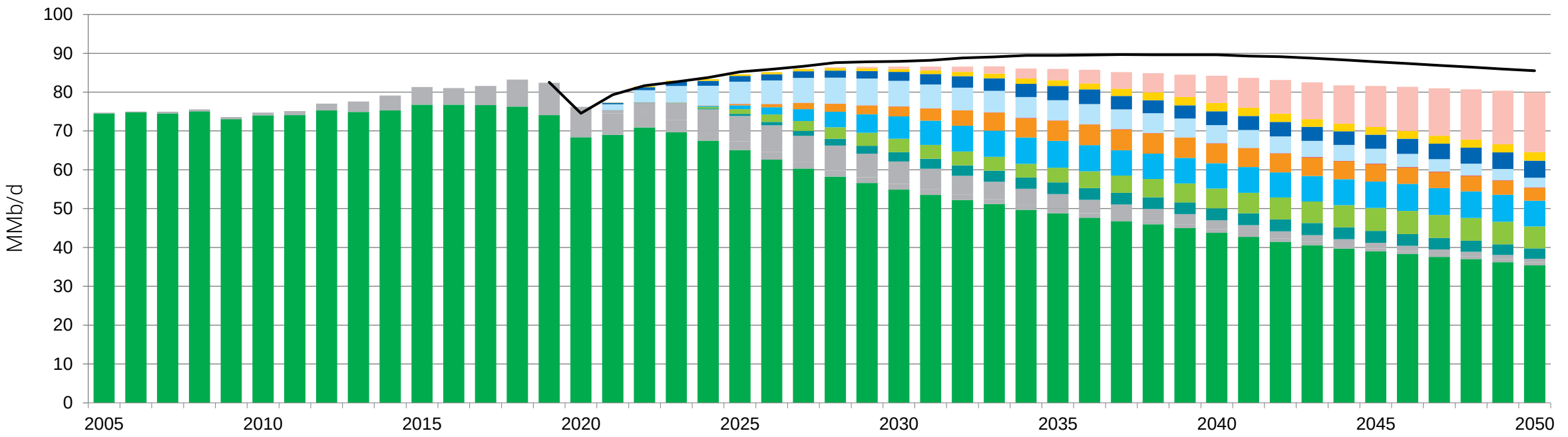
Non-OPEC Key Country Production Change From May 2021



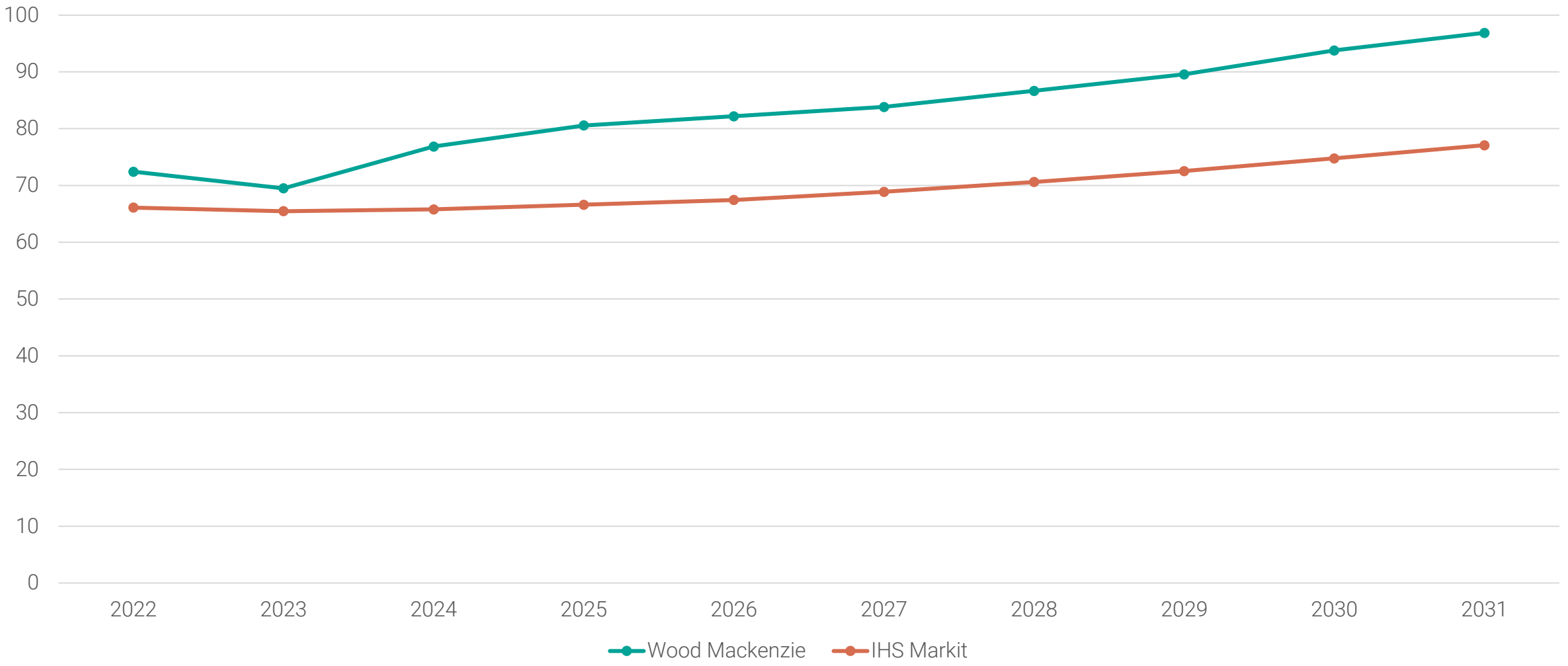
World Crude And Condensate Production



Global Crude And Condensate Supply Outlook By Category And Breakeven Price



Oil Prices Forecast



Oil And Gas Prices In A 2-degree World Scenario by Wood Mackenzie

- Three key assumptions underlie our AET-2 scenario:
  - rapid electrification in all sectors
  - the decarbonization of the power sector through the penetration of renewables and storage and coal-to-gas switching
  - the large-scale development of CCS, CCUS, and low-carbon hydrogen in hard-to-decarbonize sectors
- Oil demand in 2050 is 60% lower than the base case. Total liquids demand is about 35 million b/d by 2050.
- Brent to average US$37 to US$42/bbl, down from US$60 to US$70/bbl currently.
- In 2040, the modelled oil price is in the range of US$28 to US$32/ bbl. After 2040, as the demand decline accelerates, Brent slides to US$10 to US$18/bbl in 2050.

US Shale Oil

An Old Story

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

تاریخ انتشار: هنبه ۱۴ بهمن ۱۳۹۱

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

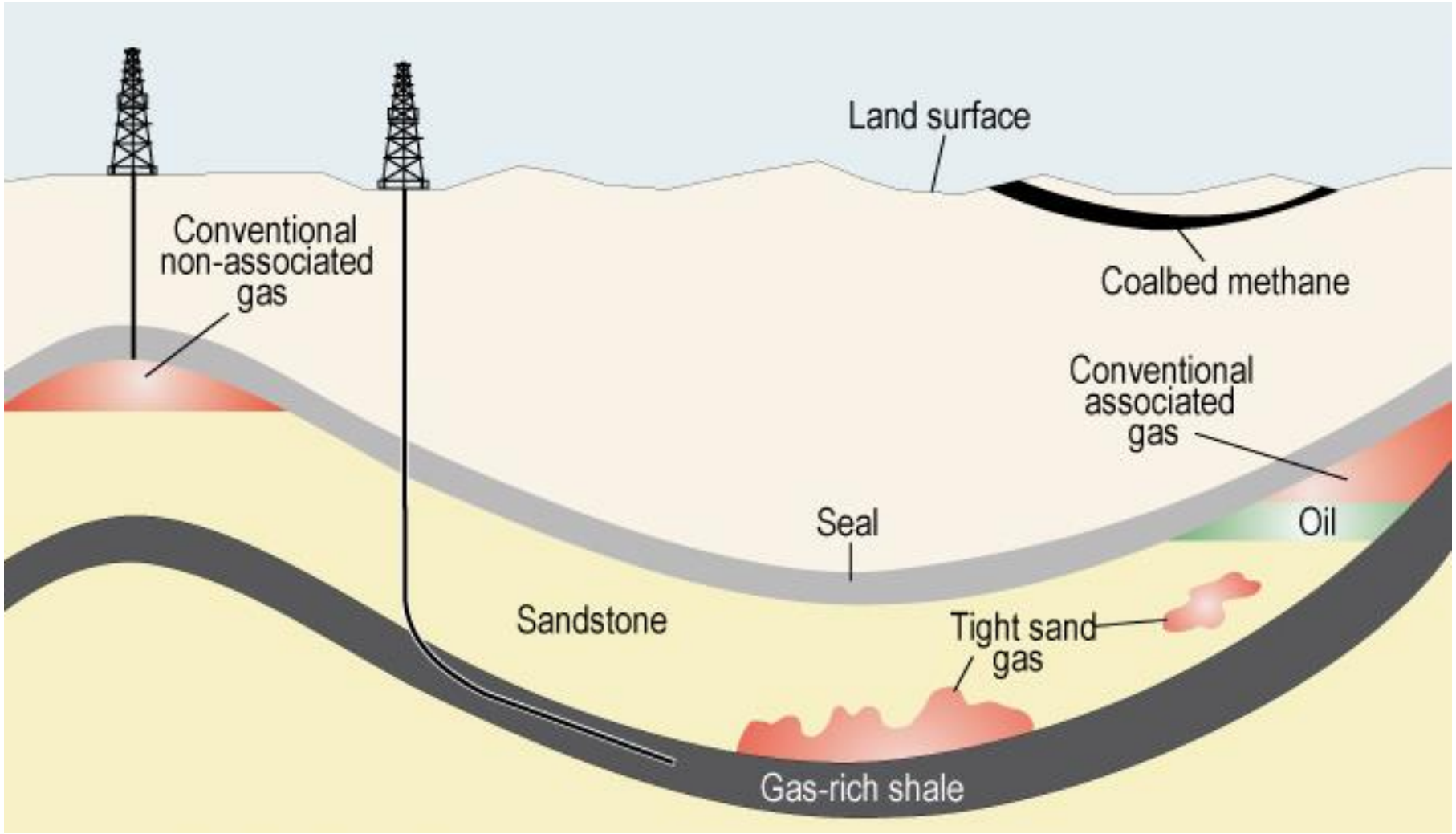
انقلاب رُسی

رامین فروزنده

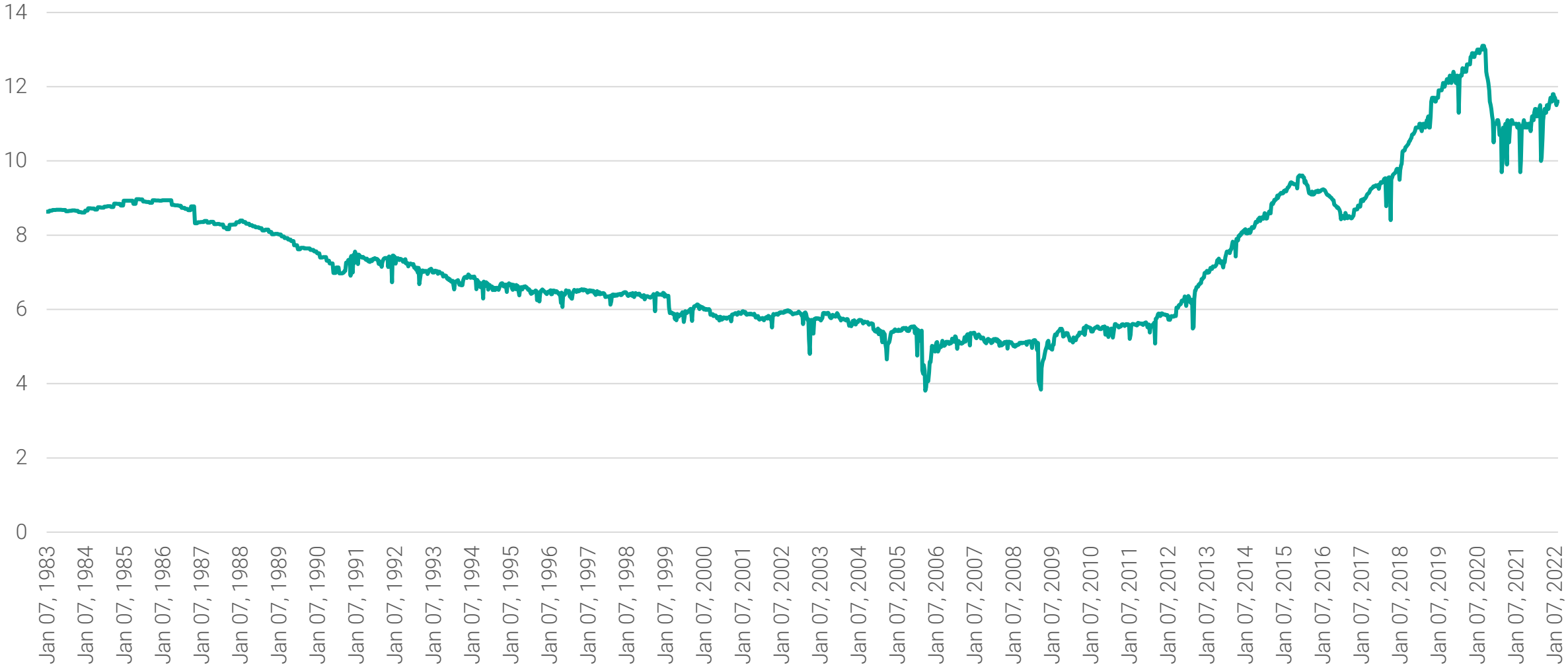
> «آمریکا احتمالاً در سال ۲۰۱۳ با پشت سر گذاشتن روسیه و عربستان، به بزرگ‌ترین تولیدکننده سوخت‌های مایع در جهان تبدیل خواهد شد.»

«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.

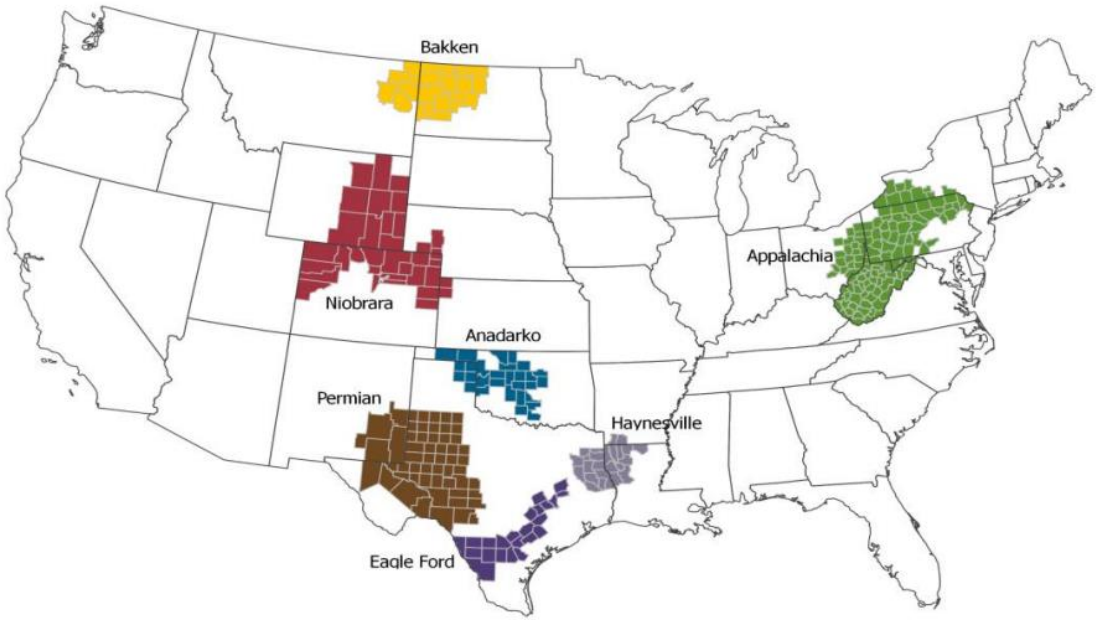
Definition


Land surface
Conventional non-associated gas
Coalbed methane
Conventional associated gas
Seal
Oil
Sandstone
Tight sand gas
Gas-rich shale

Weekly US Crude Oil Production (MBPD)



EIA Drilling Productivity Report

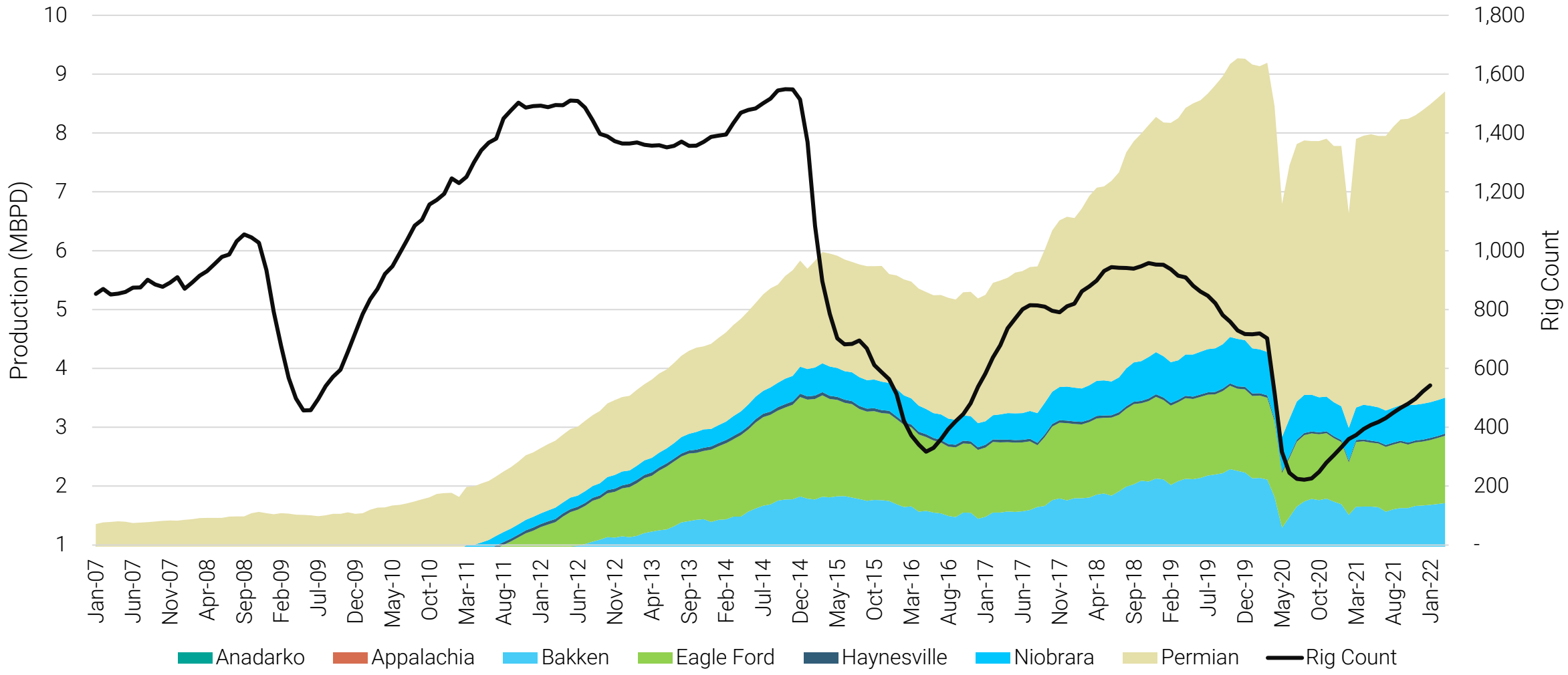


Note:

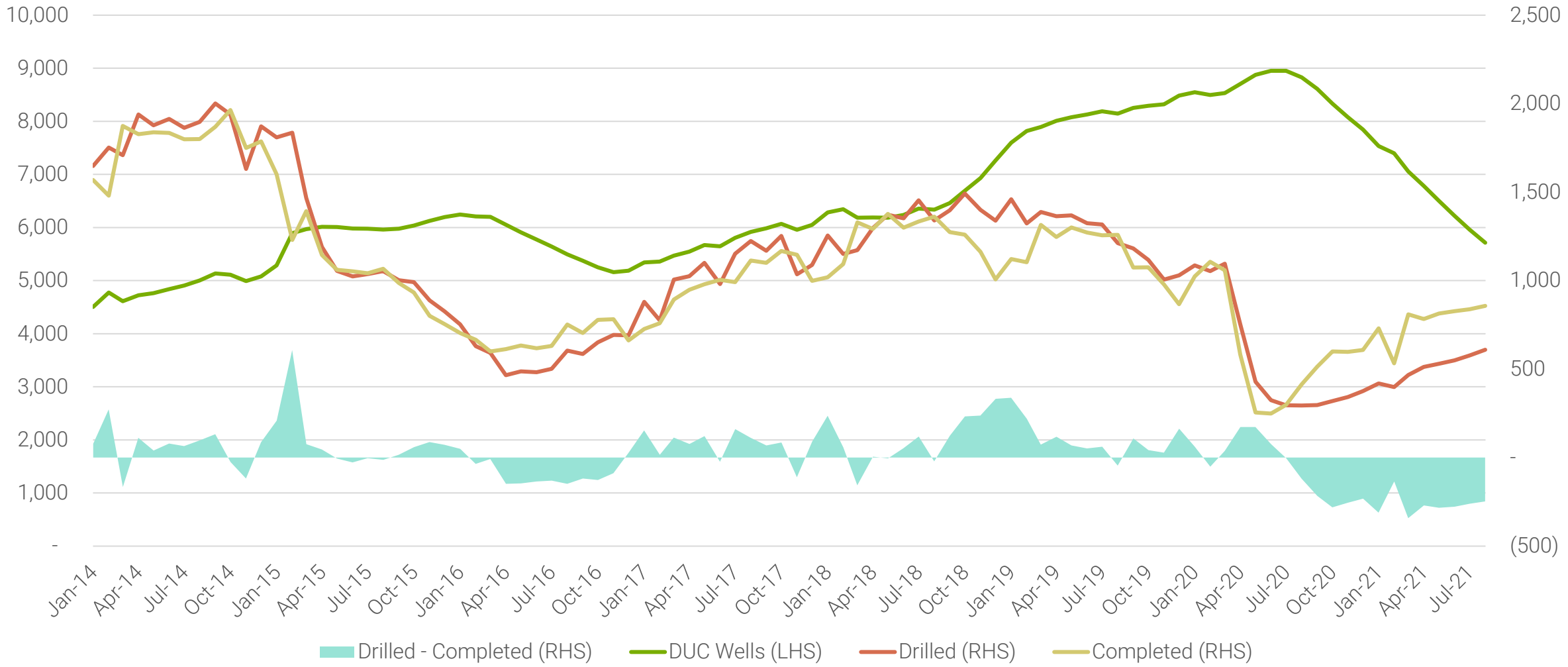
The DPR rig productivity metric *new-well oil/gas production per rig* can become unstable during periods of rapid decreases or increases in the number of active rigs and well completions. The metric uses a fixed ratio of estimated total production from new wells divided by the region's monthly rig count, lagged by two months. The metric does not represent new-well oil/natural gas production per newly completed well.

The DPR metric *legacy oil/gas production change* can become unstable during periods of rapid decreases or increases in the volume of well production curtailments or shut-ins. This effect has been observed during winter weather freeze-offs, extreme flooding events, and the 2020 global oil demand contraction. The DPR methodology involves applying smoothing techniques to most of the data series because of inherent noise in the data.

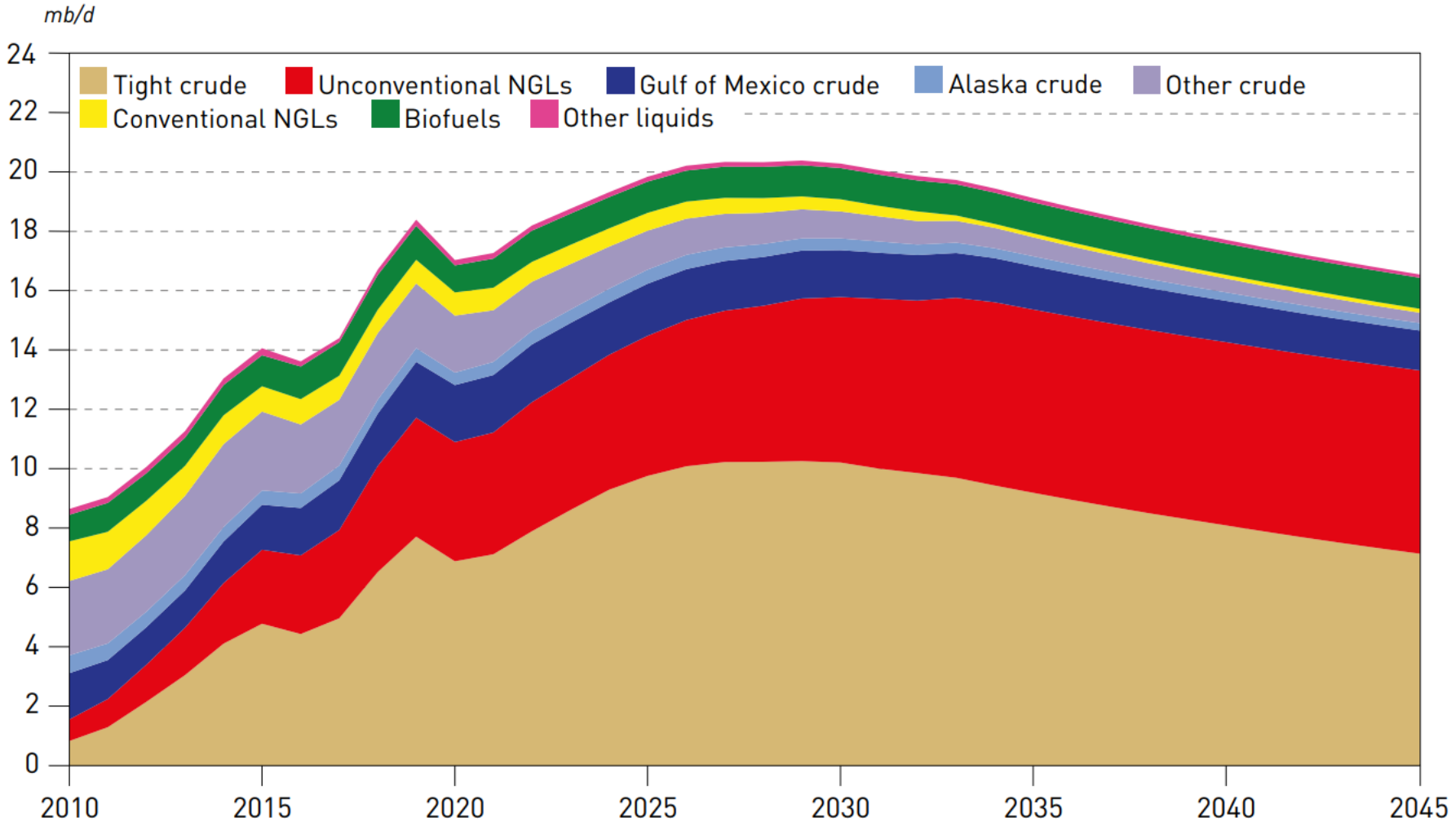
US Tight Oil Production & Total Rig Count



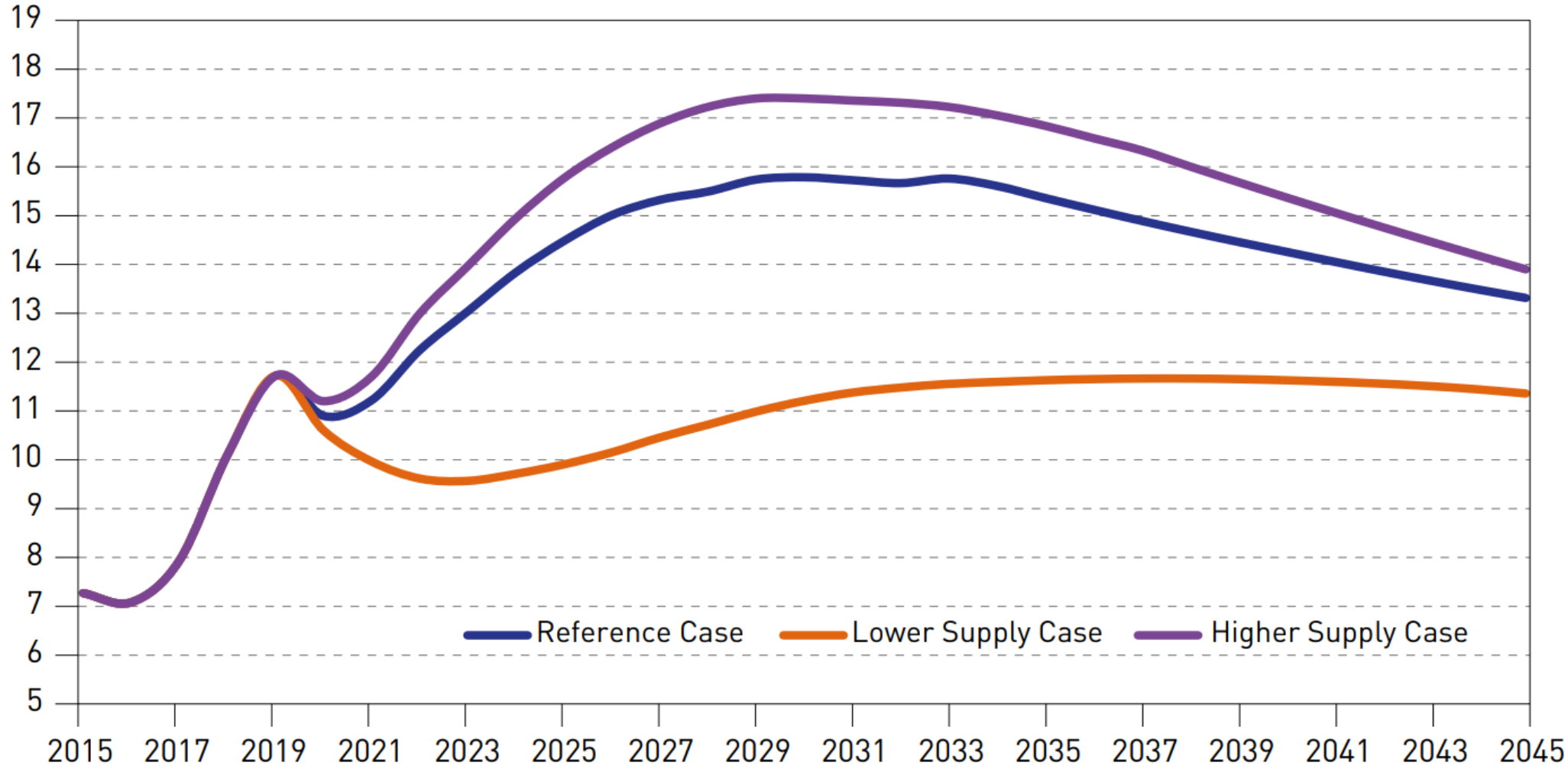
DUC Wells


10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
2,500
2,000
1,500
1,000
500
-
(500)
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Jan-20
Apr-20
Jul-20
Oct-20
Jan-21
Apr-21
Jul-21
Drilled - Completed (RHS)
DUC Wells (LHS)
Drilled (RHS)
Completed (RHS)

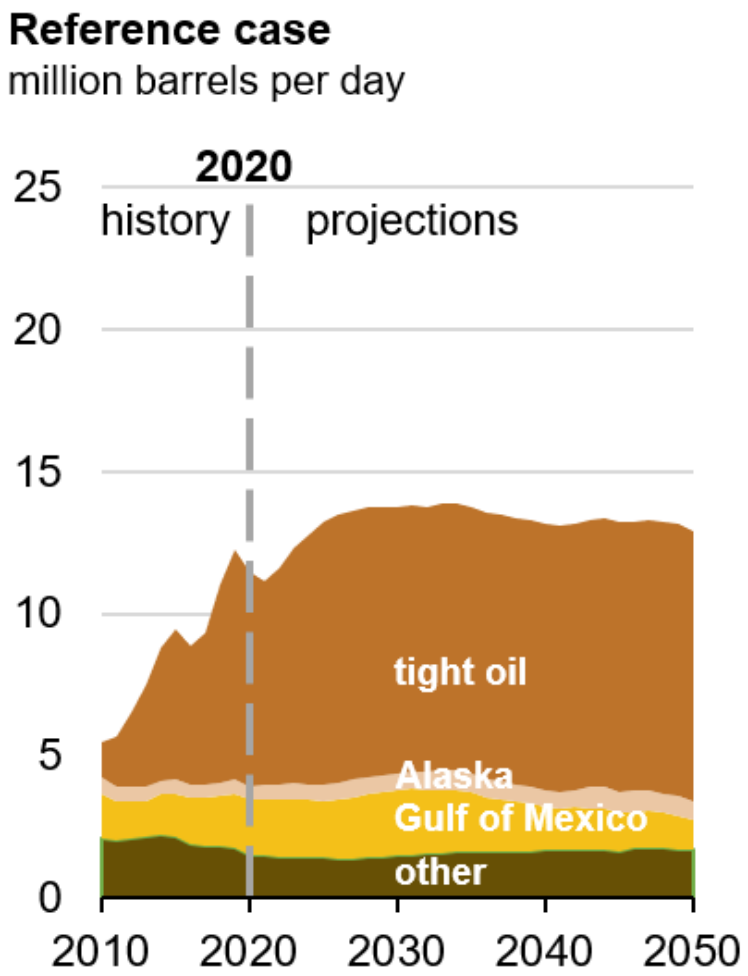
US Liquids Supply Outlook

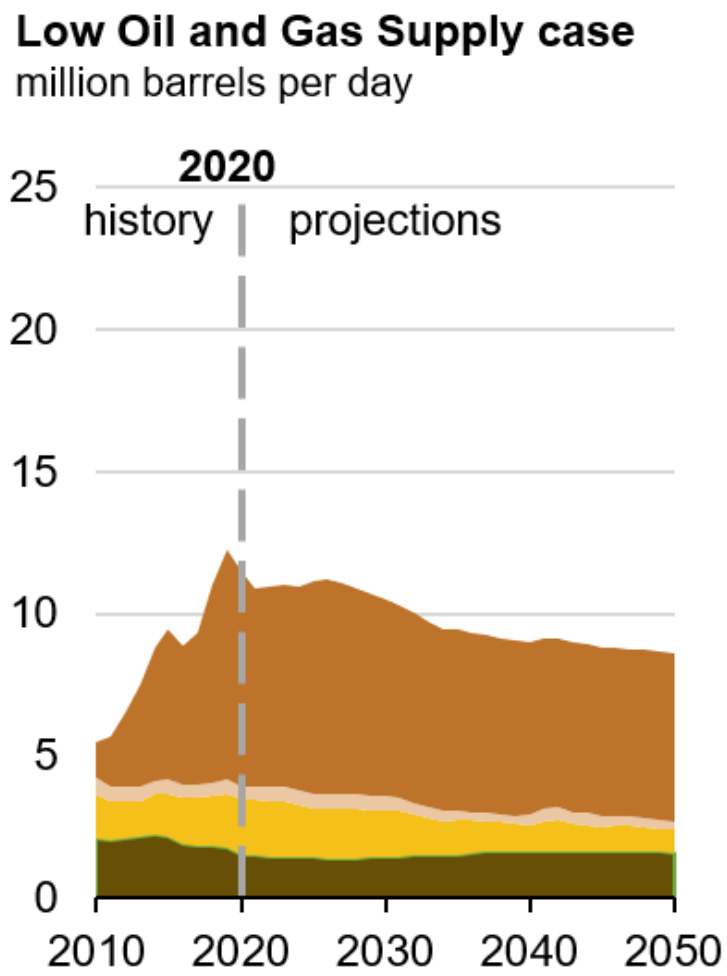


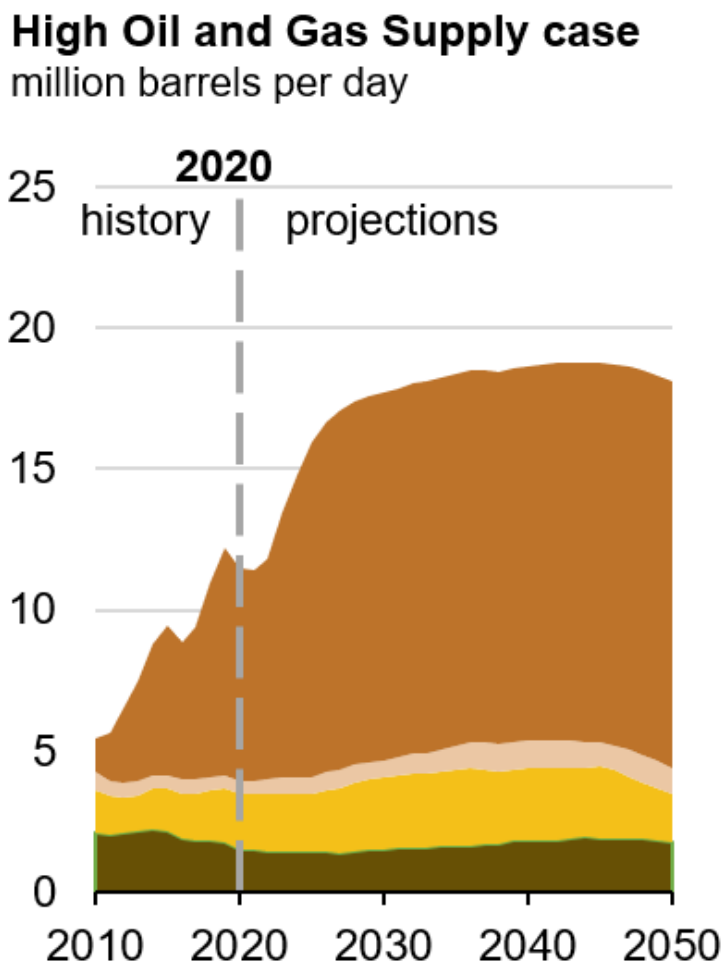
Long-term US Tight Oil Sensitivities



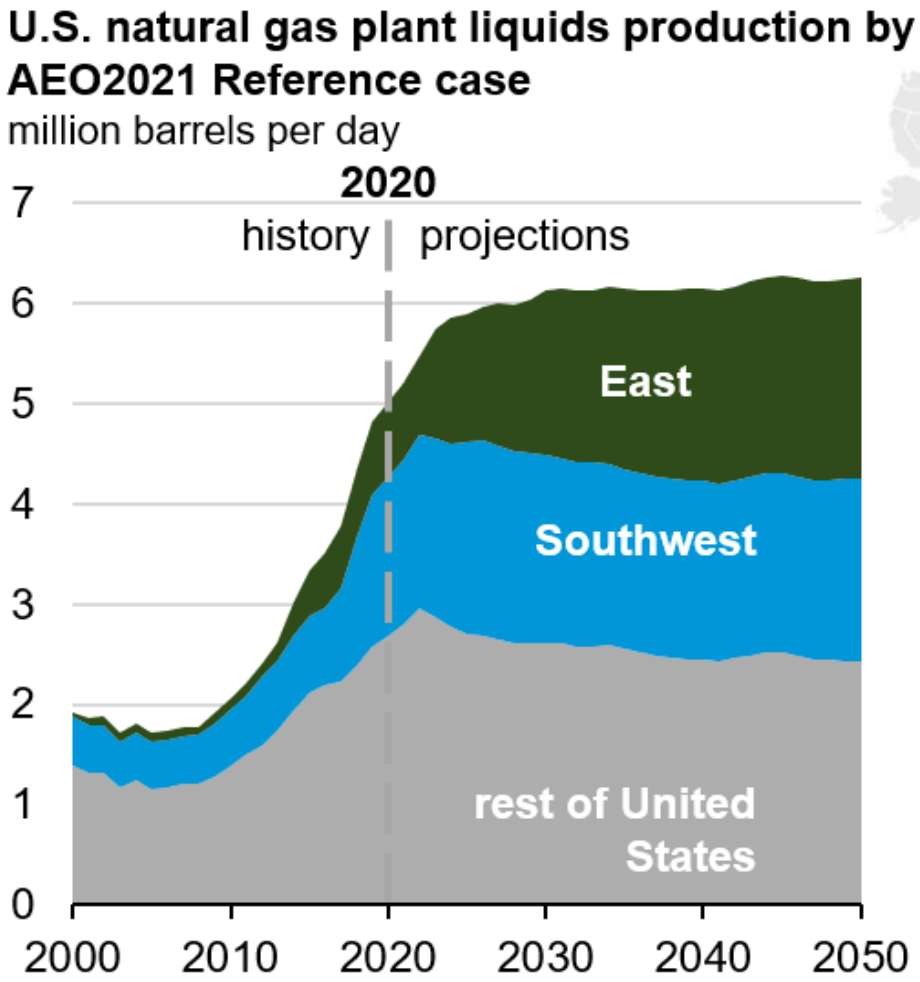
U.S. Crude Oil Production

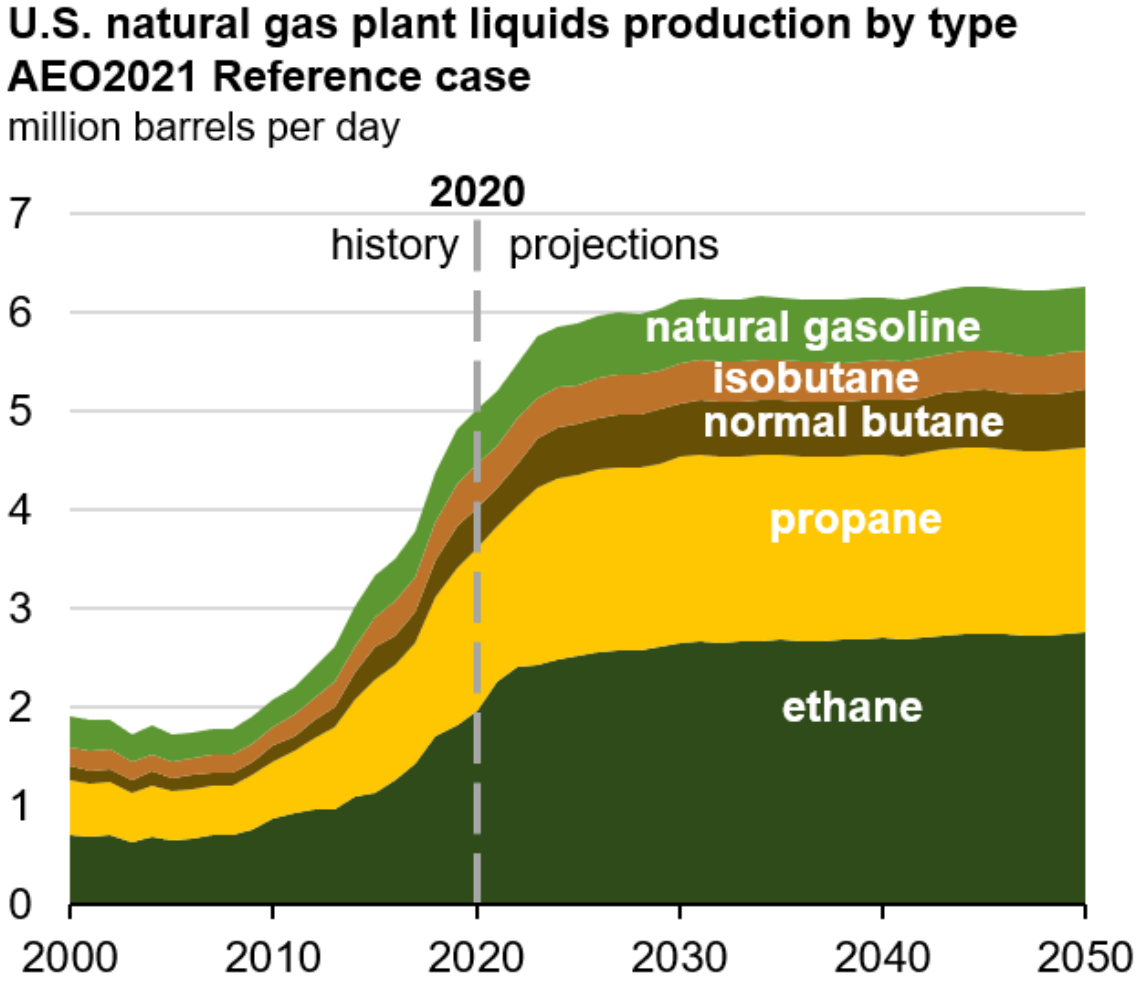




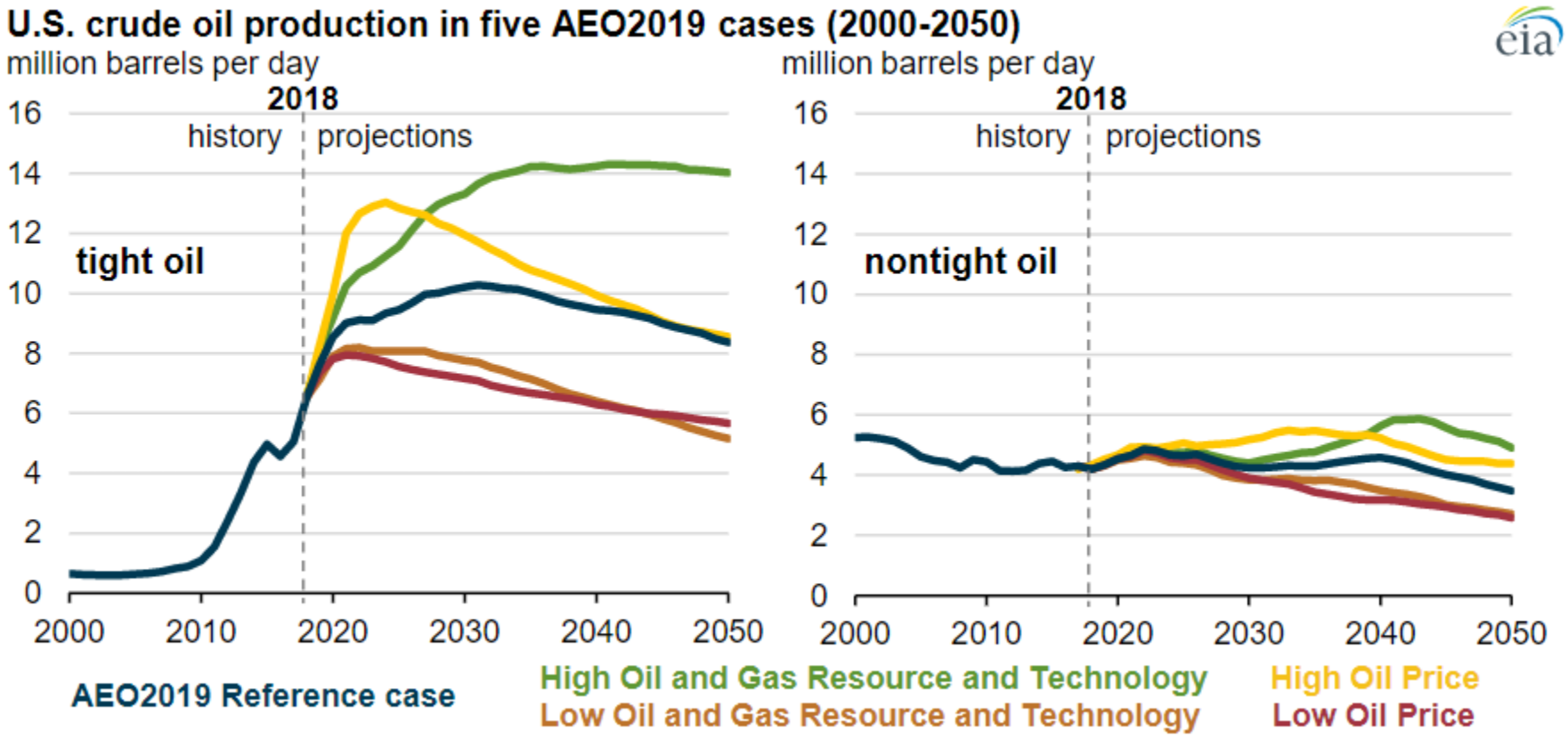


Natural Gas Plant Liquids Production By Region And Type

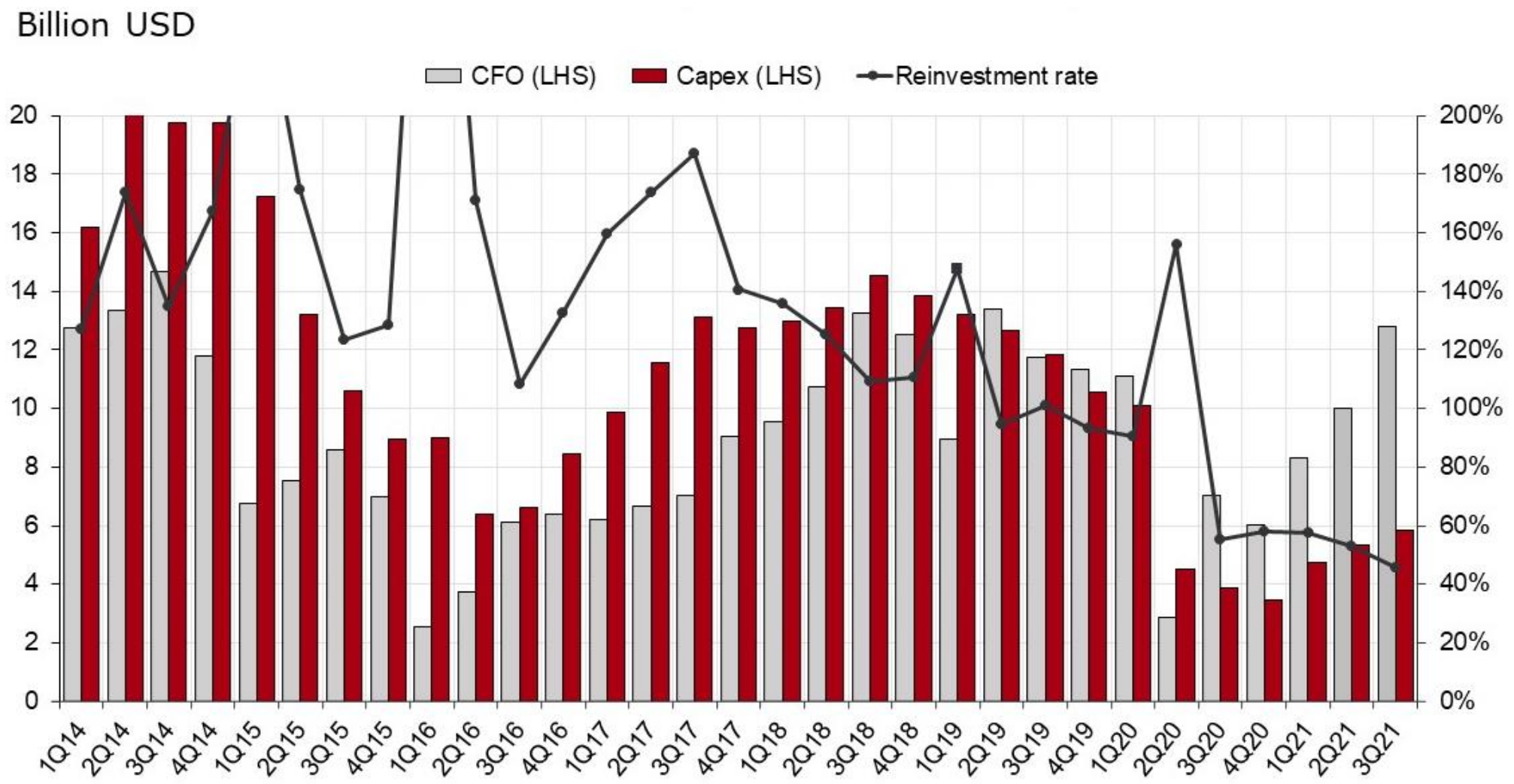




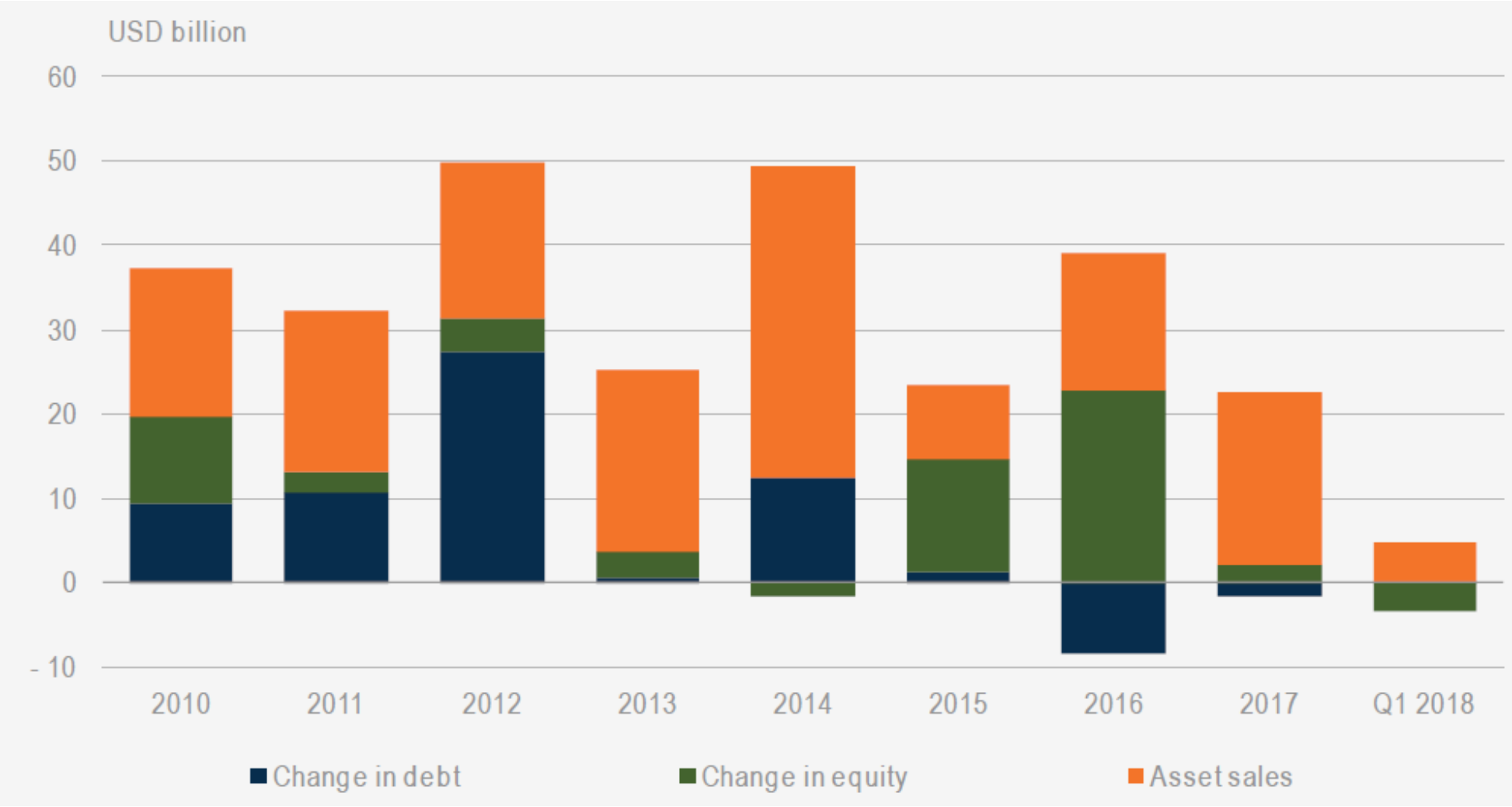
Tight Oil Development



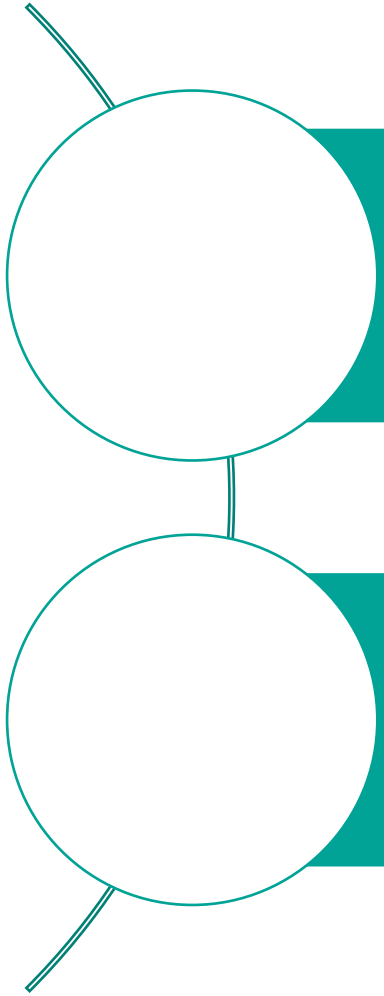
US Shale Oil CFO And Capex



US Shale Finance



Breakeven Reduction



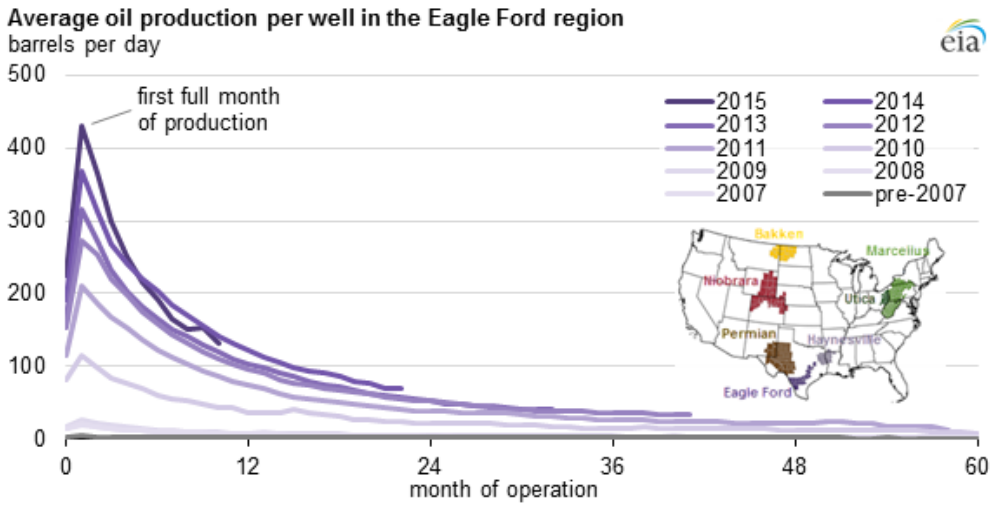
Structural

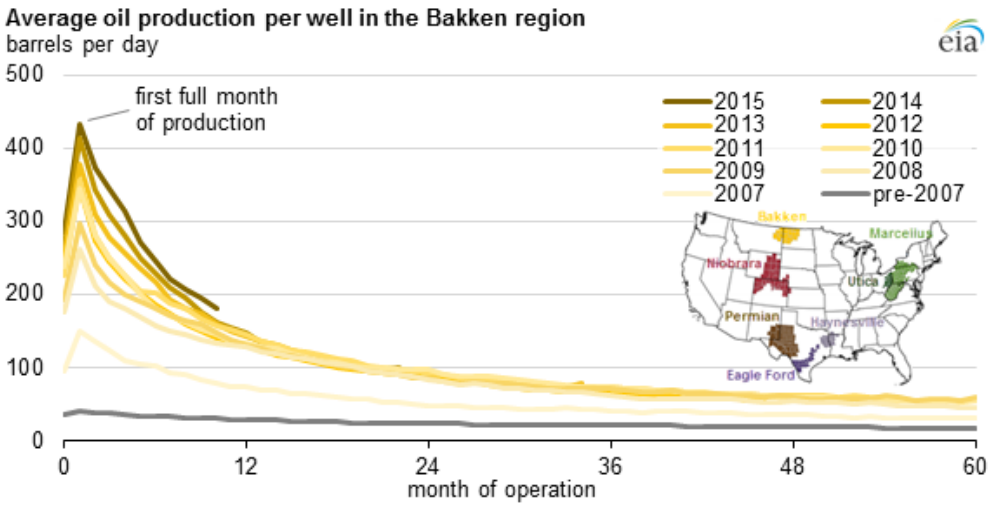
- Wells Productivity
- Drilling & Completion Efficiency

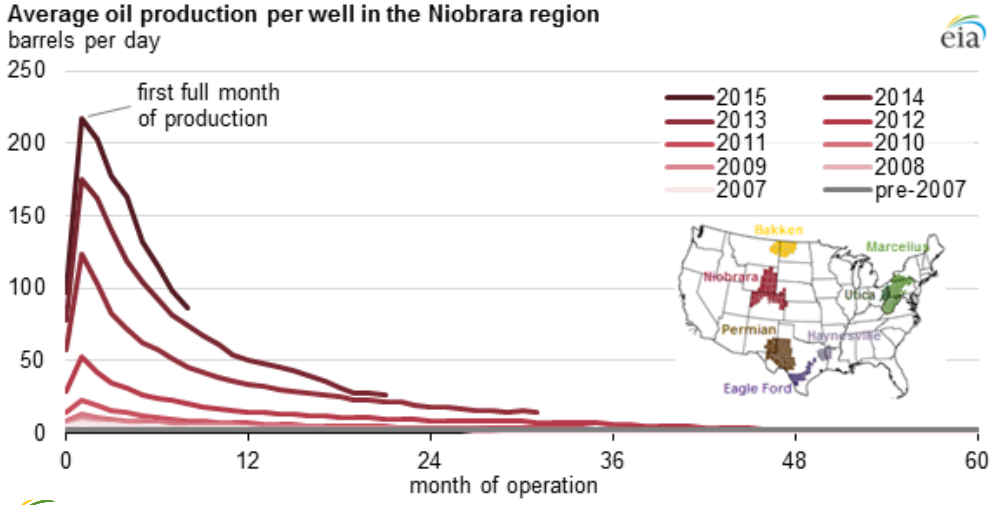
Cyclical

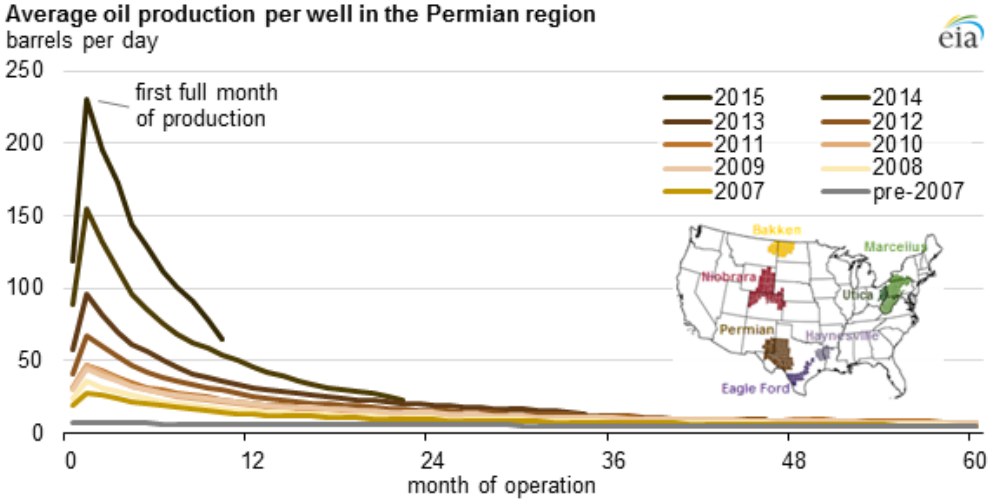
- Cost of Drilling & Operating
- High-grading

Initial Production Rates In Tight Oil Formations

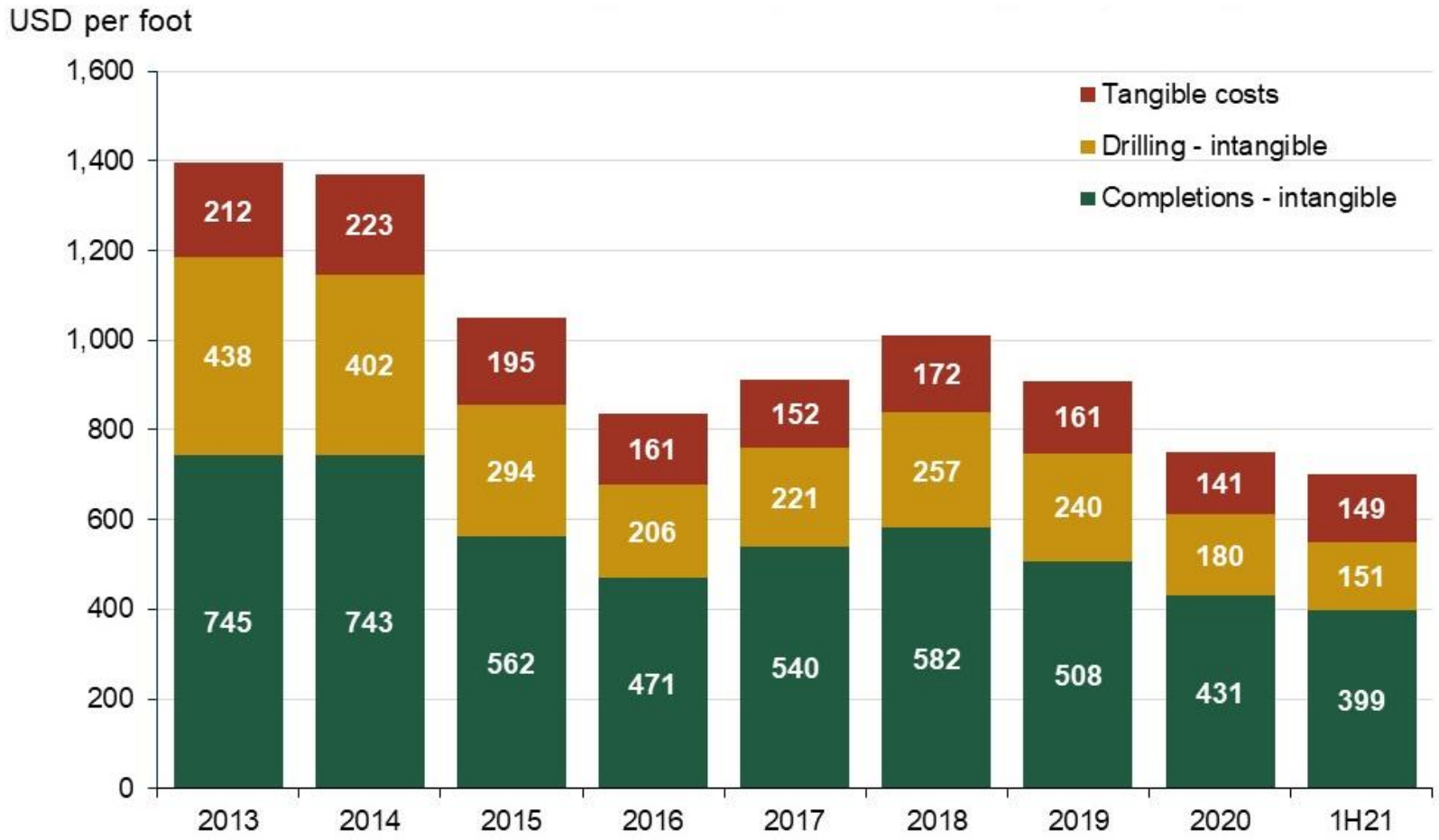






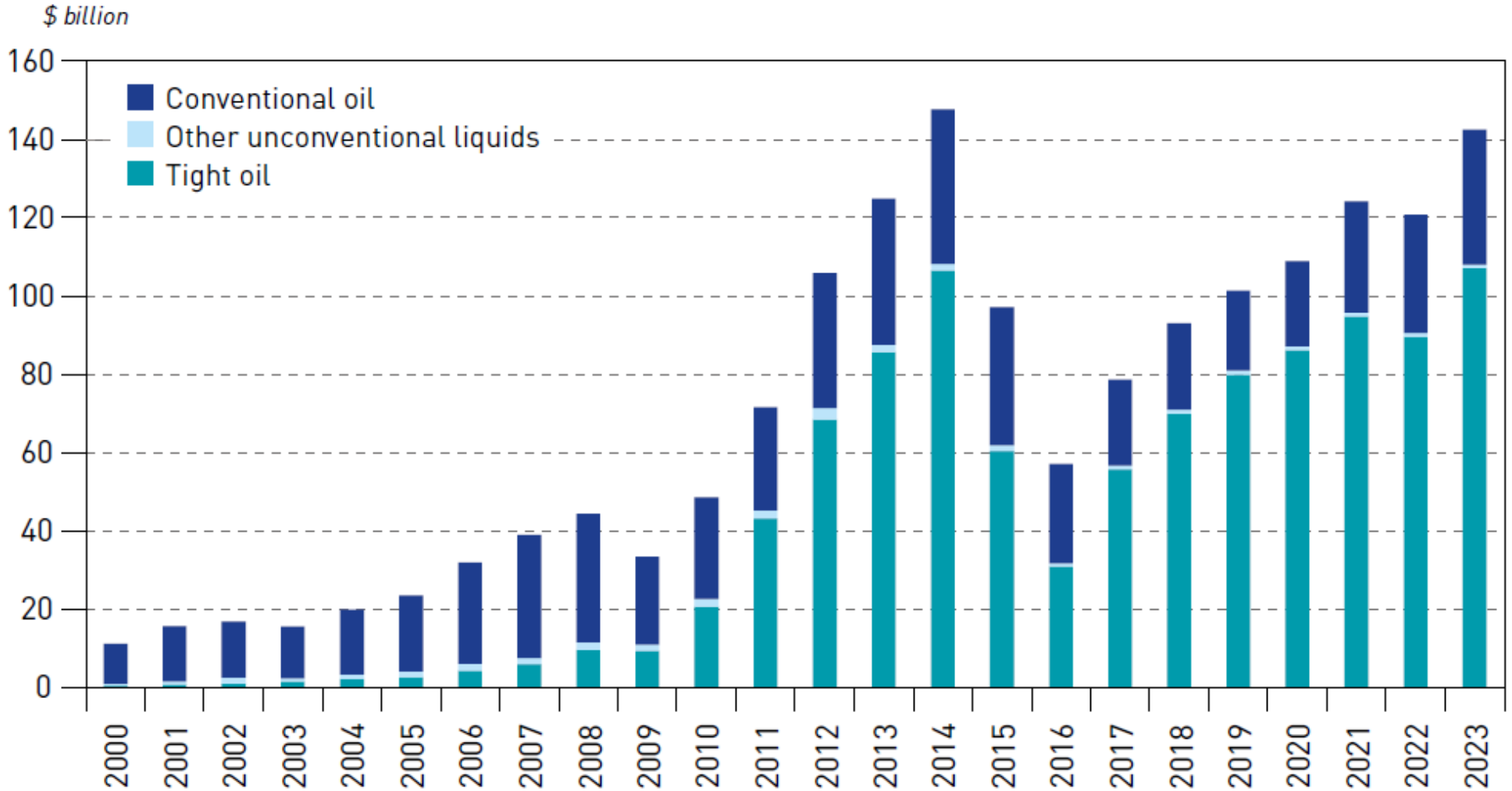


Permian Basin P50 Drilling And Completion Cost By Completion Year



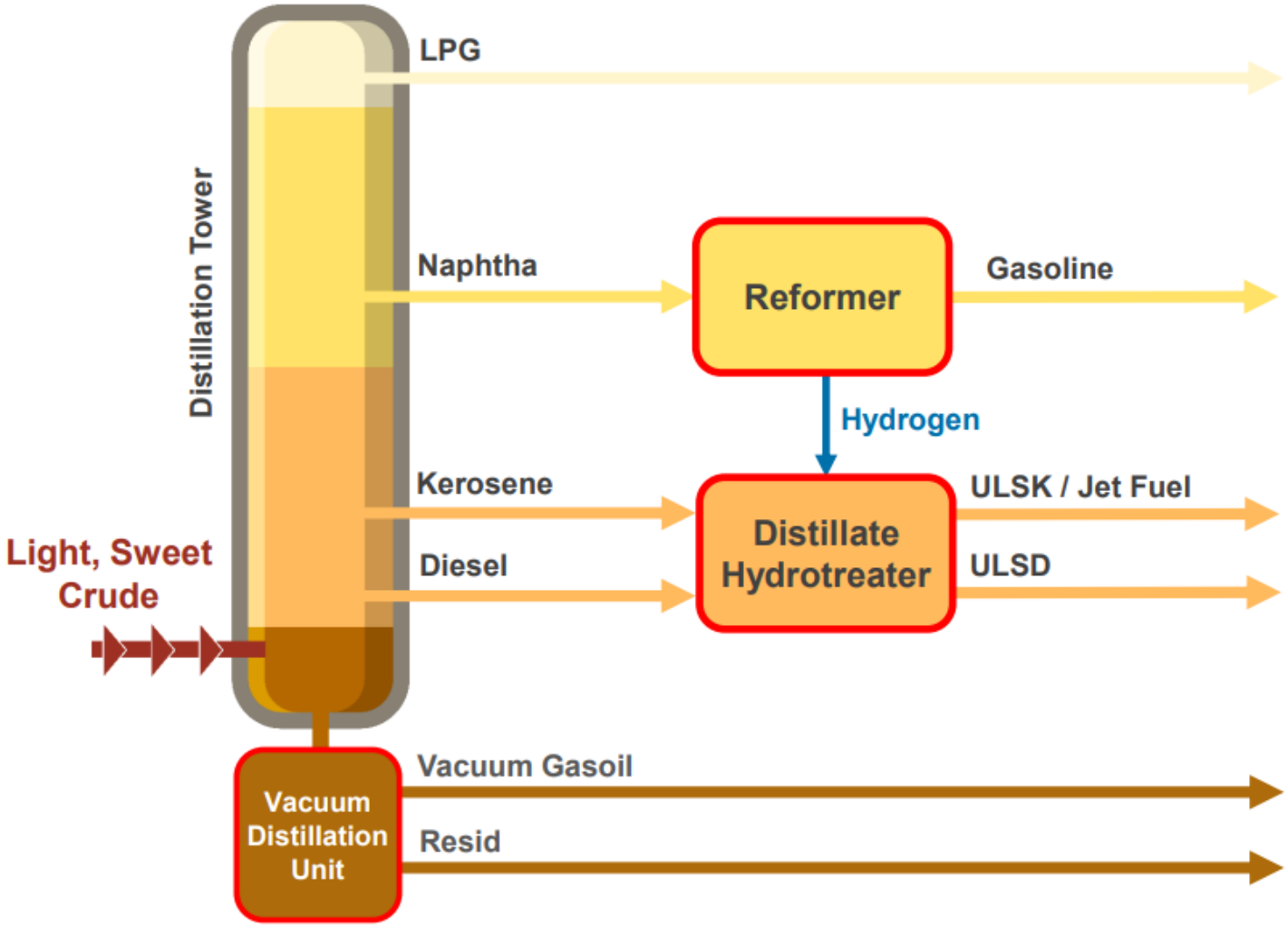
*Tangible cost consist primarily of OCTG and facilities
**The chart includes all horizontal wells with perforated length greater than 3,000'
Source: Rystad Energy ShaleWellCube, July 2021

US upstream investment

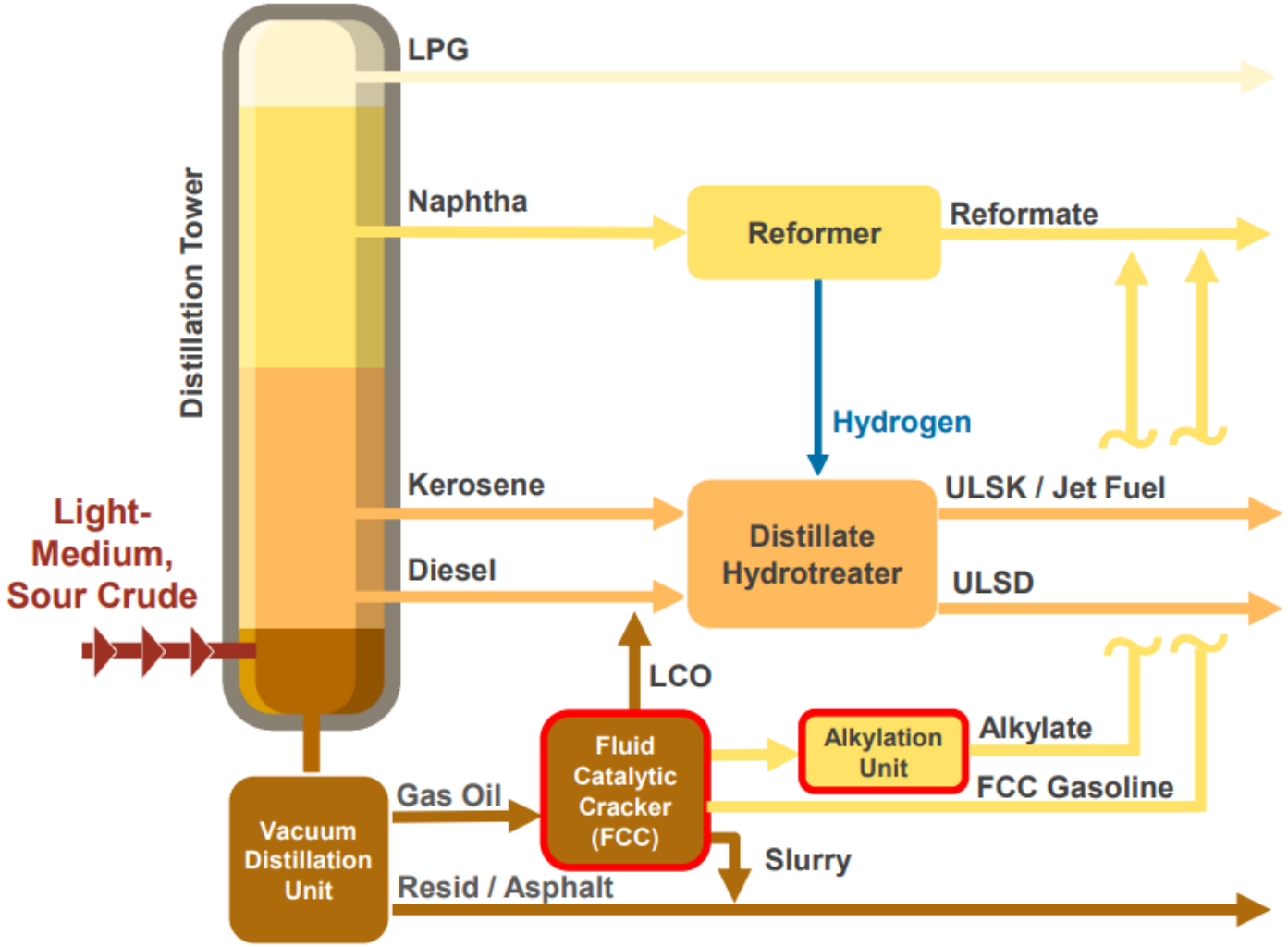


Refining & Chemicals

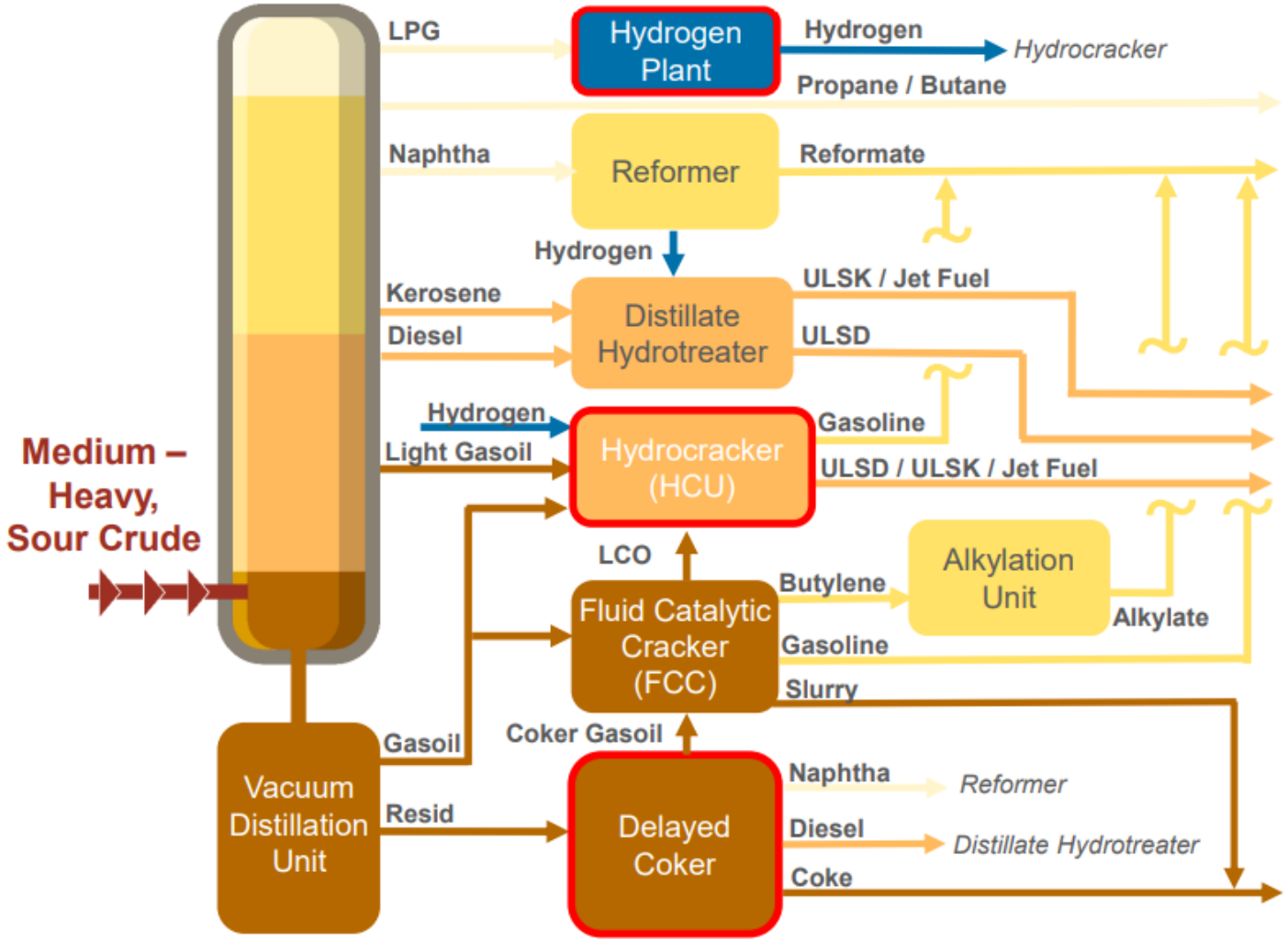
Low Complexity: Hydroskimming (Topping)



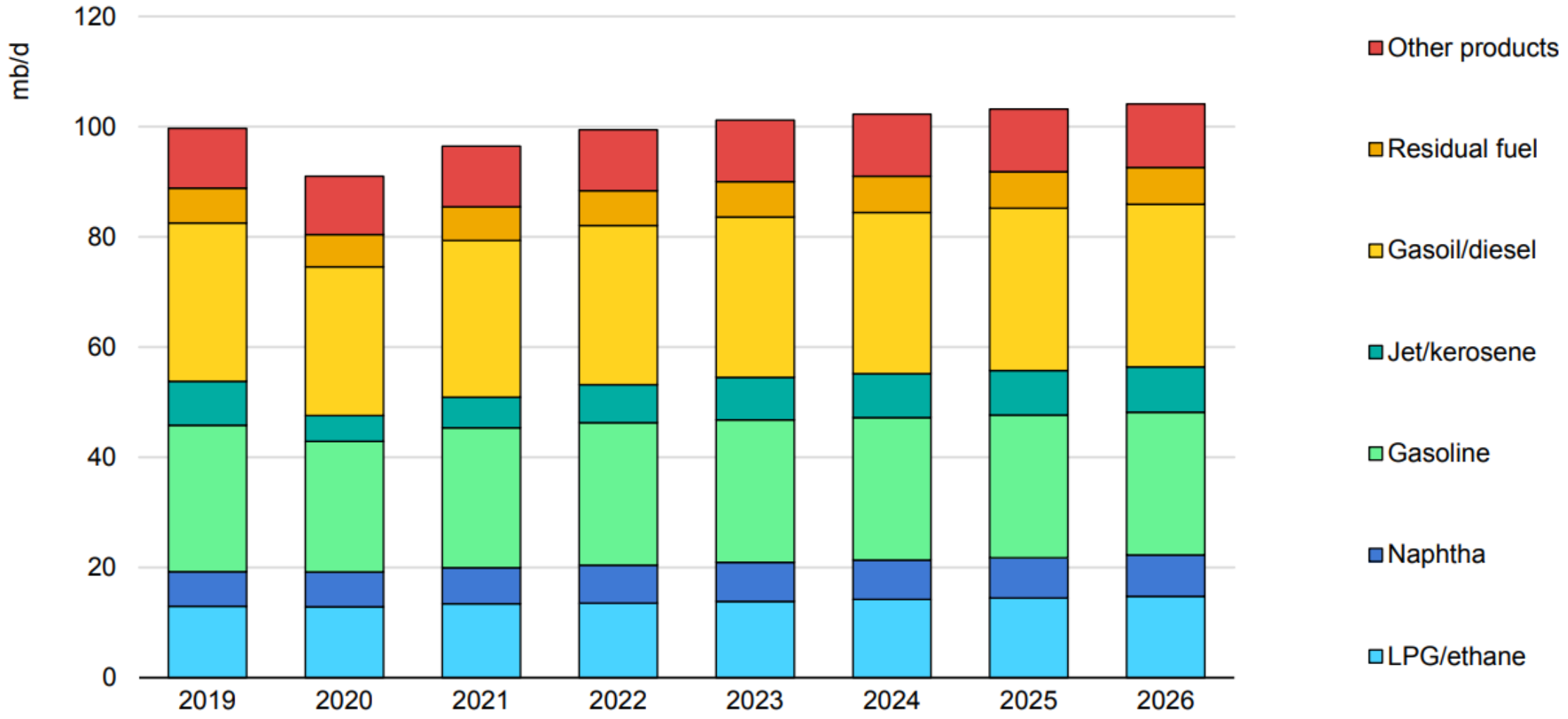
Medium Complexity: Catalytic Cracking



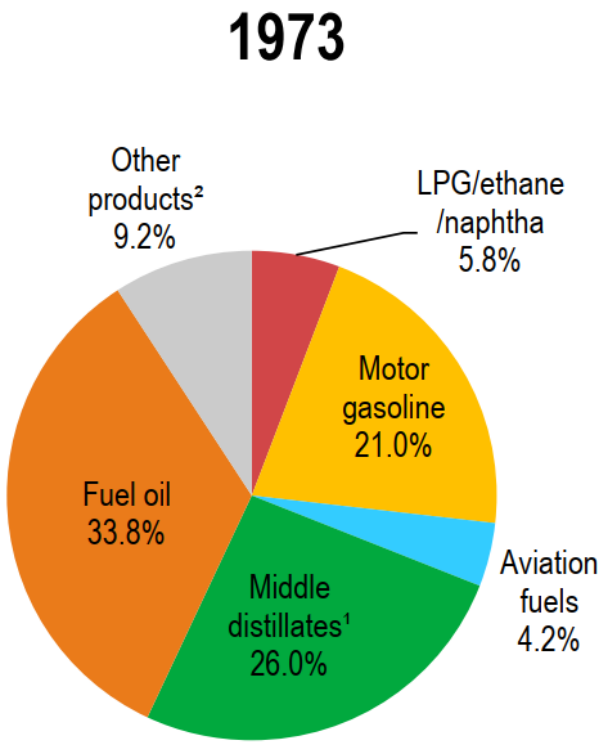
High Complexity: Coking / Reside Destruction

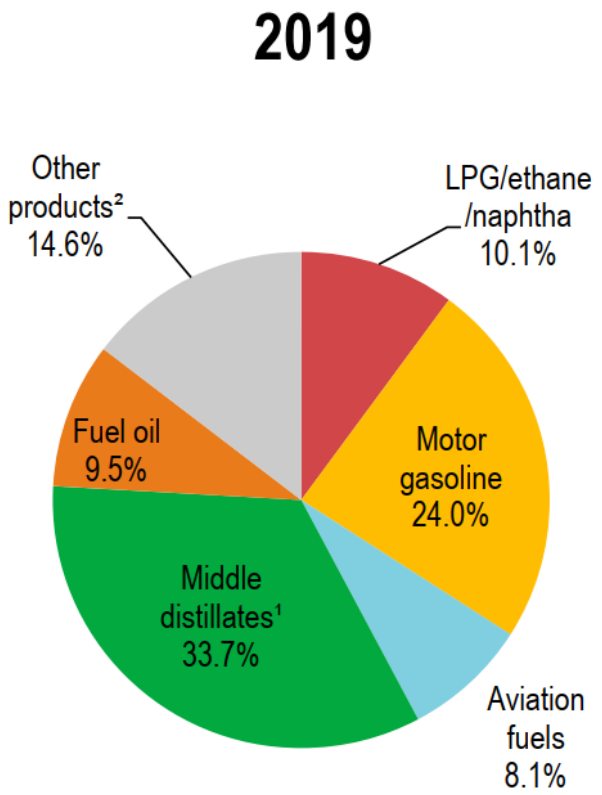


Global Oil Demand By Product



Refinery Output by Product

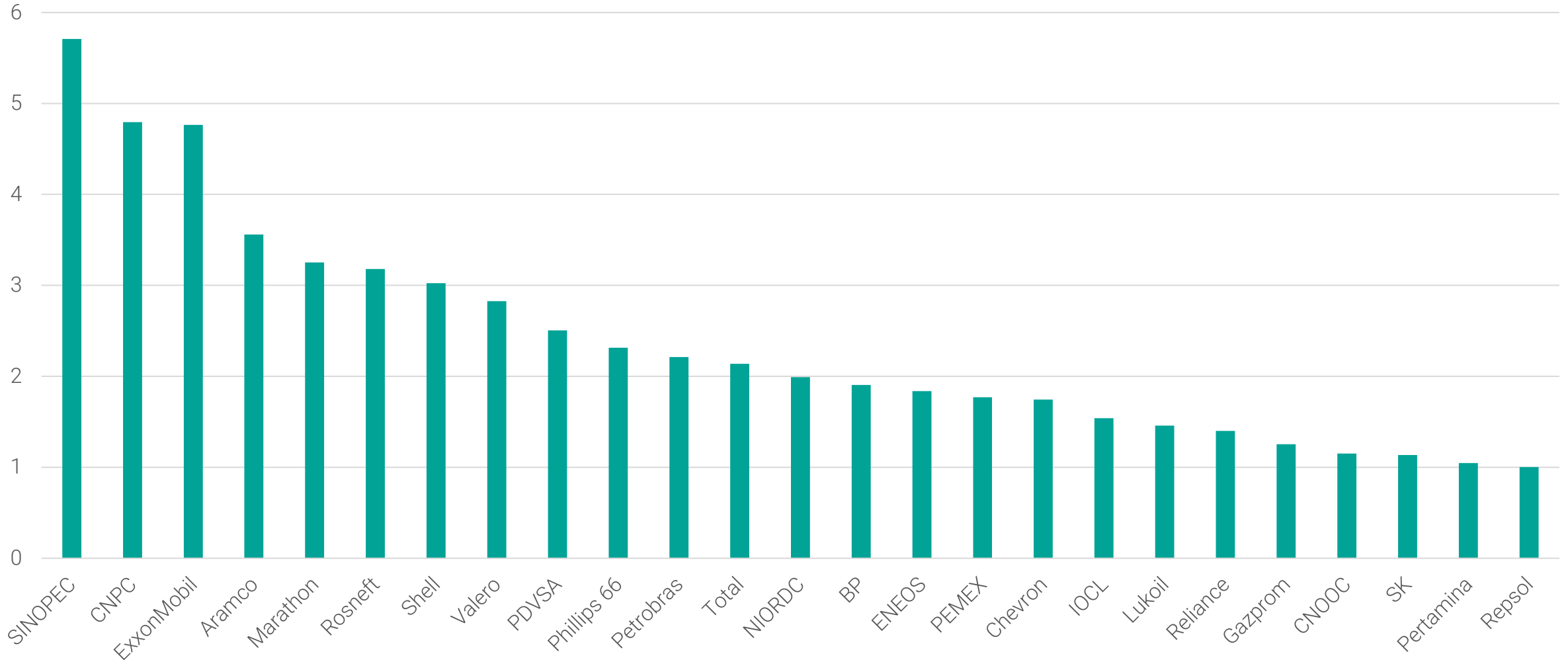




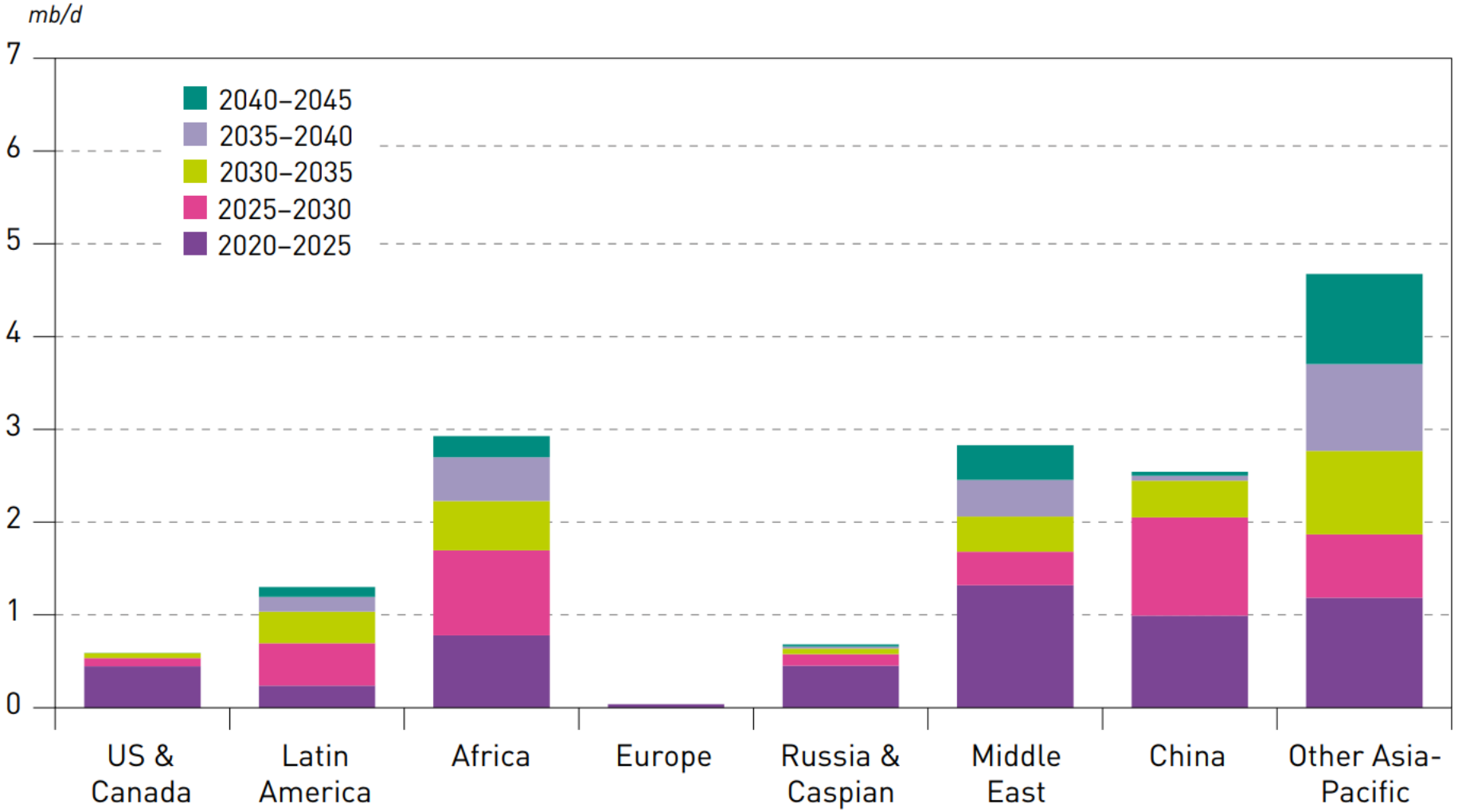
2 719 Mt

4 159 Mt

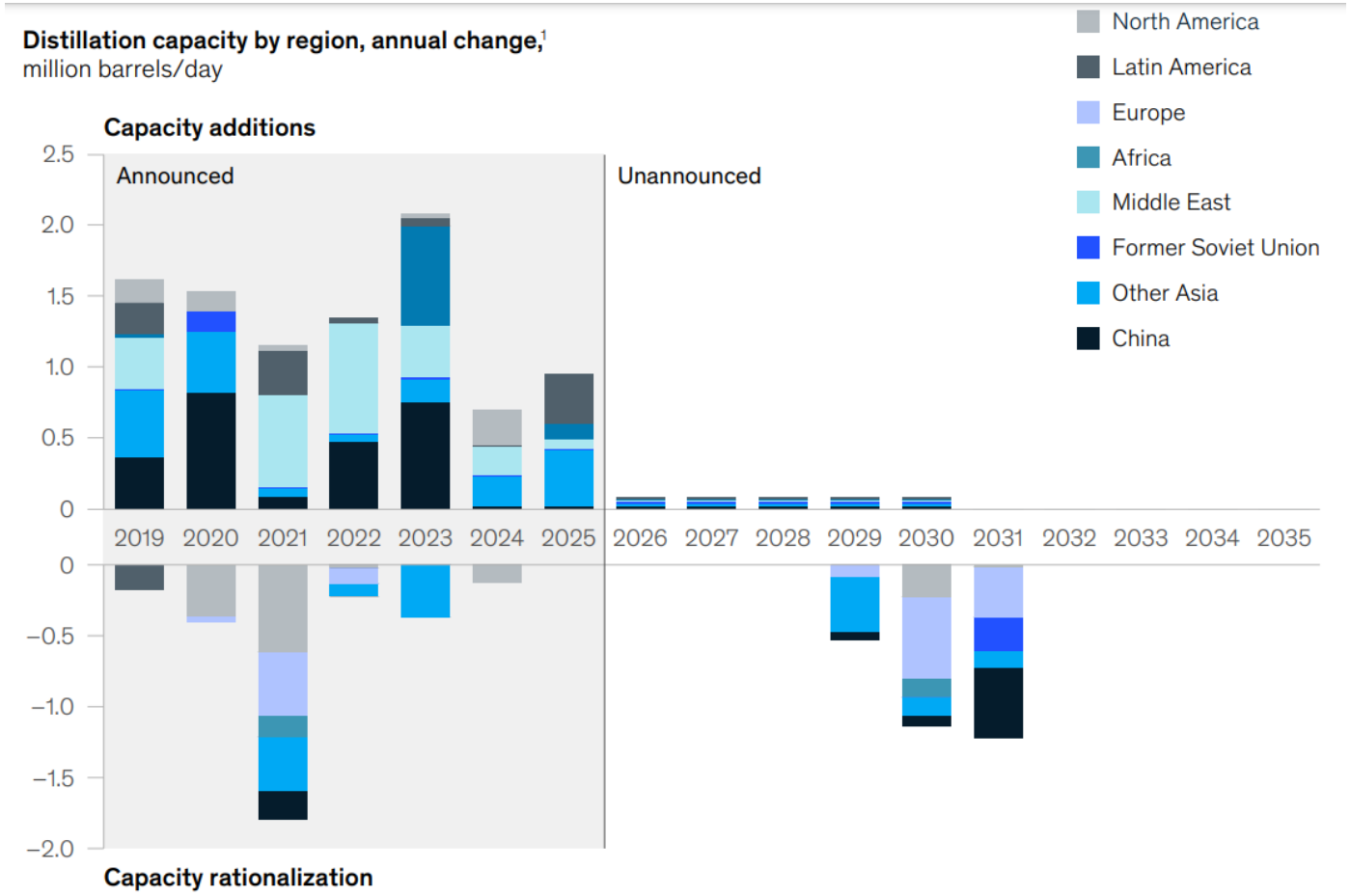
Top Refining Companies By Capacity (MBPD)



Distillation Capacity Additions, 2019–2045

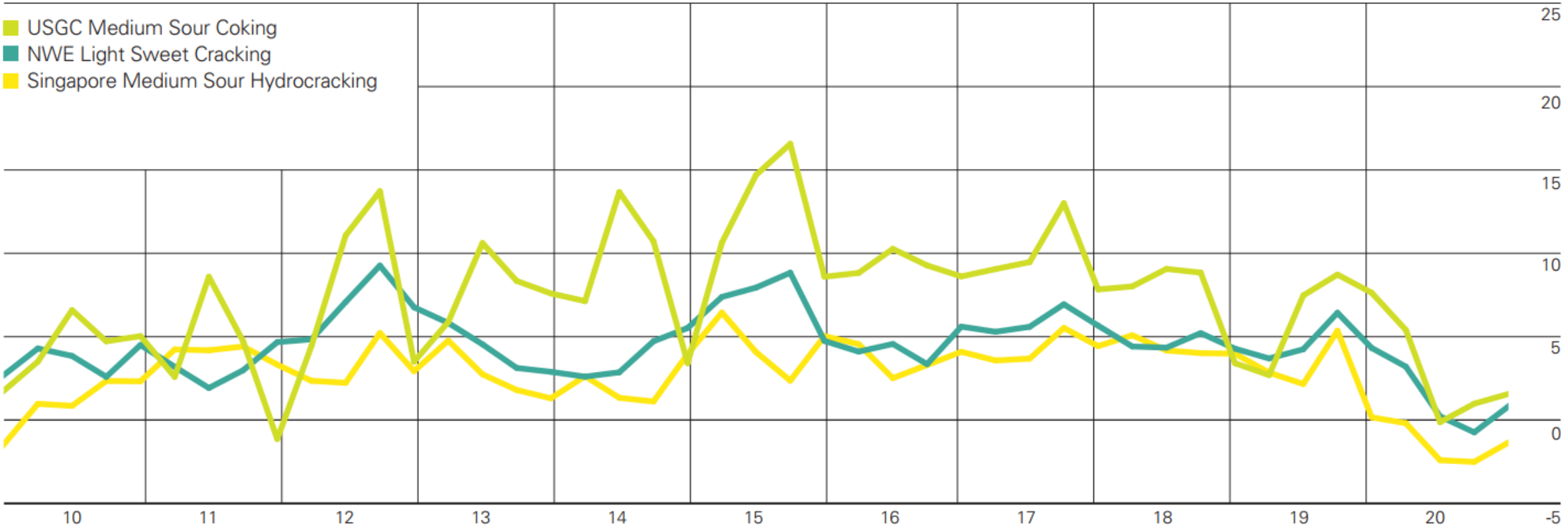


Distillation Capacity By Region, Annual Change



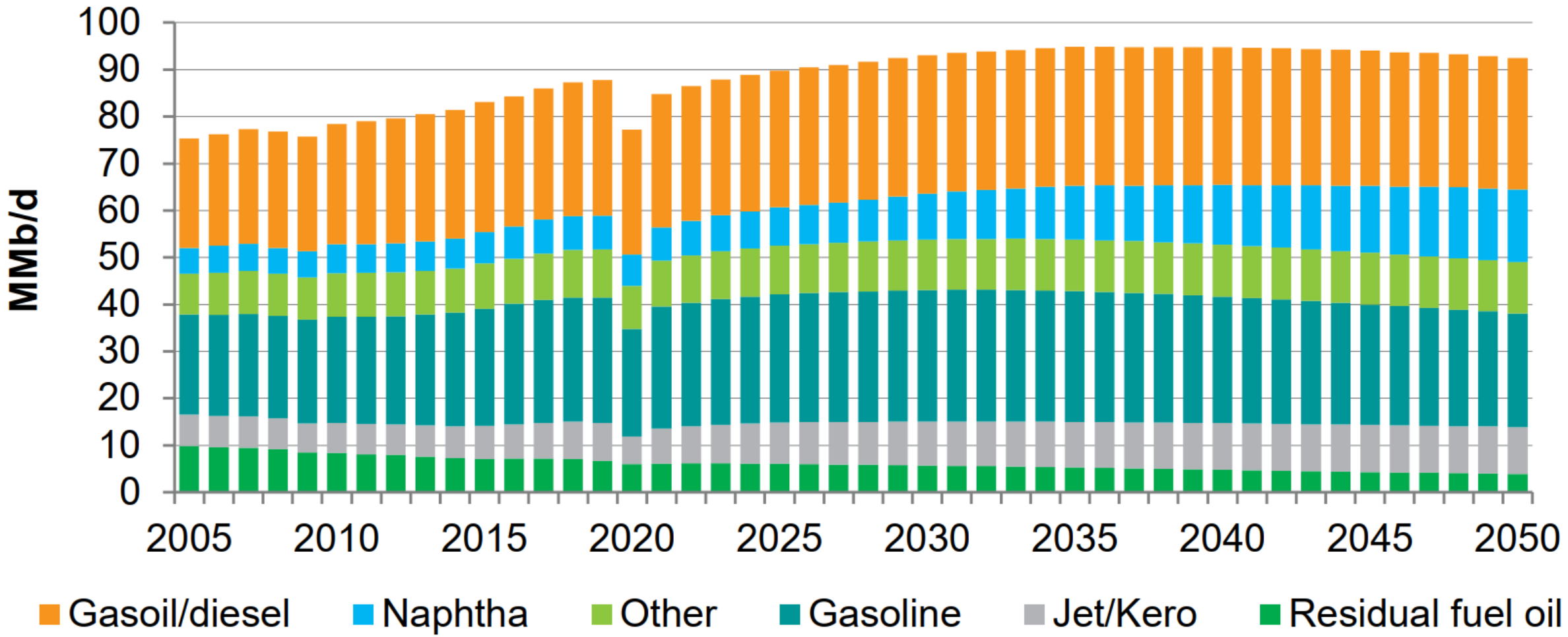
[1]Start and closure dates defined as first full year; additions include only projects classified as firm and probable; includes 0.125% per annum creep in growing markets.
Source: McKinsey Energy Insights Global Downstream Model 2021; McKinsey Refining Capacity Database

Refining Margins

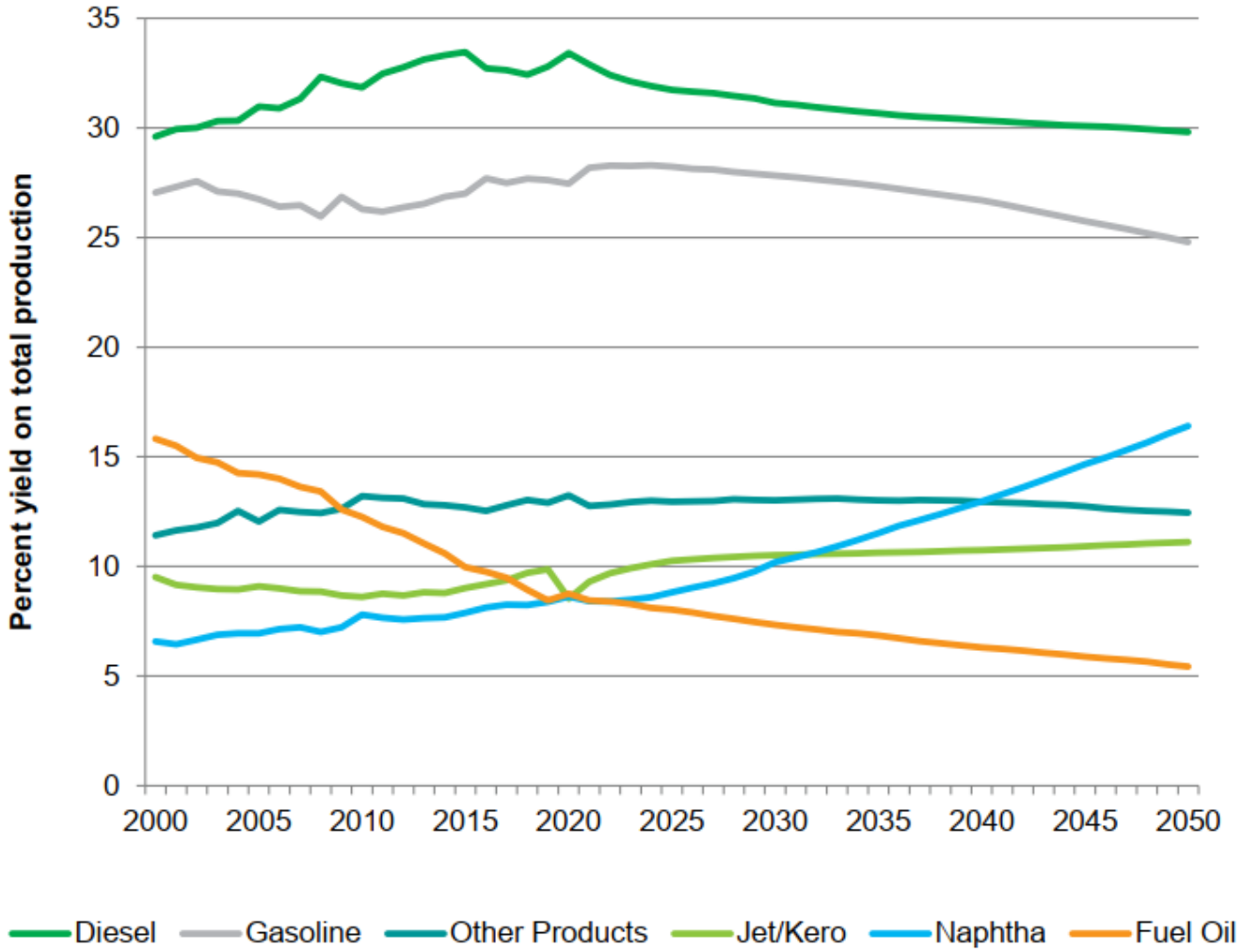


Note: The refining margins presented are benchmark margins for three major global refining centres. US Gulf Coast (USGC), North West Europe (NWE – Rotterdam) and Singapore. In each case they are based on a single crude oil appropriate for that region and have optimized product yields based on a generic refinery configuration (cracking, hydrocracking or coking), again appropriate for that region. The margins are on a semi-variable basis, i.e. the margin after all variable costs and fixed energy costs.

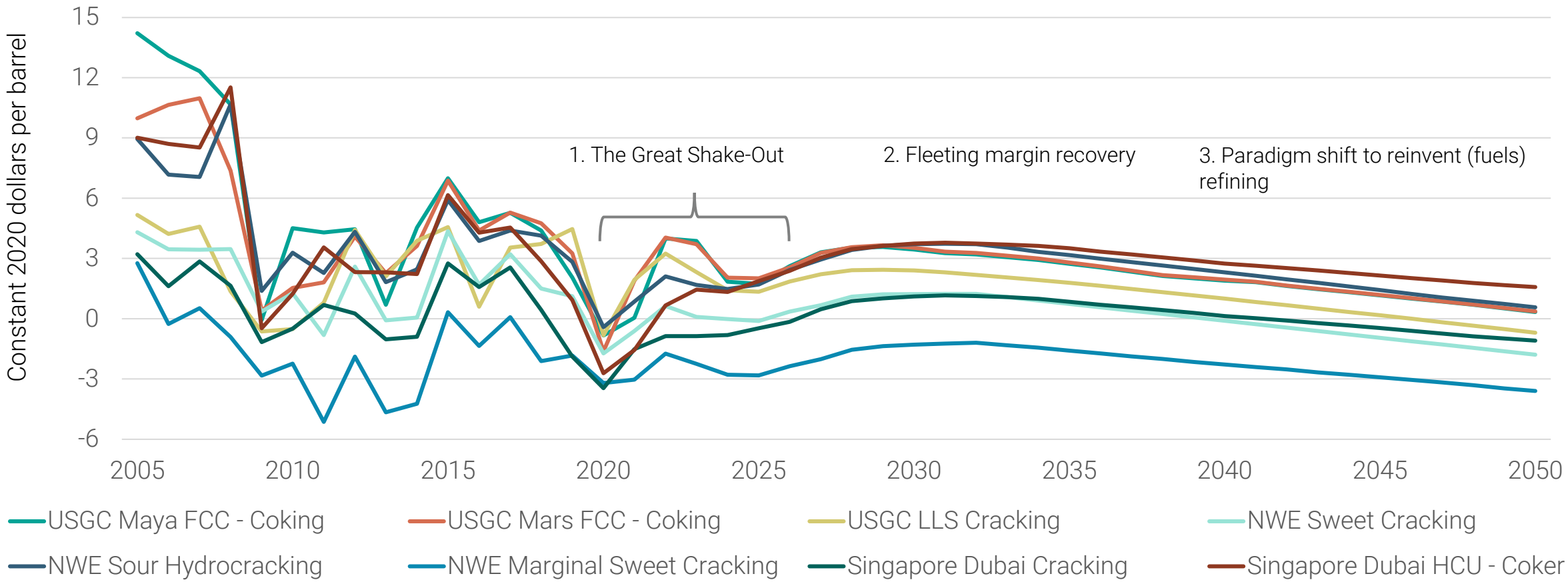
World Refined Product Demand



World Refinery Yields

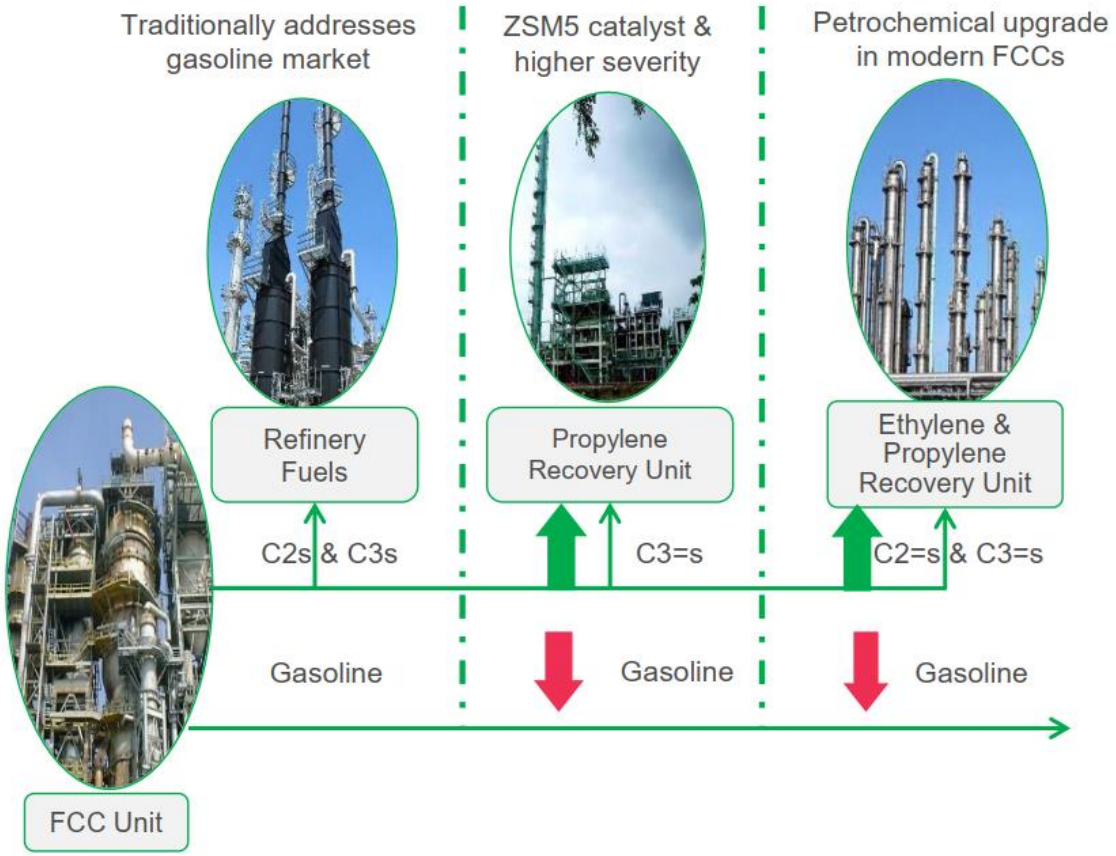


Long-term Benchmark Margin Outlook (USGC Margins Include RIN Costs)

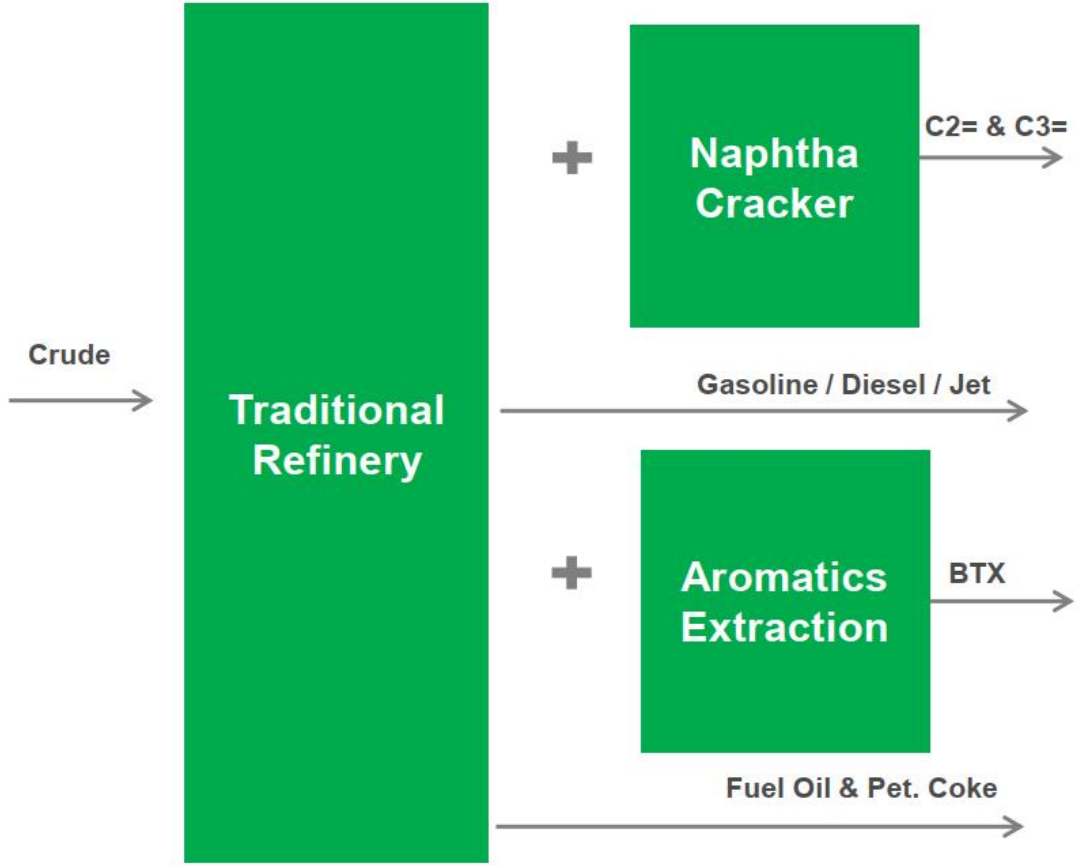


Refining Petrochemical Integration

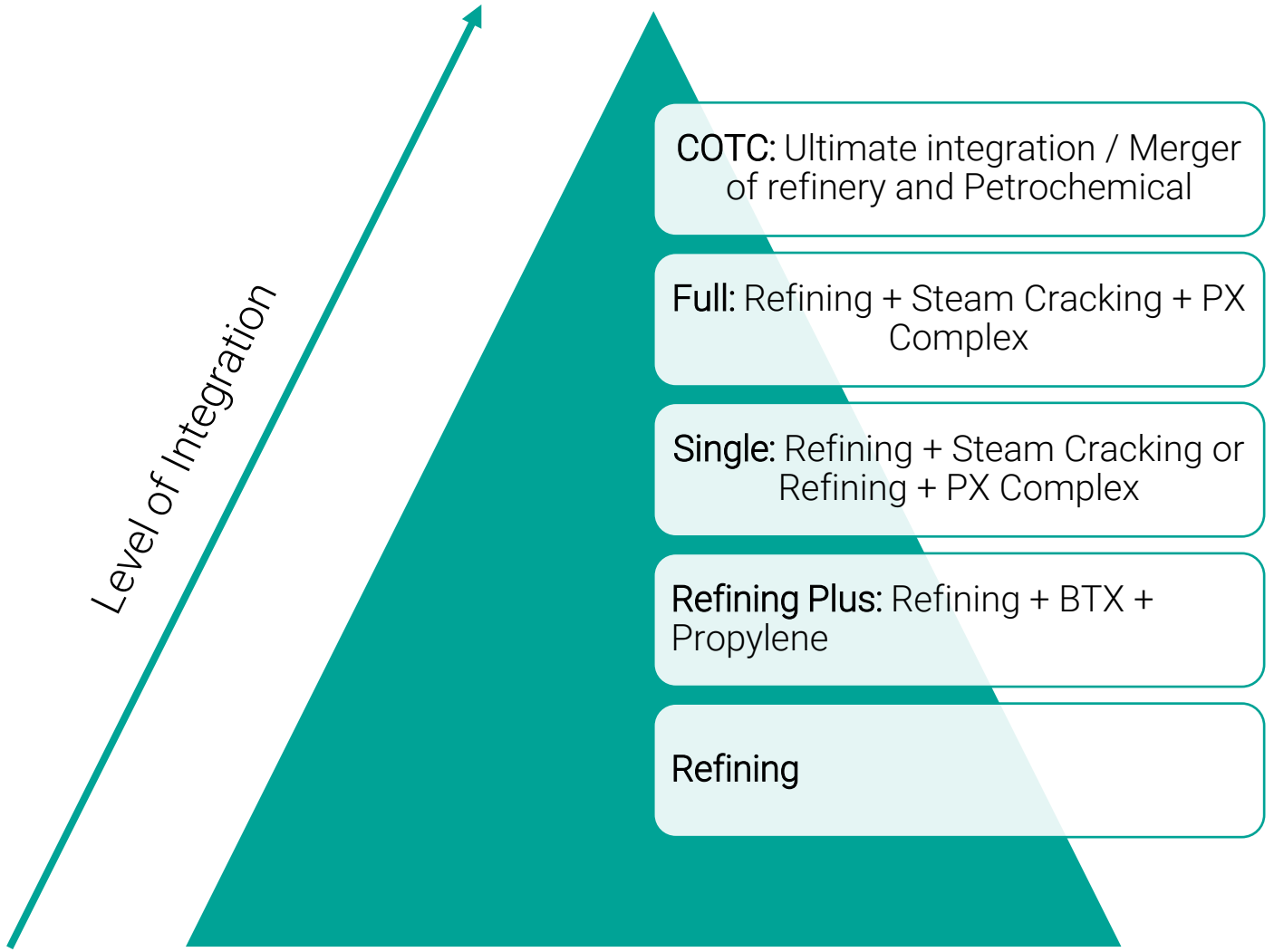
"Re-inventing" the FCC can potentially be the first move



Long term plan to "bolt-on" petrochemical production



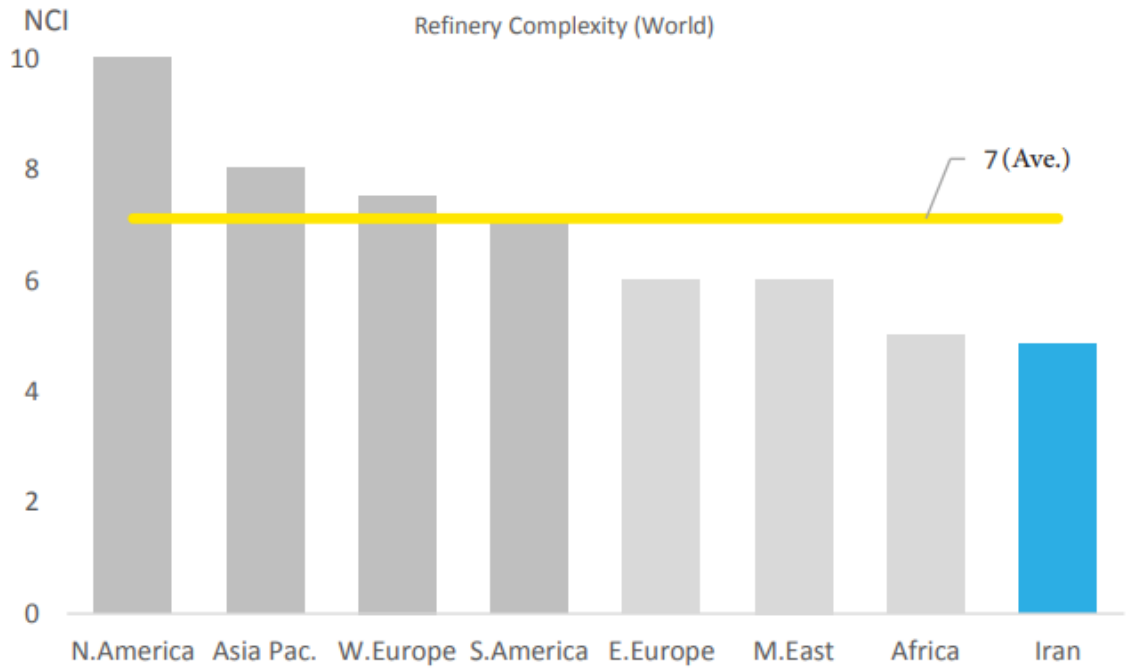
COTC Configures A Refinery To Produce Maximum Chemicals

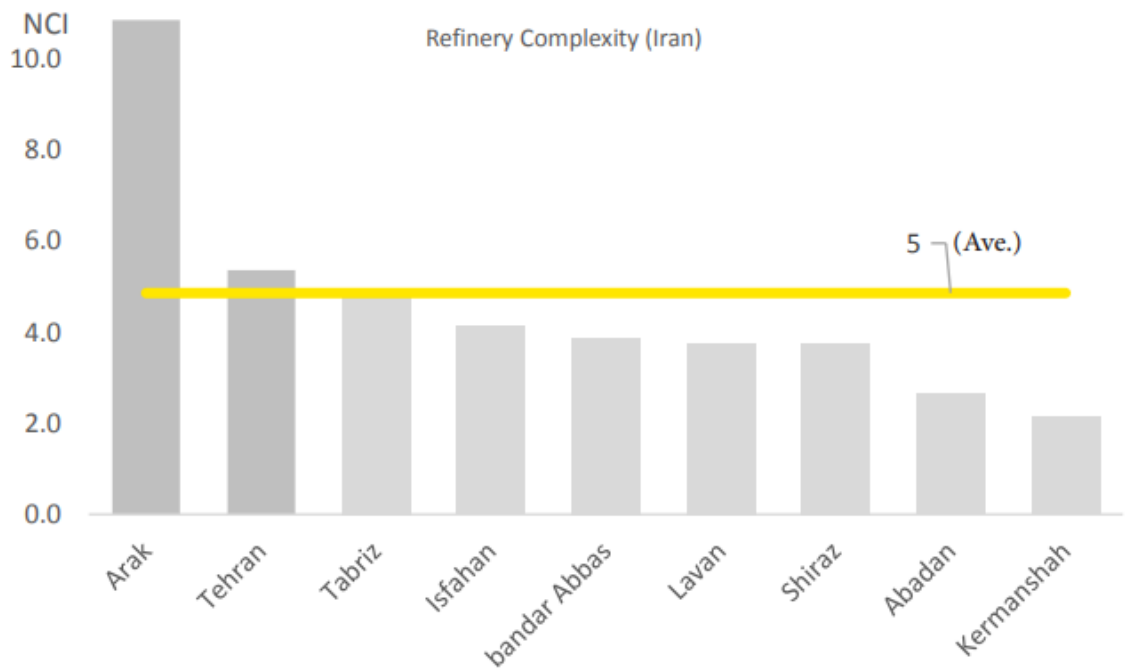


COTC Projects (2019)

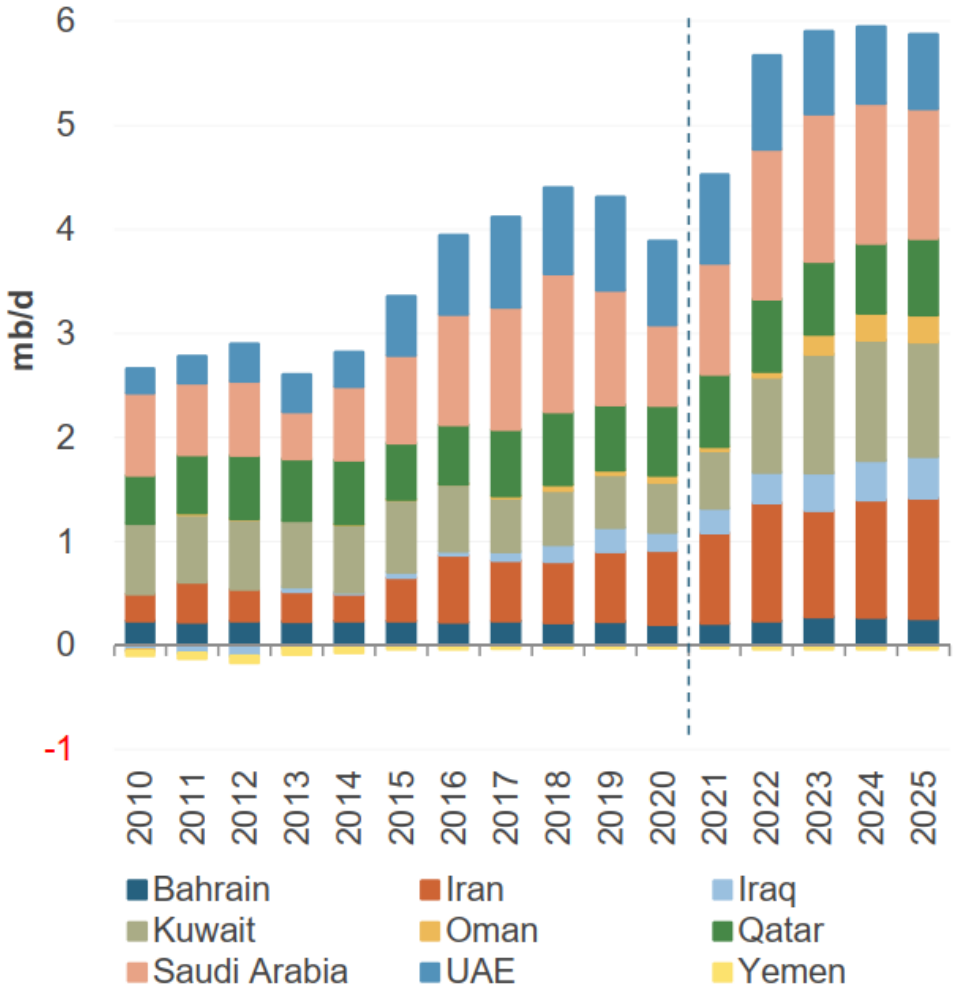
Project	Refinery Capacity (MMTPA)	P-Xylene Capacity (MMTPA)	Olefin Capacity (MMTPA)	Est. Chemical conversion/ bbl of oil (%)	Investment ($bn)	Start Trial Operation
Hengli Petrochemical	20	4.3	1.5	42	11.4	Dec 2018
Zhejiang Petroleum and Chemical (ZPC) Phase 1	20	4.0	1.4	45	12	Est. Q2 2019
Hengyi (Brunei) PMB Refinery-Petrochem	8	1.5	0.5	>40	3.45	Est. 2019
Zhejiang Petroleum and Chemical (ZPC) Phase 2	20	4.8*	1.2	50*	12	Est. 2021
Shenghong refinery and Integrated Petrochem	16	2.8	1.1	60**	11.0	H2** 2021
Aramco/SABIC JV	20	--	3.0	45	20	2025

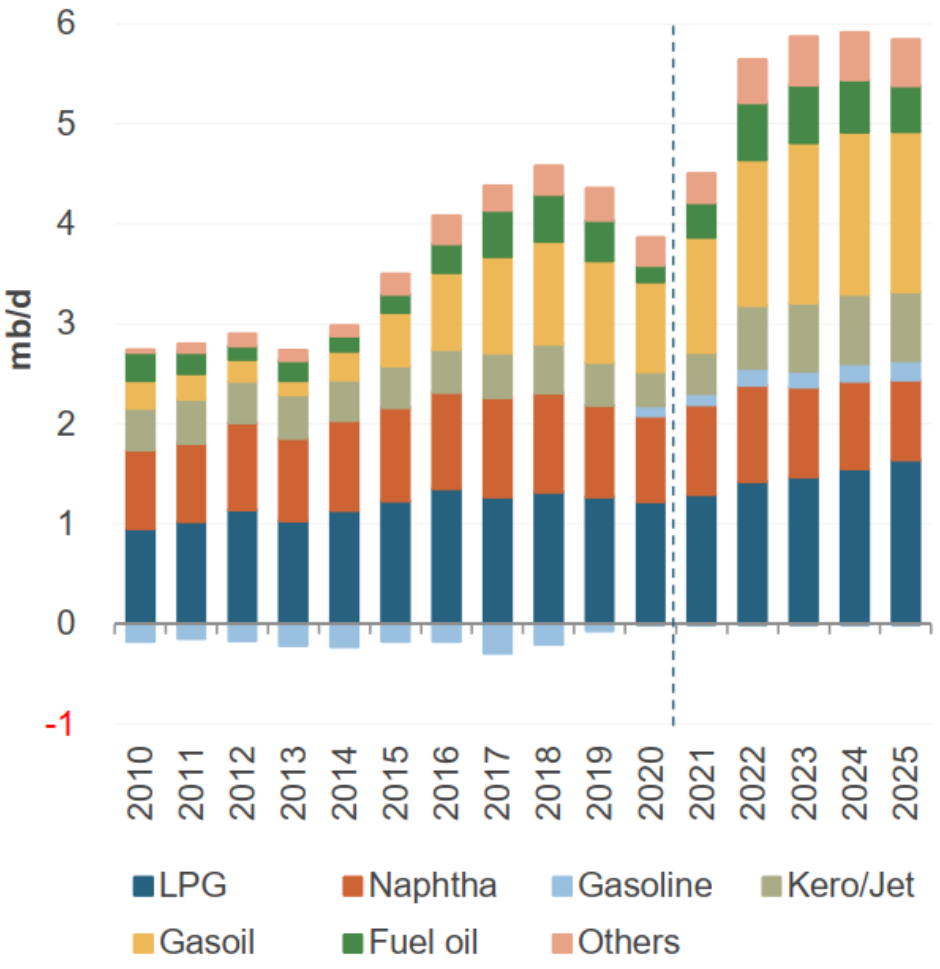
Refinery Complexity



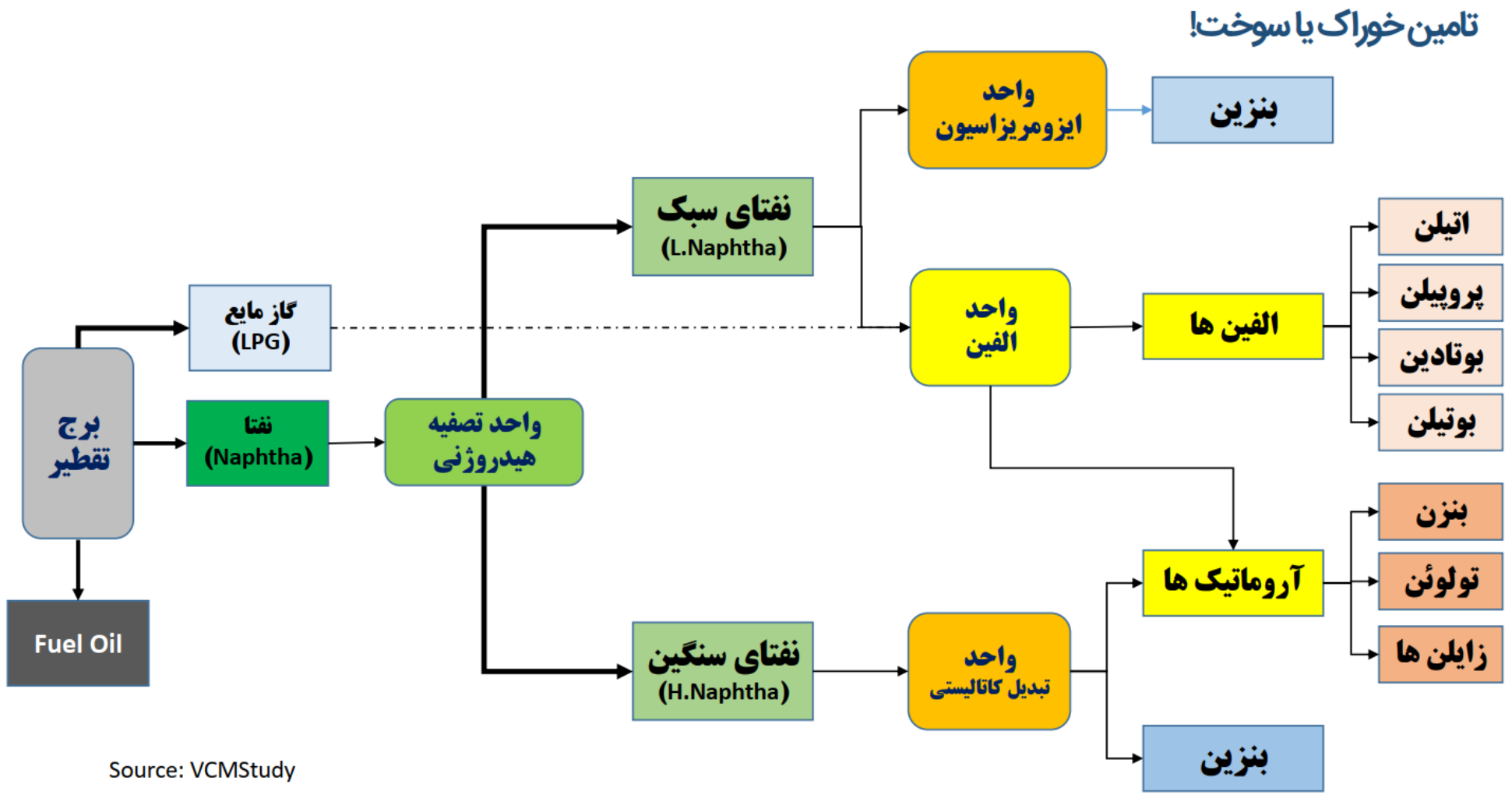


Middle East Products Net Exports





Fuel or Feed

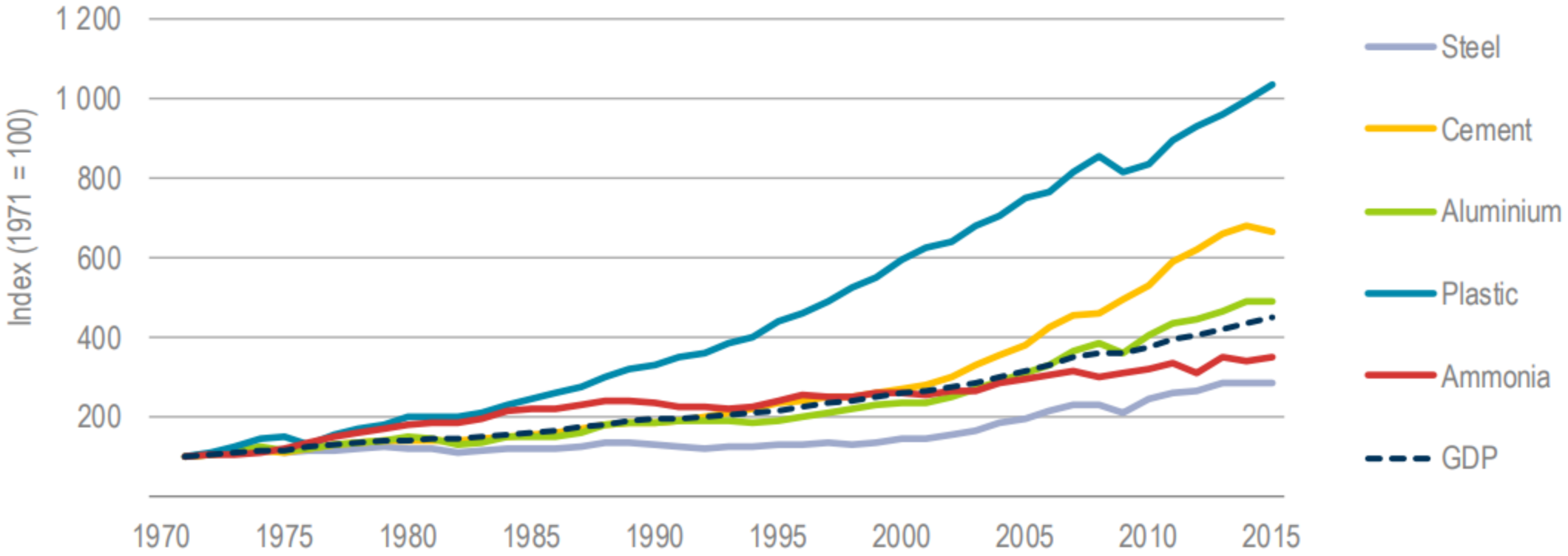


Source: VCMStudy

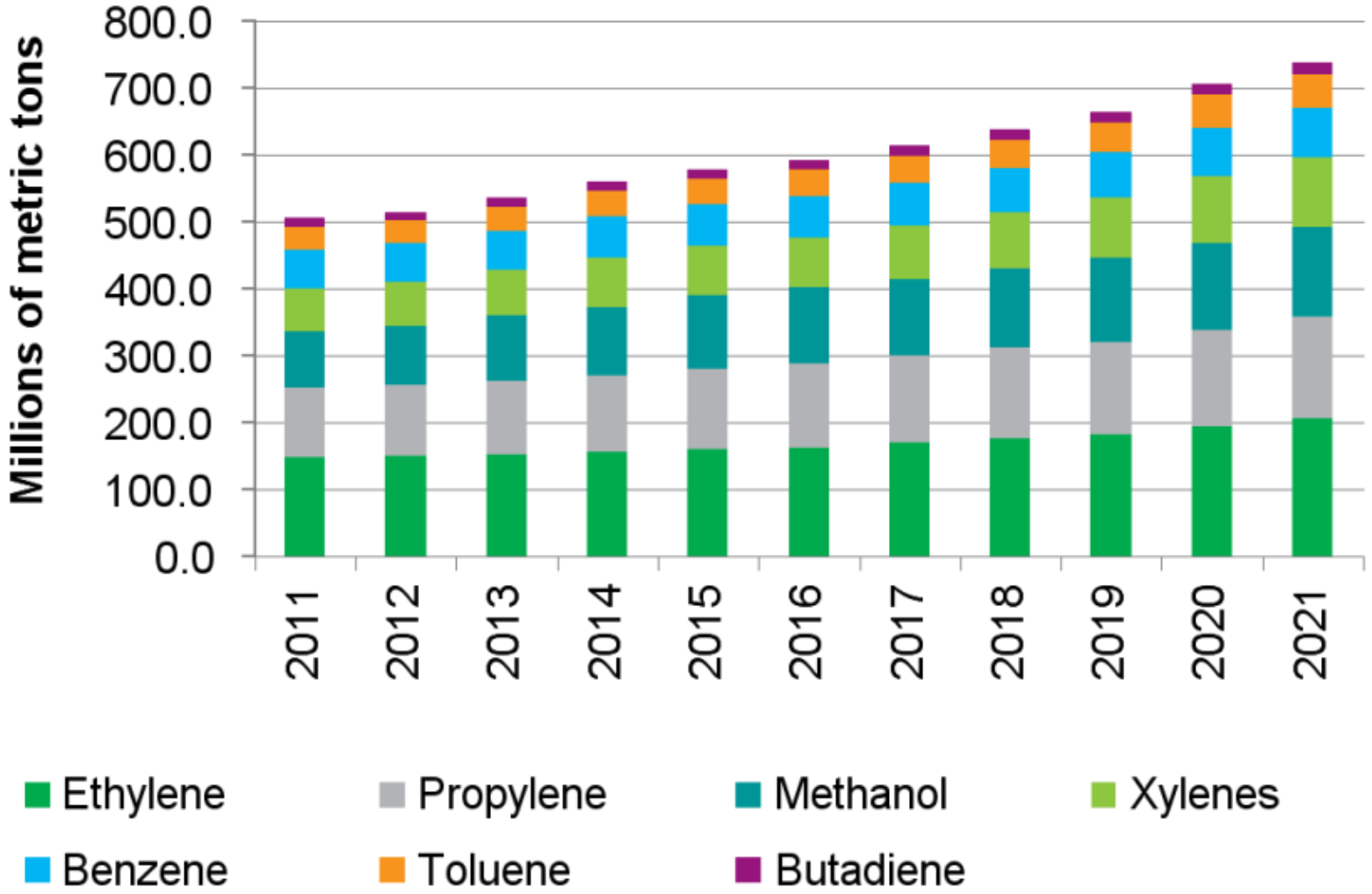
Oil Demand In The Petrochemical Sector

	2019	2020	2025	2030	2035	2040	2045	Growth 2019–2045
OECD Americas	3.5	3.2	3.8	4.1	3.9	3.7	3.5	0.1
OECD Europe	1.9	1.7	1.8	1.8	1.7	1.6	1.5	–0.4
OECD Asia Oceania	2.1	1.9	2.0	2.0	2.0	2.0	2.0	–0.1
OECD	**7.4**	**6.9**	**7.6**	**8.0**	**7.7**	**7.4**	**7.0**	**–0.4**
Latin America	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.1
Middle East & Africa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
India	0.4	0.4	0.5	0.7	0.9	1.0	1.1	0.7
China	1.9	1.8	2.1	2.2	2.4	2.6	2.7	0.8
Other Asia	1.3	1.3	1.5	1.7	1.9	2.0	2.1	0.8
OPEC	1.2	1.2	1.4	1.7	2.2	2.5	2.7	1.5
Russia	0.9	0.9	1.1	1.1	1.1	1.1	1.1	0.1
Other Eurasia	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0
Non-OECD	**6.2**	**6.0**	**7.1**	**8.0**	**9.0**	**9.7**	**10.3**	**4.1**
World	**13.7**	**12.9**	**14.7**	**15.9**	**16.7**	**17.0**	**17.3**	**3.7**

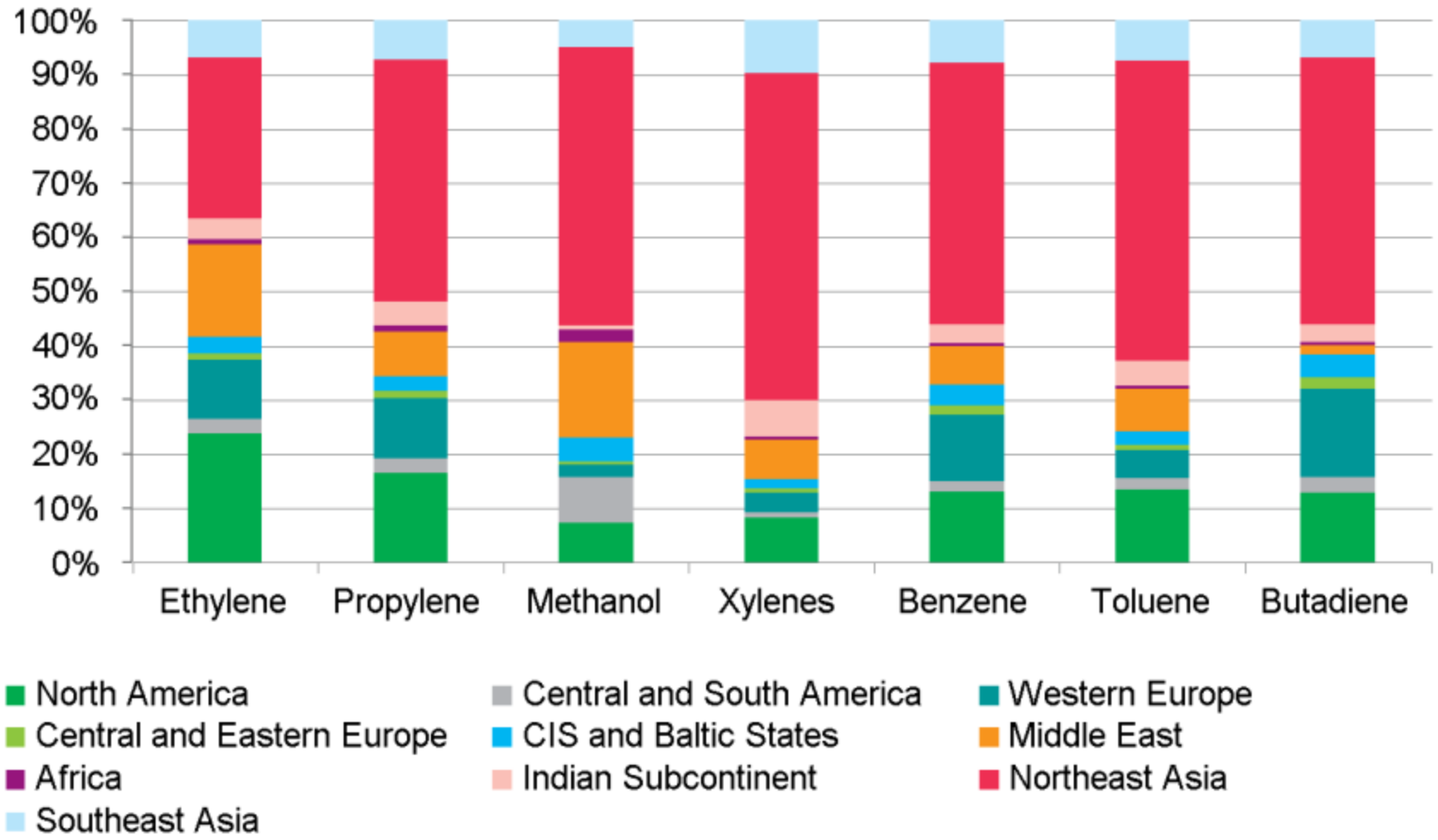
Production Growth For Selected Bulk Materials And GDP



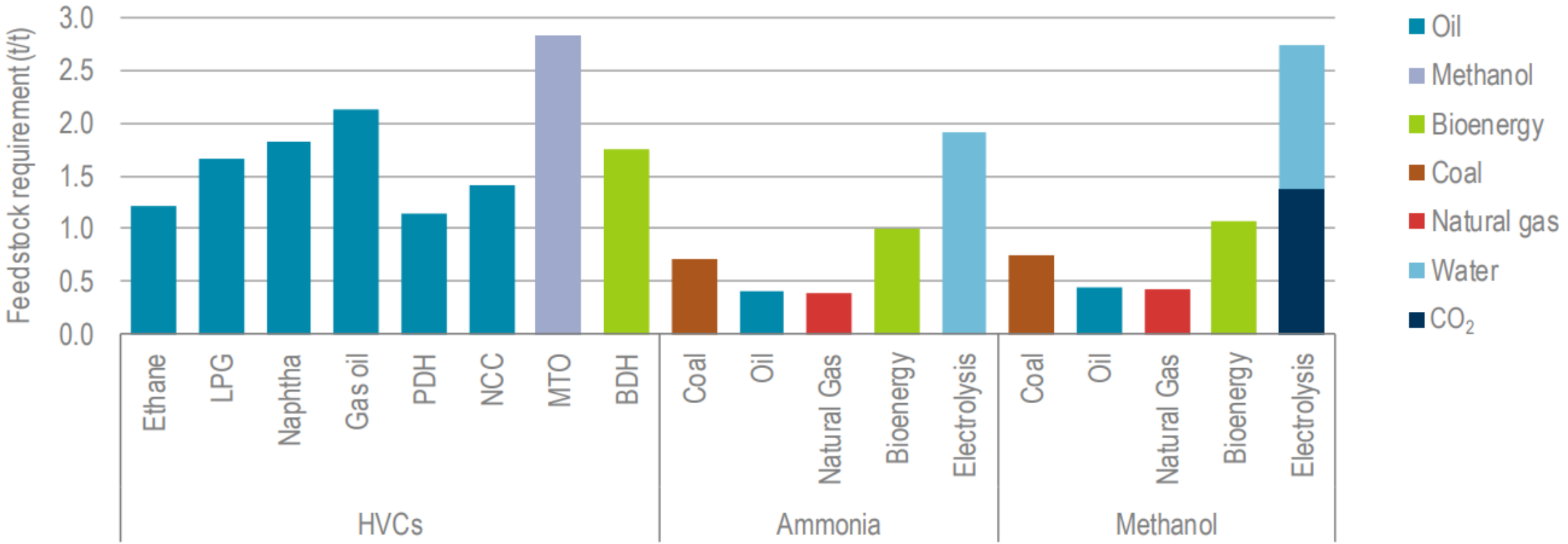
World Capacity for Primary Petrochemicals



Regional Share Of Capacity For Primary Petrochemicals

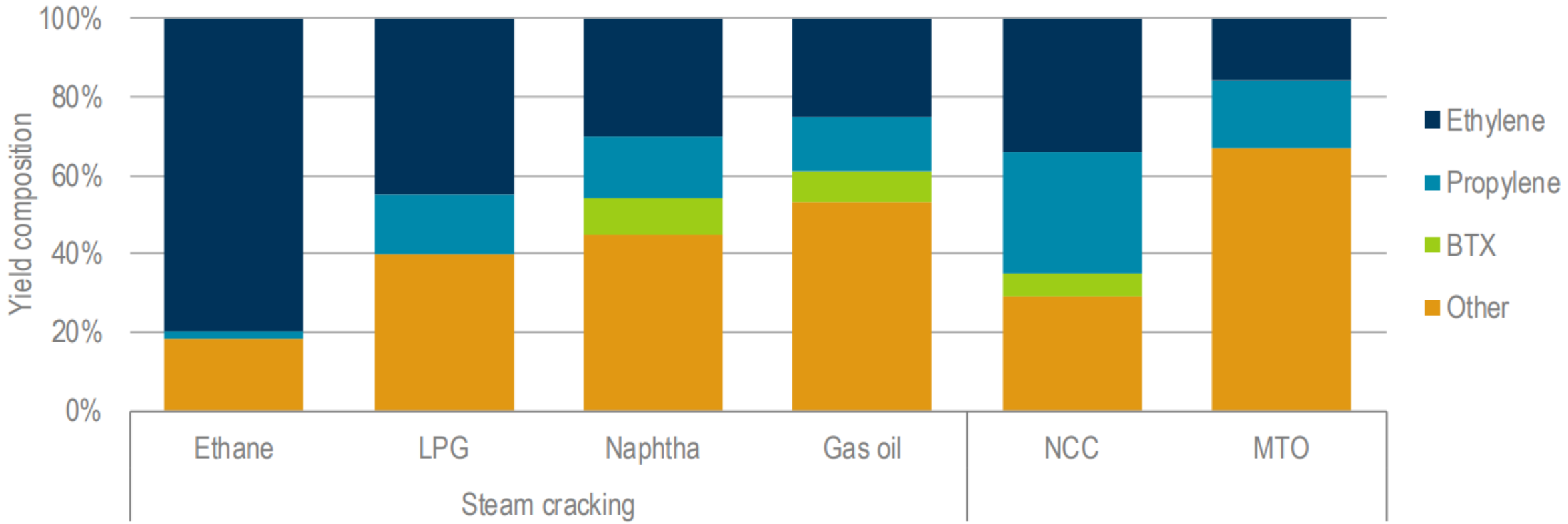


Feedstock Options By Chemical Product

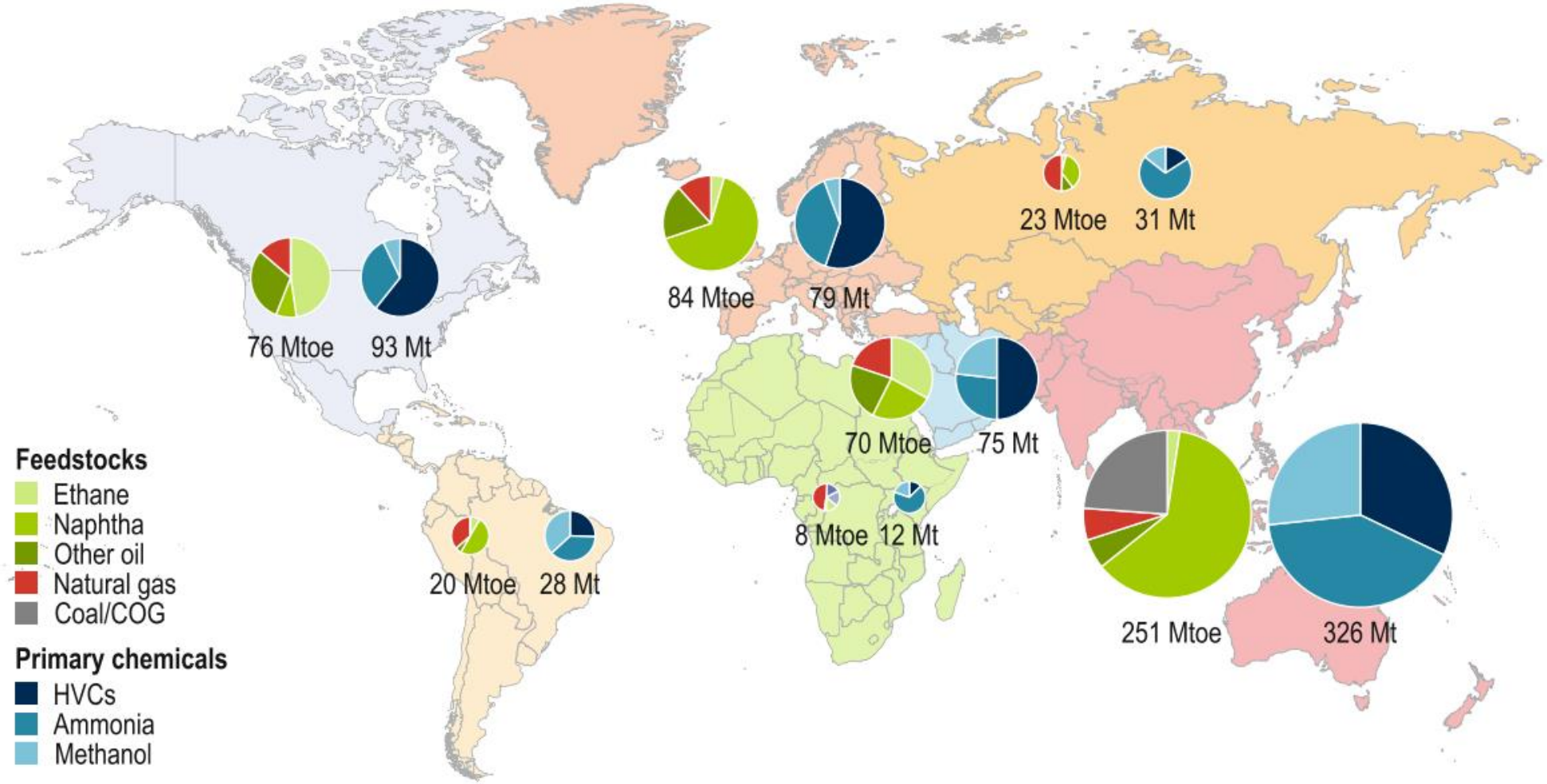


Notes: BDH = bioethanol dehydration; LPG = liquefied petroleum gas; NCC = naphtha catalytic cracking. The quantity pertaining to BDH is in terms of bioethanol.

Yield Of Individual HVCs In Multi-product Processes

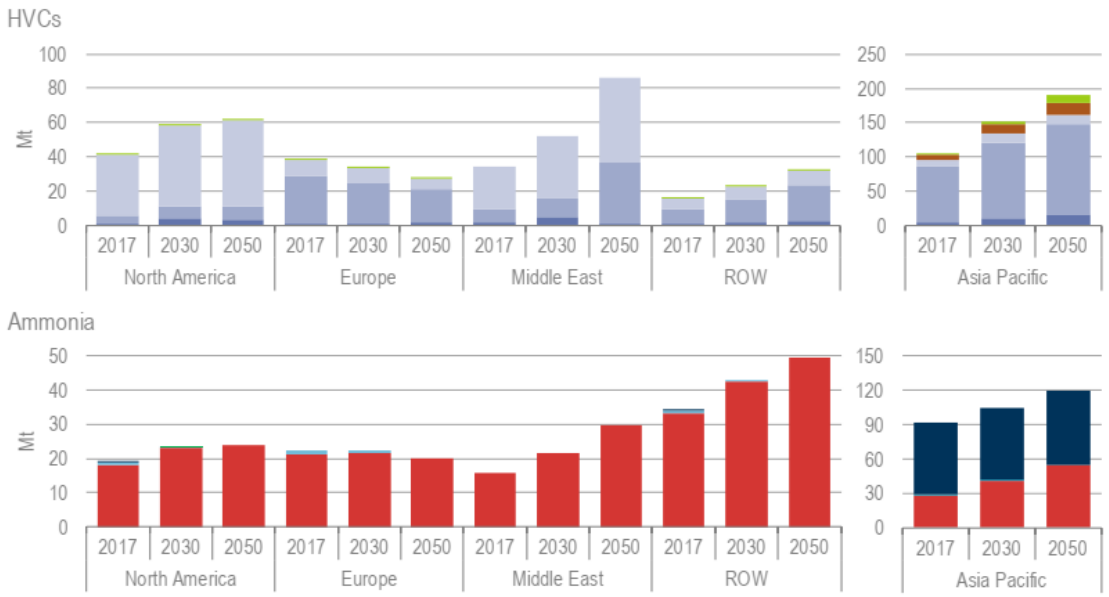


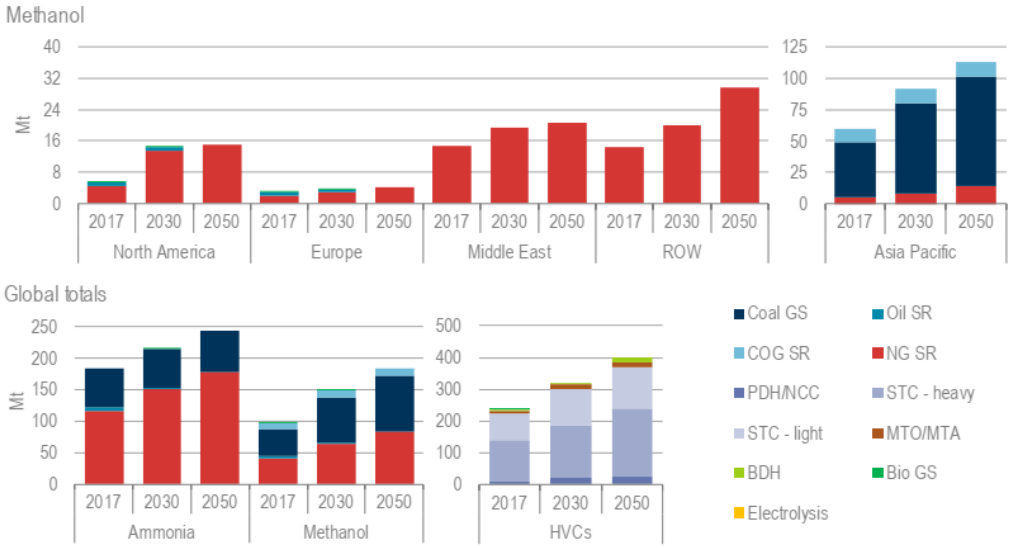
Primary Feedstock Use And Chemical Production By Region



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.

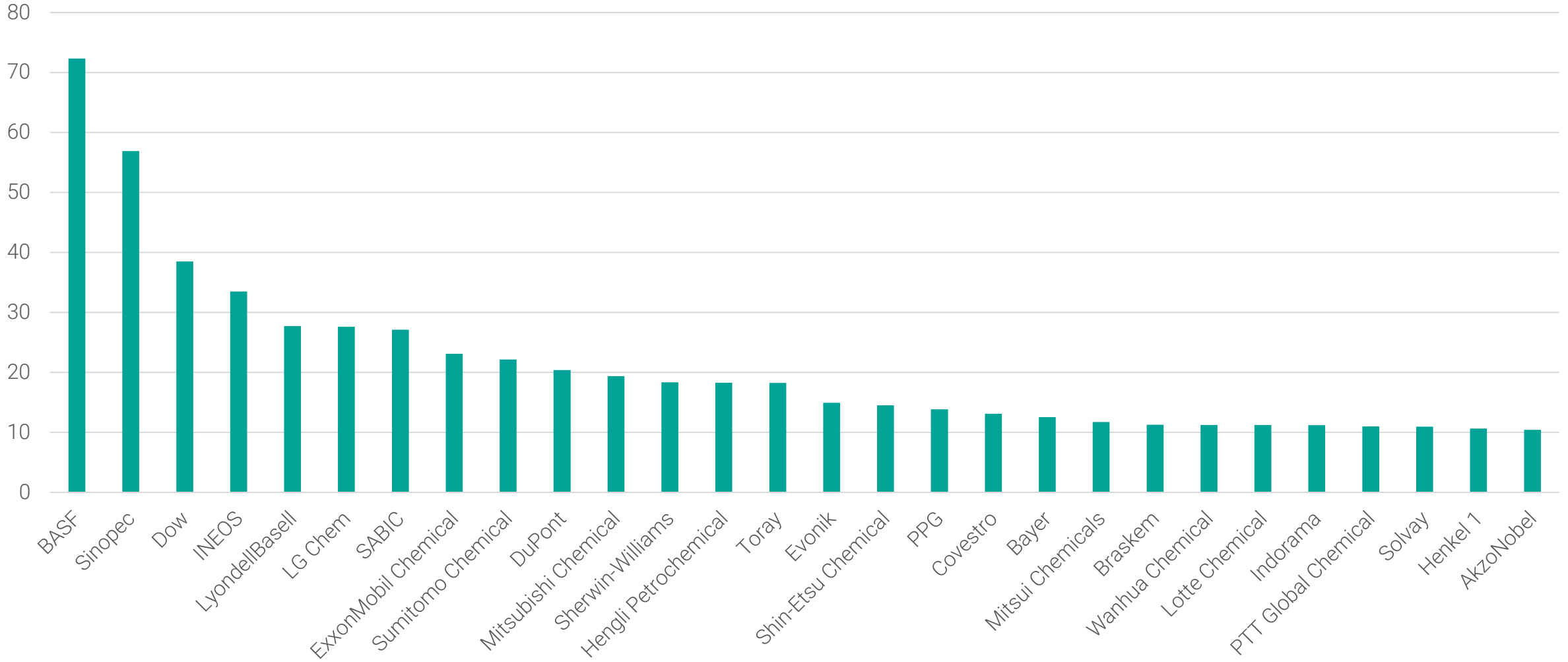
Production Routes For Primary Chemicals In The RTS





Notes: Tabulated results are provided in the online annex. Bio = bioenergy; GS = gasification; SR = steam reforming; STC - heavy = naphtha and gas oil steam cracking; STC - light = ethane and liquid petroleum gas steam cracking.

The ICIS Top 100 Chemical Companies 2020 ($B)

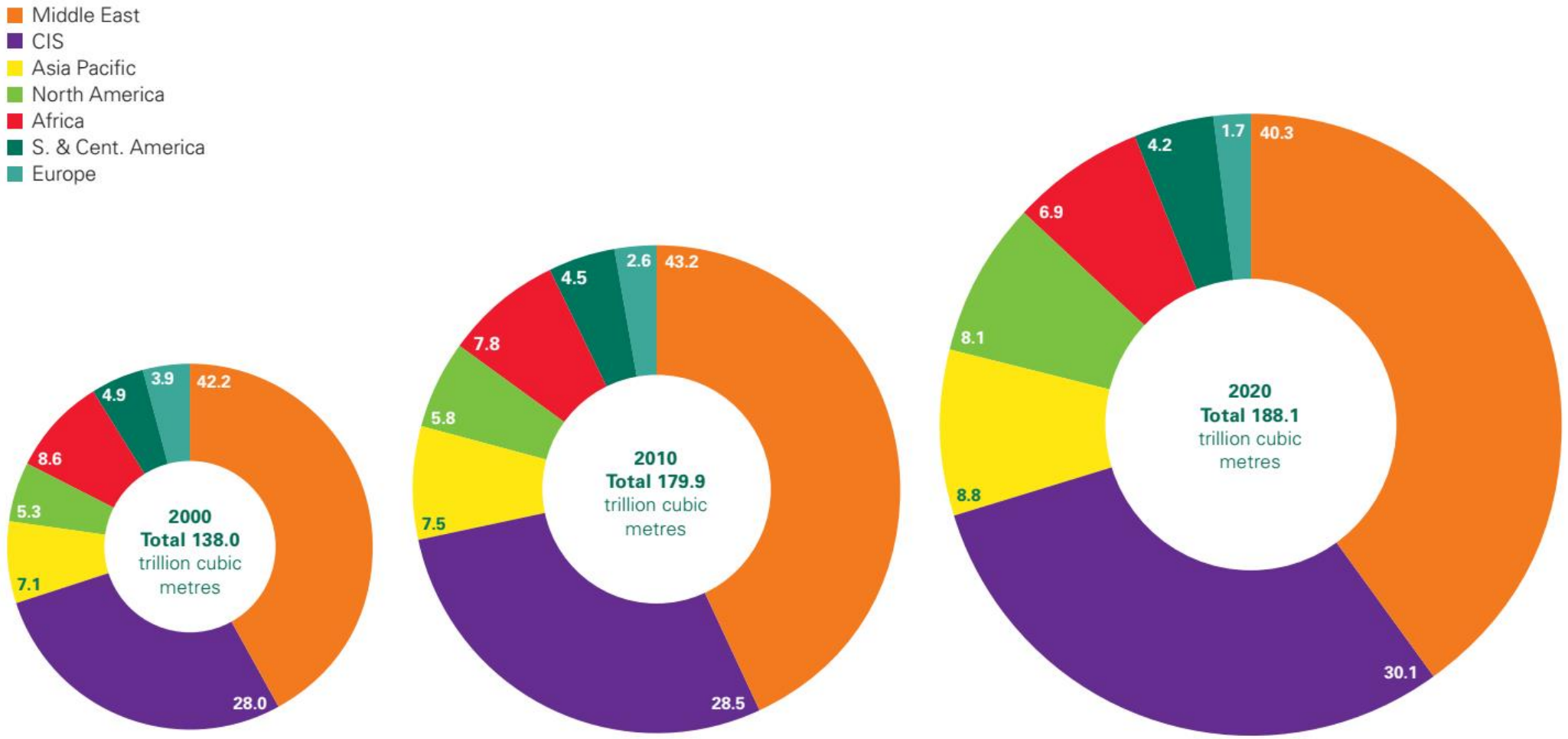


The ICIS Top 100 Chemical Companies 2020

Rank 2019	Company	Sales 2019	% change	Operating profit 2019	% change	Net income 2019	% change	Total Assets 2019	% change	R&D 2019	% change	Capex 2019	% change	Employees 2019	% change
$m, change in reporting currencies															
1	BASF	66,594	-1.5	4,549	-32.2	9,454	78.9	97,619	0.5	2,423	8.2	4,310	6.2	132,061	-3.9
2	Sinopec [2]	63,244	-6.9	2,463	-36.5	-	-	-	-	-	-	-	-	-	-
3	Dow [1]	42,951	-13.4	-395	-	-1,272	-	60,524	-27.7	765	-4.4	1,961	-6.2	36,500	-32.4
4	LyondellBasell	34,727	-11.0	4,116	-21.3	3,397	-27.6	30,435	7.6	111	-3.5	2,694	28.0	19,100	-1.8
5	SABIC [2]	32,488	-19.0	3,680	-59.1	-	-	74,933	-3.2	-	-	-	-	-	-
6	INEOS [2]	32,103	-8.6	2,485	-39.0	-	-	-	-	-	-	-	-	23,015	13.9
7	ExxonMobil [2]	27,416	-15.5	-	-	592	-82.3	-	-	-	-	1,933	29.4	-	-
8	LG Chem	24,793	1.6	776	-60.1	326	-75.2	29,470	17.6	949	8.7	1,793	1.4	-	-
9	DuPont [1]	21,512	-4.8	194	-70.4	498	-87.0	69,396	-63.1	955	-10.7	1,492	19.9	35,000	-
10	Sumitomo Chemical [3]	20,480	-4.0	1,265	-24.8	501	-64.3	33,588	15.1	-	-	1,108	-31.1	-	-

Gas Markets

Distribution Of Proved Reserves



Producers, Net Exporters and Net Importers of Natural Gas

Producers	bcm	% of world total
United States	949	23.6
Russian Federation	722	18.0
Islamic Rep. of Iran	235	5.9
People's Rep. of China	191	4.8
Canada	184	4.6
Qatar	167	4.2
Australia	148	3.7
Norway	116	2.9
Saudi Arabia	99	2.5
Algeria	92	2.3
Rest of the world	1 111	27.5
World	**4 014**	**100.0**

2020 provisional data

Net exporters	bcm
Russian Federation	230
Qatar	127
Norway	111
Australia	103
United States	77
Turkmenistan	56
Canada	47
Algeria	41
Nigeria	27
Malaysia	22
Others	176
Total	**1 017**

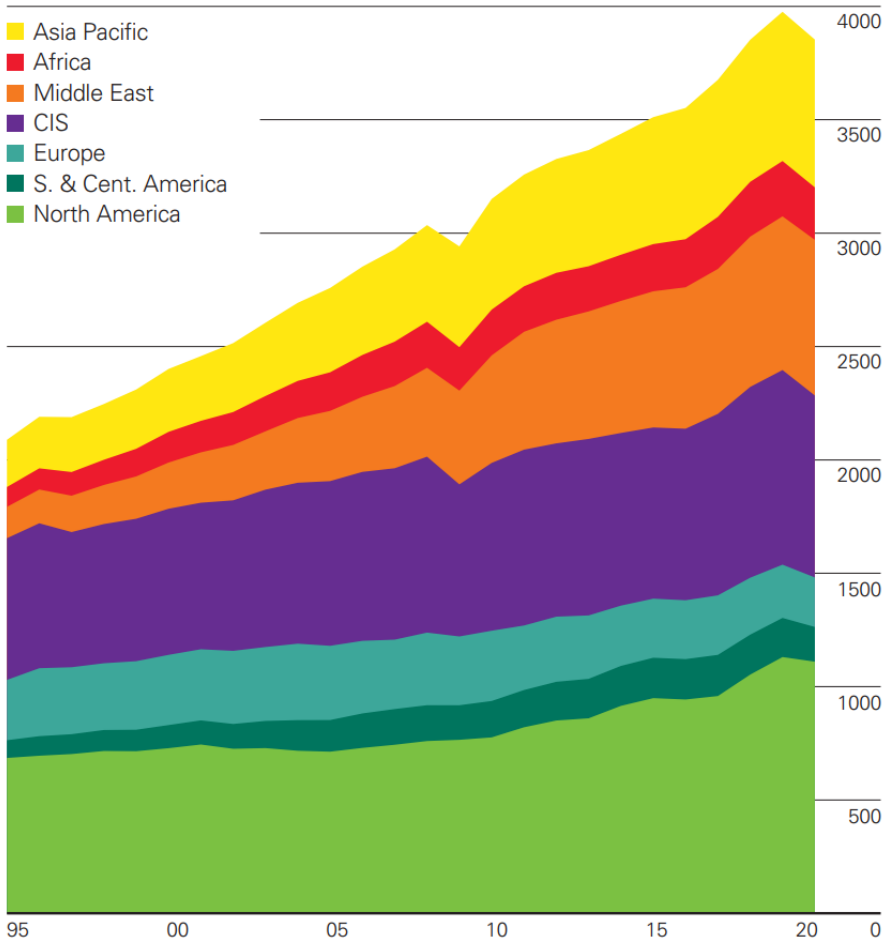
2020 provisional data

Net importers	bcm
People's Rep. of China	125
Japan	105
Germany	83
Italy	66
Mexico	64
Korea	54
Turkey	47
France	37
United Kingdom	34
India	34
Others	324
Total	**973**

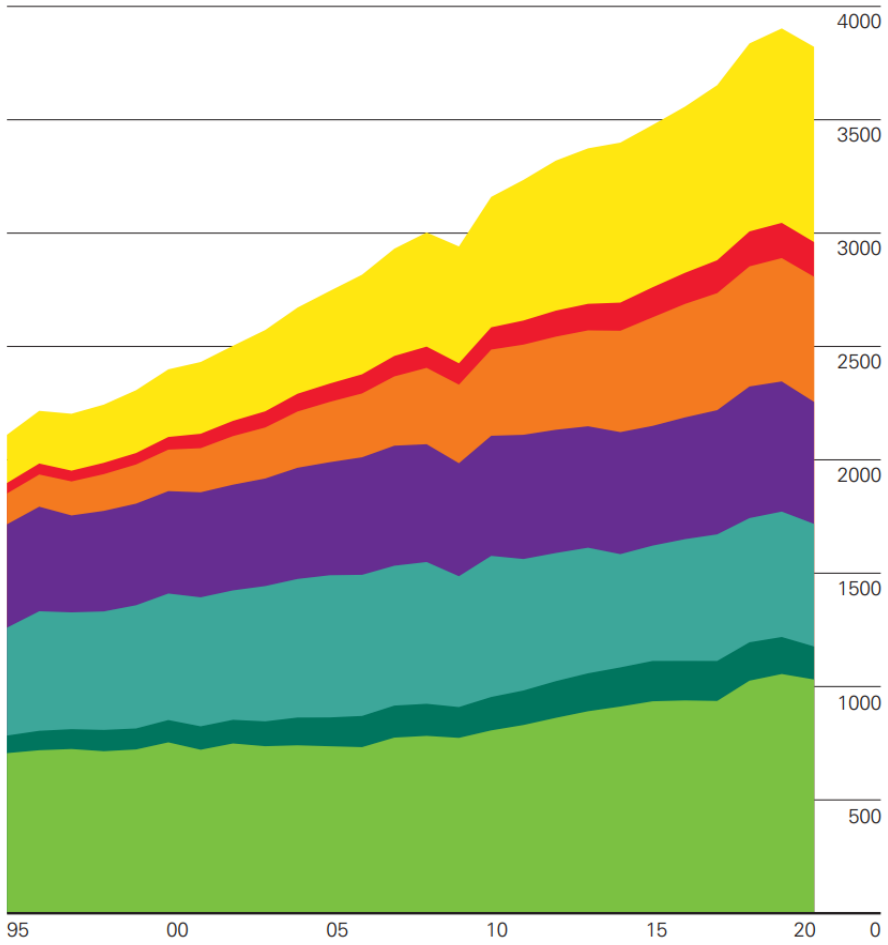
2020 provisional data

The Geopolitics of Gas

Natural gas: Production by region
Billion cubic metres



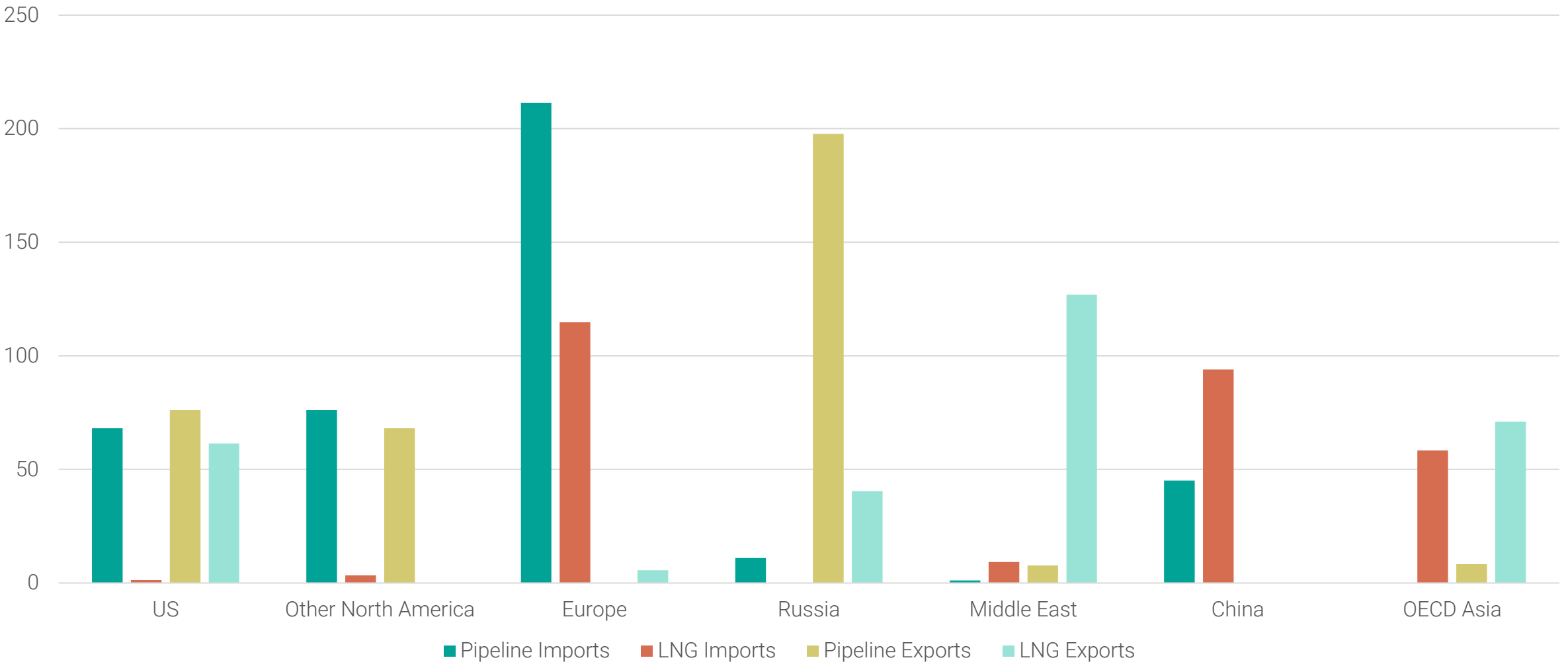
Natural gas: Consumption by region
Billion cubic metres



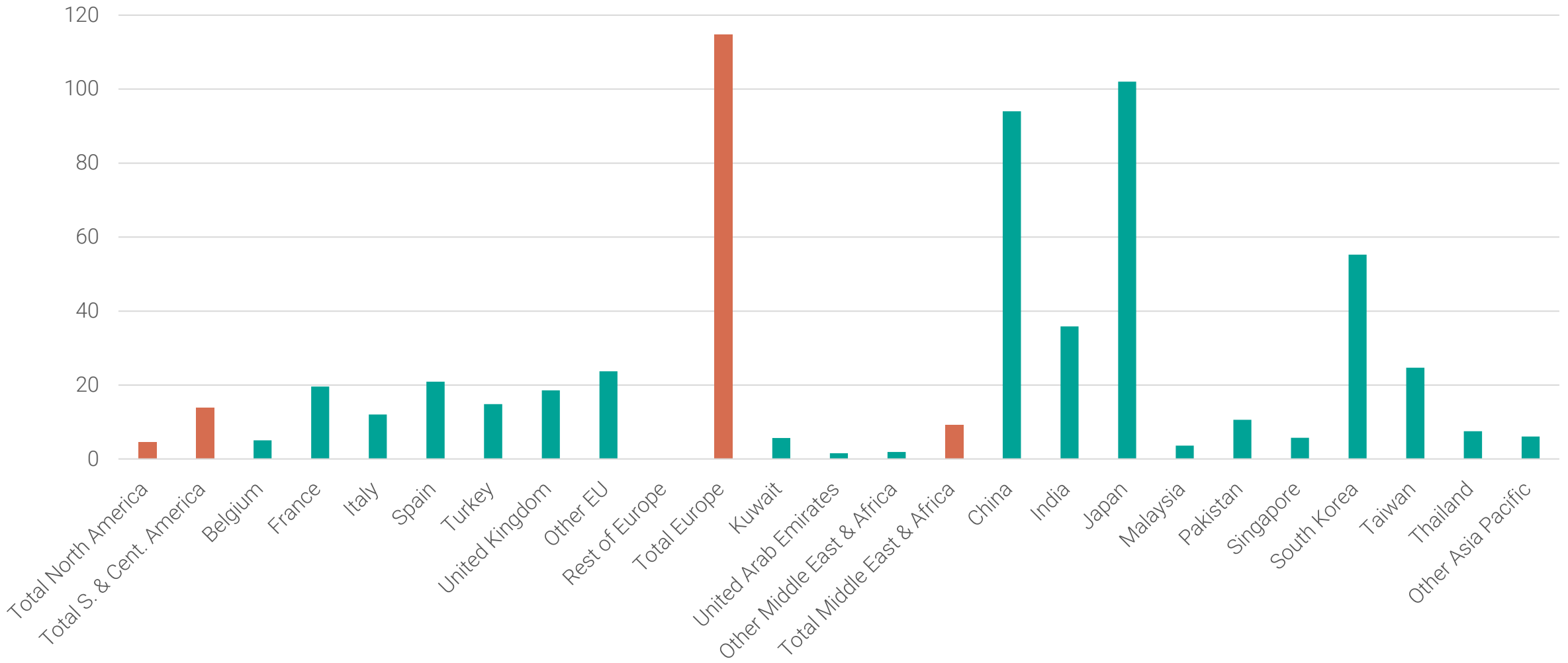
Natural Gas Inter-regional Trade (BCM)

Inter-regional Trade	Inter-regional Pipeline Trade	LNG Trade
940.1	452.2	487.9

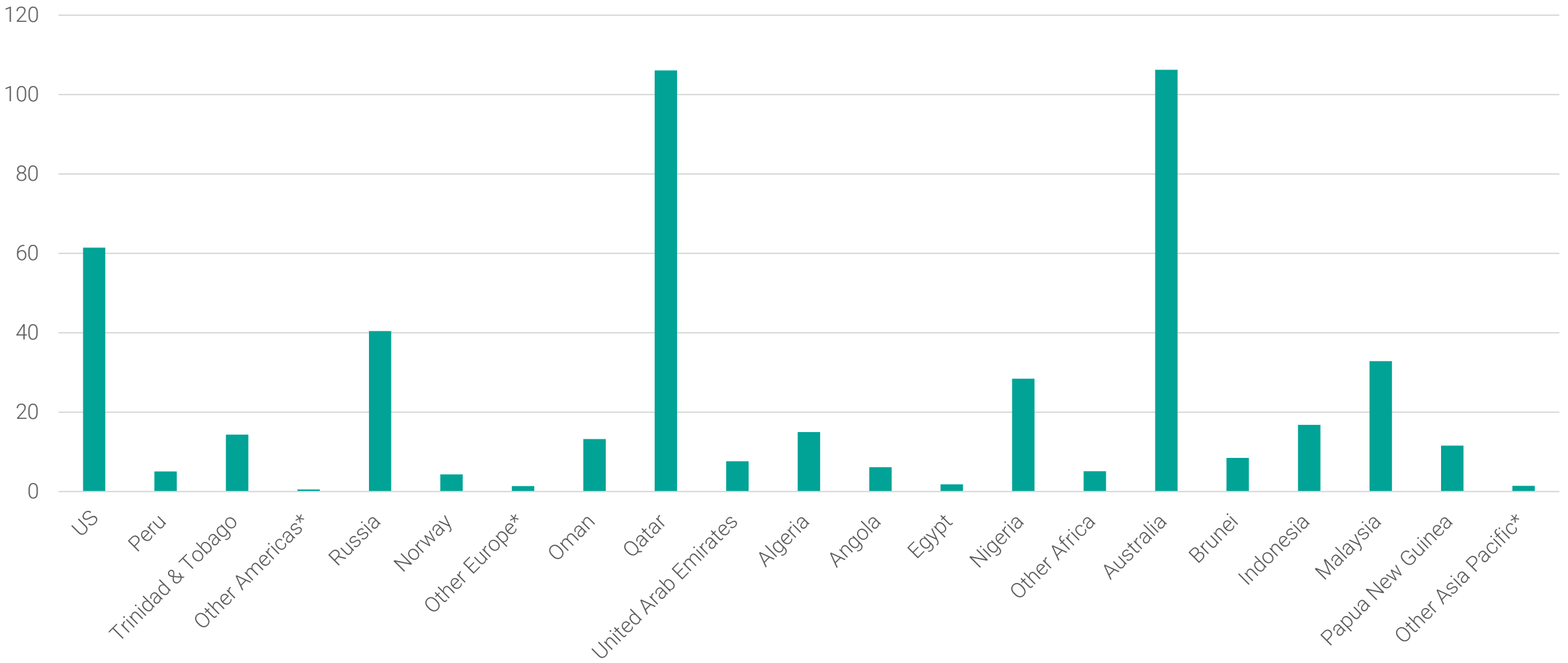
Natural Gas Major Inter-regional Trade Movements (BCM)



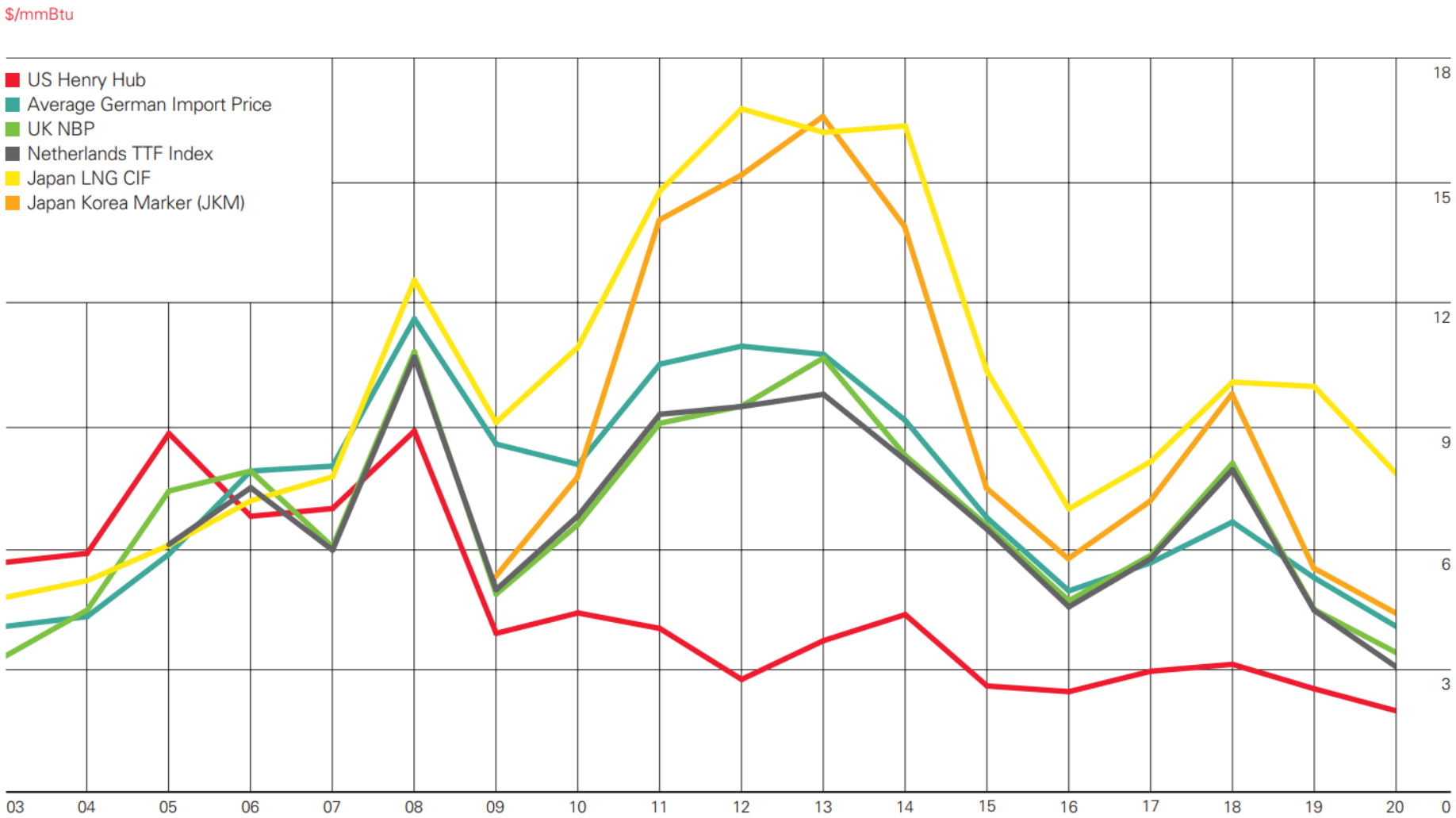
Key LNG Importers (BCM)



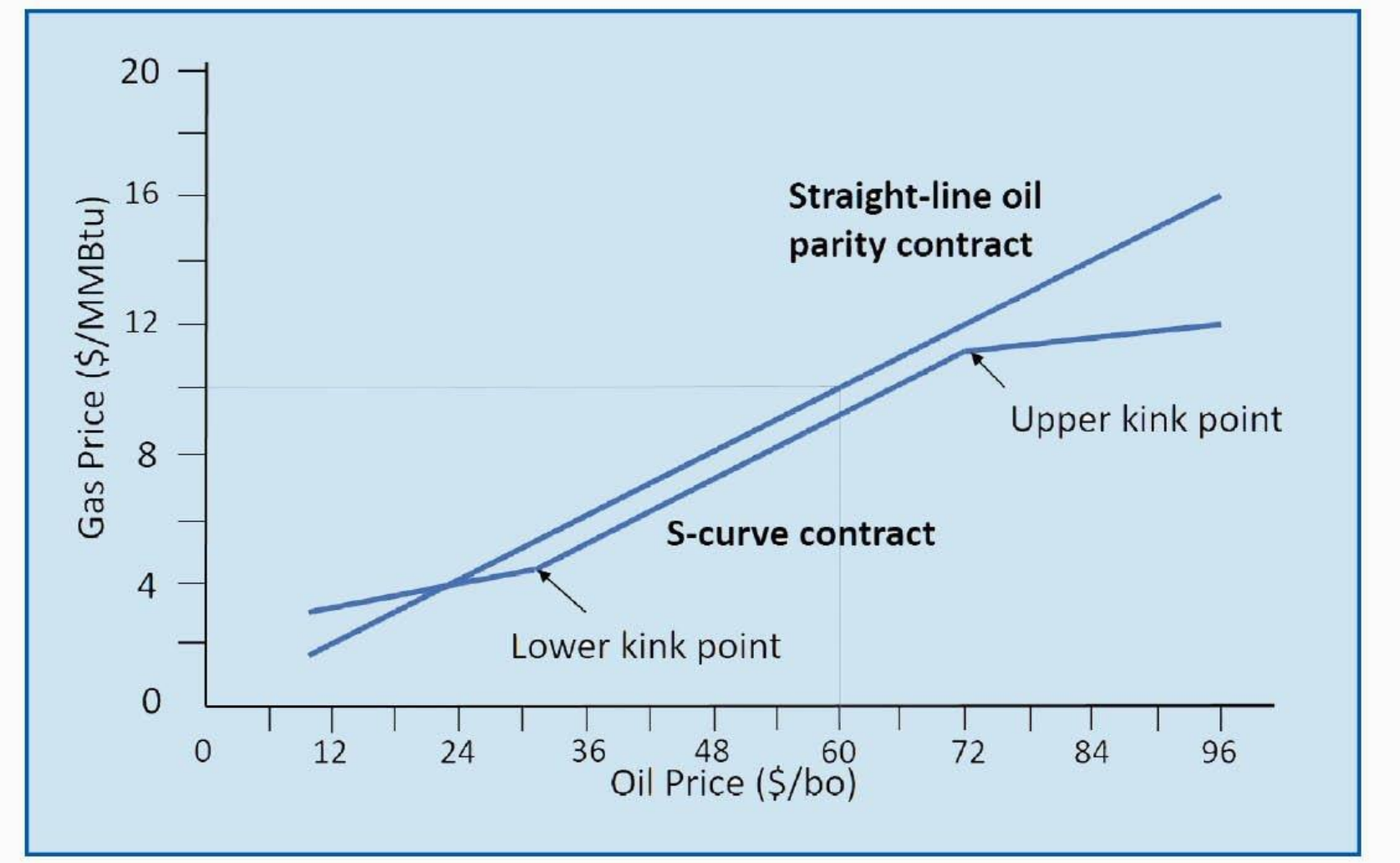
Key LNG Exporters (BCM)



Gas Prices


$/mmBtu
US Henry Hub
Average German Import Price
UK NBP
Netherlands TTF Index
Japan LNG CIF
Japan Korea Marker (JKM)
18
15
12
9
6
3
0
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20

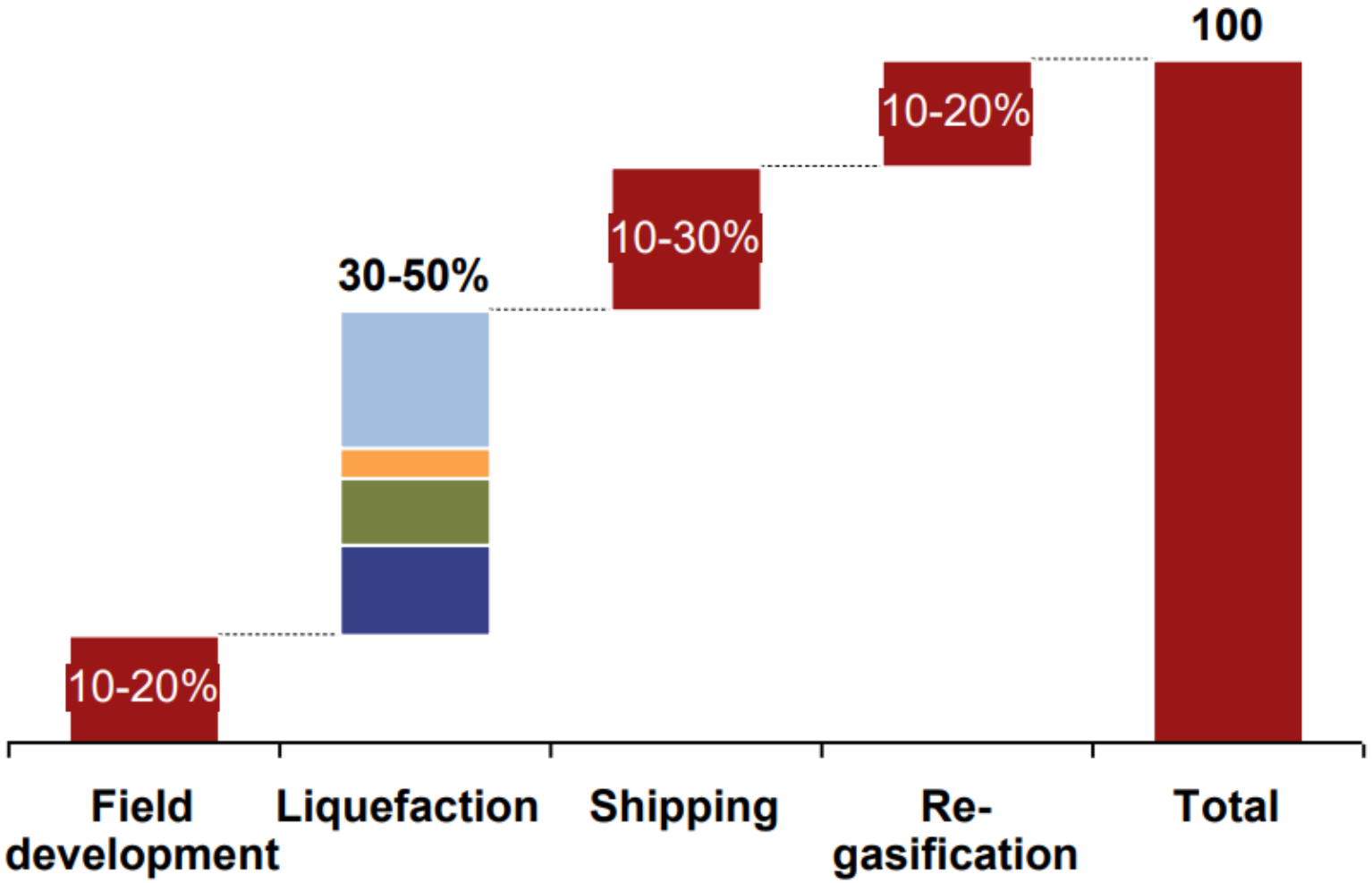
Oil Parity


Straight-line oil parity contract
Upper kink point
S-curve contract
Lower kink point
Gas Price ($/MMBtu)
Oil Price ($/bo)
0
4
8
12
16
20
0
12
24
36
48
60
72
84
96

Global Gas Markets

Gas-on-gas markets	Indexed to substitute energy prices	Oil-indexed	Regulated
• US	• EU	• Asia	• Middle East

Typical Cost Breakdown Of LNG Value Chain

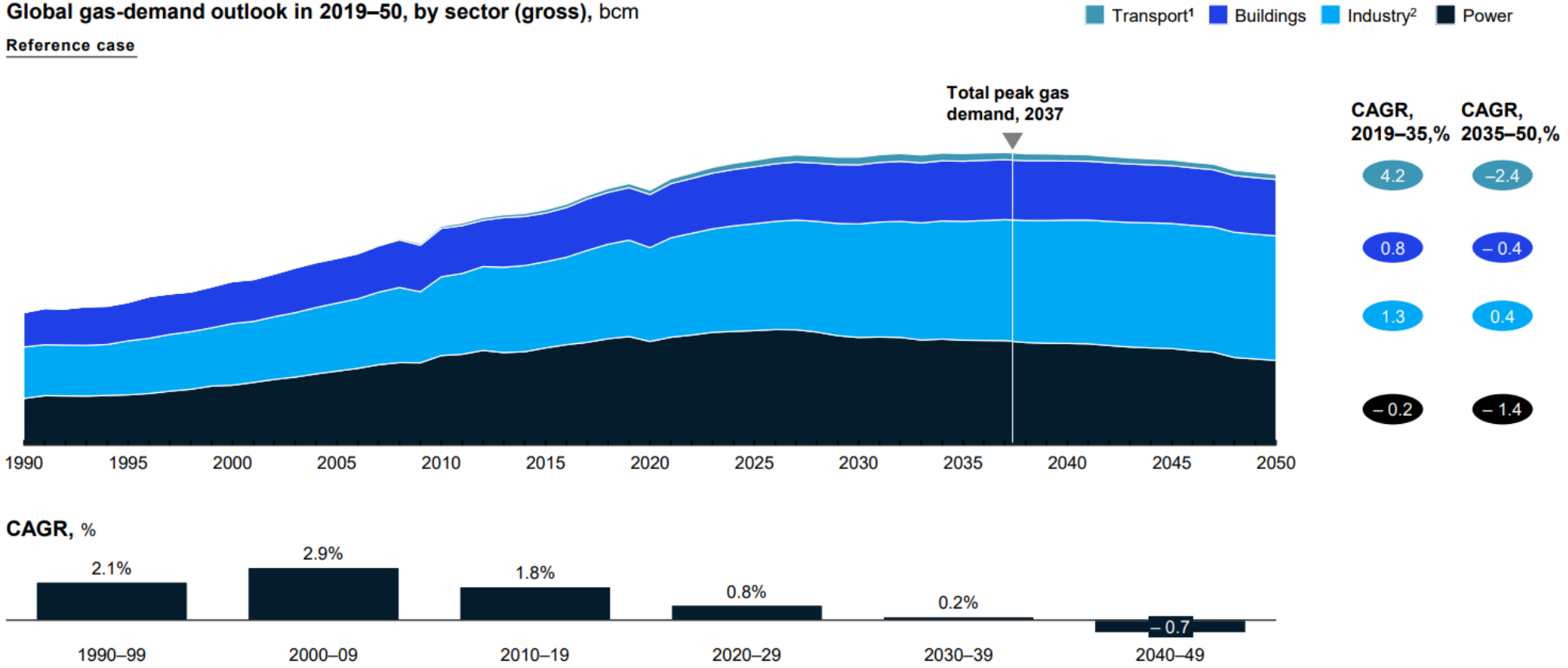


Global Gas-demand Outlook By Sector

In the 2021 Global Energy Perspective reference case, gas demand peaks in 2037 but will decline slowly afterward.

Global gas-demand outlook in 2019–50, by sector (gross), bcm

Reference case



1. Does not include gas use for pipeline transport (approximately 75 bcm in 2019).
2. Includes "other" energy sector.

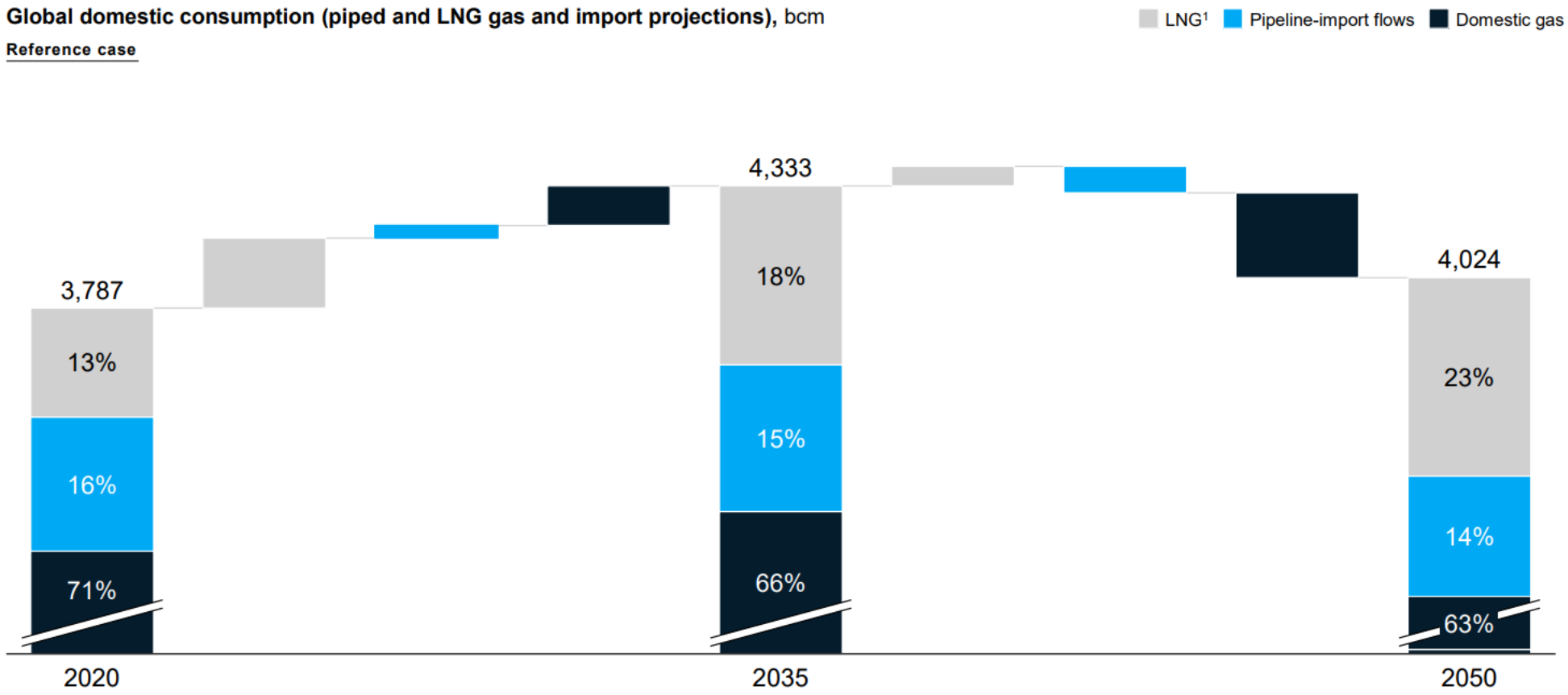
McKinsey & Company

Global Domestic Consumption (BCM)

The share of LNG in the global gas supply will increase consistently, as it meets demand growth and replaces declining pipeline and domestic gas.

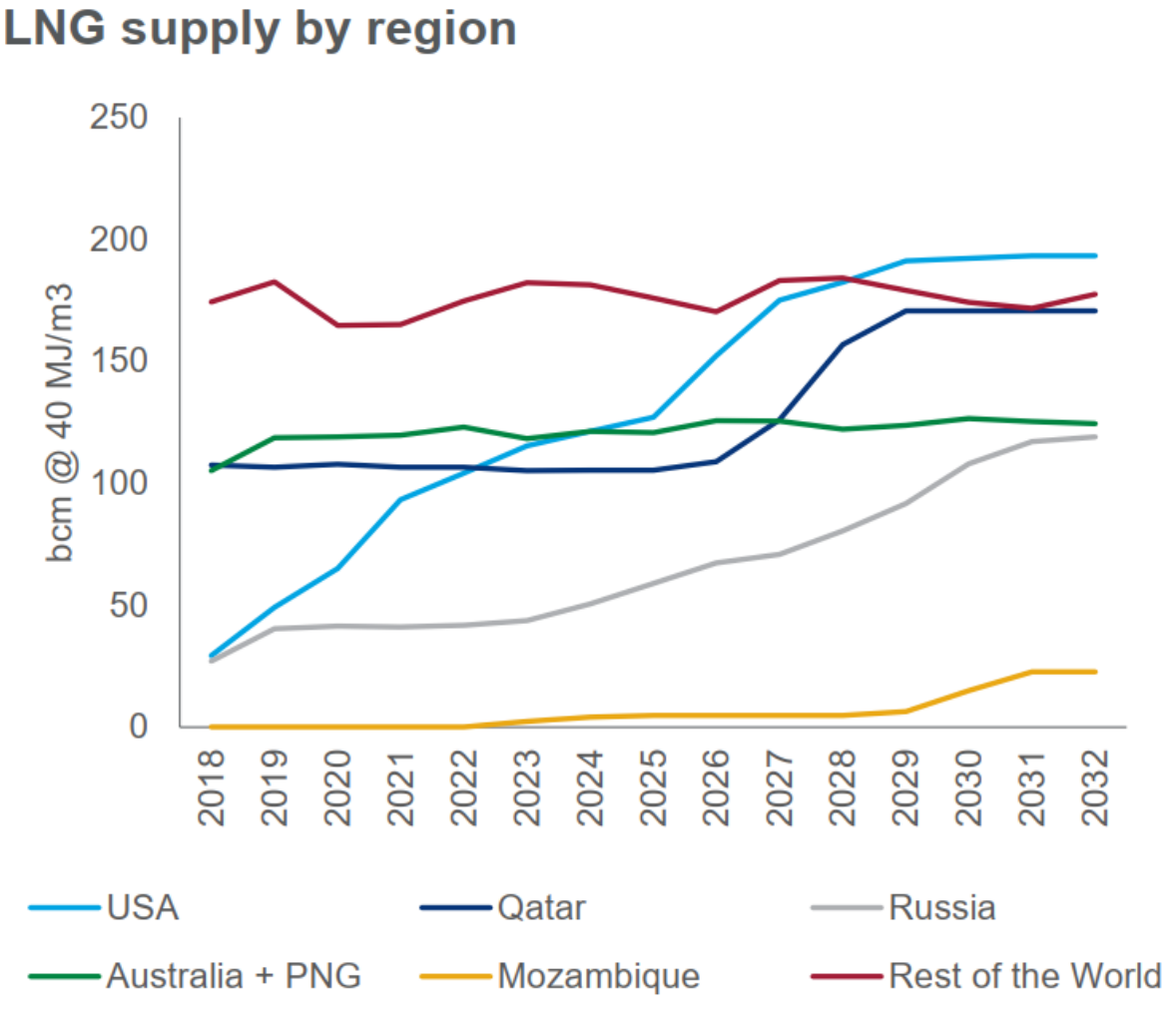
Global domestic consumption (piped and LNG gas and import projections), bcm

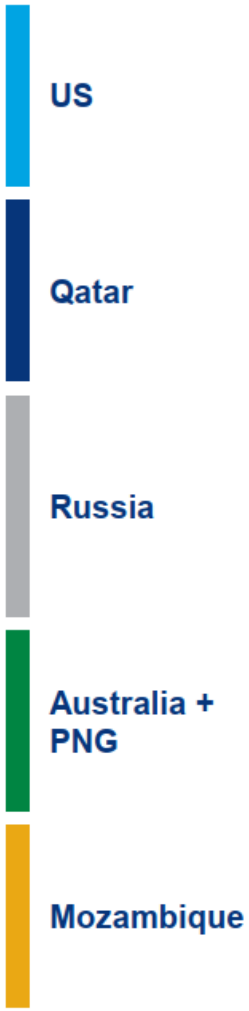
Reference case



1. Including LNG flows within country for Indonesia and Malaysia.

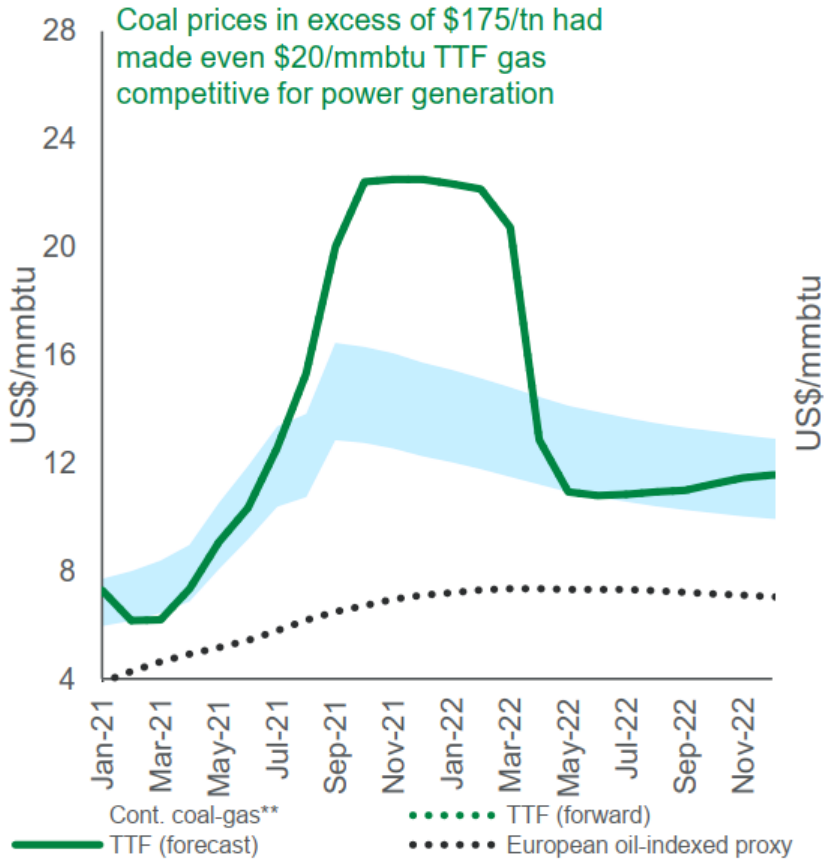
LNG Supply BY Region





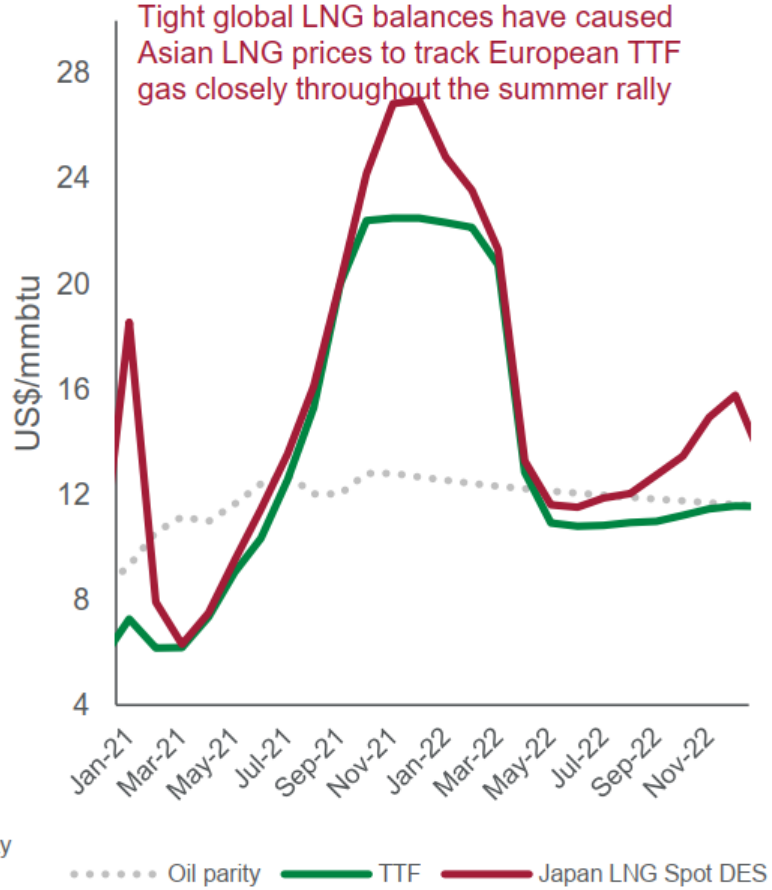
Domino Effect: High Coal Prices, Tight LNG Markets, Lift Fuel-oil Cracks

1. Tight coal and gas market

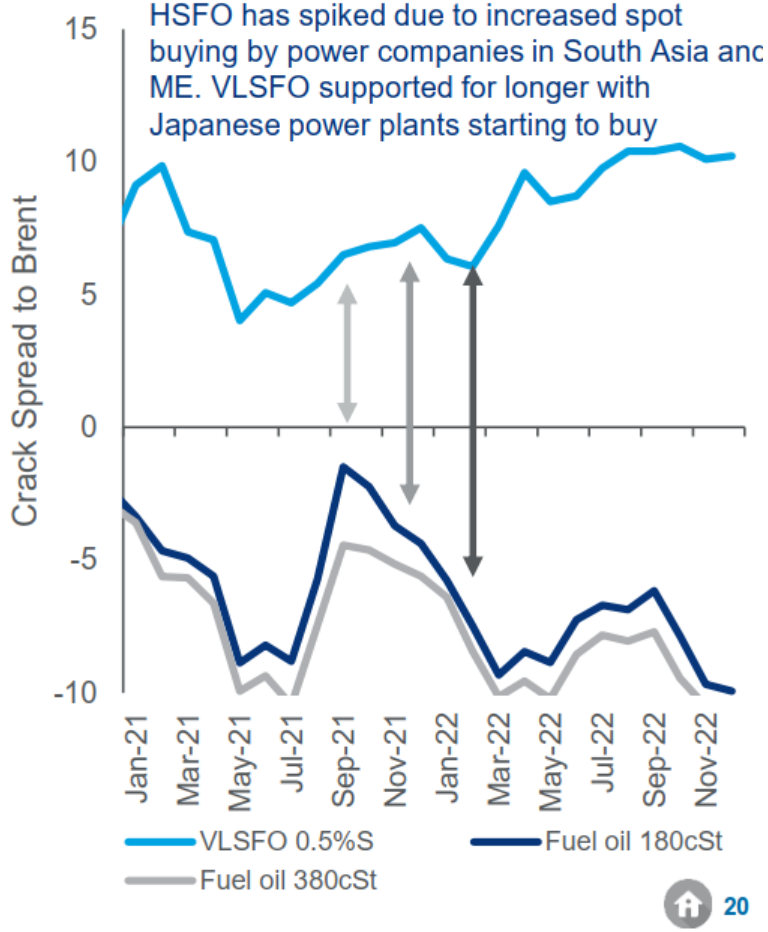


Source: Wood Mackenzie, the Argus Media group, GIE (AGSI)

2. Competition for LNG



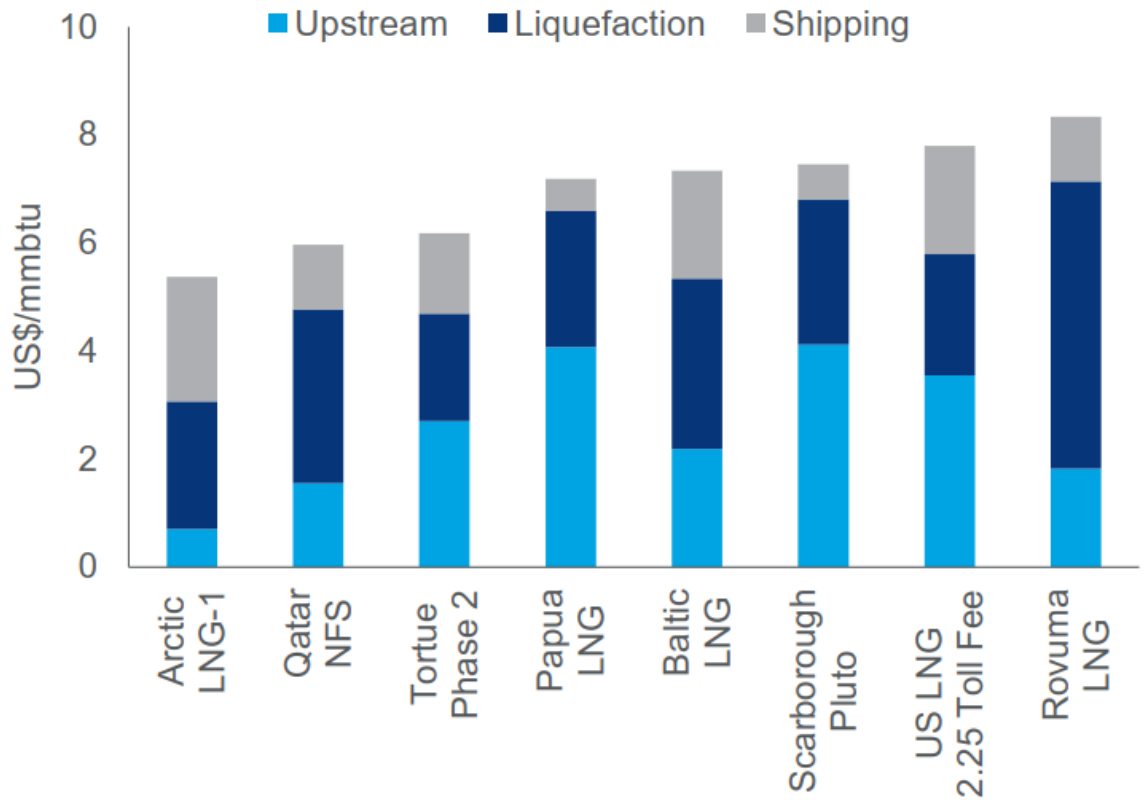
3. Pressure on Fuel Oil cracks



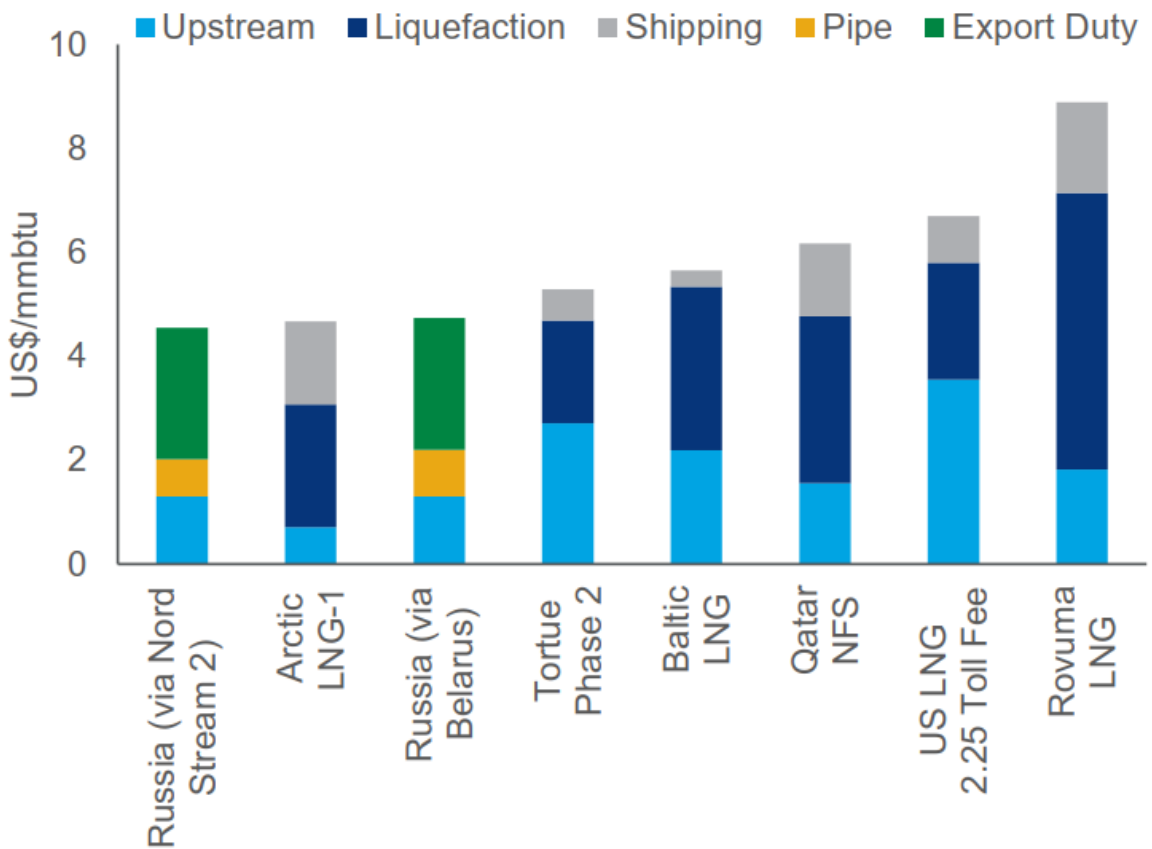
20

The Breakeven Prices Of Gas Projects

LNG breakeven cost stack DES Northern Asia

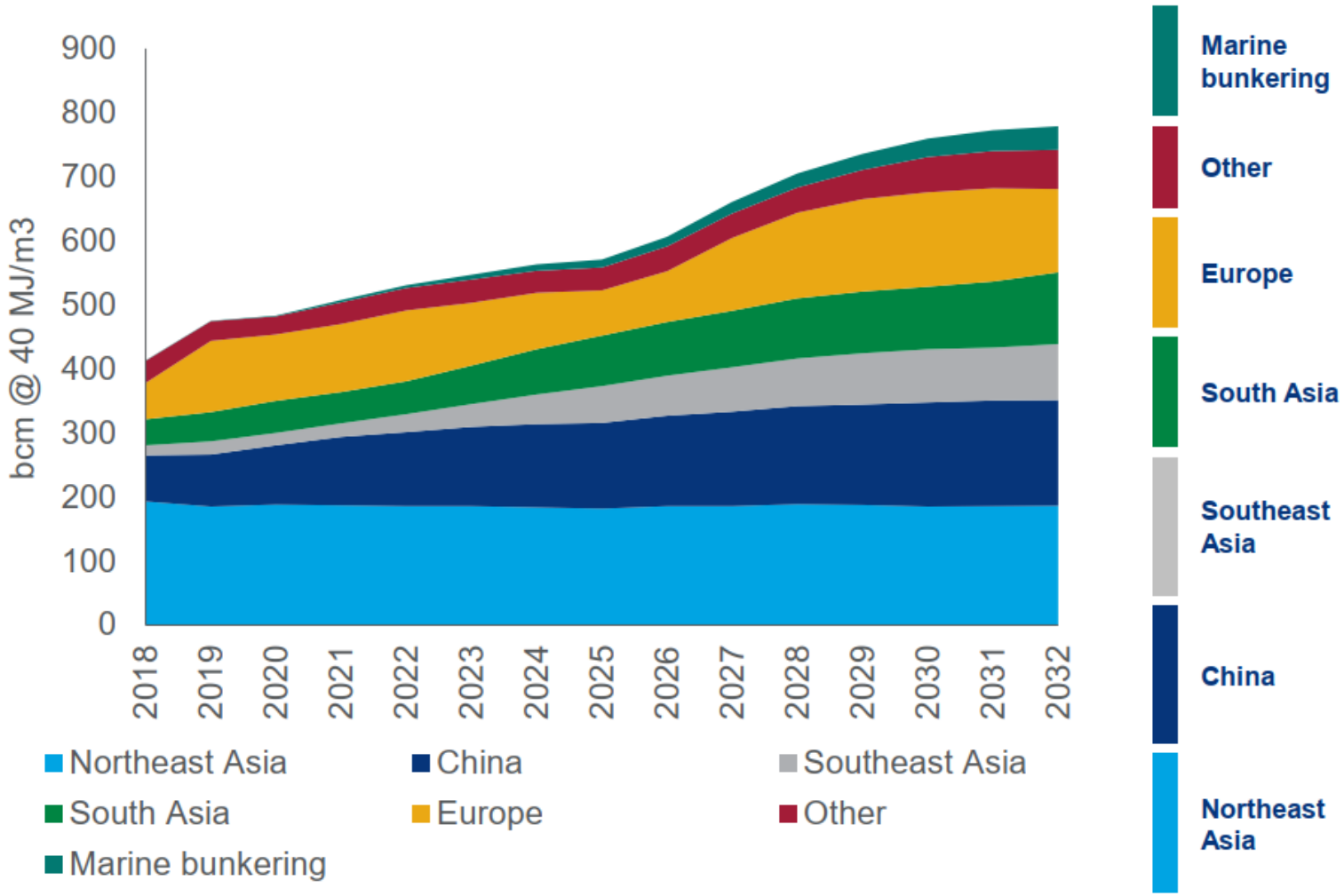


LNG and pipe breakeven cost stack DES NW Europe



Source: Wood Mackenzie LNG Tool Q4 2021

Global LNG Demand

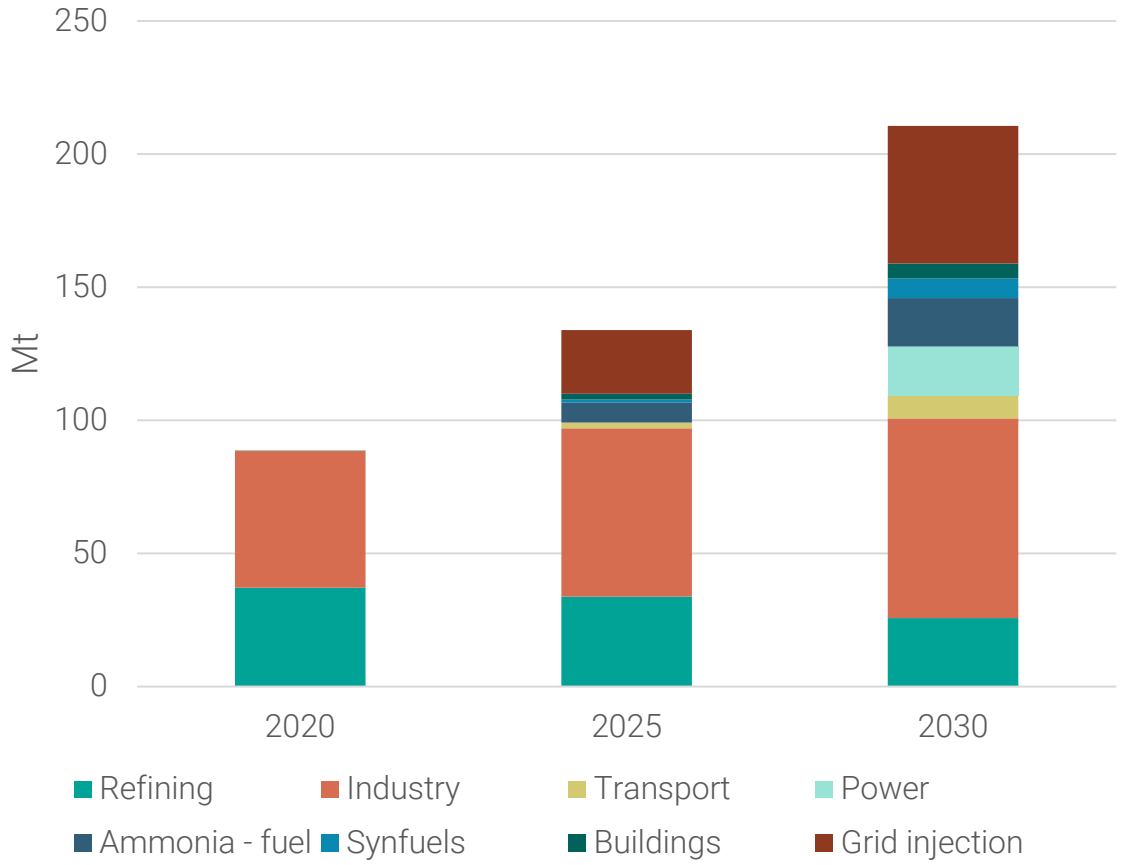


Gas And LNG Investment Requirements To 2032

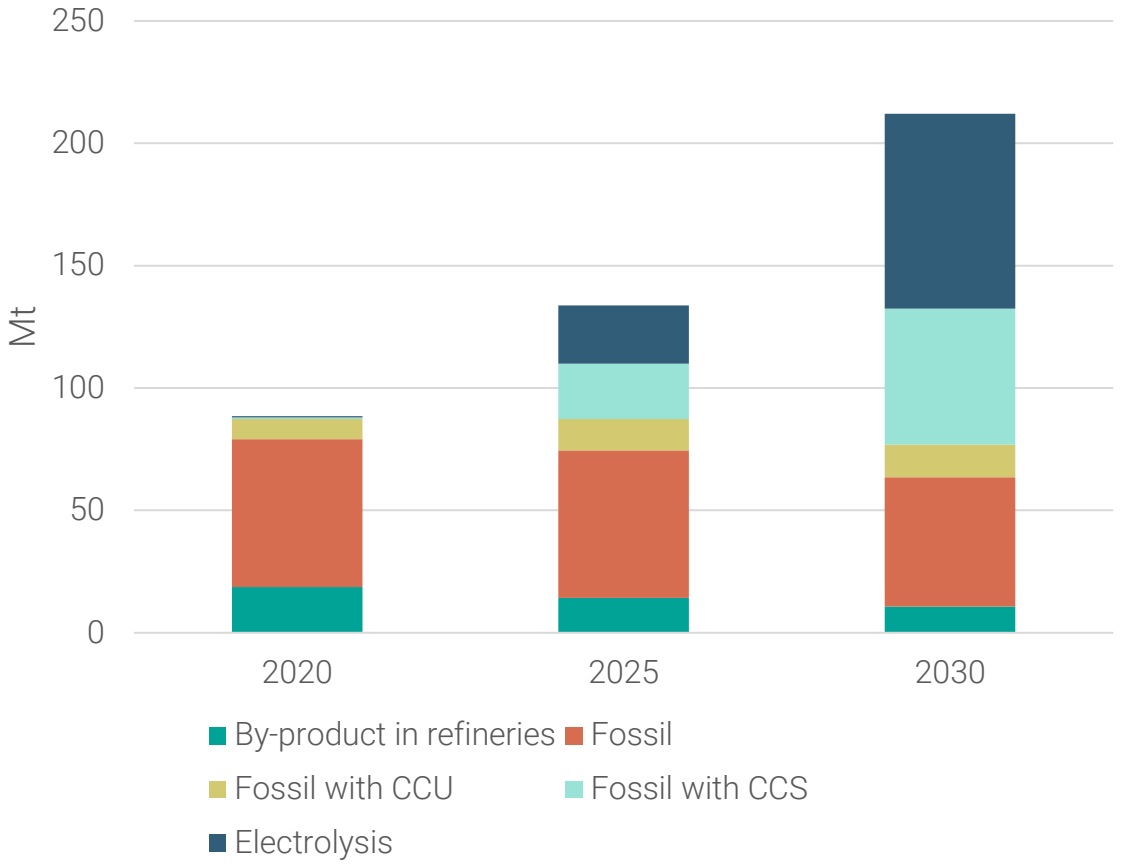
	Upstream	Liquefaction	Shipping	New pipeline developments*	Regas	Value of uncontracted LNG demand
	US$ billion capex	US$ billion capex	US$ billion capex	Bcm/yr capacity	US$ billion capex	US$ billion
Global	**1,510**	**175**	**120**	**490**	**48**	**620**
Asia	150		120	90	38	490
Europe	60			16	4	130
North America	630**	50		315	0.5	
Middle East	210	30			0.5	
Russia and the Caspian	170	25			0	
RoW	290	70		70	5	

H2

Global hydrogen demand by sector in the Net Zero Scenario

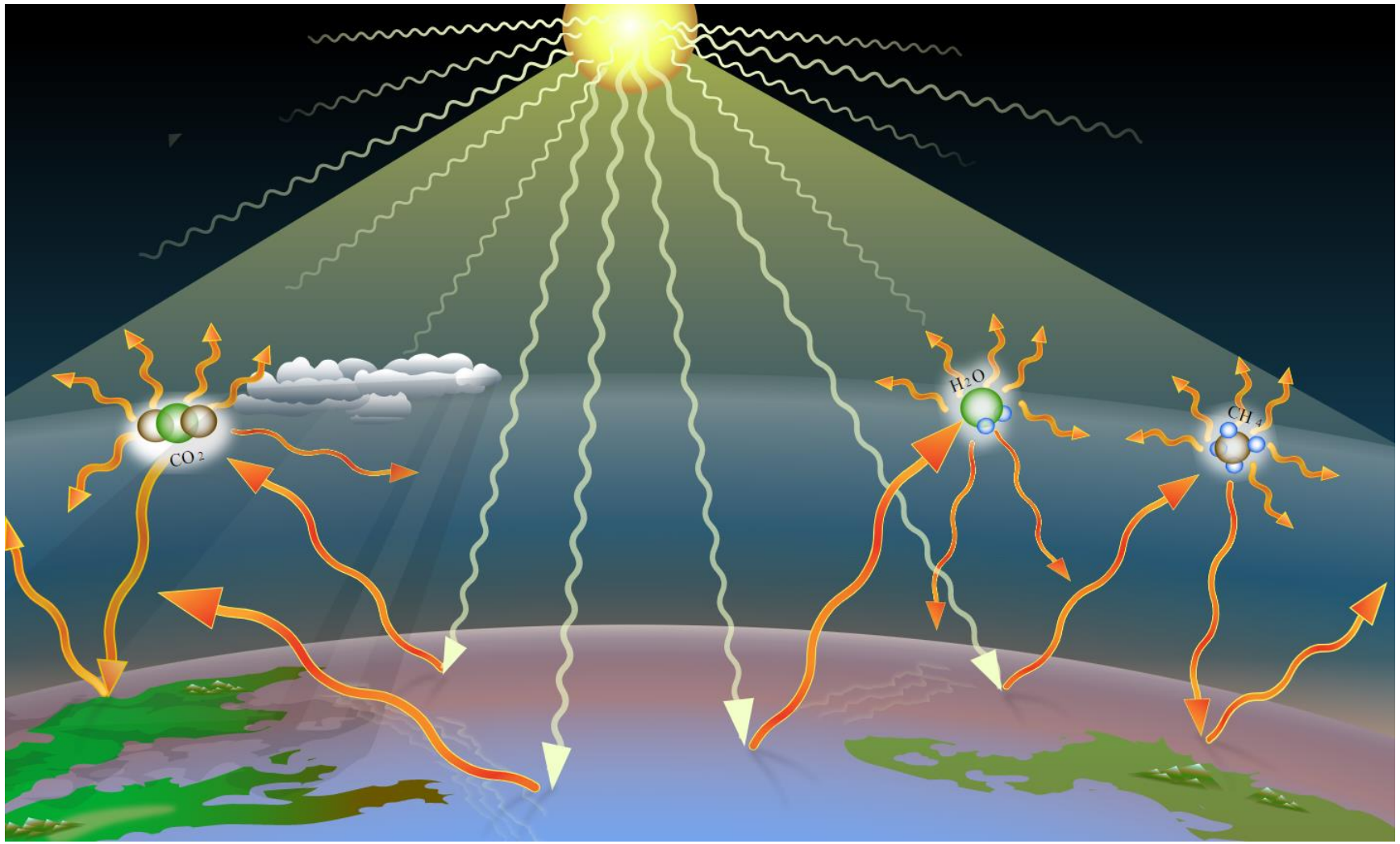


Global hydrogen demand by production technology in the Net Zero Scenario



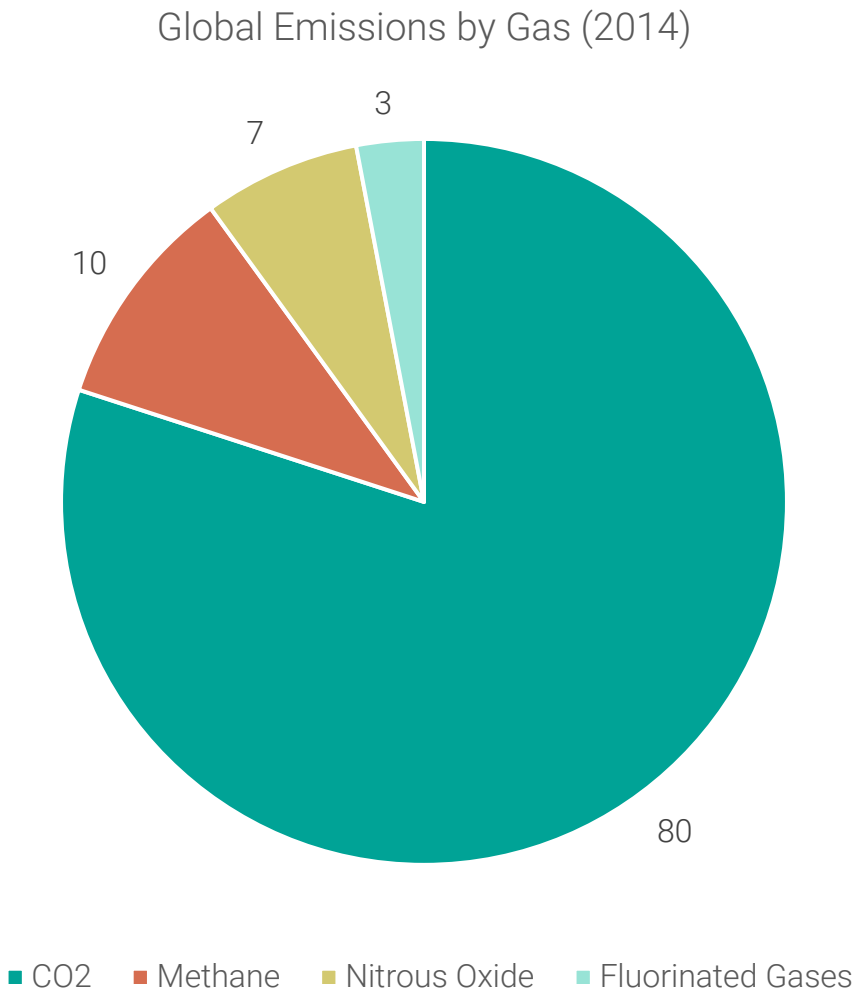
Climate Change

Greenhouse effect

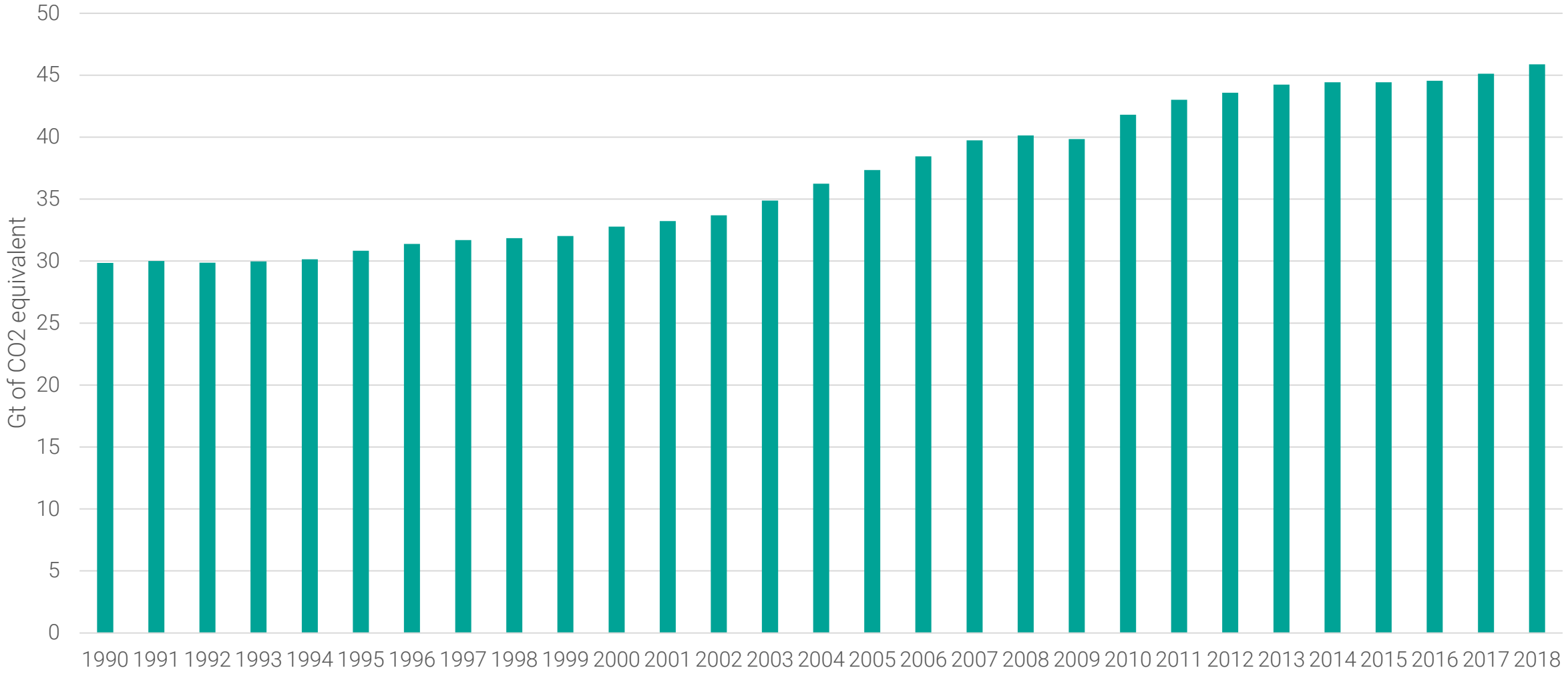


GHG

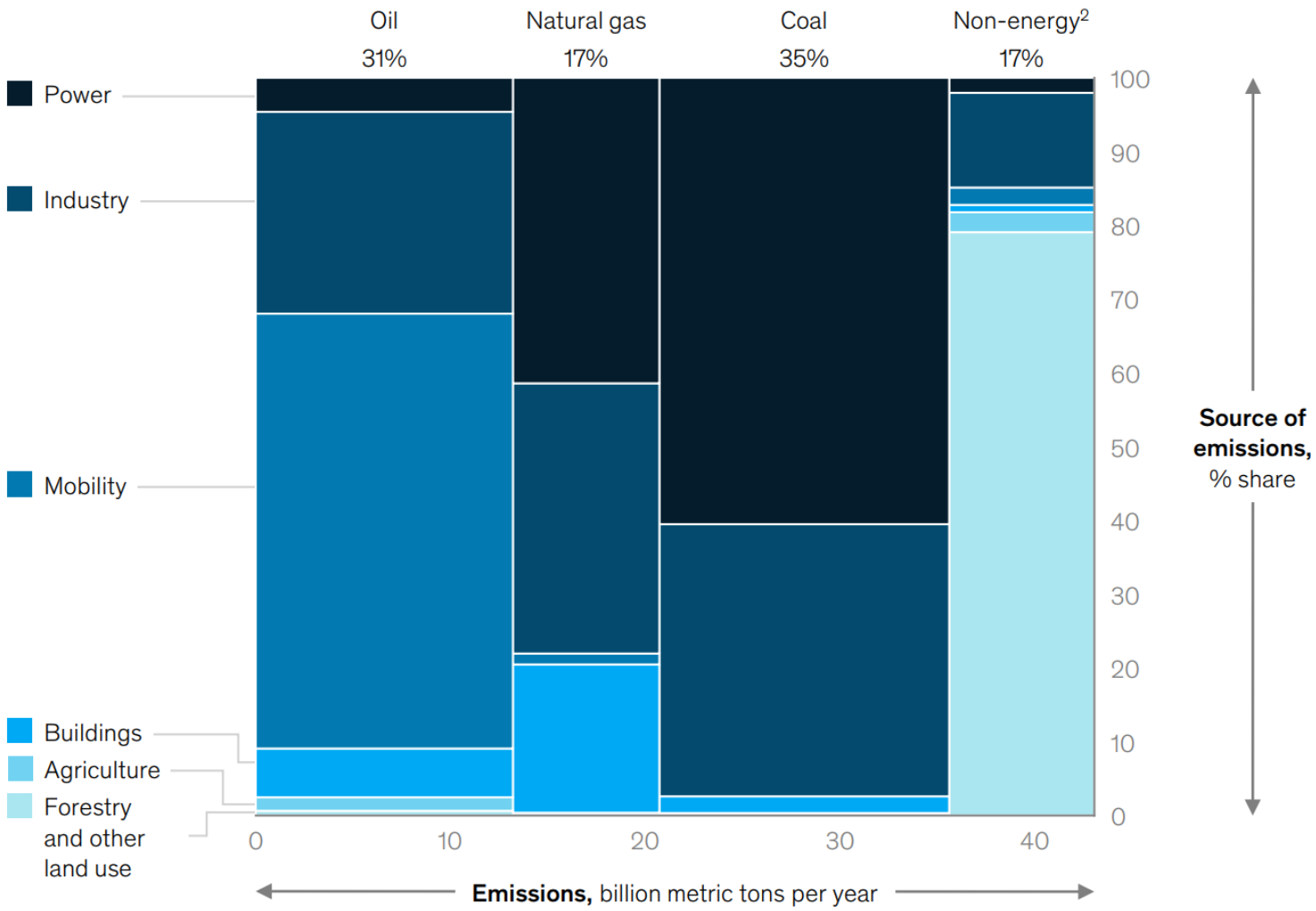
- Carbon Dioxide (CO2)
- Methane
- Nitrous Oxide
- Fluorinated Gases (F-gases)
- Water Vapor!



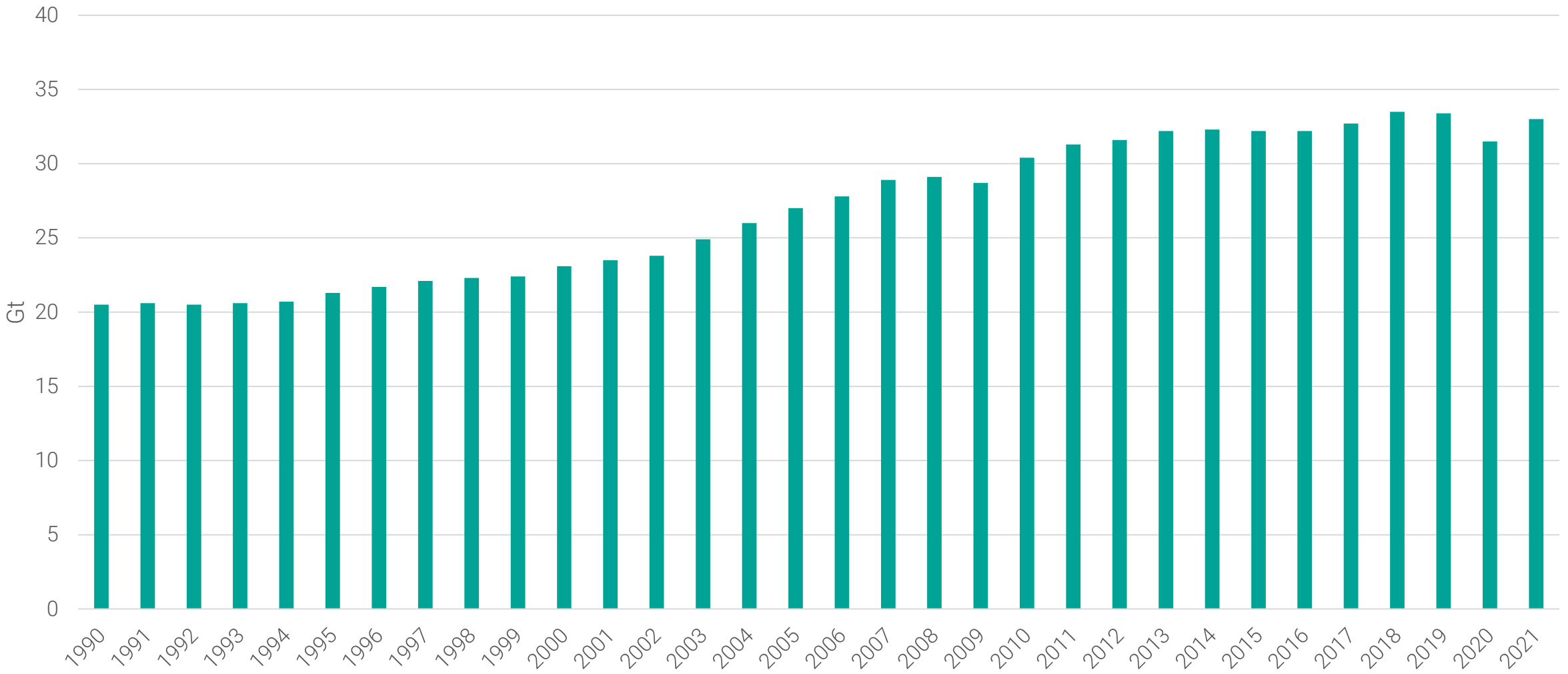
Global Greenhouse Gas Emissions



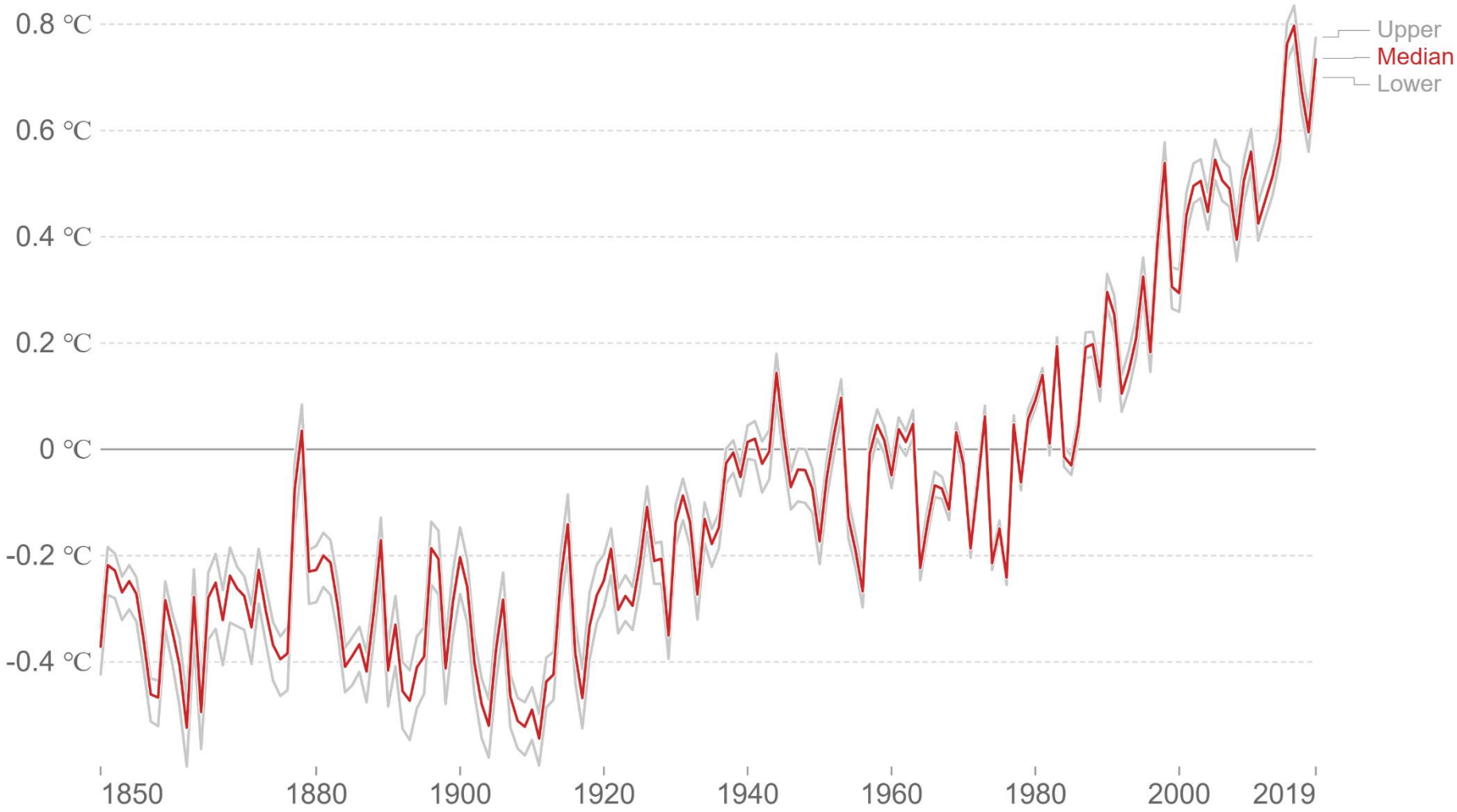
CO_2 Emissions Per Fuel And Energy And Land-use System, 2019, Share



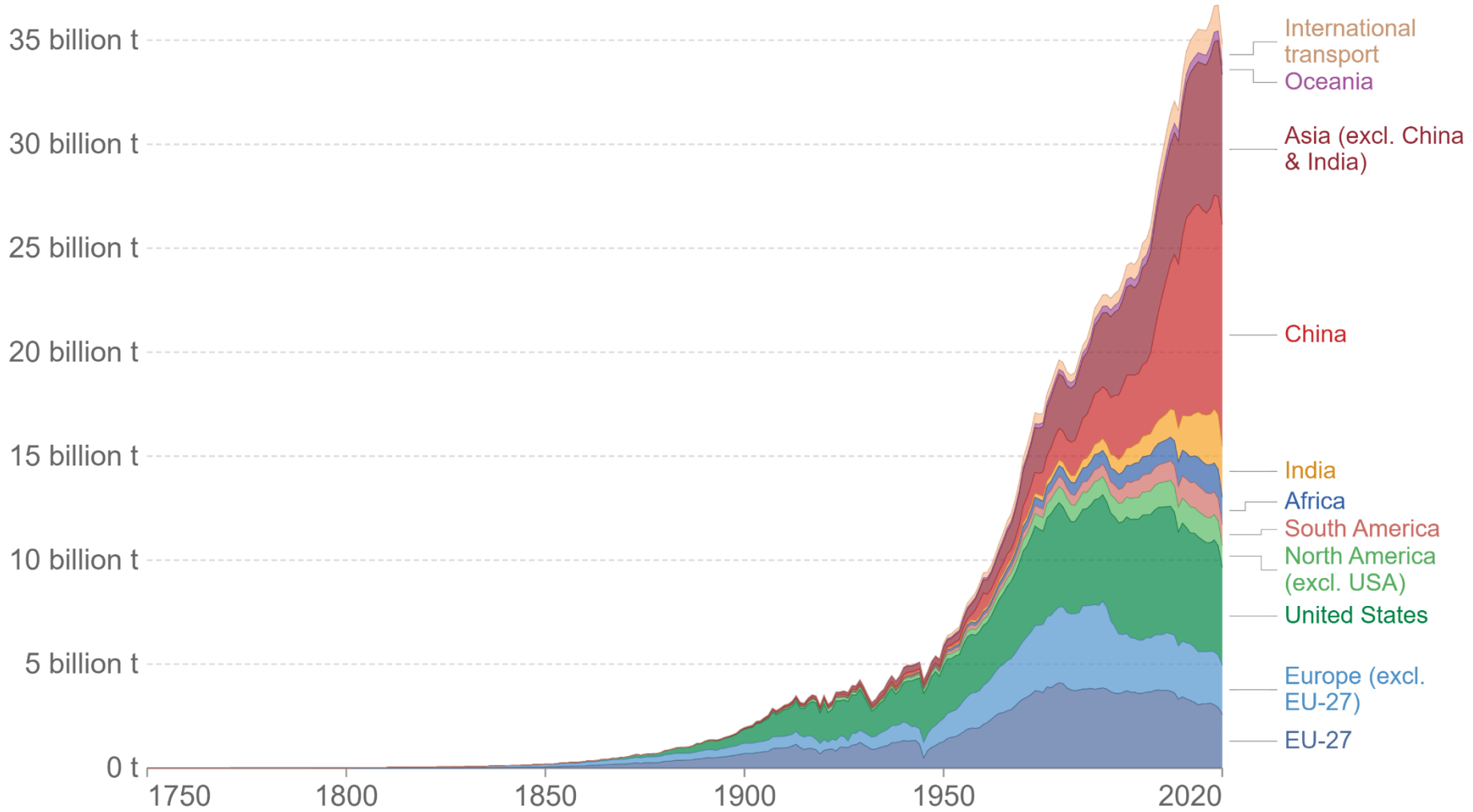
Global energy-related CO2 emissions, 1990-2021



Average Temperature Anomaly (Global)



Annual CO_2 Emissions From Fossil Fuels By World Region



Emissions' Scopes

Scope 1: Direct GHG emissions

- Emissions from operations that are owned or controlled by the reporting company

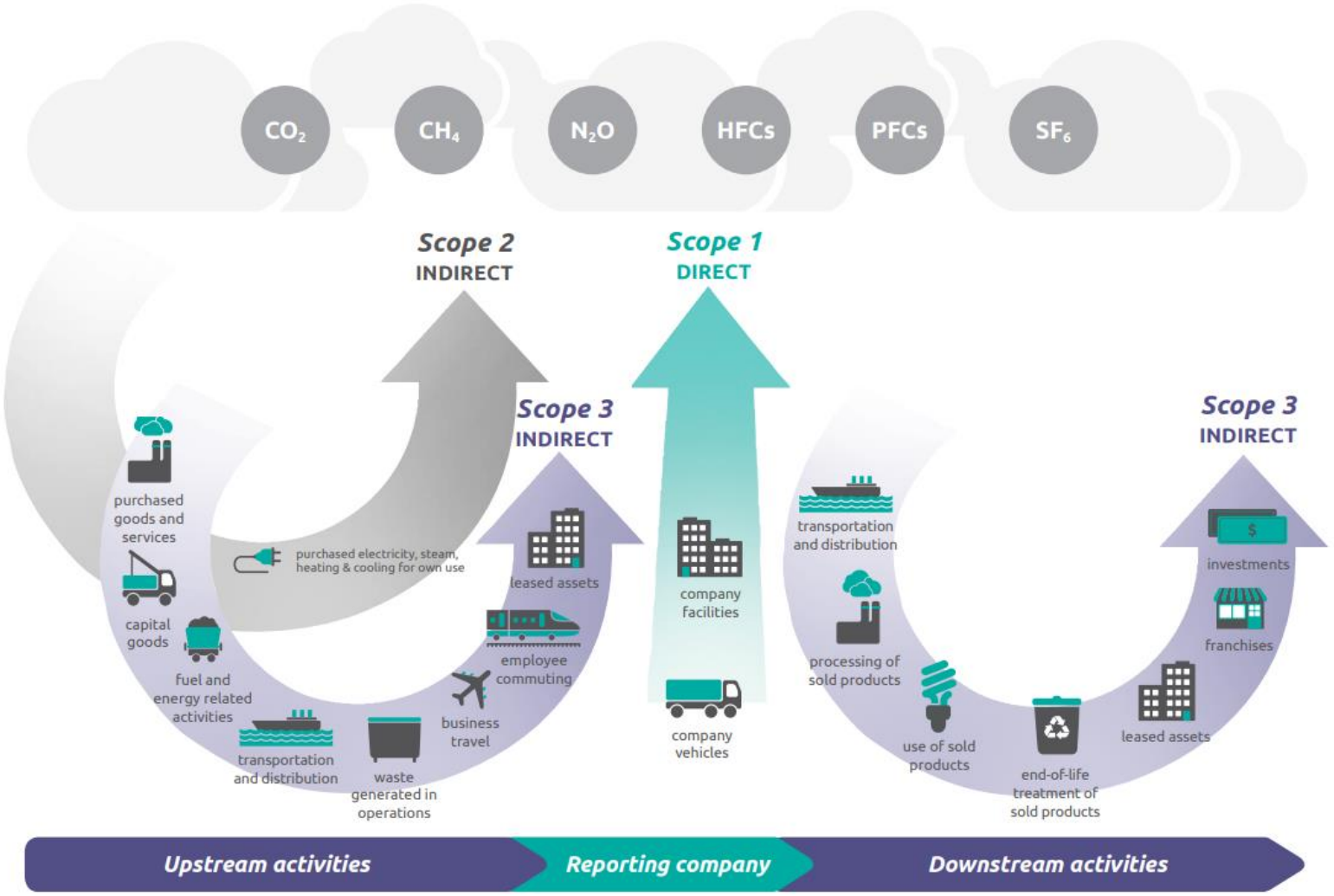
Scope 2: Electricity indirect GHG emissions

- Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company

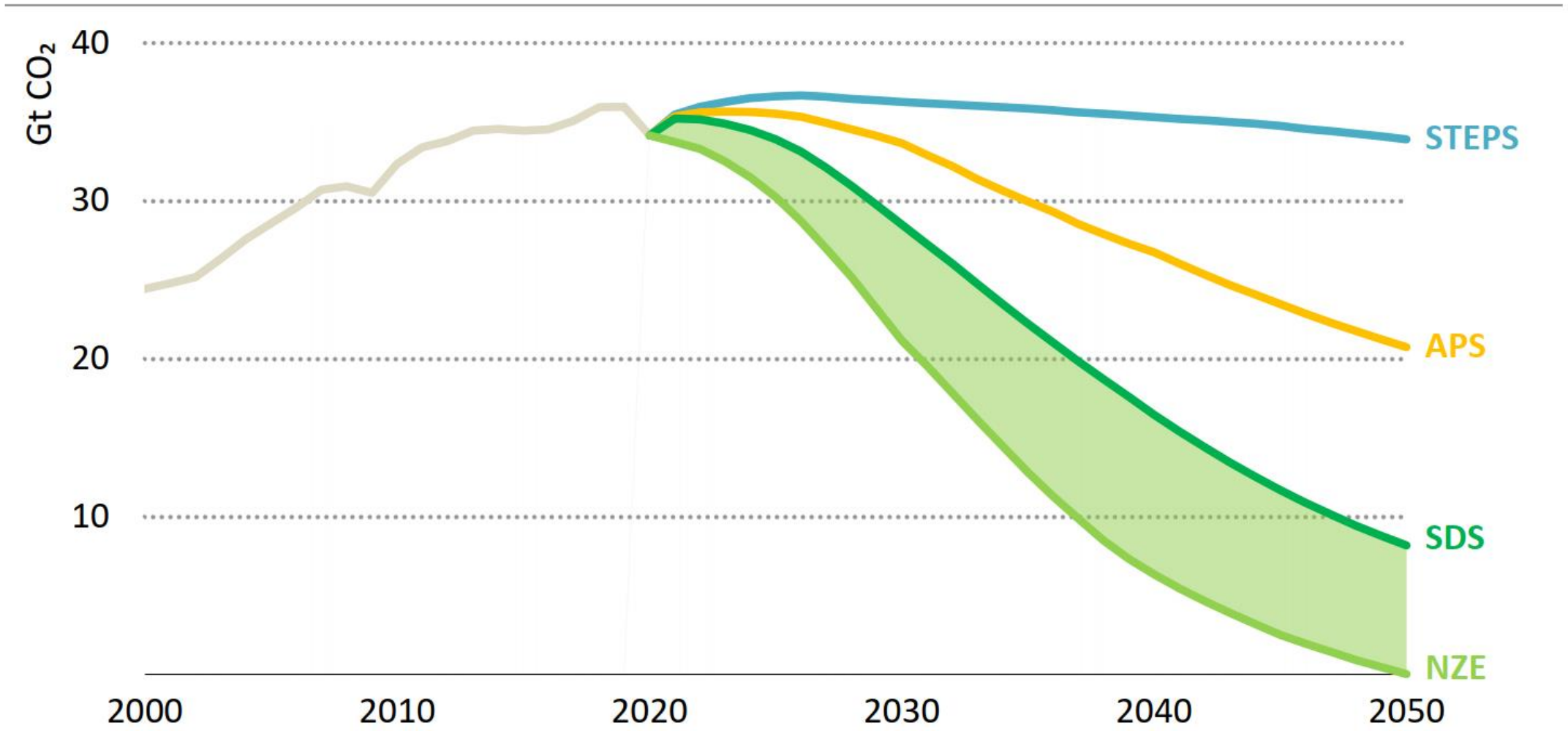
Scope 3: Other indirect GHG emissions

- All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions

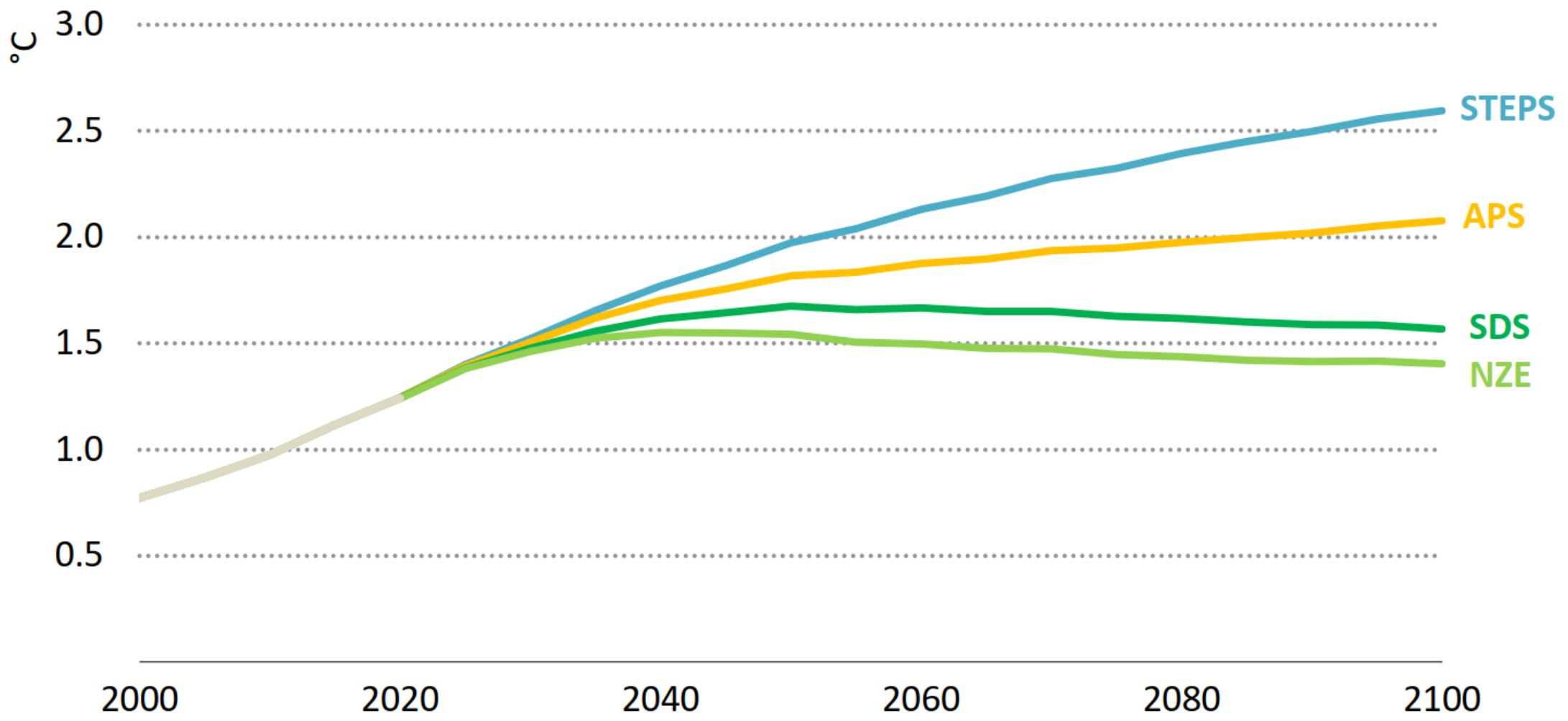
Overview of GHG Protocol scopes and emissions across the value chain



CO2 Emissions In The WEO-2021 Scenarios Over Time



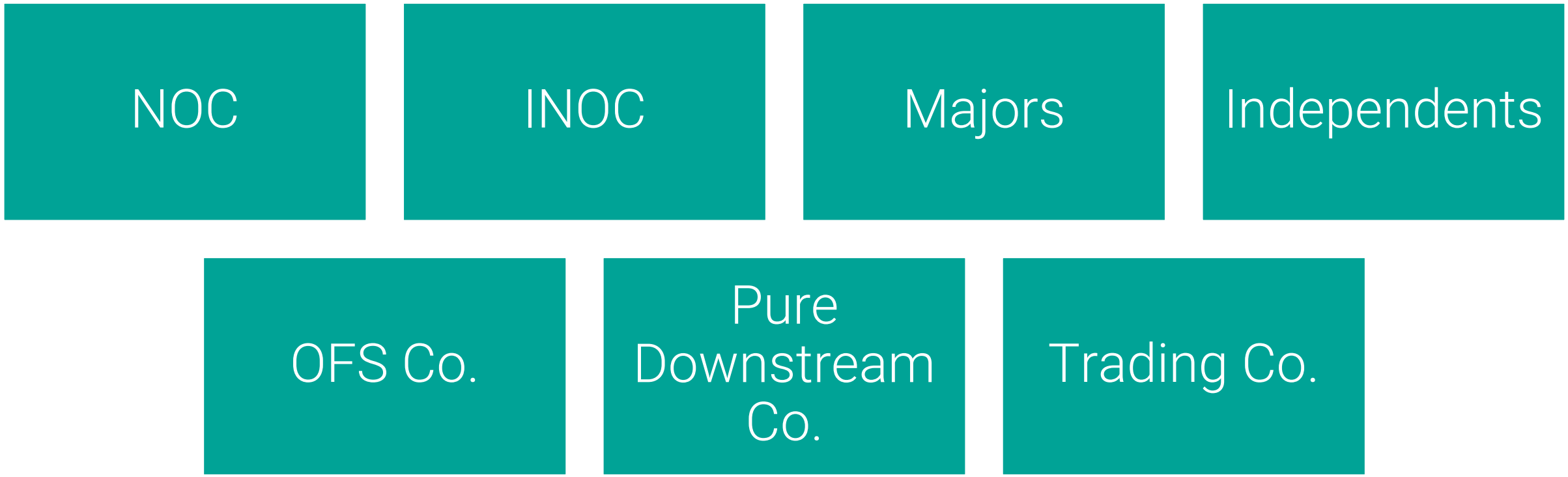
Global Median Surface Temperature Rise Over Time



Oil and Energy Companies

BP Business Model

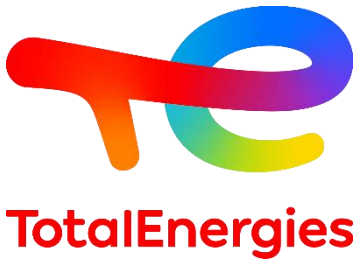
Key Players Classification by IEA



National Oil Companies

International National Oil Companies

Majors



Independents

Oilfield Services Companies

Pure Downstream Companies

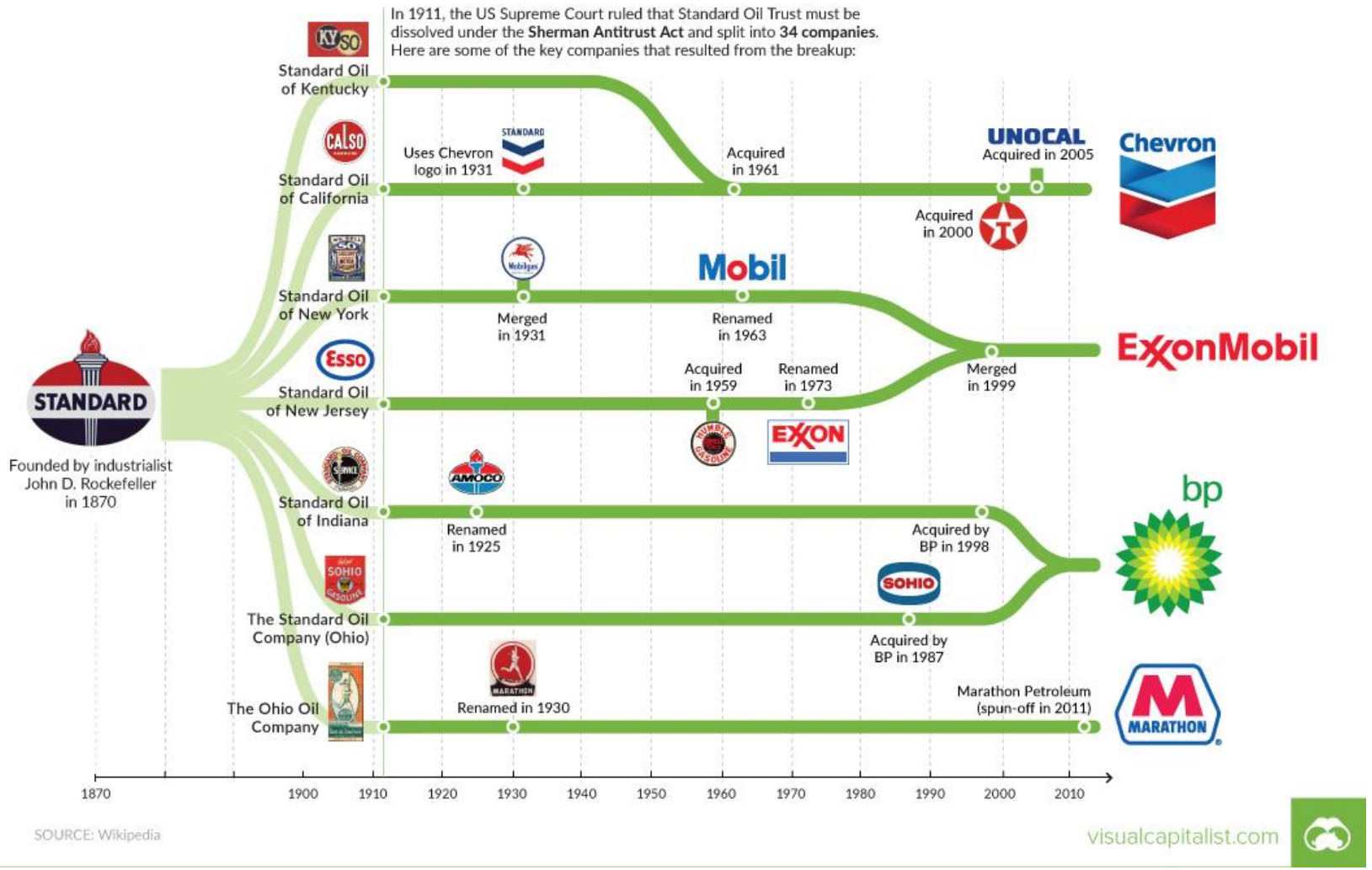
Trading Companies

The Old and New Seven Sisters

The Old Seven Sisters

The New Seven Sisters?!

The Evolution of Standard Oil



Post JCPOA E&P Players in Iran

European majors

Favoured by NIOC for their technology and know-how

TOTAL, Shell, eni, bp

European mid-caps

Specific expertise can be a plus for specific mid-size projects

OMV, CEPSA, PERENCO, DNO, PGNiG

Asians

Political relations and Iran's will to secure market share will help, but technical reputation can disserve some

CNPC, Sinopec, ONGC Videsh, PETRONAS, PTTEP, Nioc, INPEX, JAPEX, PERTAMINA, KOGAS, MITSUI & CO.

Russians

Political relations and part of Moscow's strategy to increase its influence in MENA oil and gas

GAZPROM, LUKOIL, ROSNEFT, ZARUBEZHNEFT

Iranian E&Ps

Name	Major shareholder	Name	Major shareholder
Petro Pars	Government	PEDC	Private *
OIEC	Public	PGFK	Public
Dana Energy	Private	IOEC	Public
PEDCO	Government	Kayson	Private
MAPNA	Public	Iran Ofogh	Private
Khatam-ol-Anbia	Public	Pars Petro Zagros	Private
IDRO	Government	Global Petro Tech	Private *
Persia	Public	NDCO	Public
Ghadir	Public		

Classification on Iranian Energy Players

Investment

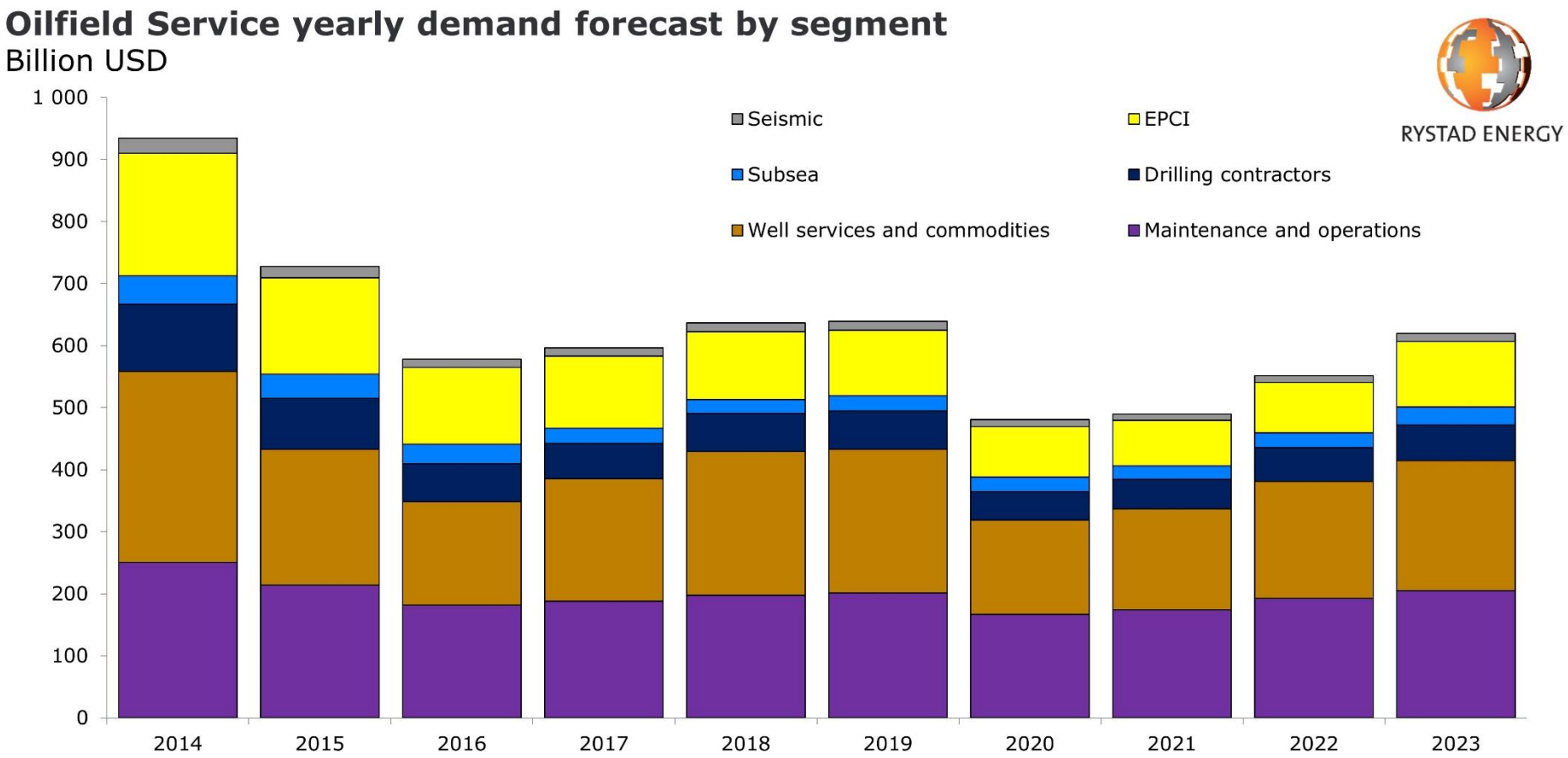
E&P	Chemicals	Refining	Power & Utilities
• NIOC • Dana Energy	• Arya Sasol • Jam	• Tehran • Abadan	• Mahtab Gostar • Mapna

Supply Chain

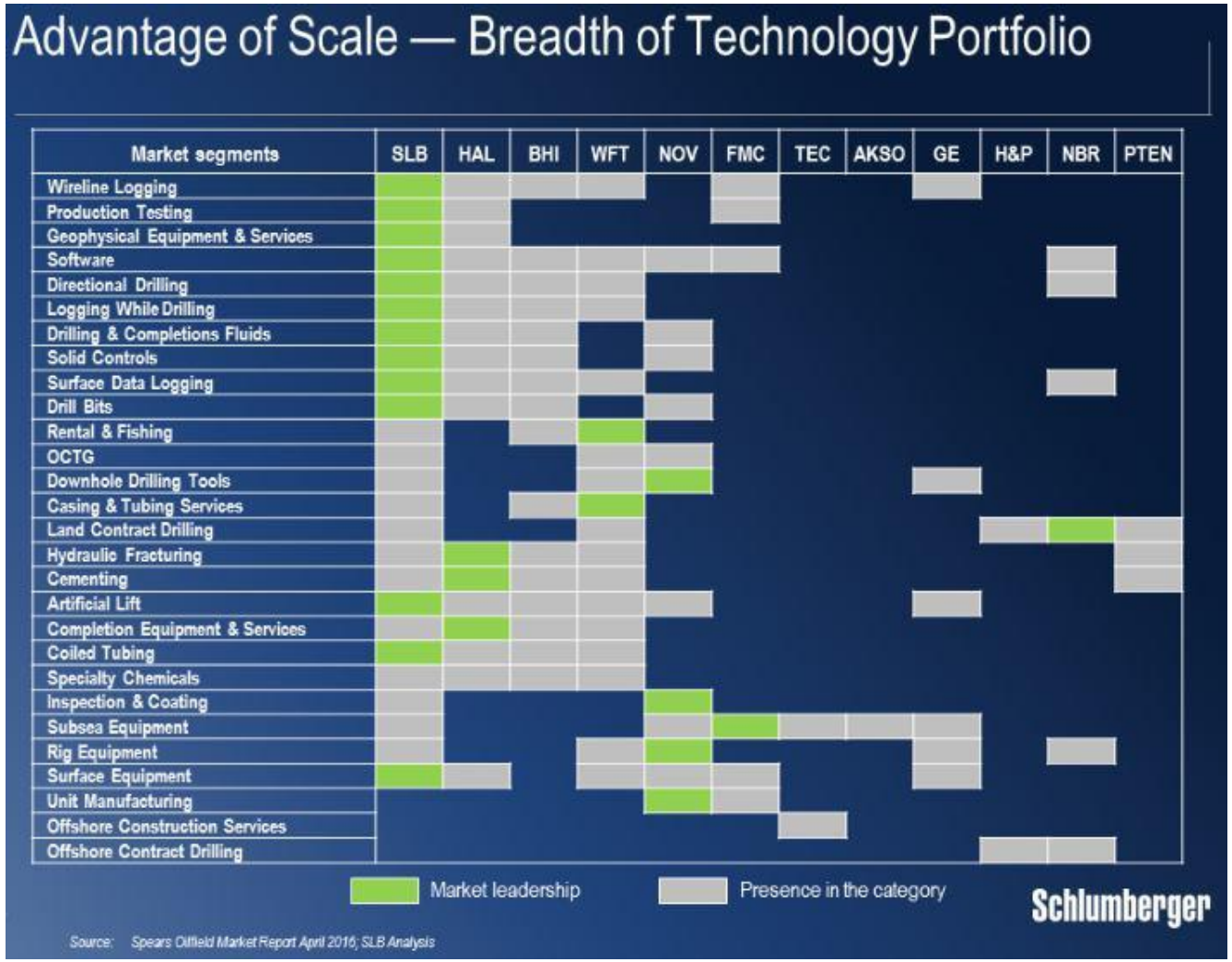
EPC	OFS	Manufacturing	Consultants
• Jahan Pars • Kayson	• NIDC • NDCO	• OTCC • LulehGostar	• Monenco • TEC

Oilfield Services Companies

Oilfield Services Market



Players Portfolio

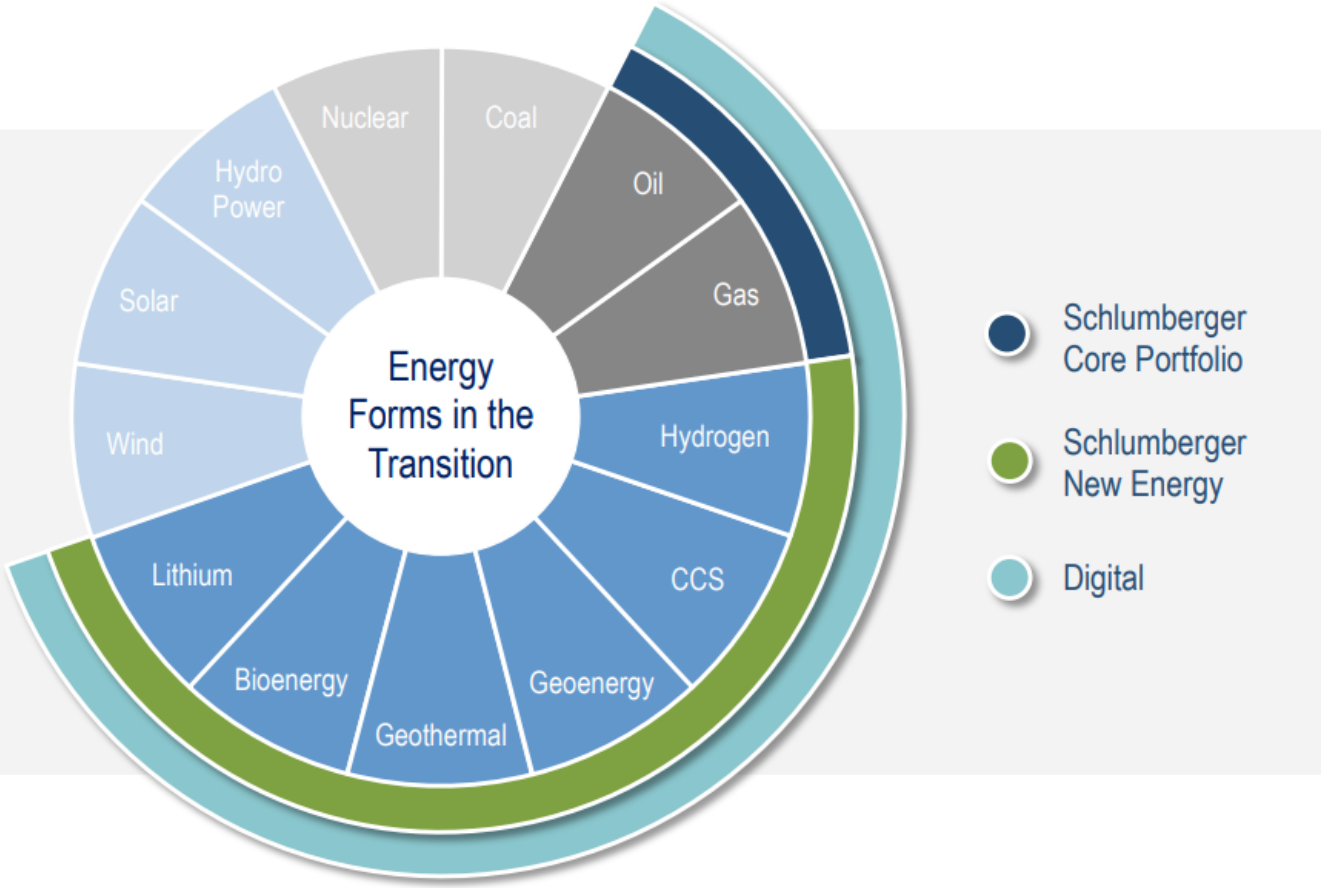


Long-term Growth in Schlumberger New Energy

Diversified
Exposure to multiple adjacent, high-growth sectors

Technology Driven
Leveraging our strengths, combining our global footprint and technology industrialization capabilities

Preferred Partner
Accessing markets with unique partnerships, a strong reputation, and recognized track record as industry leader



Schlumberger New Energy Sectors

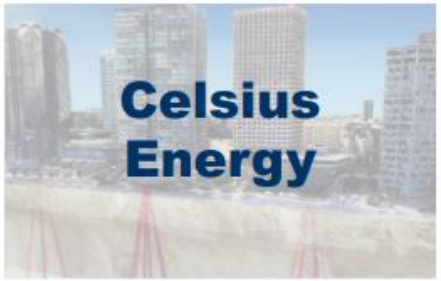
HYDROGEN

Commercializing reversible solid oxide electrolyzer technology to produce clean hydrogen

CARBON

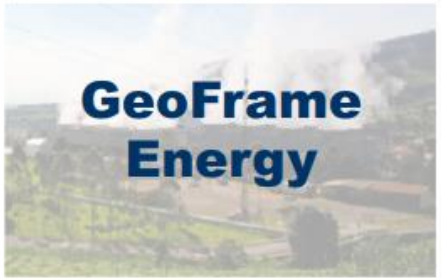
Providing carbon capture and storage solutions to partners with concentrated emission streams

GEO-ENERGY



Using geo-energy sources to provide digitally controlled heating and cooling

GEOTHERMAL



Leveraging our subsurface and drilling expertise to develop geothermal power projects

LITHIUM / BATTERIES

Creating a pipeline of ventures such as developing advanced lithium extraction process technology

Rigs Market

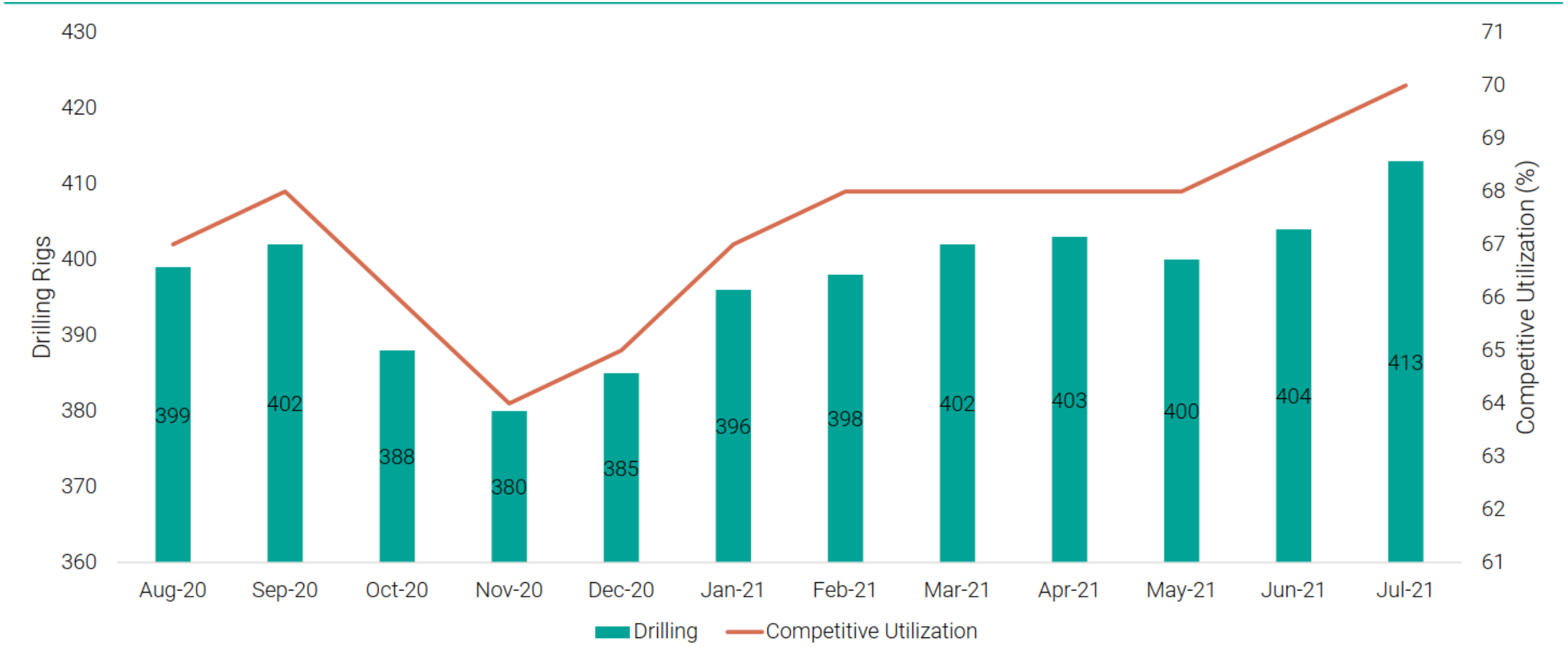
Land

Drilling
Workover

Offshore

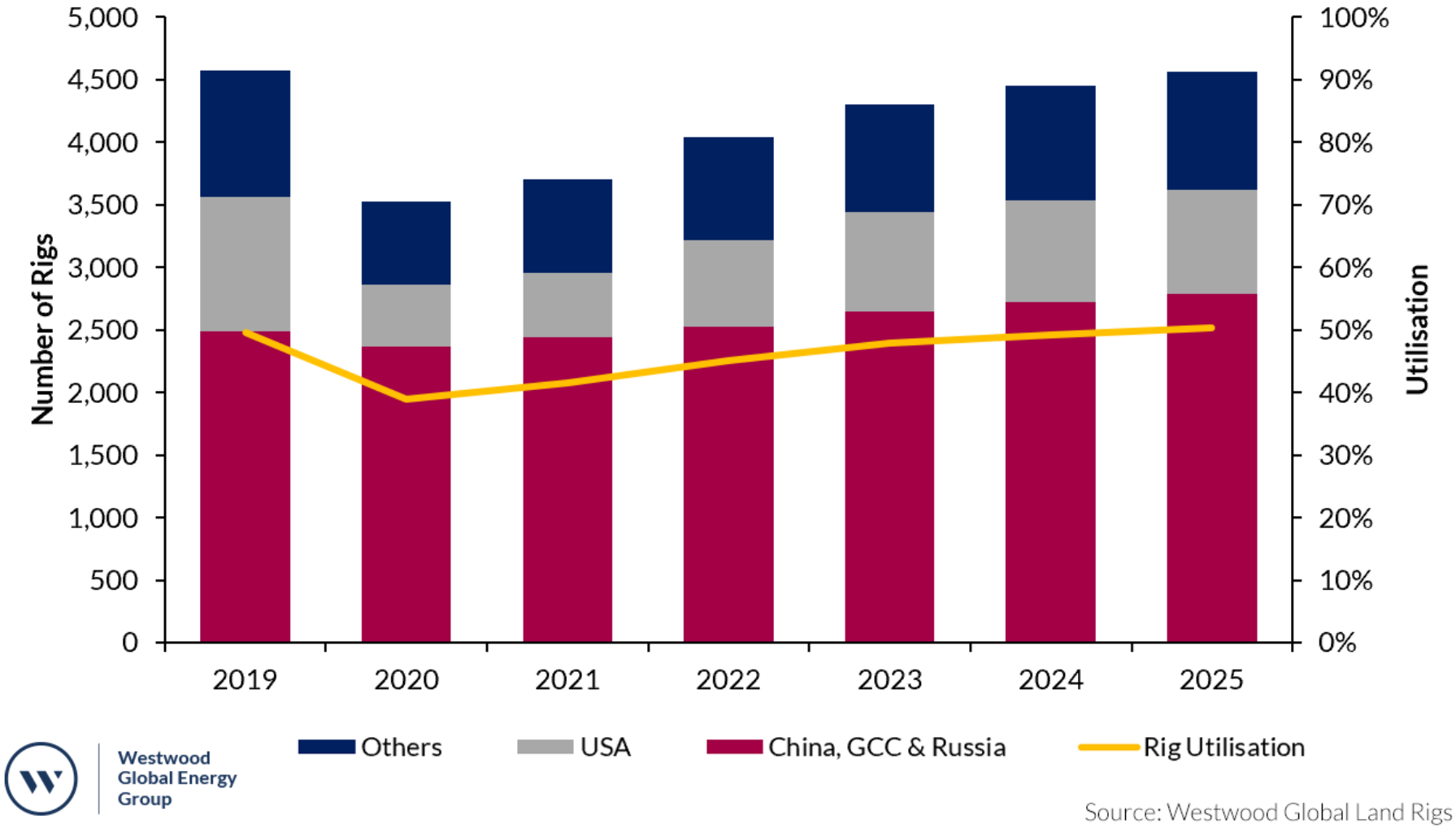
Jackup
Semisubmersible
Drillship

Offshore Rig Market



Source: Bassoe Analytics

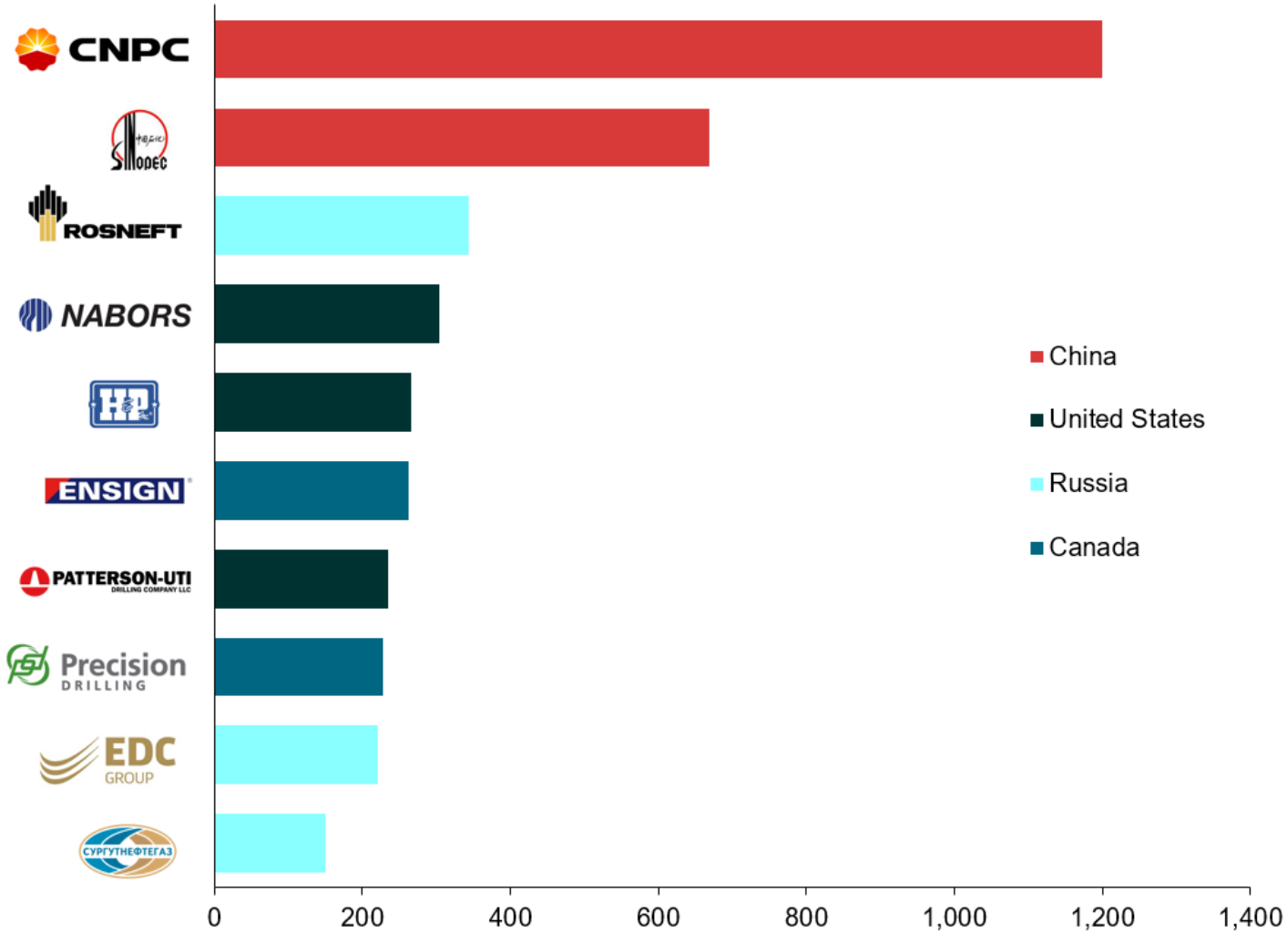
Average Number of Rigs Operational and Global Rig Utilization



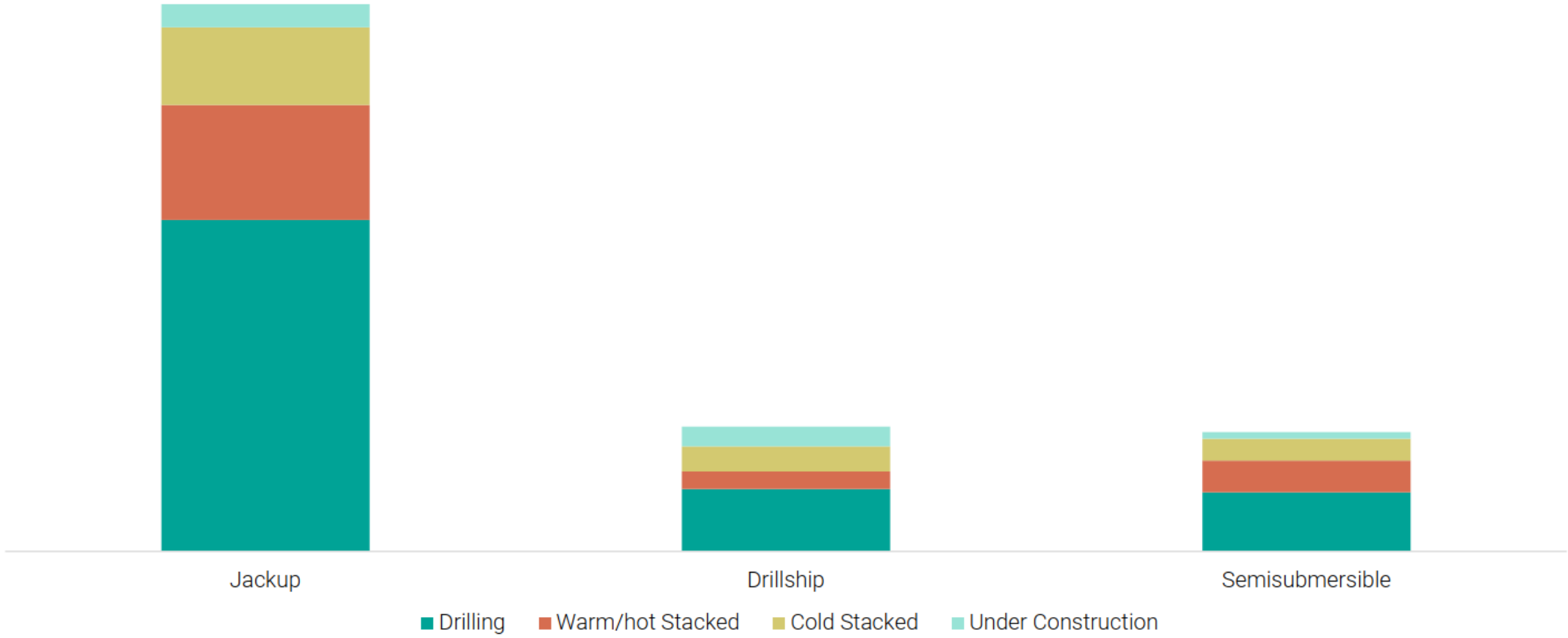
Westwood Global Energy Group

Source: Westwood Global Land Rigs

Top 10 land drilling contractors

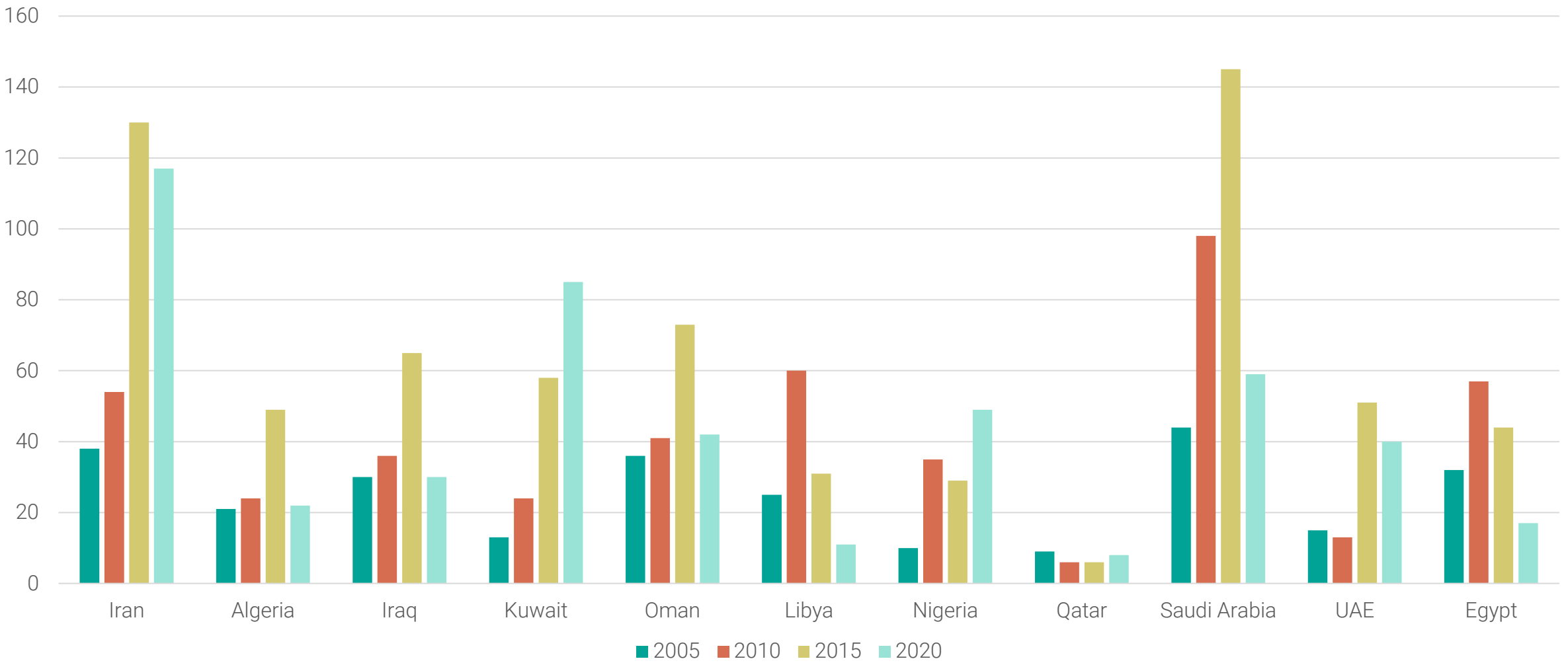


Rigs Status by Type

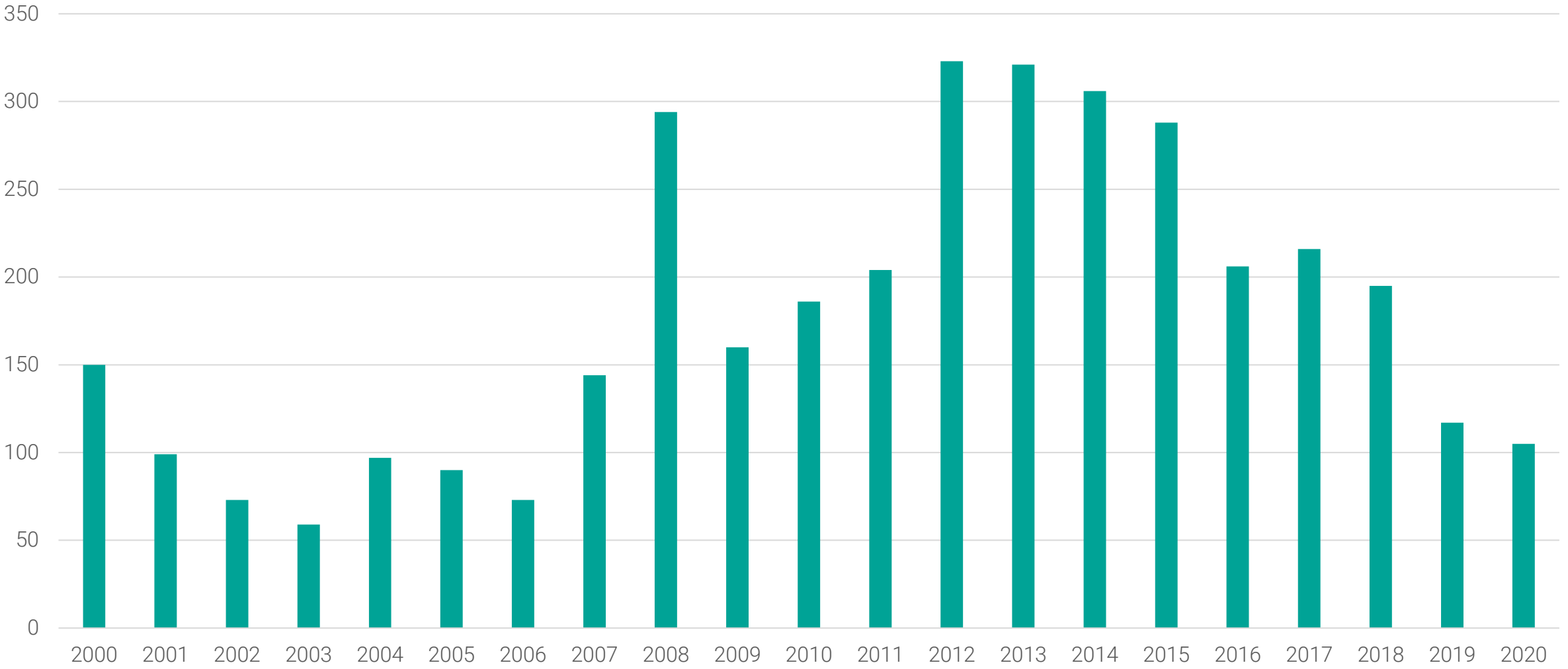


Source: Bassoe Analytics

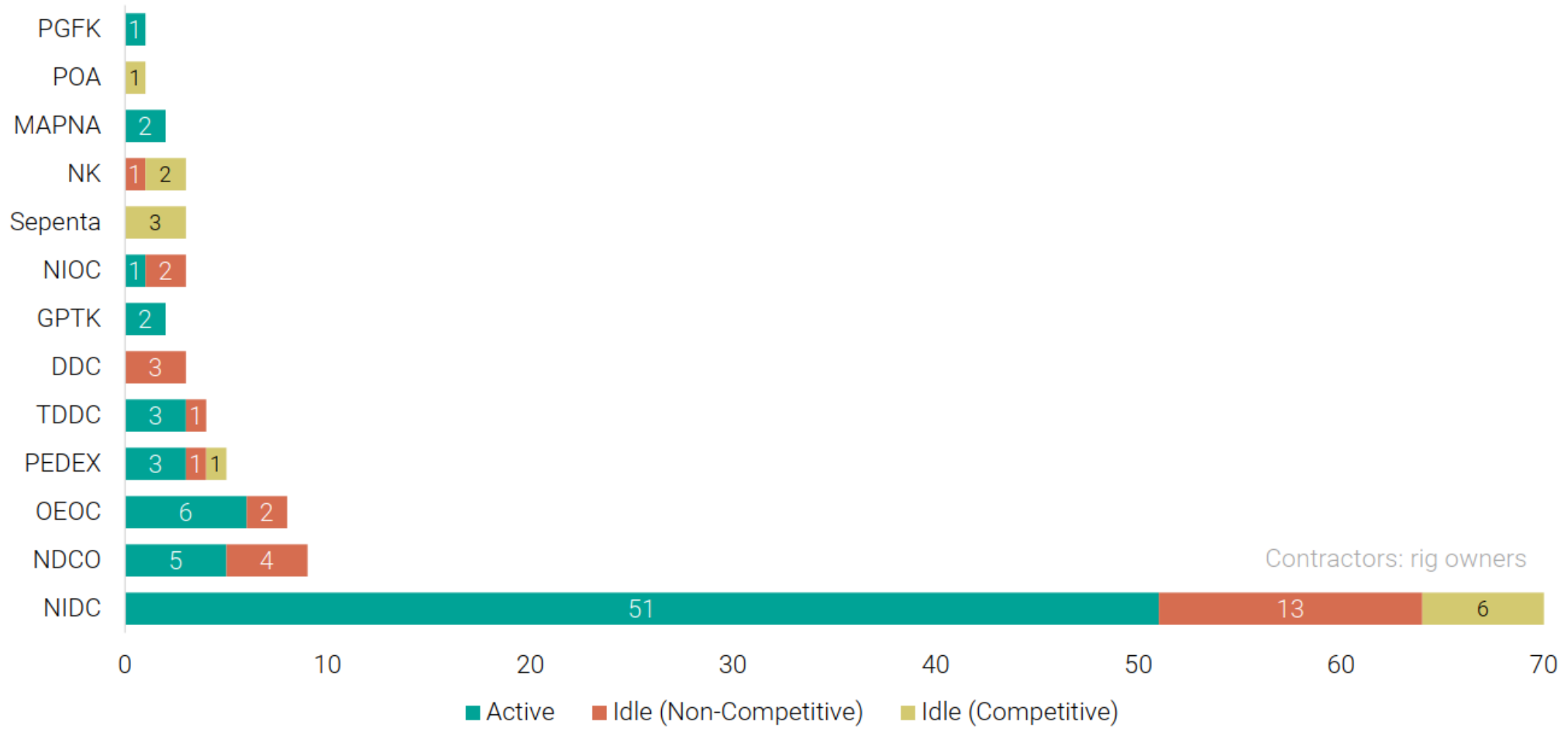
Active Rigs in MENA



Completed Wells in Iran



Iran Drilling Players (Land)

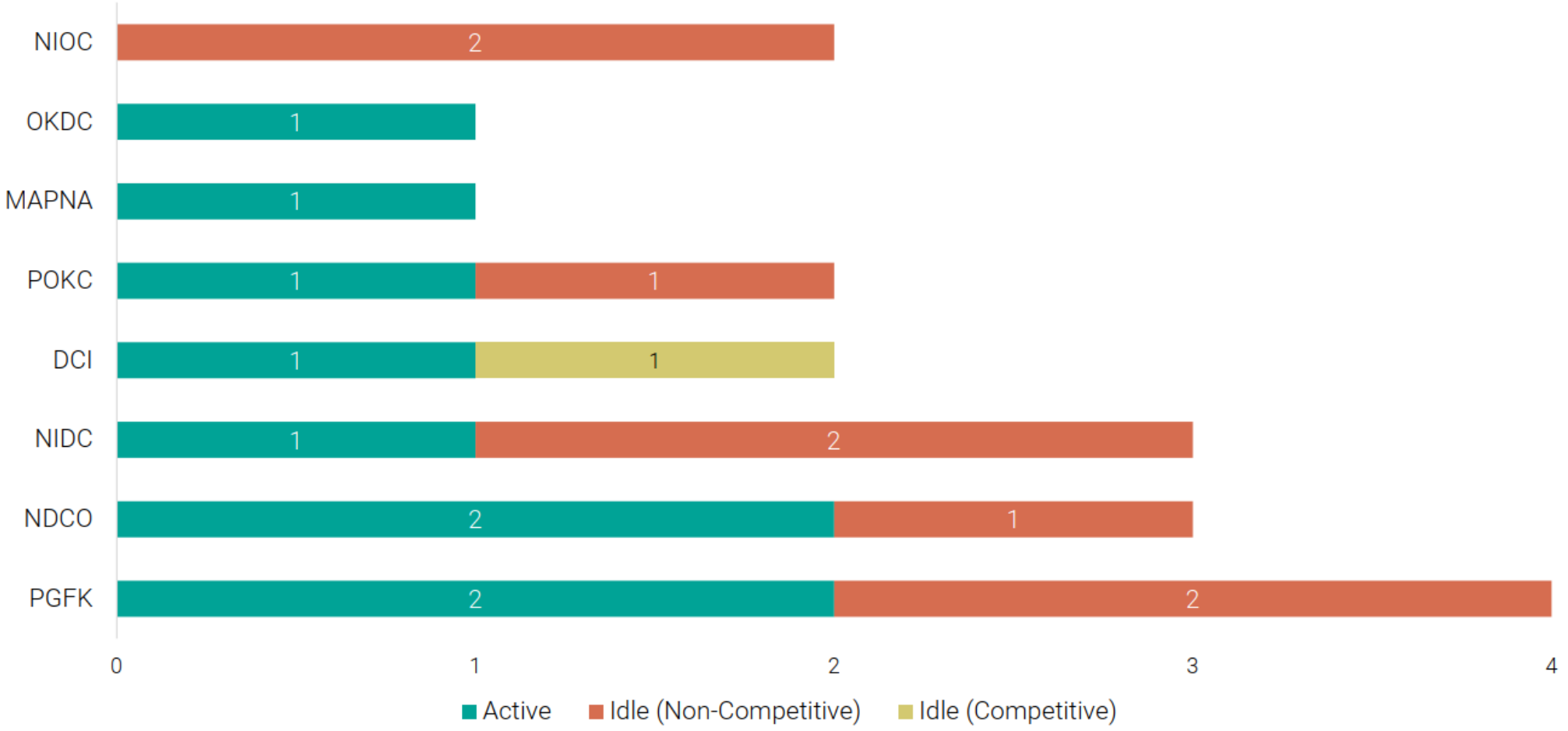


Iran Rig Report (August 2021)

18

PetroView

Iran Drilling Players (Offshore)

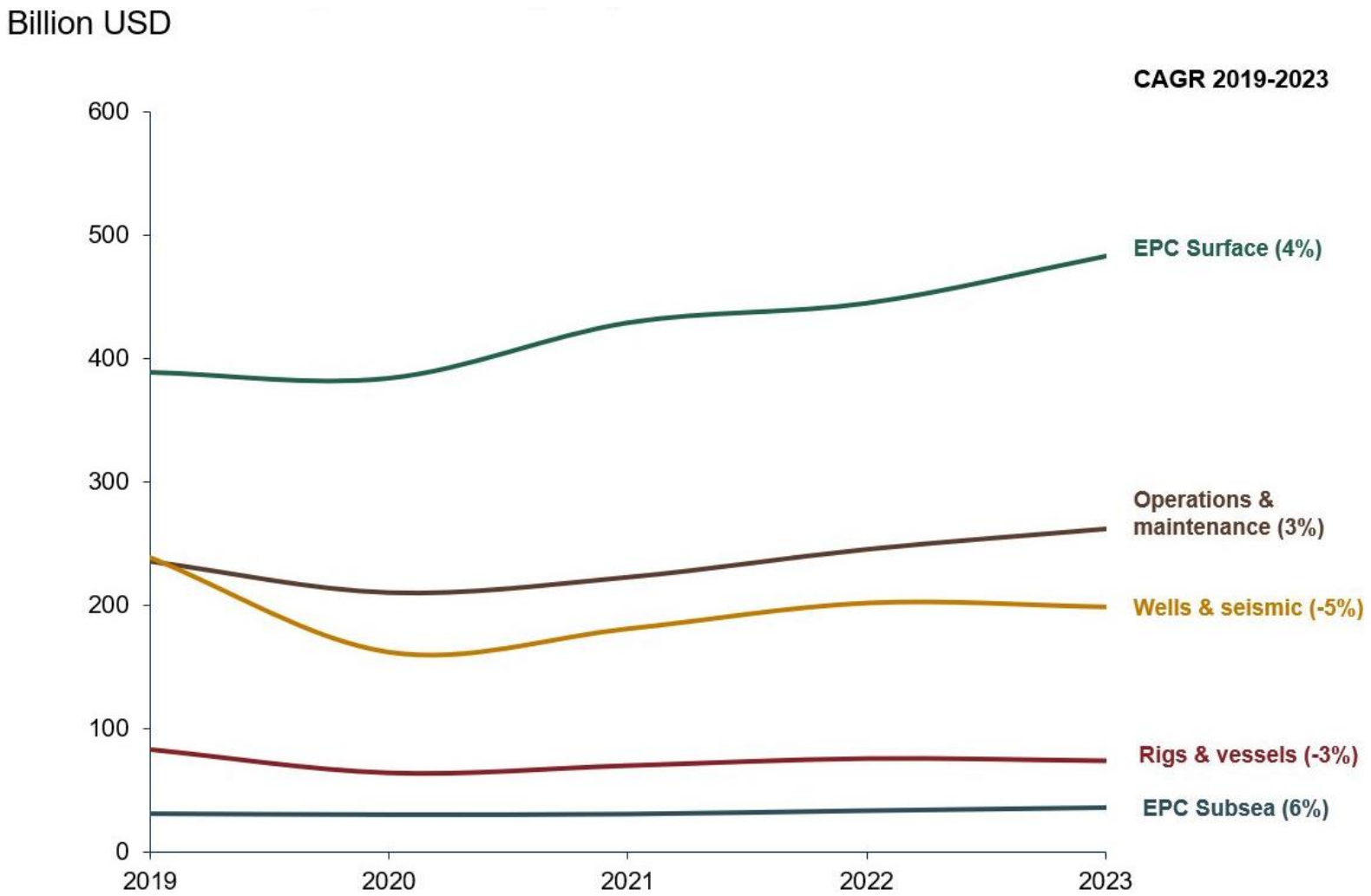


Iran Rig Report (August 2021)

19

Ranking of 11 OFS segments based on resilience to energy transition

Services Purchase By Segment



Case Study: Total

History

1924
Establishment year

Top 5
One of majors

€133B
Market Capitalization

100,000+
Number of Employees

$ 205 B
Total Sales

$ 16.3 B
Net Income

1954 1960 1970 1982 2003 2021

2016 Transformation

Integrating climate into strategy and Cost reduction

1. Creation of the Gas, Renewables & Power Segment

   - The new Gas, Renewables & Power segment will spearhead Total's ambitions in the electricity value chain by expanding in downstream gas, renewable energies and energy efficiency.

2. Creation of a new Total Global Services segment

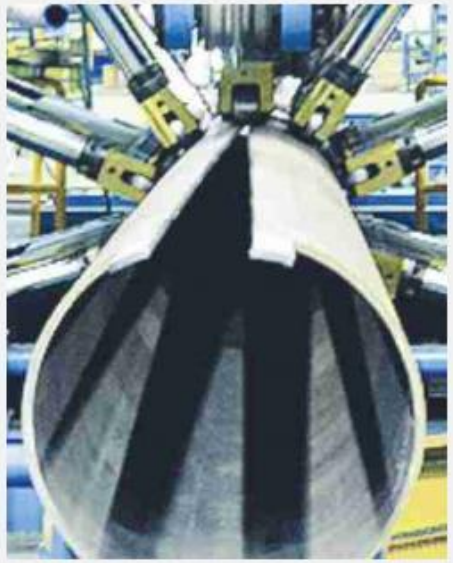
   - This new segment is being created to sustainably improve efficiency across all businesses by globally pooling support services (Accounting, Purchasing, Information Systems, Training, Human Resources Administration and Facilities Management).

3. Corporate headquarters refocused on strategic functions

   - People & Social Responsibility
   - Strategy & Innovation

ONE Total

Total Global Services generating results



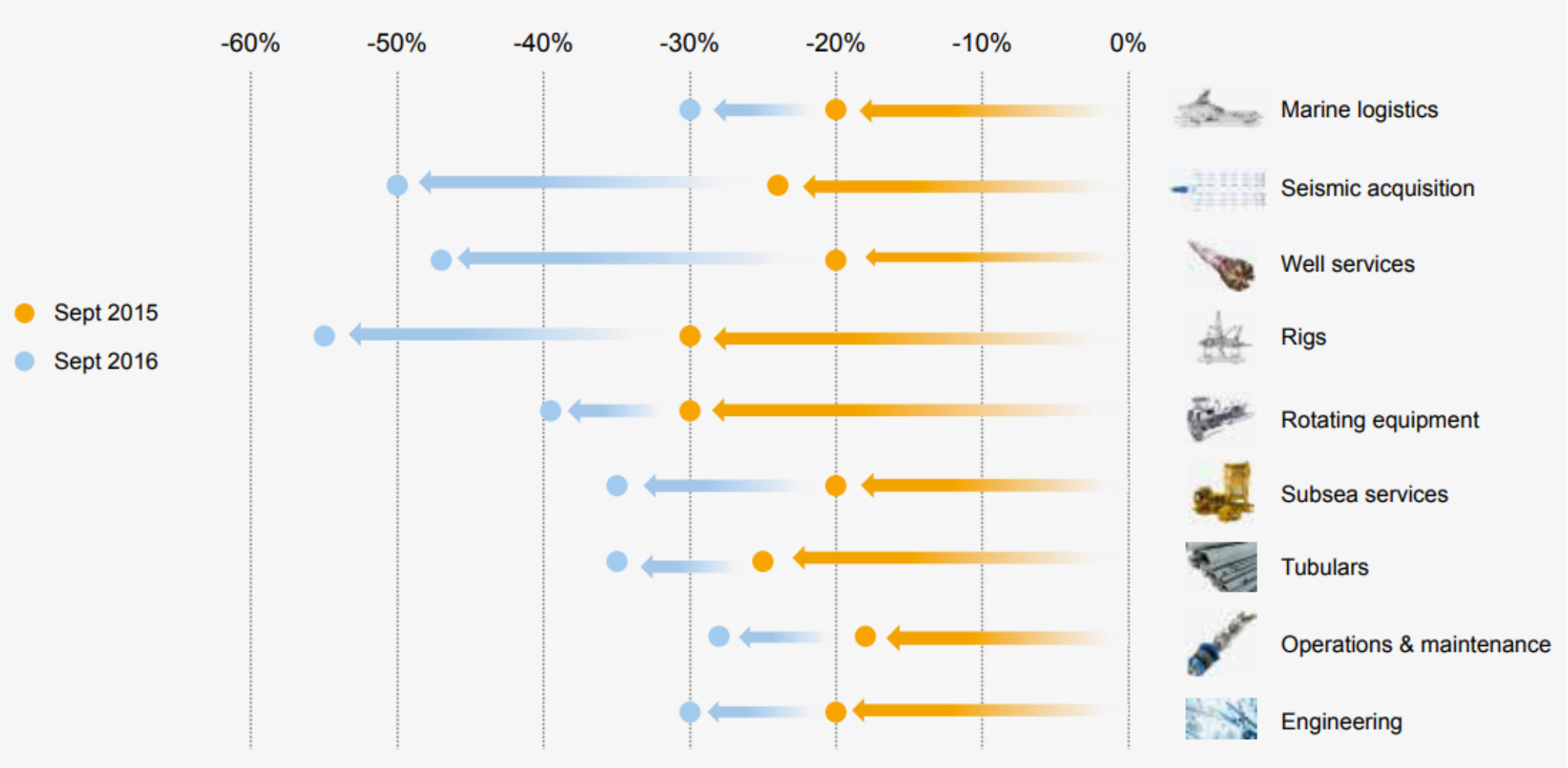
- **~400 M$ savings in 2017** (Opex + Capex), targeting **1 B$ by 2020**
- **40% of procurement negotiated globally**
- **Bundling contracts** with major vendors to create economies of scale

ONE TOTAL

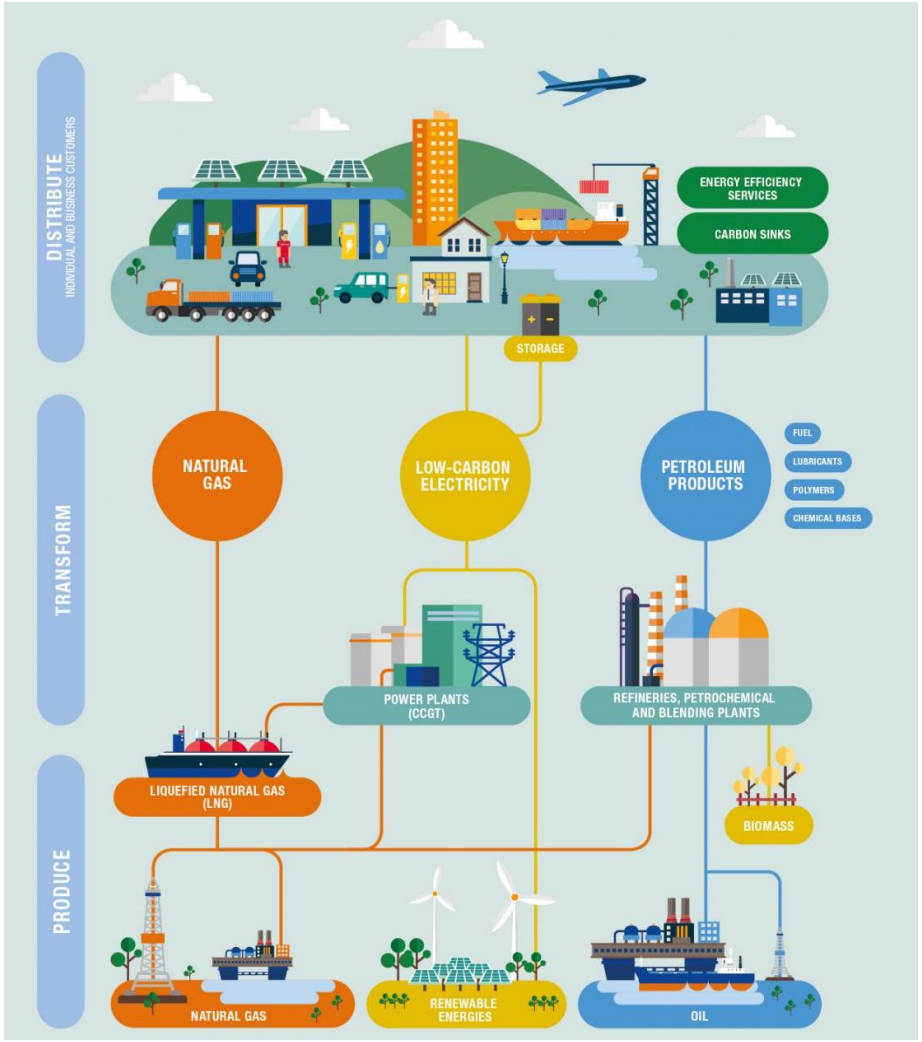
ONE TOTAL
BE SIMPLE

- **One Total Chair** per country
- **Cross-segment** support functions
- Group-wide **simplification program**

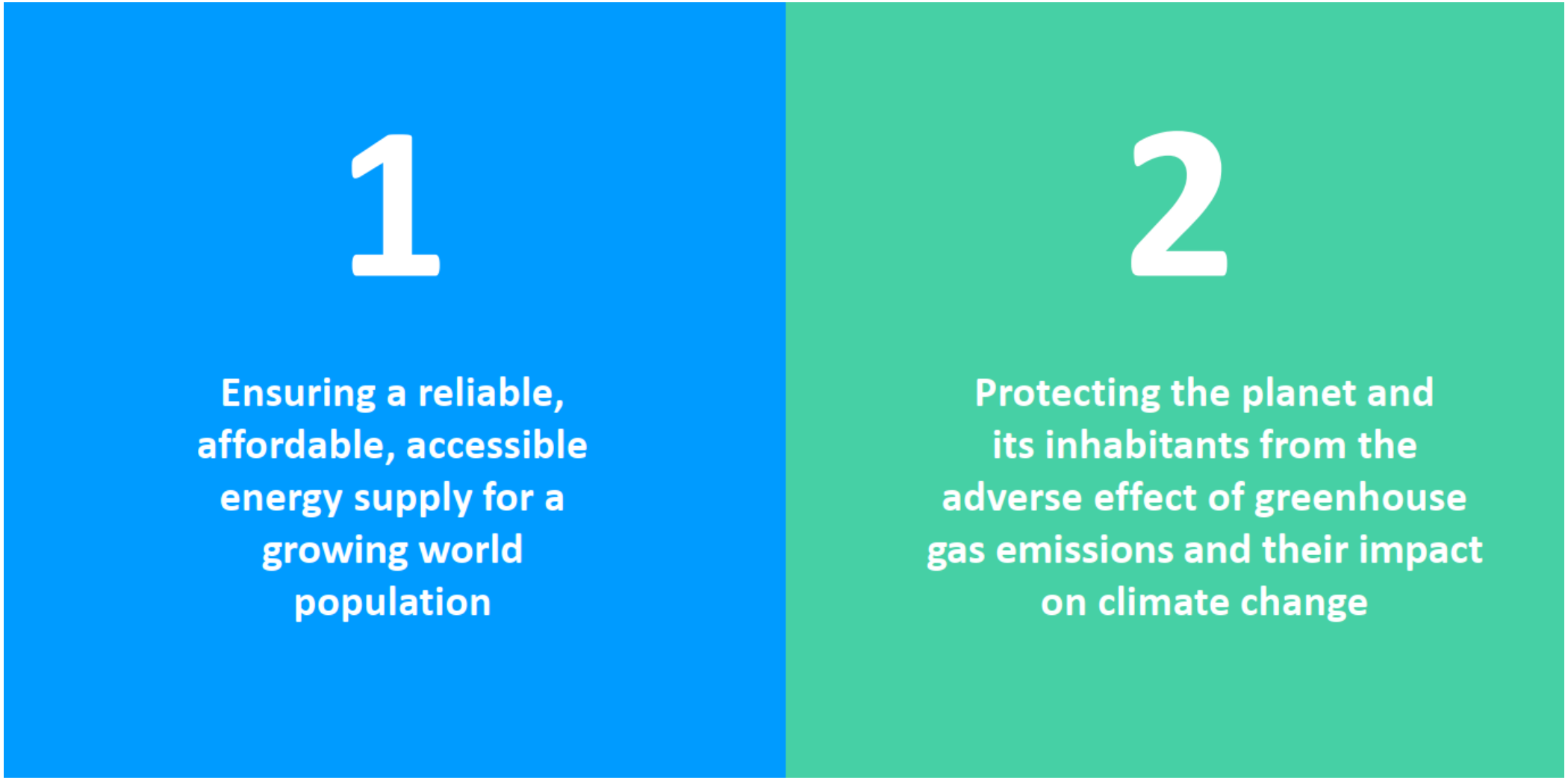
Cost Reduction



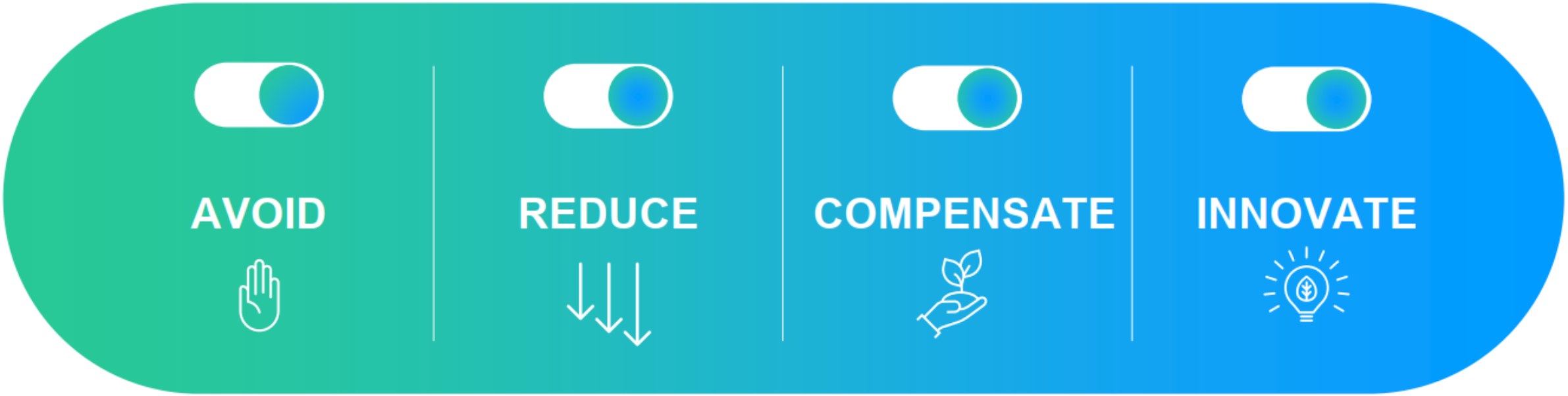
Integrated Business Model



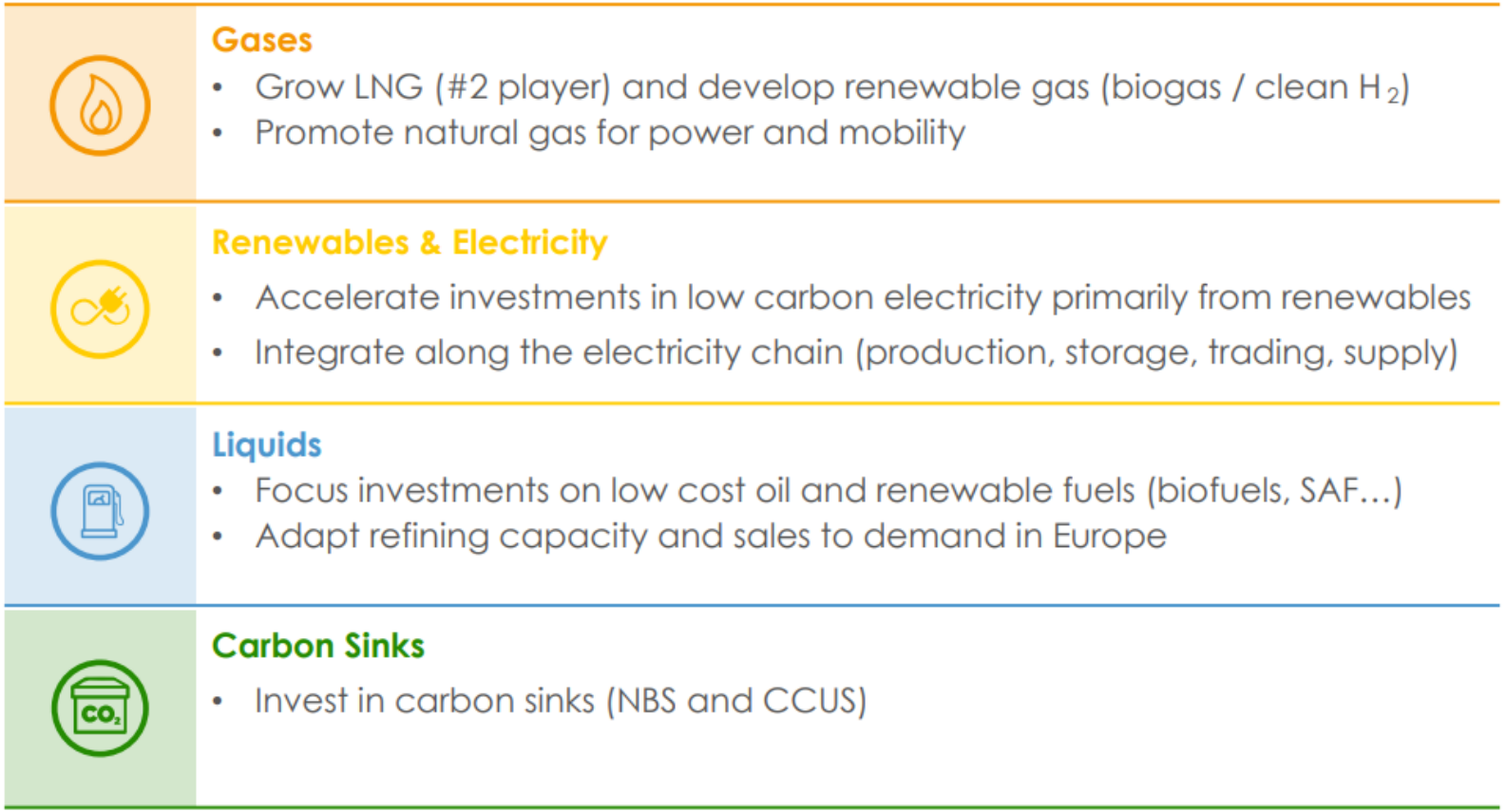
Sustainable Energy Challenge



Decarbonization levers

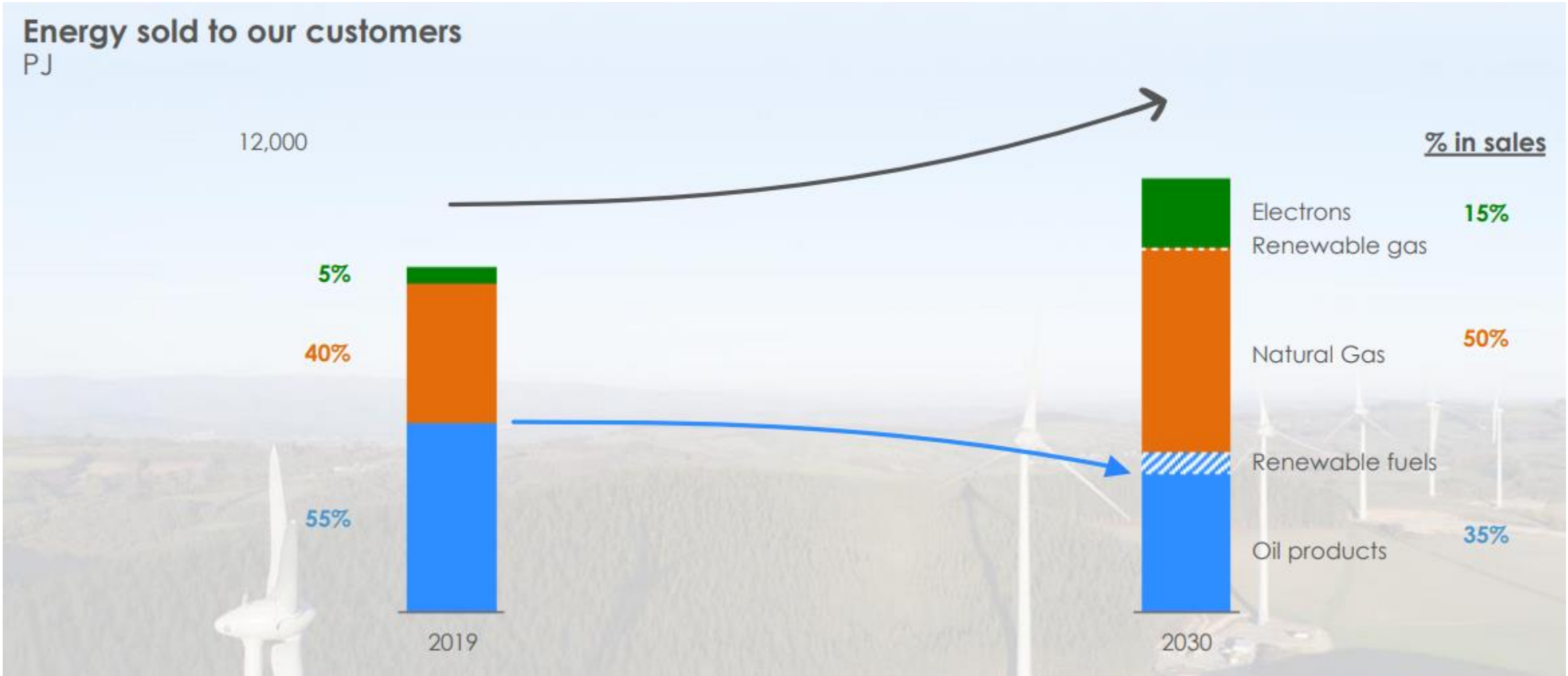


Transforming Total Into A Broad Energy Company



Total will become TotalEnergies
creating long-term value for shareholders

Growing Sales While Adapting To Demand



ESG Ambitions

ENVIRONMENT

Climate ambition to Net Zero

Biodiversity new commitments

Advocacy consistent with our climate ambition

SOCIAL

Responsible employer: no lay-offs despite crisis

2025 new diversity ambition 30% women in all management bodies

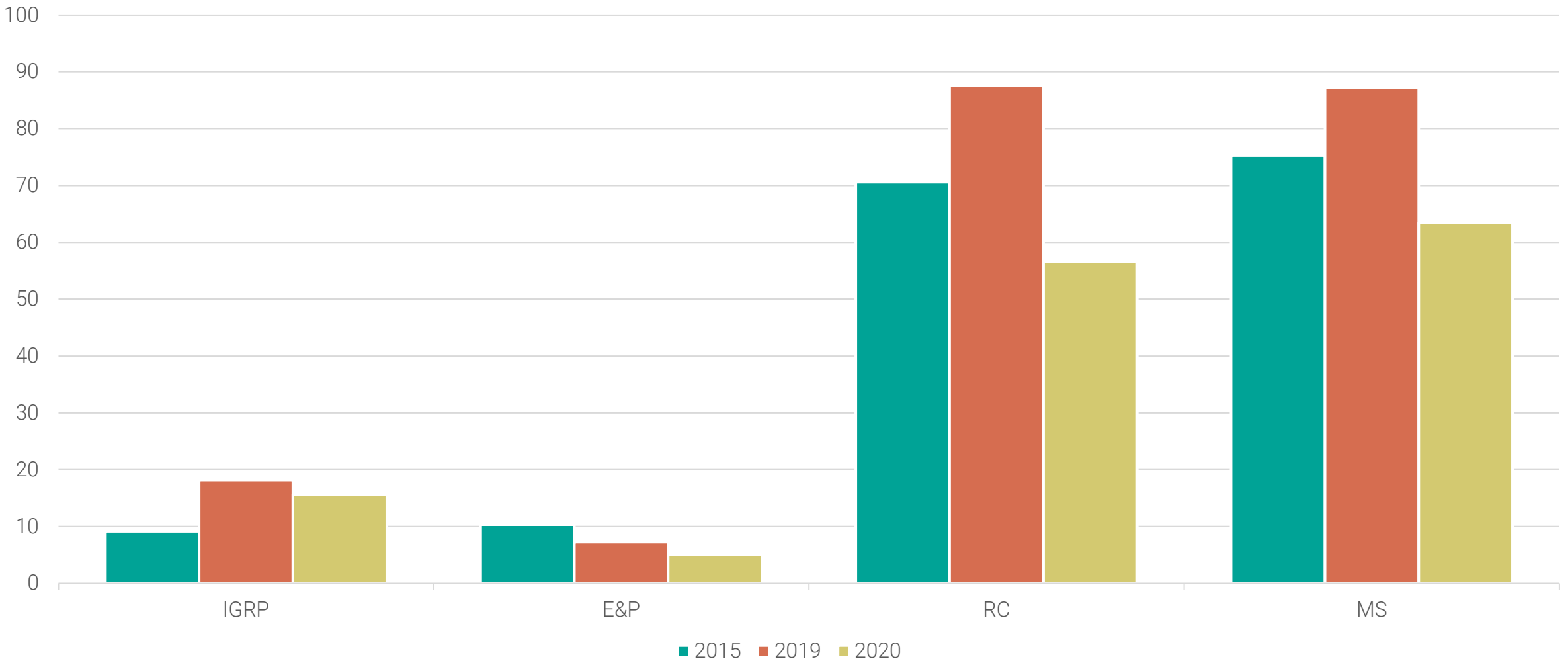
GOVERNANCE

Environmental and social challenges integrated in all Board decisions

CEO compensation:
- reduced during crisis
- linked to ESG factors

(25% of variable part and LTI)

Sales By Business Segment, Excluding Inter-segment Sales ($ B)



Net Operating Income ($ B)

Middle East

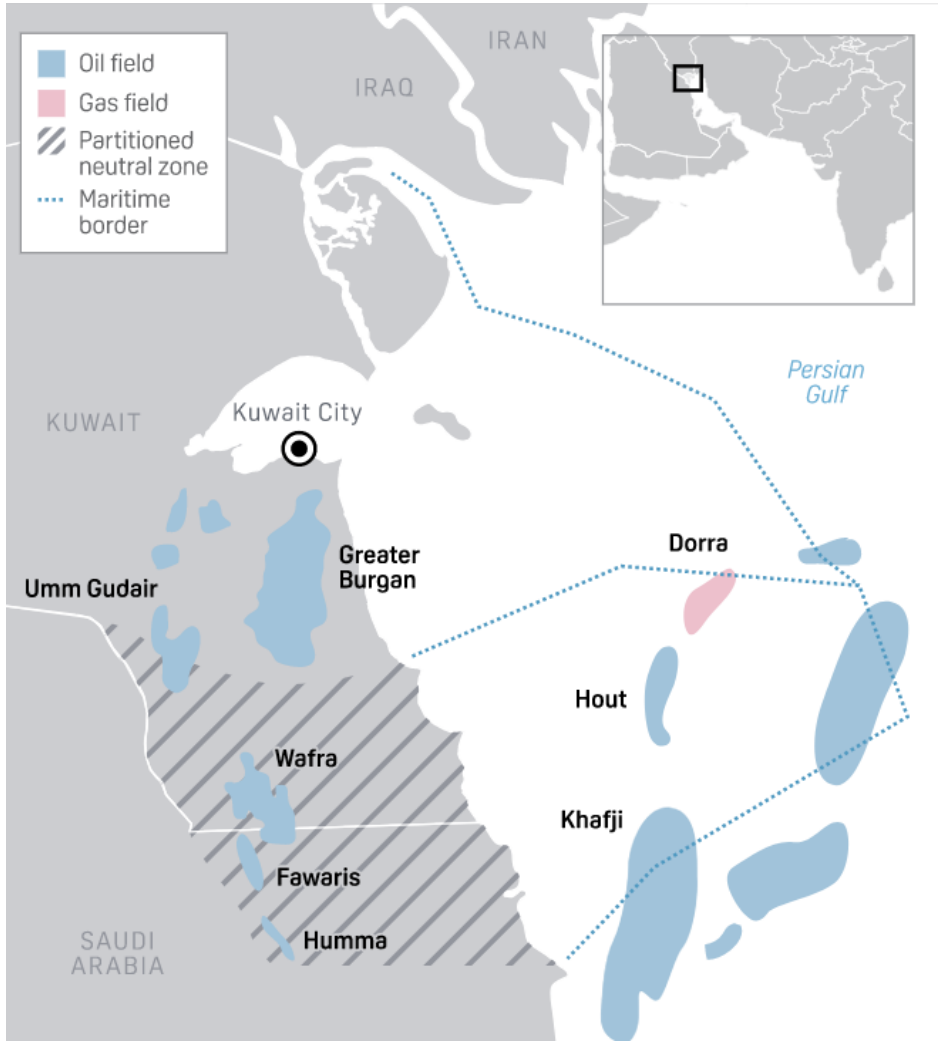
Saudi Arabia: General Information (2020)

Population (million inhabitants)	35.01
GDP per capita ($)	19,996
GDP at market prices (million $)	700,118
Proven crude oil reserves (million barrels)	261,600
Proven natural gas reserves (billion cu. m.)	8,438
Crude oil production * (1,000 b/d)	9,213.2
Marketed production of natural gas (million cu. m.)	119,000.0
Refinery capacity (1,000 b/cd)	2,927.0

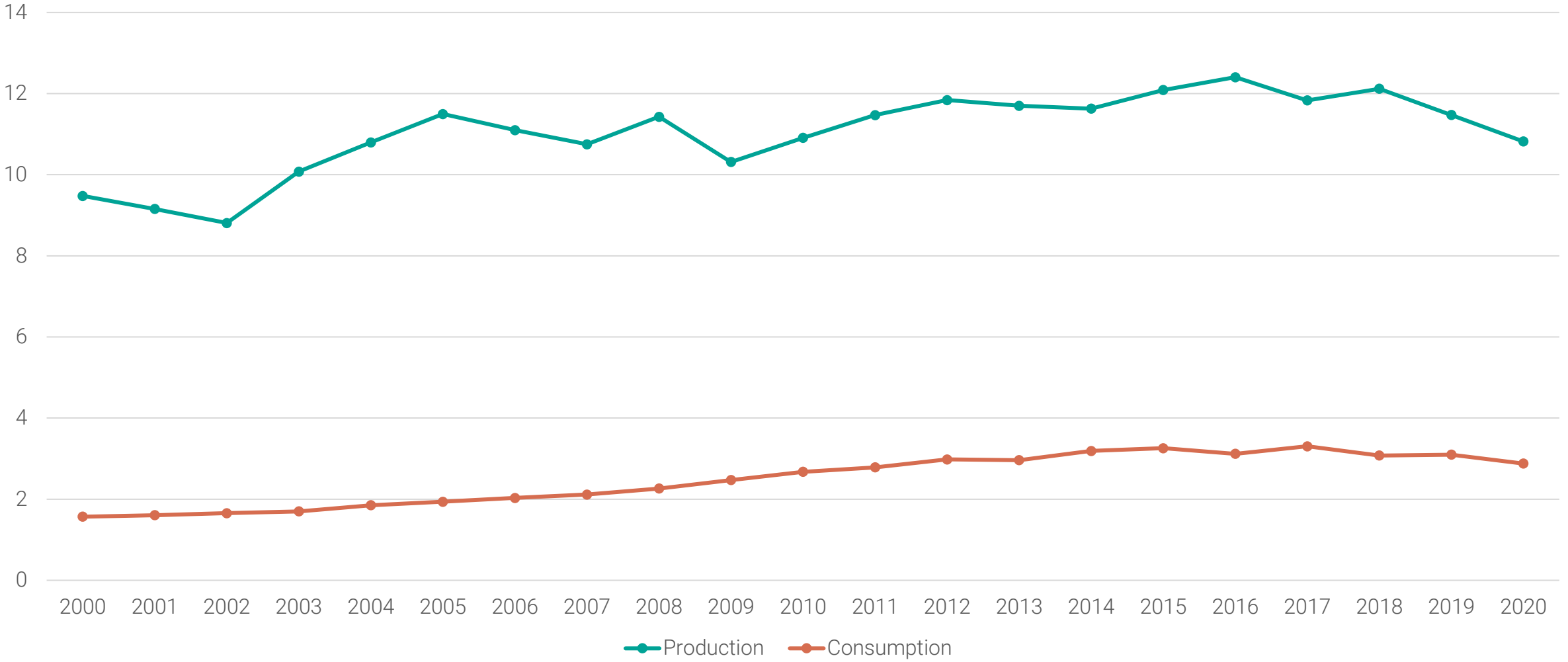
Saudi Arabia: Key Issues

- 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
- Chevron holds a unique position as operator of the oil fields in the onshore portion of the Neutral Zone
- 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

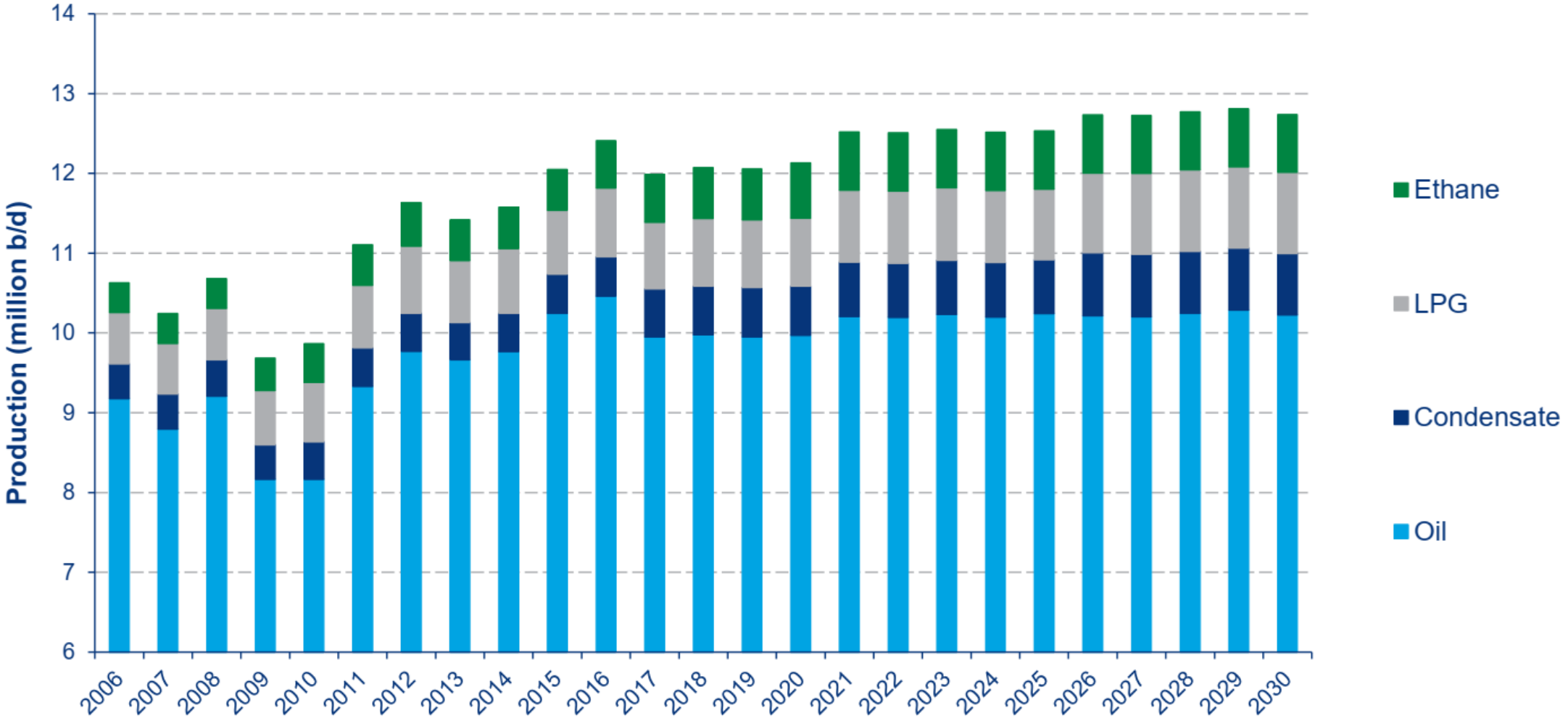
Neutral Zone



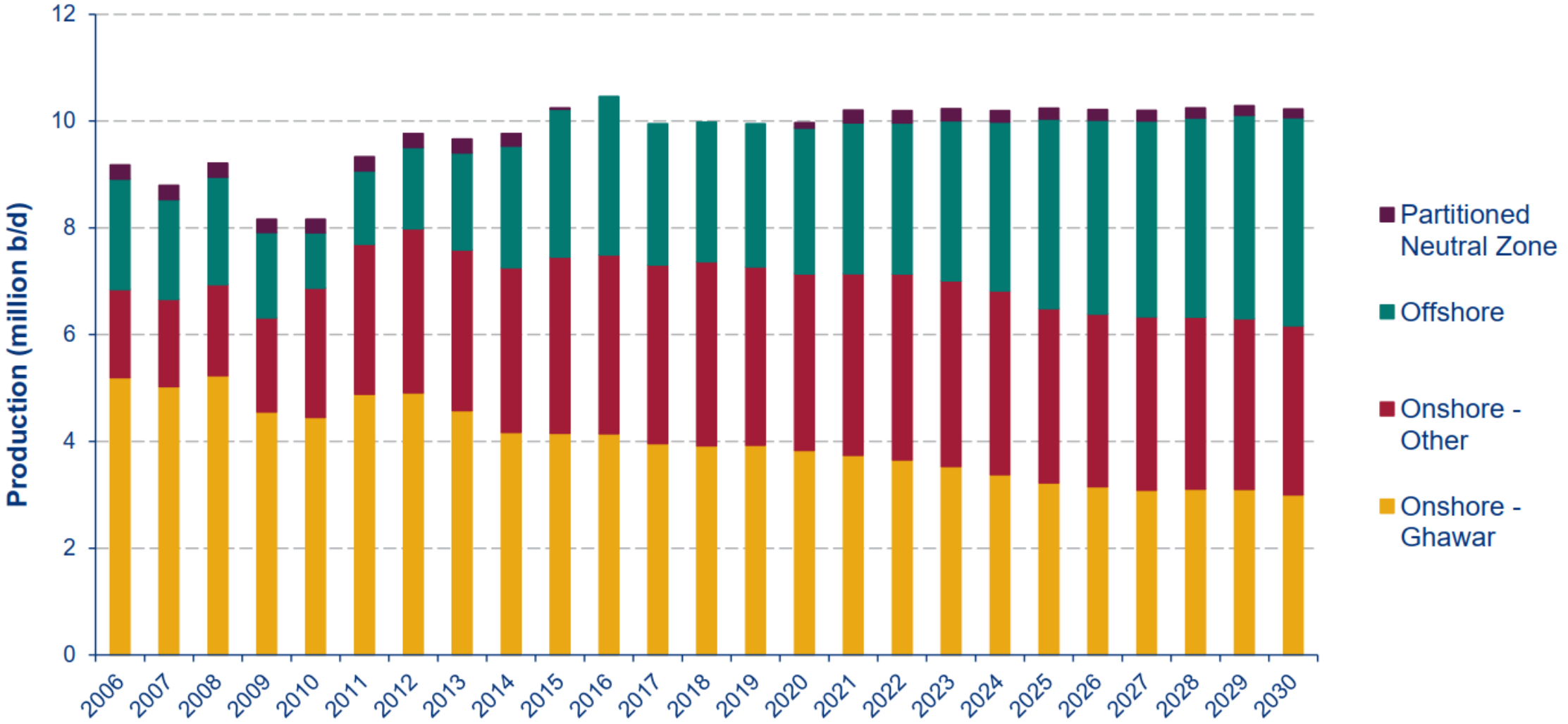
Saudi Arabia: Petroleum And Other Liquids Production And Consumption (MBPD)



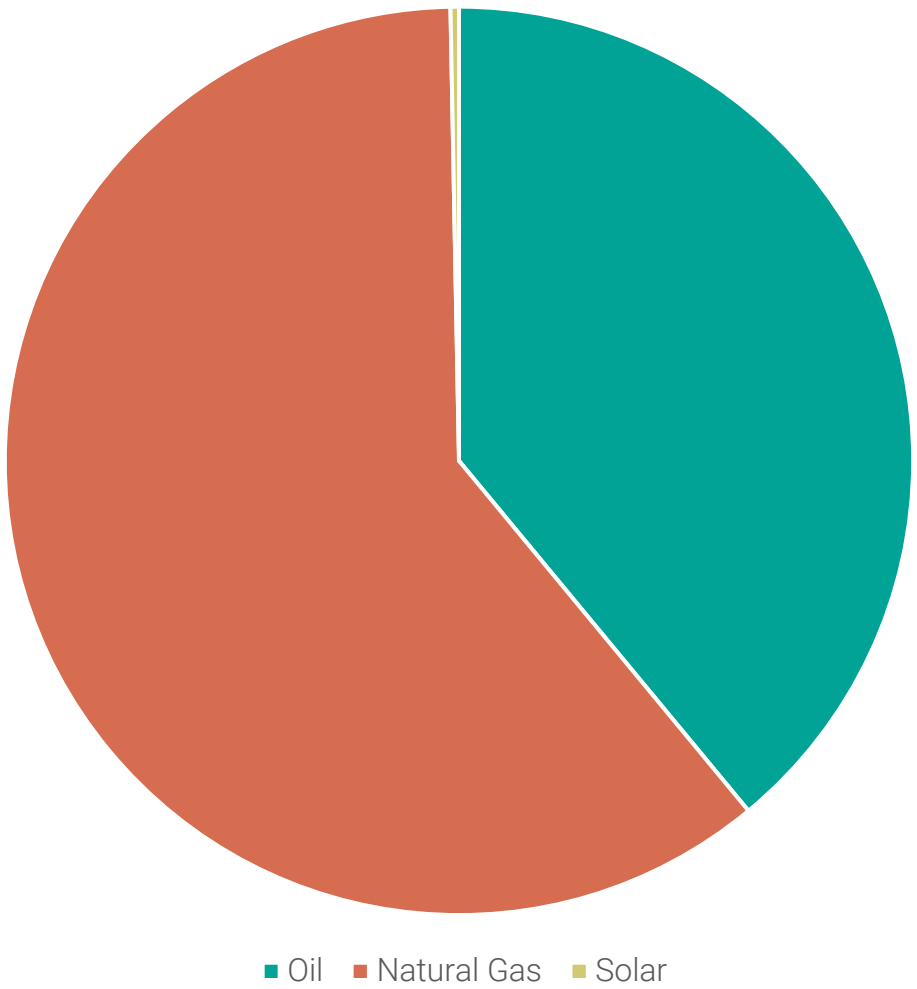
Liquids Production by Hydrocarbon Type (data: 2018)



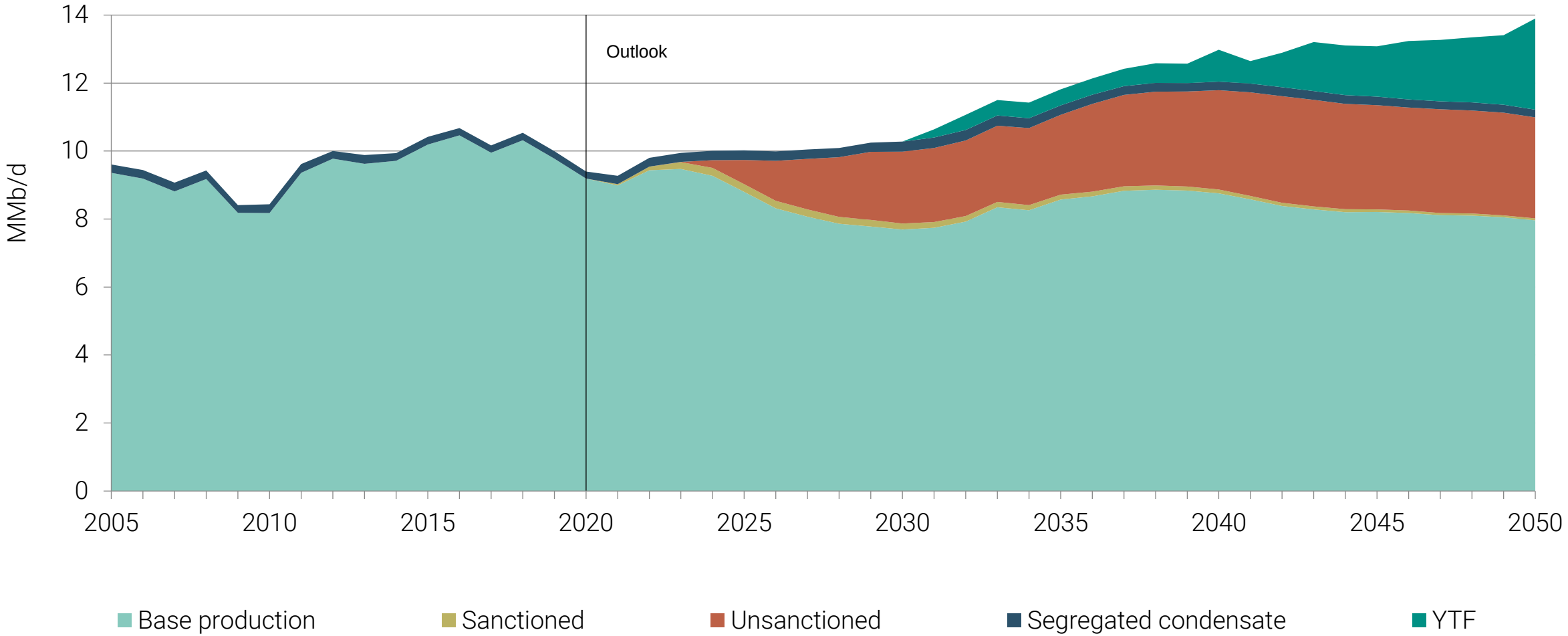
Oil production by Location (data: 2018)



Saudi Arabia: Electric Power Generation by Fuel



Saudi Arabia Crude And Condensate Production By Development



Saudi Arabia: Aramco's Consolidated statement of income

	Note	SAR Year ended December 31 2020	SAR Year ended December 31 2019	USD* Year ended December 31 2020	USD* Year ended December 31 2019
Revenue	25	**768,109**	1,105,696	**204,829**	294,852
Other income related to sales		**93,982**	131,089	**25,062**	34,957
Revenue and other income related to sales		**862,091**	1,236,785	**229,891**	329,809
Royalties and other taxes		**(89,964)**	(182,141)	**(23,991)**	(48,571)
Purchases	26	**(181,116)**	(225,170)	**(48,297)**	(60,045)
Producing and manufacturing		**(74,350)**	(58,249)	**(19,827)**	(15,533)
Selling, administrative and general		**(46,970)**	(36,647)	**(12,525)**	(9,773)
Exploration		**(7,293)**	(7,291)	**(1,945)**	(1,944)
Research and development		**(2,830)**	(2,150)	**(755)**	(573)
Depreciation and amortization	6,7	**(76,208)**	(50,266)	**(20,322)**	(13,404)
Operating costs		**(478,731)**	(561,914)	**(127,662)**	(149,843)
Operating income		**383,360**	674,871	**102,229**	179,966
Share of results of joint ventures and associates	8	**(3,554)**	(9,455)	**(948)**	(2,521)
Finance and other income	28	**3,182**	7,351	**849**	1,960
Finance costs	21	**(10,564)**	(6,026)	**(2,817)**	(1,607)
Income before income taxes and zakat		**372,424**	666,741	**99,313**	177,798
Income taxes and zakat	9	**(188,661)**	(336,048)	**(50,310)**	(89,613)
Net income		**183,763**	330,693	**49,003**	88,185
Net income (loss) attributable to					
Shareholders' equity		**184,926**	330,816	**49,313**	88,218
Non-controlling interests		**(1,163)**	(123)	**(310)**	(33)
		183,763	330,693	**49,003**	88,185
Earnings per share (basic and diluted)	37	**0.93**	1.65	**0.25**	0.44

* Supplementary information is converted at a fixed rate of U.S. dollar 1.00 = SAR 3.75 for convenience only.

Saudi Arabia: Aramco Operational highlights

MSC
(mmbpd)

12.0

(2019: 12.0)

Hydrocarbon production
(mmboed)

12.4

(2019: 13.2)

Crude oil production[1]
(mmbpd)

9.2

(2019: 9.9)

Reliability[2]
(%)

99.9

(2019: 99.2)

Gross refining capacity
(mmbpd)

6.4

(2019: 6.4)

Net chemicals production capacity
(million tonnes per year)

53.1

(2019: 21.7)

Upstream carbon intensity
(kg of CO_2e/boe)

10.5

(2019: 10.4)

Flaring intensity[3]
(scf/boe)

5.95

(2019: 5.88)

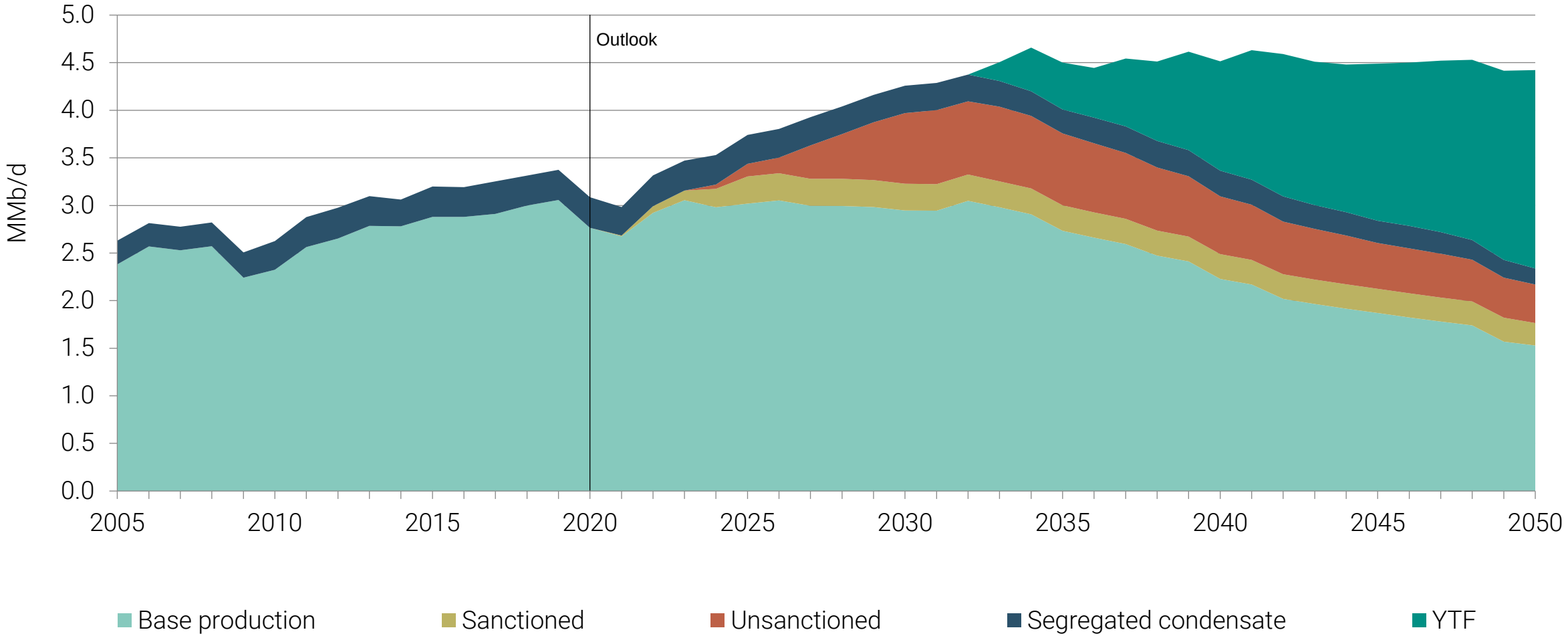
United Arab Emirates: General Information (2020)

Population (million inhabitants)	9.28
GDP per capita ($)	38,661
GDP at market prices (million $)	358,869
Proven crude oil reserves (million barrels)	107,000
Proven natural gas reserves (billion cu. m.)	7,726
Crude oil production (1,000 b/d)	2,778.6
Marketed production of natural gas (million cu. m.)	55,064.5
Refinery capacity (1,000 b/cd)	1,272.0

UAE: Key Issues

- Most of the UAE's oil and gas production (>95%) is in Abu Dhabi
- Five fields (Asab, Bab, Bu Hasa, Umm Shaif and Zakum) account for more than 85% of the total oil production
- Pipeline gas imports from Qatar started in 2007. Dubai was the first emirate to begin LNG imports in 2010, followed by Abu Dhabi in 2016
- The volumes of sales gas available for the domestic market will be significantly lower, because of 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

UAE Crude And Condensate Production By Development



Iraq: General Information (2020)

Population (million inhabitants)	40.15
GDP per capita ($)	4,160
GDP at market prices (million $)	167,037
Proven crude oil reserves (million barrels)	145,019
Proven natural gas reserves (billion cu. m.)	3,714
Crude oil production (1,000 b/d)	3,996.6
Marketed production of natural gas (million cu. m.)	7,374.1
Refinery capacity (1,000 b/cd)	828.5

Iraq: Key Issues

- Iraq has enormous oil resources. The ministry of oil estimate is over 150 billion barrels, with over 10 billion barrels in Kurdistan
- Production has grown from 2.4 million b/d in 2010 to 5 million b/d capacity in 2019, with Kurdistan contributing around 10%
- It has 110 tcf of gas resources, mostly associated with oil production, but domestic demand is not being met
- Iraq has the potential to be a substantial contributor to OPEC supply for many decades
- Kurdistan opened to foreign investors through license awards in 2002 and 2004, but the main influx started in 2006 with the award of the first Production Sharing Contract (PSC) in the region

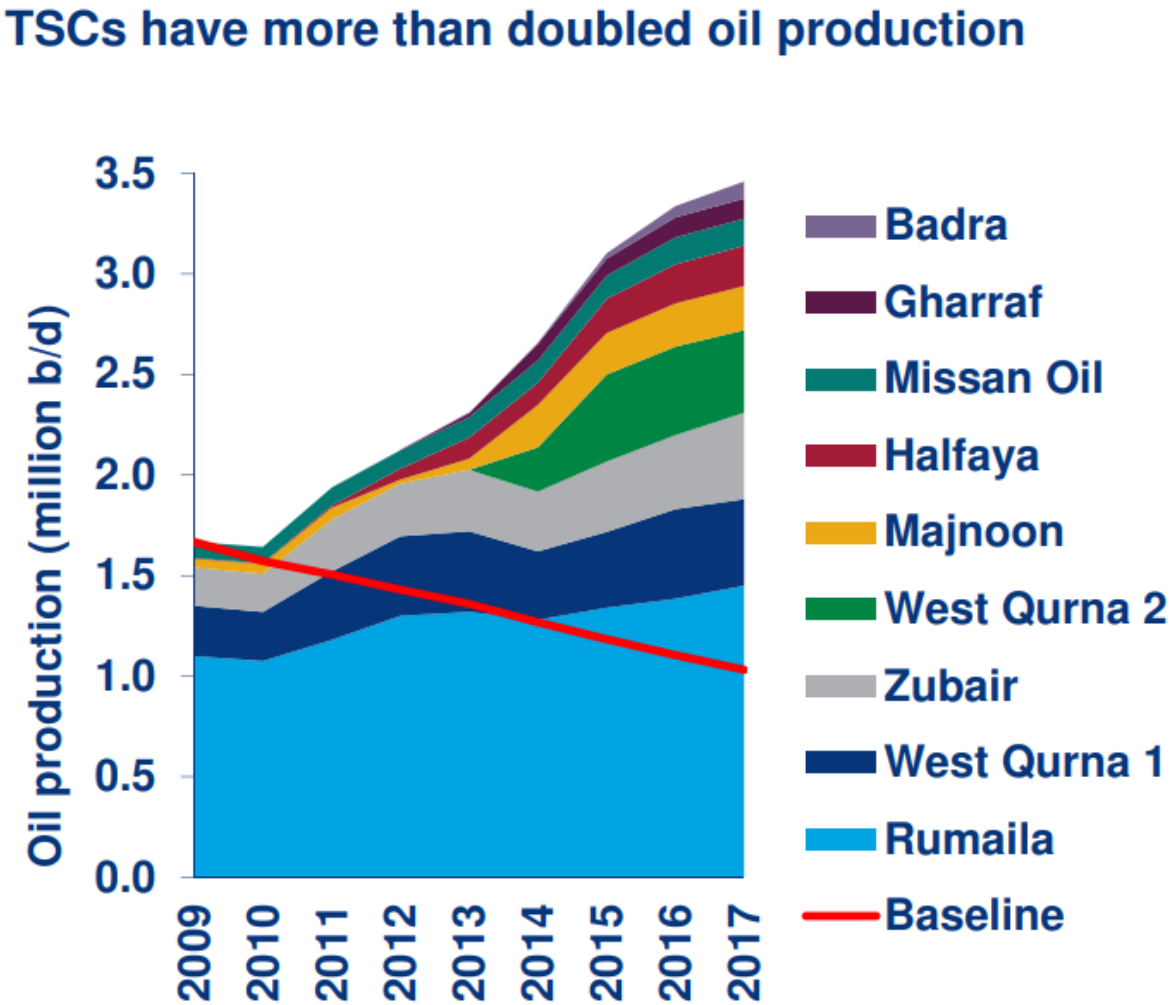
Iraq Bid Rounds Summary

Bid round	Project or licensing block	Operator	Type	Production*			Max. fee**
				Initial Target	June 2012	Plateau target	
2008	Ahdab	Petrochina	Oil	25	129	140	6.00
One (2009)	Rumaila	BP	Oil	1 173	1 279	2 850	2.00
	West Qurna (I)	ExxonMobil	Oil	268	417	2 825	1.90
	Zubair	Eni	Oil	201	225	1 200	2.00
	Missan Group	CNOOC	Oil	97	91	450	2.30
Two (2009)	West Qurna (II)	Lukoil	Oil	120	-	1 800	1.15
	Majnoon	Shell	Oil	175	21	1 800	1.39
	Halfaya	Petrochina	Oil	70	34	535	1.40
	Gharraf	Petronas	Oil	35	-	230	1.49
	Badra	GazpromNeft	Oil	15	-	170	5.50
	Qairayah	Sonangol	Heavy oil	30	2	120	5.00
	Najmah	Sonangol	Heavy oil	20	-	110	6.00
Three (2010)	Akkas	KOGAS	Gas	1.03	-	4.1	5.50
	Mansuriyah	TPAO	Gas	0.78	-	3.1	7.00
	Siba	Kuwait Energy	Gas	0.26	-	1.0	7.50
Four (2012)	Block 8	Pakistan Petroleum	Gas-prone	n/a	-	n/a	5.38
	Block 9	Kuwait Energy	Oil-prone	n/a	-	n/a	6.24
	Block 10	Lukoil	Oil-prone	n/a	-	n/a	5.99
	Block 12	Bashneft	Oil-prone	n/a	-	n/a	5.00

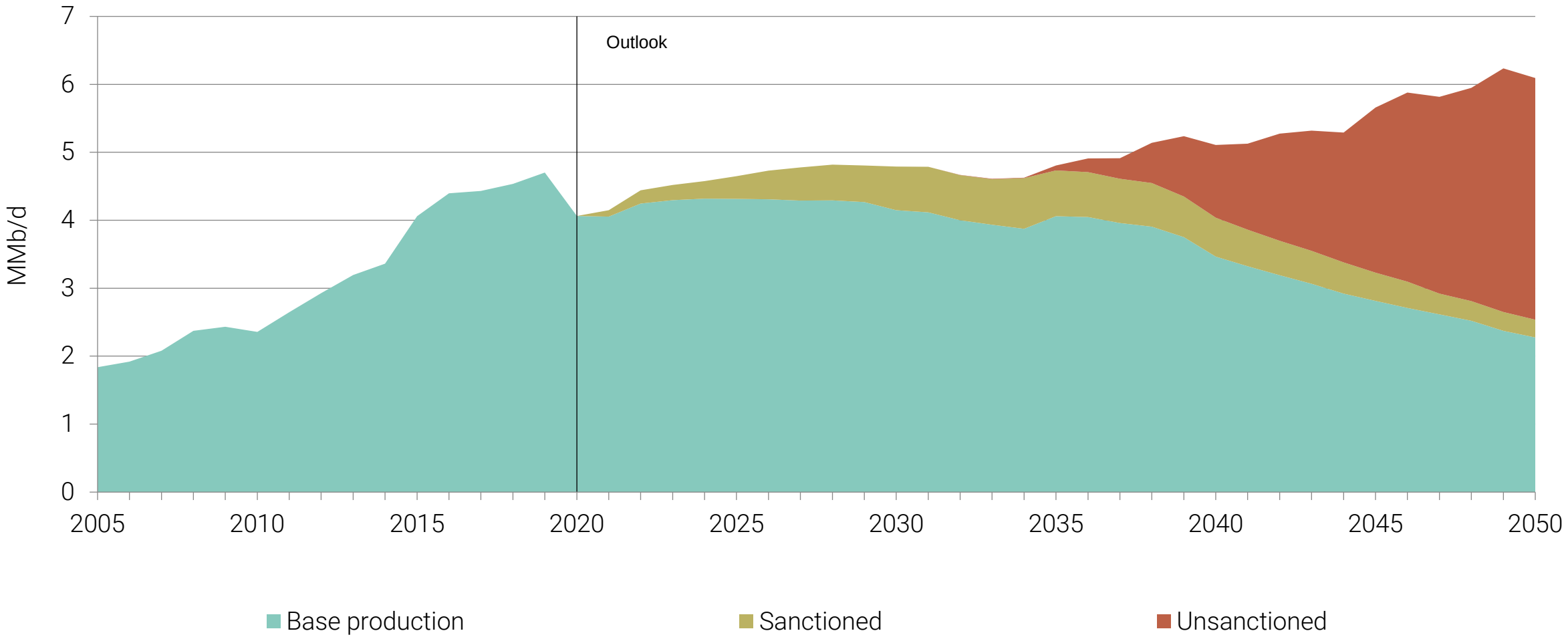
Renegotiated Terms

Project	Revised Plateau Production Target ('000 b/d)	Licence extension (Years)	Revised state equity (%)	Comments
Halfaya	400	10	10	-
Rumaila	2,100	5	6	R-factor removed
West Qurna 1	1,600	Unconfirmed	9.6	-
West Qurna 2	1,200	5	No change	Amendment includes construction of pipeline from Tuba to Fao
Zubair	850	5	No change	R-factor removed

Iraq TSCs


TSCs have more than doubled oil production
Oil production (million b/d)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2009
2010
2011
2012
2013
2014
2015
2016
2017
Badra
Gharraf
Missan Oil
Halfaya
Majnoon
West Qurna 2
Zubair
West Qurna 1
Rumaila
Baseline

Iraq Crude And Condensate Production By Development



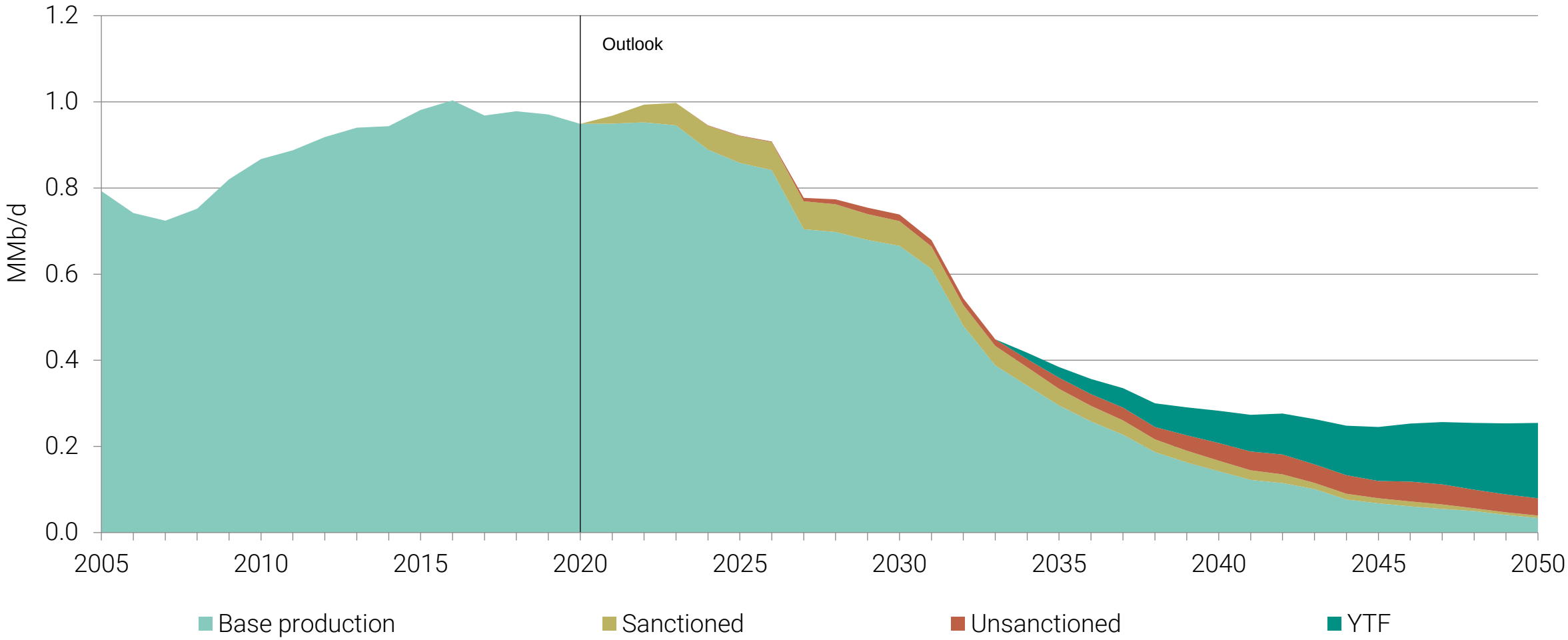
Oman: General Information (2020)

Population (million inhabitants)	5.1
GDP per capita ($)	14,255
GDP at market prices (million $)	76,330
Proven crude oil reserves (million barrels)	5,400
Proven natural gas reserves (billion cu. m.)	700
Crude oil production (1,000 b/d)	951
Marketed production of natural gas (million cu. m.)	36,900

Oman: Key Issues

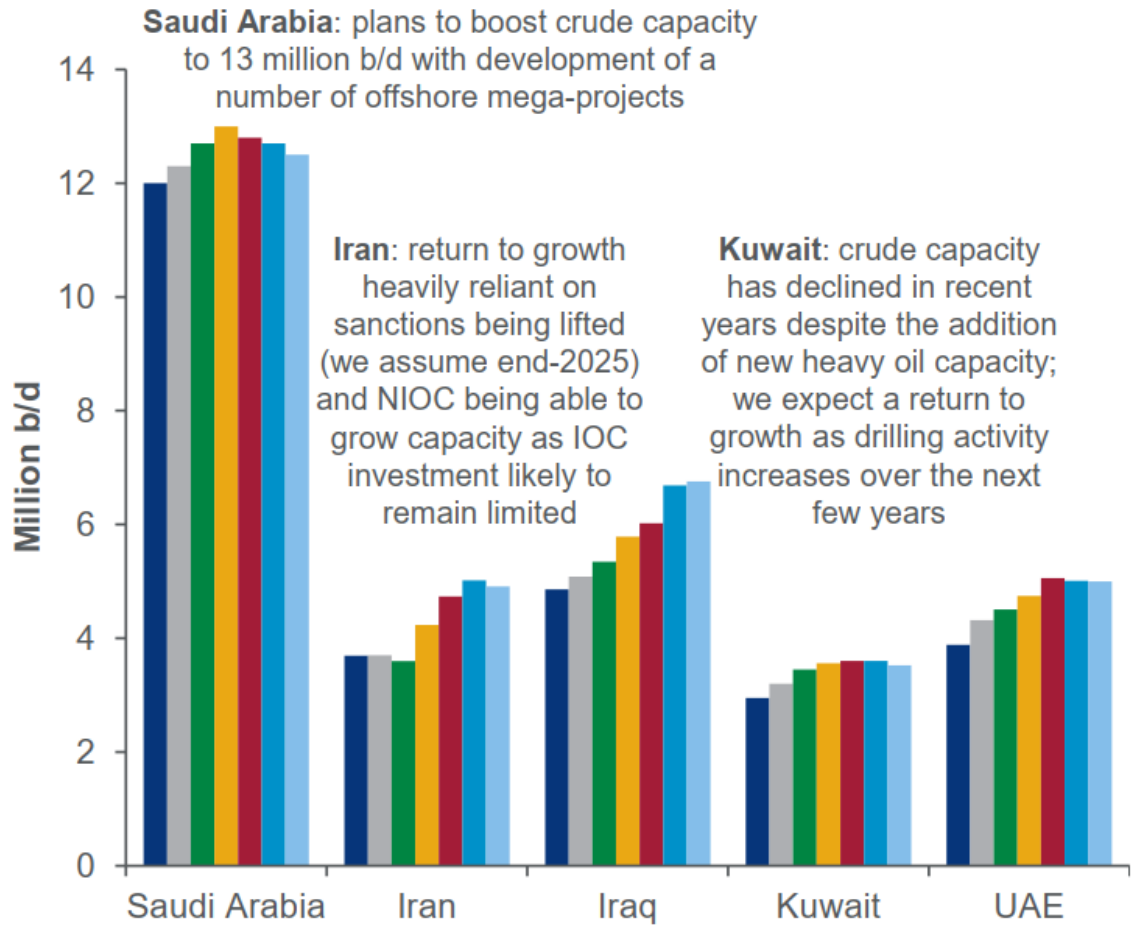
- Oman is the largest non-OPEC producer in the Middle East, dominated by state participated PDO
- Stable operating environment has drawn a multitude of international investors but considerable value remains locked up in PDO's Block 6, with less appetite and lower prospectivity in remaining acreage
- Challenging geology and requirement for EOR technology has resulted in relatively high cost developments
- Oman is a leading proponent of EOR developments in the Middle East, with steam flood, miscible gas and polymer injection projects common
- Oman offers Exploration and Production Sharing Agreements (EPSA) for new contracts. PDO Block 6 remains under concession terms

Oman Crude And Condensate Production By Development

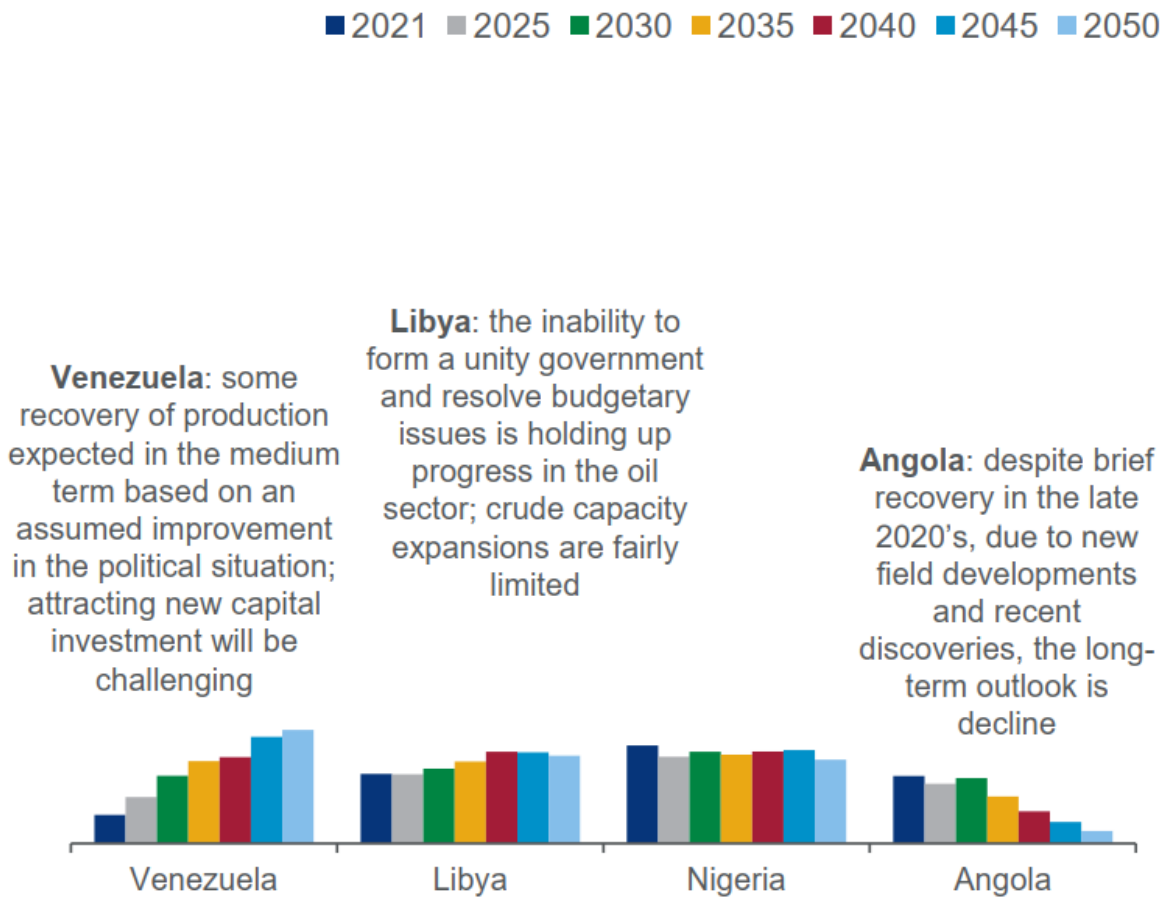


OPEC Crude Capacity

Middle East OPEC crude capacity



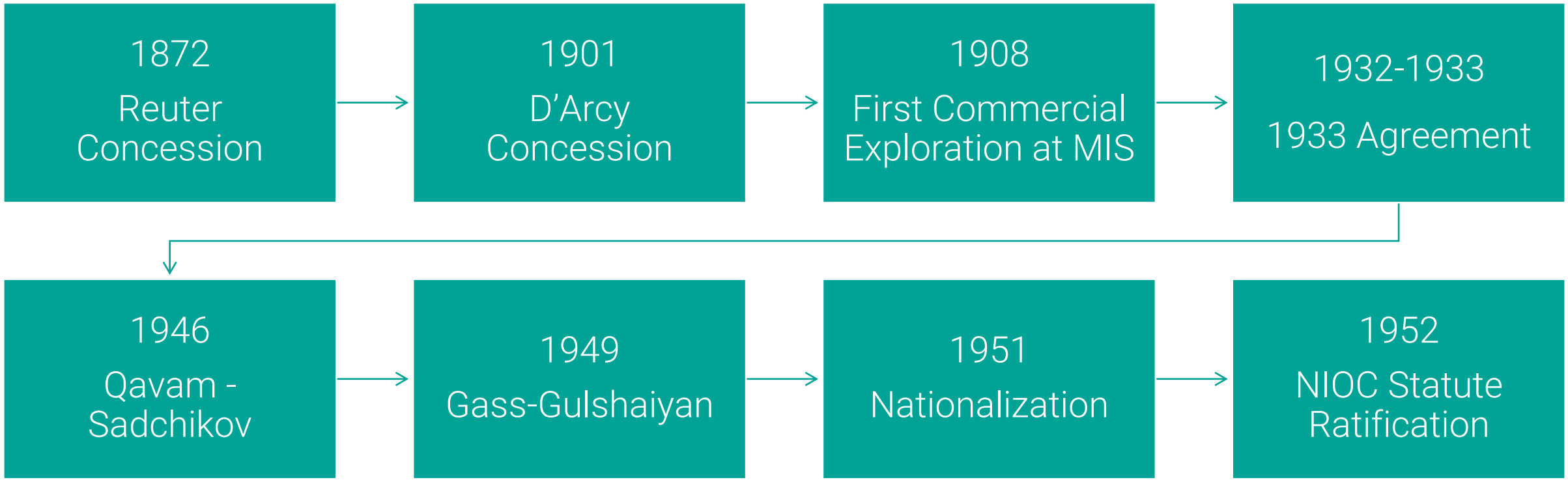
Other key OPEC crude capacity



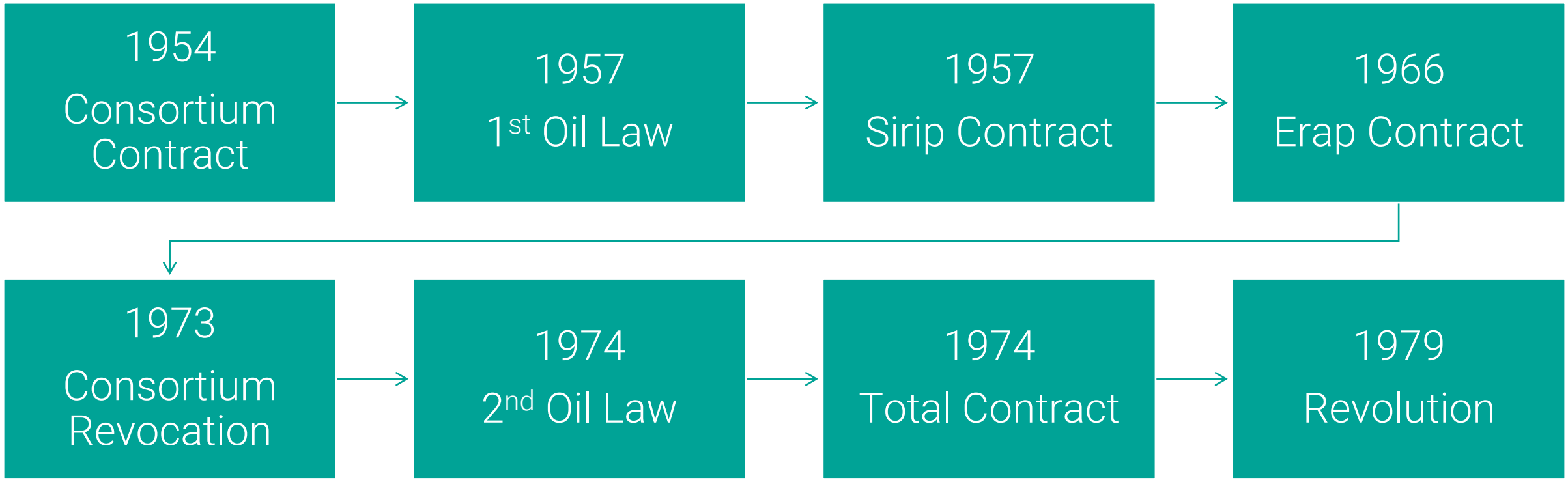
Iran Oil History in Brief

Periods of History

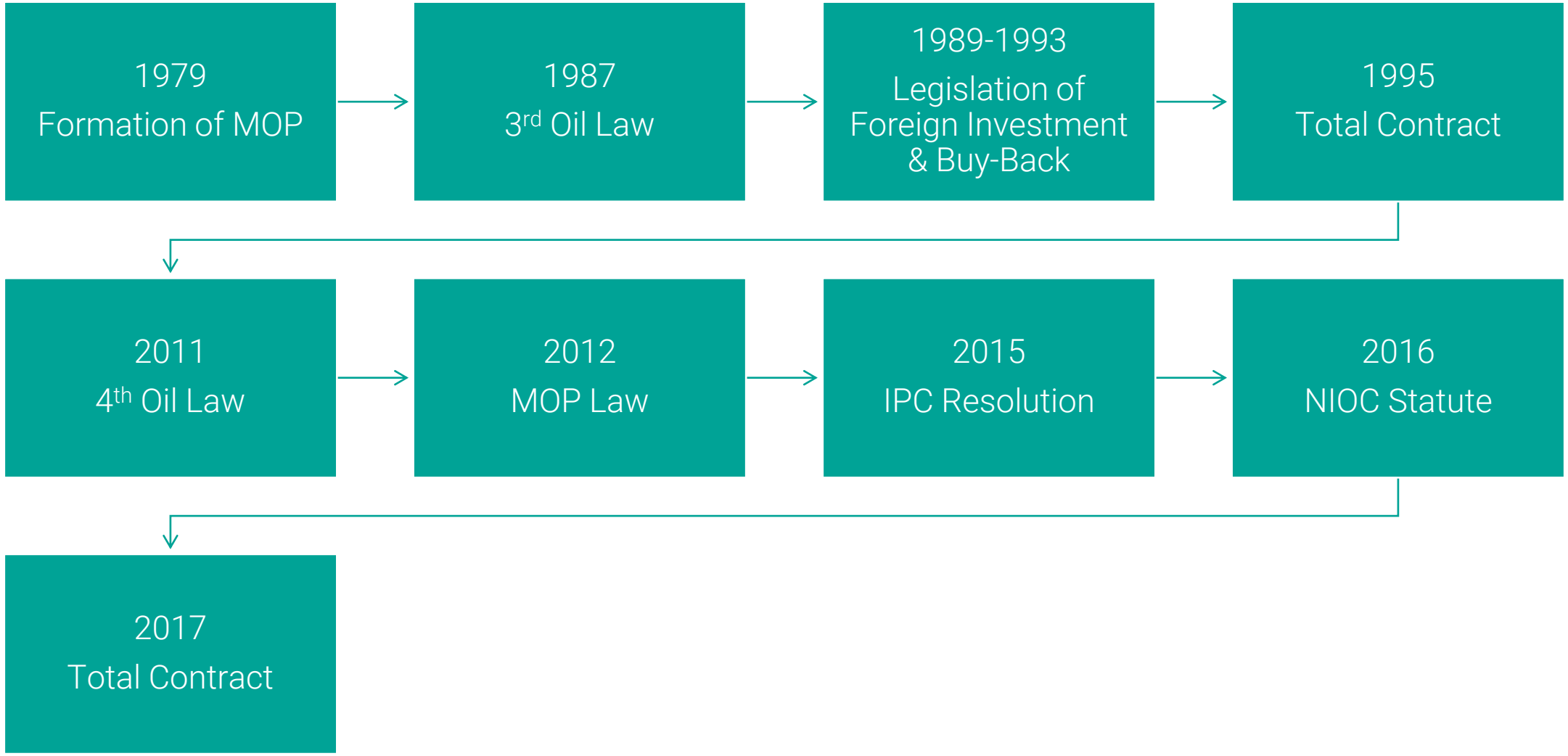
Concessions



Consortium


1954
Consortium Contract
1957
1st Oil Law
1957
Sirip Contract
1966
Erap Contract
1973
Consortium Revocation
1974
2nd Oil Law
1974
Total Contract
1979
Revolution

Service Contracts



Opportunity Management

Opportunity Realization Process

identifies a business opportunity

defines the opportunity objectives and proves its viability

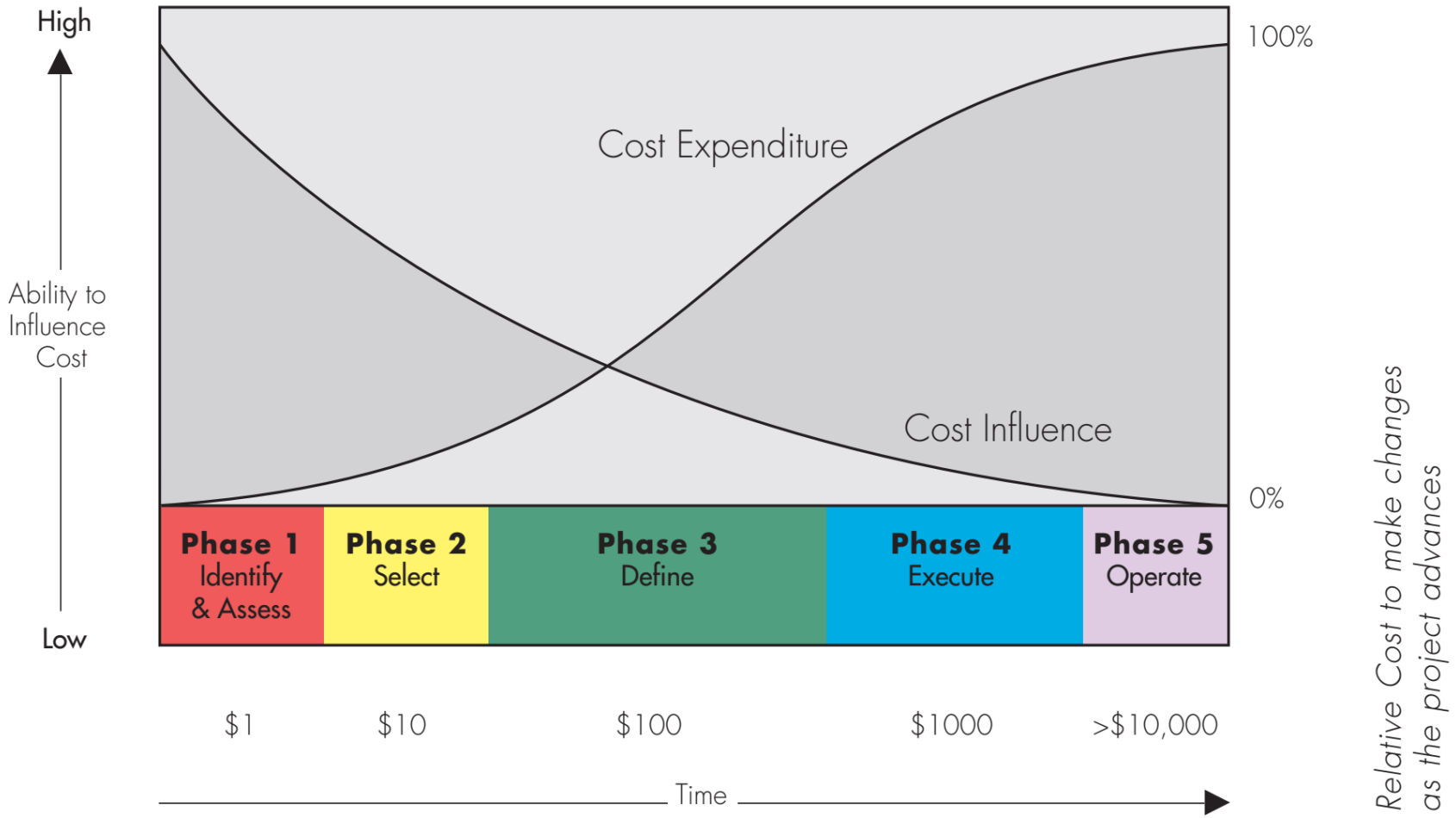
decides the way in which the opportunity will be exploited

develops the opportunity implementation strategy

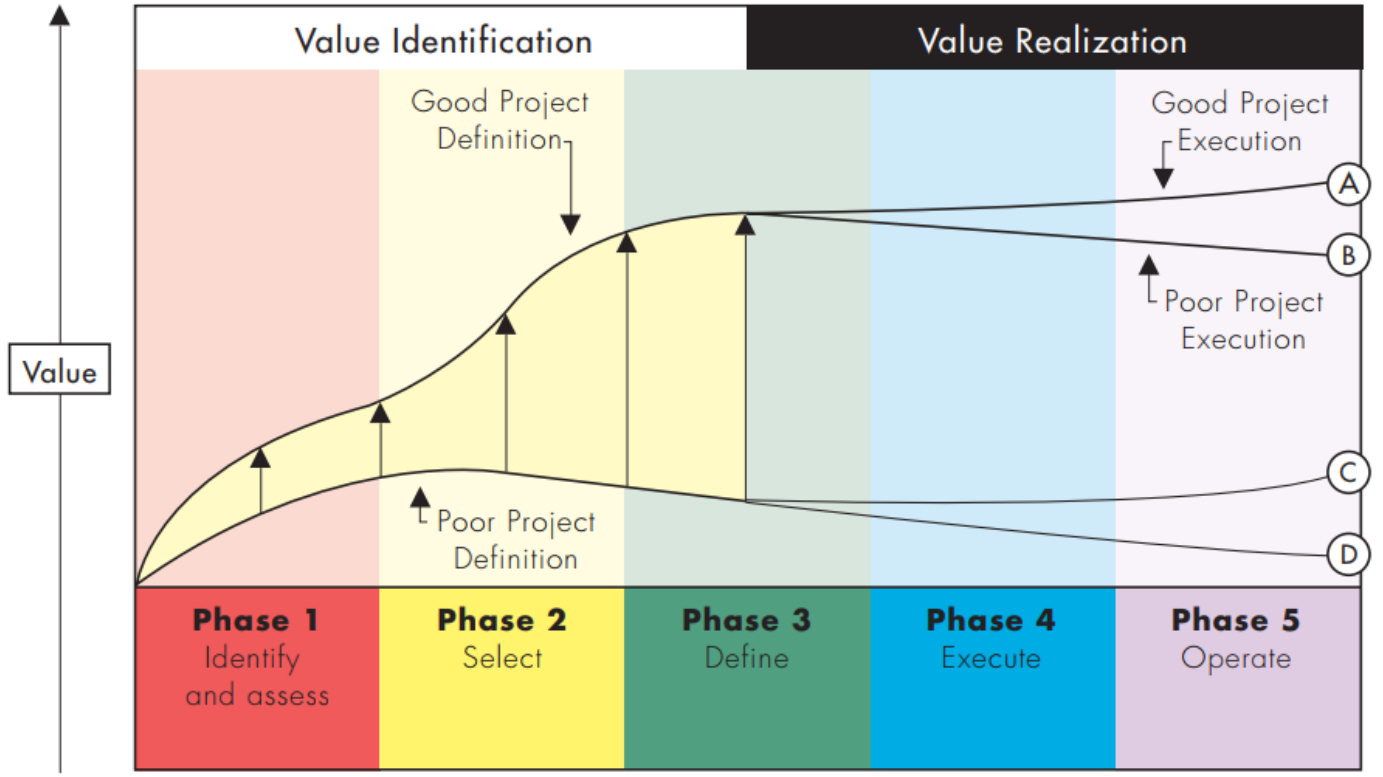
plans and implements the opportunity from the time of generation of the initial idea until an asset is in operation

provides the tools to facilitate the planning and implementation

Ability to Influence final cost over project life



Influence of Front End Loading on Project Outcomes



Legend

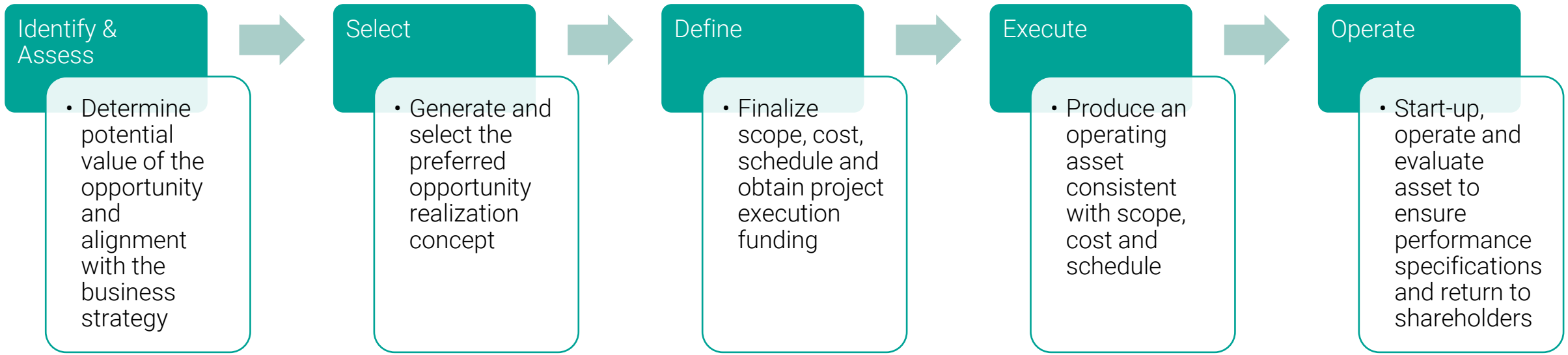
(A) Good project definition and execution

(B) Good project definition and poor project execution

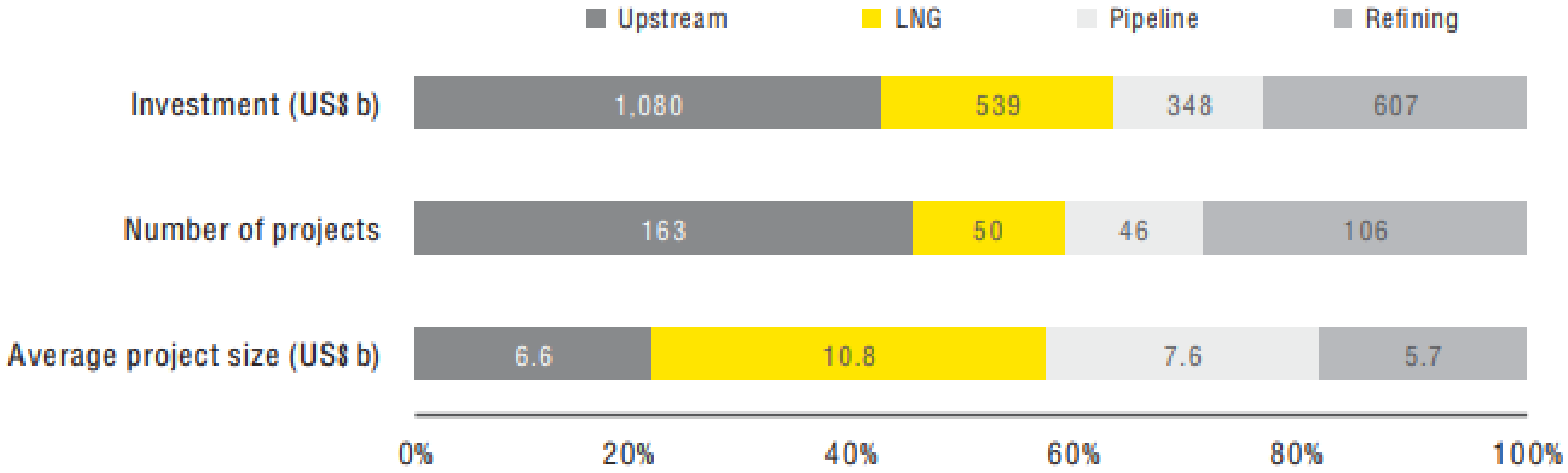
(C) Poor project definition and good project execution

(D) Poor project definition and poor project execution

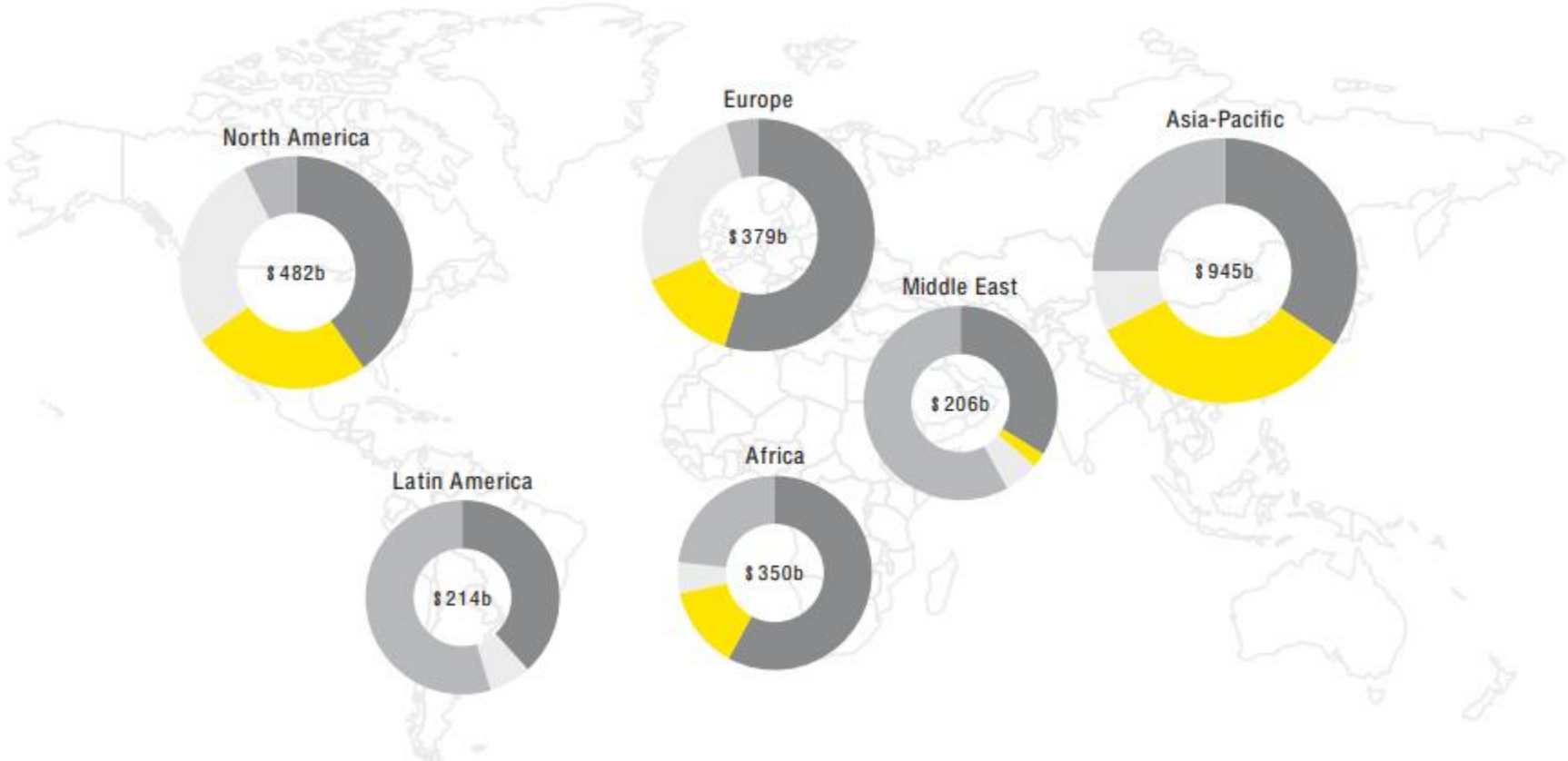
Opportunity Realization Process



Investment And Number Of Projects By Segment



Distribution Of Investment By Region (US$)



Evaluating The Performance Of Megaprojects

Our research shows that the majority of projects are facing delays and/or cost escalations and these overruns are prevalent in all of the segments and geographies.

64% of the projects are facing cost overruns.

73% of the projects are reporting schedule delays.

We evaluated the performance of megaprojects on two criteria – cost and time – to gauge the proportion of projects that are forecast to fail to deliver on budget and schedule. Of the 365 megaprojects, cost data was available for 205 projects and time data for 242.

The study revealed that the majority of the projects were delayed and/or faced cost overruns when measured against estimates made during the initial stages of the project life cycle.

We found that cost and schedule overruns were common in all industry segments and regions, though the data set out in Figure 4 and the map below suggest that certain segments and geographies perform far more poorly than others.

Our findings are largely aligned with the observations of the Independent Project Analysis (IPA) 2011 industry study. In that study, the agency found that 78% of upstream megaprojects faced either cost overruns or delays, a deterioration from 2003, when 50% of the projects were over budget or late.[2]

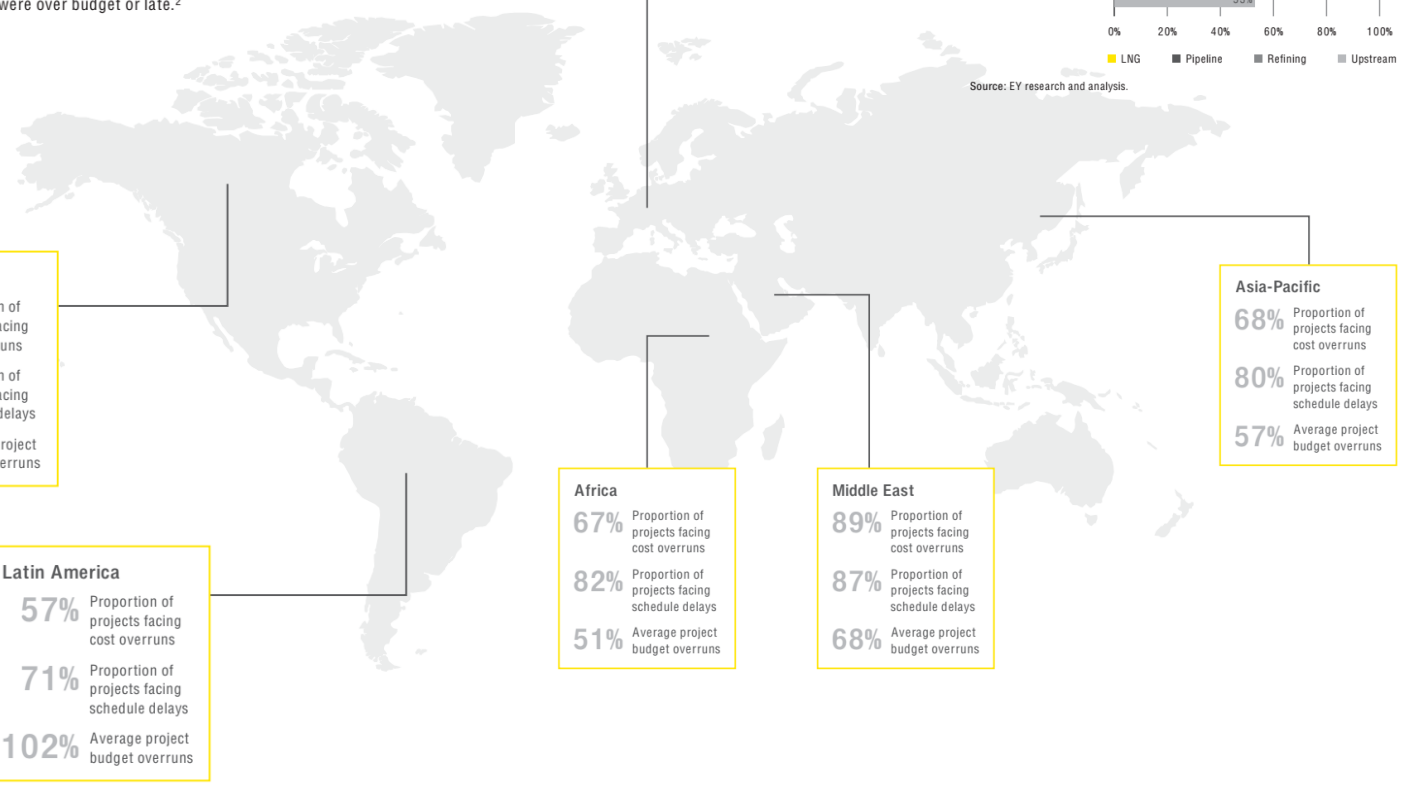
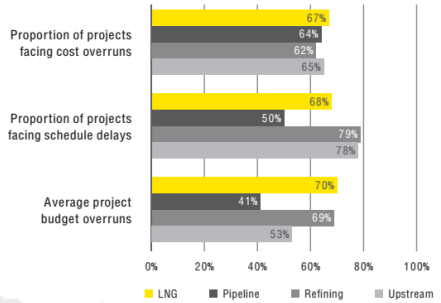


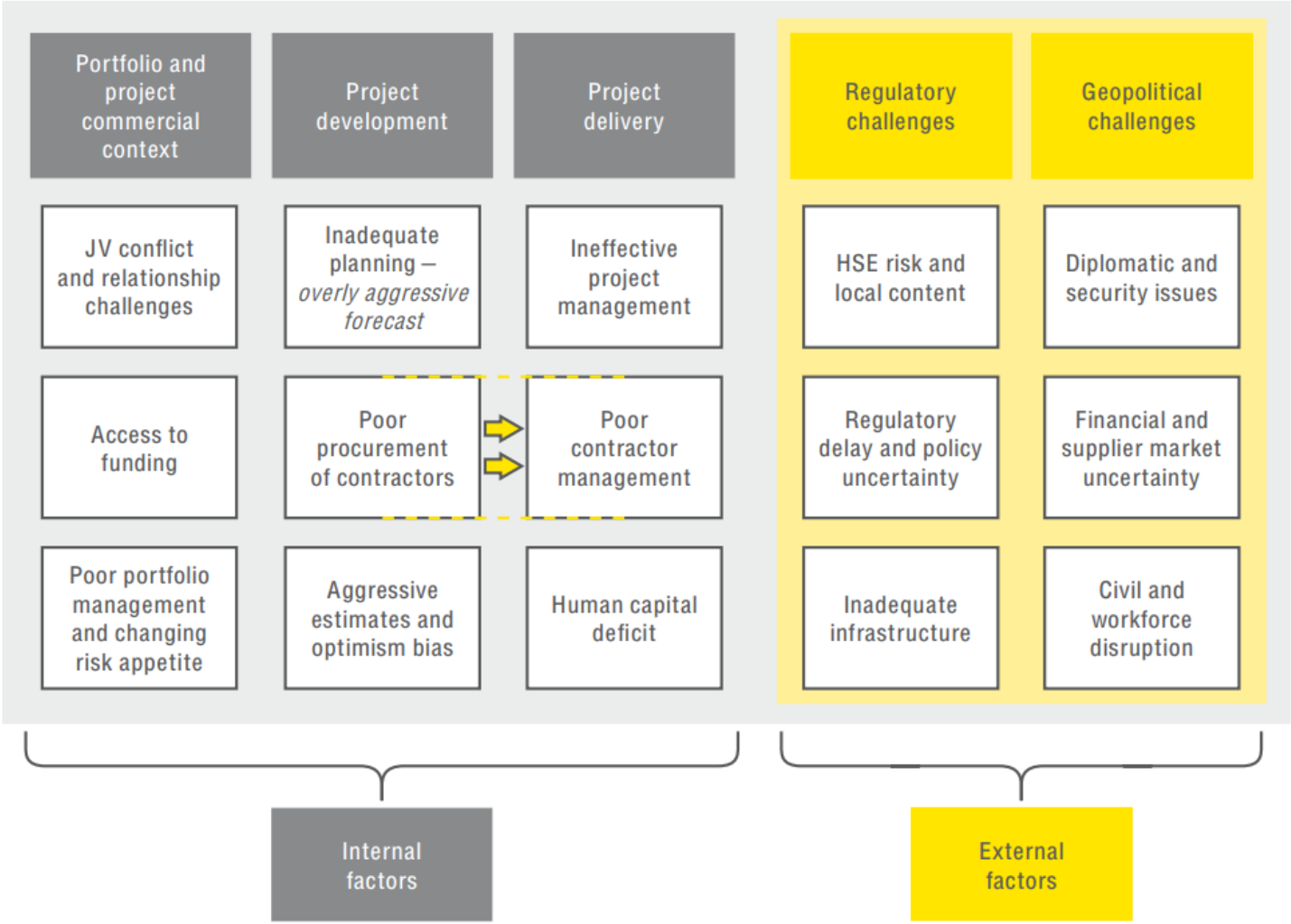
Figure 4: Proportions of projects facing cost overruns, schedule delays and average project budget overruns



Source: EY research and analysis.

[2] "Oil services & equipment, subsea perspectives from an industry observer," Jefferies, 24 January 2014, via Thomson One.

Factors Responsible For Cost Overruns And Delays



Opportunity Realization: Key Processes

Strategic

The processes that enable the opportunity to be defined and enable plans and strategies to be developed to realize the maximum value of the opportunity

Control

The processes that are used to plan and control the outcome of the Work Processes.

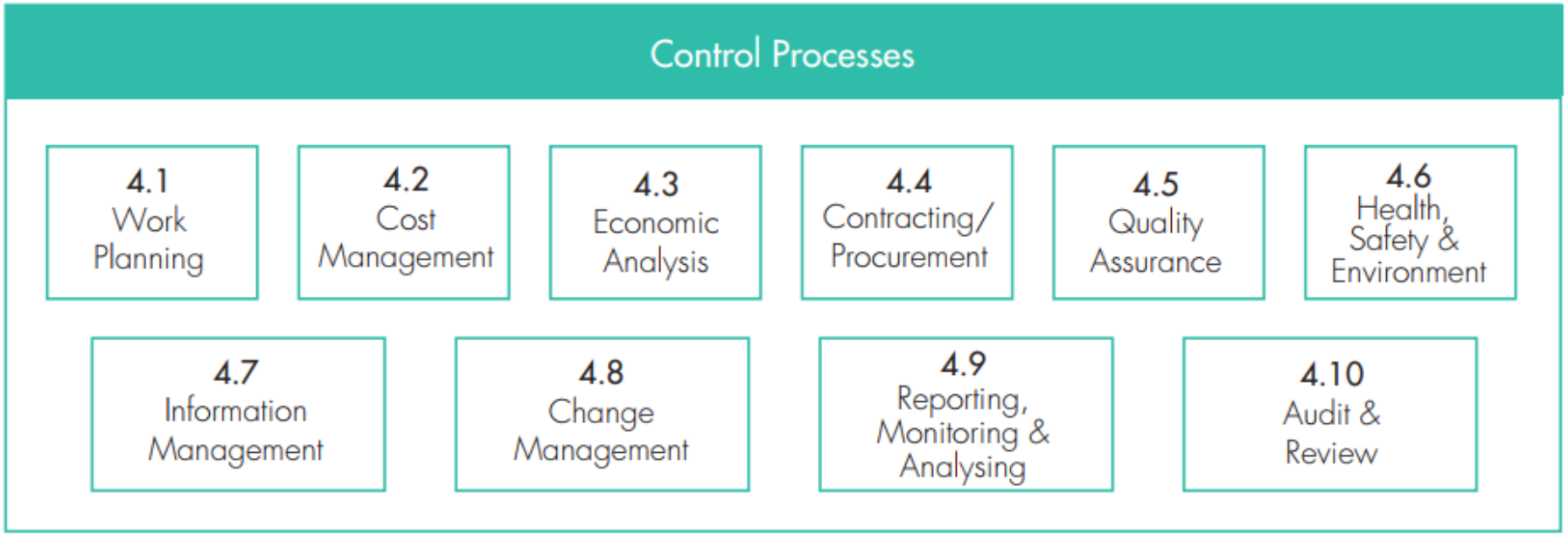
Work

those processes that are used to get work done in each of the ORP phases

Strategic Processes

Strategy Formation	Risk Management	Improvement	Finance	People
Defining the opportunity and developing strategies for realisation of its maximum value.	Identifying the risks that impact the value of the opportunity and developing and implementing plans to manage those risks.	Recognizing the value drivers and their critical success factors and developing and implementing plans for these that will improve the value of the opportunity.	Developing and implementing the budget and approvals strategy.	Determining the organisational requirements and how these will be supplied and forming and motivating the team.
Opportunity Framing Sustainable Development Asset Reference Planning Operations Philosophy Project Execution Planning Contracting Strategy Technology Planning	Downside Risk Upside Risk Insurance	Value Creation Areas and Value Drivers Performance Indicators Stretch Targets Critical Success Factors Improvement Plans Banking the Gains	Capital Allocation Process Budgets	Leadership Values, Attitudes and Behaviours Organisation Resourcing Roles and Responsibilities Skills and Competencies

Control Processes

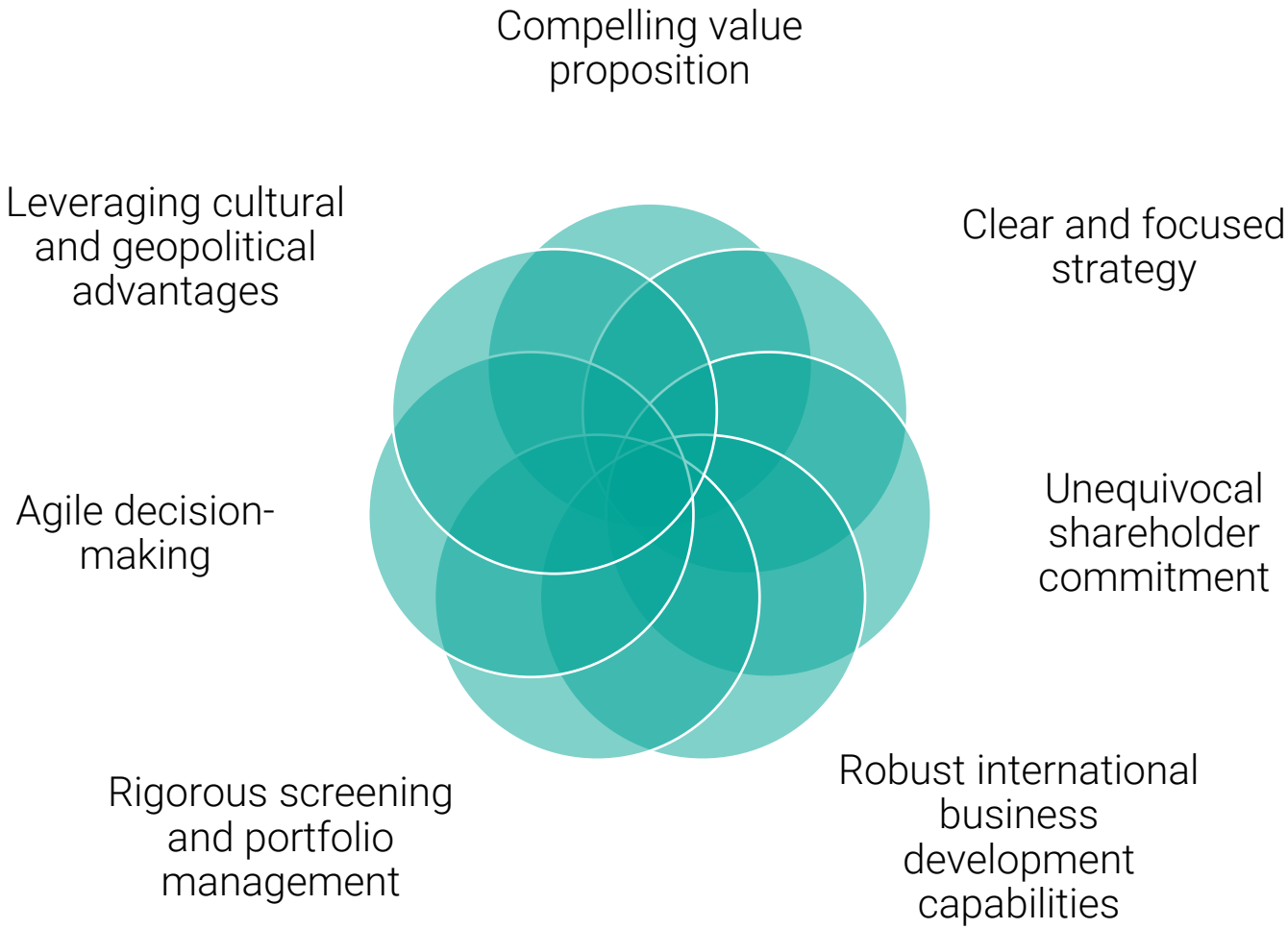


Word Processes

Phase 1 Identify & Assess	Phase 2 Select	Phase 3 Define	Phase 4 Execute	Phase 5 Operate
Portfolio Management			Detailed Design	Start-up
Venture Generation			Procurement	Production
Exploration			Construction	Maintenance
Concept Identification	Appraisal Concept Selection	Concept Definition	Commissioning Prepare for Operations	Inspection Reservoir Management
Well Engineering	Well Engineering	Well Engineering	Well Engineering	Well Engineering
Materials Management	Materials Management	Materials Management	Materials Management	Materials Management
Logistics Management	Logistics Management	Logistics Management	Logistics Management	Logistics Management

Business Strategies

Key Success Factors for Internationalization of NOCs



Main Decisions

Business model

- What do we want to be known for in the future?

Growth objectives & portfolio structure

- How big do we want to be?

Operatorship targets

- What is our target balance between operatorship and non-operatorship of portfolio assets?

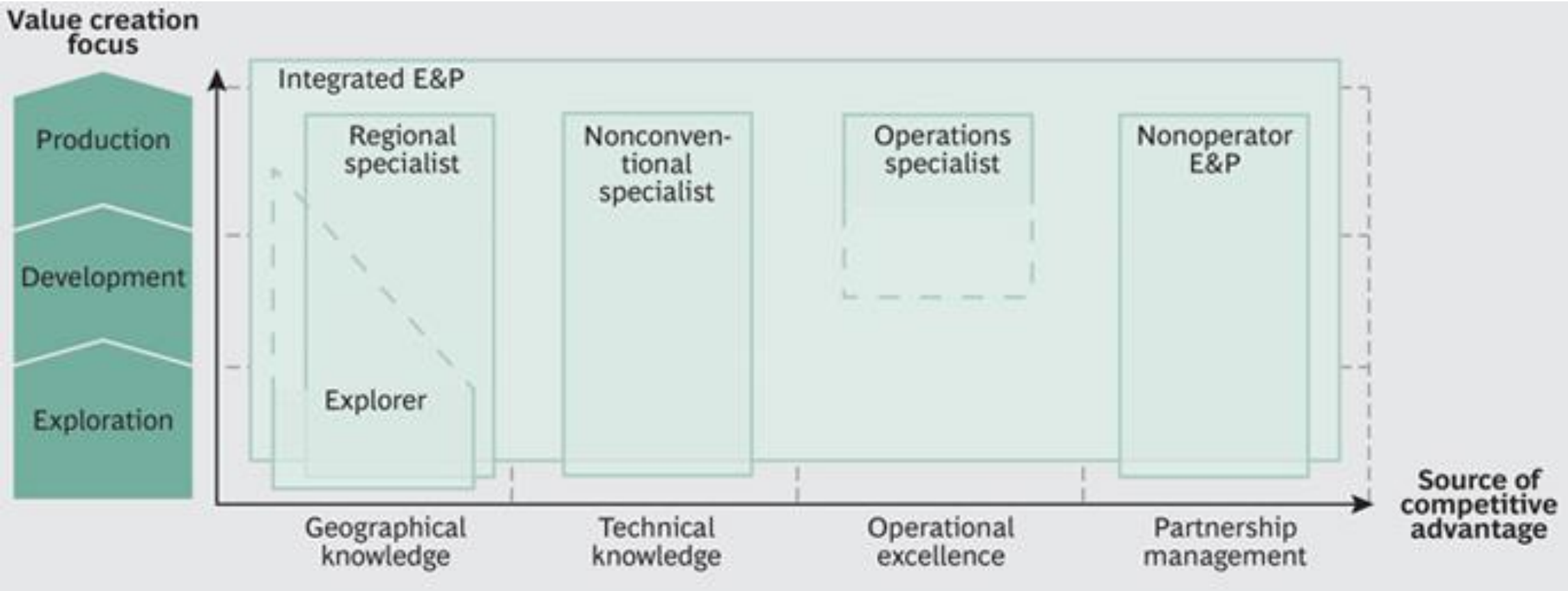
Risk appetite

- What is our appetite for risk?

Financing approach

- What financing approach is needed to support our growth strategy?

6 business models



6 E&P Business Models

Integrated E&P players (Anadarko, Premier Oil, & Apache):

- Balanced portfolio across technologies, geographies, and phases life cycle.

Explorers (Cairn Energy, Kosmos Energy, & Cove Energy)

- Concentrate on exploration of frontier areas and early monetization of discoveries.

Regional specialists (Pacific Rubiales Energy, Afren, & Pluspetrol):

- Specific countries with established presence & high degree of familiarity.

Nonconventional specialists (Chesapeake Energy, Canadian Oil Sands, & Husky Energy):

- Such as heavy oil, shale oil, and oil sands.

Operations specialists (including Perenco, Black Elk Energy, & Occidental Petroleum):

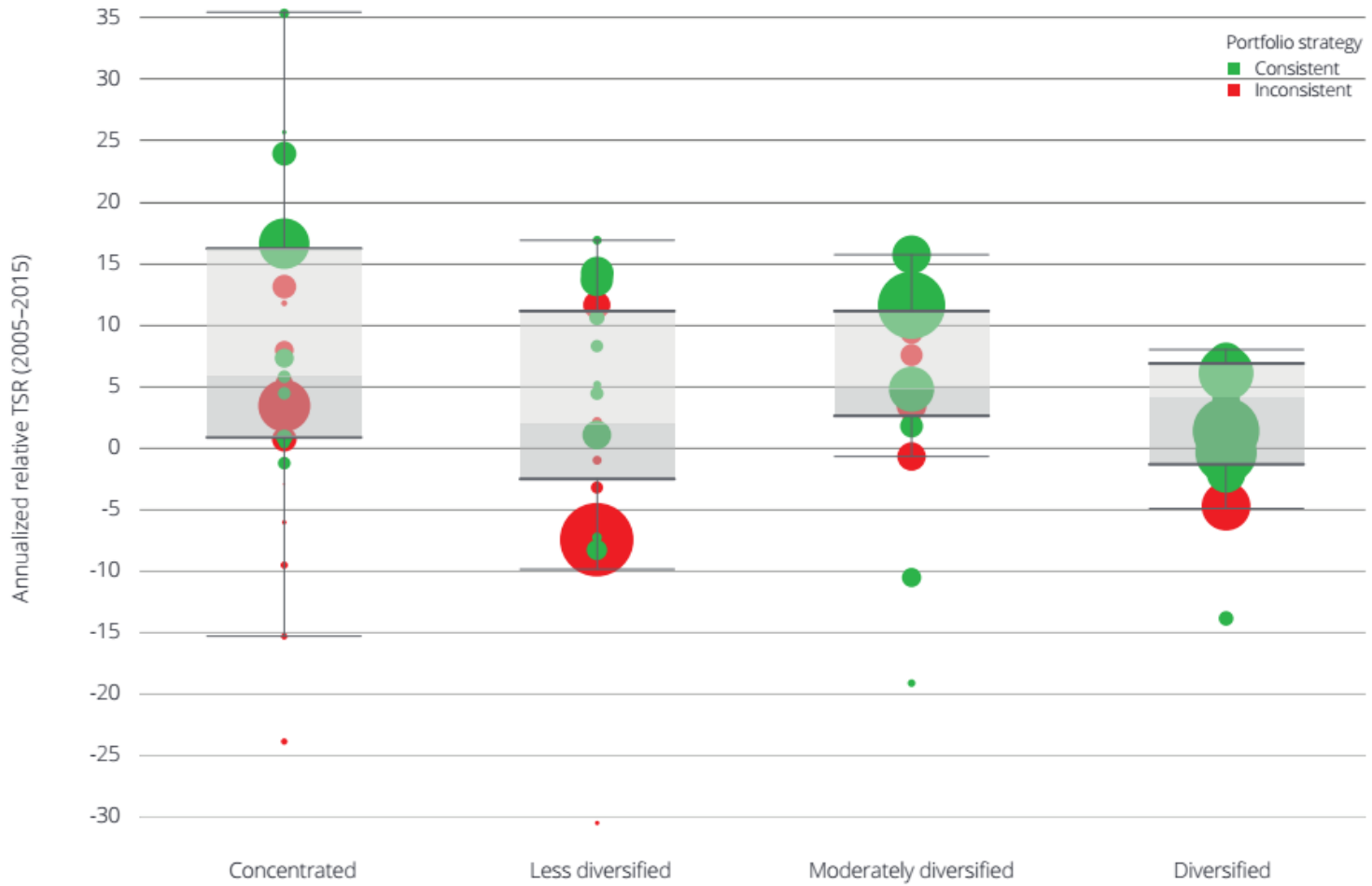
- Efficient extraction from existing fields.

Non-operator E&P players (Mitsui & Co. & Galp Energia)

- Use their relationships with NOC's and governments to gain access to high-quality assets & manage those assets but do not act as operators.

Deloitte Upstream Diversification Index

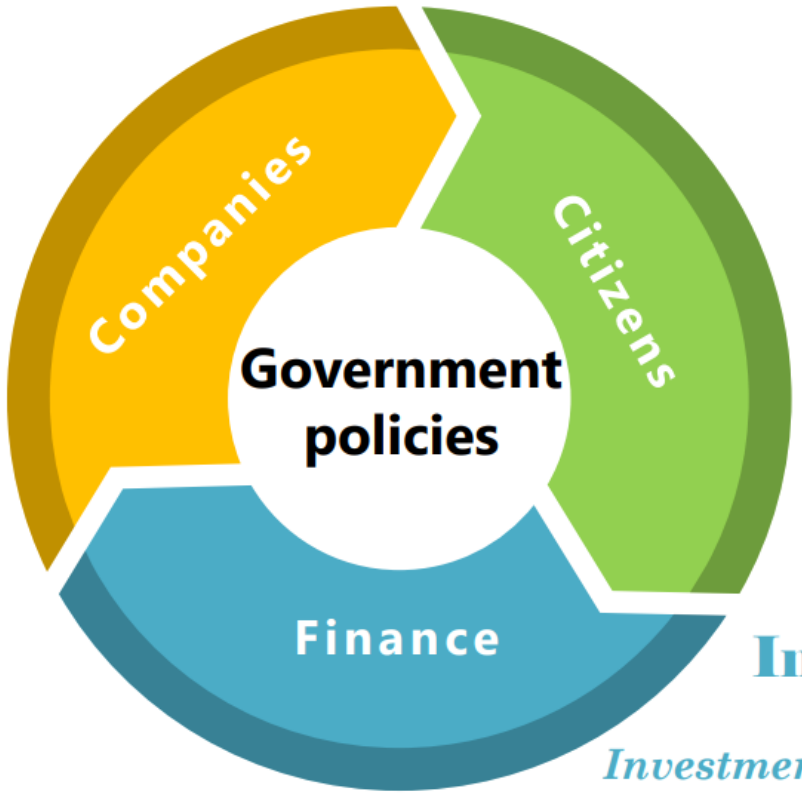
- Production Mix
- Region
- Resource
- Basin
- Investment Cycle



Oil and gas capability areas

Capability Area	Description	Example
E&P value chain	Capabilities with respect to a particular part of the E&P value chain	**Occidental** Enhanced oil recovery
Core region	Capabilities with respect to operating in a particular geographic area	**Lundin** Norwegian North Sea
Play types	Capabilities regarding exploration in particular geological play types	**Tullow Oil** Rift basins, stratigraphic traps
Technology	Capabilities in application of a particular specific technology	**Statoil** Harsh environments
Operational	Capabilities to combine various technologies and operating practices	**EOG** U.S. shale plays
Product	Capabilities relating primarily to one particular product	**BG** Gas value chain
Partnerships	Capabilities in establishing and leveraging partnerships	**Wintershall** Gazprom partnership
Political situation	Capabilities to operate under particular political circumstances	**BP** Russia
Commercial situation	Capabilities to secure assets in particular commercial situations	**Apache** Bilateral negotiations

Net-zero by 2050 Demands Unprecedented Efforts



Build wind onshore and offshore
Eliminate flaring
Improve product efficiency
Hydrogen
Equip with CCUS
Deploy solar
Widespread digitalisation
Fuel-cell trucks
Low-carbon gases
Innovation
Low-emissions shipping
Extend and digitalise grids
batteries & electrolysers
Modernise hydropower
Advanced biofuel production
Expand nuclear power & develop SMRs

Electric cars
Install batteries and solar at home
Buy energy efficient appliances
Walk or cycle short trips
Turn down air conditioning
Fly less often
Work from home
Upgrade home heating to heat pumps
Drive more slowly
Increase recycling
Retrofit homes

Clean electricity investment
Invest in innovation
Align portfolios with low-emissions activities
Develop new financial tools to unlock private capital
Investment guidelines
Improve bankability of efficiency investments
Manage risks for new technologies
Increase investment in renewables

Portfolio Management Components

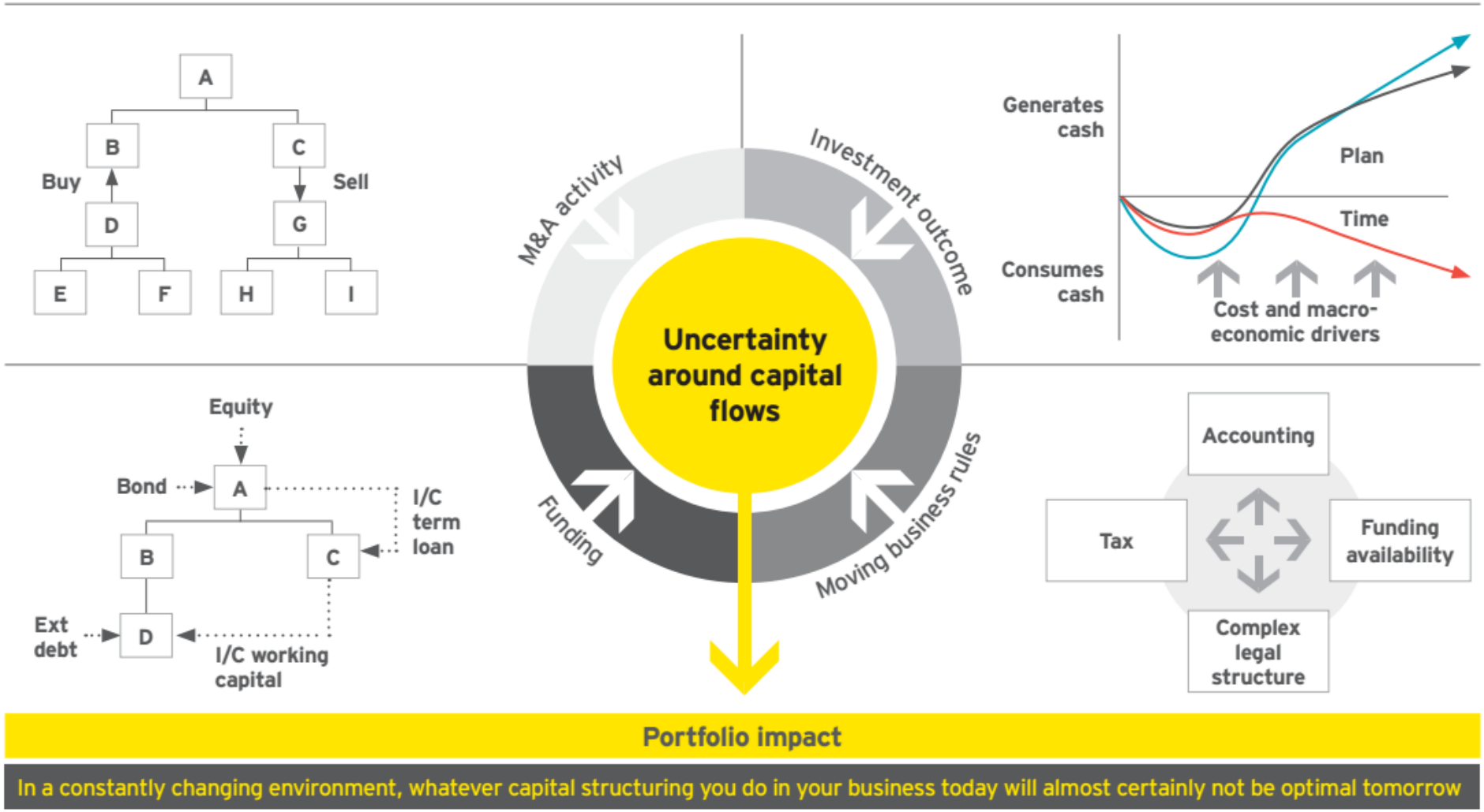
Optionality

- A company has optionality if it can quickly, effectively & efficiently shift its focus from underperforming businesses, assets & projects to better-performing ones that fit with its current strategy and enhance the overall value of the portfolio.

- A company will best leverage its optionality if it can:

1. Proactively identify potential changes in its operating environment and review the impact of these changes on its project and portfolio
2. Rapidly decide on a suitable course of action that would at the very least preserve, but ideally enhance, the value of its portfolio
3. Act in a timely, cost-efficient and effective manner

Optionality at the corporate level



Shifts in Business Strategy

Company	Enhancing traditional oil and gas operations			Deploying CCUS		Supplying liquids and gases for energy transitions		Transitioning from fuel to "energy companies"			
	Reducing methane emissions	Reducing CO_2 emissions	Sourcing renewable power	For centralised emissions	For EOR	Low-carbon gases	Advanced biofuels	Solar PV and wind generation	Other power generation	Electricity distribution/retail	Electrified services / efficiency
BP	●	●	◐	◐	◐	●	◐	●	◐	◐	●
Chevron	●	◐	●	●	◐	◐	◐	◐	○	○	◐
Eni	●	◐	●	◐	◐	◐	●	●	●	●	◐
ExxonMobil	●	◐	●	●	◐	◐	◐	○	○	○	○
Shell	●	●	●	●	◐	●	◐	●	●	●	●
Total	●	●	●	◐	◐	●	●	●	●	●	●
CNPC	◐	○	◐	◐	●	◐	◐	●	○	○	○
Equinor	●	●	●	●	◐	◐	◐	●	○	◐	◐
Petrobras	◐	◐	●	●	●	●	◐	◐	●	◐	○
Repsol	●	●	◐	◐	◐	◐	◐	●	●	●	◐

Notes: PV = photovoltaic. **Full circle** = growth area supported by observed strategic investments (e.g. M&A) and/or capital/operational expenditures in commercial-scale activities; **half circle** = announced strategy and/or minor investments, venture capital and/or research and development (R&D) spending; **empty circle**= limited evidence of investment activity. **For methane and CO_2 emissions**, which are not based on project and spending data, assessments reflect the presence and strength of methane reduction and emissions intensity targets, as well as evidence of their implementation, the emissions intensity trend of new investment, transparent reporting of absolute emissions and sources, and linking of executive and staff compensation to achieving goals. Power generation and efficiency investments in the Transitioning category pertain to projects destined for commercial sales (not own use). Electrified services include battery storage and EV charging. Low-carbon gases include low-carbon hydrogen and biomethane.

Changes to Follow

Resource abundance and importance of costumer preference

More competitive and productive landscape for the industry

Major changes in global economy shape and living standards

Lower for longer prices and peak demand for liquid fuels

Digitalization of the world economy with effects on the industry

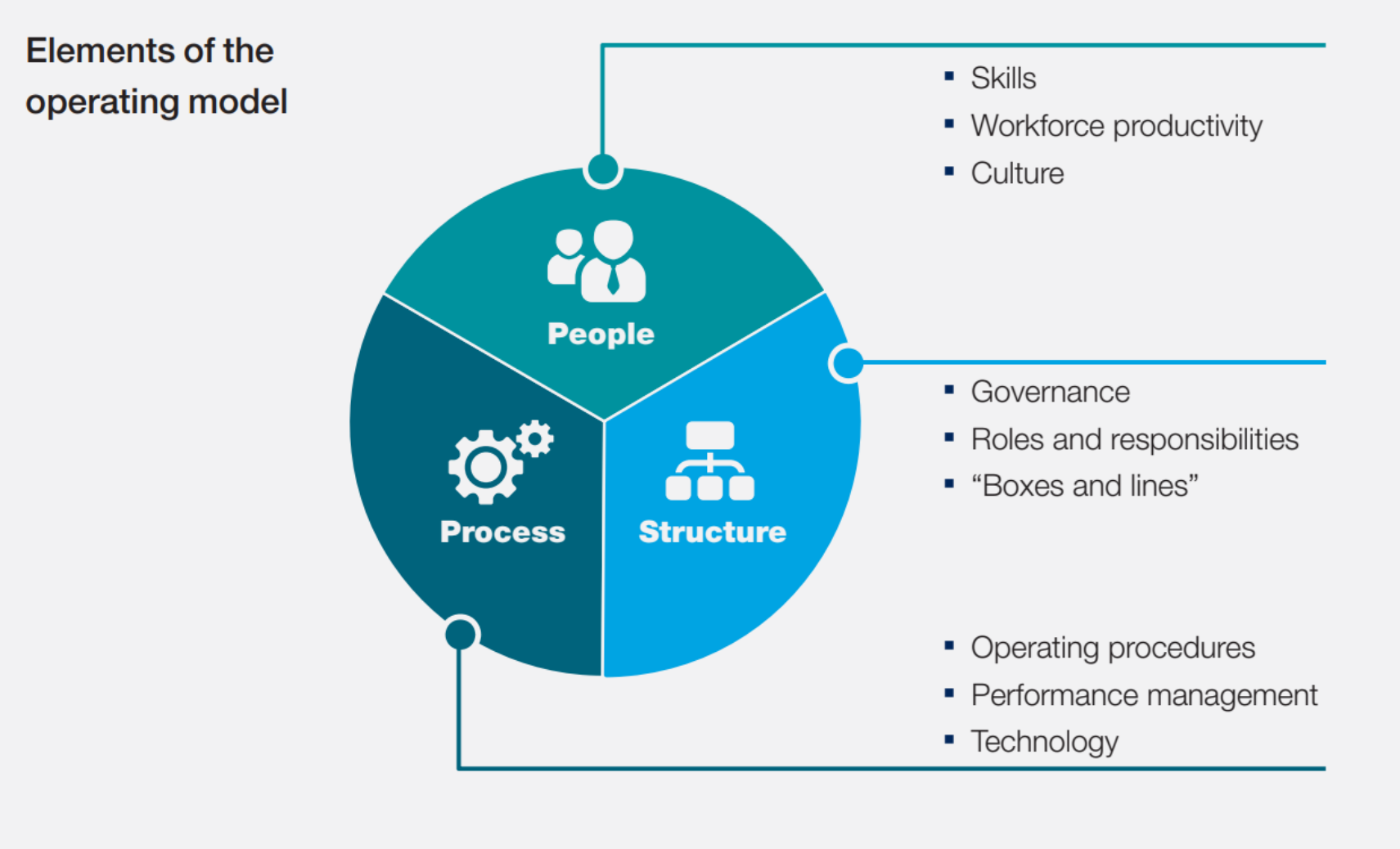
Increasing pressure from regulators and society to lower emissions

Strategic Decisions

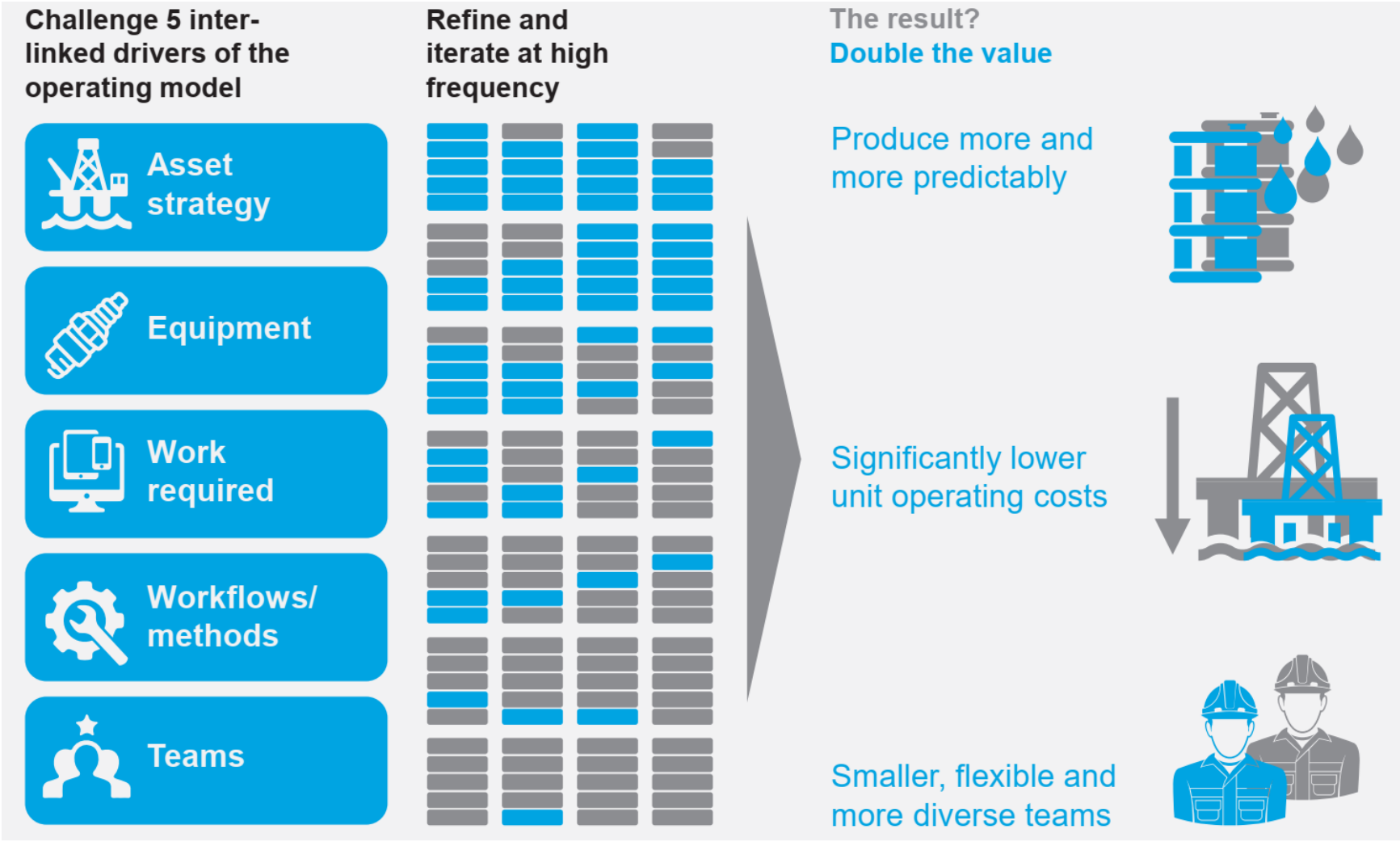
Focus on Core Competencies	Deploying key internal capabilities and divesting non-core assets through bold M&A action (DNO, BP, Perenco)
Diversification and Internationalization	Developing into other geographies and investment in new opportunities (QP)
Low-carbon Investment	Investment in gas and renewables with a focus on carbon capture and hydrogen (BP)
Integration and Consolidation	Mergers of several assets and building integrated companies (Aramco, OQ, ADNOC)
Partnership	Leveraging technical and financial capabilities and securing supply chain from sourcing to sales (ADNOC)

Strategic Tools

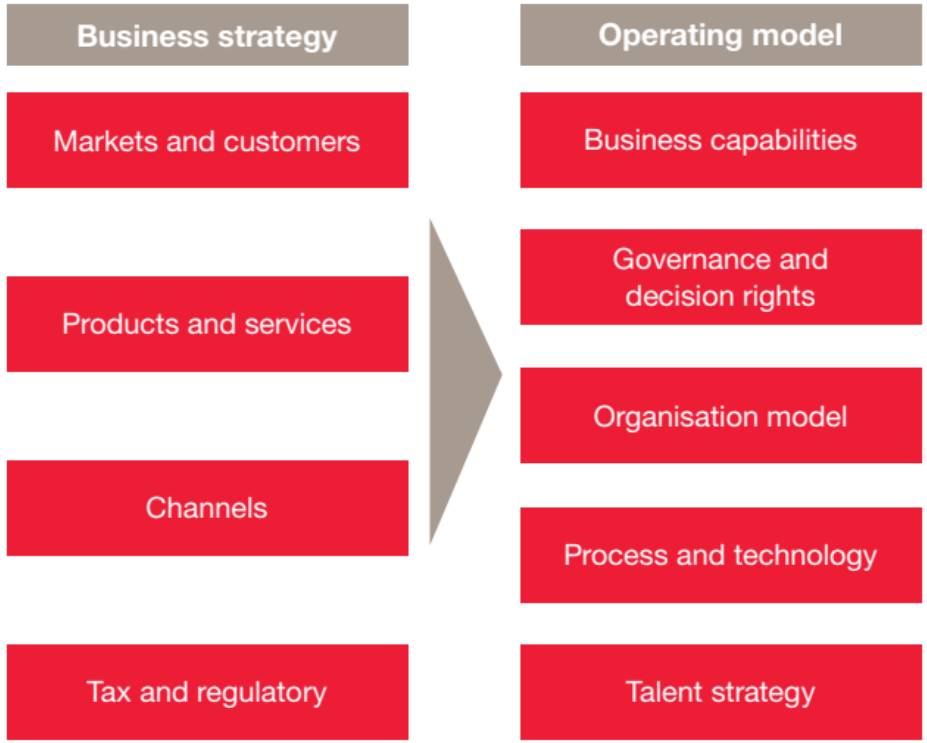
Operating Model



Optimum Operating Model for Operators



From Business Strategy to Operating Model



Key questions

Organisation strategy:

- What is your go-to-market strategy?
- To what extent should governance and decision rights occur at the global or regional level?
- To what extent do the organisation principles centre around product, geography, customer or function?

Organisation capabilities:

- How important is it to develop experts across products, geographies, customers or functions?
- What are the required organisation capabilities and what is your talent sourcing strategy to fill critical gaps (such as build, buy or rent)?
- What is the degree of emphasis on product innovation?

Business performance objectives:

- To what degree is the overall organisation strategy focused on profitability vs. growth?
- To what degree is cost containment/reduction a priority?
- To what degree is operational excellence emphasized as a competitive advantage?

Culture and management practices:

- To what degree do you empower employees to make decisions?
- To what degree is the organisation culture consistent throughout the organisation?
- Where are there inconsistencies in management practices that should be addressed?

Operating Model as a Bridge

Why are we doing this?

Leaders have increased visibility into the impacts and trade-offs of strategic decisions on day-to-day operations and initiatives.

What are we doing?

An operating model translates strategic intent into operational capabilities. It serves as the foundation for execution and provides a clear guide for enterprise leadership team, line managers and operational teams.

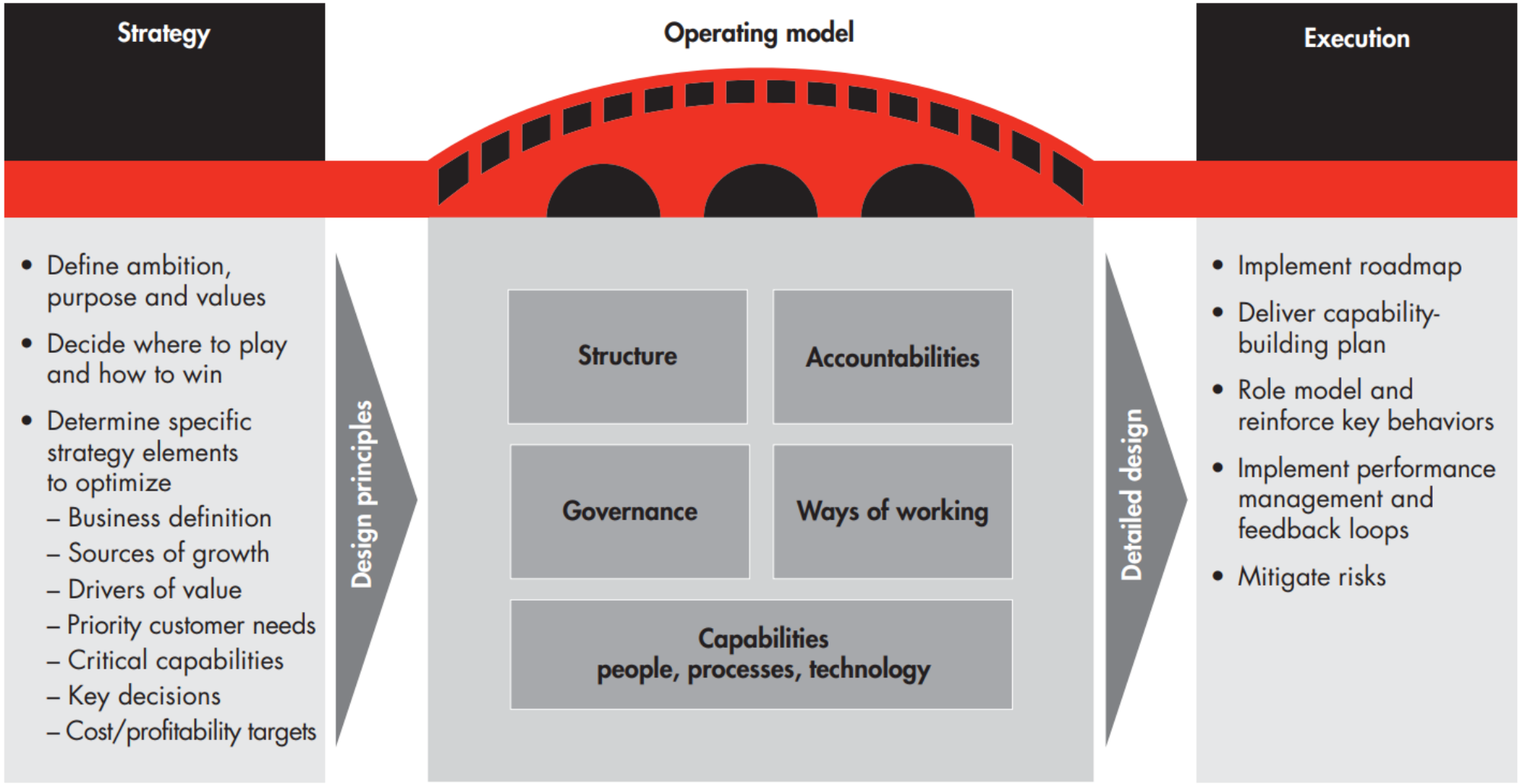
How do we do things?

It allows employees to increase engagement in strategy, providing a clearer view on how it affects their roles, processes, teams and supporting technology.

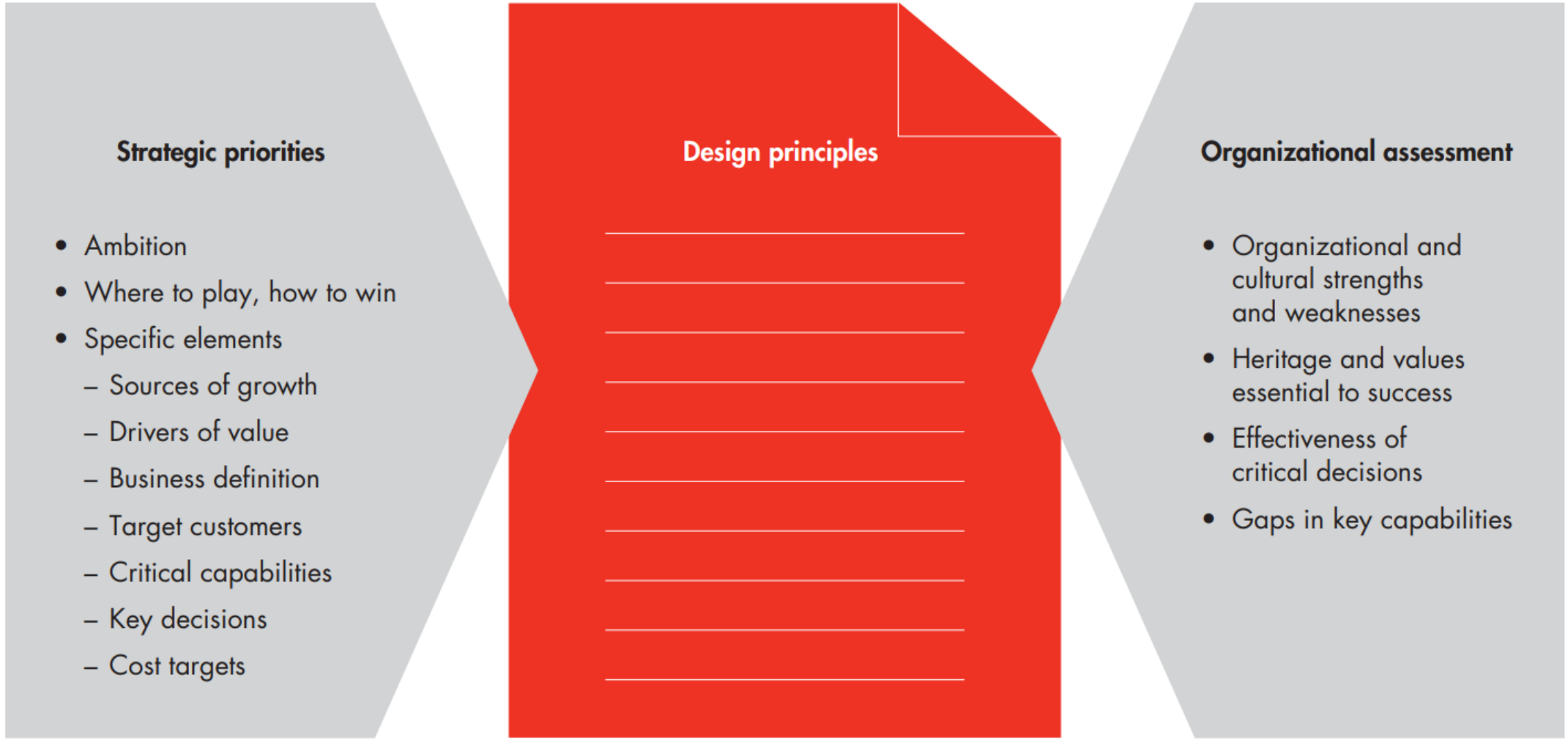
Example artifacts: Strategy articulation document, purpose, policies, organizational roadmap

Example artifacts: Process maps, procedures, guidelines, work instructions, standards, tools and systems

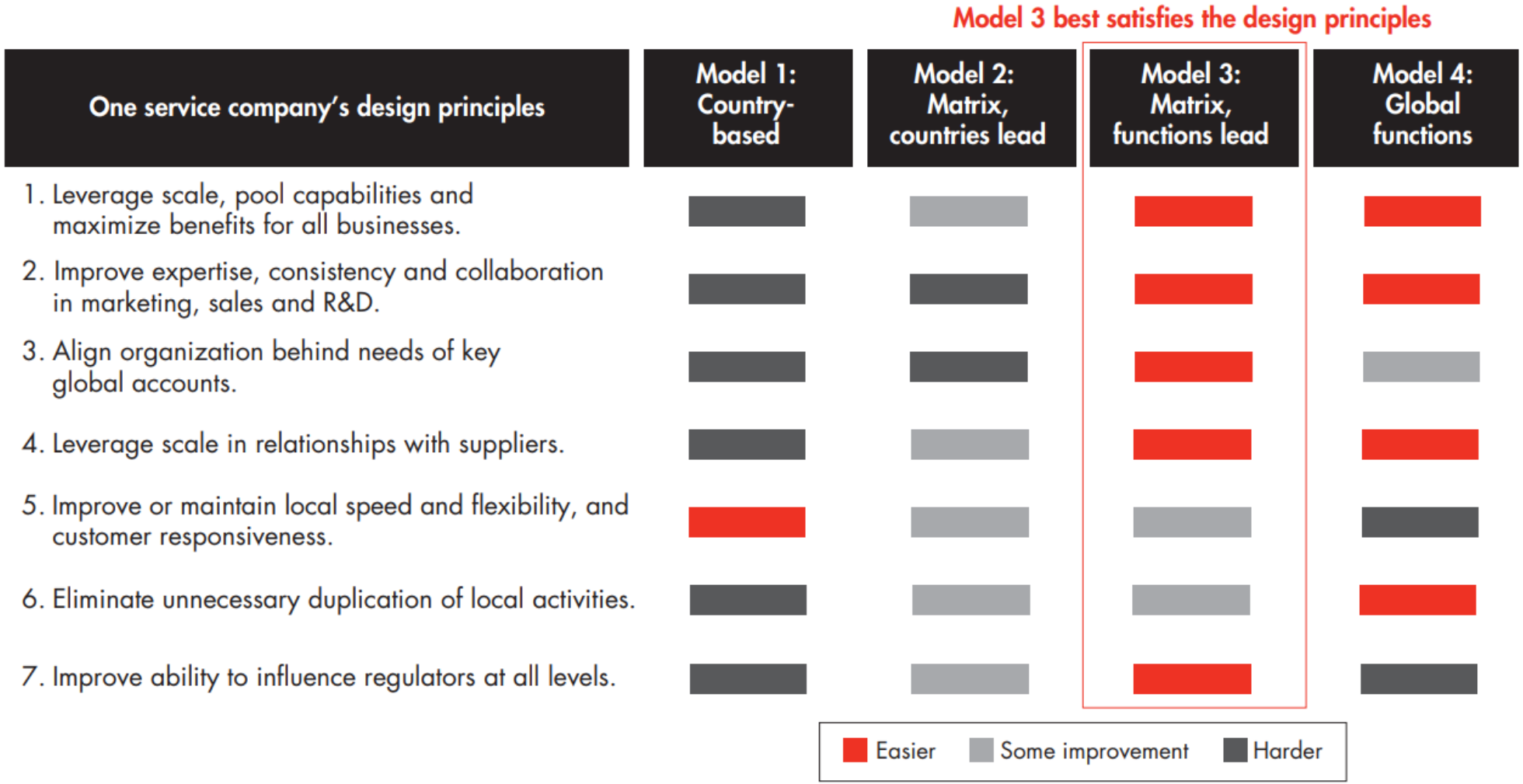
Operating Model as a Bridge



Design Principles



Operating Model Alternatives



The Persian Puzzle

Key Issues

Energy

- Efficiency
- Subsidies
- Sustainability
- Emission

Oil & Gas

- Investment
- Fiscal Regime
- Governance
- Technology

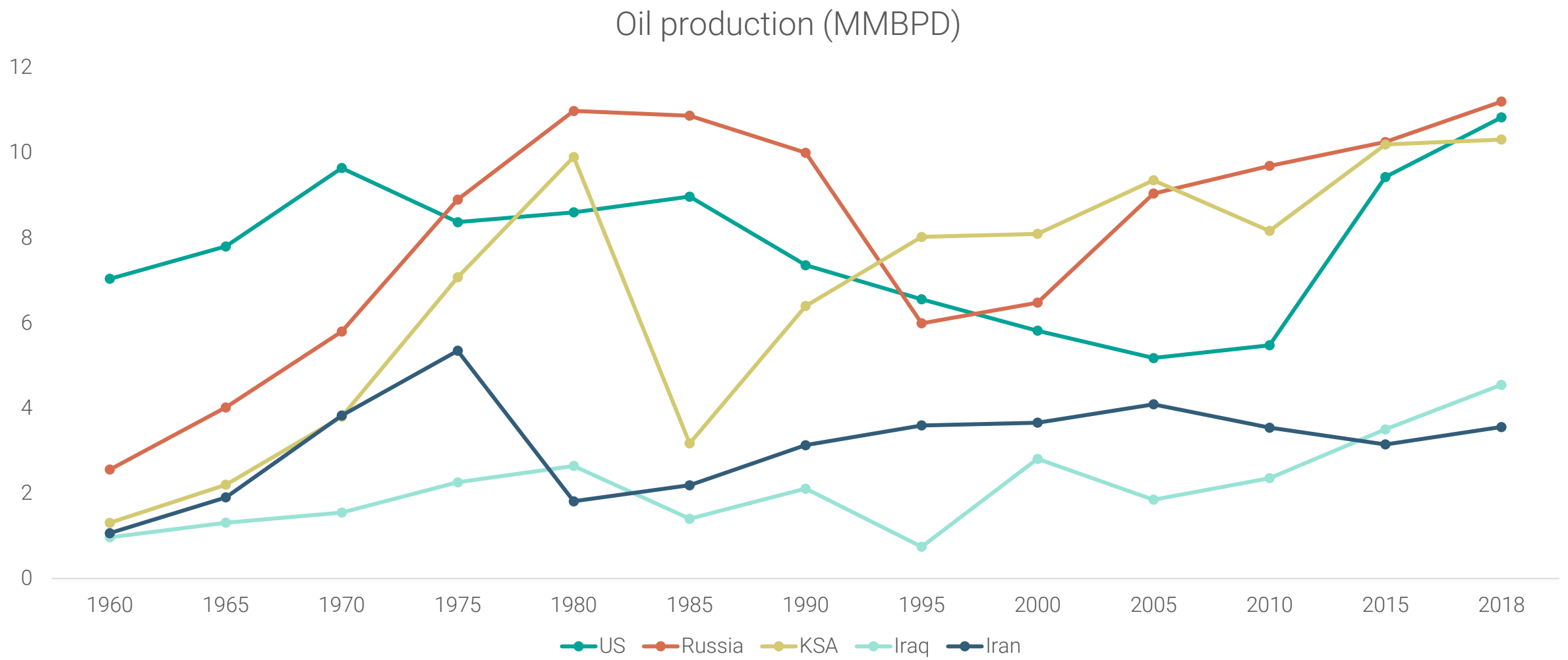
Power

- Efficiency
- Emission
- Pricing
- Investment

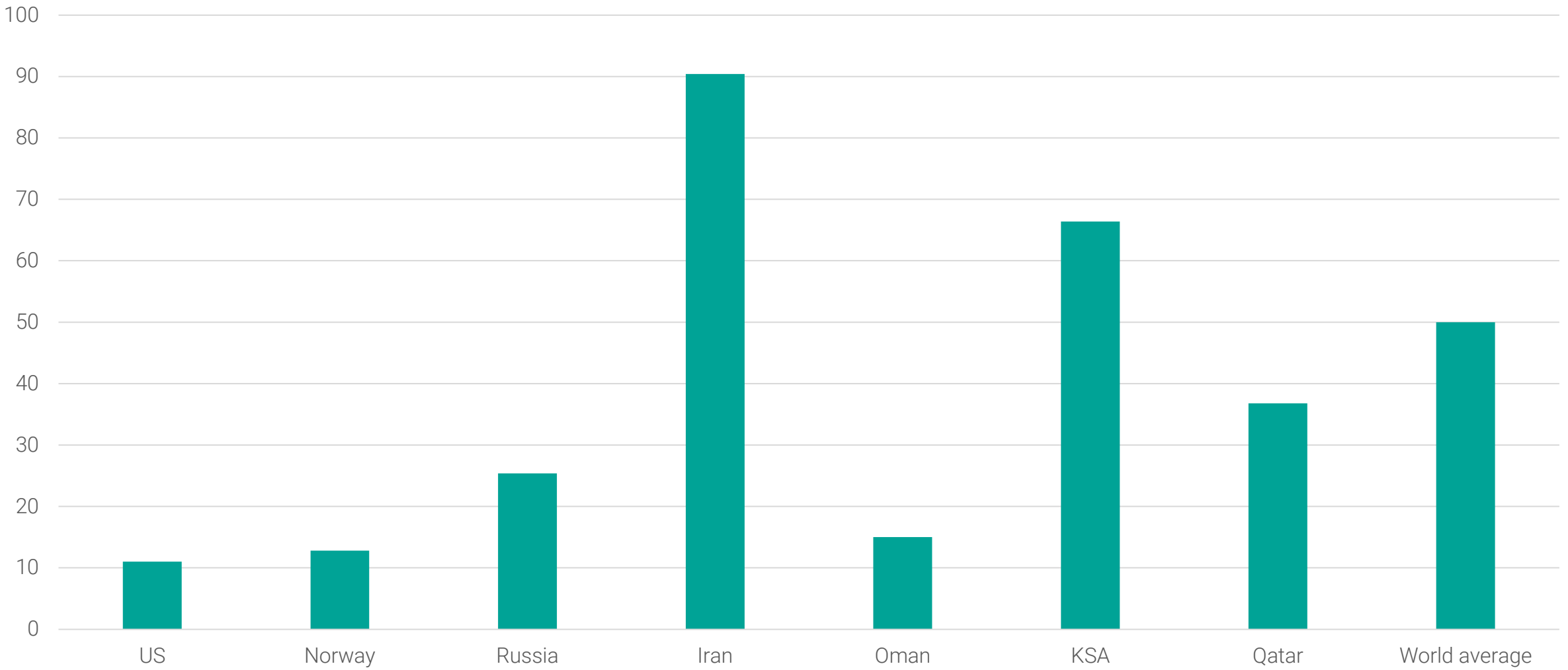
Iran's Oil Potential

Another Old Story

Iran Oil Production vs. Competitors



Reserve to Production Ratio



Iran Upstream Asset Lifecycle Issues

Exploration and Appraisal

- New Exploration Opportunities
- Shale Exploration
- Appraisal of Opportunities

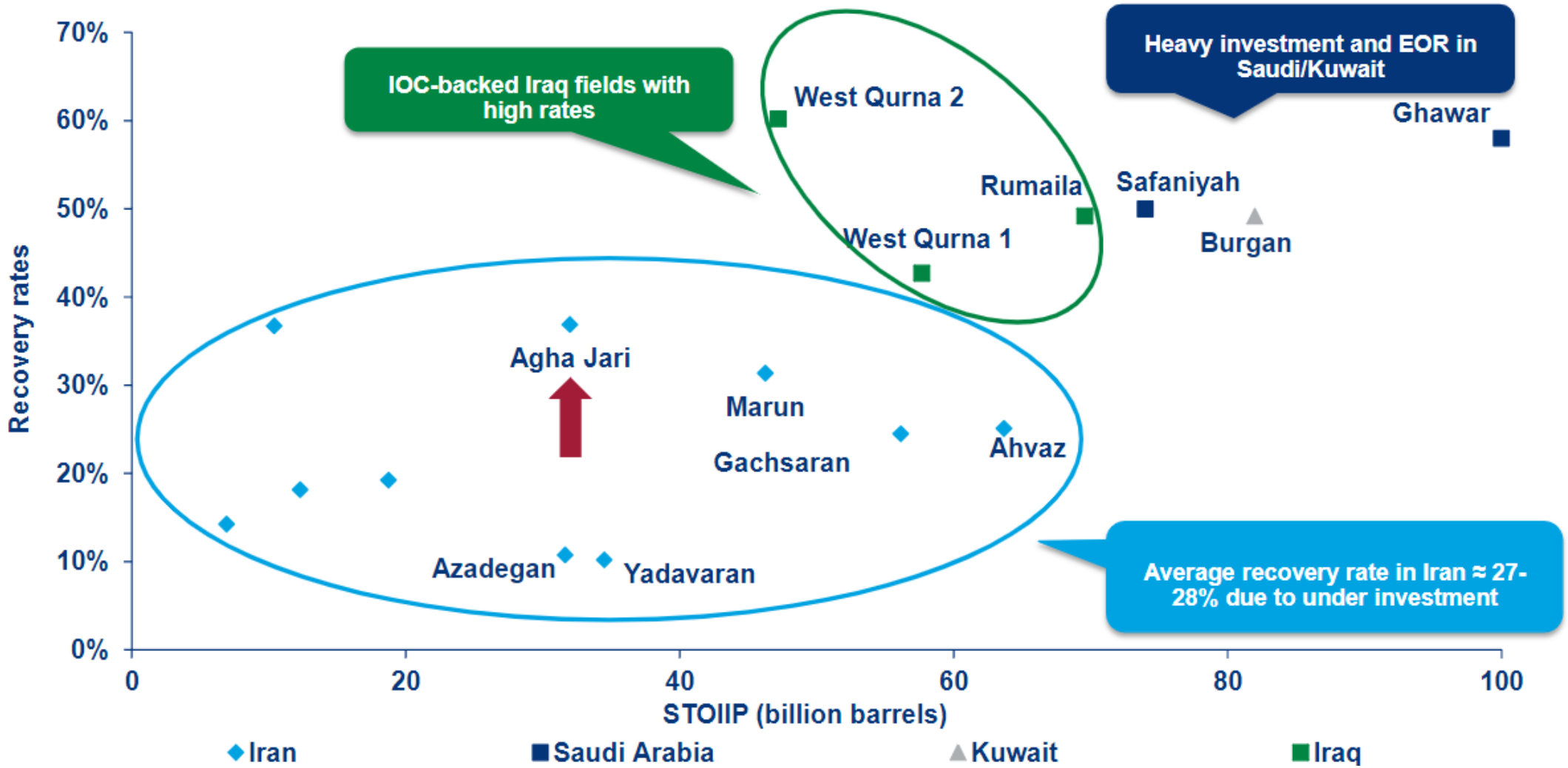
Development and Production

- 200+ Undeveloped Assets
- Limited Production
- Low OPEX in Brownfields

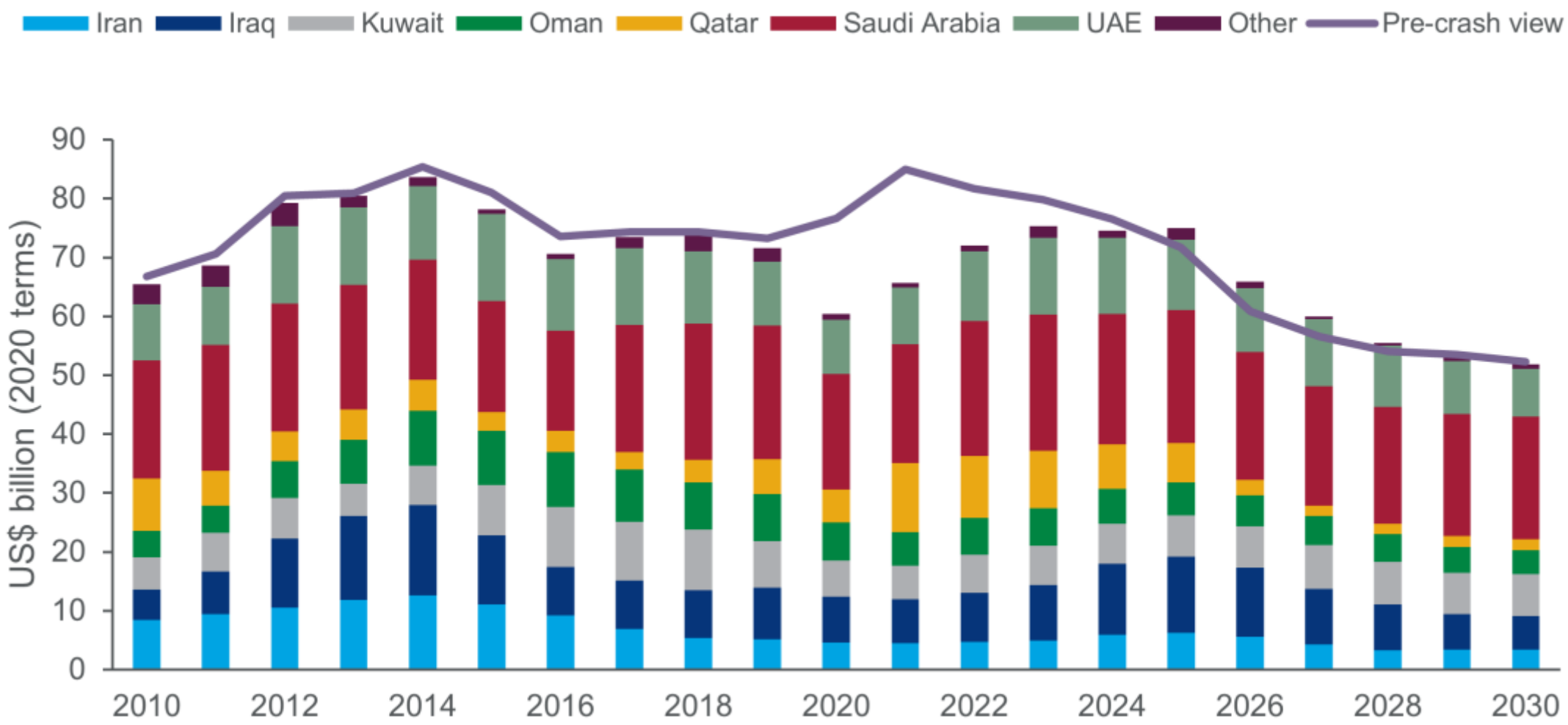
IOR / EOR

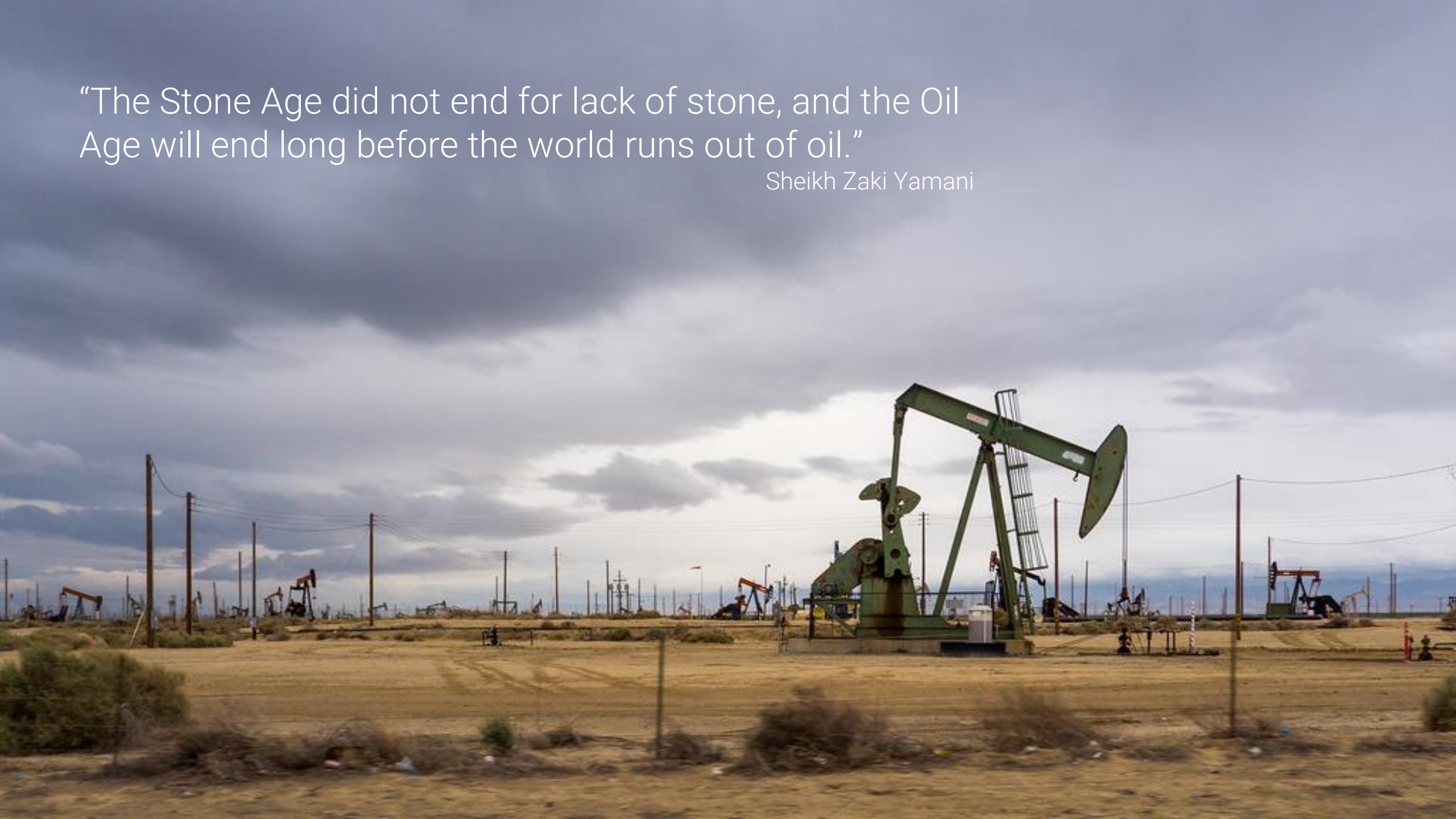
- Recovery Factor Around 25%
- Focus on IOR/EOR
- Limited access to Technology

Recovery Factor



Middle East Upstream Investment




“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