The Changing Strategic Importance of the Middle East and North Africa

Volume One: The Strengths and Limits of Oil and Gas Wealth and the Challenge of Climate Change and Great Power Competition

Working Draft:

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Photo: HAIDAR MOHAMMED ALI/AFP/Getty Images

Summary of the Analysis

This report on *The Strengths and Limits of Oil and Gas Wealth, and the Challenge of Climate Change* is an updated version of a report on the changing strategic importance of the Middle East and North Africa (MENA) region. It focuses on the energy and other economic aspects of the the region– whose economy and strategic importance is is dominated by its current and future oil and gas exports. Another report entitled **The Impact of Growing Military and Civil Instability in the MENA Region** addresses the security and civil development of the region and the challenges its nations face. This report will also available on the CSIS web site.

Addressing the Impact of Oil and Gas Exports by MENA Country: The Current Key to the Region's Strategic Importance

The analysis begins with an overview of all the key factors shaping the region's changing strategic importance, of which oil and gas exports are only a part. It then focuses on the oil and gas exports which are the key factor shaping the region's strategic importance, its role as group of major trading partners, its role as a key line of global communication between regions, and its role as in global migration.

The analysis provides a country-by-country overview of various estimates of the key quantitative and trend data on oil and gas exports. It shows that there is only a limited consensus between various sources, and just how different the resources and exports of given countries are. It also shows that the level of energy exports dominates the strategic importance of most states in the MENA region. The one exception is Israel, which is currently the only state with an advanced enough economy to export advanced goods and services and that ranks as a highly developed state for at least its Jewish population, although Saudi Arabia, Qatar, and the UAE are making important advances.

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Examples of National Petroleum Wealth versus Regional Petroleum Poverty

At the same time, the report shows that few MENA states have significant enough oil and gas resources to provide the export revenues to meet their internal needs for overall economic development, and to provide real jobs for most of their population and that earn per capita revenues that provide a real-world form of oil and gas wealth. The data also show that some of the major oil and gas exporting states have been chronically mismanaged for decades, and help explain why they are still the scene of serious internal instability and violence.

Other exporting states have relatively limited oil and/or natural gas reserves. This raises serous questions about their future export earnings in the period between 2023 and 2050. Still other MENA states have not yet exploited all of the areas which could add to their oil reserves, while the uncertainties in the data on the gas reserves and production in other states indicates that a number may be able to make major increases in their production and exports of natural gas -- the fossil fuel that has the least impact on global warming and whose use is safer than oil and much safer than coal.

Looking at the Future strategic Importance of Oil and Gas Wealth Under "Business as Usual Conditions"

The report then examines estimates of future demand for MENA oil and gas. It shows that the current trends in the global economy call for increased use of MENA oil and gas exports through at least 2050, particularly in Asia and in the less developed non-OECD states -- ***if major reductions in the demand for fossil fuels do not take place to deal with climate change and global warming*** .

The projections of future oil and gas use and imports *that do not include major cuts in fossil fuel use to deal with global warming* show major shifts in the flow of Middle Eastern and North African oil and gas exports to meet the rising demand for energy in developing countries like India, and rises in MENA oil and gas exports to allow major developed countries like China, Japan, and South Korea to reduce their dependence on coal. They also show a shift to increased use of natural gas imports to limit the use of oil. Some estimates indicate that these shifts could greatly increase the total Asian demand

for oil and gas exports through 2050.

The Critical Potential Impact of Global Warming on the MENA's Strategic Importance

At the same time, the following section of this analysis highlights a key issue shaping the future of the MENA region between 2023 and 2050. ***It shows that current projections of global warming and climate change raise critical questions about the future use of fossil fuels – the one major source of the region's trade income and wealth***. There are major uncertainties in virtually every aspect of estimates of the impact of global warming and its impact on MENA oil and gas exports.

Some estimates of the future demand for oil and gas use a "business as usual" approach that assume that the efforts to reduce global warming will remain relatively limited. They assume that importing states will not even reduce their oil and gas imports to reach the limited level of cuts in the demand for fossil fuels that is called for by existing national and regional policies or STEP level. Other estimates project massive cuts in future oil and gas use. Estimates also differ strikingly by source. OPEC's *World Energy Outlook for 2022* does examine such reductions, but the projected reductions are notably smaller than those projected by the International Energy Agency, which include a Net Zero Emissions (NZE) scenario.

The Uncertain Nature of How Cuts in Oil and Gas Demand Would Affect Given Regions

It is clear from such projections by bodies like the International Energy Agency (IEA) that a truly major effort to reduce global warming to zero through 2050 would require massive cuts in the demand for oil and gas. This could have a massive impact on the demand for MENA oil and gas exports and the economies of major exporting states unless they radically change and diversify their economies and invest enough of their export revenues before such cuts take place to provide a lasting major source of income

Such a real-world impact on MENA exports is very uncertain. The IEA projects that it requires highly developed states like

the United states and members of the EU will make major cuts in fossil fuel use because of their superior ability to invest in renewables and other alternative fuels and to make more efficient use of energy in developing their economies. As a result, the cuts in MENA oil and gas exports could be limited by the continuing demand from less advanced Asian and other developing states.

How the Different Perceptions, Goals, and Confrontations between Major Powers Could Affect thew Region's Strategic Importance: The Impact of the Ukraine War

Another set of major changes in the role and strategic importance of the MENA region could be driven by the growing strategic confrontations between the major powers. One example is the war in the Ukraine, which has had a major impact on Russian oil and gas exports. The war in the Ukraine could lead to radical long-term shifts in the nature of both European imports and Russia exports of oil and gas that affect MENA exports. It could lead to lasting European cuts in dependence on Russian exports, and to a Russia shift in gas exports to China or to new outlet in countries like Turkey.

At the same time, the current political and economic realities in the EU and other European states, and in nations like Japan and South Korea and with China -- the current political realities in the United States, impact of inflations and other economic problems, and competing needs for added investment could place major limits on investments in alternative forms of energy and reductions the the use and share of fossil fuels like oil and gas.

How the Different Perceptions, Goals, and Confrontations between Major Powers Could Affect thew Region's Strategic Importance: The Impact of China

The strategic competition (or confrontation) between China and the U.S. and its major strategic partners is another key

area that may lead to competition between China and the U.S. and its strategic partners for strategic influence over MENA oil and gas exports. This competition has already reached the point where it might trigger a serious conflict between China and other states over Taiwan that could affect the flow of energy exports throughout the MENA region, and the flow of exports through the Indian Ocean, and the Pacific.

More broadly, this competition could lead to greater Chinese demand for Russian oil and gas exports as a substitute for dependence on vulnerable shipping routes through the Indian Ocean, Strait of Malacca, and Pacific, as well as to a more intense and long-term competition between China and competing powers over their strategic ties to MENA exporting states, and over arms sales, security ties and basing facilities.

At the same time, other estimates largely ignore or minimize the impact of climate change on China and Asian develop states like India. They project that current national policies will fall far short of those needed to halt global warming. Other projections largely ignore the impact of climate change and focus on economic development in ways that estimate there will be sharp rises in oil and gas exports to key parts of the developing world.

All of these projections are further affected by the major uncertainties in the ability to analyze and predict the pace and impact of climate change. The current data, models, and scenarios are too uncertain, and the variable involved are too complex, to make reliable predictions.

How the Different Perceptions, Goals, and Confrontations between Major Powers Could Affect the Region's Strategic Importance: The Myth of U.S. Energy Independence

One area that may have less impact than many in the United States believe is the supposed end to U.S. dependence on the

secure and stable flow of MENA oil and gas exports. This has led some U.S. planners and analysts to discount the importance to the United States of protecting the reliable global flow of MENA oil and gas exports.

The analysis shows the reality is very different. The U.S. economy is critically dependent on affordable global oil and gas prices, and the U.S. prices its own fuels at global levels in an energy crisis of emergency. More importantly, the U.S. economy is highly dependent on the import of manufactured goods from oil and gas importing countries in Europe and Asia. Current data on the overall balance of U.S. trade show that U.S. overall dependence on all types of oil and imports now makes it as indirectly dependent on the flow of MENA exports to U.S. trading partners as it once was on direct oil and gas imports to the U.S.

As noted earlier, however, this situation could change radically if the U.S. made a massive investment in alternative fuels, other sources of energy, and energy efficiency/conservation to reduce its emissions and impact on global warming. Once again, the IEA examines such assumptions in its *2022 World Energy Outlook*, but such assumptions are highly uncertain. As is the case with other developed nations in the OECD, the EU, and nations like Japan, South Korea and China -- current political realities, the impact of inflation and other economic problems, and competing needs for added investment, could all place major limits on investments in alternative energy supplies and reductions in energy use.

Other Aspects of the MENA Region's Strategic Importance

The final sections of the analysis focus on its overall importance as a global trading partners, its role as a key line of maritime trade and air traffic, and its current and future impact on migration out of, and into, the region.

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Identifying Key Factors and Variables

Key Factors and Variables

This briefing covers a wide range of key variables shaping the strategic value of the Middle East and North Africa (MENA) and the key role it currently plays in providing fossil fuel exports. It presents a wide range of data, graphics, and tables on key trends, rather than focusing on current developments. to active violence or major instability.

The following three slides summarize the overall trends in the strategic importance of MENA region, of which oil and gas exports, trade, and regional lines of communication are only a part. It does so to highlight the fact that the region's strategic importance must be addressed by focusing on all of the key variables that determine the region's strategic importance.

- **Key Statistics on the MENA Region** shows the basic statistics on the size and strategic importance of the MENA region. It shows it has a moderate total population and level of trade relative to other regions, but plays a dominant role in the export of fossil fuels. It also is the source of key lines of communication like the Suez Canal and Red Sea, but does not play any major role in manufacturing exports or high technology exports other than petroleum products. It also is the source of significant migration through and out of the region.
- **Key Factors Shaping the Strategic Importance of the Middle East** provides a summary of the full range of factors now shaping its strategic importance. Key factors include major shifts in energy exports coming from the competition between Russia and the West over the Ukraine War, and China's growing need for energy imports, and the potential role of efforts to limit global warming on the use and exports of fossil fuels, plus the levels of conflict and political instability within the region.
- **Key Changes Altering the Middle East's Strategic Importance** highlights the key factors that are changing the importance of the MENA region by key country, cause, or threat.

It should be stressed that such region-wide generalizations and summary data disguise more than they reveal in every area of the world. As all of the following sections of this analysis show, MENA countries differ radically in virtually aspect of their every civil and security structures, as well as in energy resources and export income. There often are few similarities between states except for the fact that most speak Arabic, and are largely Muslim, and even here, having the same religion often leads to major differences and violence between sects.

The following sections of the analysis make it clear that MENA countries have evolved in very different ways over the last half century, and massively different changes have taken place in the both their energy resources, energy exports, and their ties to neighboring and outside powers.

It should also be stressed that as part of these differences, MENA states differ sharply in the depth and accuracy of their reporting, as do outside analytic efforts to compare their data. Most countries often fail to indicate how they gather data, and exactly how they define it. There is no way to validate much of the data now available, or to compare the accuracy of different sources. Accordingly, this analysis often presents a range of different sources to illustrate the uncertainty in key data.

Key Statistics for MENA Region

- **Eighteen countries, more if include Turkey, Sudan, and Djibouti.**
- **6% of world's population: 486-488 million in 2022**
- **52%-65% of oil reserves and 42%-45% of natural gas reserves.**
- **Exports of $1.11 trillion in goods and services in 2020. Imports of $1.24 trillion**
- **Ten countries have become unstable or in civil conflicts since the Arab spring began in 2010, extreme Poverty doubled to 5%, and 15 million refugees by 2015**

Sources: World Bank, https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ZQ, and https://data.worldbank.org/indicator/NE.IMP.GNFS.CD?locations=ZQ: World Population Review, MENA Countries 2022 - World Population Review, https://worldpopulationreview.com/country-rankings/mena-countries;

Key Factors Shaping the Strategic Importance of the Middle East

- **Crude oil, petroleum products, and gas reserves and exports, and the impact of global warming and competition between the West, Russia and China.**
- **Maritime Lines of Communication, Suez Canal and overflight rights. Immigration and Migration**
- **Development, governance, internal stability**
- **Civil wars, arms races, and regional violence**
- **Competition from major powers and other outside parties**
- **Basing, strategic partnerships, arms imports, and control of export flows.**
- **Terrorism and counterterrorism.**
- **Countering nuclear forces and proliferation. Acquiring and defending against long range precision strike capabilities.**
- **Migration and refugees**

Key Changes Altering the Middle East's Strategic Importance

- **Lack of Internal Stability, Rivalries, and Limited Development**
- **Abraham accords vs. Israeli-Palestinian/Arab tensions**
- **Iranian influence: Syria, Lebanon, Iraq, Yemen**
- **Changing nature of Security Efforts and Military Forces**
- **Changing European and Asian energy imports and demand, power projection**
- **Impact of Efforts to Limit Climate Change, Global Warming**
- **Uncertain role of United States and Great Power Competition**
- **Role of Russia and Russia Exports in Light of Ukraine War**
- **Uncertain role of China**
- **Uncertain Role of Turkey**
- **Role of Southern Red Sea States: Ethiopia, Eritrea, Somalia, Sudan**

The Dominant Impact of MENA Region’s Oil and Gas Exports on Its Strategic Importance

The Dominant Impact of MENA Region's Oil and Gas Exports On Its Strategic Importance

The following slides show the critical role the major petroleum exporting states in the MENA region play in the global economy, and why the its exports of oil, natural gas, and why petroleum products are the dominant measure of strategic importance in terms of international perceptions.

At the same time, sources again differ in detail, and even the limited range of sources included in this section illustrate the fact that sources that compare MENA country data often do not agree. Many also rely on dated or uncertain material. Like fat too many of the data available on international relations, many sources do not describe the uncertainty in their data, its full definition and when it was collected, as distinguished from the year it was reported.

The data presented show all too clearly that reports on different national holdings of oil and gas resources can be, and how the data differ according to both the source and the location of key reserves and production efforts.

- **CIA Estimate of MENA Oil and Gas Reserves, Production, and Exports: 2020-2021.** The CIA estimate, for example, flags many of the key differences in national capability, but also mixes data from 2015 to 2021. This may seem unusual, but the data provided in the following estimates often comes from very different sources and years even within a given country.
- **IEA Estimate of Oil Exports by Major Exporter: 12/2022** provides what seems to be a highly accurate estimate of oil production as of 2021-2022
- **OPEC Estimate of MENA Oil Production and Exports: 2020-2021:** The OPEC oil data in the second slide are more up to date and consistent than the CIA data, and the OPEC graphs on oil exports and gas reserves and exports seem broadly accurate in illustrating the global importance of the Middle East, but do not include North Africa or cite sources.

- **Major Oil Export Movements in 2021:** The BP (British Petroleum) annual *Statistical Review of World Energy* is one of the best efforts to portray the overall structure of global energy resources, production, and exports by country. This map shows just how important the flow of MENA oil exports is to the global economy – again highlighting its critical value to U.S. trading partners even if Europe does not largely eliminate its dependence on Russia oil and gas exports, and the fact the U.S. remains dependent on the stable flow of MEBA exports to its key trading partners and allies. It does not reflect the impact of the Ukraine War on Russian and other national exports and imports.
- **OPEC Estimates of how the Middle East Dominated World Crude Oil Exports:** 1980-2021 provides a graph of the trends in global exports by region from 1980 to 2021.
- **OPEC Estimates of OPEC Crude Oil Exports by Exporting Country:** 1980-2021 provides a graph of the trends in global exports by region from 1980to 2021 shows the critical role of key MENA exporting countries.
- **OPEC Estimate of Crude Oil Exports by Origin: 2021-2045** projects major increase in the global share of MENA exports if radical new measures are not taken to reduce demand to deal with climate change**.**
- **BP Estimate of Global Oil Trade Movements: 2011-2021:** This slide shows the trends in oil imports and exports by region. It provides a useful picture of the changes over time and again helps illustrate the differences between sources.
- **OPEC Estimate of Global Liquid Fuel Production: 2021-2045**: shows how limited projections of future increases in oil and other conventional energy liquids productions are in other regions, except for Latin America, though 2045, if major cuts in all production do not take place to respond to global warming.
- **OPEC: How the Middle East Dominates World Gas Reserves: 1960-2021:** This graph shows the steady expansion of estimates of MENA and world gas reserves, and of the growing potential importance of gas exports in the future. Some of the national trend lines involved are highly uncertain, however, and further major rises in the estimate of proven (marketable) MENA gas reserves seem likely.

- **BP Estimate of MENA Gas Reserves, Production and Importance as a Percent of GDP: 2020-2021:** Data on natural gas reserves, production, exports, and impact on given MENA national economies are far more uncertain that data on oil, but the BP analysis seems as accurate as any source available. It should be noted, however, that most estimates of gas reserves seem to be based n partial exploration and older extraction technologies, and sone new sources of gas production in the Mediterranean and other areas are not fully addressed, nor are the potential increase in production likely to occur in response to global warming.

- **Major Gas Export Movements in 2021:** This map represents a broadly accurate picture of the flow of gas exports before the Ukraine War led to major shift in gas exports. The data involved are sometimes unusually uncertain, however, and does not show the trends involved, however, as gas production increased and coal use was increasing treated as a source of global warming, or the major shifts like to occur because of the Ukraine War.

- **BP Estimate of MENA Gas Production 2011-2021:** This table does prove a broadly accurate estimate of the major increases in MENA natural gas production, although with many the same uncertainties as the previous table.

- **IEA Estimate of World Gas Production and Demand: 2019-2025** provides an estimate of the increases in the production and use of natural gas during 2021-2025, showing a major increase in MENA production and a limited increase in regional demand

- **BP Estimate of MENA Natural Gas Liquids Production 2011-2021.** This table shows the trends in Natural Gas Liquids Production, a key measure of national capacity to export natural gas long-distances without pipelines. The increases to date have been limited, but increases in global demand and the impact of the Ukraine War may led to major increases in the near future.

- **BP Estimate of MENA Natural Gas Liquids Production 2011-2021.** This table shows the trends in Natural Gas Liquids Production, a key measure of national capacity to export natural gas long-distances without pipelines. The increases to date have been limited, but increases in global demand and the impact of the Ukraine War may led to major increases in the near future.

- **IEA Estimate of Global NGL Production: 2015-2025** shows only a limited increase in MENA natural gas liquids production through 2025, reflecting the uncertainty in demand growth, and the cost and long lead times for increase NGL exports.

CIA Estimate of MENA Oil and Gas Reserves, Production, and Exports: 2020-2021

Country	Oil					Gas		
	Reserves (Billion Barrels)	Total Production in Million Barrels Per Day		Exports in Million Barrels Per Day		Reserves in Billions of Cubic Meters	Production Per Day in Billons of Cubic Meters	Exports Per Day in Billions of Cubic Meters
		Total	Refined Products	Crude Oil & Condensates	Refined Products			
Morocco	0.007	0	0.007	0	0.001	1.4	0.1	0
Algeria	12.2	1.4	0.63	0.63	0.59	4,503	87.8	42.7
Libya	48.3	1.3	0.09	1.1	0.02	1.5	0.01	0.004
Tunisia	0.43	0.043	0.028	0.03	0.014	65.1	1.03	0
Egypt	3.3	0.66	0.055	0.02	0.004	1.8	0.065	0.005
Israel	0.0013	0	0.29	0.023	0.112	176	0.001	0
Gaza Strip	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
West Bank	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Jordan	1	0	0.0067	0	0	6	0.115	0.038
Lebanon	0	0	0	0	0	0	0	0
Syria	2.5	0.081	0.11	0	0.013	0.024	0.004	0
Bahrain	0.19	0.19	0.28	0	0.025	81.4	0.018	0
Iran	208.6	3.5	1.8	2.2	0.4	33,987	237.6	17.6
Iraq	145.0	4.1	0.4	4.0	0.008	3,728	0.011	0
Kuwait	101.5	2.7	0.92	1.8	0.7	4,805	19.5	0
Oman	5.4	0.98	0.22	0.78	0.03	651	0.037	0.014
Qatar	25.2	1.8	0.49	1.3	0.27	23,860	167.5	126.8
Saudi Arabia	258.6	10.8	2.5	7.3	1.8	9,422	113.7	0
UAE	97.8	3.8	0.9	2.4	0.8	6,091	62.8	7.7
Yemen	3.0	0.07	0.02	0.0?	0.013	478	0.089	0

Note: The most up to date estimates are for 2020-2021. The year for given data vary sharply and can range from 2015 to 2021.Many data date back to 2015.

Source: CIA "Country Data," *World Factbook*, accessed 19.1.2023, https://www.cia.gov/the-world-factbook/countries/

IEA Estimate of Oil Supply by Major Producer: 12/2022

Global oil demand is set to rise by 1.9 mb/d in 2023, to a record 101.7 mb/d, with nearly half the gain from China following the lifting of its Covid restrictions.

Jet fuel remains the largest source of growth, up 840 kb/d. OECD oil demand slumped by 900 kb/d in 4Q22 as weak industrial activity and weather effects lowered use, while non-OECD demand was 500 kb/d higher.

World oil supply growth in 2023 is set to slow to 1 mb/d following last year's OPEC+ led growth of 4.7 mb/d. An overall non-

OPEC+ rise of 1.9 mb/d will be tempered by an OPEC+ drop of 870 kb/d due to expected declines in Russia. The US ranks as the world's leading source of supply growth and, along with Canada, Brazil and Guyana, hits an annual production record for a second straight year.

… Two wild cards dominate the 2023 oil market outlook: Russia and China. This year could see oil demand rise by 1.9 mb/d to reach 101.7 mb/d, the highest ever, tightening the balances as Russian supply slows under the full impact of sanctions. China will drive nearly half this global demand growth even as the shape and speed of its reopening remains uncertain

	Nov 2022 Supply	Dec 2022 Supply	Dec Prod vs Target	Dec-2022 Target	Sustainable Capacity[2]	Eff Spare Cap vs Dec[3]
Algeria	1.02	1.01	0.0	1.01	1.02	0.01
Angola	1.09	1.09	-0.36	1.46	1.17	0.08
Congo	0.26	0.25	-0.06	0.31	0.28	0.03
Equatorial Guinea	0.06	0.06	-0.06	0.12	0.09	0.03
Gabon	0.19	0.18	0.0	0.18	0.2	0.02
Iraq	4.46	4.45	0.02	4.43	4.7	0.25
Kuwait	2.68	2.66	-0.02	2.68	2.8	0.14
Nigeria	1.15	1.23	-0.51	1.74	1.37	0.14
Saudi Arabia	10.48	10.48	0.0	10.48	12.22	1.74
UAE	3.29	3.23	0.21	3.02	4.12	0.89
Total OPEC-10	**24.68**	**24.64**	**-0.78**	**25.42**	**27.98**	**3.34**
Iran[4]	2.72	2.72			3.8	
Libya[4]	1.15	1.17			1.2	0.03
Venezuela[4]	0.68	0.66			0.76	0.1
Total OPEC	**29.23**	**29.19**			**33.75**	**3.48**
Azerbaijan	0.55	0.55	-0.14	0.68	0.58	0.03
Kazakhstan	1.68	1.68	0.06	1.63	1.65	-0.03
Mexico[5]	1.61	1.65		1.75	1.66	0.01
Oman	0.84	0.84	0	0.84	0.86	0.02
Russia	9.8	9.77	-0.71	10.48	10.2	
Others [6]	0.84	0.85	-0.2	1.06	0.93	0.09
Total Non-OPEC	**15.31**	**15.34**	**-0.99**	**16.44**	**15.88**	**0.15**
OPEC+ 19 in cut deal[4]	**38.38**	**38.33**	**-1.77**	**40.1**	**42.2**	**3.48**
Total OPEC+	**44.54**	**44.53**			**49.63**	**3.63**

Sources: IEA, Oil Market Report, 1.2023, https://www.iea.org/reports/oil-market-report-january-2023?utm_medium=Email&utm_campaign=IEA+newsletters&utm_source=SendGrid

OPEC Estimate of MENA Oil Production and Exports: 2020-2021

The Middle East exported 21.766 (7.692 Saudi) million barrels a day, and North Africa Exported 2.664 million, a total of 24,430 million, or 36% of a world total of 66.958 million barrels.

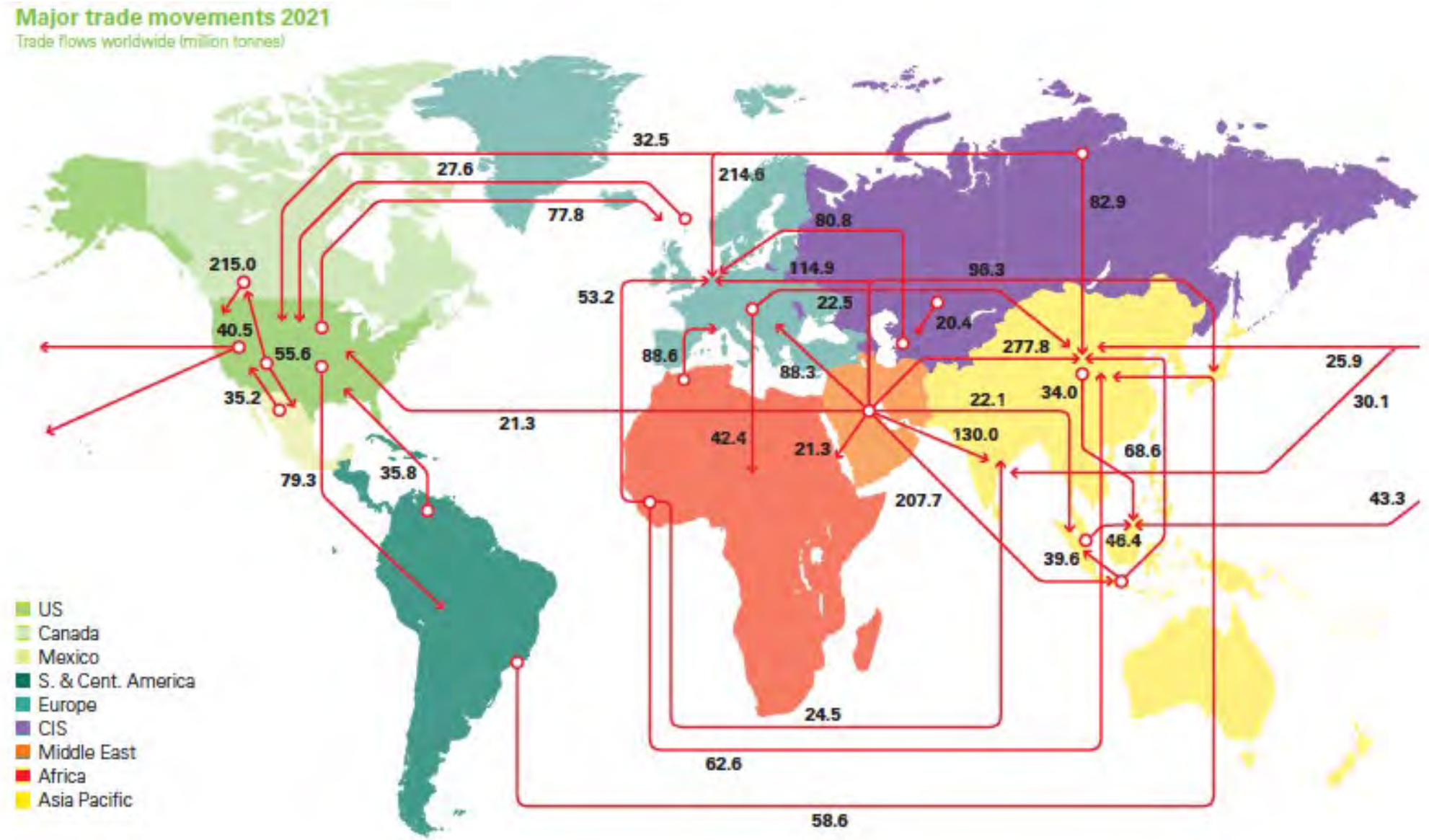
The World Bank estimates that the Middle East and North Africa exported $762.5 billion worth of goods ($153.4 billion in oil) in 2020, and imported $686.6 billion of all goods.

Country	Oil Reserves in 2020		Crude Oil Production (1,000s bbl/day)
	Global Rank	Millions of Barrels	
Saudi Arabia	2	297.5	10,954
Iran	4	157.8	3,620
Iraq	5	145.0	4,102
Russia	*6*	*107.8*	*10,944*
Kuwait	7	101.5	2,741
UAE	8	97.8	3,668
U.S.	*9*	*68,8*	*16,585*
Libya	10	48.4	1,269
China	*13*	*26.0*	*3,994*
Qatar	14	25.2	1,746
Algeria	15	12.2	1,353
Oman	21	5.4	971
South Sudan	*24*	*3.5*	*153*
Egypt	25	3.1	608
Yemen	26	3.0	67
Syria	31	2.5	96
Sudan	*36*	*1.5*	*64*
Tunisia	45	0.4	45

Note: countries with negligible reserves are not included. "Other Middle East Produced 191 thousand barrels per day.

Sources: OPEC; *World Population Review*, https://worldpopulationreview.com/country-rankings/oil-reserves-by-country; BP *Statistical Review of World Energy, 2022*, https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-full-report.pd

Major Oil Export Movements in 2021

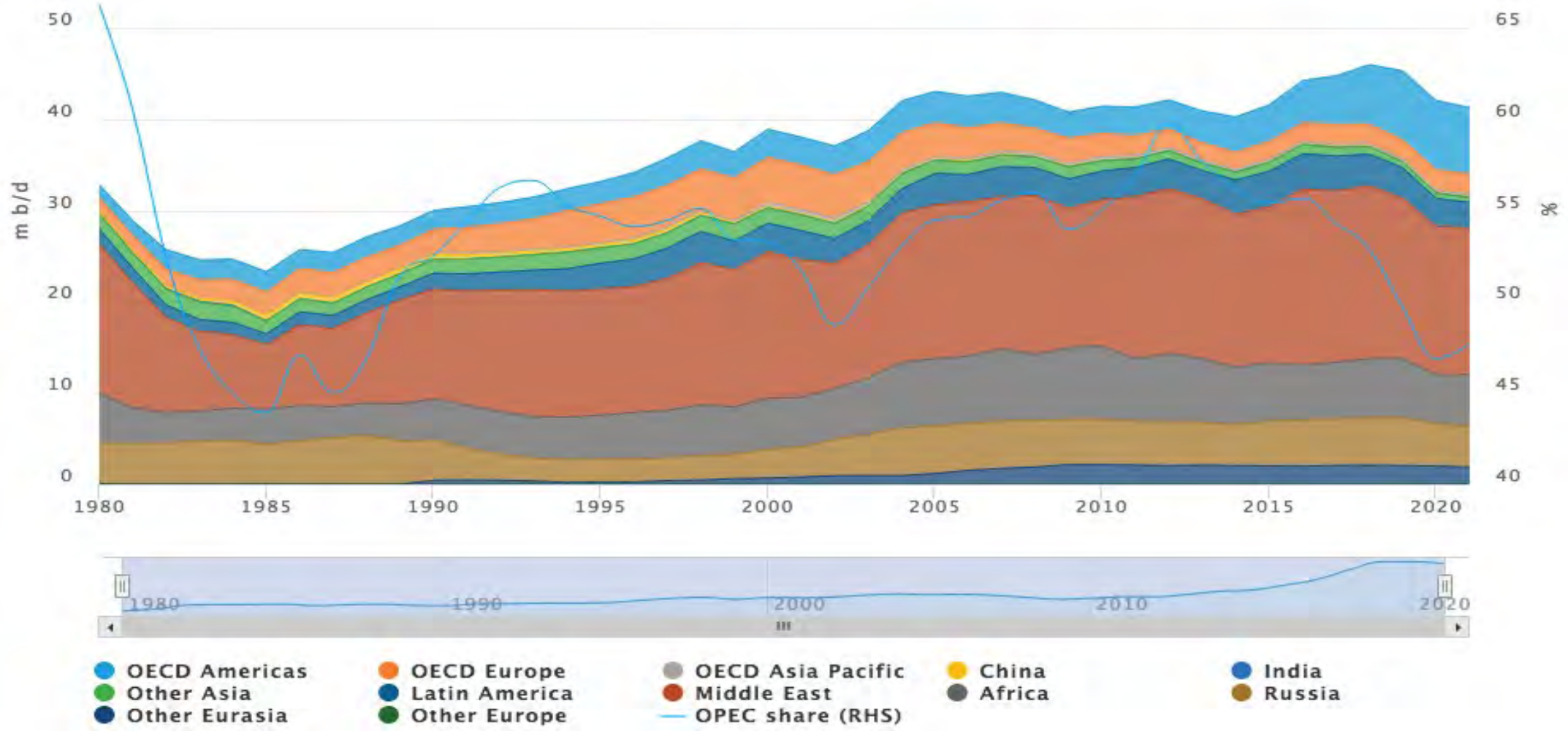


Source: BP (British Petroleum), *bp Statistical Review of World Energy 2022*, 71st edition, p. 28

† Less than 0.05. Notes: Does not include biofuels trade. Bunker fuel use is not included as exports. Intra-area movements (for example, between countries within Europe) are excluded. Crude imports and exports include condensates.

How the Middle East Dominates World Crude Oil Exports: 1980-2021

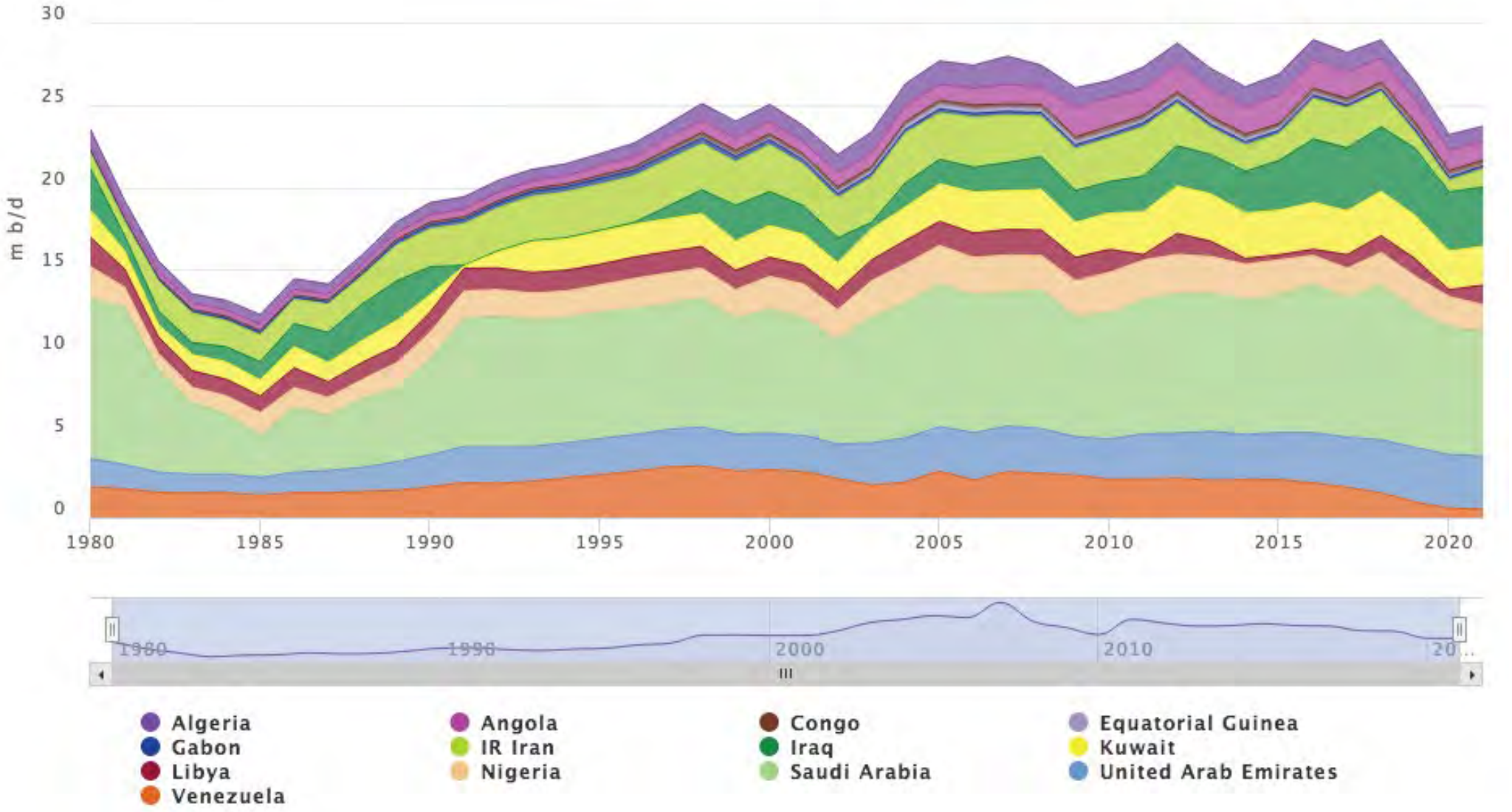
(Millions of Barrels Per Day)



Source: OPEC, *OPEC Annual Statistical Bulletin 2022*, 14.12.22, https://asb.opec.org/ASB_Charts.html?chapter=225_229.

OPEC Crude and Product Exports by OPEC Country: 1980-2021

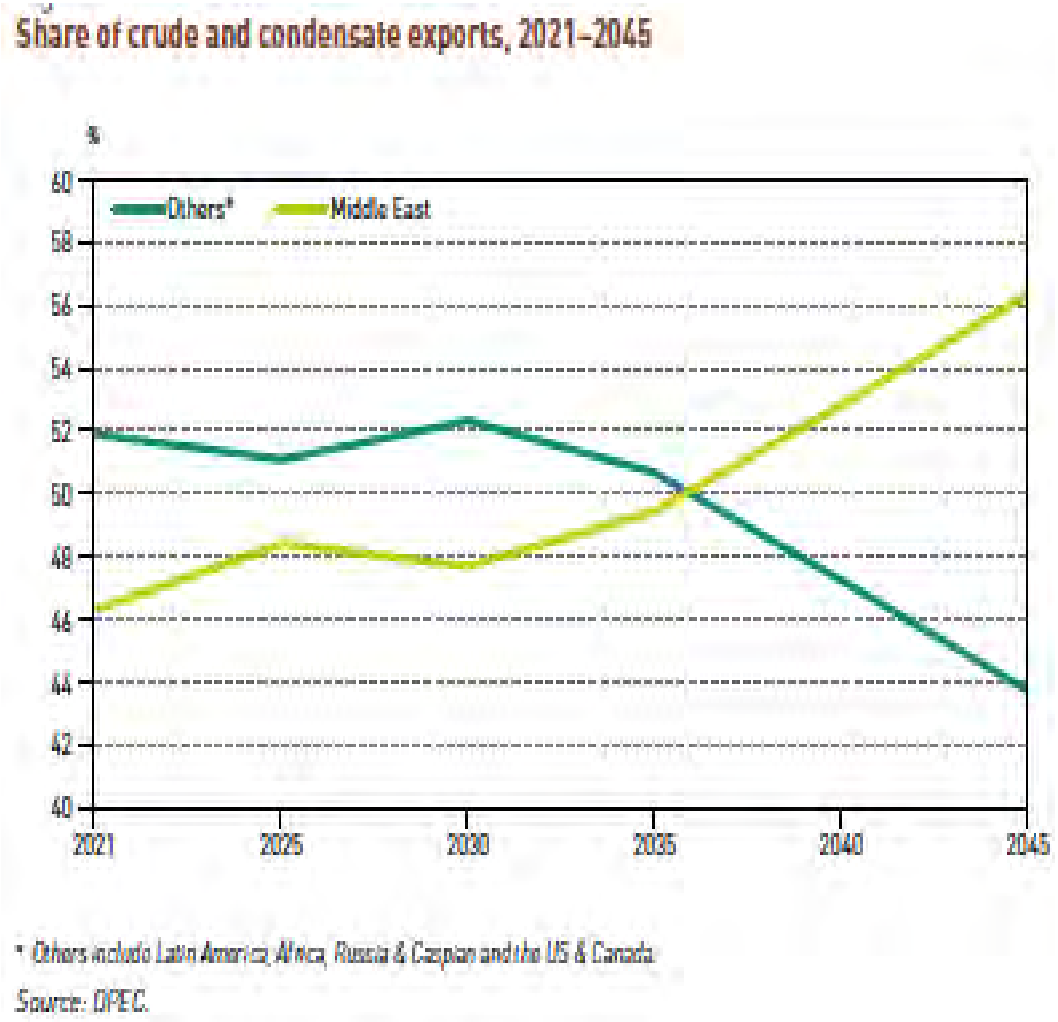
(Millions of Barrels per day)

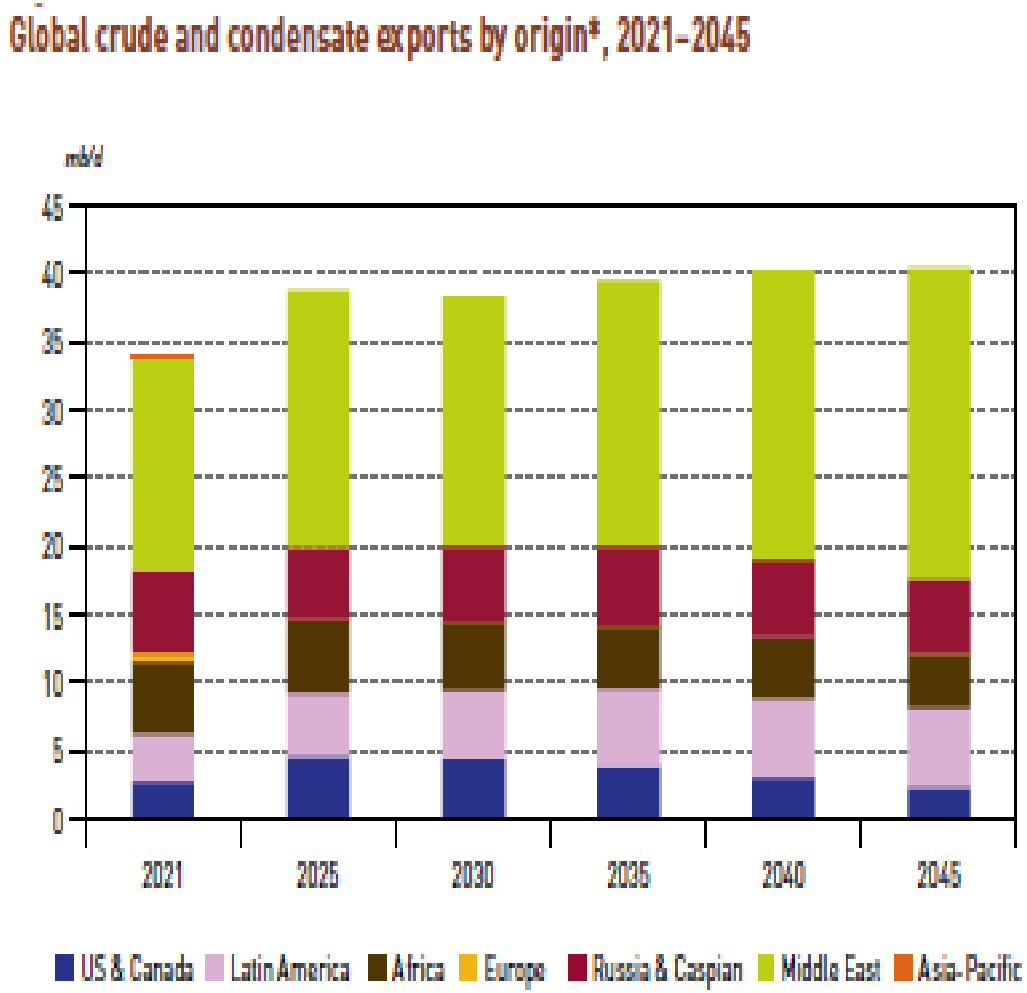


Source: OPEC, *OPEC Annual Statistical Bulletin 2022*, 14.12.22, https://asb.opec.org/ASB_Charts.html?chapter=225_229.

OPEC Estimate of Crude Oil Exports by Origin: 2021-2045

(assumes limited impact of measures to reduce emissions and global warming





Source: OPEC, *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, pp. 234-235.

BP Estimate of Global Oil Trade Movements: 2011-2021

Thousand barrels daily	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Growth rate per annum 2021	Growth rate per annum 2011-21	Share 2021
Imports														
US	11338	10587	9859	9241	9451	10056	10147	9828	9142	7869	**8478**	7.7%	-2.9%	12.7%
Europe	12489	12721	12920	12957	14024	14342	15012	14473	14396	13206	**13522**	2.4%	0.8%	20.2%
China	6295	6675	6978	7386	8333	9215	10241	11028	11861	12932	**12724**	-1.6%	7.3%	19.0%
India	3823	4168	4370	4155	4396	4945	4920	5196	5394	4898	**5325**	8.7%	3.4%	8.0%
Japan	4494	4743	4637	4383	4332	4180	4142	3940	3760	3310	**3350**	1.2%	-2.9%	5.0%
Rest of World	17634	17812	20012	21193	22913	26491	25629	25819	25320	22701	**23559**	3.8%	2.9%	35.2%
Total World	56072	56706	58776	59328	63449	71230	70090	70383	68893	64916	66959	3.1%	1.8%	100.0%
Exports														
Canada	2798	3056	3296	3536	3837	3889	4233	4499	4678	4425	**4666**	5.5%	5.2%	7.0%
Mexico	1467	1366	1347	1293	1321	1405	1289	1307	1254	1251	**1234**	-1.3%	-1.8%	1.8%
US	2495	2682	3563	4033	4563	5077	5878	7037	8003	8128	**7892**	-2.9%	12.2%	11.8%
S. & Cent. America	3755	3830	3790	3939	4106	5735	3976	3736	3451	3452	**2987**	-13.5%	-2.3%	4.5%
Europe	2139	2181	2545	2467	3064	4907	3387	3405	3236	2732	**3041**	11.3%	3.6%	4.5%
Russia	7448	7457	7948	7792	8444	8823	8992	8117	8122	7778	**8234**	5.9%	1.0%	12.3%
Other CIS	2180	1962	2166	2092	2045	2097	2236	2060	2127	2089	**2120**	1.5%	-0.3%	3.2%
Saudi Arabia	8120	8468	8365	7911	8008	8729	8352	8574	8348	7904	**7696**	-2.6%	-0.5%	11.5%
Middle East (ex Saudi Arabia)	12188	11742	12242	12699	13977	15902	16205	16069	14678	13531	**14074**	4.0%	1.4%	21.0%
North Africa	1951	2602	2127	1743	1747	1735	2600	2748	2783	1844	**2664**	44.5%	3.2%	4.0%
West Africa	4759	4724	4590	4849	4891	4458	4523	4558	4619	4223	**3942**	-6.7%	-1.9%	5.9%
Asia Pacific (ex Japan)	6088	6299	6307	6450	5896	6348	6556	6442	6602	6058	**6566**	8.4%	0.8%	9.8%
Rest of World	663	338	491	524	1550	2124	1863	1831	1993	1502	**1842**	22.7%	10.8%	2.8%
Total World	56072	56706	58776	59328	63449	71230	70090	70383	68893	64916	66959	3.1%	1.8%	100.0%

Notes: Unless otherwise stated, this table shows inter-regional trade based on the regional classification in the table 'Oil trade in 2020 and 2021'.
Bunker fuel use is not included as exports. Intra-area movements (for example, between countries within Europe) are excluded.
Annual changes and shares of total are calculated using thousand barrels daily figures.

Source: BP (British Petroleum), *bp Statistical Review of World Energy 2022*, 71st edition, p. 27

OPEC Estimate of Global Liquid Fuel Production: 2021-2045

	2021	2025	2030	2035	2040	2045	Change 2021–2045
Americas	25.2	29.0	29.2	27.9	26.5	25.2	0.0
of which US	*17.8*	*21.3*	*21.3*	*19.9*	*18.5*	*17.2*	*–0.5*
Europe	3.8	4.1	4.2	4.1	4.1	4.1	0.3
Asia-Pacific	0.5	0.5	0.6	0.5	0.5	0.4	–0.1
OECD	29.4	33.6	34.0	32.6	31.0	29.7	0.3
China	4.3	4.6	4.5	4.4	4.3	4.2	–0.2
India	0.8	0.8	0.8	0.8	0.8	0.8	0.0
Other Asia	2.4	2.3	2.2	2.1	2.0	1.8	–0.6
Latin America	6.0	7.3	8.8	9.0	8.9	8.7	2.8
Middle East	3.2	3.5	3.8	3.8	3.8	3.8	0.5
Africa	1.3	1.5	1.8	1.7	1.6	1.6	0.2
Russia	10.8	10.2	10.4	10.5	10.5	10.4	–0.4
Other Eurasia	2.9	3.2	3.3	3.3	3.3	3.2	0.3
Other Europe	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Non-OECD	31.9	33.4	35.6	35.8	35.3	34.6	2.8
Non-OPEC production	61.3	67.0	69.6	68.3	66.3	64.3	3.0
Processing gains	2.3	2.6	2.8	2.9	3.0	3.2	0.9
Non-OPEC liquids	63.6	69.6	72.4	71.2	69.3	67.5	3.9
OPEC liquids	31.6	36.1	36.1	38.3	40.4	42.4	10.7
World	95.2	105.7	108.4	109.5	109.8	109.8	14.6

Note: The sum of the countries/regions may not add up to the global supply total due to rounding and stock change assumptions.
Source: OPEC.

Sources: OPEC; *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, *p. 10*

IEA Estimate of World Gas Production and Demand: 2019-2025

World natural gas production by region and key country (bcm)

	2019	2020	2021	2022	2023	2024	2025
Africa	252	241	262	267	275	283	292
Asia Pacific	637	630	651	670	674	676	679
of which China	*174*	*189*	*205*	*214*	*220*	*225*	*230*
Central and South America	167	150	147	150	152	156	156
Eurasia	921	866	955	858	859	883	891
of which Russia	*738*	*692*	*762*	*668*	*665*	*684*	*688*
Europe	249	230	223	227	218	217	216
Middle East	671	674	694	712	729	739	761
North America	1 174	1 154	1 178	1 208	1 223	1 241	1 263
of which United States	968	954	973	1 006	1 028	1 042	1 055
World	**4 071**	**3 945**	**4 110**	**4 092**	**4 132**	**4 195**	**4 259**

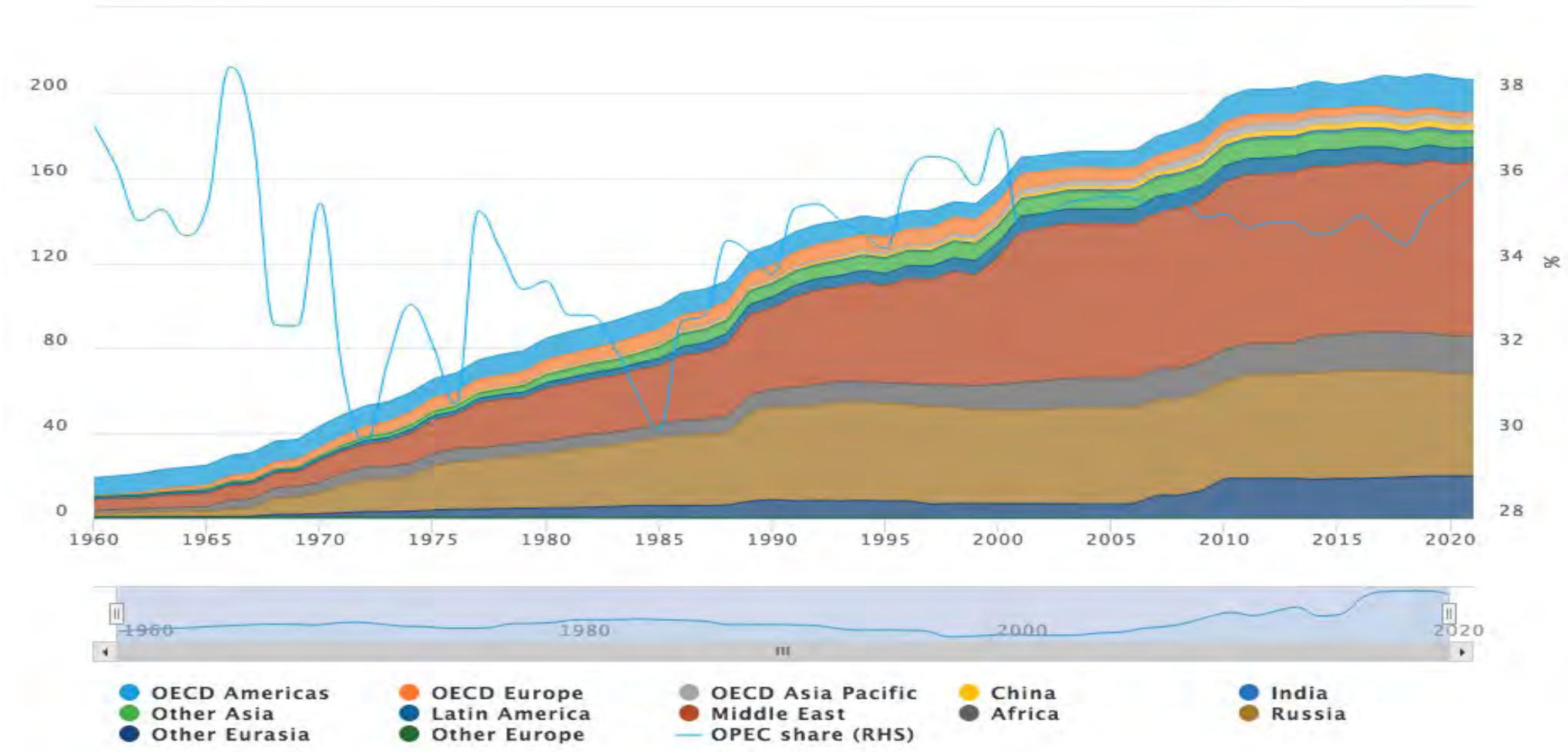
World natural gas demand by region and key country (bcm)

	2019	2020	2021	2022	2023	2024	2025
Africa	164	161	169	172	177	183	188
Asia Pacific	835	841	895	907	935	962	990
of which China	*306*	*325*	*364*	*377*	*395*	*416*	*438*
Central and South America	155	142	153	147	148	150	153
Eurasia	608	584	634	619	614	624	632
of which Russia	*482*	*460*	*501*	*484*	*479*	*487*	*492*
Europe	586	573	604	549	556	545	536
Middle East	545	548	564	582	596	609	627
North America	1 106	1 080	1 084	1 108	1 101	1 105	1 116
of which United States	*888*	*869*	*867*	*887*	*878*	*880*	*889*
World	**3 999**	**3 930**	**4 103**	**4 083**	**4 127**	**4 178**	**4 243**

Sources: IEA, *Gas Market Report*, 1.2023, pp. 112-113, https://iea.blob.core.windows.net/assets/c7e74868-30fd-440c-a616-488215894356/GasMarketReport%2CQ3-2022.pdf

OPEC: How the Middle East Dominates World Gas Reserves: 1960-2021

(1,000 billion standard cubic meters)



Source: OPEC, OPEC Annual Statistical Bulletin 2022, 14.12.22, https://asb.opec.org/ASB_Charts.html?chapter=229. .

BP Estimate of MENA Gas Production and Exports: 2020-2021

The Middle East exported 143.1 Billion Cubic Meters of LNG in 2021, or 14% of a world total of 1,021 .9 BCM.

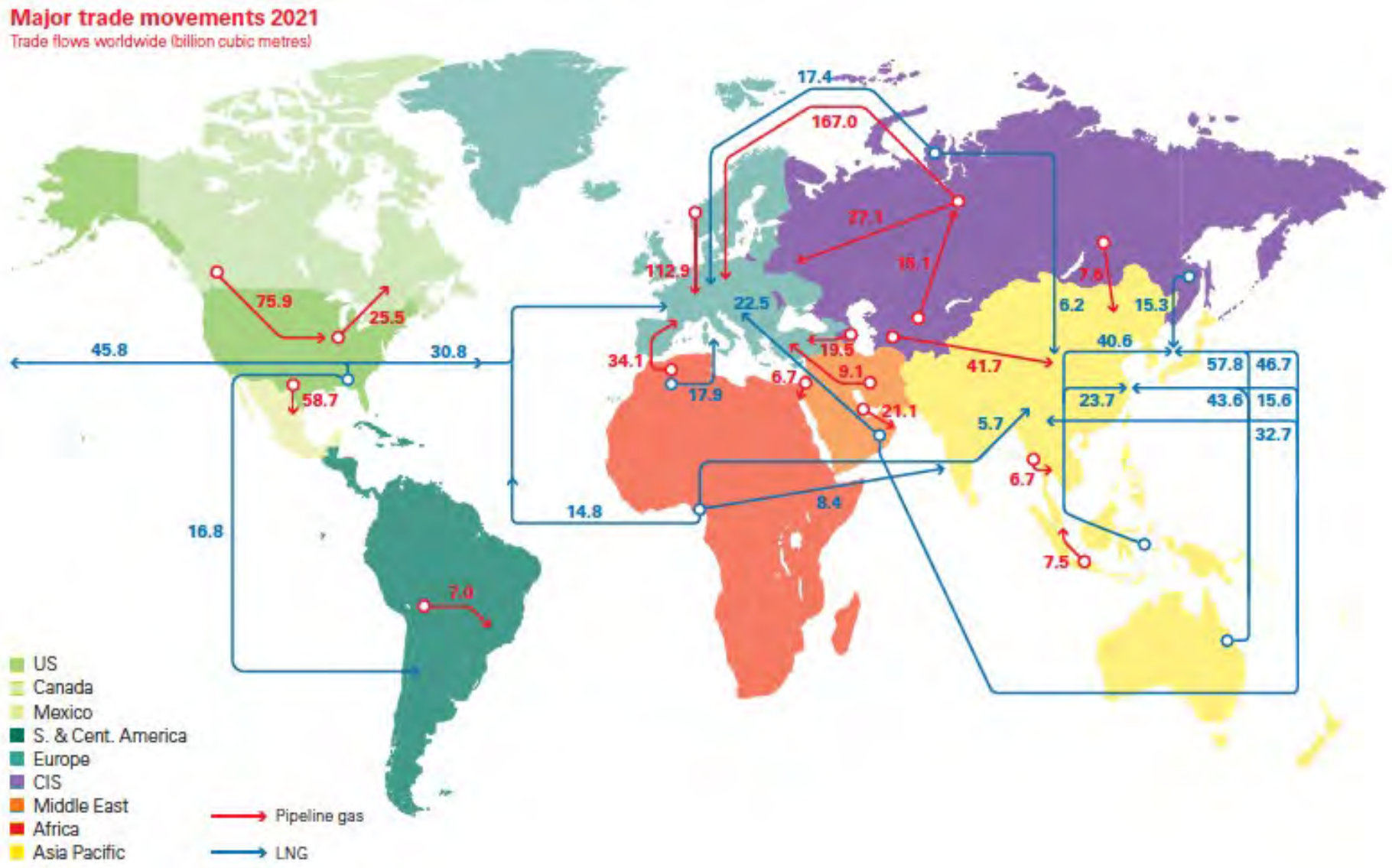
The World Bank estimates that the Middle East and North Africa exported $762.5 billion worth of goods ($24.98 billion in gas) in 2020, and imported $686.6 billion worth.

Country	Gas Reserves in 2020		Production		Natural Gas Rents as% of GDP
	Global Rank	Reserve. (MMcf)	Global Share	BCM in. 2021	
Russia	*1*	*1,688,228,000*	*24.3%*	*701.7*	*2.3*
Iran	2	1,201,382,000	17.3%	256.7	3.5
Qatar	3	871,585,000	12.5%	177.0	3.3
United States	*4*	*368,704,000*	*5.3%*	*934.2*	*0.0*
Saudi Arabia	5	294,205,000	4.2%	117.3	0.4
UAE	7	215,098,000	3.1%	57.0	0.4
China	*10*	*163,959,000*	*2.4%*	*209.2*	*0.1*
Algeria	11	159,054,000	2.3%	100.8	1.6
Iraq	12	111,522,000	1.6%	9.4	0.2
Egypt	16	77,200,000	1.1%	67.8	0.4
Kuwait	20	63,500,000	0.9%	17.4	0.4
Libya	21	53,183,000	0.8%	12.4	1.5
Oman	28	24,910,000	0.4%	41.8	1.6
Yemen	31	16,900,000	0.2%	0.4	0.0
Syria	42	8,500,000	0.12%	2.9	0.5
Israel	45	7,027,000	0.10%	na	0.1
Bahrain	52	3,250,000	0.05%	17.2	1.3
Sudan	55	3,000,000	0.04%	na	0.0
Tunisia	57	2,300,000	0.03%	na	0.1
Turkey	84	218,000	0.003%	na	0.0
Jordan	85	213,000	0.003%	na	0.0
Morocco	94	51,000	0.0007%	na	0.0

Notes: (1) Does not include updated estimates for Turkey, Lebanon, Israel, Egypt, and Gaza; (2) No production data for lowest output countries. Total Other Middle East is 17.9 BCM. Total Other Africa is 30.6 BCM

Source; BP, *Statistical Review of World Energy, 2022*, https://www.bp.com/content/dam/bp/business sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-full-report.pdf; World Bank, *Natural Gas Rents as % of GDP, 2020*, https://data.worldbank.org/indicator/NY.GDP.NGAS.RT.ZS

Major Gas Export Movements in 2021



Source: BP (British Petroleum), *bp Statistical Review of World Energy 2022*, 71st edition, p. 37

† † Less than 0.05.

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

1 Includes all of non-EU Europe other than Norway.

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BP Estimate of Total MENA Gas Production 2011-2021

Billion cubic metres	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Growth rate per annum 2021	Growth rate per annum 2011-21	Share 2021
Bahrain	12.6	13.1	14.0	14.7	14.6	14.4	14.5	14.6	16.3	16.4	**17.2**	5.1%	3.2%	0.4%
Iran	151.0	156.9	157.5	175.5	183.5	199.3	213.9	224.9	232.9	249.5	**256.7**	3.1%	5.4%	6.4%
Iraq	6.3	6.3	7.1	7.5	7.3	9.9	10.1	10.6	11.0	7.0	**9.4**	33.9%	4.0%	0.2%
Kuwait	12.9	14.7	15.5	14.3	16.1	16.4	16.2	16.9	18.2	16.5	**17.4**	5.9%	3.1%	0.4%
Oman	27.1	28.3	30.8	29.3	30.7	31.5	32.3	36.3	36.7	36.9	**41.8**	13.5%	4.4%	1.0%
Qatar	150.4	162.5	167.9	169.4	175.9	174.8	170.5	175.2	177.2	174.9	**177.0**	1.4%	1.6%	4.4%
Saudi Arabia	87.6	94.4	95.0	97.3	99.2	105.3	109.3	112.1	111.2	113.1	**117.3**	4.0%	3.0%	2.9%
Syria	7.4	6.1	5.0	4.6	4.1	3.5	3.5	3.5	3.3	2.7	**2.9**	5.3%	-9.0%	0.1%
United Arab Emirates	51.0	52.9	53.2	52.9	56.6	59.5	59.5	56.1	57.5	55.4	**57.0**	3.1%	1.1%	1.4%
Yemen	9.4	7.6	10.4	9.8	2.9	0.5	0.3	0.1	0.3	0.3	**0.4**	30.2%	-27.1%	*
Other Middle East	4.2	2.5	6.3	7.3	8.1	9.0	9.5	10.1	10.1	15.0	**17.9**	19.9%	15.5%	0.4%
Total Middle East	520.0	545.5	562.6	582.6	600.9	624.3	639.6	662.4	674.6	687.8	**714.9**	4.2%	3.2%	17.7%
Algeria	79.6	78.4	79.3	80.2	81.4	91.4	93.0	93.8	87.0	81.5	**100.8**	24.1%	2.4%	2.5%
Egypt	59.1	58.6	54.0	47.0	42.6	40.3	46.8	58.6	64.9	58.5	**67.8**	16.3%	1.4%	1.7%
Libya	7.5	11.6	12.2	11.8	14.7	14.8	13.6	13.2	13.5	12.1	**12.4**	2.7%	5.2%	0.3%
Nigeria	36.4	39.2	33.1	40.0	47.6	42.6	47.2	48.3	49.3	49.4	**45.9**	-6.9%	2.3%	1.1%
Other Africa	17.9	18.9	20.5	20.7	21.8	22.8	26.9	27.9	28.3	29.8	**30.6**	3.3%	5.5%	0.8%
Total Africa	200.6	206.7	199.1	199.6	208.0	211.8	229.5	241.7	242.9	231.2	**257.5**	11.7%	2.5%	6.4%
Total World	**3257.3**	**3326.2**	**3365.4**	**3433.3**	**3511.1**	**3544.7**	**3673.5**	**3851.7**	**3967.7**	**3861.5**	**4036.9**	**4.8%**	**2.2%**	**100.0%**
of which: OECD	1151.0	1187.0	1196.5	1242.1	1281.0	1289.8	1328.0	1431.7	1511.6	1483.5	**1503.0**	1.6%	2.7%	37.2%
Non-OECD	2106.3	2139.1	2168.9	2191.2	2230.1	2255.0	2345.5	2420.0	2456.1	2378.0	**2533.8**	6.8%	1.9%	62.8%
European Union	117.5	113.9	113.9	99.9	84.3	82.3	76.8	68.8	61.1	47.8	**44.0**	-7.7%	-9.3%	1.1%

*Excludes gas flared or recycled. Includes natural gas produced for Gas-to-Liquids transformation.

*Less than 0.05%.

Source: includes data from Cedigaz, FGE MENA natural gas service.

Notes: As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar); as they are derived directly from measures of energy content using an average conversion factor and have been standardized using a gross calorific value (GCV) of 40 MJ/m³, they do not necessarily equate with gas volumes expressed in specific national terms. Growth rates are adjusted for leap years.

Annual changes and shares of total are calculated using billion cubic metres figures.

Source: BP (British Petroleum), *bp Statistical Review of World Energy 2022*, 71st edition, p. 29

Summary of the Analysis

This report on *The Strengths and Limits of Oil and Gas Wealth, and the Challenge of Climate Change* is an updated version of a report on the changing strategic importance of the Middle East and North Africa (MENA) region. It focuses on the energy and other economic aspects of the the region– whose economy and strategic importance is is dominated by its current and future oil and gas exports. Another report entitled **The Impact of Growing Military and Civil Instability in the MENA Region** addresses the security and civil development of the region and the challenges its nations face. This report will also available on the CSIS web site.

Addressing the Impact of Oil and Gas Exports by MENA Country: The Current Key to the Region's Strategic Importance

The analysis begins with an overview of all the key factors shaping the region's changing strategic importance, of which oil and gas exports are only a part. It then focuses on the oil and gas exports which are the key factor shaping the region's strategic importance, its role as group of major trading partners, its role as a key line of global communication between regions, and its role as in global migration.

The analysis provides a country-by-country overview of various estimates of the key quantitative and trend data on oil and gas exports. It shows that there is only a limited consensus between various sources, and just how different the resources and exports of given countries are. It also shows that the level of energy exports dominates the strategic importance of most states in the MENA region. The one exception is Israel, which is currently the only state with an advanced enough economy to export advanced goods and services and that ranks as a highly developed state for at least its Jewish population, although Saudi Arabia, Qatar, and the UAE are making important advances.

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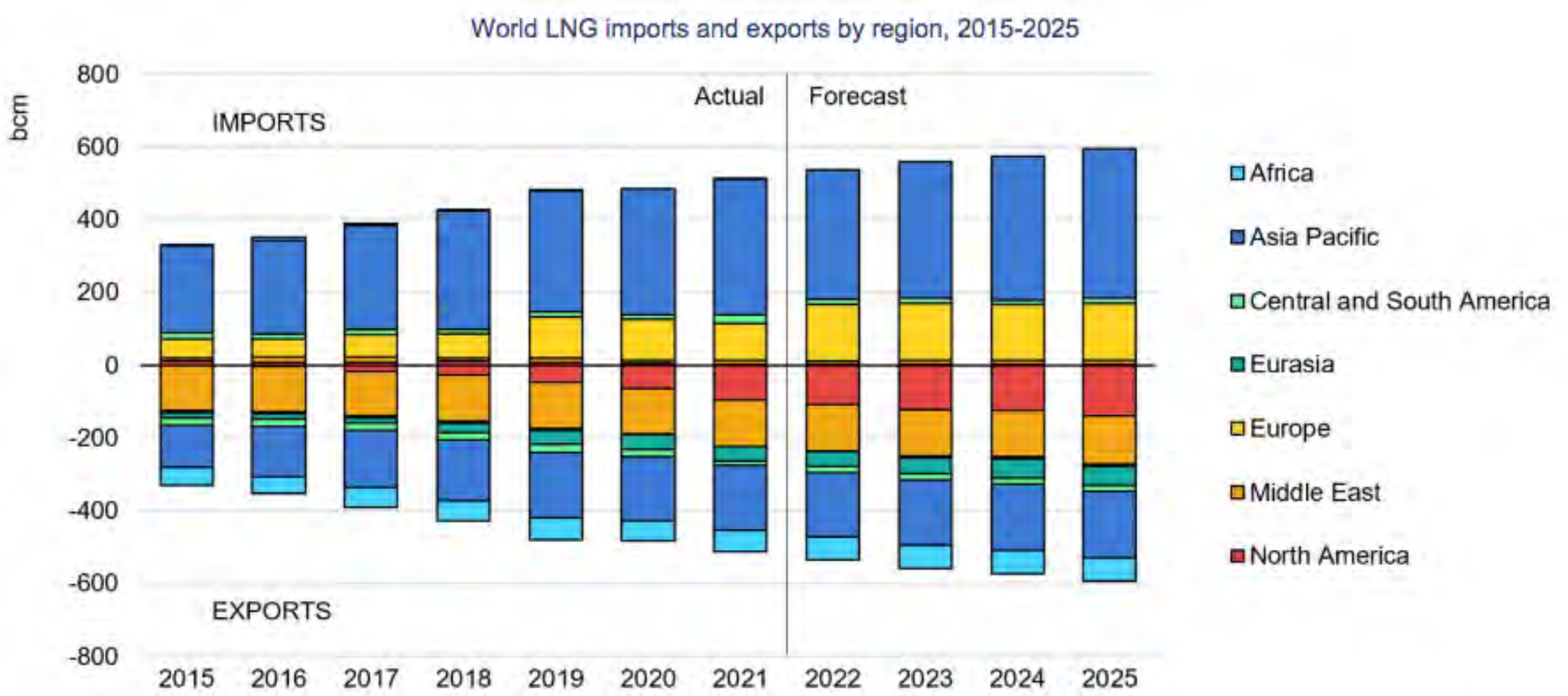
BP Estimate of MENA NGL Production: 2011-2021

Oil: Natural gas liquids production in thousands of barrels per day*

Thousand barrels daily	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Growth rate per annum 2021	Growth rate per annum 2011-21	Share 2021
Iran	404	412	418	441	461	488	364	368	379	354	**450**	27.1%	1.1%	3.7%
Iraq	45	42	41	40	41	48	64	64	68	64	**70**	8.8%	4.5%	0.6%
Kuwait	273	283	287	276	288	290	305	313	299	257	**326**	26.8%	1.8%	2.7%
Oman	–	–	–	–	–	–	–	–	–	–	**–**	–	–	–
Qatar	426	437	471	466	470	473	450	471	470	432	**436**	1.0%	0.2%	3.6%
Saudi Arabia	1513	1635	1518	1577	1578	1718	1717	1728	1687	1609	**1560**	-3.1%	0.3%	12.9%
Syria	34	26	14	10	8	8	8	8	9	10	**10**	–	-11.5%	0.1%
United Arab Emirates	447	479	482	539	614	654	631	604	639	607	**637**	4.9%	3.6%	5.3%
Yemen	23	24	24	25	26	26	27	28	28	28	**28**	0.3%	1.8%	0.2%
Other Middle East	11	10	10	10	10	10	10	11	19	18	**15**	-18.1%	3.2%	0.1%
Total Middle East	3175	3346	3266	3385	3494	3715	3576	3596	3597	3378	**3531**	4.5%	1.1%	28.3%
Algeria	225	216	210	260	268	261	254	252	247	233	**248**	6.5%	1.0%	2.1%
Angola	14	20	22	30	16	23	39	40	47	47	**40**	-13.6%	11.2%	0.3%
Chad	–	–	–	–	–	–	–	–	–	–	**–**	–	–	–
Republic of Congo	9	12	9	8	7	7	7	7	7	7	**7**	3.7%	-2.3%	0.1%
Egypt	65	66	67	47	64	60	57	58	56	44	**47**	4.5%	-3.3%	0.4%
Equatorial Guinea	21	20	21	19	17	19	21	19	17	15	**15**	2.3%	-2.9%	0.1%
Gabon	–	–	–	–	–	–	–	–	–	–	**–**	–	–	–
Libya	8	40	22	8	15	15	20	21	27	15	**40**	159.1%	16.6%	0.3%
Nigeria	86	79	83	86	80	76	78	83	87	63	**80**	28.4%	-0.6%	0.7%
South Sudan	–	–	–	–	–	–	–	–	–	–	**–**	–	–	–
Sudan	–	–	–	–	–	–	–	–	–	–	**–**	–	–	–
Tunisia	4	5	6	5	5	5	4	4	3	3	**2**	-19.4%	-4.0%	*
Other Africa	–	–	–	–	–	–	–	1	1	3	**7**	147.7%	–	0.1%
Total Africa	431	456	440	462	472	467	481	465	492	430	**487**	13.3%	1.2%	4.0%

Source: BP (British Petroleum), *bp Statistical Review of World Energy 2022*, 71st edition, p. 18

IEA Estimate of Global NGL Production: 2015-2025



Sources: IEA, *Gas Market Report*, 1.2023, pp. 112-113, https://iea.blob.core.windows.net/assets/c7e74868-30fd-440c-a616-488215894356/GasMarketReport%2CQ3-2022.pdf

MENA Country Dependence on Oil and Gas Export Revenues

MENA Country Dependence on Oil and Gas Export Revenues

The slides in this section show the very different levels of MENA country dependence on oil export revenues. Similar data are lacking on gas revenues, although they are an increasingly important aspect of MENA fossil fuel and total exports, and gas exports are expected to become a growing share of total exports in the future, and to include new exports affecting the economies of countries like Lebanon and Israel.

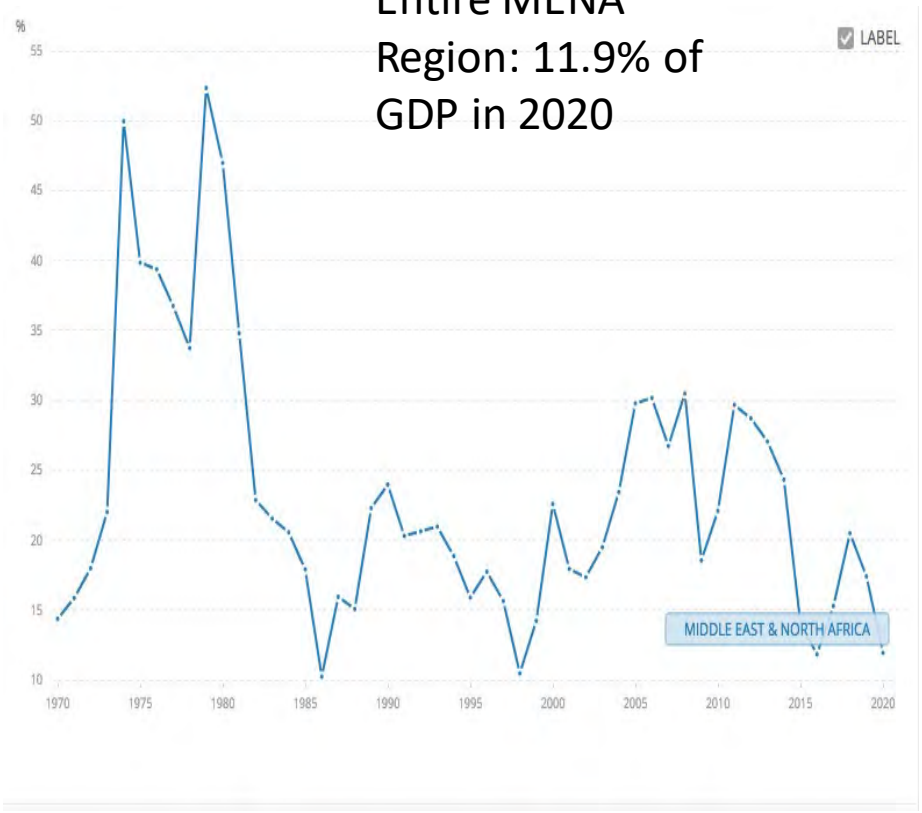
- **MENA Dependence on Oil Export Revenues as a Percent of GDP** shows oil export revenues as a percent of total GDP. The lowest percentage is zero. The highest is 32.2% for Iraq. Kuwait, Algeria, Libya, Oman, Qatar, Saudi Arabia, and Tunisia all get more than 10% of their GDP from oil exports – a critical share of their economy.
- **Major MENA Country Net Oil Export Revenues: 2020-First Half 2022** shows the amount of annual oil export revenues for 2020-2022, and the sharp changes from year to year caused by shifts in international oil revenues. It is clear that such revenue streams are critical to major MENA oil exporters, but do not provide anything approaching a predictable flow of income, or basis for economic and governmental spending. Note that the figure for 2022 only covers six months. The full year provided much higher revenues.
- **Major MENA Country Net Per Capita Oil Export Revenues: 2020-First Half 2022** shows per capita oil export income. Once again, the figure for 2022 only covers six months. The full year provided much higher revenues. These figures are perhaps the best picture of nominal "oil wealth" per country. It is clear that such "wealth" is nominal for some of the largest exporters like Algeria and Iran, and is rarely large enough to be substitute for effective overall economic development.

It should o be noted that the UN and other sources estimate that that MENA region will have some of the highest population growth of any region in the world through 2050, , as well as have a steadily rising dependency ratio in many cases. As a result, oil wealth will often drop in the future.

At the same time, it must be stressed that these figures do not include gas export income, and this means they sharply understate dependency on total fossil fuel exports, and total fossil fuel "wealth," in the case of major MENA gas exporters.

MENA Dependence On Oil Export Revenues As A Percent of GDP

Entire MENA Region: 11.9% of GDP in 2020



Algeria	2020	10.2
Bahrain	2020	7.4
Djibouti	2020	0.0
Egypt, Arab Rep.	2020	2.1
Iran, Islamic Rep.	2020	17.2
Iraq	2020	32.2
Israel	2020	0.0
Jordan	2020	0.0
Kuwait	2020	31.6
Lebanon	2020	0.0
Libya	2020	**21.1**
Morocco	2020	0.0
Oman	2020	19.4
Qatar	2020	11.7
Saudi Arabia	2020	17.7
Syrian Arab Republic	2019	2.6
Tunisia	2020	1.0
United Arab Emirates	2020	11.5
West Bank and Gaza	2020	0.0
Yemen, Rep.	2018	4.5

Source: Adapted from World Bank, https://data.worldbank.org/indicator/NY.GDP.PETR.RT.ZS?locations=ZQ.

Major MENA Country Net Oil Export Revenues: 2020-First Half 2022

	Nominal (billion dollars)					Real (billion 2021 dollars)				
Country	2020	2021	2022	2023	Jan-July 2022	2020	2021	2022	2023	Jan-Jul 2022
Algeria	$15	$25	$39	$35	$24	$15	$25	$36	$32	$22
Angola	$18	$27	$43	$40	$26	$19	$27	$40	$36	$24
Congo (Brazzaville)	$3	$6	$9	$8	$5	$4	$6	$8	$7	$5
Ecuador Guinea	$2	$3	$5	$4	$3	$2	$3	$4	$4	$2
Gabon	$2	$4	$6	$5	$4	$2	$4	$6	$5	$4
Iran	$17	$39	$62	$57	$37	$17	$39	$58	$51	$34
Iraq	$48	$83	$131	$120	$77	$50	$83	$121	$109	$72
Kuwait	$34	$59	$100	$94	$58	$36	$59	$93	$85	$54
Libya	$4	$26	$28	$27	$16	$4	$26	$26	$24	$15
Nigeria	$21	$29	$40	$45	$23	$22	$29	$37	$40	$21
Saudi Arabia	$106	$184	$304	$266	$184	$111	$184	$282	$240	$171
United Arab Emirates	$46	$75	$125	$120	$73	$48	$75	$116	$108	$68
Venezuela	$4	$8	$16	$13	$9	$4	$8	$15	$12	$9
OPEC total	**$320**	**$570**	**$907**	**$835**	**$539**	**$335**	**$570**	**$842**	**$752**	**$500**

Source: EIA, OPEC Revenues Fact Sheet, August 2022, https://www.eia.gov/international/analysis/special-topics/OPEC_Revenues_Fact_Sheet..

Major MENA Country Net Per Capita Oil Export Revenues: 2020-First Half 2022

	Nominal (dollars)					Real (2021 dollars)				
Country	2020	2021	2022	2023	Jan-July 2022	2020	2021	2022	2023	Jan-July 2022
Algeria	$342	$565	$883	$785	$528	$358	$565	$819	$708	$490
Angola	$547	$806	$1,240	$1,106	$738	$573	$806	$1,151	$997	$685
Congo (Brazzaville)	$611	$1,069	$1,432	$1,248	$828	$639	$1,069	$1,329	$1,125	$769
Equatorial Guinea	$1,471	$2,132	$3,130	$2,893	$1,762	$1,540	$2,132	$2,905	$2,608	$1,636
Gabon	$1,085	$1,887	$2,878	$2,275	$1,799	$1,136	$1,887	$2,671	$2,051	$1,670
Iran	$198	$465	$730	$664	$431	$207	$465	$678	$599	$400
Iraq	$1,151	$1,945	$2,988	$2,685	$1,771	$1,205	$1,945	$2,774	$2,421	$1,644
Kuwait	$7,989	$13,610	$22,577	$20,970	$13,186	$8,363	$13,610	$20,956	$18,905	$12,240
Libya	$587	$3,873	$4,143	$3,876	$2,401	$614	$3,873	$3,845	$3,494	$2,229
Nigeria	$101	$138	$182	$200	$105	$106	$138	$169	$180	$97
Saudi Arabia	$3,063	$5,221	$8,508	$7,343	$5,149	$3,207	$5,221	$7,897	$6,619	$4,780
United Arab Emirates	$4,670	$7,517	$12,394	$11,807	$7,228	$4,888	$7,517	$11,504	$10,644	$6,709
Venezuela	$117	$253	$460	$373	$277	$122	$253	$427	$336	$257
OPEC	$634	$1,104	$1,725	$1,556	$1,024	$663	$1,104	$1,601	$1,403	$950

Data source: U.S. Energy Information Administration, August 2022 Short-Term Energy Outlook.

Source: EIA, OPEC Revenues Fact Sheet, August 2022, https://www.eia.gov/international/analysis/special-topics/OPEC_Revenues_Fact_Sheet..

The Uncertain Future Strategic Vectors Shaping MENA Energy Exports

The Uncertain Future Strategic Vectors Shaping MENA Energy Exports

The present structure and importance on MENA oil and gas exports, and the MENA region, could change strikingly by 2030, and radically by 2050. It is affected by four major potential shifts in the international demand for oil and gas exports, and the role of fossil fuels in the global economy. These shifts are now highly unpredictable and will probably remain so for years into the future. Some could increase the strategic importance of the MENA region and others could radically reduce it.

The following sections of the analysis highlight these key uncertainties, but it must be stressed that the data do not support any current form of predictions, and that any such efforts would be little more than guess work. The exception is the kind of valid valid analytic work the makes clear assumptions about the future, and explore a given set of scenarios. The following subsections present such analyses from sources like the U.S. Energy Information Administration and the International Energy Agency, but it is critical to note that these effectively are contingency studies, not efforts at prediction or prophecy. They also are excerpted from highly complex models and analytic efforts and the original source should be consulted in depth to understand the full nature of the assumptions and models used.

- **How Developing Nations May Become Key Strategic Consumers of Middle Eastern Oil and Gas Exports** *presents estimates of the changes in international demand that could result if only limited efforts are made to change such demands as a result of global warming.*
- **Climate Change Policy and the Radical Potential Impact on Projections of the Future Strategic Impact of MENA Oil and Gas Exports** *raises critical questions about massive potential reductions n the demand for MENA oil and gas exports and the strategic importance of the region.*
- **Russia and the Ukraine War as Key Strategic Variables** *highlights the uncertainties in future demand for oil and gas exports, and the strategic importance of given exporters, caused by the war in the Ukraine.*

- **The Impact of China's Rising Strategic Position** *highlights the uncertainties in future demand for MENA oil and gas exports, and the potential risk of a war or major strategic economic confrontation between China and the U.S. and its major strategic partners in Europe and Asia.*
- **Continuing U.S. Strategic Dependence on MENA Oil and Gas Exports** *shows that U.S. "independence" from the need to secure the steady and affordable flow of MENA oil and gas exports is a myth unless efforts to reduce carbon emissions and global warming become so effective that they approach the net zero case – a contingency that currently seems highly unlikely.*

How Developing Nations May Become Key Strategic Consumers of Middle Eastern Oil and Gas Exports

How Developing Nations May Become Key Strategic Consumers of Middle Eastern Oil and Gas Exports

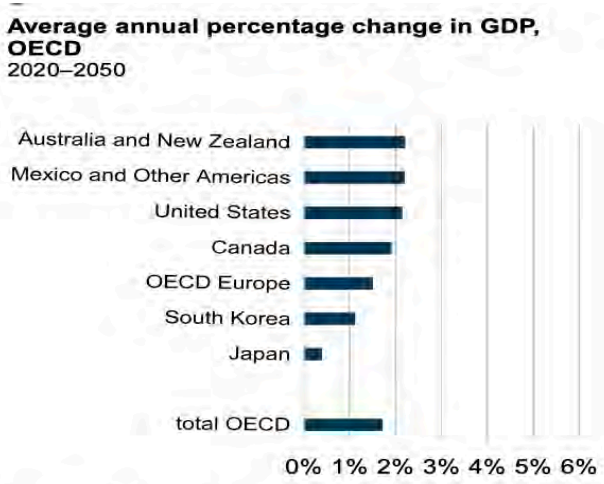
The data and graphic in this section project a major rise in the demand for MENA oil and gas exports if importing nations do not male major new efforts to reduce carbon emissions and global warming, or developed economies like the United States do not assume most of the burden in reducing the demand for fossil fuels. *As noted earlier, such analyses are highly uncertain.*

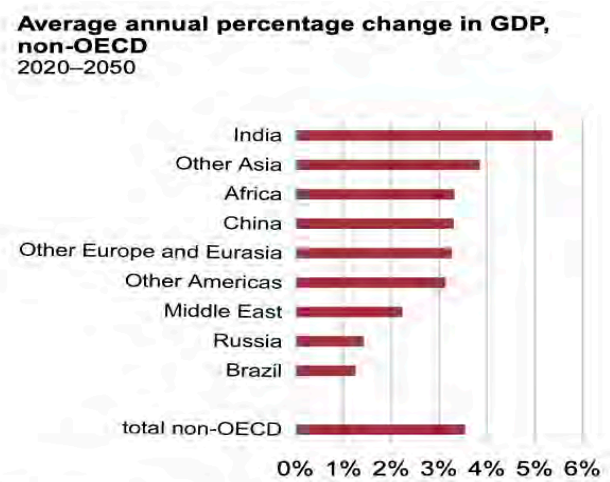
- **Economic Growth in China, India, and the Developing World Mean Massive Increases in Energy Demand and in Flow of Imports from MENA** and **Energy Consumption Growth Shifts to Non-OECD Asia: 2020-2050** provide two versions of EIA estimates of how large the potential demand for more oil and gas exports could be if massive new measures are not taken to reduce their demand for fossil fuels.
- **China, India, Asia, and the Developing World 's Growing Strategic Dependence on MENA and Other Crude Oil Exports Through 2050** shows a pre-Ukraine war estimate of how critical added MENA exports could be to the development of China and India.
- **Asia and Pre-Ukraine War Estimates of Key Gas Import Trends: 2010-2050** shows a similar estimate for increases in the demand for natural gas.
- **Asian Over-Dependence on Crude Oil and Coal as Primary Energy Sources** shows how critical it is for key Asian states to import more oil – and especially natural gas – to reduce their dependence on coal unless they make massive investments in alternative energy supplies

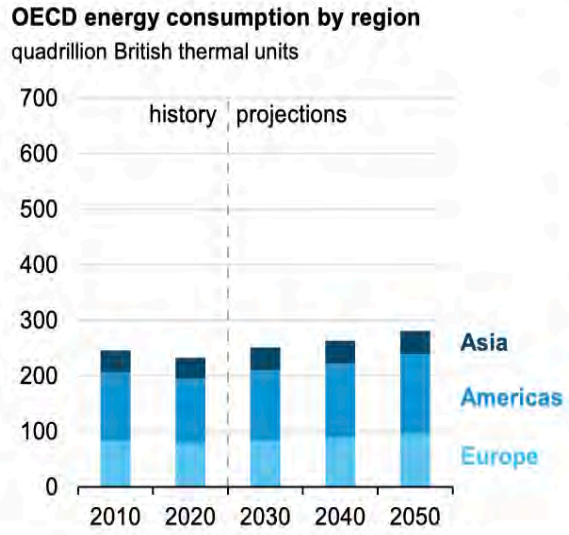
Economic Growth in China, India, and the Developing World Mean Massive Increases in Energy Demand and in Flow of Imports from MENA

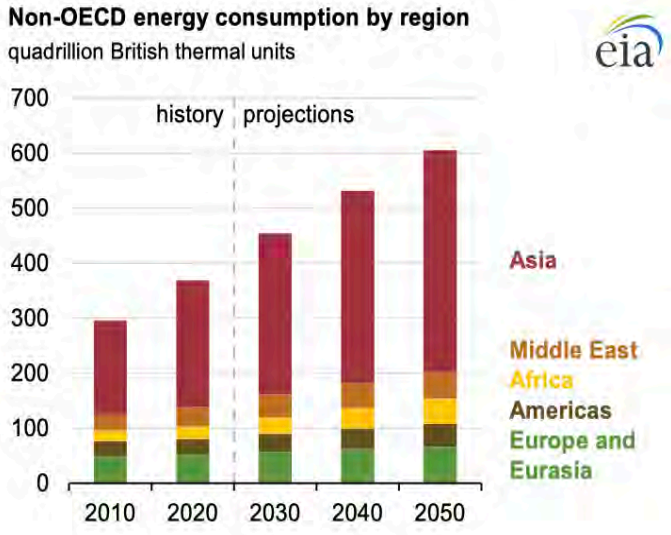
The regions with the fastest-growing economies in the IEO2021 Reference case are non-OECD countries in Asia. India's growth is greatest, but the WEPS regions[7] of Other non-OECD Asia, Africa, China, and Other non-OECD Europe and Eurasia remain leaders in economic growth as well. Although China continues to grow at an average rate equal to Africa and Other non-OECD Europe and Eurasia, its growth notably slows throughout the projection period. *Together, these top five growth regions were home to 70% of the world's population in 2020 and 44% of GDP. By 2050, these shares grow to 73% and 59%, respectively.*

Economic growth varies widely among Asian regions in the IEO2021 Reference case. Most notably, the projected GDP growth rate in China slows considerably compared with its growth rate from 2000 to 2010, when GDP increased by an average of over 10% per year. We also project slower economic growth for Japan and South Korea, illustrating the interconnectedness of Asian economies, as the decline in Chinese demand and trade for intermediate and finished goods, in addition to other structural and demographic factors, affects economic growth in these neighboring countries.



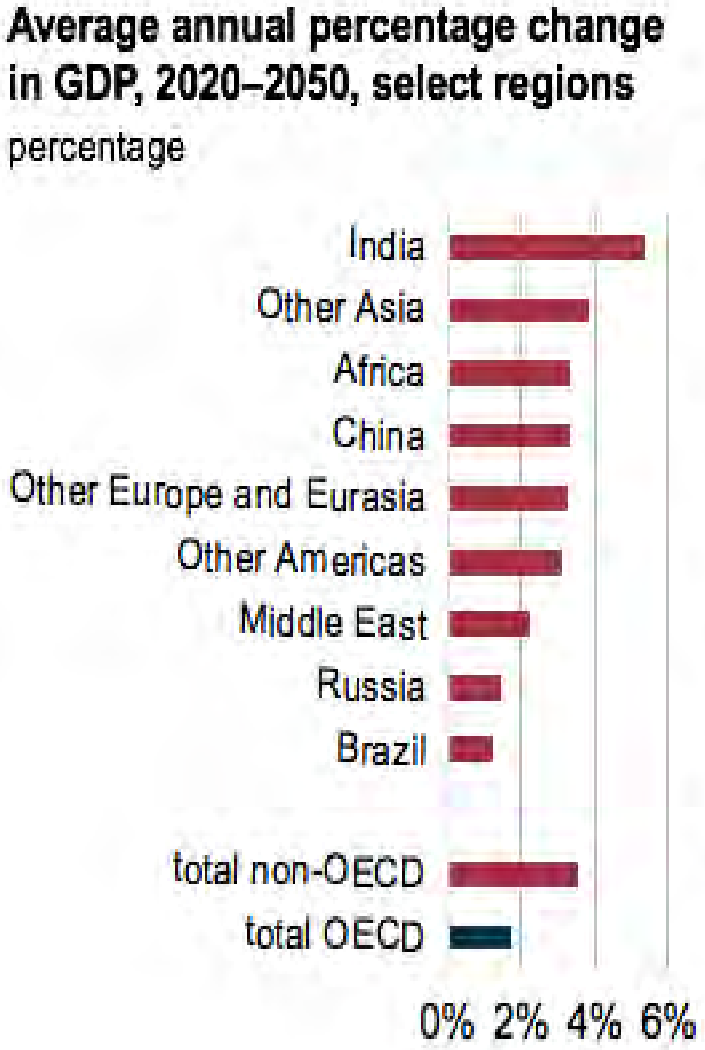


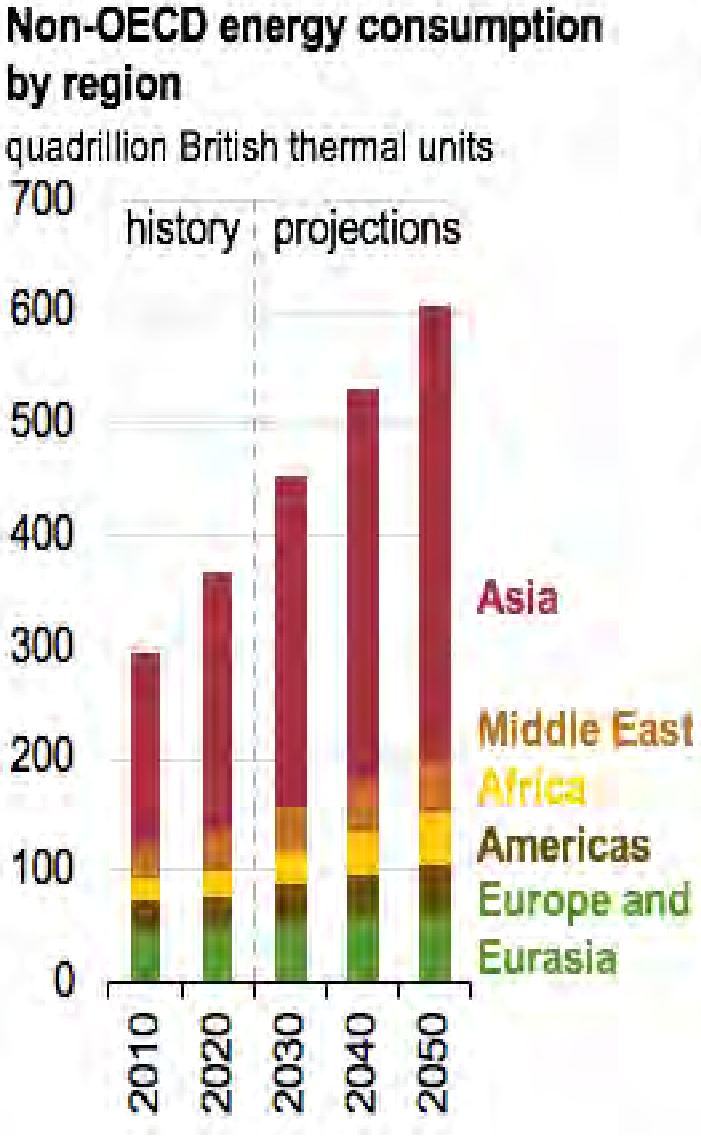


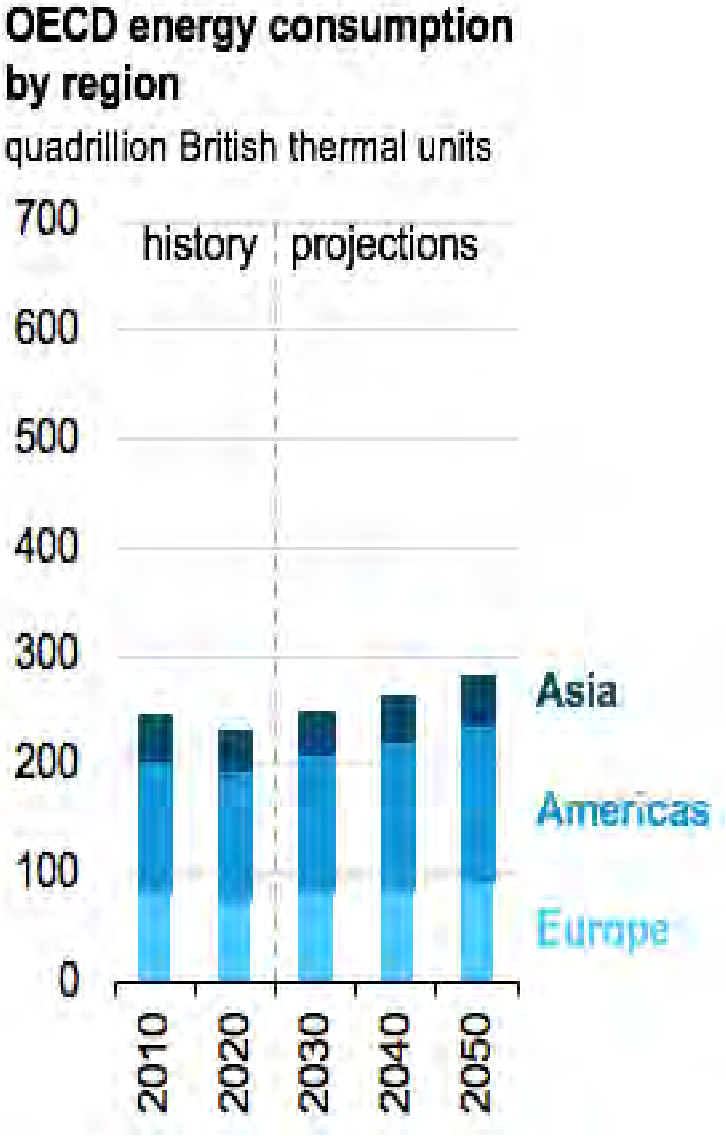


Source: EIA, *International Energy Outlook 2021*, October 2021, https://www.eia.gov/outlooks/ieo/consumption/sub-topic-01.php.

Energy Consumption Growth Shifts to Non-OECD Asia: 2020-2050





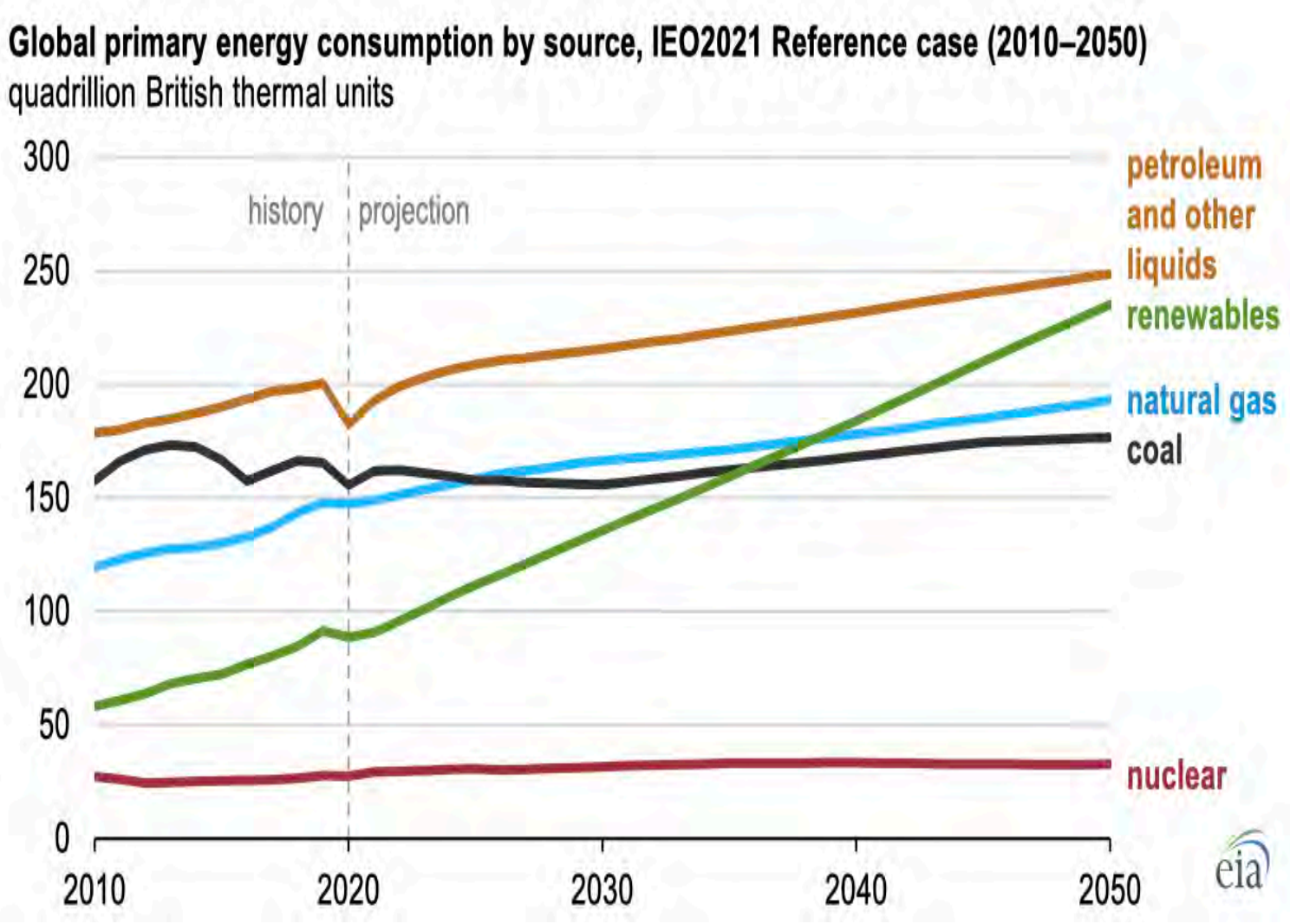


Source: EIA, International Energy Outlook 2021, PPT, p. 17.

Rising Global and Asian Dependence on Liquid Fuels Through 2050

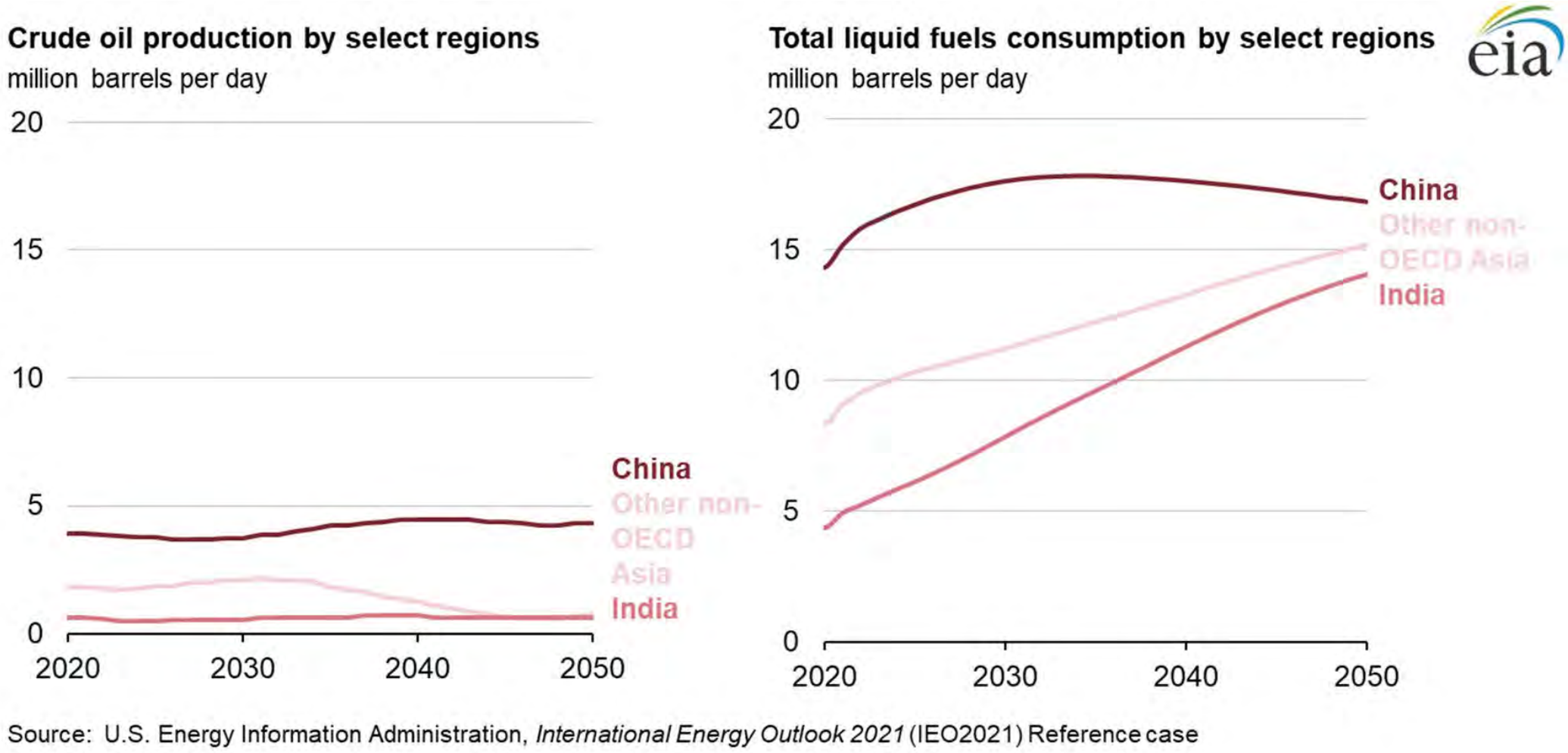
Oil and natural gas production will continue to grow, mainly to support increasing energy consumption in developing Asian economies.
Driven by increasing populations and fast-growing economies, consumption of liquid fuels will grow the most in non-OECD Asia, where total consumption nearly doubles by 2050 from 2020 levels in the Reference case.

Because these countries will consume more liquid fuels than they produce in the Reference case, we project that non-OECD Asia will supplement local production with increased imports of crude oil and finished petroleum products. The increased imports will primarily be supported by increased production in the Middle East. In the Reference case, by 2050, non-OECD Asia will become the largest importer of natural gas, and Russia will become the largest net exporter of natural gas.



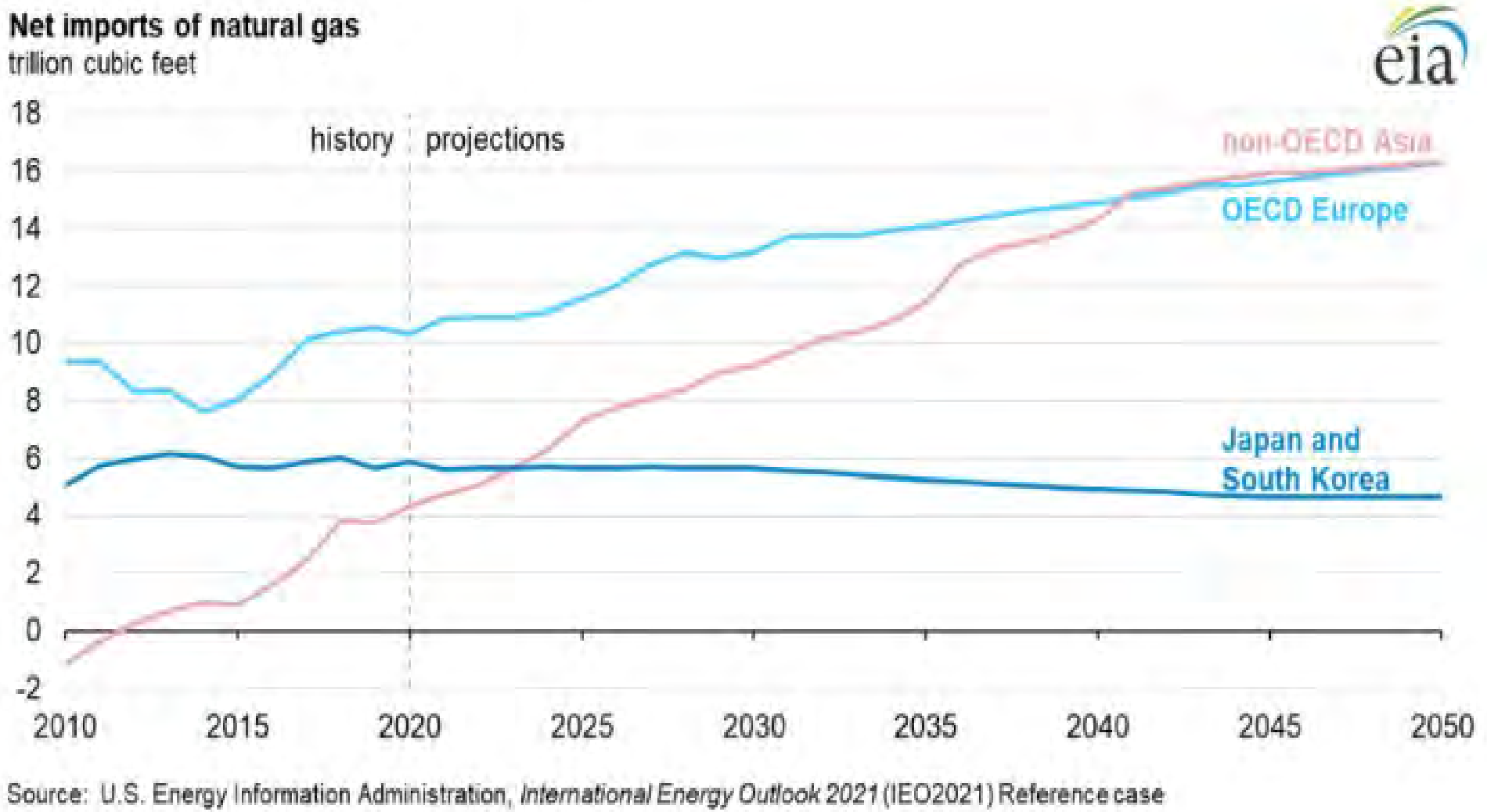
Source: EIA, International Energy Outlook 2021, October 2021, https://www.eia.gov/todayinenergy/detail.php?id=49856.

China and Asia's Growing Strategic Dependence on MENA and Other Crude Oil Exports Through 2050



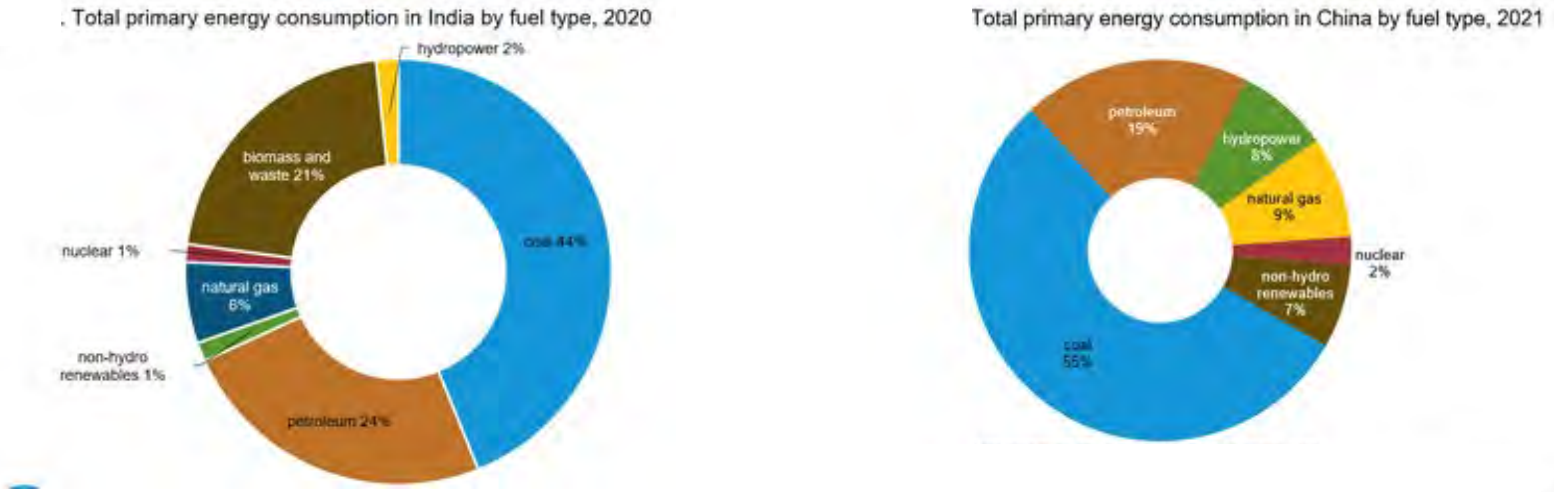
Source: EIA, International Energy Outlook 2021, October 2021, .

Asia and Pre-Ukraine War Estimates of Key Gas Import Trends: 2010-2050



Source: U.S. Energy Information Administration, *International Energy Outlook 2021* (IEO2021) Reference case

Asian Over-Dependence on Crude Oil and Coal as Primary Energy Sources



Source: EIA,, Full Country Analyses, 2022.

Estimates of Future Oil and Gas Demand if Major New Efforts to Reduce Use of Fossil Fuels Are Not Driven by Major New Efforts to Reduce Climate Change

Estimates of Future Oil and Gas Demand if Major New Efforts to Reduce Use of Fossil Fuels are Not Driven by Climate Change Policies

The slides in this section expand the previous analysis to show that variety of sources like the U.S. government Energy Information Administration (EIA), Exxon Mobil, and OPEC estimate that global and MENA oil and natural gas production will continue to grow through 2050 *if no major changes take place to reduce oil and gas use to avid global warming and climate change*. Under these conditions, the strategic importance of the MENA region will steadily increase because of the need to support the increasing energy consumption in developing Asian economies. Some such estimates indicate that oil and natural gas consumption will nearly double by 2050 from 2020 levels in the Reference case.

- **EIA and Exxon Mobil The Future Use of Oil and Gas Through 2050 if One Largely Ignores Climate Change** compares estimates of future global energy demand through 2050 by the estimate by the U.S. Energy Information Administration (EIA), and Exxon-Mobil, one of the world's largest energy firms. The EIA estimate only projects a limited reduction in oil and gas use in response to climate change. The Exxon-Mobil projection shows a reduction in coal use, but not in oil and gas.

- **"Business as Usual" Rising Global and Asian Dependence on Liquid Fuels and Gas Through 2050** shows a different estimate by EIA made in 2021, which does not cut oil and gas use. This estimate stated that, "Because these countries will consume more liquid fuels than they produce in the Reference case, we project that non-OECD Asia will supplement local production with increased imports of crude oil and finished petroleum products. The increased imports will primarily be supported by increased production in the Middle East. In the Reference case, by 2050, non-OECD Asia will become the largest importer of natural gas, and Russia will become the largest net exporter of natural gas."
- **The Future Use of Oil and Gas Through 2050 if One Minimizes Climate Change** provides a similar projection by OPEC. It shows a major rise in alternative energy and natural gas use, a limited rise in oil use, and major cuts in coal use.

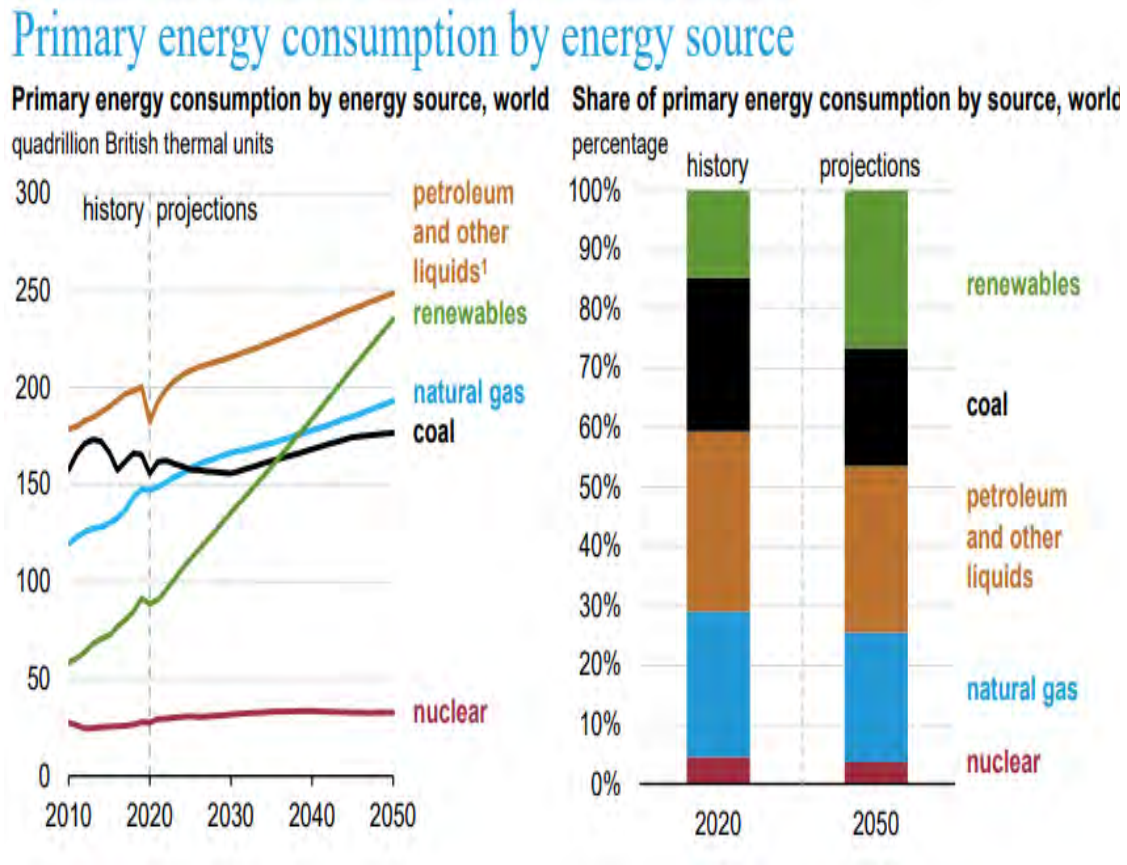
- **OPEC Estimate of Source of Regional Crude and Condensate Imports by Origin, 2021–2045** shows an OPEC estimate of oil use that also ignores the potential impact of climate change. It shows that the MENA region will dominate the increase in both global demand, and Asian demand. It should be noted, however, that this estimate does not take account of any changes in the flow of Russia exports as a result of the Ukraine War.

- **OPEC Estimate of Rise in Gas Demand: 2021- 2045** provides a similar OPEC estimate of the rising trends in MENA gas exports, which will be particularly critical because natural gas has less impact on global warming and is becoming a more desirable fuel, and way of reducing dependence on high emission fuels like coal, even if draconian measures are not take to reduce dependence on all fossil fuels.

The Future Use of Oil and Gas Through 2050 if One Minimizes Climate Change

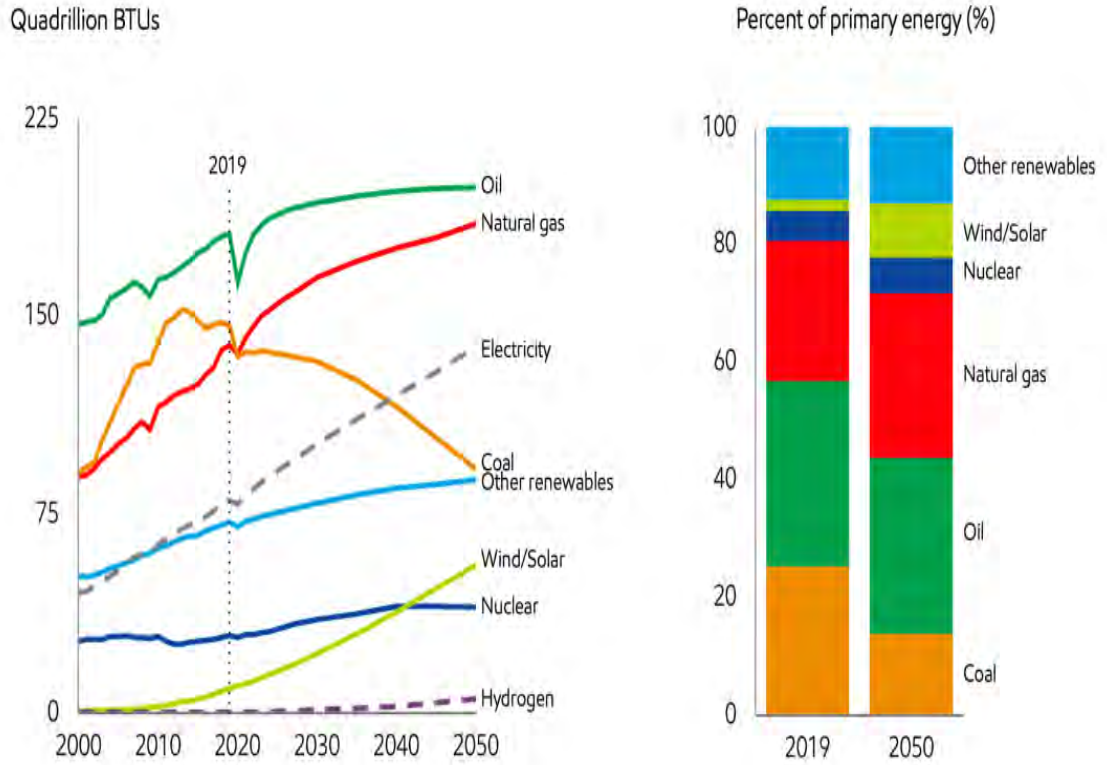
(Primary energy consumption by energy source projections)

Energy Information Administration (EIA)



Source: U.S. Energy Information Administration, International Energy Outlook 2021, accessed at https://www.eia.gov/outlooks/ieo/

ExxonMobil

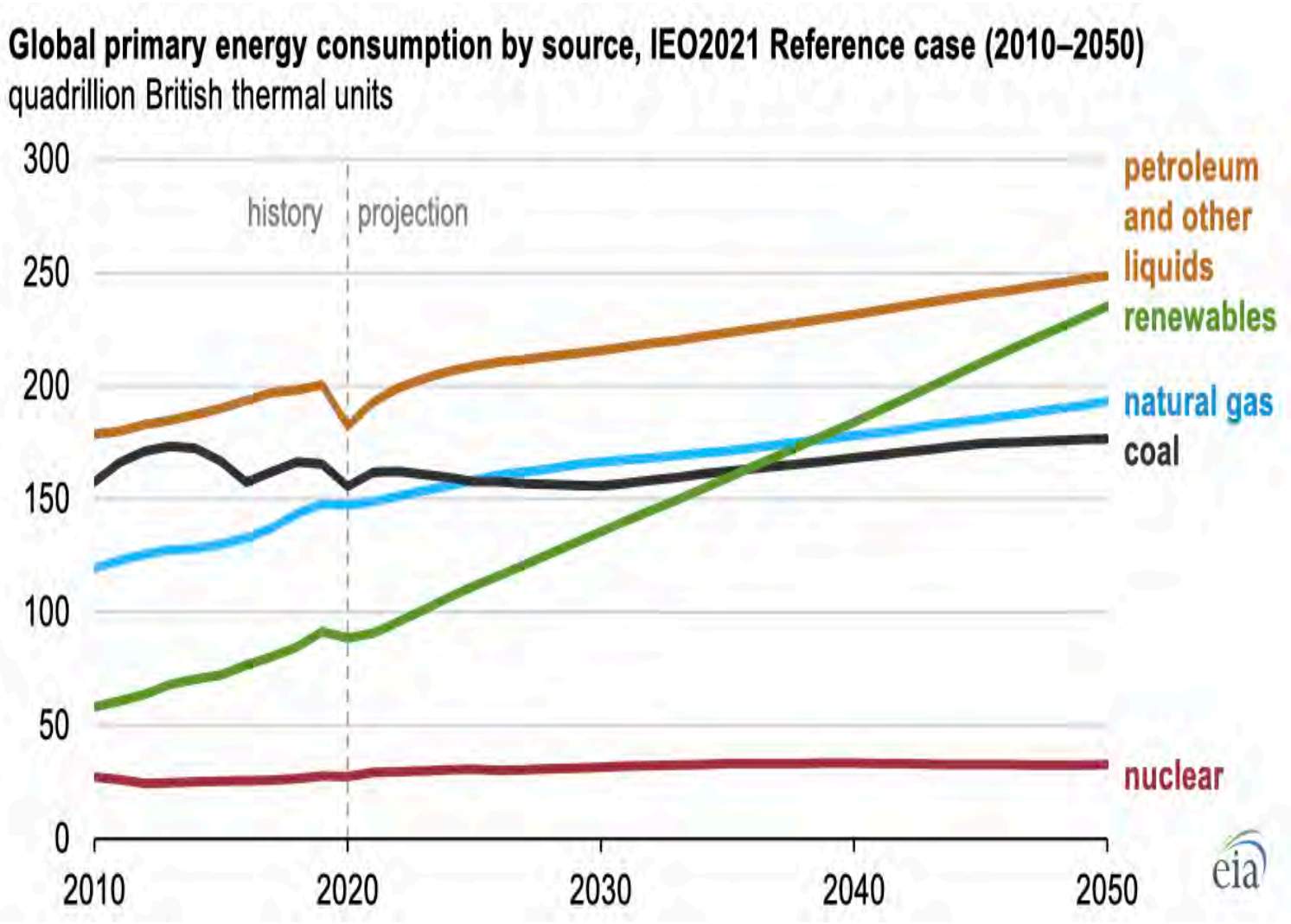


Source: ExxonMobil, Energy demand: Three drivers, Outlook for Energy 2021, accessed at https://corporate.exxonmobil.com/Energy-and-innovation/outlook-for-energy/Energy-demand#Transportation

"Business as Usual" Rising Global and Asian Dependence on Liquid Fuels and Gas Through 2050

Oil and natural gas production will continue to grow, mainly to support increasing energy consumption in developing Asian economies.
Driven by increasing populations and fast-growing economies, consumption of liquid fuels will grow the most in non-OECD Asia, where total consumption nearly doubles by 2050 from 2020 levels in the Reference case.

Because these countries will consume more liquid fuels than they produce in the Reference case, we project that non-OECD Asia will supplement local production with increased imports of crude oil and finished petroleum products. The increased imports will primarily be supported by increased production in the Middle East. In the Reference case, by 2050, non-OECD Asia will become the largest importer of natural gas, and Russia will become the largest net exporter of natural gas.



Source: EIA, *International Energy Outlook 2021*, October 2021, https://www.eia.gov/todayinenergy/detail.php?id=49856.

OPEC Estimate of Total Energy Demand: 2021-2045

OPEC Projections

Oil demand is expected to increase 12.3 mboe/d, reaching 100.6 mboe/d in 2045. A significant part of this growth is accounted for by the post-pandemic recovery. Beyond 2030, oil demand increases only marginally in line with stricter energy policies, efficiency gains and a switch to other fuels. Consequently, the share of oil in the primary energy mix declines from around 31% in 2021 to 28.7% in 2045. Even after this decline, oil is set to retain the number one position in the energy mix.

Natural gas demand is set to increase strongly by 19 mboe/d between 2021 and 2045. It reaches 85 mboe/d by the end of the forecast period. It is assumed that natural gas will remain a long-term fuel of choice, despite the current market distortions.

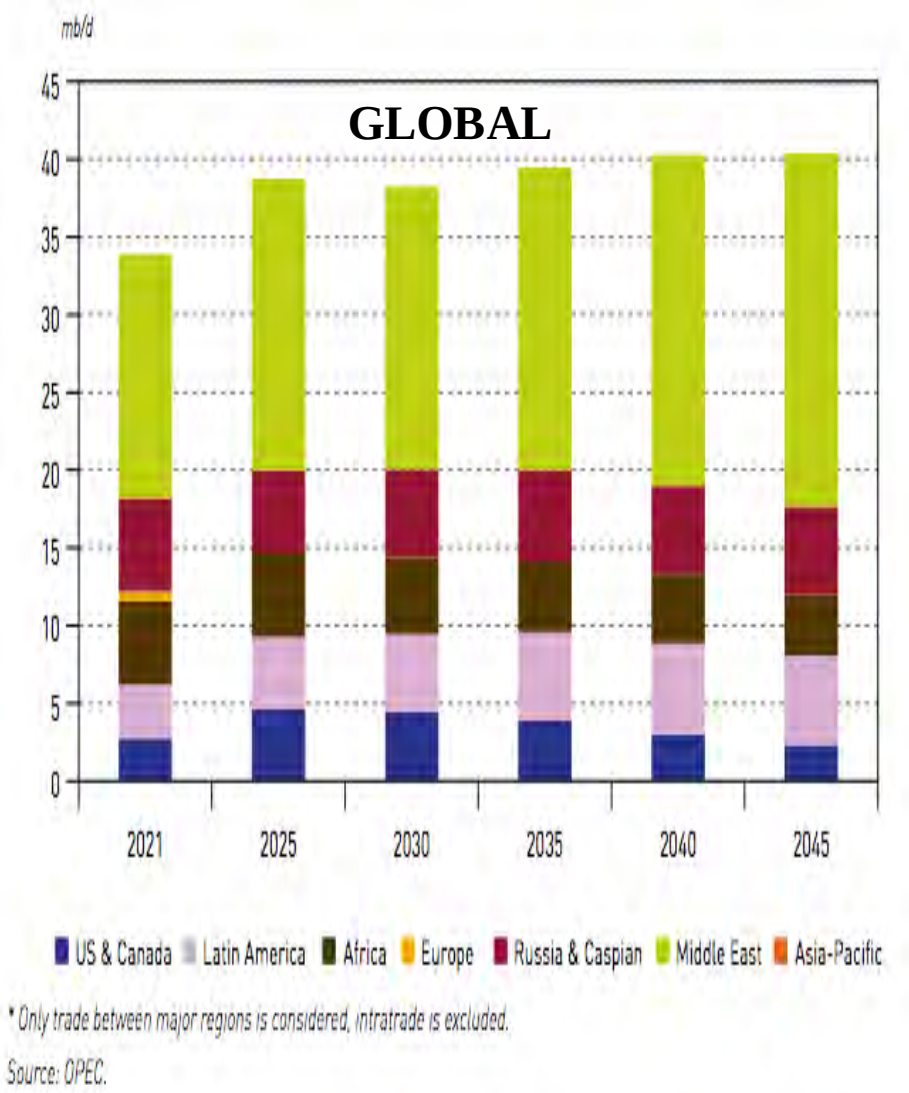
The long-term potential for natural gas is based on the sufficient gas resources and its relatively low CO2 emissions, which is why many countries intend to increase the share of gas in their energy mix. Its share in the energy mix increases, from just above 23% in 2021 to almost 24.5%in 2045. Due to coal's decline, gas becomes the second largest fuel in the mix after 2030.

World primary energy demand by fuel type, 2021–2045

	Levels mboe/d						Growth mboe/d	Growth % p.a.	Fuel share %	
	2021	2025	2030	2035	2040	2045	2021–2045	2021–2045	2021	2045
Oil	88.3	96.1	98.9	100.1	100.5	100.6	12.3	0.5	30.9	28.7
Coal	74.7	74.0	70.7	66.4	62.1	58.2	-16.5	-1.0	26.1	16.6
Gas	66.4	69.9	74.9	79.5	83.0	85.3	18.9	1.0	23.2	24.3
Nuclear	15.2	16.3	17.8	19.6	21.7	23.3	8.1	1.8	5.3	6.6
Hydro	7.5	8.0	8.7	9.4	10.1	10.4	2.9	1.4	2.6	3.0
Biomass	26.2	27.9	30.0	32.0	33.7	34.9	8.6	1.2	9.2	9.9
Other renewables	7.4	11.2	17.8	24.9	32.5	38.3	30.9	7.1	2.6	10.9
Total	285.7	303.4	318.9	331.9	343.6	351.0	65.3	0.9	100.0	100.0

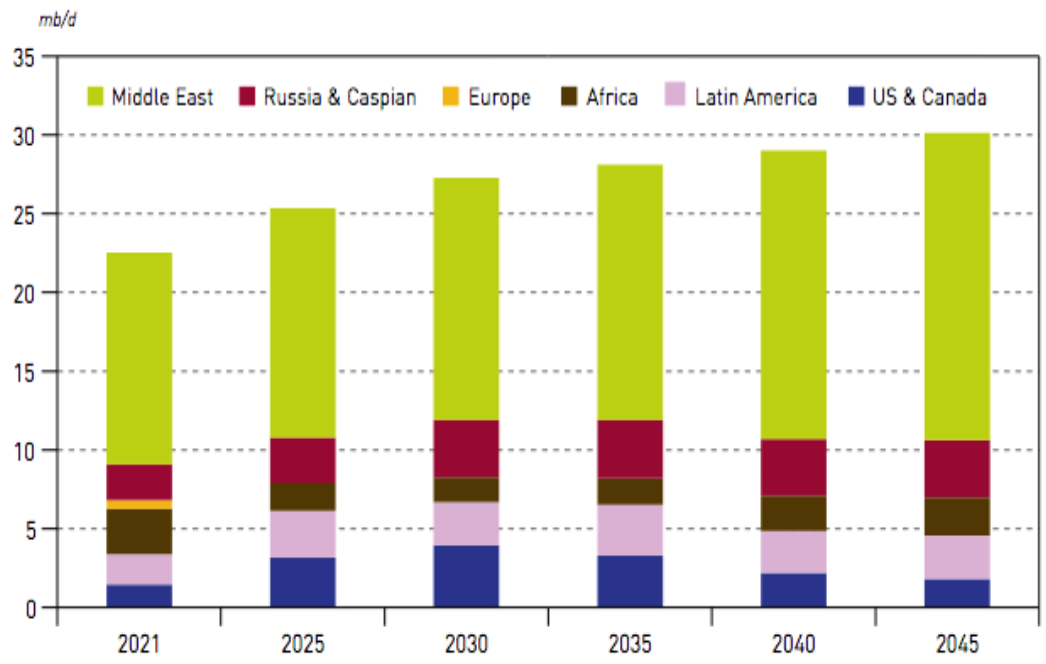
Sources: OPEC; *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, p. 57.

OPEC Estimate of Source of Regional Crude and Condensate Imports by Origin, 2021–2045



* Only trade between major regions is considered, intratrade is excluded.

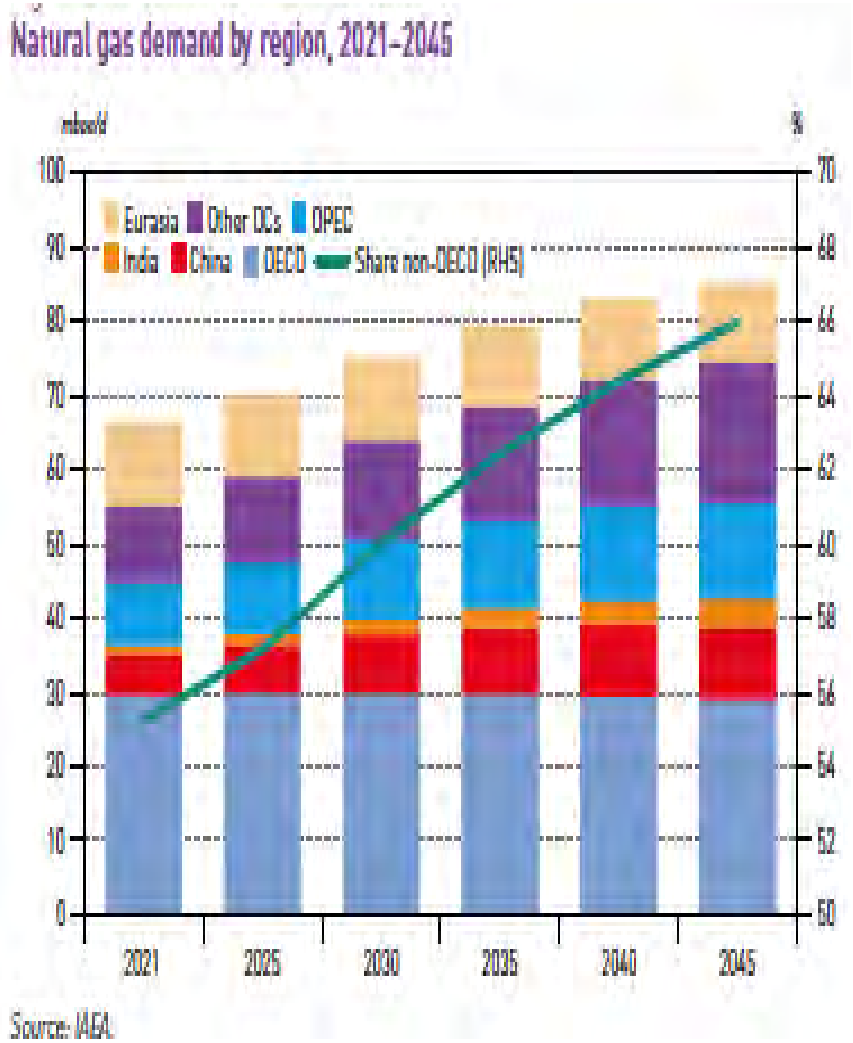
Source: OPEC.



Source: OPEC, *World Oil Outlook, 2022*, pp. 13-14, Accessed 12.14.22, file:///Users/Downloads/WOO_2022.pdf.

IEA and OPEC Estimate of Rise in Gas Demand: 2021- 2045

In Millions of Barrels Equivalent per Day



	Levels mboe/d						Growth mboe/d	Growth % p.a.	Share %	
	2021	2025	2030	2035	2040	2045	2021-2045	2021-2045	2021	2045
OECD Americas	17.7	18.2	18.4	18.7	18.8	18.8	1.1	0.2	26.7	22.1
OECD Europe	8.4	8.2	8.0	7.7	7.2	6.7	-1.7	-0.9	12.7	7.9
OECD Asia-Pacific	3.6	3.5	3.5	3.5	3.5	3.5	-0.1	-0.1	5.4	4.1
OECD	**29.7**	**30.0**	**29.9**	**29.9**	**29.6**	**29.0**	**-0.7**	**-0.1**	**44.7**	**34.0**
China	5.5	6.6	7.9	8.9	9.6	9.9	4.4	2.5	8.3	11.6
India	1.1	1.4	1.9	2.6	3.2	3.8	2.7	5.2	1.7	4.5
OPEC	8.5	9.7	10.9	11.9	12.6	12.9	4.4	1.7	12.9	15.1
Other DCs	10.1	11.4	13.3	15.3	17.2	18.9	8.8	2.7	15.2	22.1
Russia	8.4	7.6	7.5	7.3	7.1	6.8	-1.6	-0.9	12.6	7.9
Other Eurasia	3.1	3.2	3.4	3.7	3.9	4.0	0.9	1.1	4.6	4.7
Non-OECD	**36.7**	**40.0**	**45.0**	**49.6**	**53.5**	**56.3**	**19.6**	**1.8**	**55.3**	**66.0**
World	**66.4**	**69.9**	**74.9**	**79.5**	**83.0**	**85.3**	**18.9**	**1.0**	**100.0**	**100.0**

Source: OPEC, *World Oil Outlook, 2022*, pp. 73, Accessed 12.14.22, file:///Users/Downloads/WOO_2022.pdf and OPEC; *World Energy Outlook, 2022, https://www.opec.org/opec_web/en/publications/340.htm, p. 73* .

The Radical Potential Impact of Climate Change on Projections of the Future Strategic Impact of MENA Oil and Gas Exports

The Radical Potential Impact of Climate Change

This section projects a radically different future for the MENA region, and one that would sharply reduce its income, economic development, and strategic importance. It shows that a major international effort to reduce the impact of climate change would lead to massive cuts in oil and gas use, leading to levels of demand in 2050 only about 20-25% of the current level.

Its slides in this section draw upon a range of sources, but rely primarily on the work of the International Energy Agency (IEA) which provides the best recent estimate of how efforts to reduce the impact of climate change, and global warming, could affect the future use of MENA oil and gas exports. They draw heavily on the IEA's *World Energy Outlook for 2021 (v)* , which was published in October 2021, and the IEA's *World Energy Outlook for 2022 (https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf*), which was was published I n November 2022. .

The 2021 report by the IEA is a 393 page analysis of the full range of potential impacts of current trends in energy supply and use, that compared the "business as usual" estimates of future oil and gas use in the previous section with what would happen if the limited efforts to reduce climate changes that are now the Stated Energy Policy Scenarios (STEPs) of different countries were increased during 2020-2050 by an Additional Push Scenario (APS) and a far more drastic a Net Zero Emissions Scenario (NZE).

The 2022 report by the IEA is a 535-page report that focused on the impact of the war in the Ukraine, but had a section updating the IEA's "Road Map to Net Zero Emissions (NZE), and updated and expanded much of the analysis and data in the 2021report.

The summary tables and charts that follow are only a small part of the full IEA analyses of the variables involved. The two full reports should be consulted to understand the various forces at work on a global level, the different options available, and how they affect the full range of global energy options, technologies, and uses of energy. It should be stressed that the IEA concentrated on broad global trends. It also assessed the Middle East region, not the MENA). They do, however, clearly warn that the strategic importance of the MENA region could diminish sharply in the future, along with its main source of revenues.

- **Just How Uncertain Current Projections of Warming and Future Reductions in Global Warming Now Are and Even "Best Case" Assumptions Leave a Major Overshoot Well Beyond 2020:** The first two slides are a critical preface to the estimates that follow. They show how wide the range of estimates of efforts to deal with the trends in climate change, and efforts to reduce emissions, can be. At the same time, it is becoming steadily clearer that global warming is real, and that the political and economic reaction to such developments could lead to far more aggressive cuts in the use of fossil fuels.

- **OPEC Estimate of Policy Goals of Key States in Reducing Fossil Fuel Use** shows the potential scale of national efforts to reduce the use of fossil fuels, but also raises the issue of financing. OPEC estimates of future energy use and imports assume that developed states will meet these goals, but less developed state will still make major increases in their use of oil and gas – assumptions that may well be realistic.

- **OPEC Estimates of Different Scenarios for Energy Use Through 2045** : OPEC.s World Energy Outlook for 2022 provides a highly detail analysis of possible scenarios for the possible future use of given types of energy supply. They include both a case with no major constraints because of climate change and one using advanced technologies to make major changes in fossil fuel use.

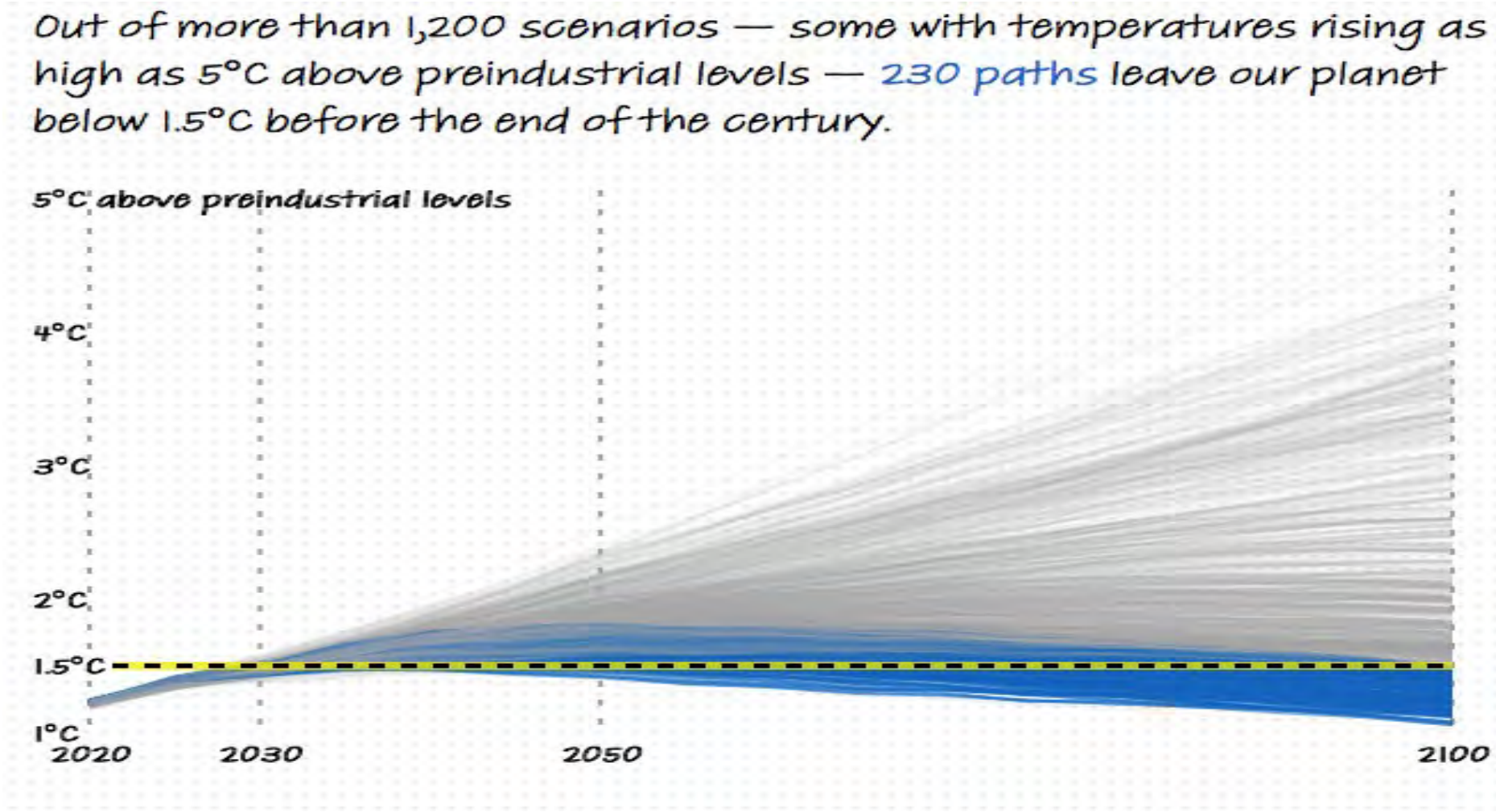
- **The Future of Oil and Gas Through 2050: British Petroleum (BP)** provides an illustration of this point in the form of an estimate by BP of the potential impact of efforts to cut global warming on oil and gas, another major global energy firm. It compares an estimate of oil and gas use if current policies to reduce the emissions leading to global warming are fully implement with an estimate of what it would take to produce a far more serious reduction in such warming, and an estimate of what would happen if the global economy acquired new momentum without such reductions.

- **IEA Estimate of the Stated Policies of Importing States on Fossil Fuel Demand: 1950-2050** introduces the summary results of IEA analyses. It shows that even existing national policies would reduce the use of fossil fuels by 40% by 2050 if fully implemented.

- **The Future of Oil and Gas Through 2050:** The IEA Estimate in 2021 goes much further. It examines the far more serious cuts in fossil fuels necessary to limit or end the growth of the emissions that cause global warming.

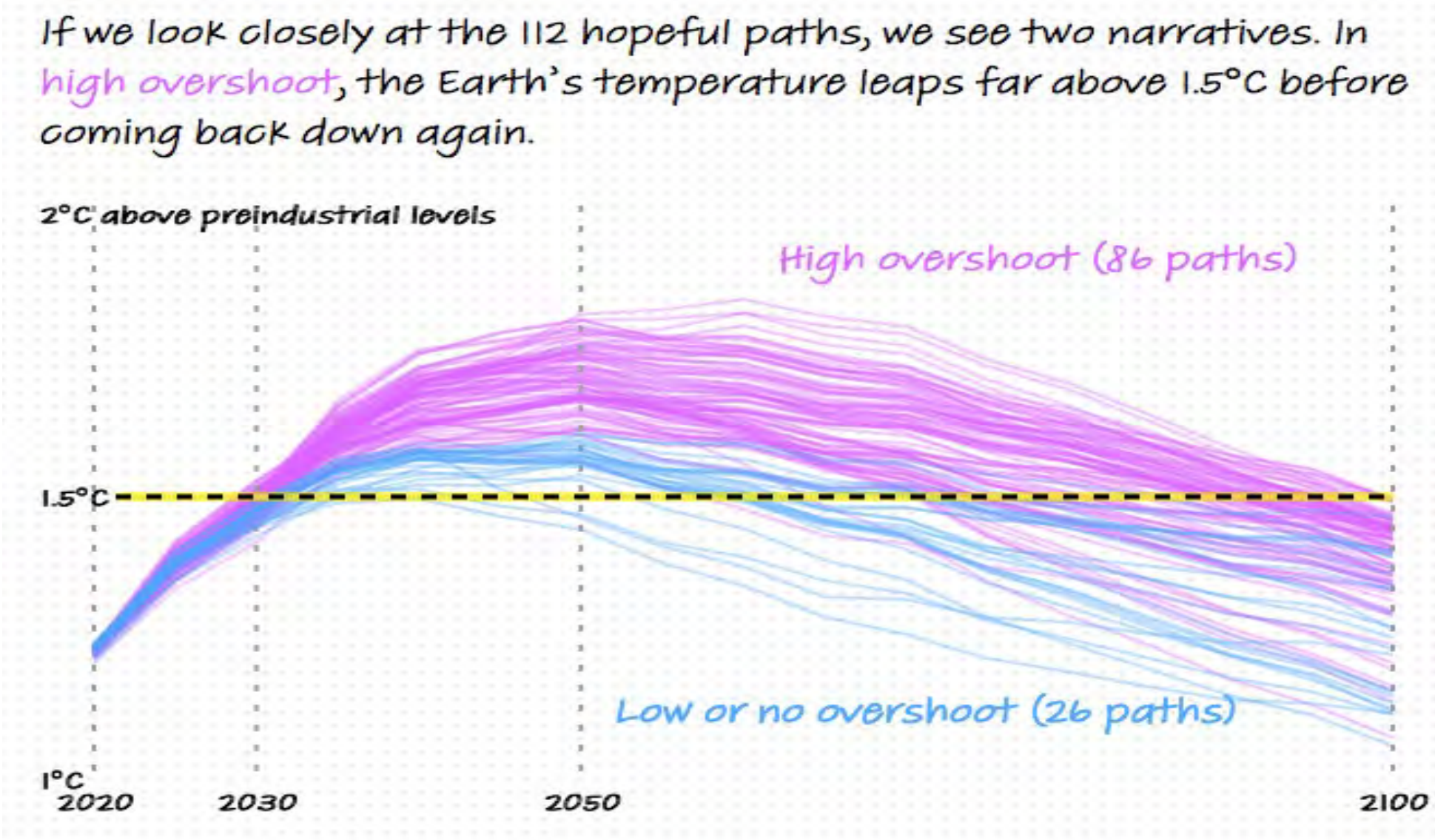
- **The Future of Oil and Gas Through 2050: IEA Estimate in 2022** updates the 2021 estimate and shows the impact of the projected additional cuts in fossil fuel use on carbon emissions.
- **An IEA Path for Cutting Fossil Fuels and to Net Zero Emissions:** Provides a more detailed comparison of the trend lines in how fossil fuels and other sources of energy are used today and in zero emissions case in 2050 that was developed by the IEA in 2023.
- **Future Oil Production by Region and Scenario (mb/d) 2010-2050** present a major policy challenge. It minimizes the cuts in MENA production by assuming that most of the cuts in oil production would come from developed states – an assumption that may not be realistic.
- **Future Refining Capacity and Runs by Region and Scenario (mb/d) 2010-2050** makes roughly the same estimates about refined product. This helps explain why the IEA estimates so small an impact on the economic growth and development of the MENA region.
- **Natural Gas Production by Region and Scenario (bcm) 2010-2050** makes roughly the same estimates about natural gas. This could be particularly unrealistic in the case of the United States.
- **IEA Estimate of Crude Oil and Natural Gas Exports to EU and Developing Asia, 2021-2030** assumes Europe and Russia will make major reduction in natural gas use while Asia will not. Once again, this assumption may be more politically correct than realistic *if climate changes does not produce steadily more drastic effects in the next decade*.
- **IEA Estimate of Energy Demand Growth by Region and Scenario, 2021-30.** This graph shows that the IEA projects a major increase in overall energy use in virtually every major region through at least 2030,
- **IEA Estimate of the Global Energy Supply and Demand by Sector, Scenario and Fuel:** 2021 vs. 2030; This graph shows the major cuts needed in coal and oil use by end type of consumption over the next seven years to achieve major cuts in emission, and the limit on the use of national gas.
- **The Future of Oil and Gas In Transportation Through 2050: International Energy Agency:** This graph assumes that all nations will largely eliminate all gasoline, diesel, and oil product vehicles by 2050 in the NZE case, and will not substitute byusing natural gas**.**

Just How Uncertain Current Projections of Warming and Future Reductions in Global Warming Now Are - I



Source: Chris Mooney, Naema Ahmed and John Muyskens, "We looked at 1,200 possibilities for the planet's future. These are our best hope," *Washington Post*, December 1, 2022, https://www.washingtonpost.com/climate-environment/interactive/2022/global-warming-1-5-celsius-scenarios/

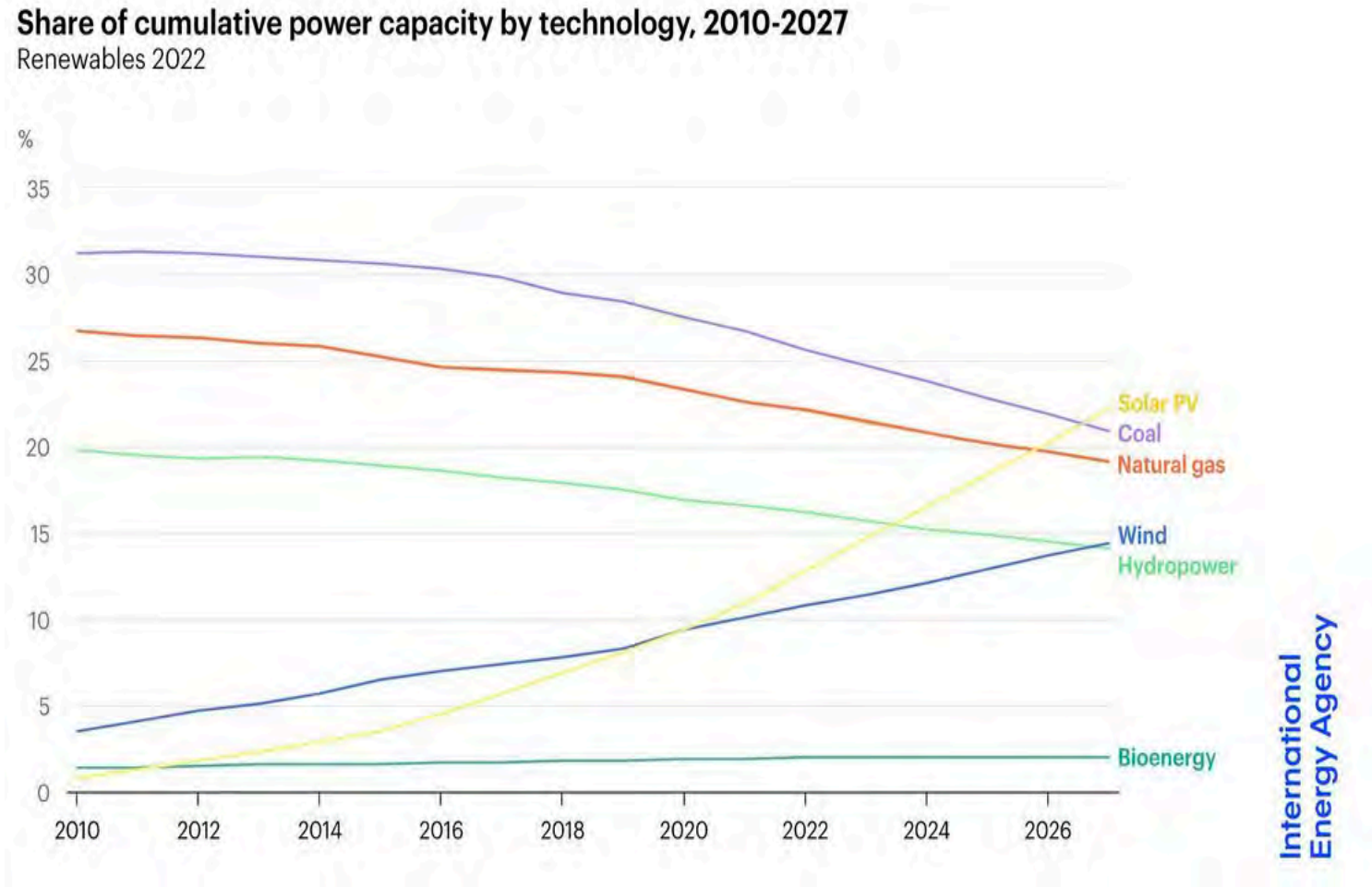
Even "Best Case" Assumptions Leave a Major Overshoot Well Beyond 2020



Source: Chris Mooney, Naema Ahmed and John Muyskens, "We looked at 1,200 possibilities for the planet's future. These are our best hope," *Washington Post*, December 1, 2022, https://www.washingtonpost.com/climate-environment/interactive/2022/global-warming-1-5-celsius-scenarios/

Shifts in Energy Sources Have Already Begun: IEA Estimate of Sources of Electric Power Generation: 20210-2027

Renewables are set to account for over 90% of global electricity expansion over the next five years, overtaking coal to become the largest source of global electricity by early 2025. And by 2027, solar PV alone is set to be the largest source of power capacity, confirming it as the king of global electricity markets.



Source: IEA, "The energy mix: the energy and climate challenges of 2023 and beyond," January 9. 2023, https://mail.google.com/mail/u/0/#search/IEA/FMfcgzGrbvGPPnjnShNfgfzrStwwRlKp.
Inbox

OPEC Estimate of Policy Goals of Key States in Reducing Fossil Fuel Use

Climate finance

The effects of climate change are already directly impacting developing countries. Moreover, the deployment of resources from developed countries for them to mitigate and adapt to the impacts of climate change remains neglected. Considering the very limited fiscal leeway in developing countries and the lack of capacity to tackle climate change, support from developed countries is urgently required.

Indeed, in 2009, developed countries had a stated commitment to mobilize $100 billion a year to developing countries for climate action by 2020. However, this longstanding responsibility on climate finance has fallen short, and additionally the financing provided is mostly loans, which only increases the debt burden of developing countries.

At COP26 developed countries confirmed that this target will be met in 2022 or 2023, with the five-year climate finance average from 2020–2025 at about $100 billion. Developed countries have also announced greater flows from 2025, albeit details on this are still to be decided.

Concurrently, the implementation of developing countries' NDCs depends on the scale of access to financial support and other means of implementation. Some NDCs include information on the mobilization of national and international support,

Mitigation targets of major economies

Country/region	Share of global GHG emissions (%)	NDC target by 2030	LTS (or NZT) target
Annex I Party			
US	11.84	50–52% below 2005 levels	NZT by 2050
EU27	6.81	55% below 1990 levels	Climate neutrality by 2050
Russia	4.07	30% below 1990 levels	NZT by 2060
Japan	2.36	46–50% below 2013 levels	Carbon neutrality by 2050
Non-Annex I Party			
China	23.92	65% below 2005 levels (GDP intensity)	Carbon neutrality by 2060
India	6.84	33–35% below 2005 levels (GDP intensity)	NZT by 2070
Brazil	2.90	50% below 2005 levels	NZT by 2050
South Africa	1.06	350–420 $MtCO_2eq$	NZT by 2050

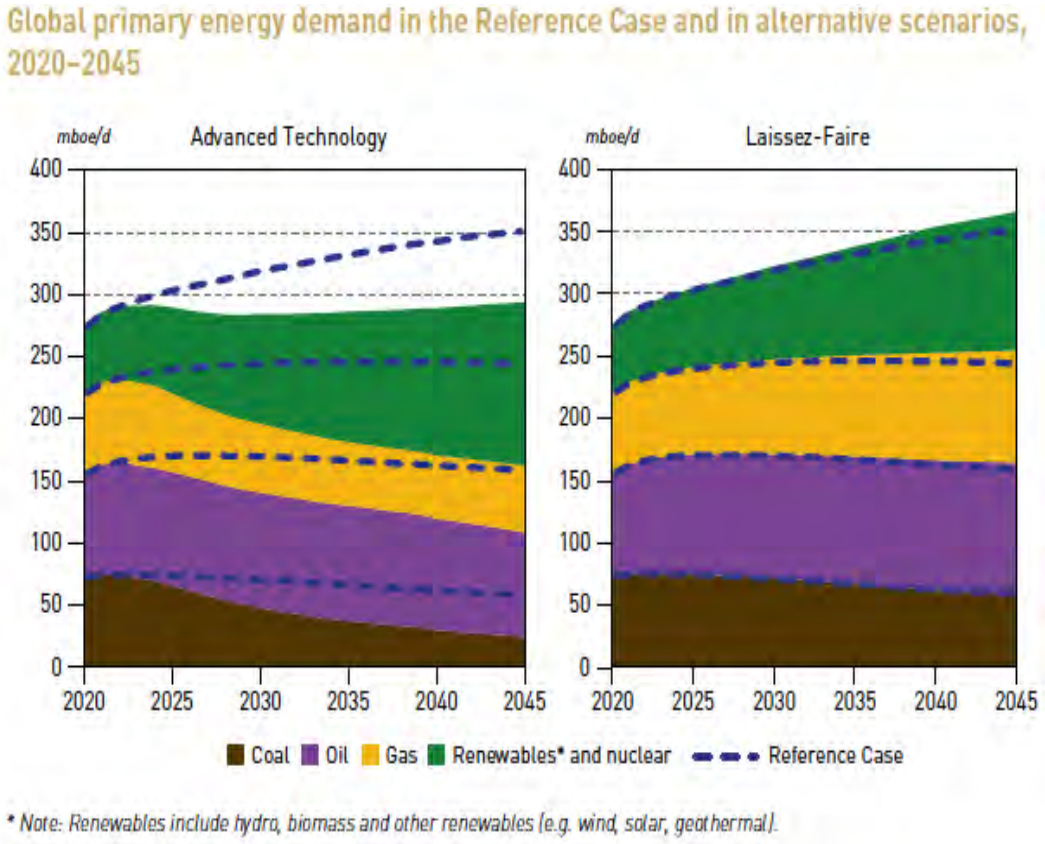
Note: NZT stands for net-zero target.

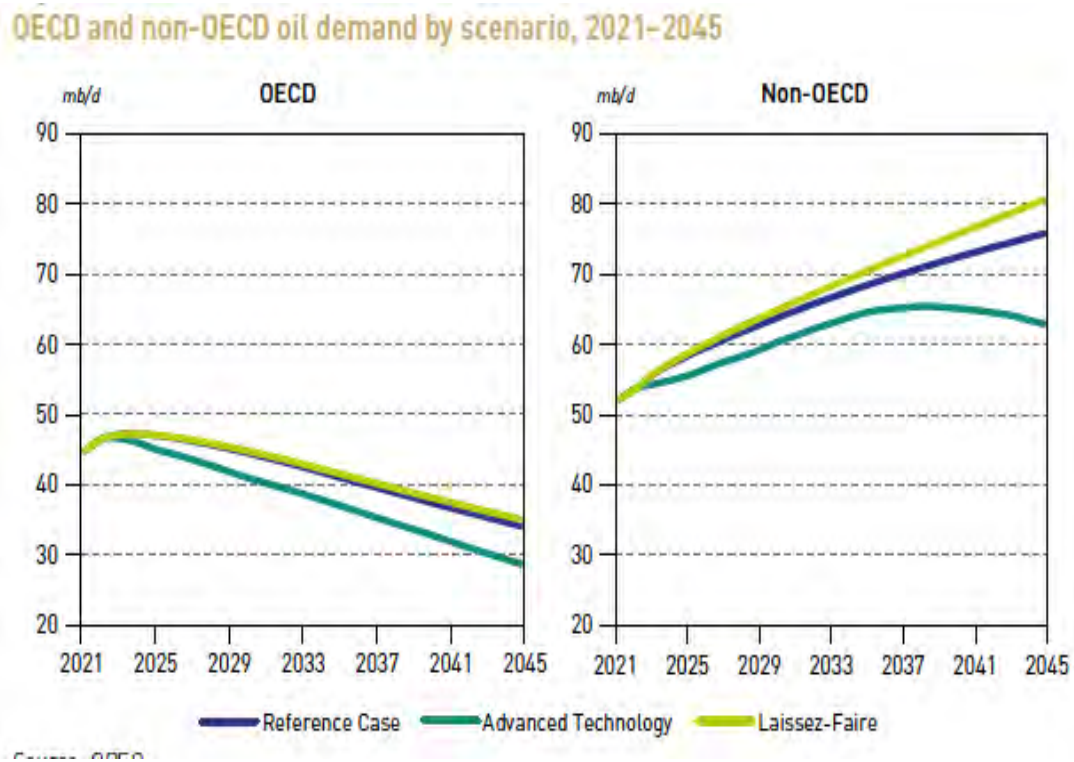
Source: Climate Action Tracker, 2022.

Sources: OPEC; *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, *p. 10*

OPEC Estimates of Different Scenarios for Energy Use Through 2045

(Note that the reference case calls for reductions in coal use, but that even the advanced technology scenario only calls for limited reductions in oil and gas use. Developed OECD nations make major cuts in oil use, but developing Non-OECD nations make major increases in oil use or limited reductions)

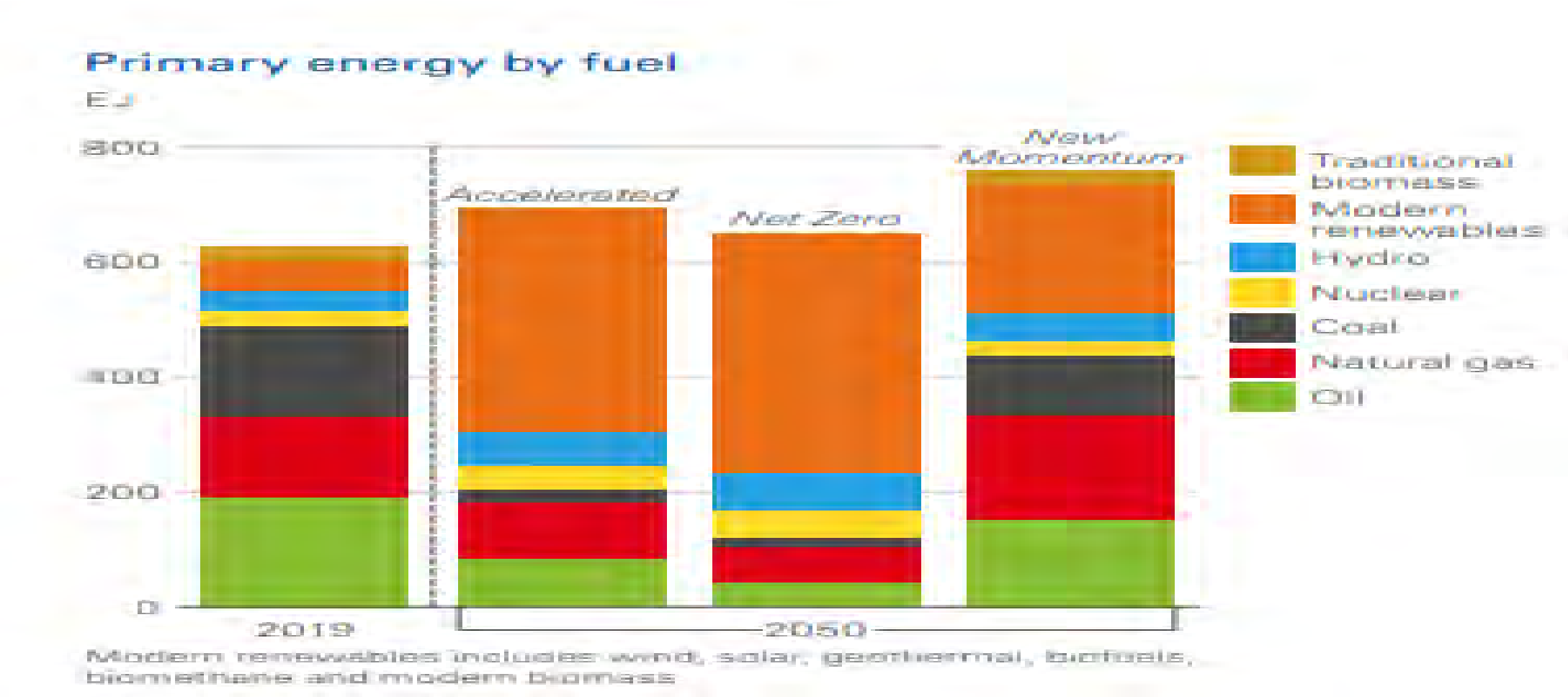




Sources: OPEC; *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, *p. 285. 292*

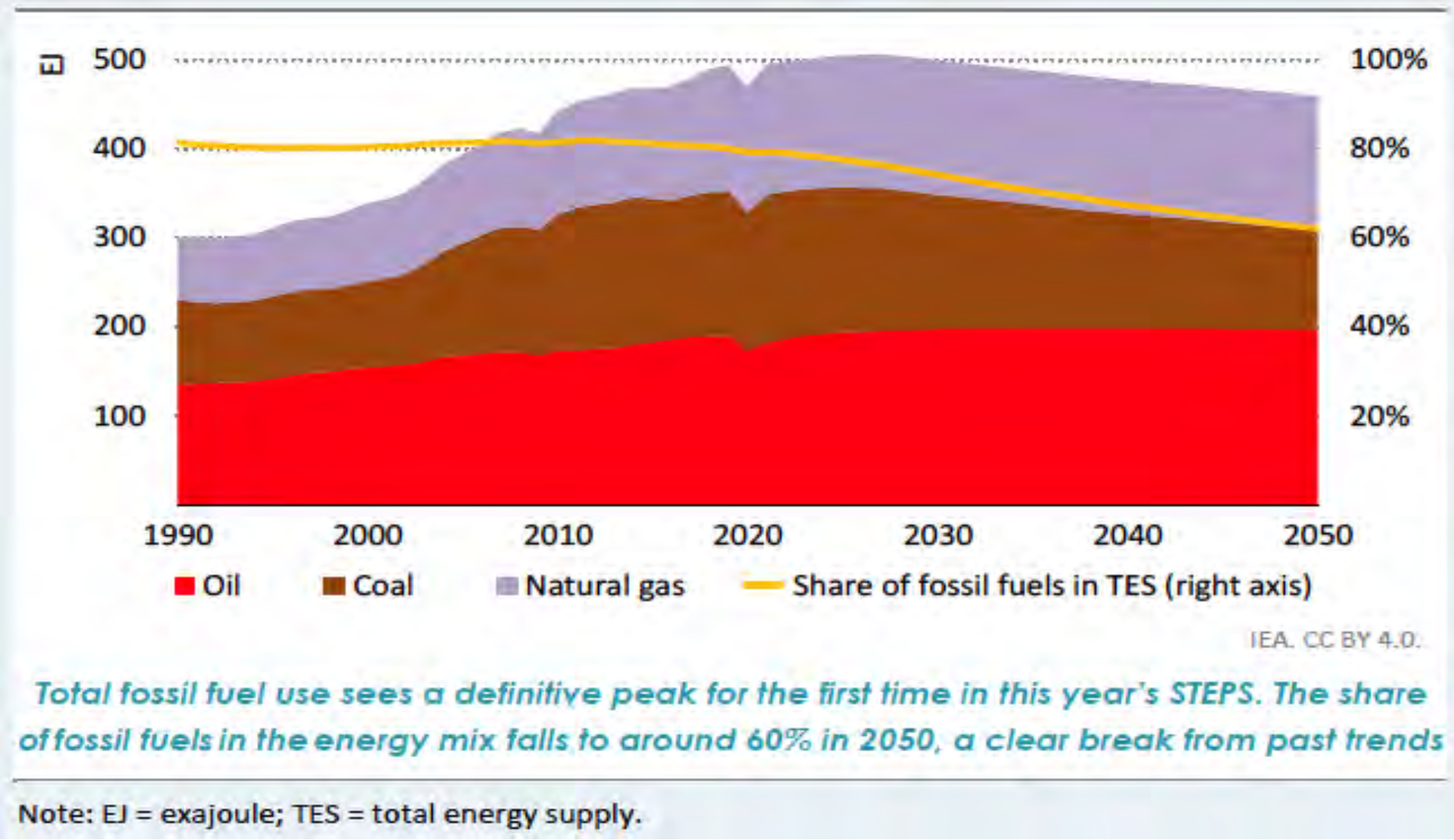
The Future of Oil and Gas Through 2050: British Petroleum (BP)

(Primary energy consumption by energy source projections)



Source: BP, *International Energy Outlook 2022*, accessed at https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2022.pdf

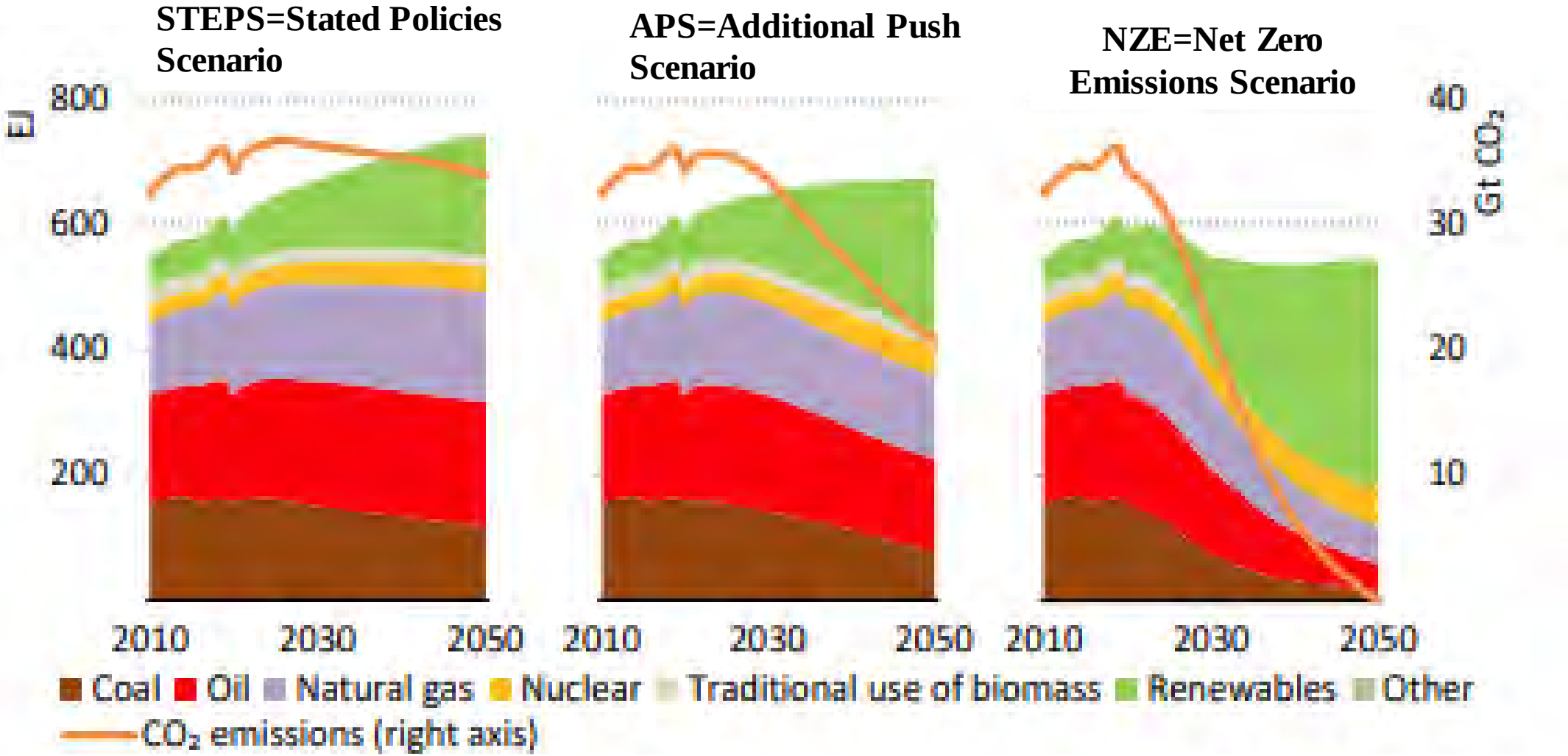
IEA Estimate of the Stated Policies of Importing States on Fossil Fuel Demand: 1950-2050



Source: IEA, World Energy Outlook, 2022, p.39, https://iea.blob.core.windows.net/assets/64c27e00-c6cb-48f1-a8f0-082054e3ece6/Renewables2022.pdf,

The Future of Oil and Gas Through 2050: IEA Estimate in 2021

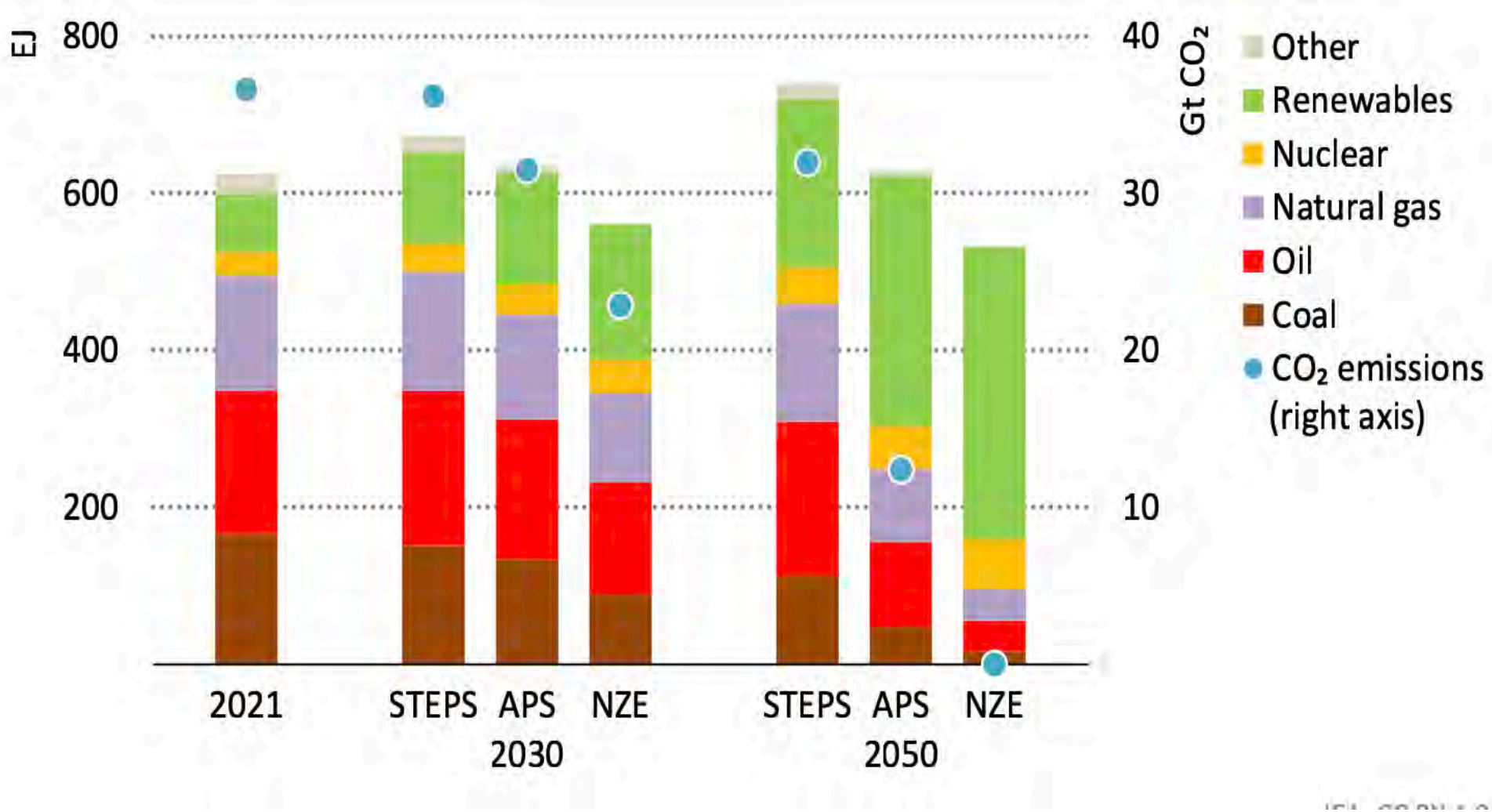
(Primary energy consumption in exajoules by energy source)



Source: IEA, *World Energy Outlook 2021*, accessed at https://iea.blob.core.windows.net/assets/88dec0c7-3a11-4d3b-99dc-8323ebfb388b/WorldEnergyOutlook2021.pdf

The Future of Oil and Gas Through 2050: IEA Estimate in 2022

(Total energy supply by fuel in exajoules and gigatons of CO2 emissions by scenario)

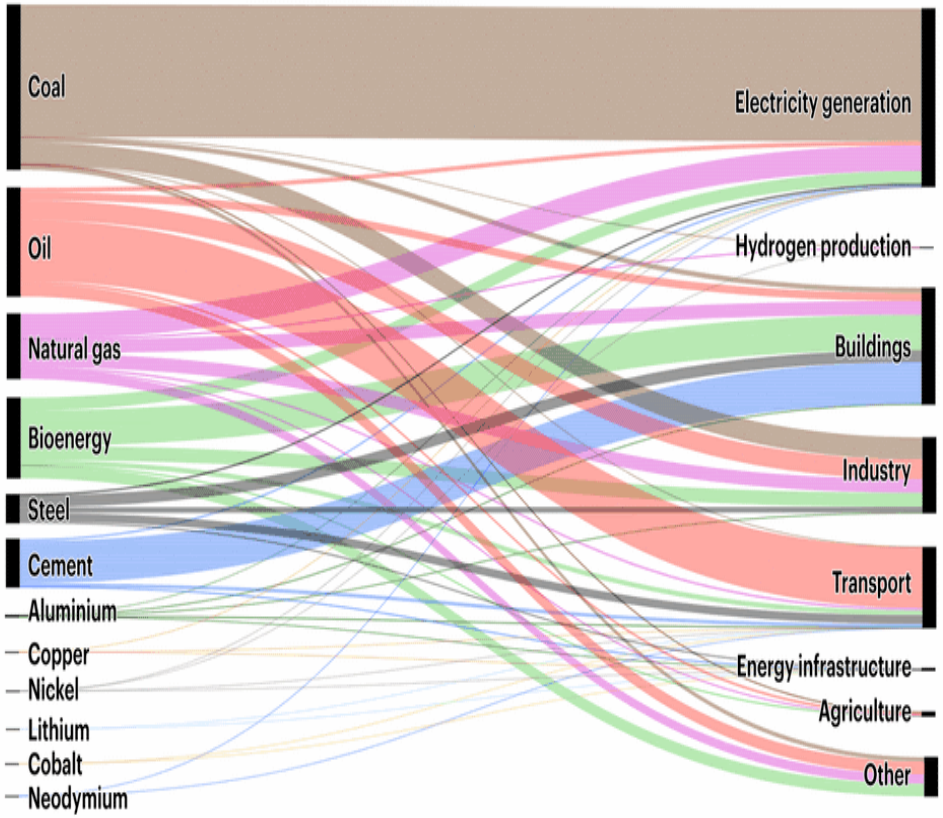


Source: IEA, *World Energy Outlook 2022*, accessed at https://iea.blob.core.windows.net/assets/88dec0c7-3a11-4d3b-99dc-8323ebfb388b/WorldEnergyOutlook2022.pdf, p. 237

An IEA Path for Cutting Fossil Fuels and to Net Zero Emissions

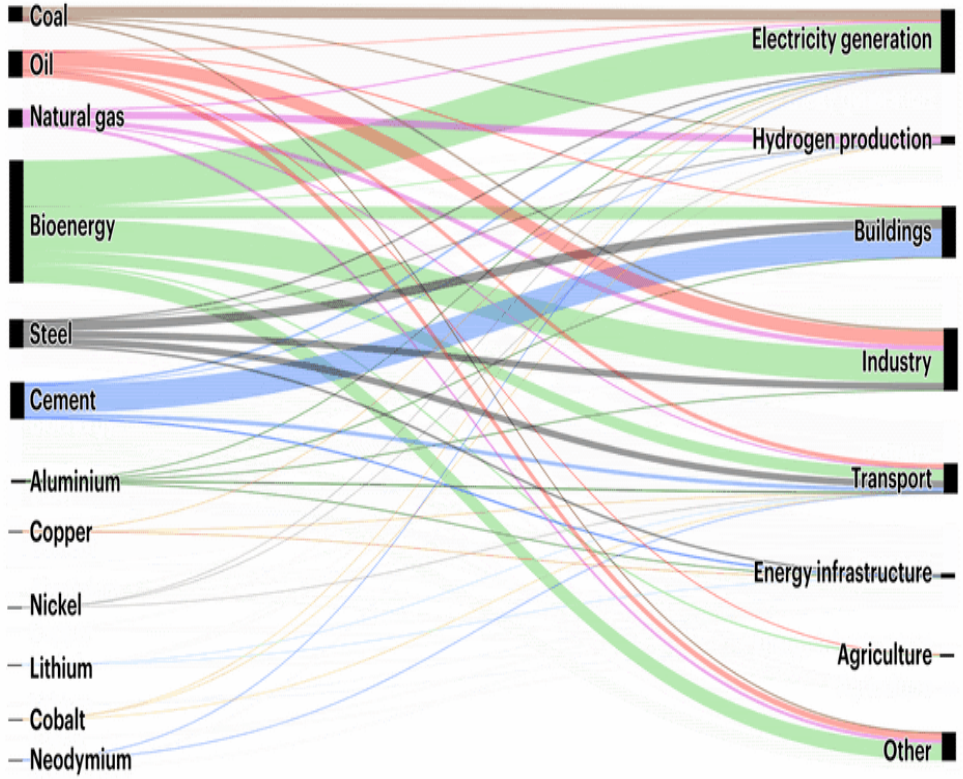
Today's energy system uses over 25 million tonnes of resources a year to operate, the majority of them fossil fuels

Global mass-based resource flows into the energy system, 2021



In our path to net zero emissions by mid-century, the energy system in 2050 uses only half as much resources, and far less fossil fuels

Global mass-based resource flows into the energy system in the Net Zero Emissions Scenario, 2050



International Energy Agency

Source: IEA, "the energy mix: more international engagement on energy and climate," February 6, 2023, https://mail.google.com/mail/u/0/#search/IEA/FMfcgzGrcXhFbRFdfwVmNfcMnnNKzkT,

Future Oil Production by Region and Scenario (mb/d) 2010-2050

			STEPS			APS		
	2010	2021	2030	2040	2050	2030	2040	2050
North America	14.2	24.4	28.6	27.0	24.6	25.8	19.2	14.7
Canada	3.5	5.6	6.2	6.4	5.5	5.4	4.1	3.2
United States	7.8	16.8	20.7	18.6	16.7	18.8	14.0	10.7
Central and South America	7.4	5.9	9.0	10.1	11.4	8.3	7.7	6.5
Brazil	2.2	3.0	4.5	4.3	5.1	4.4	3.8	3.3
Guyana	0.0	0.1	1.6	2.0	1.1	1.4	1.5	1.0
Venezuela	2.8	0.6	0.8	1.4	2.7	0.7	1.2	1.3
Europe	4.4	3.6	3.1	2.2	1.3	2.7	1.3	0.6
Norway	2.1	2.0	2.0	1.3	0.6	1.9	1.0	0.5
United Kingdom	1.4	0.9	0.6	0.4	0.3	0.5	0.2	0.1
Africa	10.2	7.4	7.0	6.4	6.1	5.8	4.0	2.9
Angola	1.8	1.2	0.9	0.8	0.9	0.8	0.6	0.5
Nigeria	2.5	1.7	1.3	1.3	1.3	1.2	0.9	0.7
Middle East	25.4	27.9	33.9	38.2	40.4	31.2	27.5	22.9
Iraq	2.4	4.1	4.6	5.5	6.2	4.6	3.7	2.7
Iran	4.2	3.4	3.9	4.6	5.0	3.7	4.0	2.8
Kuwait	2.5	2.7	3.3	3.4	3.5	3.0	2.6	2.3
Saudi Arabia	10.0	11.0	13.5	14.8	15.9	12.3	10.9	10.0
United Arab Emirates	2.8	3.6	4.8	5.4	5.5	4.1	3.2	2.5
Eurasia	13.4	13.7	11.9	10.8	10.6	11.2	7.6	5.4
Russia	10.4	10.9	8.8	7.7	7.7	8.5	5.5	3.9
Asia Pacific	8.4	7.4	6.3	5.4	4.8	5.7	3.5	2.2
China	4.0	4.0	3.6	3.1	2.7	3.3	1.9	1.1
Conventional crude oil	66.8	60.1	62.5	62.5	62.6	56.8	41.9	31.0
Tight oil	0.7	7.4	10.9	11.3	9.9	9.7	8.3	6.7
United States	0.6	6.9	9.9	9.7	8.6	8.8	7.8	6.2
Natural gas liquids	12.7	18.2	20.9	19.9	19.3	19.2	15.9	13.9
Canada oil sands	1.6	3.4	3.9	3.8	3.7	3.5	2.8	2.2
Other production	1.6	1.3	1.7	2.6	3.8	1.6	1.8	1.6
Total	83.4	90.3	99.9	100.1	99.3	90.7	70.7	55.3
OPEC share (%)	*40%*	*35%*	*36%*	*40%*	*43%*	*40%*	*40%*	*43%*

Source: IEA, *World Energy Outlook 2022*, accessed at https://iea.blob.core.windows.net/assets/88dec0c7-3a11-4d3b-99dc-8323ebfb388b/WorldEnergyOutlook2022 .pdf, p. 336

Future Refining Capacity and Runs by Region and Scenario (mb/d) 2010-2050

	Refining capacity					Refinery runs				
		STEPS		APS			STEPS		APS	
	2021	2030	2050	2030	2050	2021	2030	2050	2030	2050
North America	21.6	21.1	20.8	20.1	11.1	17.6	18.5	18.1	16.5	7.5
Europe	15.8	14.5	13.3	14.0	6.9	12.0	11.4	9.4	10.2	3.9
Asia Pacific	37.1	40.3	41.5	39.4	28.3	29.2	33.1	34.7	30.5	18.9
Japan and Korea	6.9	6.3	5.8	6.2	3.5	5.2	5.0	4.6	4.6	2.2
China	17.5	19.0	19.0	18.5	11.1	14.2	14.5	14.1	13.4	6.4
India	5.3	6.6	7.8	6.4	5.4	4.8	6.4	7.6	5.7	4.0
Southeast Asia	5.3	6.3	6.8	6.3	6.3	3.7	5.5	6.4	5.1	4.7
Middle East	9.6	11.2	12.0	11.0	9.7	7.6	9.6	10.6	8.5	6.6
Russia	6.9	6.5	6.3	6.1	4.6	5.6	4.0	3.5	3.6	2.4
Africa	3.4	4.5	4.8	4.2	4.2	1.8	3.1	3.9	2.7	2.6
Brazil	2.2	2.3	2.3	2.0	1.6	1.8	2.1	2.2	1.7	1.2
Other	4.6	4.8	4.8	4.7	4.2	2.3	2.9	3.5	2.8	2.6
World	101.2	105.2	105.8	101.5	70.6	77.9	84.7	85.9	76.5	45.7
Atlantic Basin	54.1	53.6	52.2	51.0	32.5	40.9	41.9	40.4	37.3	20.1
East of Suez	47.1	51.6	53.6	50.5	38.1	37.0	42.9	45.5	39.1	25.6

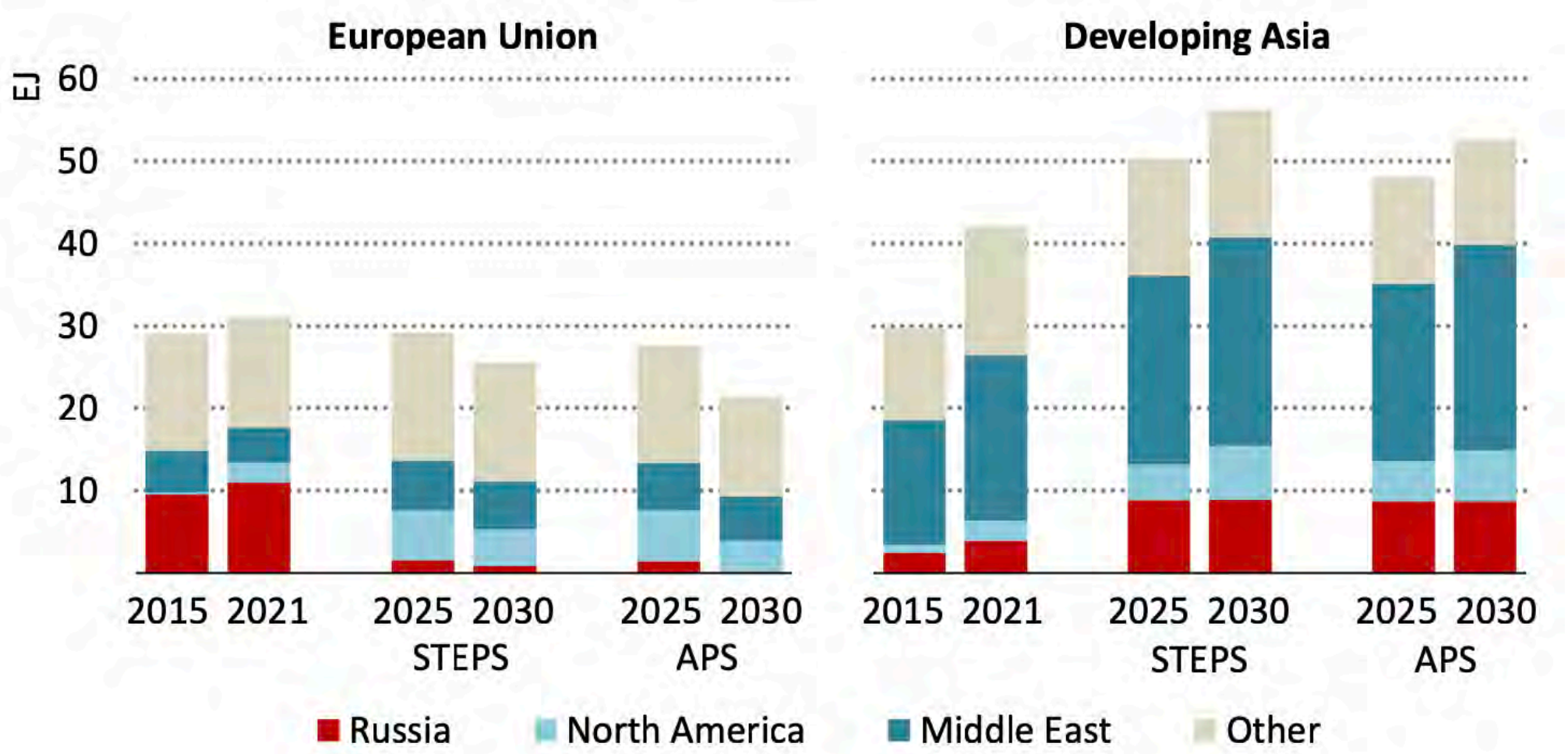
Source: IEA, *World Energy Outlook 2022*, accessed at https://iea.blob.core.windows.net/assets/88dec0c7-3a11-4d3b-99dc-8323ebfb388b/WorldEnergyOutlook2022 .pdf, p. 362

Future Natural Gas Production by Region and Scenario (bcm) 2010-2050

			STEPS		APS	
	2010	2021	2030	2050	2030	2050
North America	811	1 189	1 283	1 017	1 098	485
Canada	156	189	189	200	154	87
Mexico	51	31	31	34	31	34
United States	604	969	1 063	784	913	364
Central and South America	160	151	149	195	133	95
Argentina	41	41	53	107	51	60
Brazil	16	25	25	38	19	11
Europe	341	239	247	208	177	65
European Union	148	51	39	34	17	2
Norway	110	119	126	78	80	20
Africa	203	265	313	369	285	239
Algeria	85	103	103	65	97	39
Egypt	57	72	74	58	74	50
Mozambique	3	4	23	83	14	43
Nigeria	33	44	51	57	48	41
Middle East	463	660	853	1 030	798	690
Iran	144	236	248	319	245	154
Iraq	5	12	32	44	29	28
Qatar	121	169	247	326	236	225
Saudi Arabia	73	100	150	191	148	189
Eurasia	807	998	831	857	751	654
Azerbaijan	17	33	35	24	35	29
Russia	657	793	633	612	584	483
Turkmenistan	45	90	91	155	73	100
Asia Pacific	488	648	694	678	636	432
Australia	53	151	165	150	154	121
China	96	200	250	285	228	120
India	51	32	48	78	47	53
Indonesia	86	58	57	38	50	33
Rest of Asia Pacific	203	206	174	126	156	106
World	**3 274**	**4 149**	**4 372**	**4 355**	**3 878**	**2 660**

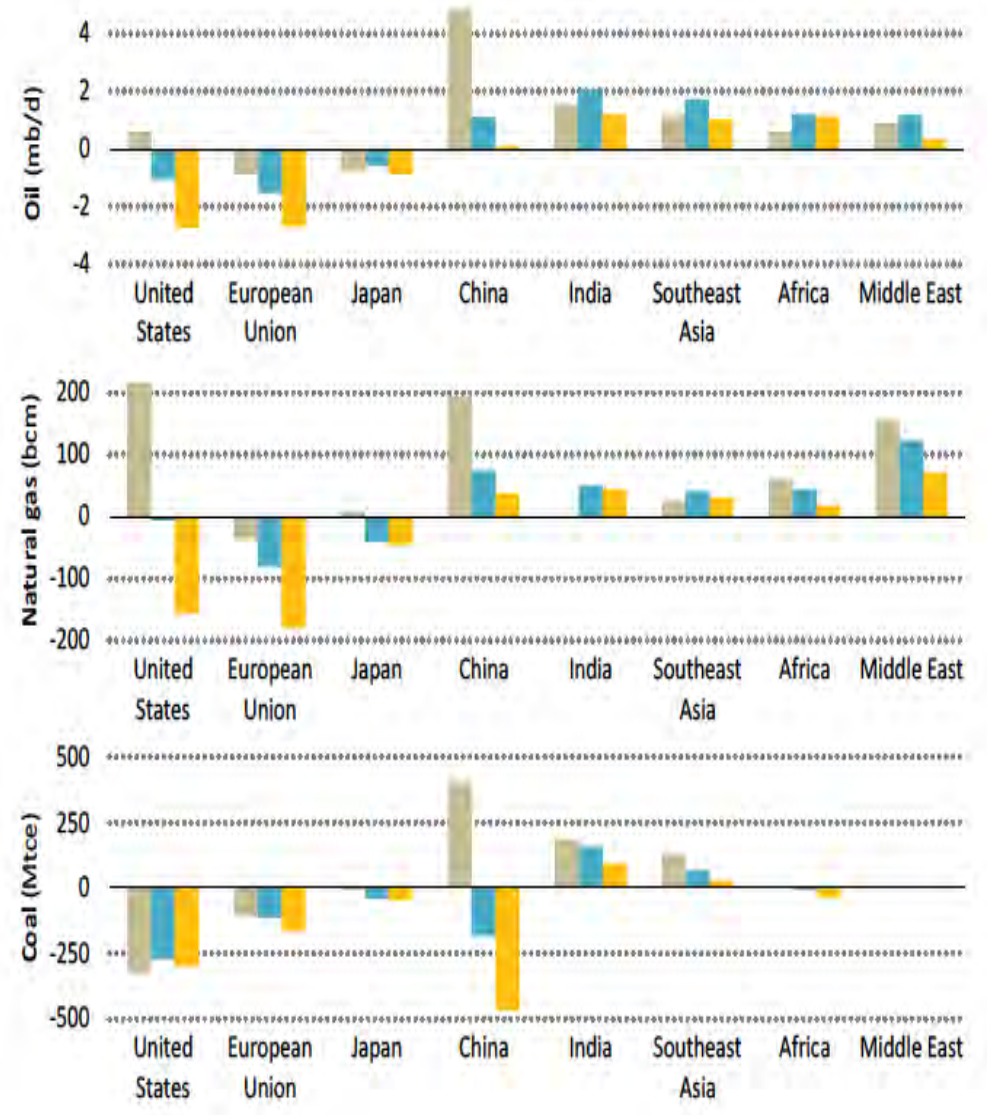
Source: IEA, *World Energy Outlook 2022*, accessed at https://iea.blob.core.windows.net/assets/88dec0c7-3a11-4d3b-99dc-8323ebfb388b/WorldEnergyOutlook2022 .pdf, p. 377

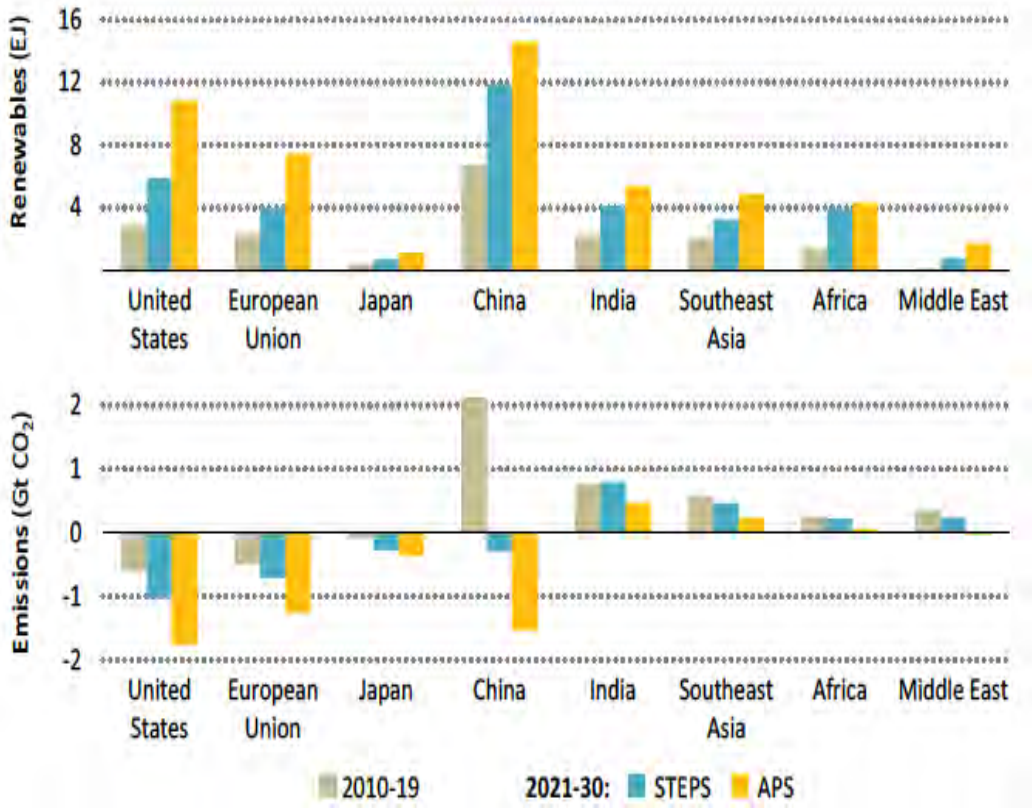
IEA Estimate of Crude Oil and Natural Gas Exports to EU and Developing Asia, 2021-30



Source: IEA, *World Energy Outlook, 2022*, May 2022, p.57

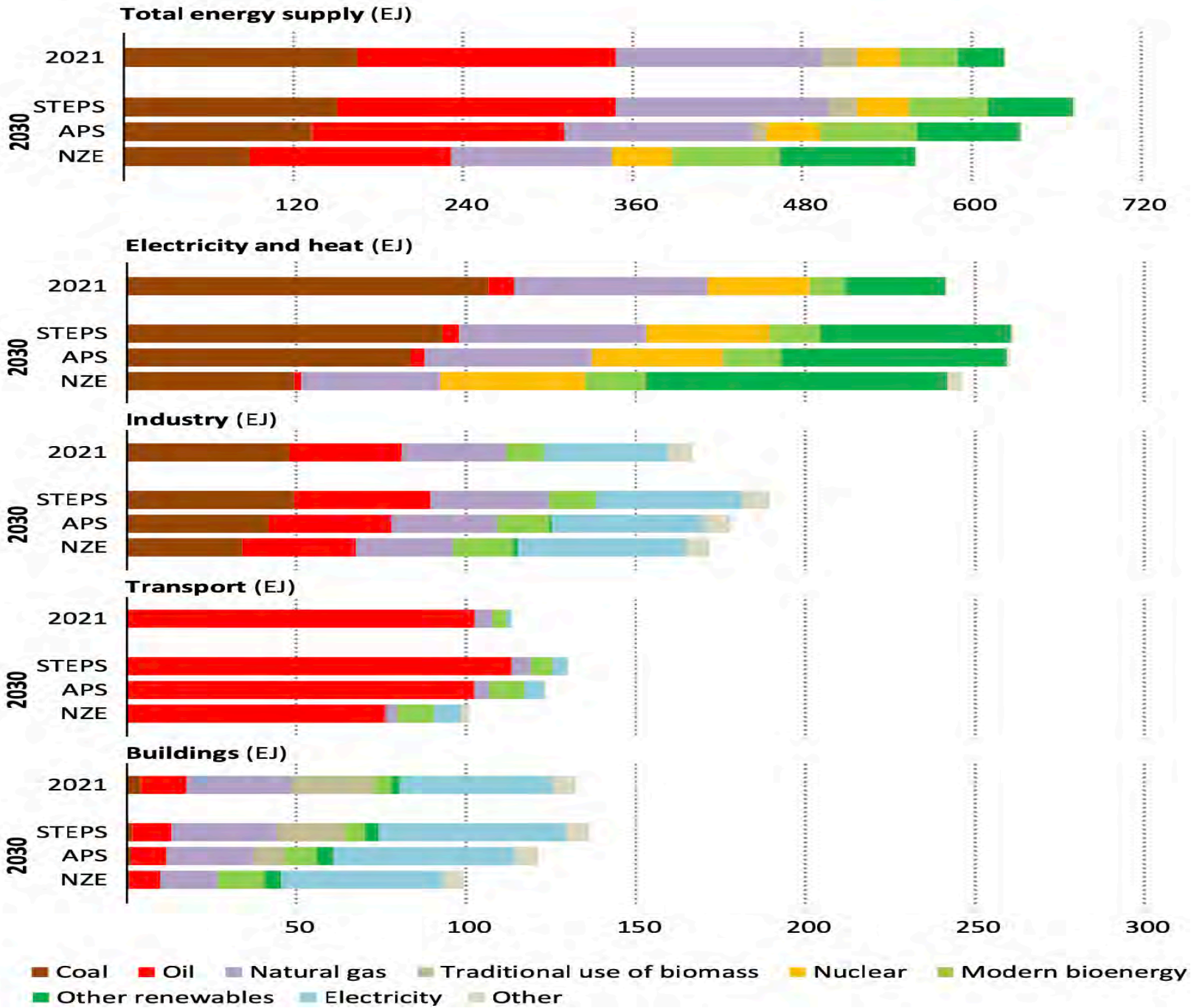
IEA Estimate of Energy Demand Growth by Region and Scenario, 2021-30





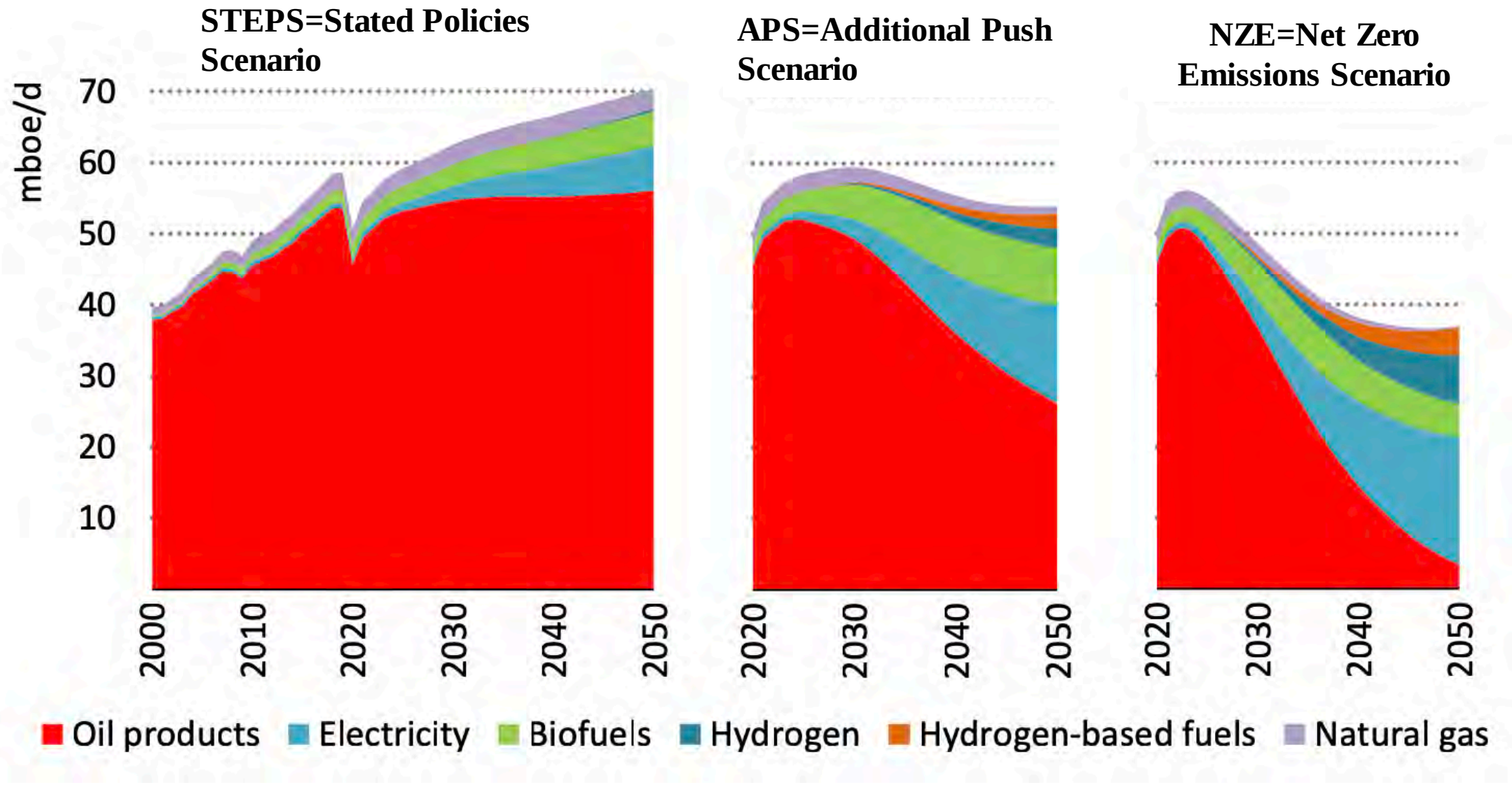
Source: IEA, *World Energy Outlook, 2022*, May 2022, p.67

IEA Estimate of the Global Energy Supply and Demand by Sector, Scenario and Fuel: 2021 vs. 2030



Source: IEA, World Energy Outlook, 2022, p.46, https://iea.blob.core.windows.net/assets/64c27e00-c6cb-48f1-a8f0-082054e3ece6/Renewables2022.pdf,

The Future of Oil and Gas in Transportation Through 2050: International Energy Agency



Source: IEA, *World Energy Outlook 2021*, accessed at https://iea.blob.core.windows.net/assets/88dec0c7-3a11-4d3b-99dc-8323ebfb388b/WorldEnergyOutlook2021.pdf, p. 52

Russia and the Ukraine War as Key Strategic Variables

Russia and the Ukraine War as Key Strategic Variables

The war in the Ukraine has led to major sanctions on Russian oil and gas exports, as well as many other aspects of the Russian economy. It has also led European and other states to make major changes in their oil and gas imports -- with sanctioning states turning to other exporters while Russia seeks markets from states that do not support the Ukraine, or find Russian exports to continue to be desirable for price, logistic, and other reasons.

So far Russia has suffered from the impact on its exports of a broad European reduction in Russian oil and gas imports, and the loss of most of its European gas markets as a result of European boycotts of its as pipelines through the North Sea, At the same time, it has benefited from the impact of sanctions on oil and gas prices and sales to non-sanctioning states – with the cooperation of MENA states like Saudi Arabis and the UAE and limits on MENA production.

. Europe and other gas importing starts have suffered from high gas and oil prices, but have rush to find alternative sources of fuel – particularly gas. They also have rushed to create new gas import and distribution facilities which are already importing MENA gas in some cases. These developments are crisis driven, however, and the future course and outcome of the war in the Ukraine is uncertain, as is an major structural shifts in demand for Russian exports that will last once the fighting is over. This makes it impossible to predict how the Ukraine War will impact on MENA oil and gas exports overtime, even if one ignores climate change.

The IEA *World Energy Outlook 2022* examined a range of possible ways that Europe and mother states could reduce their dependence on Russian imports, including shifts to renewable and other new energy sources that could reduce emissions and global warming. The summary to the IEA analysis noted that,

> Today, the world is in the midst of the first truly global energy crisis, with impacts that will be felt for years to come. Russia's unprovoked invasion of Ukraine in February has had far- reaching impacts on the global energy system, disrupting supply and demand patterns and fracturing long-standing trading relationships.
>
> The crisis is affecting all countries, but at the International Energy Agency (IEA), we are particularly concerned about the effect it is having on the people who can least afford it. One of the striking findings in this year's *World Energy Outlook (WEO)* is that the combination of the Covid pandemic and the current energy crisis means that 70 million people who recently gained access to electricity will likely lose the ability to afford that access – and 100 million people may no longer be able to cook with clean fuels, returning to unhealthy and unsafe means of cooking. That is a global tragedy. And it is not only an energy crisis with which we are dealing: many countries also face a food security crisis and increasingly visible impacts of climate change.

The IEA analysis focused on how the the war raised major issues regarding efforts to alter oil and gas demand to react to climate change – issues that remain speculative until the outcome of the Ukraine War and the full impact of economic crisis in Europe become clear. Other studies have raised serious questions about possible permanent shifts in Russian gas exports from Europe to China. The cost of moving most of the gas production from the areas where Russia produced the gas exported to Europe are high because these sites are far from the main Chinese markets, and liquid natural gasification and pipeline require major investments and essential force Russia and Chia to reach some kind of lasting agreement over impact volumes and prices. Such a shift would, however, sharply reduce China's vulnerability in moving oil and gas exports from the MENA region, and Russia's vulnerability to sanctions.

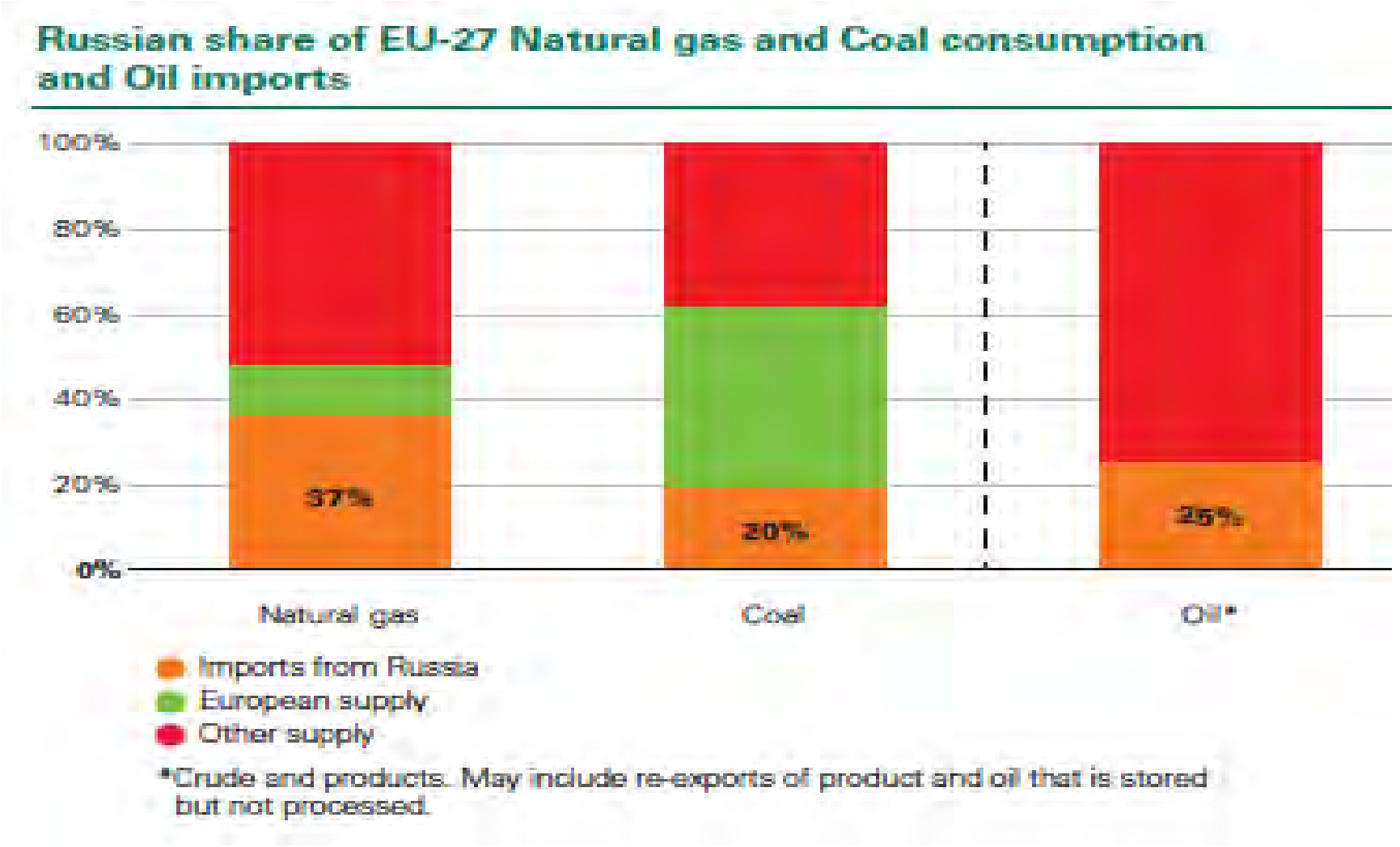
The slides in this section illustrate the scale of sanctions to date and some aspects of possible efforts to change Russian exports, and European import needs. The outcome of Ukraine War is now far too uncertain, however, to predict what will happen, and the costs involved in making major changes in the vector of Russian oil and gas exports are too uncertain.

- **Russian Energy Exports to the EU Before the Ukraine War** shows how dependent Europe was on Russian oil, coal, and gas exports before the war began.
- **Russia's Major Energy Exports in 2021** provides similar data from another source.
- **Percent of Total Russian Crude Oil and Condensate, and Natural Gas, Exports by Importing Country Before the Ukraine War: 2020** shows the flow of oil and gas by importing country and that most Russian gas went to Europe.
- **The Unanticipated Impact of Sanctions on Russian Oil and Gas Exports** shows that major cuts in gas exports did not have the anticipated impact on Russian exports by mid-2022 because Russia found alternative markets and major price rise stook place.
- **The Shift in Russian Oil Exports to Asia** shows that much of the gas Europe had imported from Russia shifted to Asian Markets.
- **IEA: Record LNG inflow to Europe offsets the steep drop in Russian gas deliveries –As of Mid-2022: Part** One and Part Two **provide an IEA estimate of how Europe was able to substitute other imports for Russian supply.**
- **Russia's Gas Reserves and New Export Routes** shows that Russia gas exports could shift to Turkey and China.

- **It would take Russia at least a decade to ramp up gas supplies to Asian markets to a level close to its 2021 exports to the European Union: Part One and Part Two** provide an analysis of the difficulties Russia would face in shifting most of its gas exports to China under normal business conditions, but do not address such an effort if both countries were seeking major reduction in their relative economic and military strategic risks.

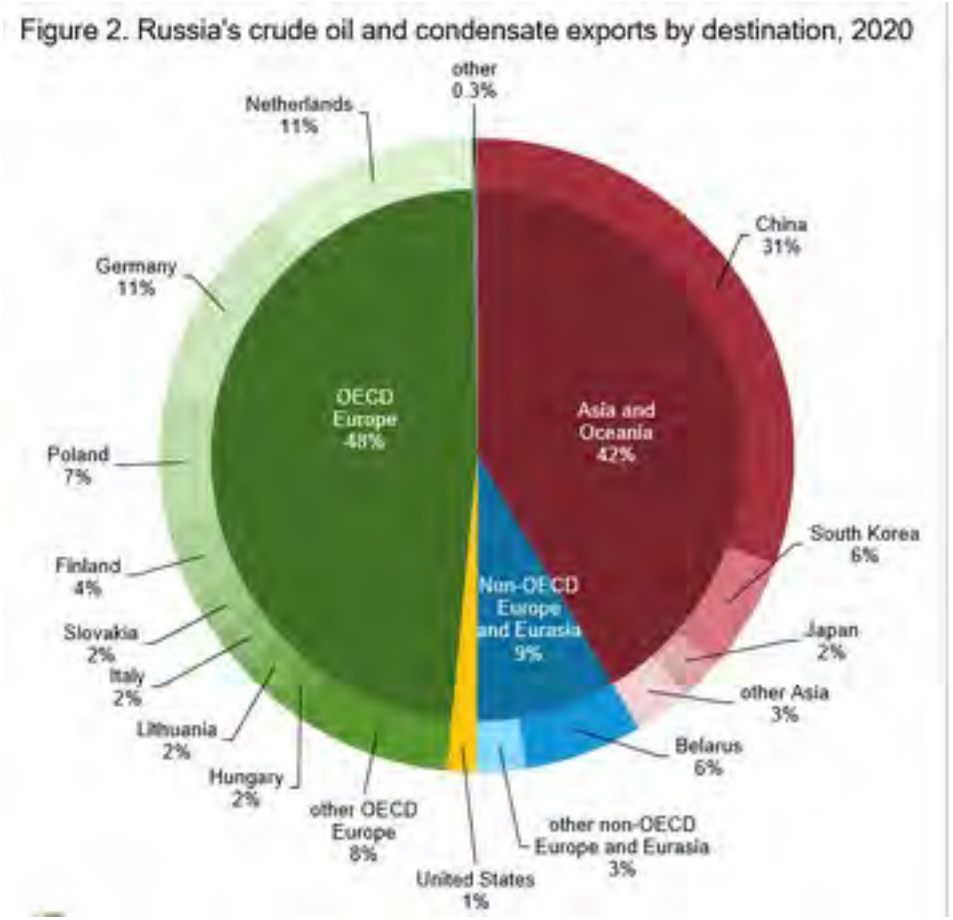
- **IEA Projection of Impact of Ukraine War on Future Impact of Russian Oil and Gas to EU and Developing Asia: 2015-2030** provides a rough estimate of how Russia exports might shift if Europe took dramatic action to implement efforts to replace such exports with renewable and alternative energy supplies, while developing states continued to import oil and gas.

Russian Energy Exports to the EU Before the Ukraine War



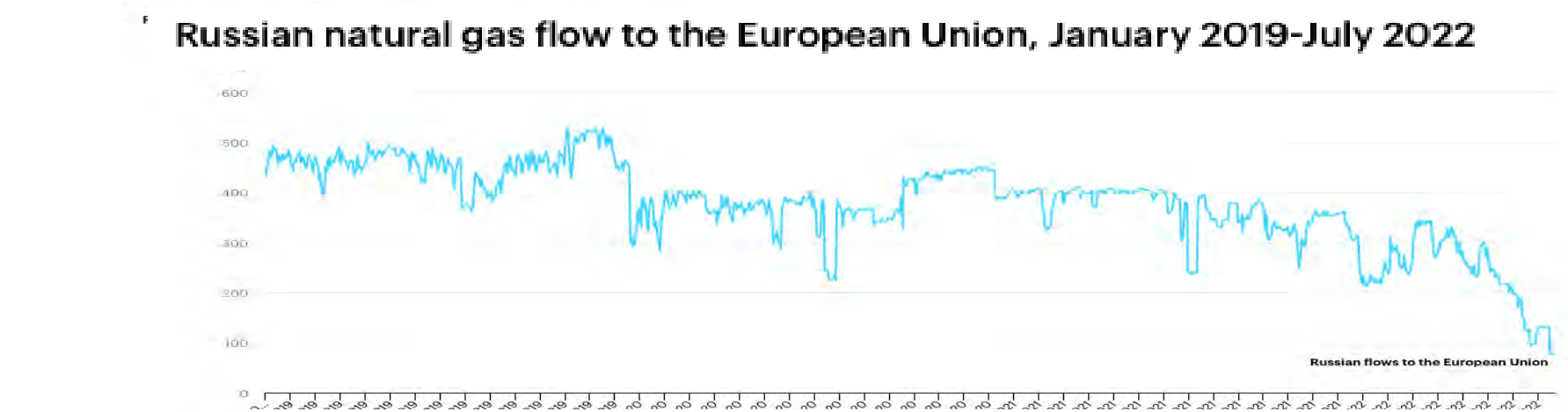
Source: BP (British Petroleum), *bp Statistical Review of World Energy 2022*, 71st edition, p. 7

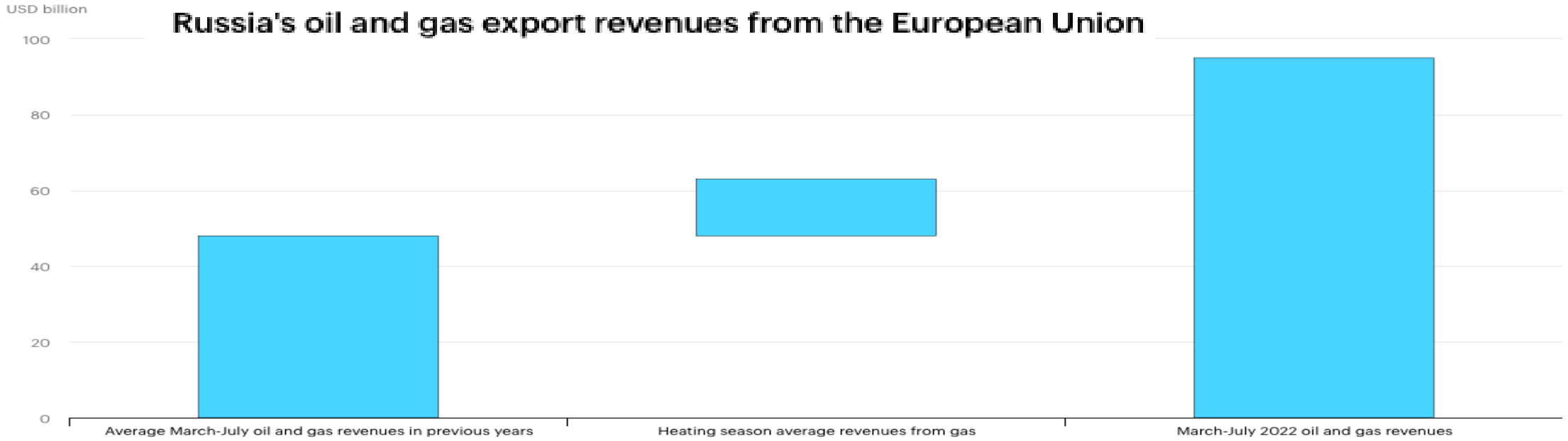
Percent of Total Russian Crude Oil and Condensate, and Natural Gas, Exports by Country Before the Ukraine War: 2020



Source: EIA, *Russia, Full Analysis*, Last Updated: December 13, 2021, , https://www.eia.gov/international/analysis/country/RUS.

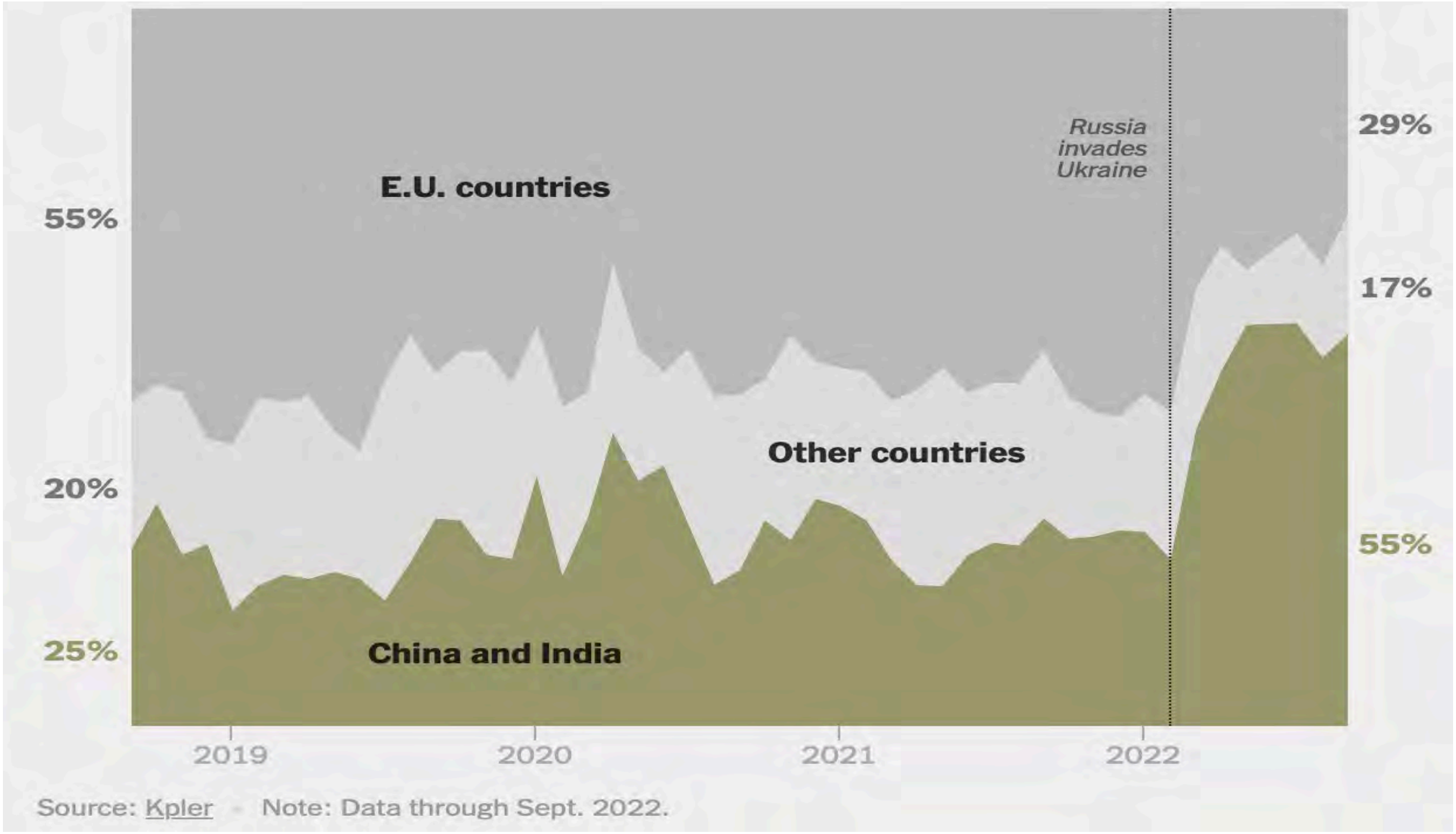
The Unanticipated Impact of Sanctions on Russian Oil and Gas Exports





Source: IEA, "Russia's oil and gas export revenues from the European Union," October 26, 2022, https://www.iea.org/data-and-statistics/charts/russia-s-oil-and-gas-export-revenues-from-the-european-union

The Shift in Russian Oil Exports to Asia



Source: Lazaro Gamio and Ana Swanson, "How Russia Pays for War," *New York Times*, Oct. 30, 2022, https://www.nytimes.com/interactive/2022/10/30/business/economy/russia-trade-ukraine-war.html?smid=nytcore-ios-share&referringSource=articleShare.

IEA: Record LNG inflow to Europe offsets the steep drop in Russian gas deliveries – As of Mid-2022: Part One

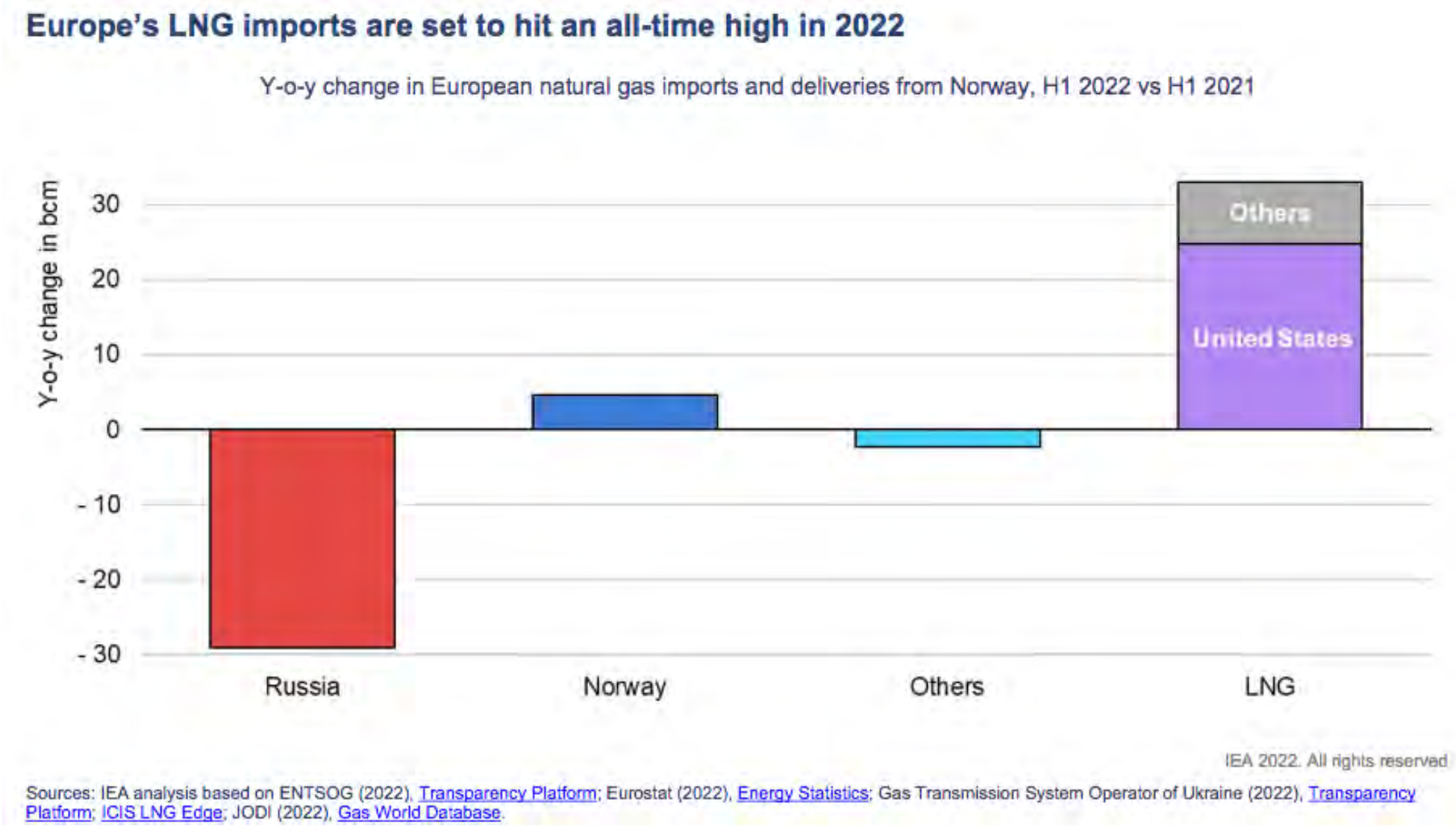
Sources: IEA, Gas Market Report, 1.2023, p. 103, https://iea.blob.core.windows.net/assets/c7e74868-30fd-440c-a616-488215894356/GasMarketReport%2CQ3-2022.pdf

Russian gas supplies to Europe continued their sharp decline in the first half of 2022, further tightening the European gas and global LNG markets. Flexible LNG inflow to Europe hit an all-time high, offsetting the lower gas deliveries from Russia.

Russia's piped exports to OECD Europe fell by an estimated 33% y-o-y in the first six months of 2022. While deliveries to the Republic of Türkiye dropped by 8% in the first five months, gas supplies to the European Union fell by 38% y-o-y in H1. End of March 2022 Russia issued a decree introducing a new rouble-based payment system for Russian piped gas. Gazprom unilaterally cut gas supplies to Bulgaria, Poland, Finland, Denmark and the Netherlands following their refusal to adhere to the new payment system. Russia imposed a range of sanctions on European companies on 11 May, following which Gazprom announced that it would cease to use the Yamal–Europe pipeline, a key supply route to Poland and Germany. Gas transit via Ukraine to the rest of Europe remained stable despite the Russian invasion. On 10 May Ukraine's gas transmission systems operator declared force majeure at a key compressor station Ukraine, following illegal actions and unauthorised gas offtakes by occupying forces. According to Ukraine's Gas TSO, flows can be temporarily rerouted, although Gazprom refused to accommodate this option. Transit gas volumes via Ukraine to the European Union have dropped by 60% since then. Gazprom reduced further gas supplies via Nord Stream, with deliveries falling from an average 158 mcm/d to 63 mcm/d by 18 June. According to Gazprom this is due to lower compressor power at the Portovaya compressor station. Supplies were steeply reduced to Austria, the Czech Republic, France, Germany, Italy and Slovakia. Lower flows from Russia and declining domestic production were compensated by higher pipeline deliveries from alternative sources and record volumes of LNG inflow. Pipeline supplies from Norway rose by over 8% in the first half of 2022, while gas deliveries from Azerbaijan via the TAP pipeline surged by over 70% y-o-y. North African gas supplies declined by 15% due to the non-availability of the Maghreb–Europe pipeline and lower Libyan flows. LNG imports rose by 60% y-o-y to over 80 bcm in H1 2022 – their highest-ever level for this period of the year. The United States supplied 75% of incremental LNG, solidifying its position as Europe's largest LNG supplier.

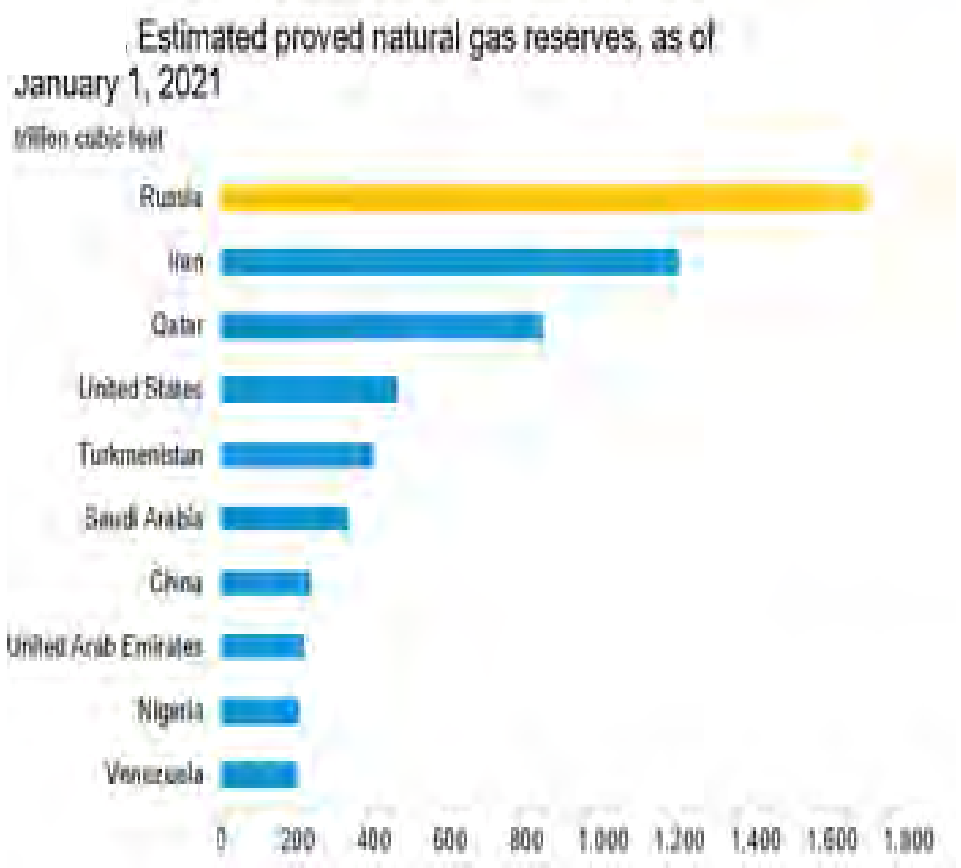
OECD Europe's domestic gas production is expected to increase by 3% in 2022, driven by higher output in Norway and the United Kingdom. Higher storage injection needs are set to provide strong support for imports in H2. Considering available capacities and assuming that Nord Stream flows will remain at 63 mcm/d, Russian piped gas flows are expected to fall by 40% y-o-y in 2022, largely compensated by higher LNG inflows, up by over 45%. The current forecast is subject to unusually large uncertainty, due to Russia's unpredictable behaviour.

IEA: Record LNG inflow to Europe offsets the steep drop in Russian gas deliveries – As of Mid-2022: Part Two



Sources: IEA, Gas Market Report, 1.2023, p. 103, https://iea.blob.core.windows.net/assets/c7e74868-30fd-440c-a616-488215894356/GasMarketReport%2CQ3-2022.pdf

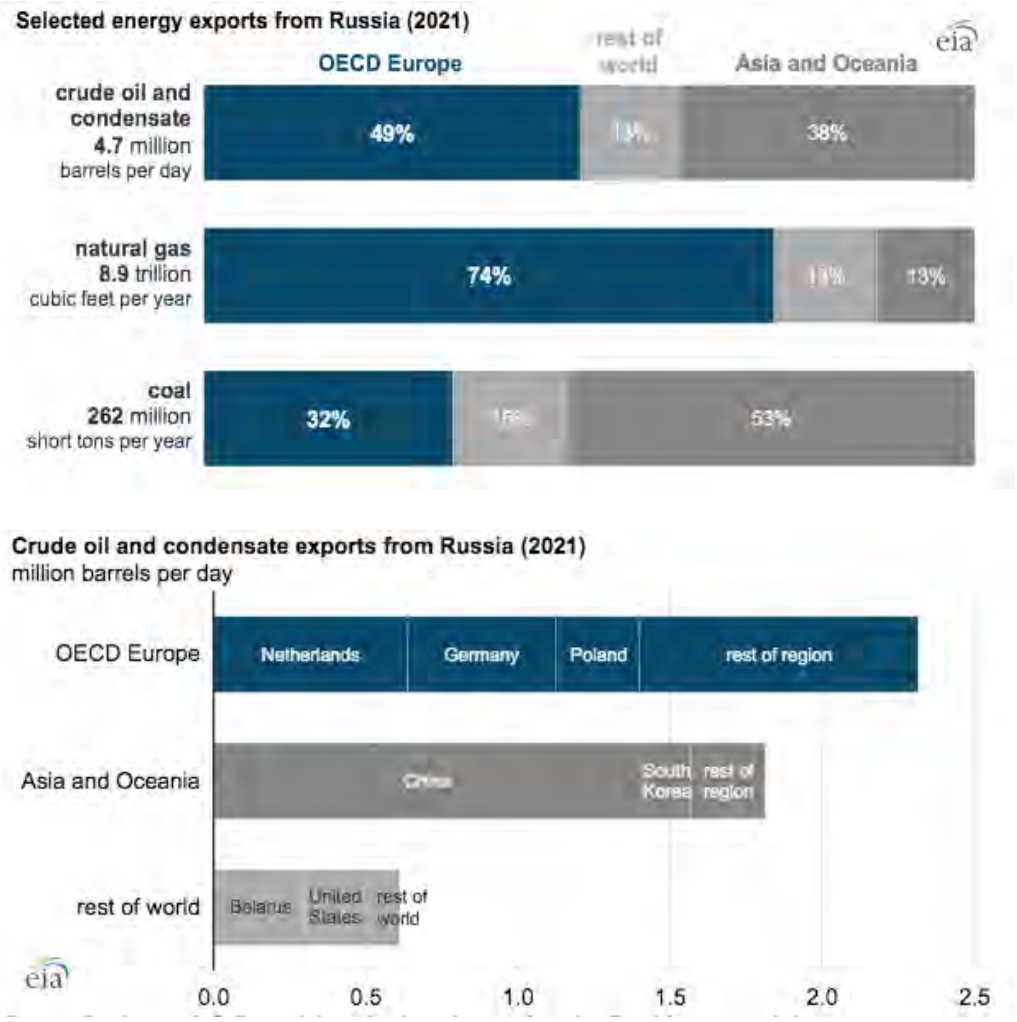
Russia's Gas Reserves and New Export Routes

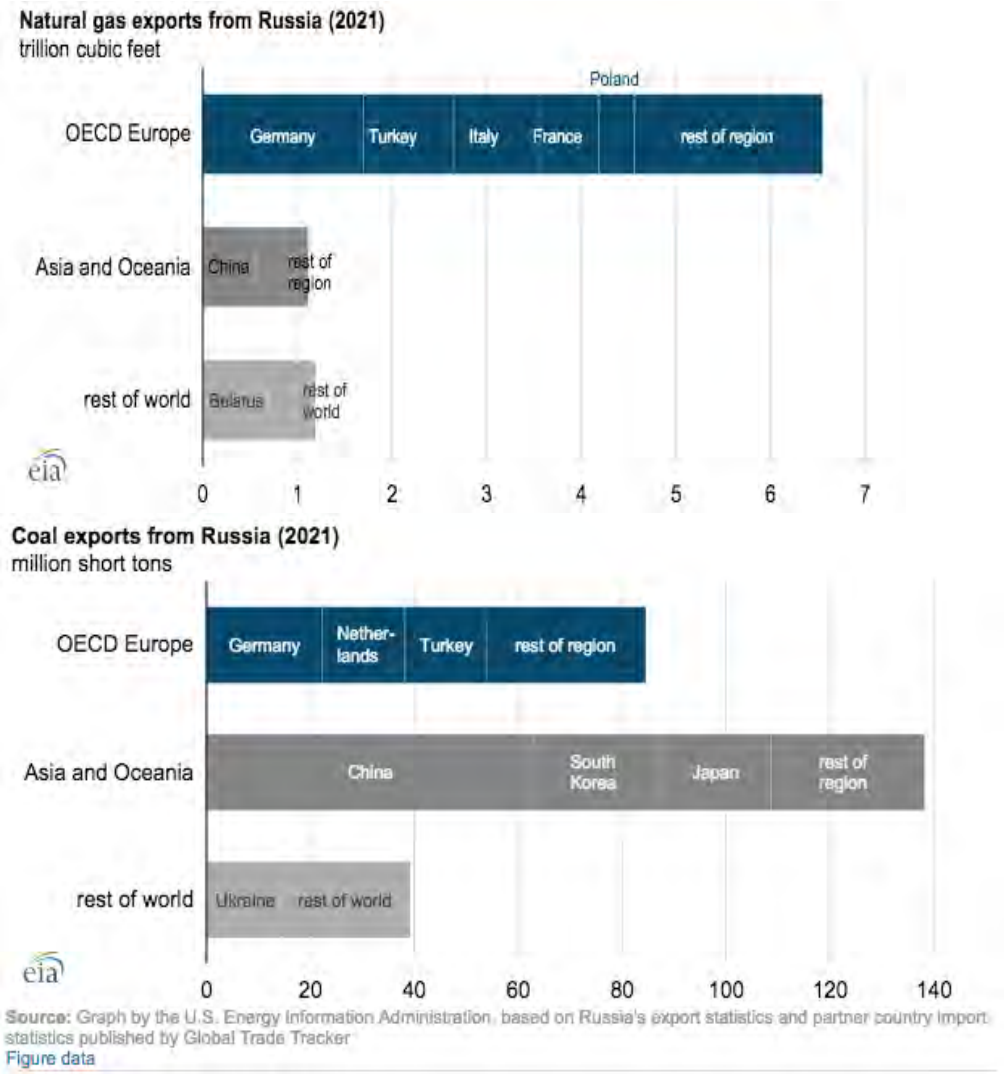


- The TurkStream natural gas pipeline began operations in January 2020. The natural gas export pipeline connects Russia's largest natural gas reserves to Turkey's natural gas transport system and enables Turkey to provide an alternative route for Russia's piped natural gas to southern Europe. The TurkStream system consists of two parallel pipelines that each have a capacity of about 556 Bcf per year and stretch 580 miles across the Black Sea from the Russian coast at Anapa to the Turkish border. The first pipeline supplies natural gas for Turkey's domestic consumption, while the second pipeline (also referred to as TurkStream 2) extends further onshore for about 550 miles to deliver natural gas to Hungary, Serbia, and Bulgaria.[33]
- The natural gas pipeline called the Power of Siberia began transporting natural gas in December 2019, providing an initial capacity of about 177 Bcf per year. The pipeline is the first natural gas pipeline to deliver Russia's natural gas exports to China; the 1,400-mile long pipeline is connected to the Chayandinskoye field and crosses China's border at the Heilongjiang province. The pipeline is expected to reach full capacity of about 1.3 Tcf per year by 2025, providing a substantial amount of natural gas supply and an attractive alternative fuel source for power generation to a region in China that uses high levels of coal.[34]
- Gazprom approved a feasibility study on the construction of a natural gas pipeline that could deliver natural gas to China via Mongolia. The resulting Soyuz Vostok pipeline has a planned export capacity of up to about 1.7 Tcf per year and, if completed, would become an extension of the Power of Siberia natural gas pipeline and provide an alternative route for Russia's natural gas into China.[35]

Source: EIA, *Russia, Full Analysis*, Last Updated: December 13, 2021, , https://www.eia.gov/international/analysis/country/RUS.

Russia's Major Energy Exports in 2021





Source: EIA, "Europe is a key destination for Russia's energy exports," *Today in Energy*, March 14, 2022, https://www.eia.gov/todayinenergy/detail.php?id=51618.

It would take Russia at least a decade to ramp up gas supplies to Asian markets to a level close to its 2021 exports to the European Union:

Part One

Sources: IEA, Gas Market Report, 1.2023, p. 87, https://iea.blob.core.windows.net/assets/c7e74868-30fd-440c-a616-488215894356/GasMarketReport%2CQ3-2022.pdf

The phase-out of Russian gas from the EU market is expected to intensify Russia's efforts to reconfigure its gas and LNG exports towards Asia. Our analysis indicates that in a best-case scenario for Russia it would take at least a decade to ramp up its gas supplies to Asian markets to a level close to its 2021 exports to the European Union (155 bcm). It would also necessitate the development of new gas export infrastructure and require significant capital investment at a time when Russia's access to capital markets and energy technologies is restricted by the various sanction regimes imposed after its invasion of Ukraine.

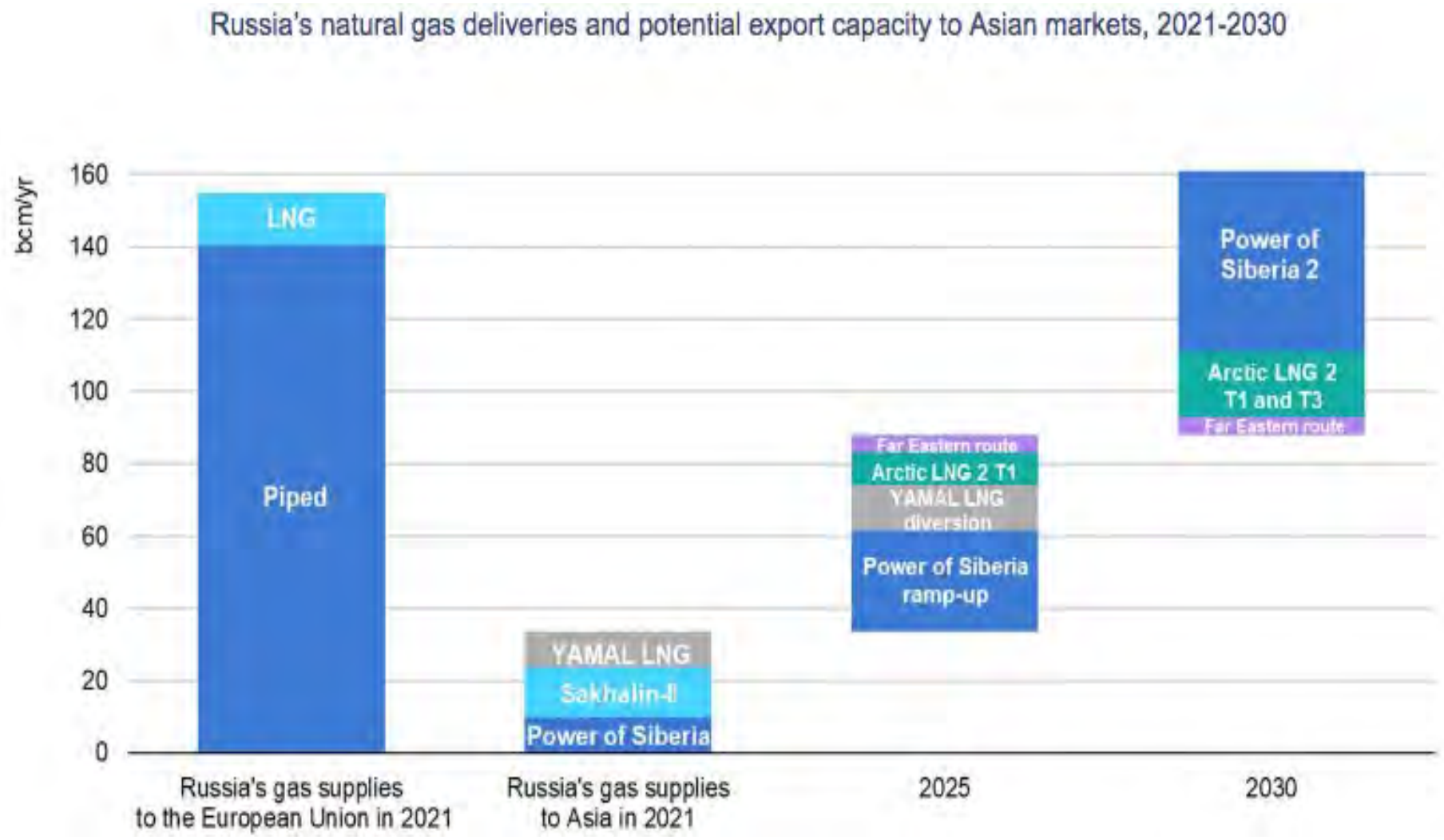
Russia's natural gas exports to Asia totalled 32 bcm in 2021, of which 10 bcm were exported via the Power of Siberia pipeline to China and the remainder via LNG from the Sakhalin-II and YAMAL LNG plants to various Asian markets. China is by far Russia's largest market in Asia (17 bcm), followed by Japan (9 bcm) and Korea (4 bcm).

Russia's gas deliveries to Asian markets could increase by 40 bcm/yr to reach just over 70 bcm/yr by 2025. Under the long-term contract underpinning gas supplies via the Power of Siberia pipeline, Russia's gas exports to China are set to increase to 15 bcm in 2022 and gradually ramp up to 38 bcm/yr by 2025. Russia can divert over 10 bcm of LNG passing through the YAMAL LNG plant from Europe to Asian markets. Rerouting all the LNG flows from Europe to Asia would significantly increase shipping costs, especially during the December to June period when navigation on the Northern Sea Route is limited due to ice and weather conditions. Our forecast assumes that Arctic LNG train 1 will be commissioned, which could increase LNG supplies to Asian markets by 9 bcm/yr, although they would face similar constraints as cargoes from YAMAL LNG. In February 2022 Gazprom and CNPC signed a 10 bcm/yr long-term contract for gas deliveries via the Far Eastern pipeline route (according to non-official sources, for a duration of 25 years). The expected resource base for the gas deliveries, the Yuzhno-Kirinskoye field, could start production in 2023-2025, meaning that supplies could ramp up to 10 bcm/yr in the second half of the decade.

The current sanctions put at risk the development of Arctic trains 2 and 3, which are assumed to be delayed beyond 2025 in our current forecast. Once operational, they could supply an additional 18 bcm/yr to Asian markets. The planned 50 bcm/yr Power of Siberia two pipeline is designed to connect the western Siberian fields to China's gas market through Mongolia. According to Gazprom's own estimates, the pipeline could be constructed by 2027/28. Notably, no legally binding supply contract has been agreed for this route and negotiations between Gazprom and its counterparts in China may last for several years, possibly delaying its start-up to beyond 2030.

It would take Russia at least a decade to ramp up gas supplies to Asian markets to a level close to its 2021 exports to the European Union:

Part Two



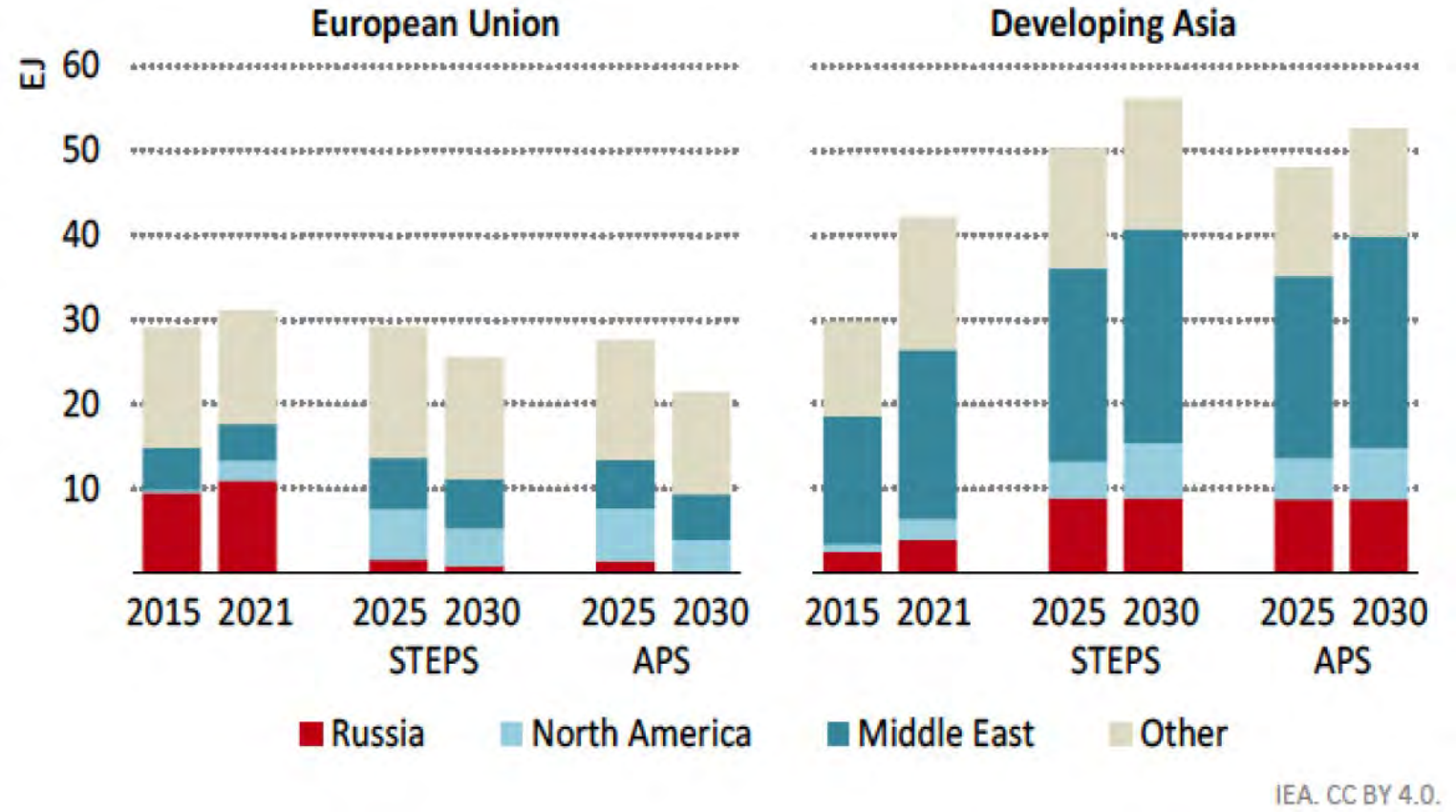
Sources: IEA, Gas Market Report, 1.2023, p. 88, https://iea.blob.core.windows.net/assets/c7e74868-30fd-440c-a616-488215894356/GasMarketReport%2CQ3-2022.pdf

IEA Projection of Impact of Ukraine War on Future Impact of Russian Oil and Gas to EU and Developing Asia: 2015-2030

Russia's share of global fossil fuel exports declines substantially as a result of the current crisis…

In the case of oil, Russia exported more than 7 mb/d in 2021; 3 this falls by around 25% by 2030 in the STEPS and by 40% to 2050. By the mid-2020s, North America is exporting more oil to global markets than Russia, but the gap left by Russia is mainly filled by higher exports from the Middle East.

…For the moment, with no links to alternative markets, much of the natural gas that was intended to flow westwards to Europe has no place to go. As a result, Russia's share of internationally traded gas, which stood at 30% in 2021, falls to 15% by 2030 in the STEPS and to 10% in the APS. Its projected net income from gas sales (revenue minus costs) falls from USD 75 billion in 2021 to less than USD 30 billion in 2030 in the APS



Russia's oil and gas exports switch focus to developing Asia in the STEPS and APS, but gains in these new markets are less than losses in exports to Europe

Note: EJ = exajoule.

Source: IEA, *World Energy Outlook 2022*, 10.12.2022, pp. 54 & 56, 2022, https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf.

China and Its Impact on Great Power Competition and a Future War in Asia

China and its Impact on Great Power Competition and a Future War in Asia

The previous sections have explored possible Shifts in China's imports from the MENA region *if they are dominated by market conditions*. This section explores what might happen if the the confrontation between China and the U.S. and America's strategic partners continues to intensity. It looks beyond the comparative narrow issues of a war with Taiwan or crises in the Pacific Ocean area, and considers the risk that China might become far more active in seeking a security role in the MENA region, or that a war could expand to cover energy imports by America's major Asian strategic partners, and energy traffic through the Indian Ocean and the Strait of Malacca.

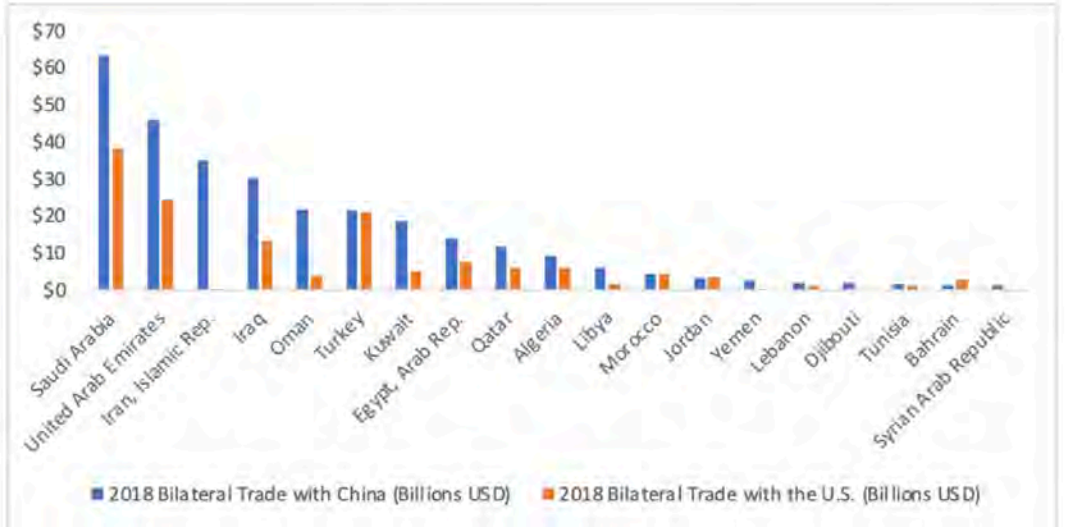
- **Shifts in MENA Trade with U.S. and China** sets the stage by showing the patterns in U.S. and Chinese trade with the MENA region.
- **Chinese Strategic Partnerships in the Middle East** shows the expansion of China's role in the MENA region**.**
- **Chinese Port Access and Bases in Indian Ocean/Red Sea** shows China's expanding port facilities and bases in the Indian Ocean.
- **OPEC Projection of China's Share of the Global Economy: 2021-2045** shows an OPEC projection of major increases in China's share of the global economy through 2045 -- uncertain level of growth and one minimizing the impact of global warming.
- **China's Strategic Dependence on Gulf and Other Crude Oil Imports in 2000-2021** and **China's Strategic Dependence on Gulf and Other Natural Gas Imports in 2000-2021** show the sharp recent rise in China's oil and gas imports**.**
- **Chinese Gas Imports in 2010-2021** compares the sharp rise in China's gas imports with those of Japan, South Korea and Taiwan.
- **The Arabian Sea and Indian Ocean** and **The Chinese Naval "Belt and Road" in the Indian Ocean Area** illustrate the possible scale of a war between the U.S. and China, or India and China, that affected energy traffic through the Arabian Sea and Indian Ocean.
- **India's Strategic Dependence on MENA and Other Crude Oil Imports in 2002-2021** shows how critical India's dependence on MENA energy exports already are.

- **OPEC Estimate of Indian Energy Demand: 2021-2045** shows and OPEC estimate of how the rises in India's demand might compare with those of China, and the extent to which developing countries might increase the global and MENA export demand for oil and gas in a gas with limited reductions in emissions and where the developed states make the largest future cuts in oil and gas use.
- **The Straits of Malacca** and **EIA Estimate of Oil and Gas Trade Volumes Through Straits of Hormuz and Malacca: 2018-2040** show how critical control of the Strait of Malacca can be and that it is projected to become amore critical chokepoint than the Strait of Hormuz,
- **Shifts in MENA Trade with U.S. and China** sets the stage by showing the patterns in U.S. and Chinese trade with the MENA region.
- **Key Oil Shipping Routes to Asia** and **Key Gas Shipping Routes to Asia** show how an energy war or confrontation could expand into the Pacific and affect key U.S. trading and security partners like Japan, South Korea, and Taiwan**.**
- **China Anti-Access/Area Denial Defense Layers** provide a rough picture of China's expanding capabilities to fight an energy war in the Pacific. These capabilities have vastly increased since 2016.
- **U.S. Pacific Bases** shows the range of U.S. military deployments in the Pacific.
- **Japan's Strategic Dependence on MENA and Other Oil and Natural Gas Imports in 2002-2021** shows Japan's critical dependence on the secure flow of MENA energy exports.
- **South Korea's Strategic Dependence on MENA and Other Oil and Natural Gas Imports in 2002-2021** provides a matching picture of critical dependence on the secure flow of MENA energy exports. Similar recent data are not available on Taiwan

Shifts in MENA Trade with U.S. and China

Figure 1. MENA trade flows with China and the U.S., 1992-2018 ($ bn)

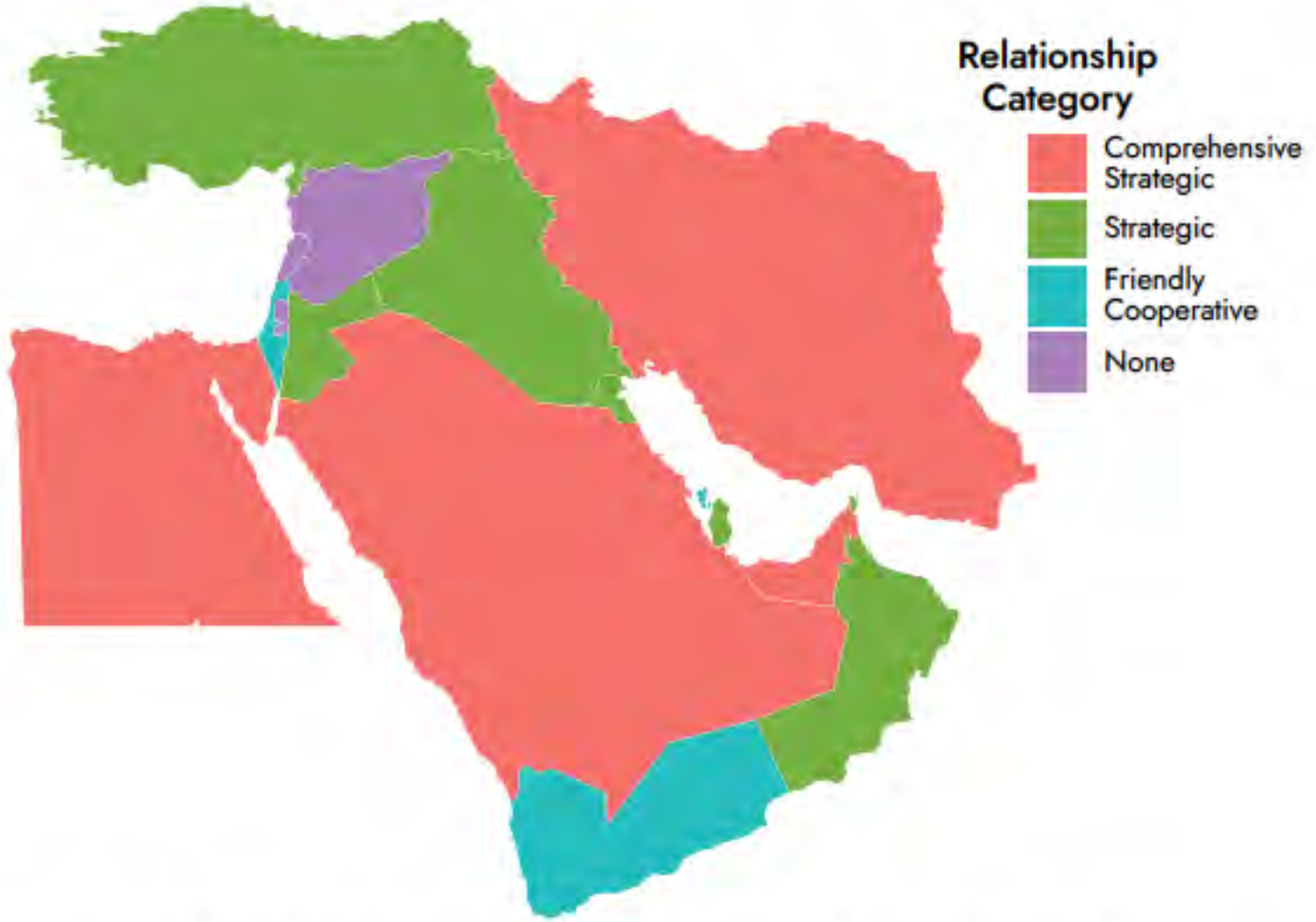
Figure 2. Chinese and U.S. bilateral trade with MENA economies, 2018 ($ bn)



"While the U.S. was MENA's largest trading partner for most of the post-World War II era, China rapidly overtook it in the years immediately following the 2007-09 Great Recession. By 2018, China-MENA trade was $132.5 billion larger than U.S.-MENA trade, and this gap is expected to continue to grow for the foreseeable future (Figure 1). In 2018, all MENA countries — except for Bahrain and Jordan — had larger bilateral trade totals with China than they did with the U.S. (Figure 2)."

Source: Amin Mohseni-Cheraghlou, MENA at the center of the West: China's "opening up to the West" strategy, March 2021; https://www.mei.edu/publications/mena-center-west-chinas-opening-west-strategy, and World Bank's World Integrated Trade Solution (WITS) Database and authors' calculation.

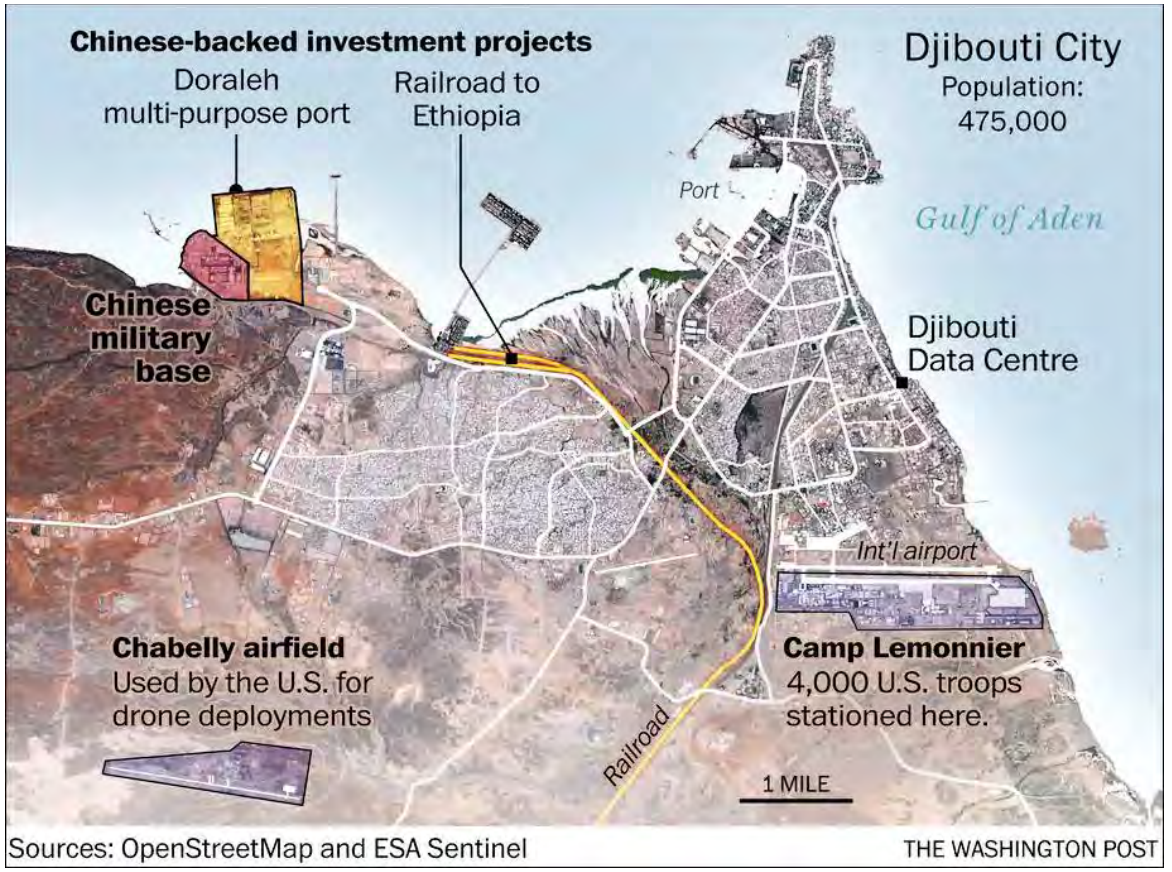
Chinese Strategic Partnerships in the Middle East*



Sources: Kenneth Allen, Phillip C. Saunders, and John Chen, *Chinese Military Diplomacy, 2003–2016: Trends and Implications* (Washington, DC: NDU Press, 2017); Jonathan Fulton, *China's Changing Role in the Middle East* (Washington, DC: Atlantic Council, 2019), 4; "Foreign Minister Yang Jiechi, Lebanese Foreign Minister Mansour Exchange Congratulatory Messages on the 40th Anniversary of Diplomatic Ties Between the Two Countries," Chinese Embassy in Lebanon, November 9, 2011, available at <http://www.china-embassy.org/eng/zgyw/t876100.htm>.

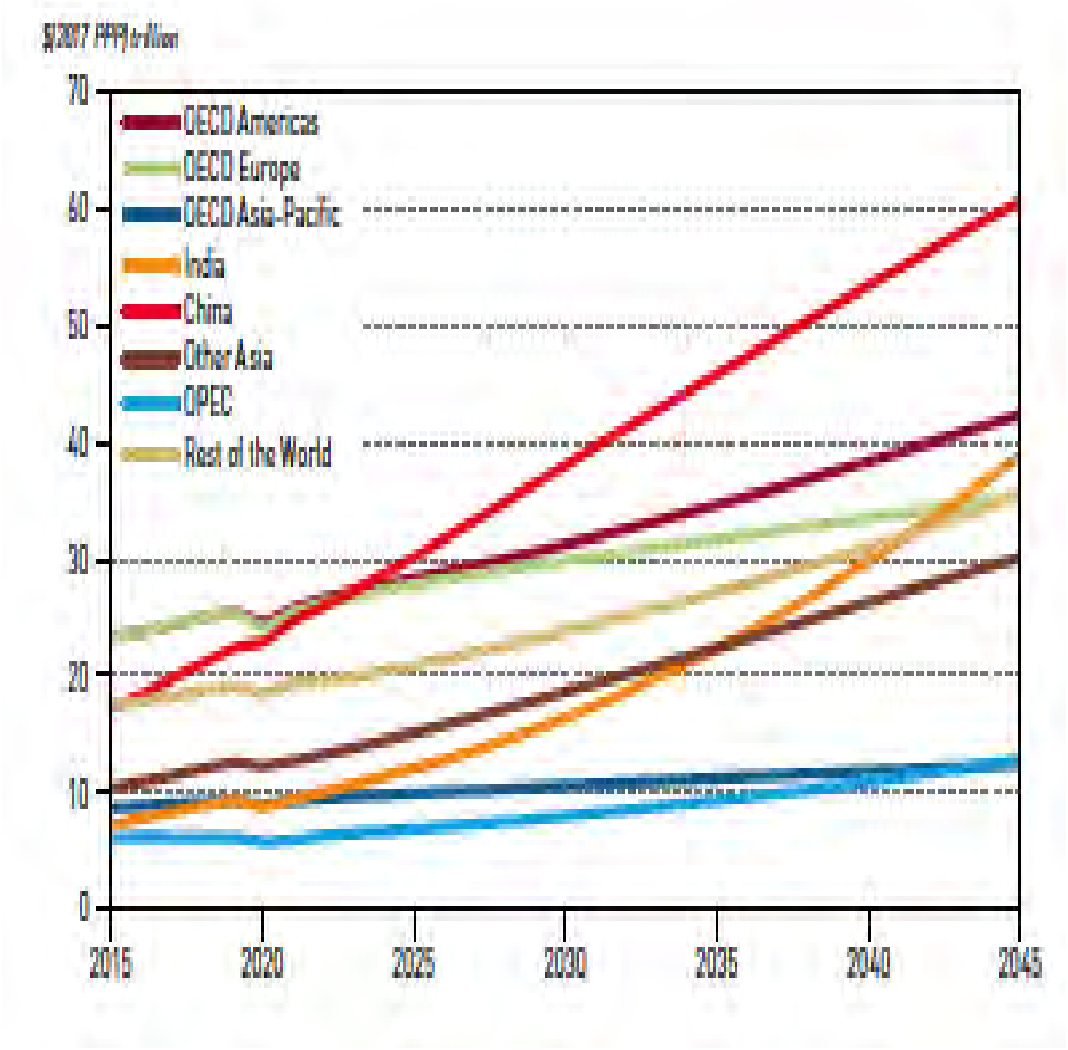
Source: Thomas Lynch, *Strategic Assessment 2020*, NDU, 2020, pp. 276

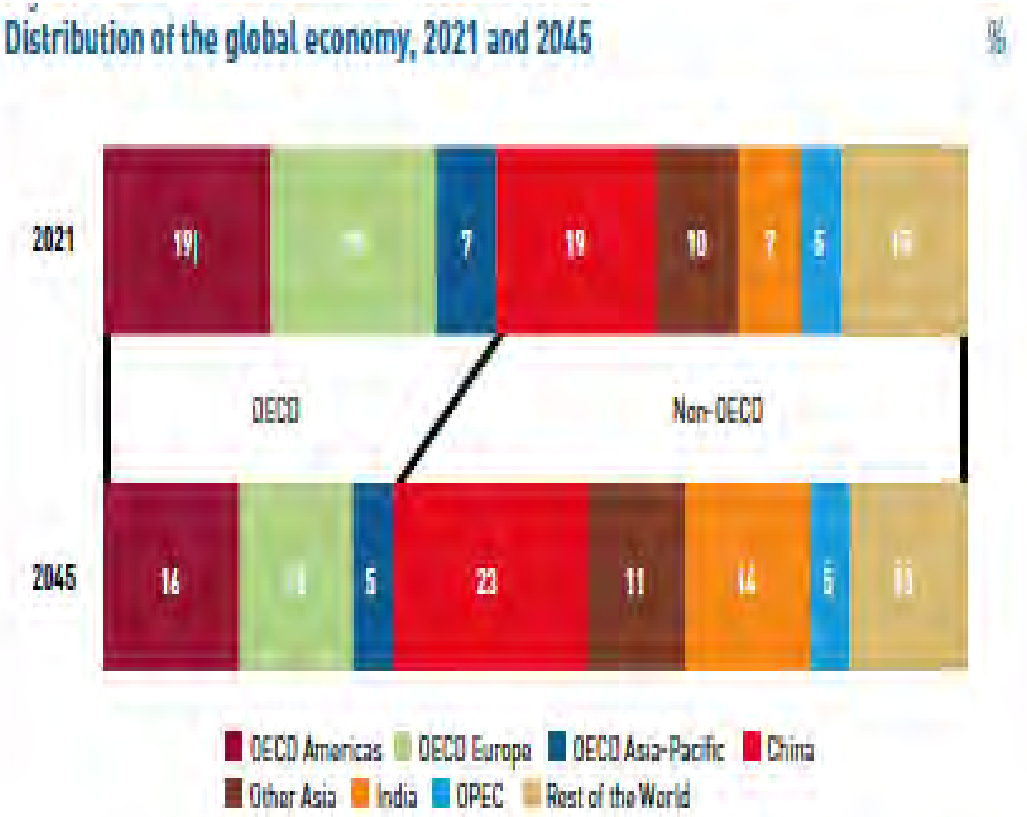
Chinese Port Access and Bases in Indian Ocean/Red Sea



Source: Open street Map; ESA Sentinel; *Washington Post;* and Juan Cole, "The Dragon Arrives: 1st Chinese overseas Military Base in Djibouti," *Informed Comment*, August 2, 2017.

OPEC Projection of China's Share of the Global Economy: 2021-2045





Sources: OPEC; *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, p. 39

OPEC Estimate of Chinese Energy Demand: 2021-2045

China's primary energy demand by fuel over the outlook period. In total, energy demand is projected to increase by 8.1 mboe/d, with a significant drop-off in growth after 2030. One of the reasons for this is a slowdown in population and economic growth, but also rising energy efficiency (in transformation and final use). In addition, China's official target is to hit peak CO2 emissions by 2030, which will shape the future energy mix.

Consequently, the 14th Five-Year Plan (FYP) foresees 'strict control' of coal usage until 2025 and a gradual phase down thereafter. Retrofitting coal plants will also help to increase transformation efficiency and, in turn, reduce primary fuel usage. This is why China is forecast to see a drop in its coal demand of a huge 14.2 mboe/d between 2021 and 2045. This would bring coal share's down in the primary energy mix by almost 25 pp to 33.6% by 2045.

At the same time, natural gas demand is expected to increase by 4.4 mboe/d, partly replacing some of the phased out coal capacity. This growth is partly linked to the deployment of China's domestic gas resources, as emphasized by official targets.

Chinese oil demand is set to witness a significant slowdown after 2030, which is in line with an expected rising share of EVs in the country.

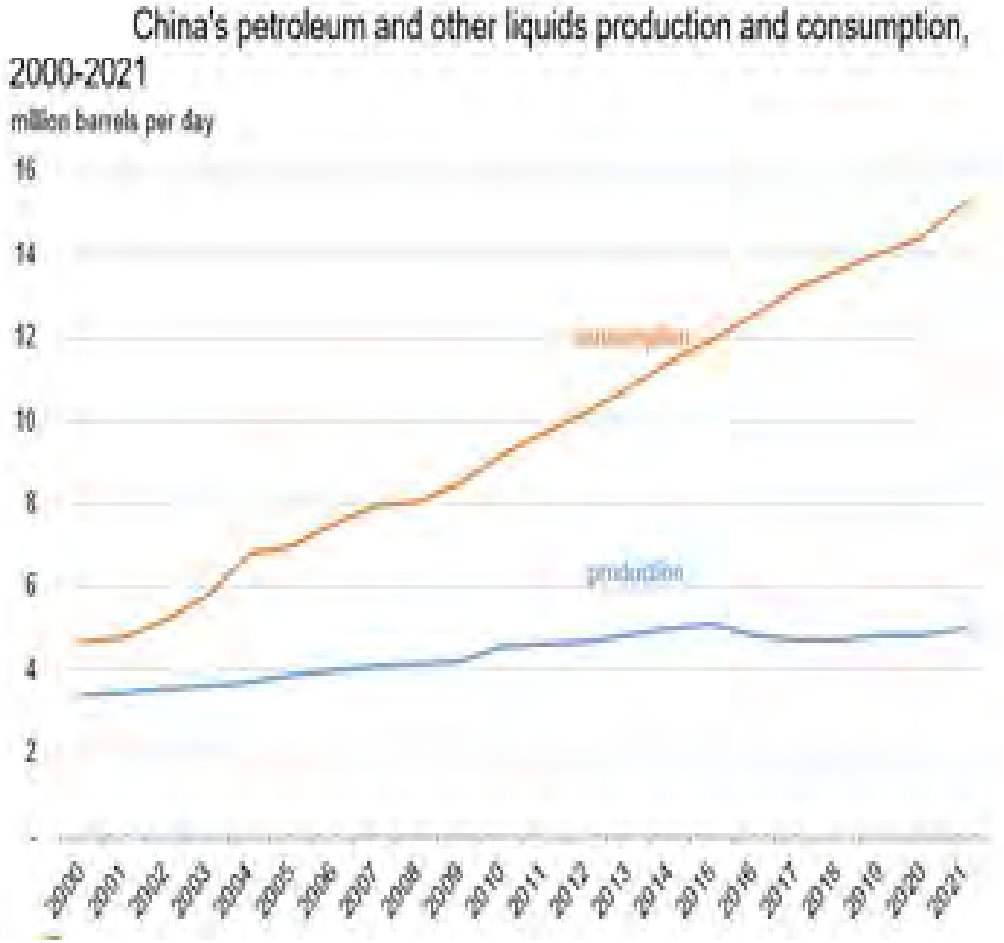
At the same time, China's demand for other renewables will increase by almost 9 mboe/d. Nuclear energy is also expected to see strong growth.

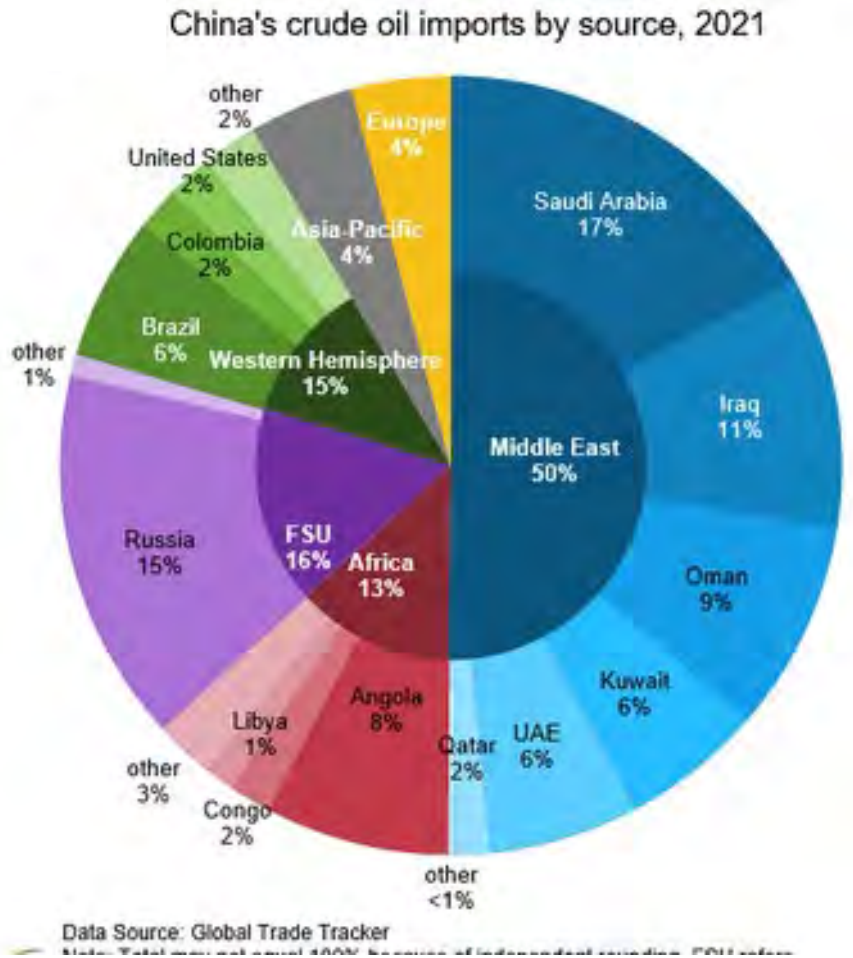
China primary energy demand by fuel type, 2021–2045

	Levels mboe/d						Growth mboe/d	Growth % p.a.	Fuel share %	
	2021	2025	2030	2035	2040	2045	2021–2045	2021–2045	2021	2045
Oil	14.2	15.7	16.2	16.6	16.6	16.5	2.3	0.6	20.5	21.3
Coal	40.3	39.8	37.0	33.0	29.1	26.1	-14.2	-1.8	58.0	33.6
Gas	5.5	6.6	7.9	8.9	9.6	9.9	4.4	2.5	7.9	12.7
Nuclear	2.3	3.1	3.9	4.9	5.9	6.9	4.6	4.7	3.3	8.9
Hydro	2.3	2.4	2.6	2.7	2.8	2.9	0.7	1.1	3.3	3.8
Biomass	2.7	3.0	3.4	3.8	4.0	4.2	1.5	1.9	3.9	5.4
Other renewables	2.3	3.4	5.5	7.4	9.0	11.0	8.8	6.8	3.3	14.2
Total	69.4	73.9	76.6	77.3	77.0	77.5	8.1	0.5	100.0	100.0

Sources: OPEC; *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, p. 63.

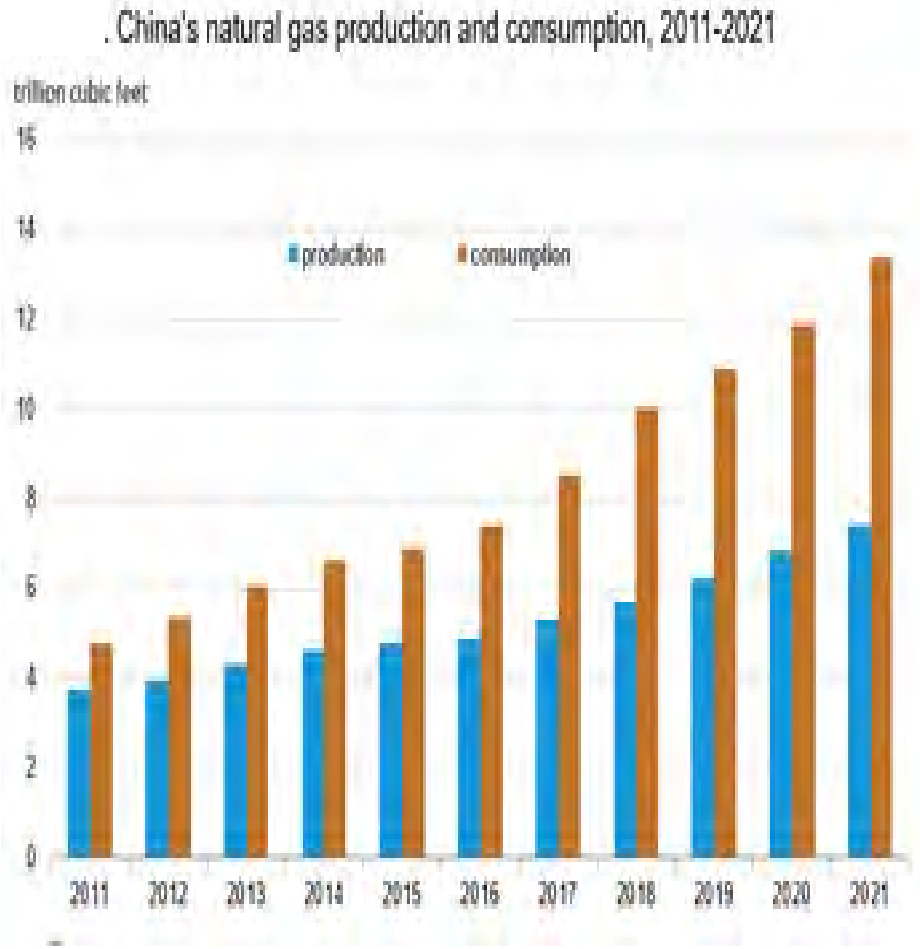
China's Strategic Dependence on Gulf and Other Crude Oil Imports in 2000-2021

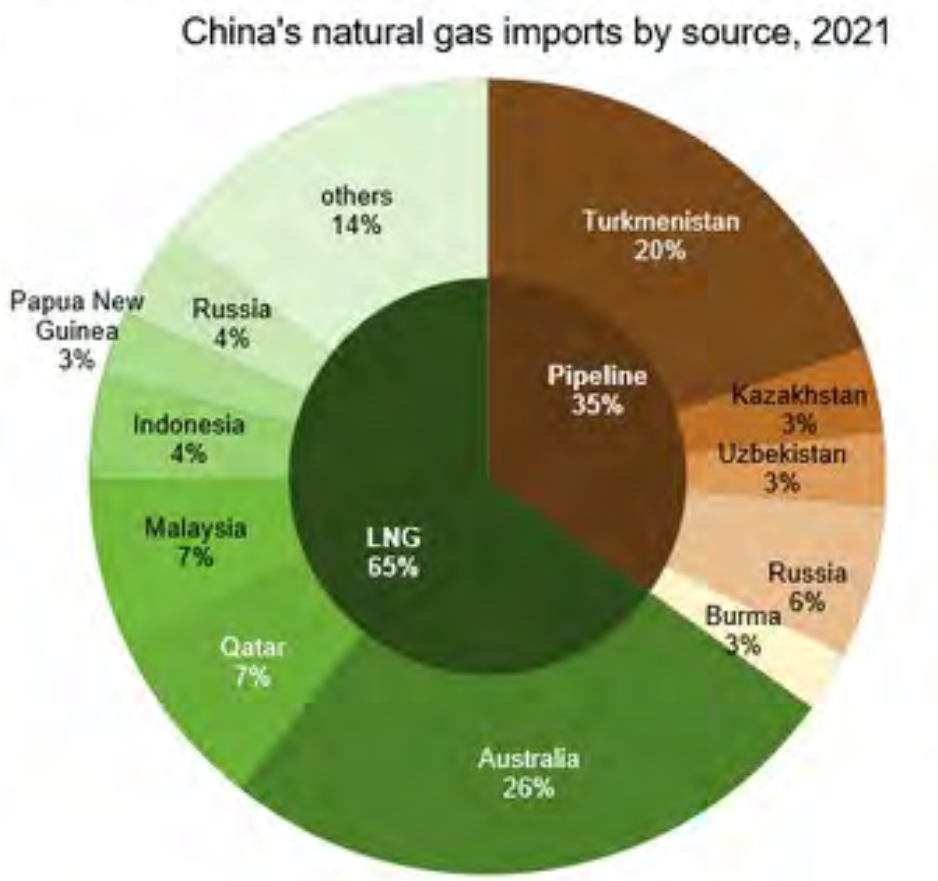




Source: EIA, China, Full Country Analysis, August 6, 2022.

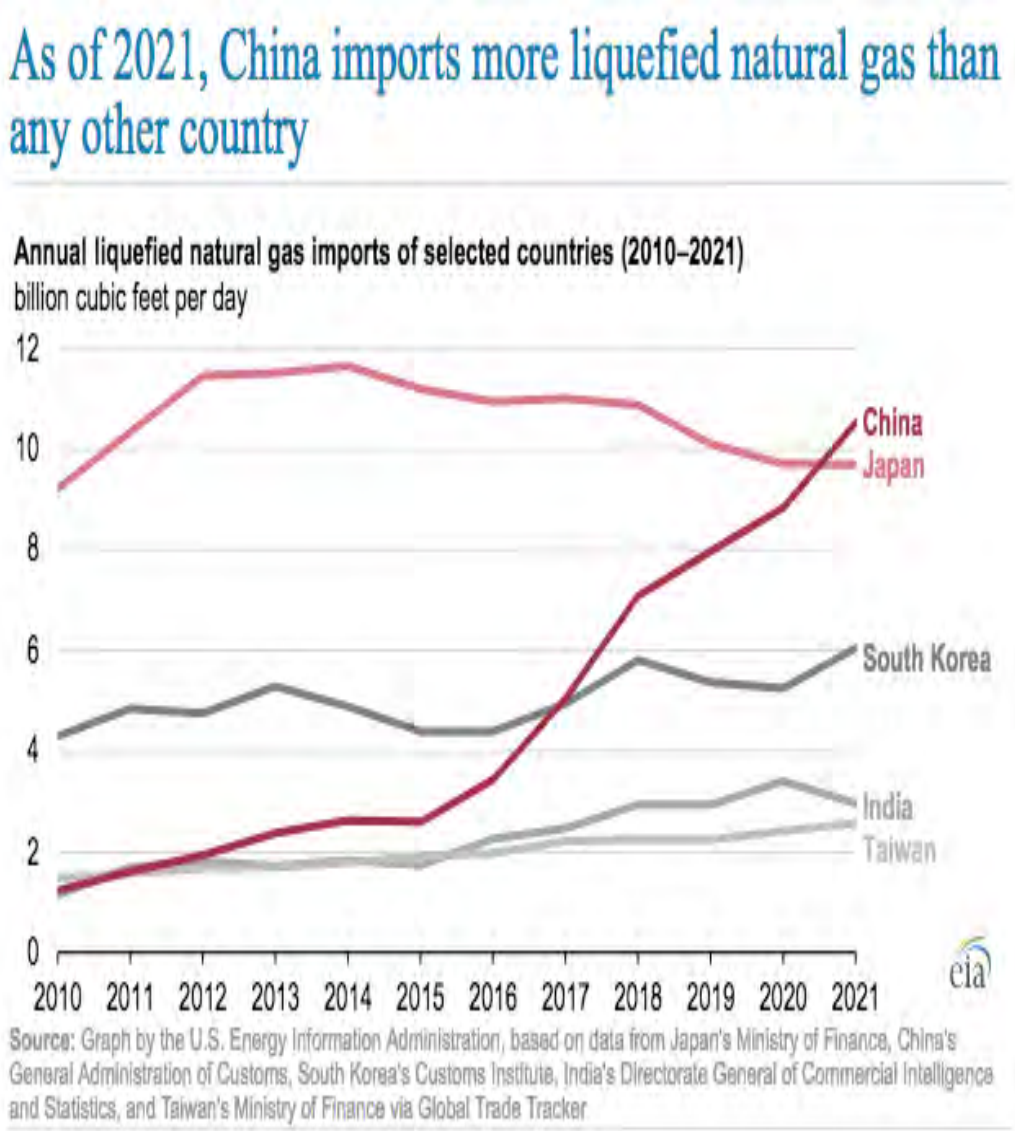
China's Strategic Dependence on Gulf and Other Natural Gas Imports in 2000-2021

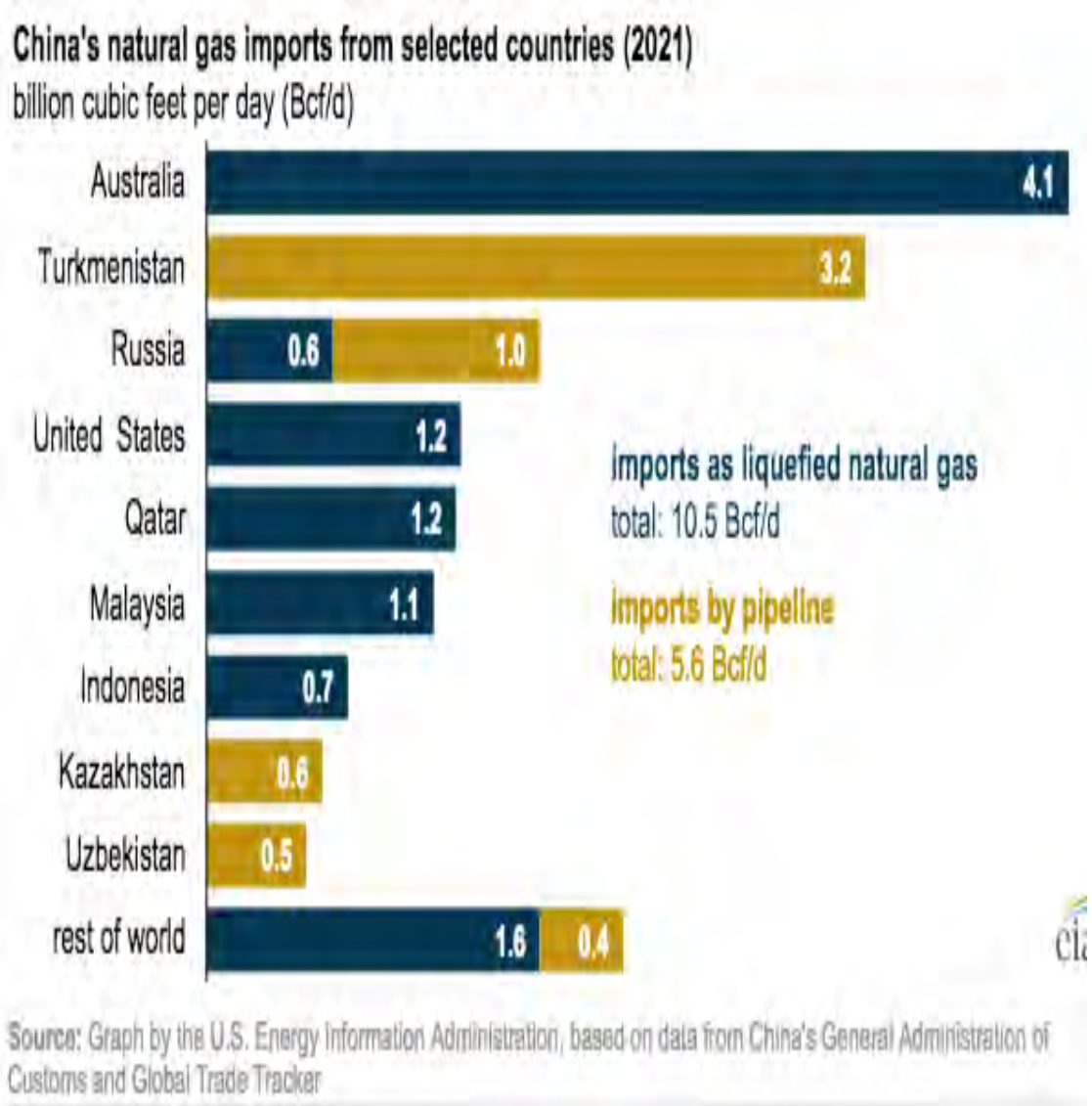




Source: EIA, China, Full Country Analysis, August 6, 2022.

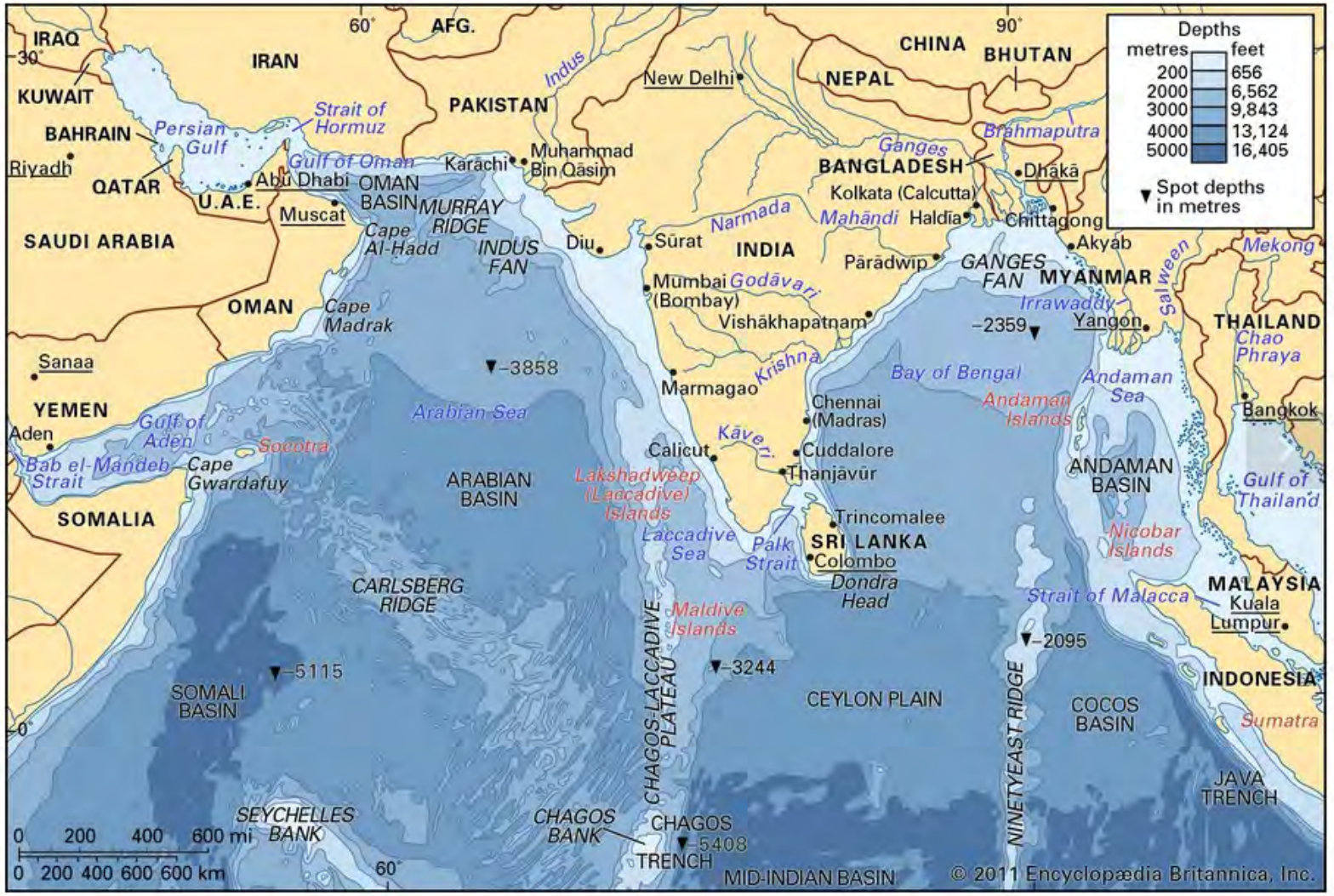
Chinese and OtherAsian Gas Imports: 2010-2021





Source: EIA, May 2022, https://www.eia.gov/todayinenergy/detail.php?id=52258 /

The Arabian Sea and Indian Ocean



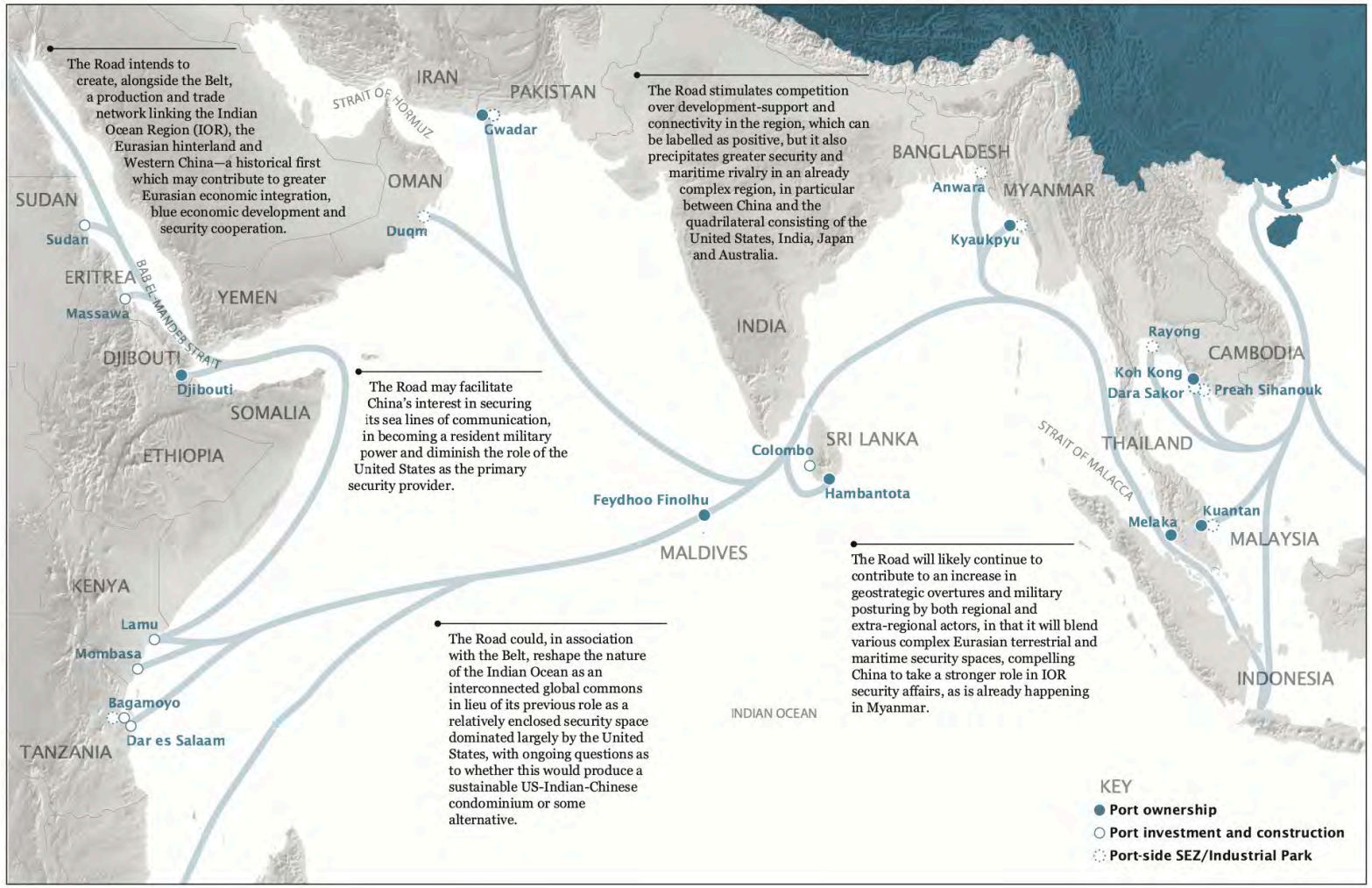
Source: Encyclopedia Britannica. https://www.britannica.com/place/Arabian-Sea.

The Chinese Naval "Belt and Road" in the Indian Ocean Area

Table 1.1. Chinese sea port ownership in the South China Sea and Indian Ocean Region since October 2013

Year	Region	Host state	Port	Lease period
2015	Indian Ocean	Pakistan	Gwadar	40 years
2015	Indian Ocean	Myanmar	Kyaukpyu	50 years
2015	South China Sea	Malaysia	Kuantan	60 years
2016	Indian Ocean	Djibouti	Obock	10 years
2016	South China Sea	Malaysia	Melaka Gateway	99 years
2017	Indian Ocean	Sri Lanka	Hambantota	99 years
2017	South China Sea	Brunei	Muara	60 years
2017	Indian Ocean	Maldives	Feydhoo Finolhu	50 years

Note: Transparency issues mean that data on the year of agreement and lease period may be inaccurate.



Source: Richard Ghiasy, Fei Su and Lora Saalman, *The Maritime Silk Road, Security Implications*, SIPRI, 2018, pp. 6, 29; https://www.sipri.org/sites/default/files/2019-10/the-21st-century-maritime-silk-road.pdf. Map by Christian Dietrich.

India's Strategic Dependence on MENA and Other Crude Oil Imports in 2002-2021

Figure 2. India's petroleum and other liquids production and consumption, 2002–2021

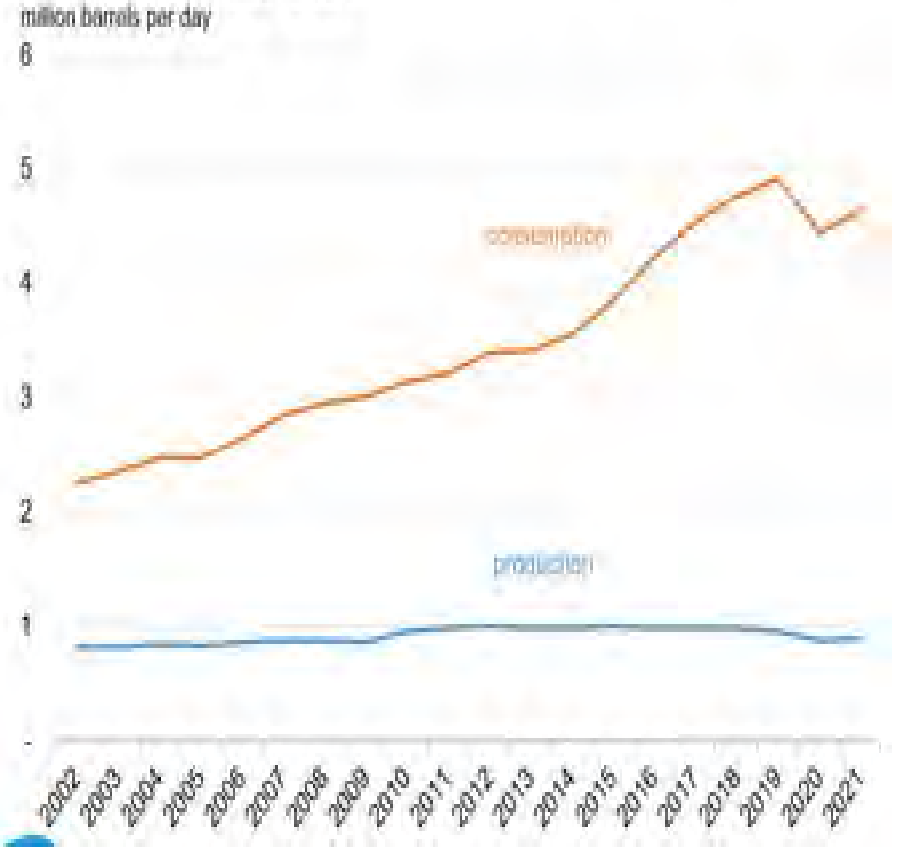
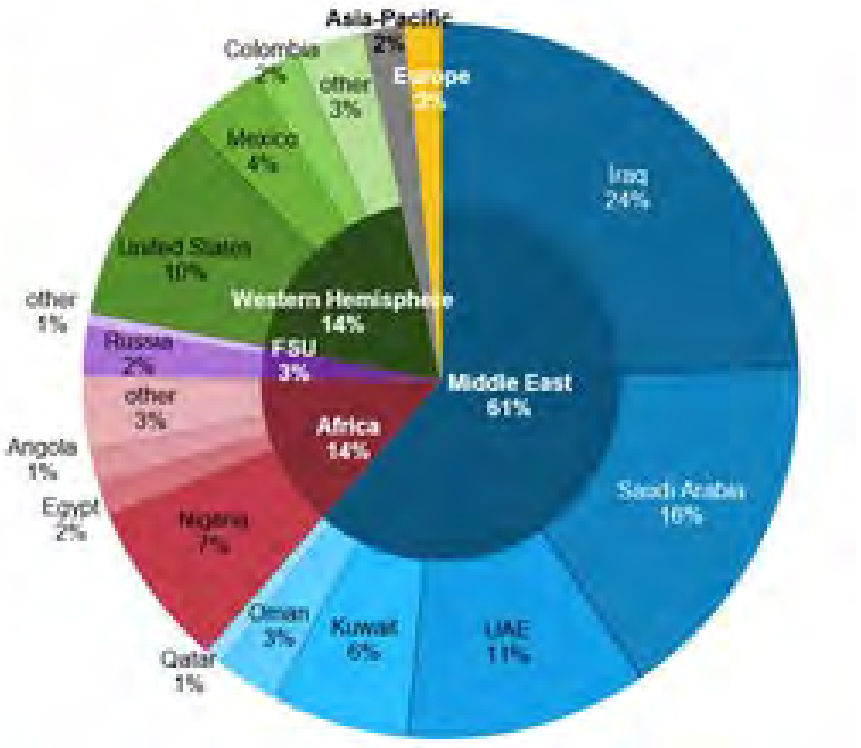


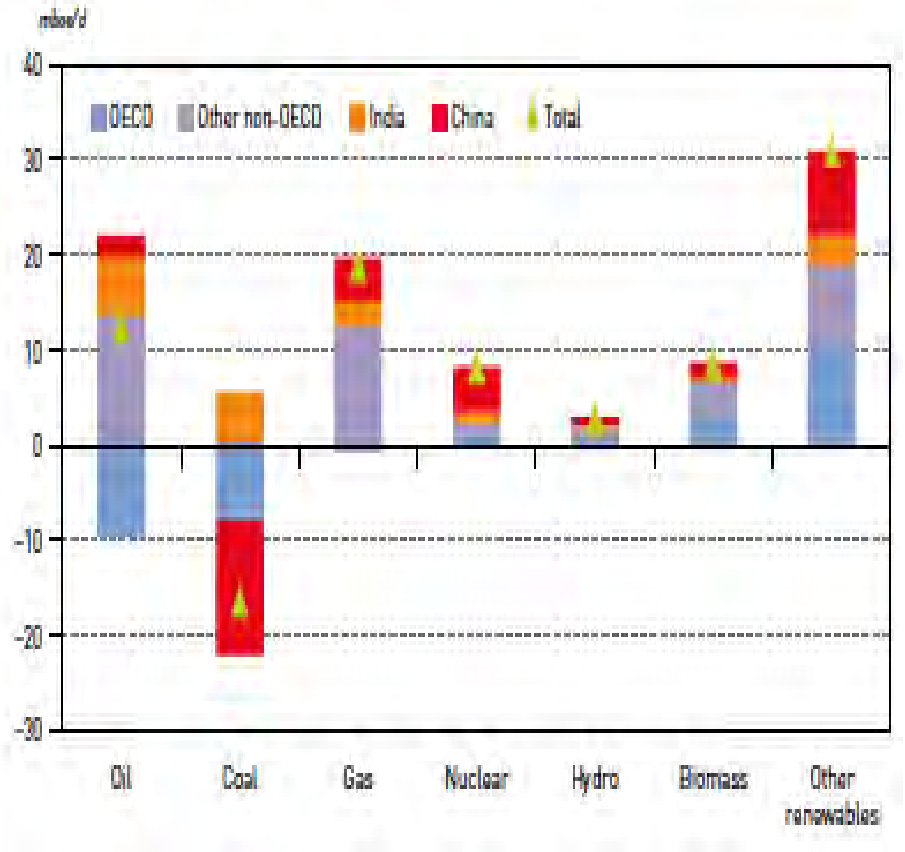
Figure 3. India's crude oil imports by source, 2021



Source: U.S. EIA., India Country Report, November 17, 2022, https://www.eia.gov/international/analysis/country/IND.

OPEC Estimate of Indian Energy Demand: 2021-2045

Growth in energy demand by fuel type and region, 2021-2045

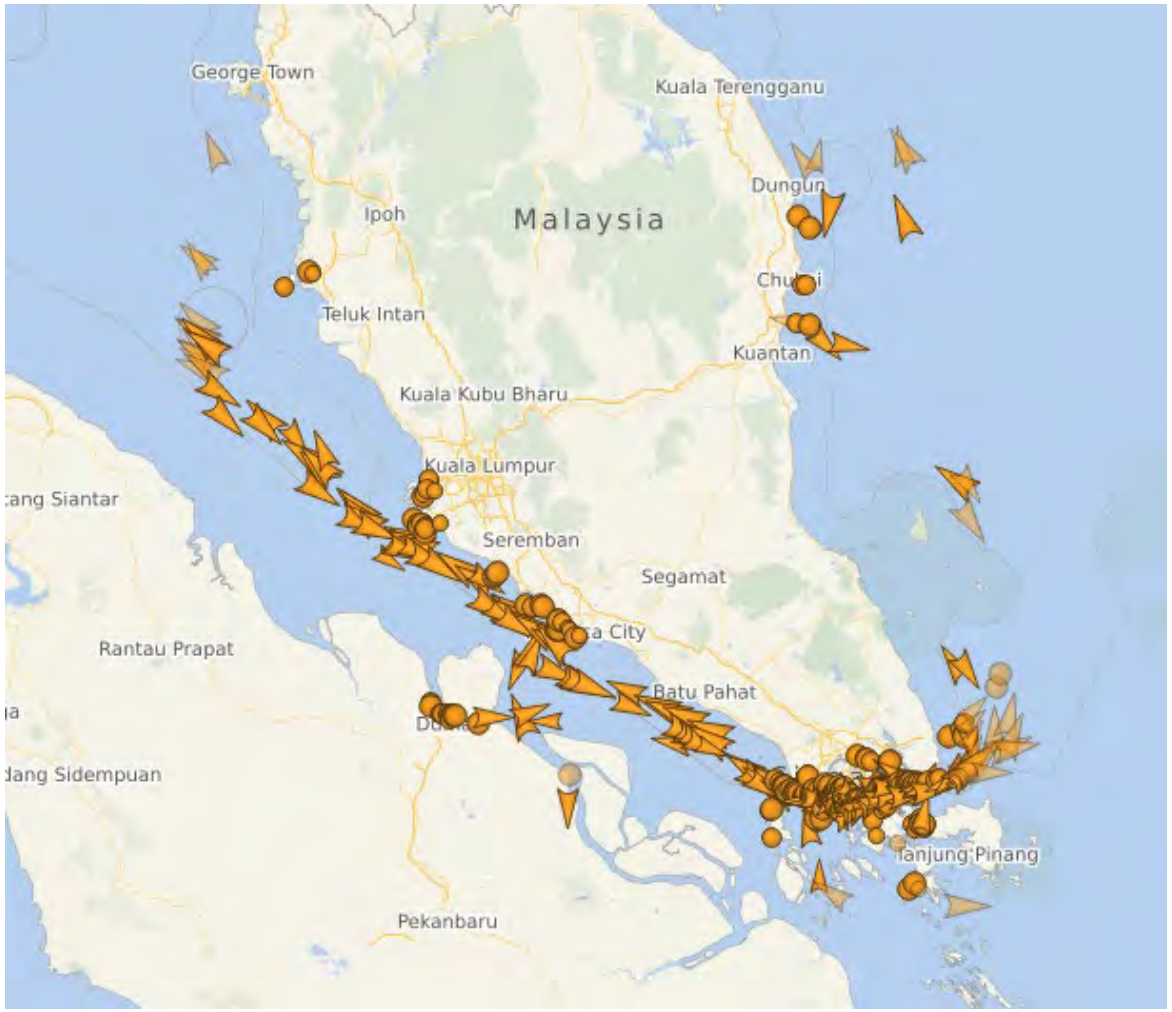


India primary energy demand by fuel type, 2021–2045

	Levels mboe/d						Growth mboe/d	Growth % p.a.	Fuel share %	
	2021	2025	2030	2035	2040	2045	2021–2045	2021–2045	2021	2045
Oil	4.8	5.8	7.1	8.3	9.6	11.0	6.2	3.5	25.7	29.2
Coal	8.0	9.2	10.7	12.1	13.1	13.1	5.1	2.1	43.1	34.8
Gas	1.1	1.4	1.9	2.6	3.2	3.8	2.7	5.2	6.0	10.2
Nuclear	0.3	0.4	0.6	0.8	1.1	1.4	1.1	6.7	1.6	3.7
Hydro	0.3	0.4	0.5	0.6	0.7	0.7	0.4	3.4	1.7	1.9
Biomass	3.8	3.9	4.0	4.1	4.1	4.1	0.3	0.4	20.2	10.9
Other renewables	0.3	0.6	1.0	1.6	2.4	3.5	3.2	10.9	1.6	9.3
Total	18.6	21.7	25.8	30.1	34.2	37.7	19.1	3.0	100.0	100.0

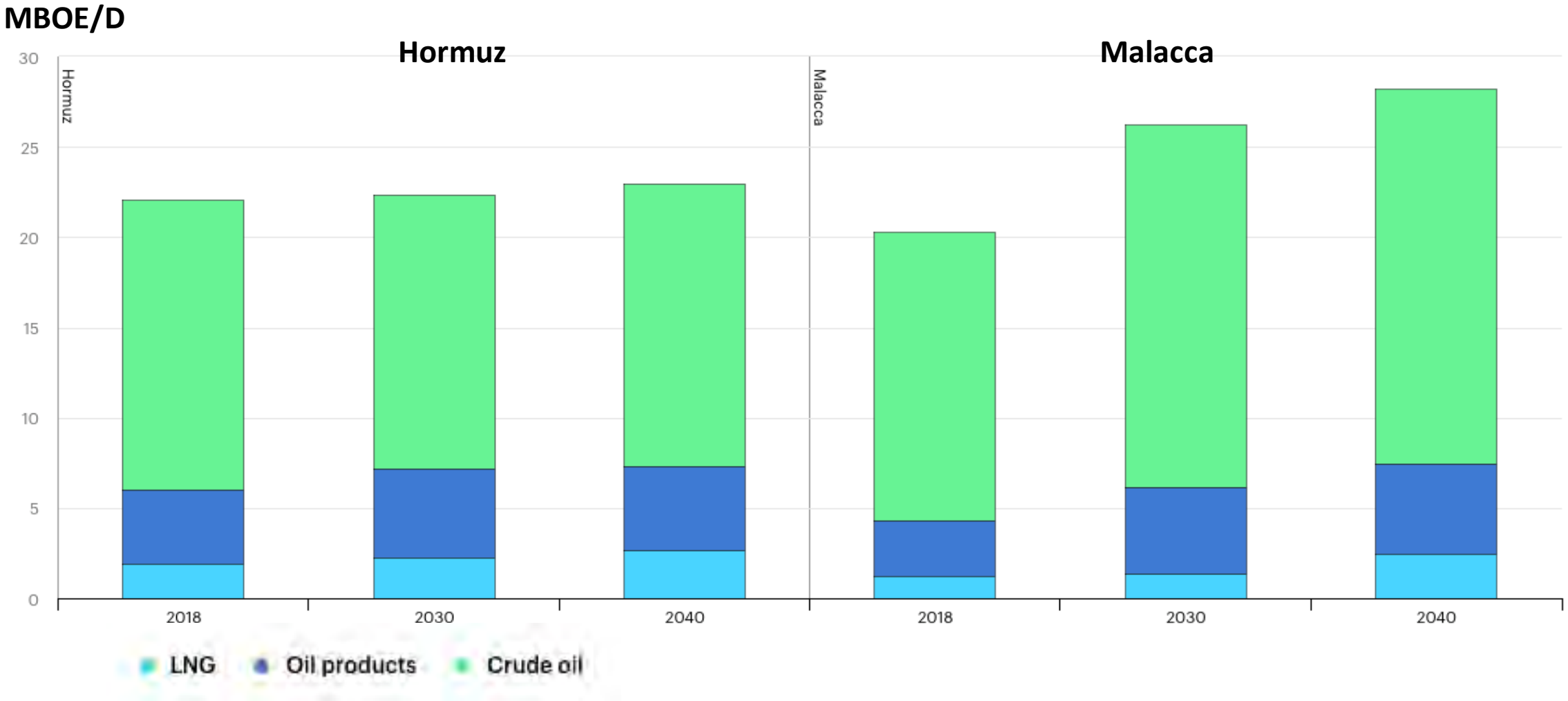
Sources: OPEC; *World Energy Outlook, 2022*, https://www.opec.org/opec_web/en/publications/340.htm, p. 64-65.

The Straits of Malacca



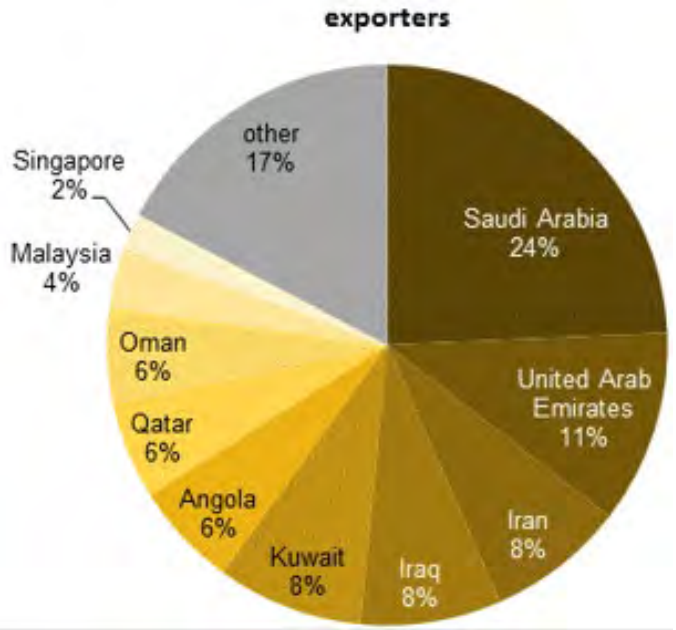
Source: Marine Vessel Traffic, 14.12.2022, https://www.marinevesseltraffic.com/tankers/MALACCA%20STRAIT/ship-traffic-tracker#gotomap; and https://commons.wikimedia.org/wiki/File:Map_of_the_Strait_of_Malacca-de.jpg

EIA Estimate of Oil and Gas Trade Volumes Through Straits of Hormuz and Malacca: 2018-2040



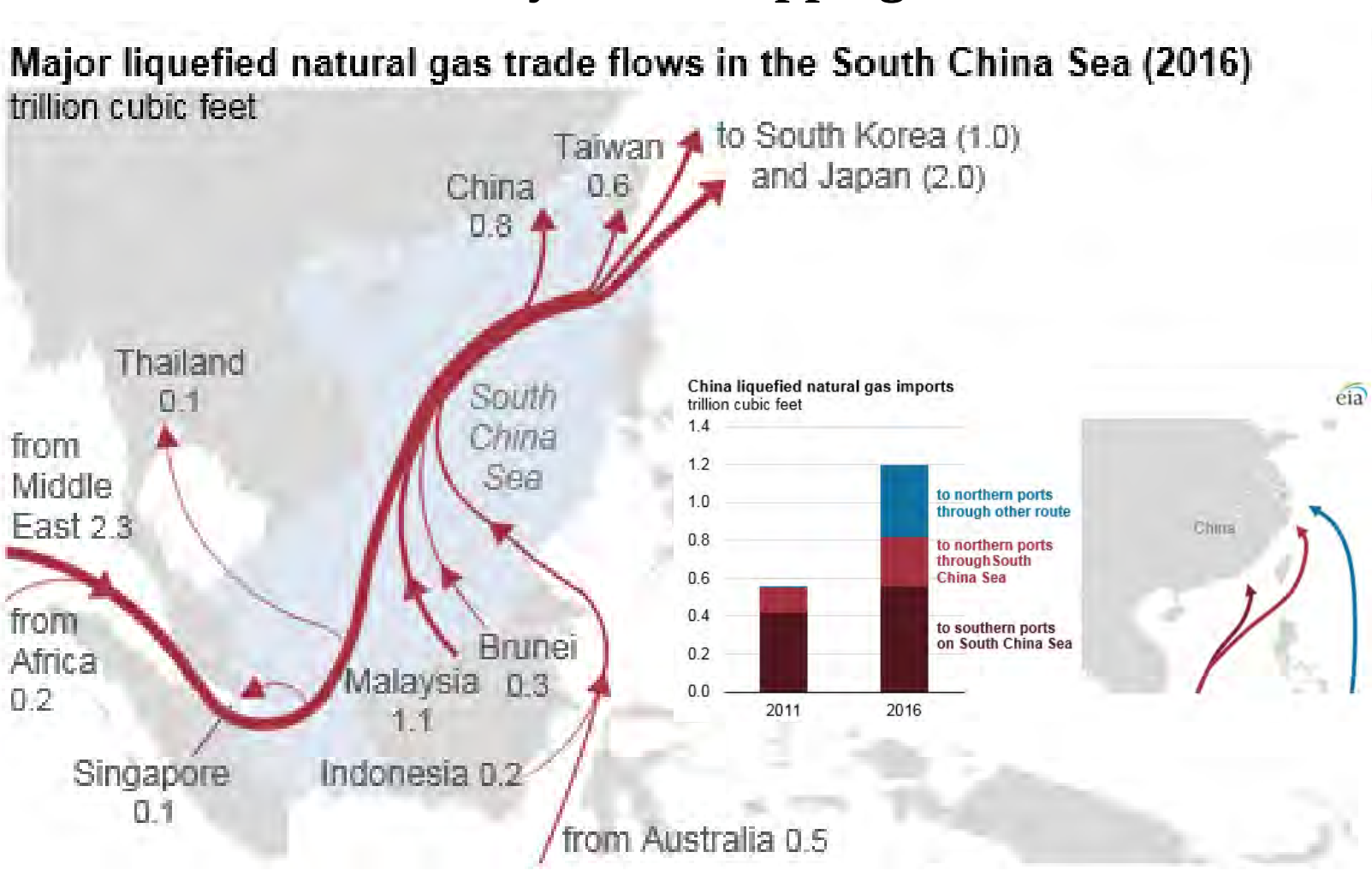
Source: EIA, "Oil and gas trade volumes via major chokepoints in the Stated Policies Scenario, 2018-2040 ," October 26, 2022, https://www.iea.org/data-and-statistics/charts/oil-and-gas-trade-volumes-via-major-chokepoints-in-the-stated-policies-scenario-2018-2040.

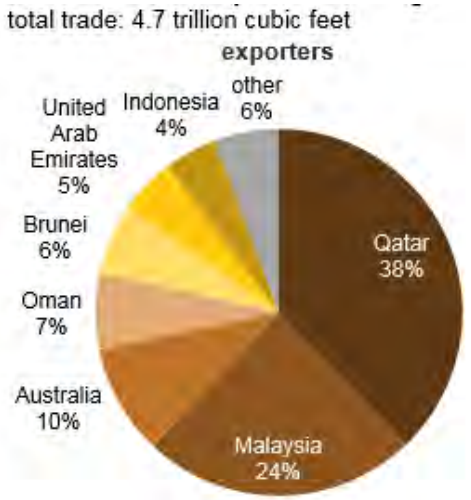
Key Oil Shipping Routes to Asia

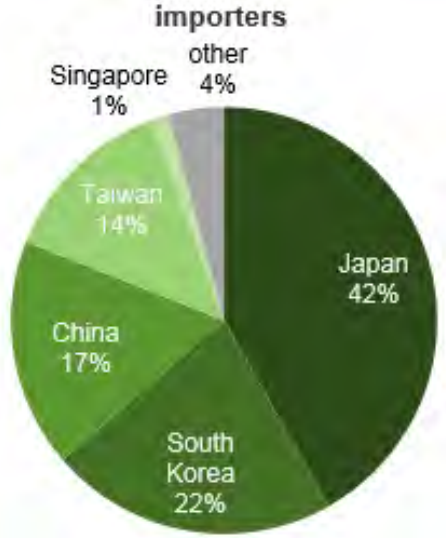


Source: EIA, More than 30% of global maritime crude oil trade moves through the South China Sea, August 27, 2018, https://www.eia.gov/todayinenergy/detail.php?id=36952#

Key LNG Shipping Routes to Asia

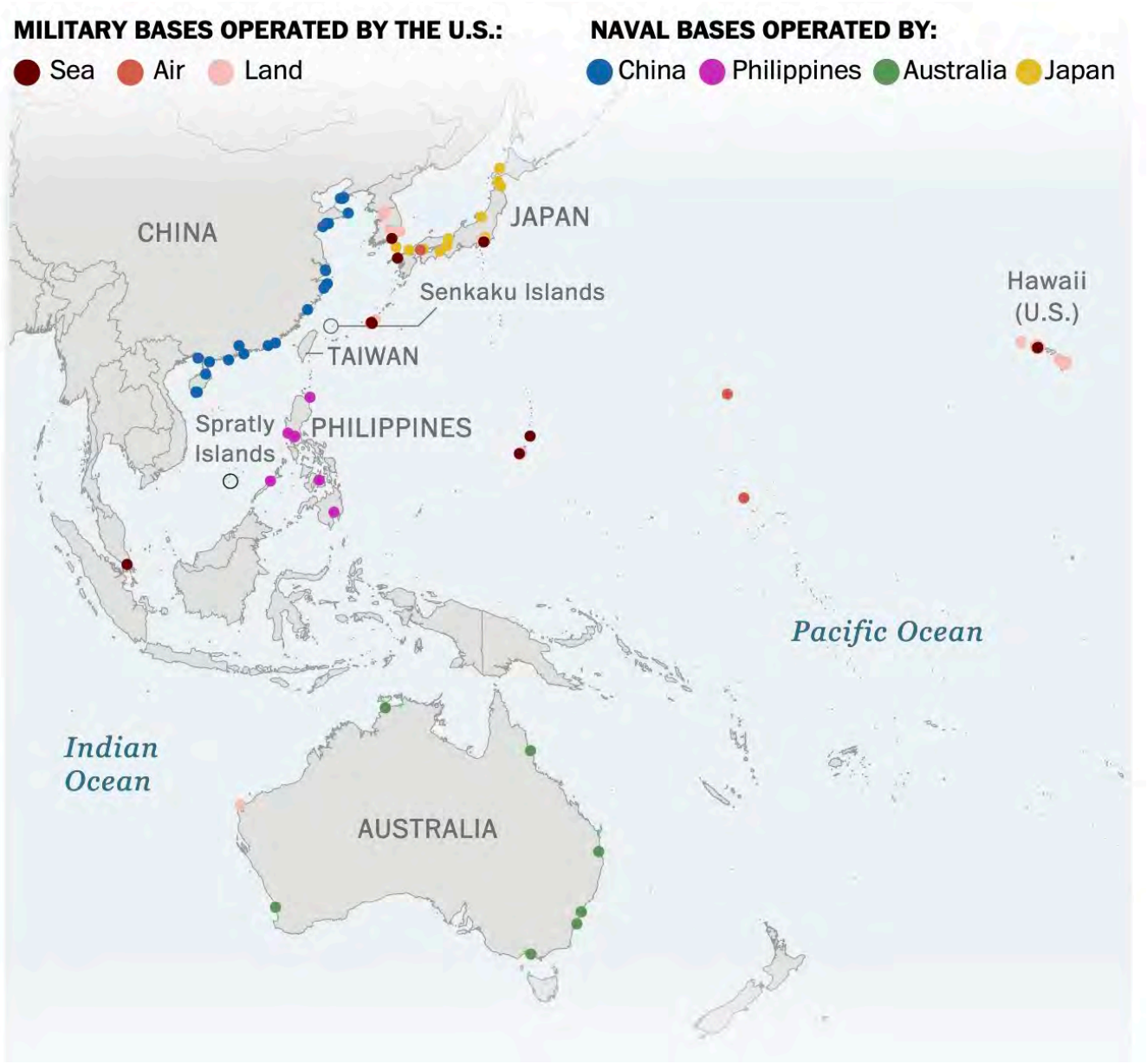






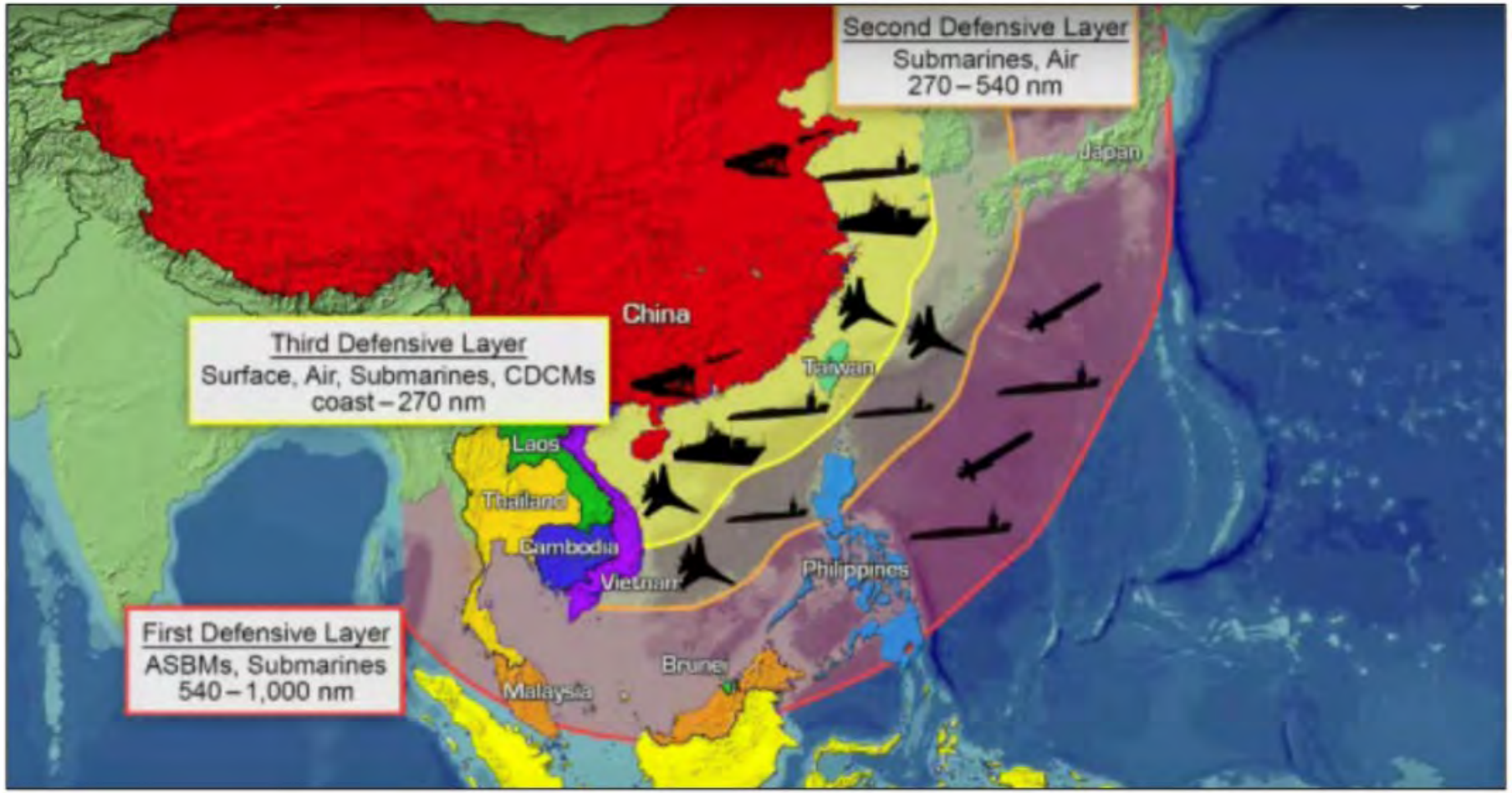
Source: EIA, Almost 40% of global liquefied natural gas trade moves through the South China Sea, November 2, 2017, https://www.eia.gov/todayinenergy/detail.php?id=33592#.

The Changing Chinese, U.S., Japanese, Philippine, and Australian Military Base Structure in the Pacific



Source: Adapted from Ellen Nakashima and Christian Shepherd, "Rattled by China, U.S. and allies are beefing up defenses in the Pacific," *Washington Post*, February 20, 2023, https://www.washingtonpost.com/national-security/2023/02/20/china-taiwan-invasion-deterrence/

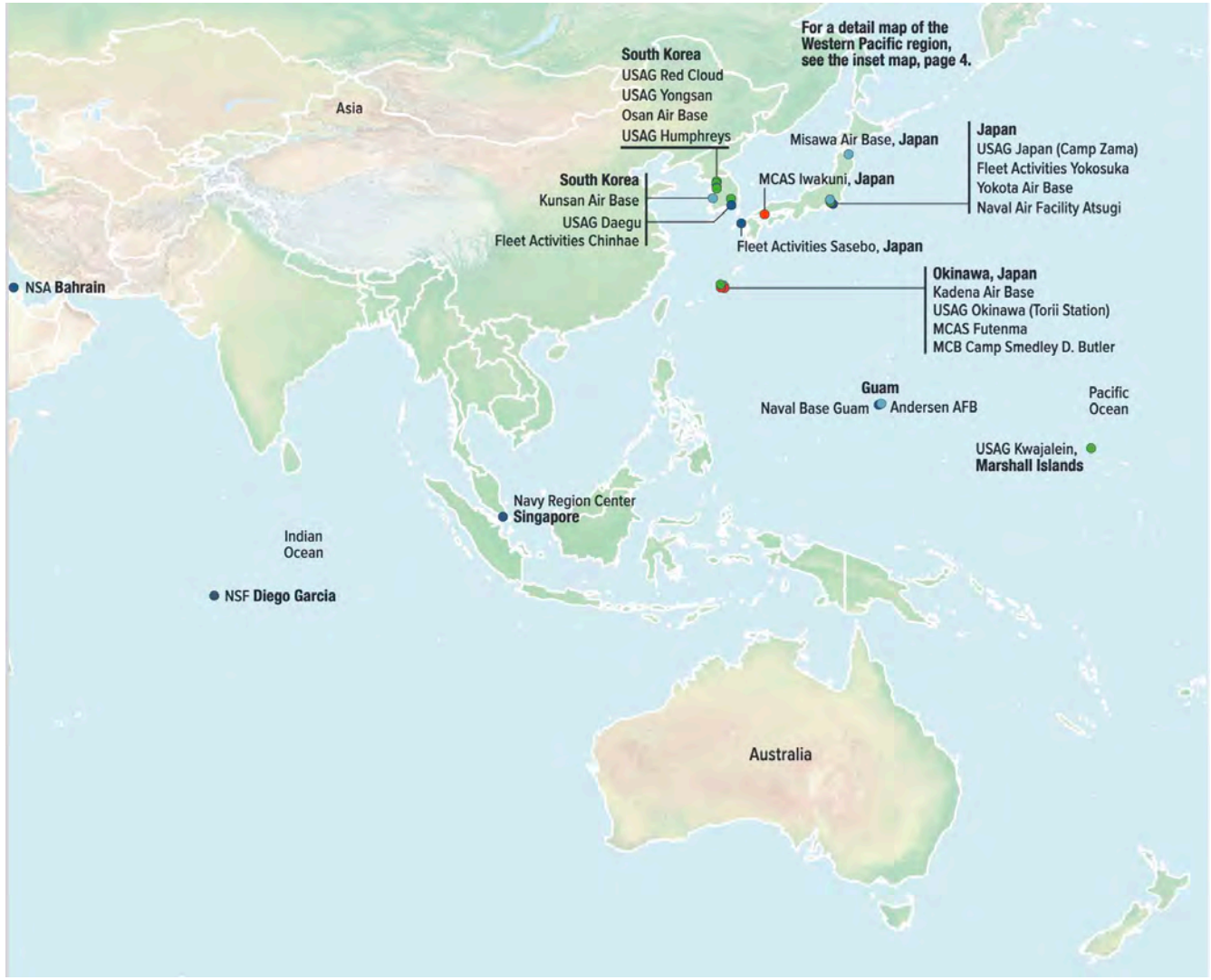
China Anti-Access/Area Denial Defense Layers



Source: Reformatted from Intelligence, Surveillance, and Reconnaissance Design for Great Power Competition, CRS, June 4, 2020, p. 8, and Sam Lagrone, "Navy Shelving A2/D2 Acronym," *USNI News*, October 3, 2016.

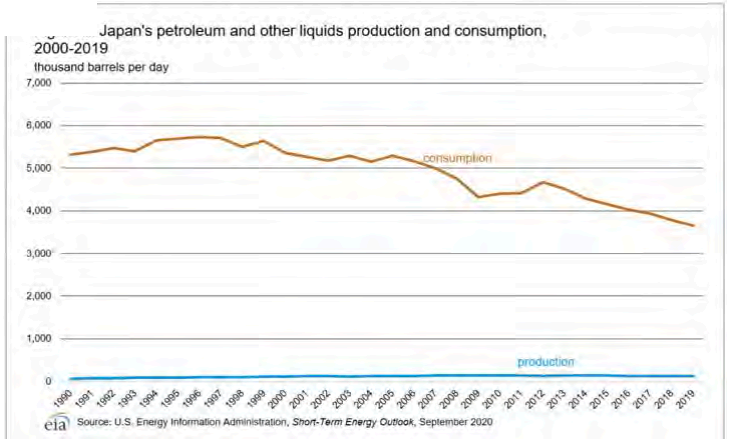
Notes: Office of Naval Intelligence image. China's anti-access area denial defensive layers consists of multiple capabilities to include, but not limited to, anti-ship ballistic missiles (ASBM), submarines, surface-to-surface missiles, surface-to-air missiles, coastal defense cruise missiles (CDCM), and fighter and bomber aircraft. Operating within this highly contested environment presents a significant challenge for U.S. and allied military forces. Specific challenges for ISR include collecting target-quality data via penetrating and persistent ISR operations, rapidly making sense of that data, and transmitting that data to a commander, weapon, or weapon system to complete the find, fix, target kill chain, at machine speed, of adversary threat systems.

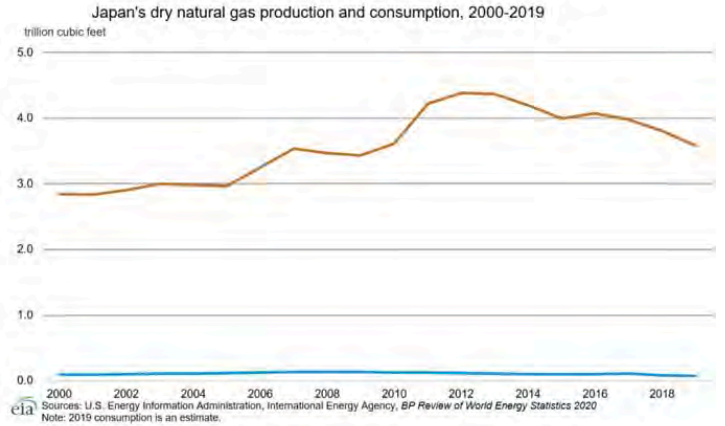
U.S. Pacific Bases

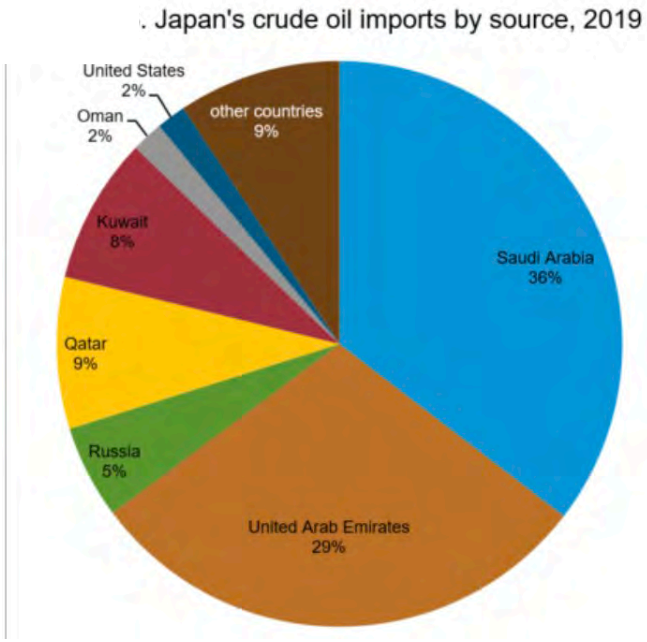


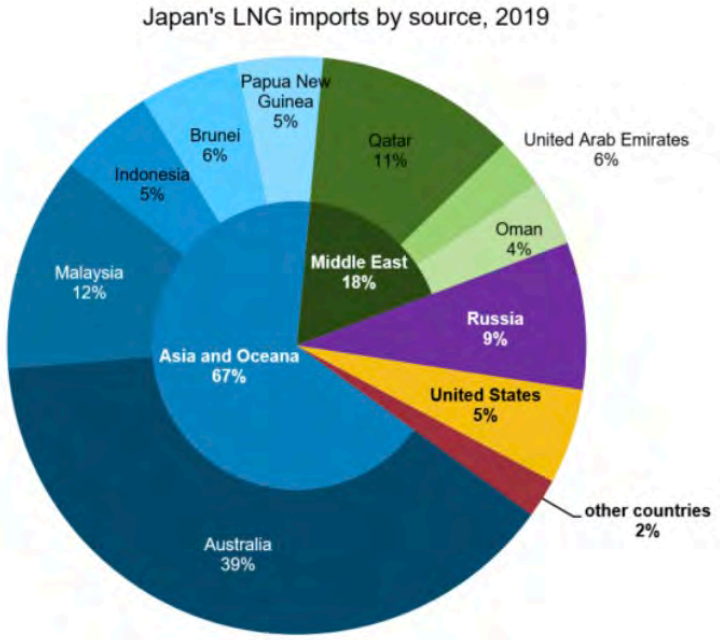
Source: Adapted from *Military Times*, "Installation Guide 2021," http://sightlinemediagroup.com/wp-content/uploads/Military-Times-Installation-Guide-2021-eBook.pdf, pp. 3-5

Japan's Strategic Dependence on MENA and Other Energy Imports in 2002-2021



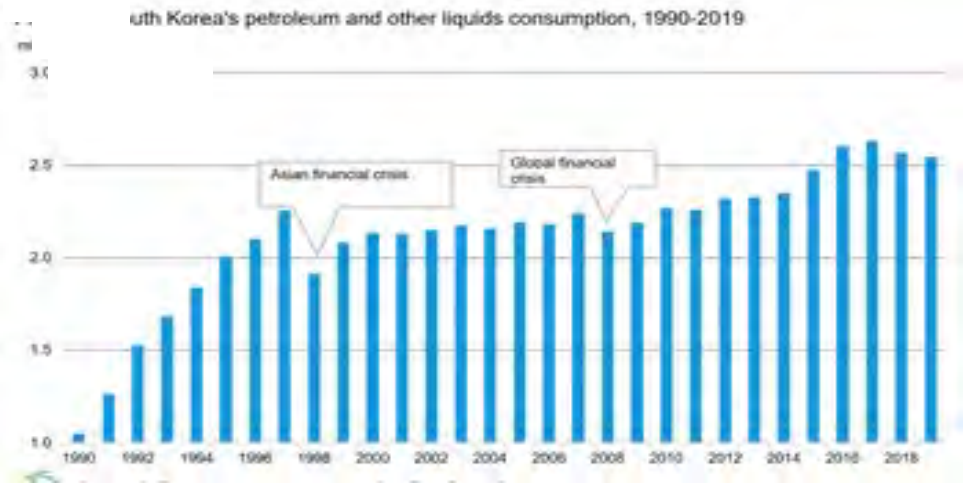


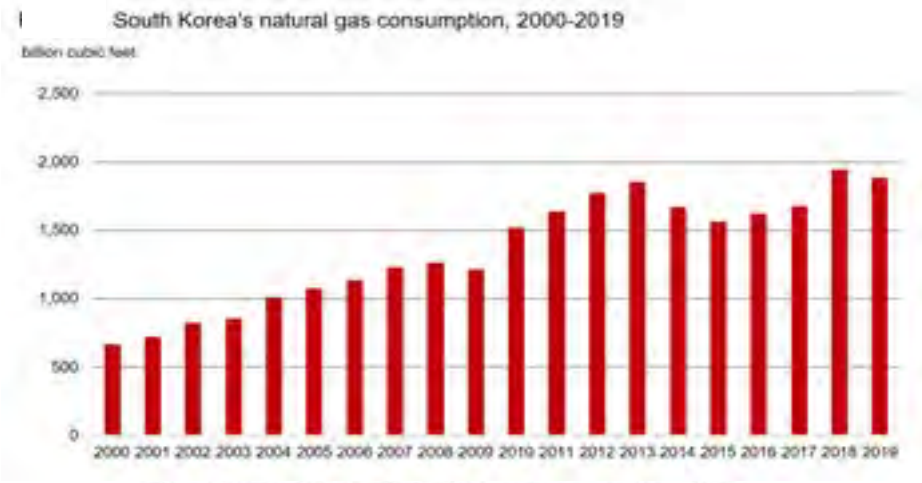


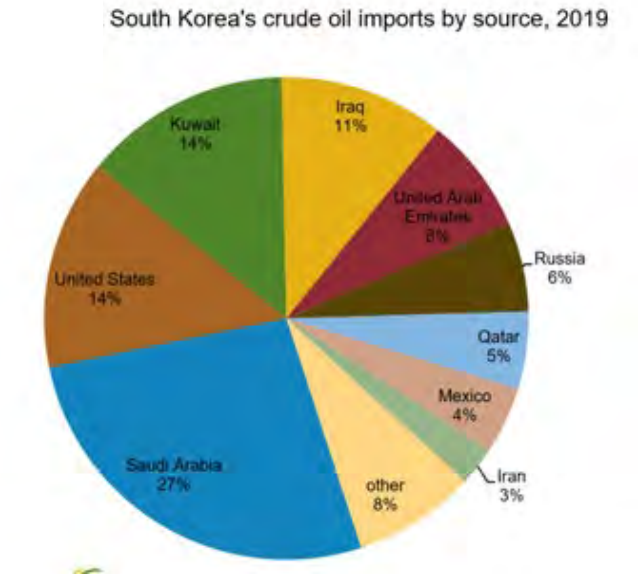


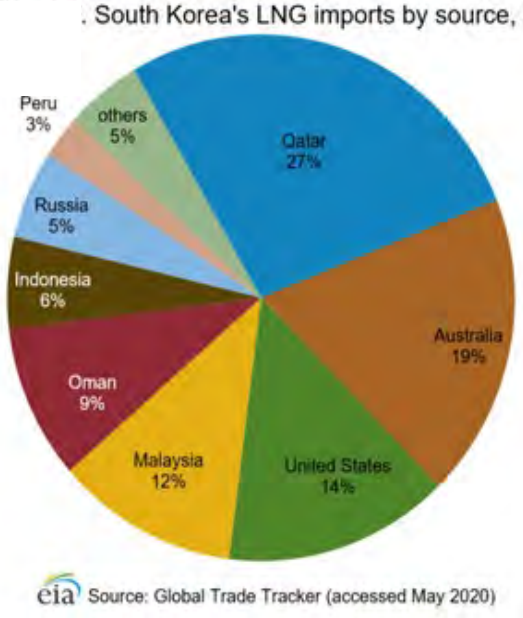
Source: U.S. EIA, *Japan Country Report*, November 2, 2022, https://www.eia.gov/international/analysis/country/JPN.

South Korean Strategic Dependence on MENA and Other Energy Imports in 1990-2019









Source: U.S. EIA, *South Korea Full Country Report*, November 6, 2022, https://www.eia.gov/international/analysis/country/KOR

Taiwan's Strategic Dependence on MENA and Other Energy Imports in 1990-2019

- **Taiwan is dependent on imports for its energy requirements. In 2021 Taiwan relied on imports of fossil fuels for 97.7 percent of its total energy supply.**
- **Electricity is primarily generated from coal and natural gas, representing 81.5 percent of total generation, while nuclear power accounted for only 9.6 percent and renewables (mostly solar and wind) for 6.0 percent.**
- **Taiwan began implementing an energy transition policy in 2016 which has set goals to promote green energy, increase use of natural gas, reduce coal-fired power, and end the use of nuclear power. The one remaining operational nuclear power plant is to be decommissioned by 2025.**
- **Currently stockpiles slightly exceed the minimum requirements with 39 days of coal, 146 days of oil, and 11 days of natural gas.**
- **74% of the imports consisted of either coal or crude oil and petroleum products, with the vast majority of oil being sourced in the Middle East, while coal came mainly from Australia (49%), Indonesia (28%) and Russia (17%). Overall, about 30% of Taiwan's total domestic energy consumption was accounted for by electricity, with more than half (56%) of it being consumed by the industrial sector**
- **As the majority of electricity is produced by using either coal (45%) or Liquefied Natural Gas (LNG) (36%), the electronics industry has become one of Taiwan's largest carbon dioxide emitters. Taiwan's Semiconductor Manufacturing Company (TSMC) alone accounts for an estimated 4.8% of the nation's total power consumption.**
- **Taiwan seeks to significantly alter its electricity mix and has therefore selected LNG, which has a lower carbon emission factor than coal or oil, as its designated bridge technology**
- **As of 2021, contracts with Australia, the US, Qatar and Papua New Guinea formally secure more than eight million tonnes of LNG per year. In 2020, however, almost 70% of Taiwan's total LNG imports of more than 18 million tons came from only three suppliers, namely Qatar (28%), Australia (27%) and Russia (14%).**
- **n 2016, more than 90% of its LNG imports passed through the South China Sea,**

Source: Excerpted from Dr. Jeff Kucharski , "Taiwan's Greatest Vulnerability Is Its Energy Supply", *The Diplomat*, 13.9.2022, https://thediplomat.com/2022/09/taiwans-greatest-vulnerability-is-its-energy-supply/; and "Taiwan´s Energy Security: Liquefied Natural Gas, Renewables, and the EU," EIAS, June 16, 2021, https://eias.org/publications/op-ed/taiwans-energy-security-liquefied-natural-gas-renewables-and-the-eu/,

Continuing U.S. Strategic Dependence on MENA Oil and Gas Exports?

U.S. “Independence” from a Stable Global Flow of Market-Driven Oil and Gas Imports is Currently a Myth

The Myth of U.S. Energy Independence and the Uncertain Impact of Climate Change

One area that may have less impact than many in the United States believe is the supposed end to U.S. dependence on the secure and stable flow of MENA oil and gas exports. This has led some U.S. planners and analysts to discount the importance of the reliable flow of MENA oil and gas exports the United States. In practice, however, the analysis shows the reality is very different.

Why U.S. "Independence" from the Security and Stability of Global Oil and Gas Imports is a Myth: The first slide summarizes the three key reasons why U.S. energy independence is currently little more than a myth.

Cuts in U.S. Oil Imports from MENA and the Gulf: 1950-2021 shows that net U.S. oil imports dropped to very low levels from and are now offset by U.S. oil gas exports**.**

Projected U.S. Oil "Independence:" 2010-2050 shows EIA estimates that this situation will continue through at least 2050 if the U.S. does not make major shifts in its energy use to deal with carbon emissions and global warming.

OPEC Projection of U.S. Oil and Liquids Supply:" 2021-2025 provides a different view of U.S. energy liquids production, but the text of the source makes it clear that the cause is U.S. environmental policies and efforts to reduce climate change and not limits in U.S. potential production capacity.

OPEC Projection that there will be No Major Increase in U.S. Oil and Liquids Imports from the Middle East and Africa " 2021-2045 shows that OPEC does not project any major increase in U.S. imports from the Middle East through 2045.

U.S. Dependence on Other Oil and Gas Importing Economies in 2020 shows, however, that the United States is a major indirect importer of both oil and gas through its overall balance of trade with Europe, Japan, South Korea, and other states whose ability to produce manufactured goods is dependent on the steady and affordable flow of oil and gas imports whose volume and price depends on the exports from the MENA region.

More importantly, the U.S. economy is highly dependent on the import of manufactured goods from oil and gas importing countries in Europe and Asia. The data in this slide on the overall balance of U.S. trade show that U.S. overall dependence on all types of oil and imports now makes it as indirectly dependent on the flow of MENA exports to U.S. trading partners as it once was on direct oil and gas imports to the U.S.

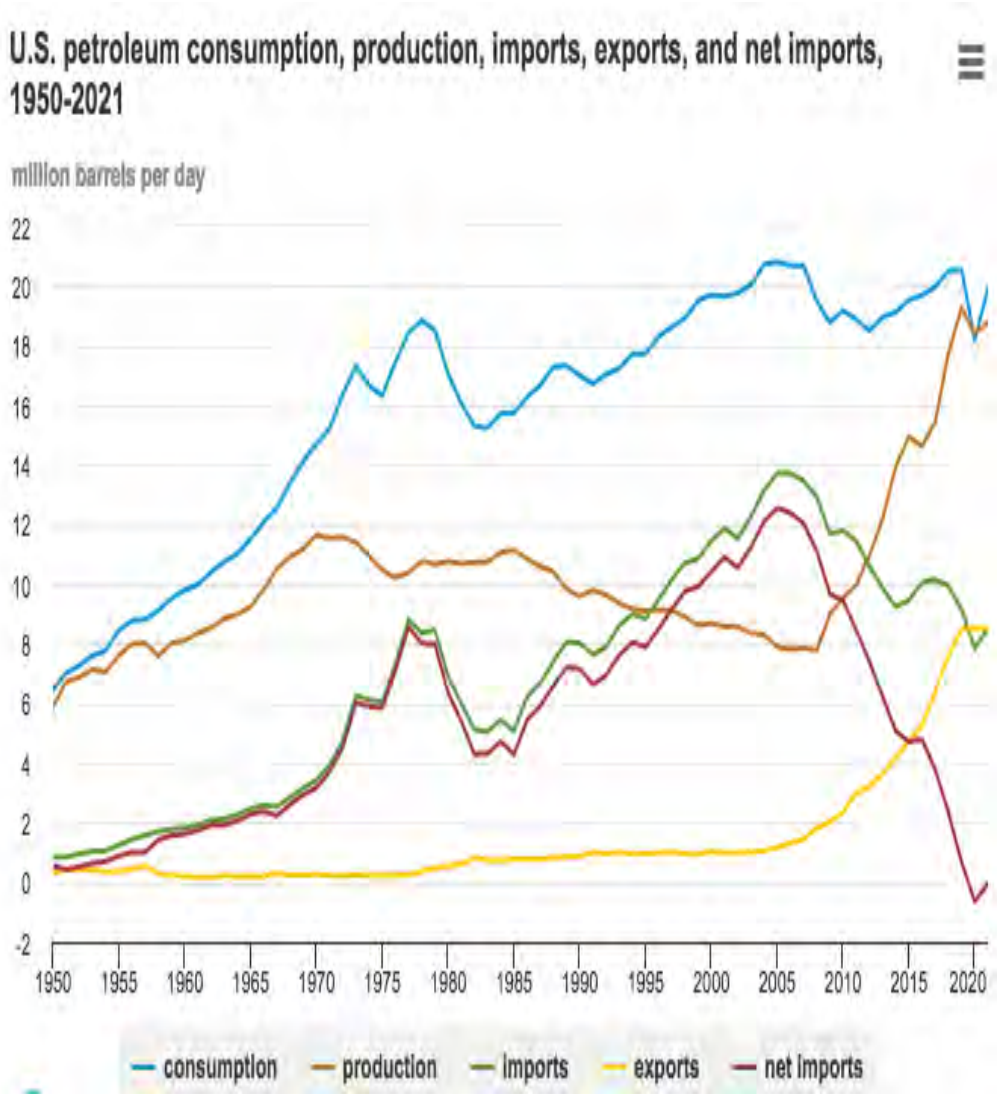
As the OPEC estimates, and other estimates of the impact of global warming on energy supply show, this situation could change radically if the U.S. made a massive investment in alternative fuels, other sources of energy, and energy efficiency/conservation to reduce its emissions and impact on global warming. Once again, the IEA makes such assumptions in its 2022 World Energy Outlook, but such assumptions are highly uncertain.

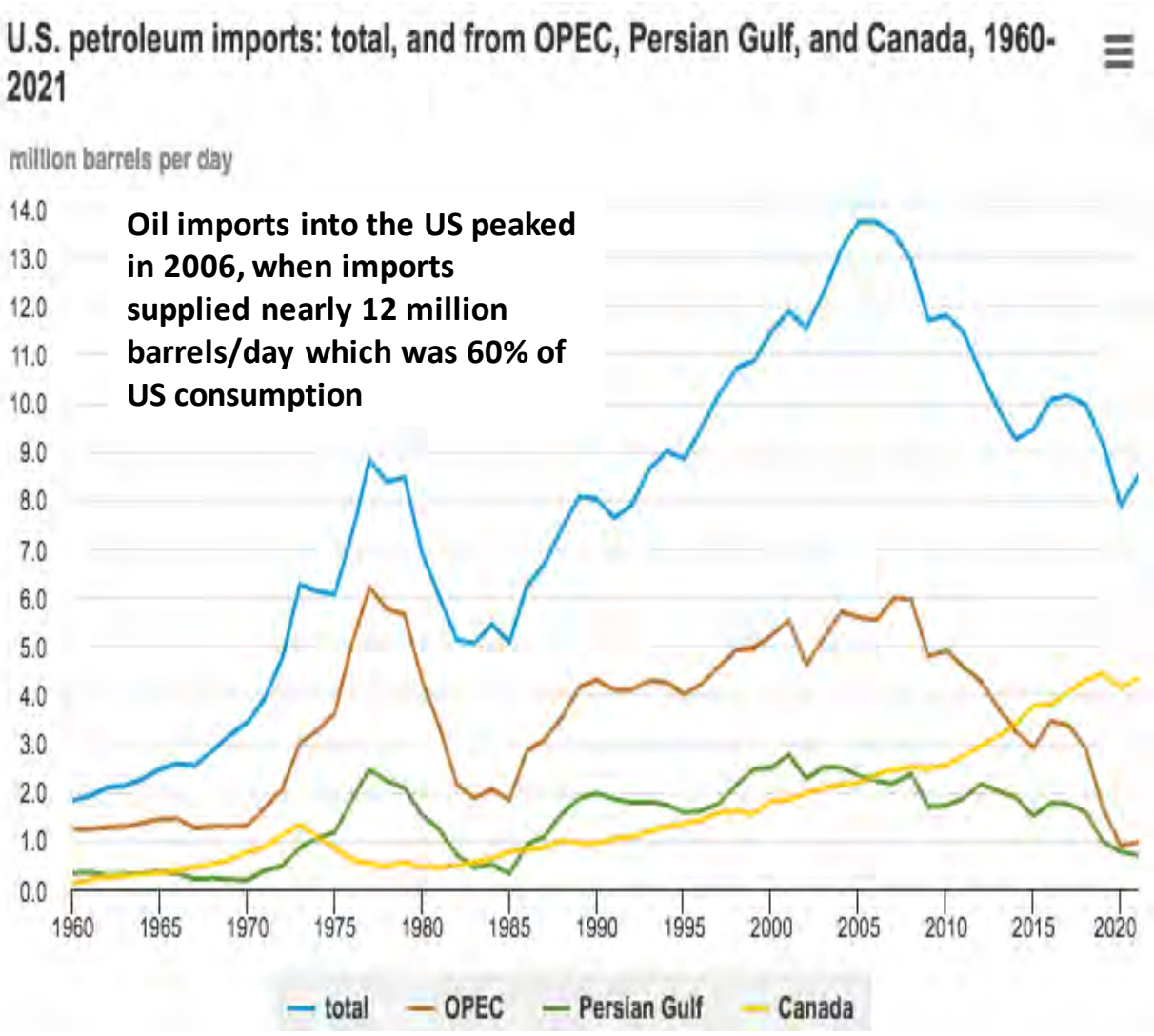
At the same same, the current political realities in the United States, impact of inflations and other economic problems, and competing needs for added investment could place major limits on such U.S. investments in alternative energy supplies and reductions in energy use – as is the case with demand in the EU, most OECD countries, and key Asian consumers like Japan, South Korea and China .

Why U.S. "Independence" from the Security and Stability of Global Oil and Gas Imports is a Myth

- ***The cost of even peak U.S. direct petroleum and gas imports was a fraction of the total value of U.S. trade.***
- ***Halting U.S. direct oil and gas imports has left the U.S. the world's largest importer, and the bulk of its imports of goods come from Asian and European countries that are major oil and gas importers and whose ability to export cheaply is dependent on growing and reliable imports driven by peacetime market prices.***
- ***The U.S. is also one of the world's largest exporters of both goods and services. Most of the nations it exports to have economies dependent on the stable flow of oil and gas exports from other states.***

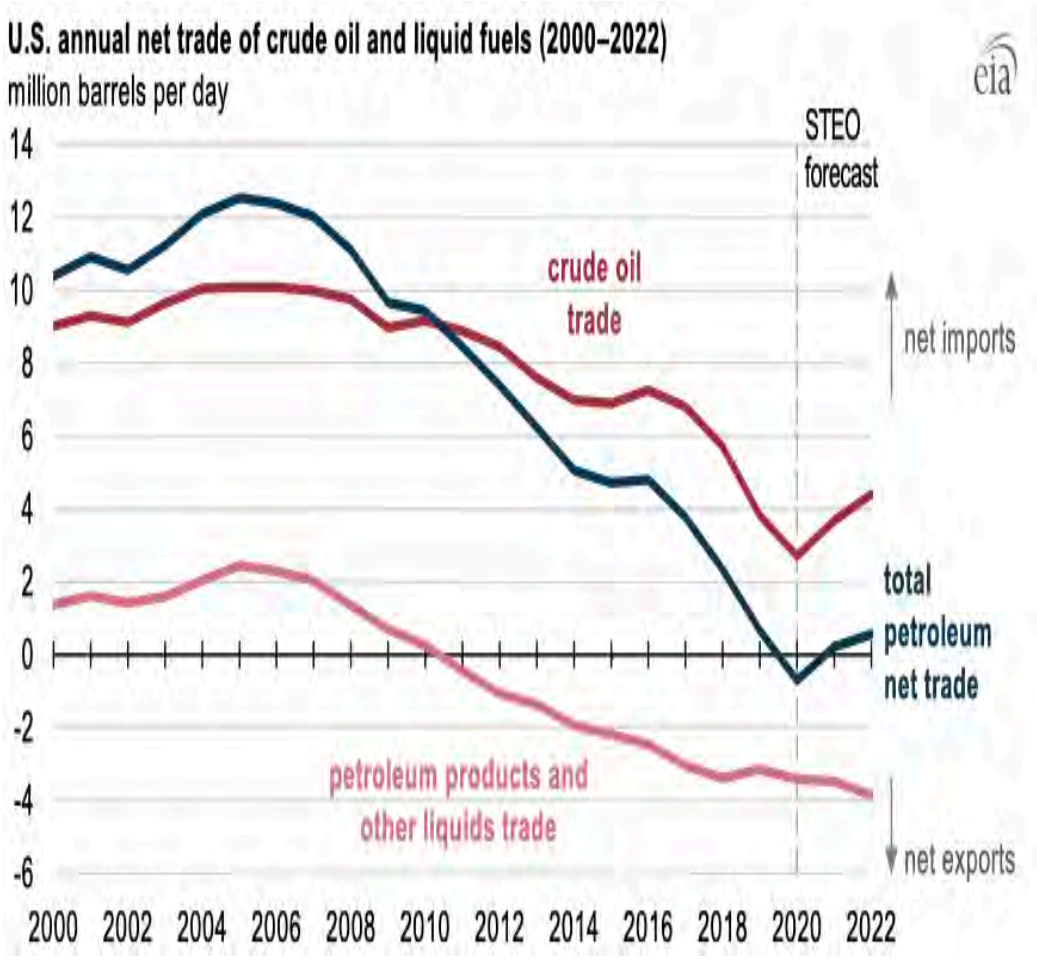
Cuts in U.S. Oil Imports from MENA and the Gulf: 1950-2021

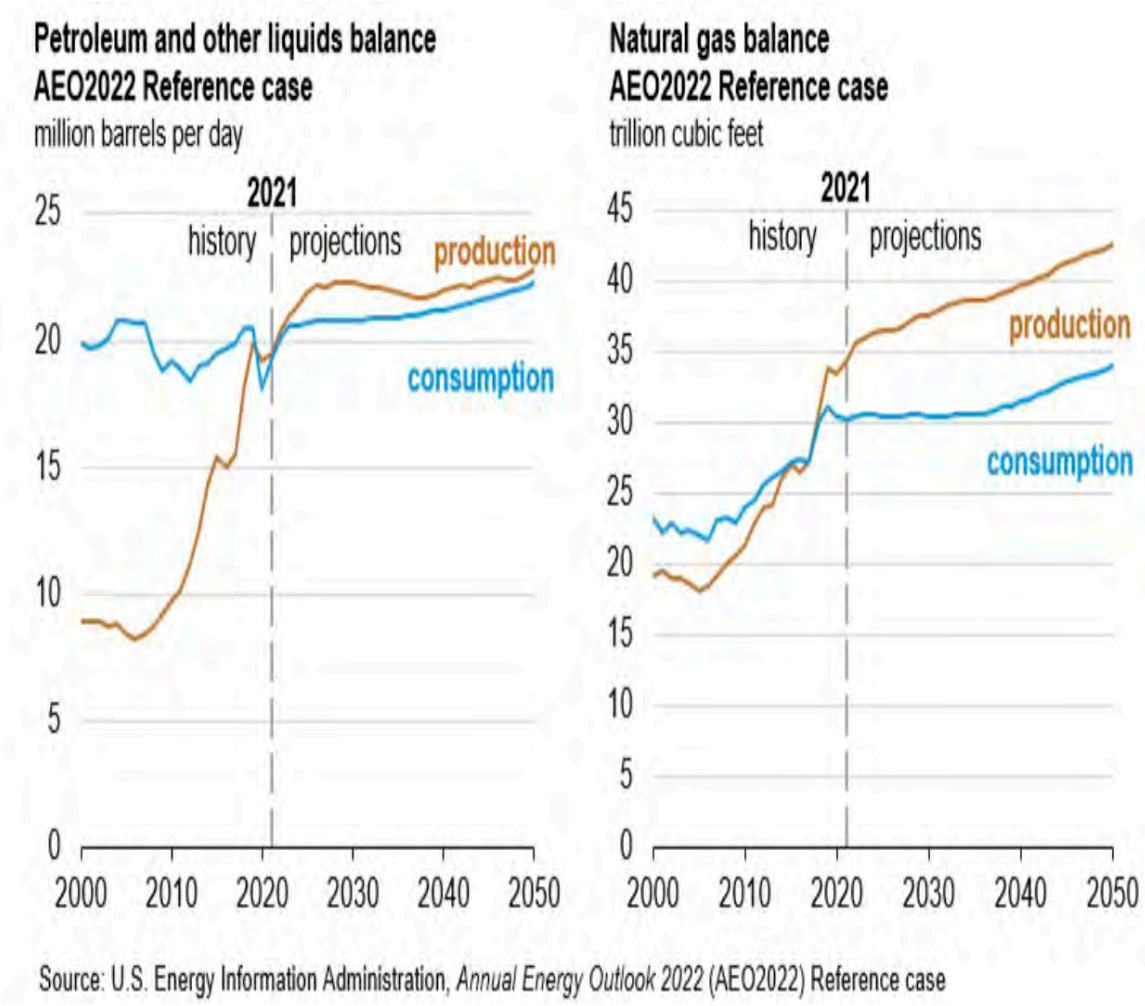




Source: EIA, November 2022, https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php

Projected U.S. Oil "Independence:" 2010-2050

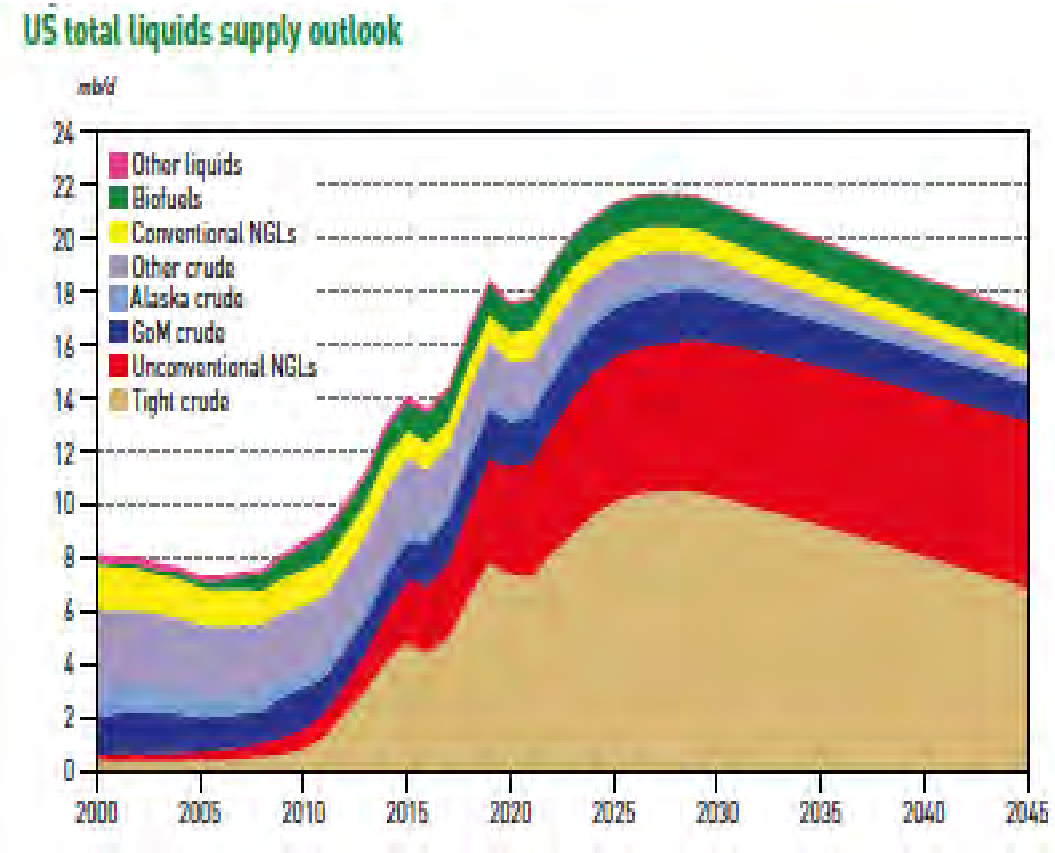




Source: MacIntyre & French, "EIA forecasts the U.S. will import more petroleum than it exports in 2021 and 2022," *Today in Energy*, DOE/EIA, February 17, 2021, https://www.eia.gov/todayinenergy/detail.php?id=46776; and DOE/EIA, *Annual Energy Outlook 2022*, March 3, 2022, https://www.eia.gov/outlooks/aeo/narrative/production/sub-topic-01.php.

OPEC Projection of U.S. Oil and Liquids Supply:" 2021-2025

(Note that reductions are the largely the result of U.S. policy decisions relating to environmental and global warming issues, not drops in potential future energy production capacity)

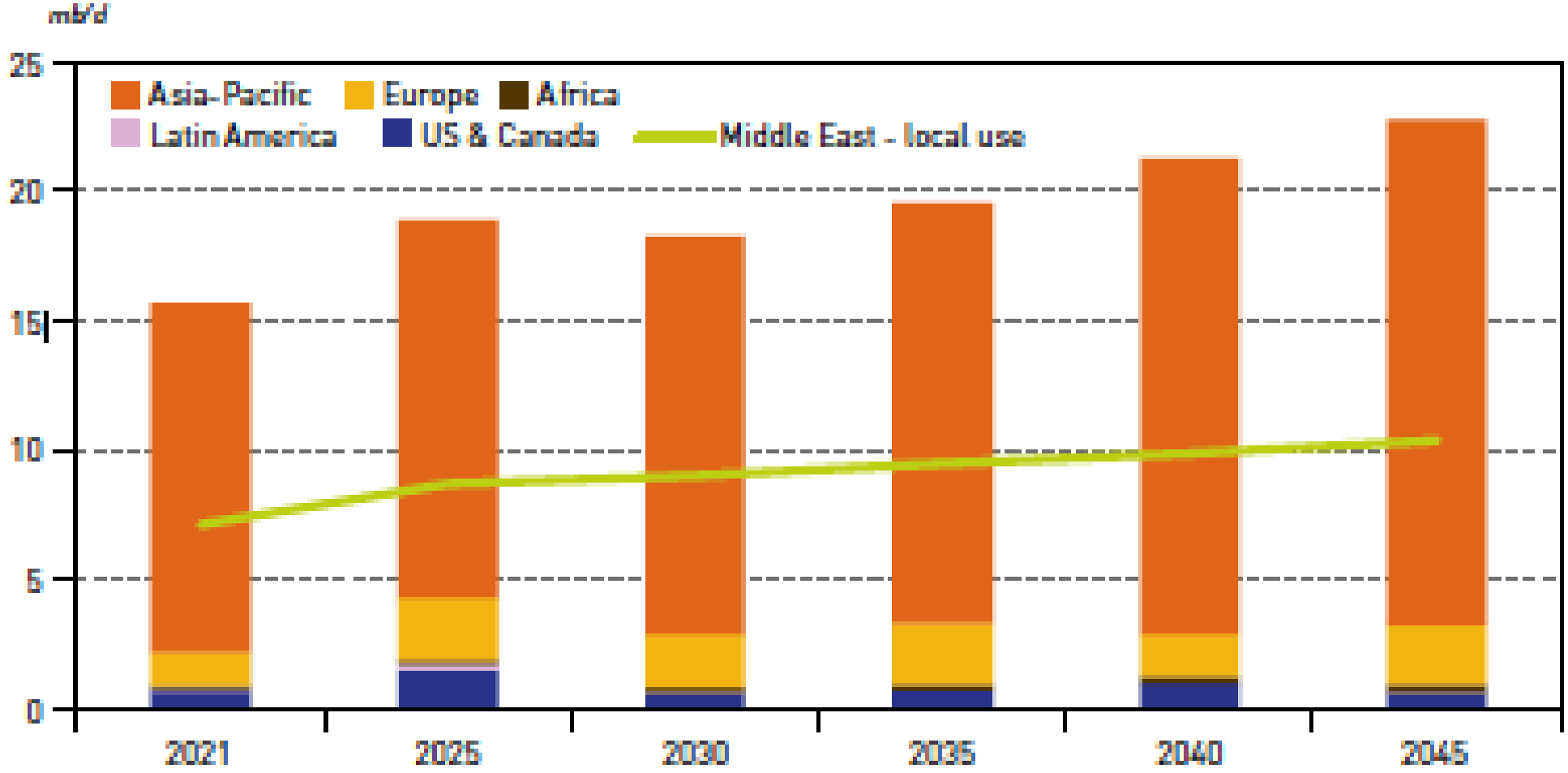


US total liquids supply, 2021–2045 *mb/d*

	2021	2025	2030	2035	2040	2045	Change 2021–2045
US tight oil	11.6	15.5	16.1	15.2	14.2	13.1	1.6
of which: tight crude	*7.3*	*10.1*	*10.3*	*9.2*	*8.1*	*6.9*	*-0.4*
of which: unconventional NGLs	*4.3*	*5.4*	*5.8*	*6.0*	*6.1*	*6.2*	*2.0*
US Gulf of Mexico crude	1.7	1.8	1.8	1.6	1.5	1.4	-0.3
US Alaska crude	0.4	0.4	0.3	0.3	0.2	0.2	-0.3
US other crude	1.8	1.4	0.9	0.7	0.5	0.4	-1.4
US other NGLs	1.1	1.0	0.9	0.8	0.7	0.6	-0.5
US biofuels	1.1	1.2	1.2	1.3	1.3	1.4	0.3
US other liquids	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Memo item: US total crude	*11.2*	*13.7*	*13.4*	*11.8*	*10.3*	*8.9*	*-2.3*
Memo item: US total NGLs	*5.4*	*6.4*	*6.7*	*6.8*	*6.8*	*6.9*	*1.5*
Total US liquids production	**17.8**	**21.3**	**21.3**	**19.9**	**18.5**	**17.2**	**-0.5**

Source: OPEC; *World Energy Outlook, 2022,* https://www.opec.org/opec_web/en/publications/340.htm, *pp. 154-155*

OPEC Projection that there will be No Major Increase in U.S. Oil and Liquids Imports from the Middle East and Africa :" 2021-2025



Source: OPEC; *World Energy Outlook, 2022,* https://www.opec.org/opec_web/en/publications/340.htm, *pp. 154-155*

U.S. Dependence on Other Oil and Gas Importing Economies in 2020

Category	Imports	Exports
Total	$3.1 Trillion	$2.5 Trillion
Capital Goods	$678 billion	$547 billion
Consumer Goods	$654 billion	$206 billion
Industrial Goods	$522 billion	$531 billion
Automotive Goods	$376 billion	$172 billion
Food, Feeds, & Beverages	$151 billion	$131 billion

US Imports

The top imports to the United States are

- Cars: $144 billion
- Computers: $92.4 billion
- Packaged Medical Treatments: $84.1 billion
- Broadcasting Equipment: $82 billion
- Crude Petroleum: $75.1 billion

The Largest Sources of US imports are:

- China: $438 billion
- Mexico: $326 billion
- Canada: $264 billion
- Germany: $116 billion
- Japan: $112 billion

US Exports

The top exports from the United States are:

- Refined Petroleum: $58.4 billion
- Crude Petroleum: $52.3 billion
- Cars: $47.6 billion
- Integrated Circuits: $44.2 billion
- Petroleum Gas: $34.7 billion

The Largest Sources of US imports are:

- Canada: $218 billion
- Mexico: $196 billion
- China: $122 billion
- Japan: $63.1 billion
- Germany: $59.2 billion

Source: Matthew Weber, **U.S. Imports and Exports: Components and Statistics, June 28, 2022,** https://www.thebalancemoney.com/u-s-imports-and-exports-components-and-statistics-3306270.

The MENA Region's Strategic Importance Goes beyond Oil and Gas

The MENA Region's Strategic Importance as a Function of Overall Trading Patterns

While the West tends to focus on the strategic importance of the MENA region as an energy exporter, exports are only part of its strategic importance in terms of trade. The level and nature of MENA country exports is also critical to the stability of the global economy. The MENA countries are cumulatively a major global trading partner, although they again differ radically in their ability to finance imports, and in ways that are largely driven by the income they receive from exports of fossil fuels, rather than their size, population, and needs for development..

- **MENA National Civil Trade Patterns - I** shows how important the region's overall civil imports and exports (which include oil and gas) are to the global economy. As is the case throughout this analysis, this importance varies sharply by MENA country. Algeria, Libya, Tunisia, Egypt, Gaza/West Bank, Jordan, Lebanon, Syria, Iran, Iraq, add Yemen all have major to massive trade deficits.

  Some of data do give a misleading picture of the volume of total trade – particularly in the cases of Algeria, Egypt, Israel, Syria, Iran, Iraq, Qatar, Saudi Arabia, and the UAE – because they do not reflect the cost of arms imports or buying foreign services for military forces and security forces. In some cases, these are a massive part of national imports. Data on such imports are provided in a separate analysis of the strategic importance of security forces, but they have critical limits. While SIPRI provides a useful estimate of the comparative cost of arms imports based on its estimates of the cost of weapons, the U.S. government has cancelled the distribution of its report on *World Military Expenditures and Arms Transfers,* and no commercial or other outside source has high credibility.

- **MENA National Civil Trade Patterns - II** provides a very rough estimates of the content of trade, and key trading partners. This slide is almost certainly valid, however, in showing that outside importers of oil gas often do not "recycle" the cost of their oil and gas exports to the MENA country they export from. They do, however, show China's role as a key exporter to the MENA region

- **Volume of Crude Oil and Petroleum Products Transported Through Major Global Chokepoints and the Cape of Good Hope, 2011-2016 (million b/d)** shows that the MENA region has several of the world's most important maritime chokepoints and that many of its oil and gas exports must pass through other such choke points outside the MENA area.
- **Strategic Importance is a Function of Global Lines of Communication as well as Oil and Gas Exports** highlights the fact that the MENA region is a critical global line of communication for maritime traffic through the Red Sea, Suez, and Strait of Hormuz. It is particularly critical in allow rapid and efficient just in time delivery by large container vessel. It's growing role as an air transit corridor is hard to analysis in statistical terms.
- **Suez Canal and Red Sea, Growing Traffic through the Suez Canal: The "Container Impact, and Suez Sumed and Arab Gas Pipelines** all highlight the growing strategic importance of the Red Sea, Suez Canal, and Sumed pipelines.
- **EIA Map of Routes for Transit of Petroleum Exports: 2016** and **How Middle Eastern Members of OPEC Dominated the Global Flow of Crude Oil in 2021** map the critical importance of MENA trade routes to global oil and gas imports and major trading regions and states.
- **Strait of Hormuz I** and **Strait of Hormuz II** illustrate the critical strategic importance of both the security and stability of oil and gas exports both within and through through the Strait. It is also a critical source of imports of food and other material for some of the world's major oil and gas exporters.

MENA National Civil Trade Patterns - I

Country	Current Account Balance ($US Billions)			Exports ($US Billions)			Imports ($US Billions)		
	2019	2020	2021	2019	2020	2021	2019	2020	2022
Morocco	-4.4	-1.4	-3.2	44.0	37.5	47.1	54.1	46.3	60.0
Algeria	-17.0	-18.2	-4.6	38.6	24.9	41.8	54.3	42.3	44.3
Libya[a]	-11.3	-4.8	-4.8	30.0	29.3	9.5	18.8	25.4	14.3
Tunisia	-3.4	-2.5	-2.8	19.2	16.0	19.7	23.5	19.6	24.3
Egypt	-10.2	14.2	18.6	53.5	40.1	58.3	79.0	72.5	94.0
Israel	14.7	22.5	21.1	117.8	114.4	143.8	108.8	96.0	124.6
Gaza Strip/West Bank	*-1.8*	*-1.9*	*-1.5*	*2.7*	*2.4*	*3.2*	*9.2*	*8.1*	*10.2*
Jordan	-0.8	-2.5	-4.0	16.2	10.4	13.9	22.0	18.4	23.4
Lebanon	-11.3	-3.0	-3.0	18.2	8.8	10.1	31.1	15.2	17.4
Syria[b]	-2.1	-2.1	-	1.7	1.9	-	5.5	6.3	-
Bahrain[c]	-1.5	-1.6	-2.4	-	26.8	30.1	-	23.9	27.2
Iran[b]	16.3	9.5	-	84.0	101.4	-	63.1	76.4	-
Iraq	15.8	-6.2	24.6	88.9	50.6	78.3	72.3	54.7	50.7
Kuwait[d]	30.3	22.0	34.9	72.8	47.4	77.1	59.7	44.0	49.0
Oman	-4.0	-12.3	-4.3	43.6	35.7	46.3	32.6	34.0	36.5
Qatar	4.3	-3.0	26.3	92.0	70.9	105.5	66.8	59.1	61.2
Saudi Arabia	38.2	-22.8	44.3	285.9	182.8	286.5	218.9	182.2	213.0
UAE[b]	13.2	26.5	-	298.6	308.5	-	226.5	229.2	-
Yemen[b]	-1.9	-2.4	-	0.9	0.4	-	3.1	4.1	-

[a] Data are for 2018, 2019, 2020. [b] Data are for 2016 and 2017. [c] Data are for 2016, 2017, 2018. [d] Data for imports and exports are in current year dollars.

Source: CIA "Country Data," *World Factbook*, accessed 19.1.2023, https://www.cia.gov/the-world-factbook/countries/ye[illegible]

MENA National Civil Trade Patterns - II

Morocco
Exports
- Partners: Spain 23%, France 19% (2019)
- Commodities: cars, insulated wiring, fertilizers, phosphoric acid, clothing and apparel (2019)

Imports
- Partners: Spain 19%, France 11%, China 9%, United States 7%, Germany 5%, Turkey 5%, Italy 5% (2019)
- Commodities: refined petroleum, cars and vehicle parts, natural gas, coal, low-voltage protection equipment (2019)

Algeria
Exports
- Partners: Italy 13%, France 13%, Spain 12%, United States 7%, United Kingdom 7%, India 5%, South Korea 5% (2019)
- Commodities: refined petroleum, wheat, packaged medical supplies, milk, vehicle parts (2019)

Imports
- Partners: China 18%, France 14%, Italy 8%, Spain 8%, Germany 5%, Turkey 5% (2019)
- Commodities: refined petroleum, wheat, packaged medical supplies, milk, vehicle parts (2019)

Libya
Exports
- Partners: Italy 18%, China 16%, Germany 15%, Spain 15%, United Arab Emirates 6%, France 6%, United States 5% (2019)
- Commodities: crude petroleum, natural gas, gold, refined petroleum, scrap iron (2019)

Imports
- Partners: China 16%, Turkey 14%, Italy 9%, United Arab Emirates 9%, Egypt 5% (2019)
- Commodities: refined petroleum, cars, broadcasting equipment, cigarettes, jewelry (2019)

Tunisia
Exports
- Partners: France 29%, Italy 17%, Germany 13% (2019)
- Commodities: insulated wiring, clothing and apparel, crude petroleum, olive oil, vehicle parts (2019)

Imports
- Partners: France 17%, Italy 16%, Germany 8%, China 8%, Algeria 7% (2019)
- Commodities: refined petroleum, natural gas, low-voltage protection equipment, cars, insulated wiring (2019)

Egypt
Exports
- Partners: United States 9%, United Arab Emirates 6%, Italy 6%, Turkey 6%, Saudi Arabia 6%, India 5% (2019)
- Commodities: crude petroleum, refined petroleum, gold, natural gas, fertilizers (2019)

Imports
- Partners: China 15%, Russia 7%, United States 6%, Saudi Arabia 6%, Germany 5%, Turkey 5% (2019)
- Commodities: refined petroleum, wheat, crude petroleum, cars, packaged medicines (2019)

Israel
Exports
- Partners: United States 26%, China 9%, United Kingdom 7% (2020)
- Commodities: diamonds, packaged medicines, medical instruments, integrated circuits, refined petroleum (2019)

Imports
- Partners: United States 12%, China 11%, Germany 7.5%, Switzerland 7%, Turkey 6% (2020)
- Commodities: diamonds, cars, crude petroleum, refined petroleum, broadcasting equipment (2019)

Gaza
Exports
- Partners: NA
- Commodities: strawberries, carnations, vegetables, fish (small and irregular shipments permitted to transit the Israeli-controlled Kerem Shalom crossing)

Imports
- Partners: NA
- Commodities: food, consumer goods, fuel

West Bank
Exports
- Partners: NA
- Commodities: stone, olives, fruit, vegetables, limestone

Imports
- Partners: NA
- Commodities: food, consumer goods, construction materials, petroleum, chemicals

Jordan
Exports
- Partners: United States 21%, Saudi Arabia 13%, India 8%, Iraq 7%, United Arab Emirates 5%, China 5% (2019)
- Commodities: fertilizers, calcium phosphates, packaged medicines, clothing and apparel, phosphoric acid (2019)

Imports
- Partners: China 17%, Saudi Arabia 15%, United States 6%, United Arab Emirates 6%, Egypt 5%, India 5% (2019)
- Commodities: cars, refined petroleum, natural gas, crude petroleum, clothing and apparel (2019)

Lebanon
Exports
- Partners: Switzerland 27%, United Arab Emirates 15%, South Korea 11%, Saudi Arabia 7%, Kuwait 6% (2019)
- Commodities: gold, jewelry, shotguns, diamonds, scrap copper (2019)

Imports
- Partners: United Arab Emirates 11%, China 10%, Italy 8%, Greece 8%, Turkey 7%, United States 6% (2019)
- Commodities: refined petroleum, cars, packaged medicines, jewelry, gold (2019)

Syria
Exports
- Partners: Saudi Arabia 23%, Turkey 18%, Egypt 14%, United Arab Emirates 8%, Jordan 7%, Kuwait 5% (2019)
- Commodities: olive oil, cumin seeds, pistachios, tomatoes, apples, pears, spices, pitted fruits (2019)

Imports
- Partners: Turkey 27%, China 22%, United Arab Emirates 14%, Egypt 5% (2019)
- Commodities: cigarettes, broadcasting equipment, wheat flours, sunflower oil, refined petroleum (2019)

Bahrain

Exports
- Partners: United Arab Emirates 31%, Saudi Arabia 12%, Japan 8%, United States 8% (2019)
- Commodities: refined petroleum, aluminum and plating, crude petroleum, iron ore, gold (2019)

Imports
- Partners: United Arab Emirates 27%, China 11%, Saudi Arabia 7%, United States 5%, Brazil 5%, Japan 5%, India 5% (2(
- Commodities: cars, iron ore, jewelry, gold, gas turbines (2019)

Iran

Exports
- Partners: China 48%, India 12%, South Korea 8%, Turkey 6%, United Arab Emirates 5% (2019)
- Commodities: crude petroleum, polymers, industrial alcohols, iron, pistachios (2019)

Imports
- Partners: China 28%, United Arab Emirates 20%, India 11%, Turkey 7%, Brazil 6%, Germany 5% (2019)
- Commodities: rice, corn, broadcasting equipment, soybean products, beef (2019)

Iraq

Exports
- Partners: China 26%, India 24%, South Korea 9%, United States 8%, Italy 6%, Greece 6% (2019)
- Commodities: crude petroleum, refined petroleum, gold, dates, petroleum coke (2019)

Imports
- Partners: United Arab Emirates 28%, Turkey 21%, China 19% (2019)
- Commodities: refined petroleum, broadcasting equipment, cars, jewelry, cigarettes (2019)

Kuwait

Exports
- Partners: China 20%, South Korea 16%, India 15%, Japan 10%, Taiwan 6%, Vietnam 5% (2019)
- Commodities: crude petroleum, refined petroleum, aircraft, natural gas, industrial hydrocarbon products (2019)

Imports
- Partners: China 14%, United Arab Emirates 12%, United States 10%, Saudi Arabia 6%, Japan 6%, Germany 5%, India 5%
- Commodities: cars, broadcasting equipment, natural gas, packaged medicines, jewelry (2019)

Oman

Exports
- Partners: China 46%, India 8%, Japan 6%, South Korea 6%, United Arab Emirates 6%, Saudi Arabia 5% (2019)
- Commodities: crude petroleum, natural gas, refined petroleum, iron products, fertilizers (2019)

Imports
- Partners: United Arab Emirates 36%, China 10%, Japan 7%, India 7%, United States 5% (2019)
- Commodities: cars, refined petroleum, broadcasting equipment, gold, iron (2019)

Qatar

Exports
- Partners: Japan 17%, South Korea 16%, India 14%, China 13%, Singapore 7% (2019)
- Commodities: natural gas, crude petroleum, refined petroleum, ethylene polymers, fertilizers (2019)

Imports
- Partners: United States 15%, France 13%, United Kingdom 9%, China 9%, Germany 5%, Italy 5% (2019)
- Commodities: United States 15%, France 13%, United Kingdom 9%, China 9%, Germany 5%, Italy 5% (2019)

Saudi Arabia

Exports
- Partners: China 20%, India 11%, Japan 11%, South Korea 9%, United States 5% (2019)
- Commodities: crude petroleum, refined petroleum, polymers, industrial alcohols, natural gas (2019)

Imports
- Partners: China 18%, United Arab Emirates 12%, United States 9%, Germany 5% (2019)
- Commodities: cars, broadcasting equipment, refined petroleum, packaged medicines, telephones (2019)

UAE

Exports
- Partners: India 11%, Japan 10%, Saudi Arabia 7%, Switzerland 6%, China 6%, Iraq 6% (2019)
- Commodities: crude petroleum, refined petroleum, gold, jewelry, broadcasting equipment (2019)

Imports
- Partners: China 15%, India 12%, Untied States 7% (2019)
- Commodities: gold, broadcasting equipment, jewelry, refined petroleum, diamonds (2019)

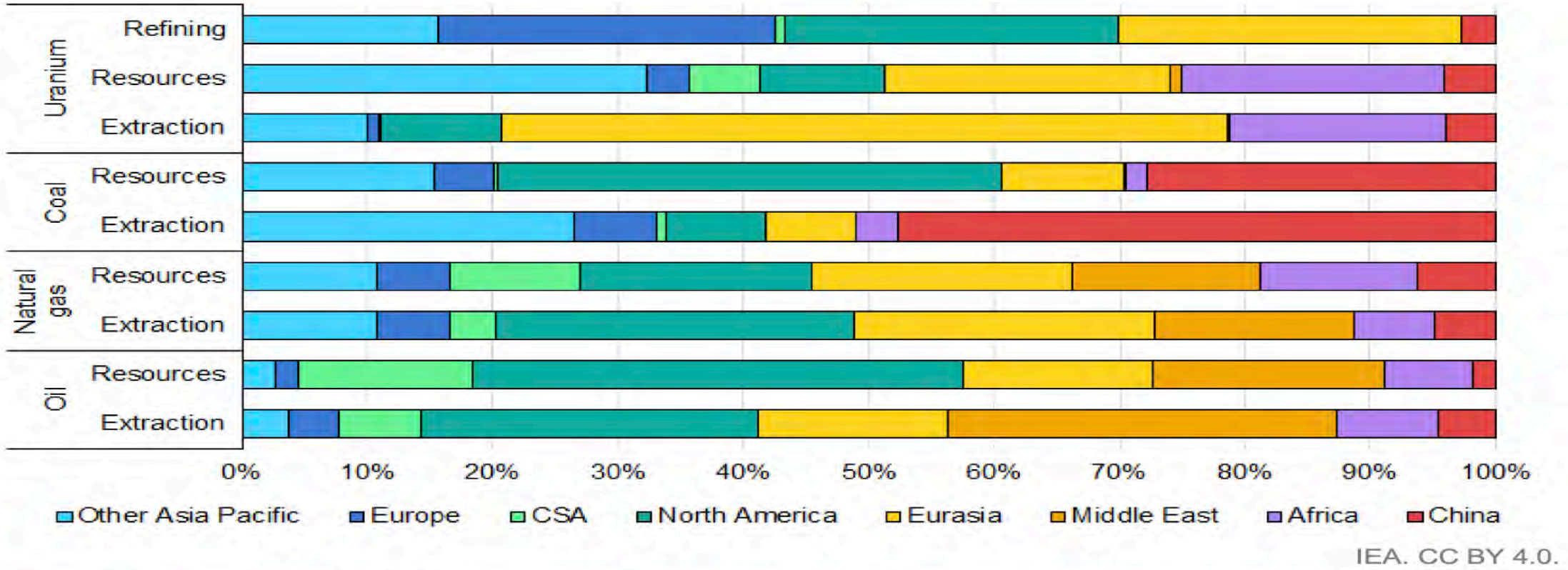
Yemen

Exports
- Partners: China 53%, Saudi Arabia 10%, United Arab Emirates 7%, Australia 5% (2019)
- Commodities: crude petroleum, gold, fish, industrial chemical liquids, scrap iron (2019)

Imports
- Partners: China 25%, Turkey 10%, United Arab Emirates 9%, Saudi Arabia 8%, India 7% (2019)
- Commodities: wheat, refined petroleum, iron, rice, cars (2019)

Source: CIA "Country Data," *World Factbook*, accessed 19.1.2023, https://www.cia.gov/the-world-factbook/countries.

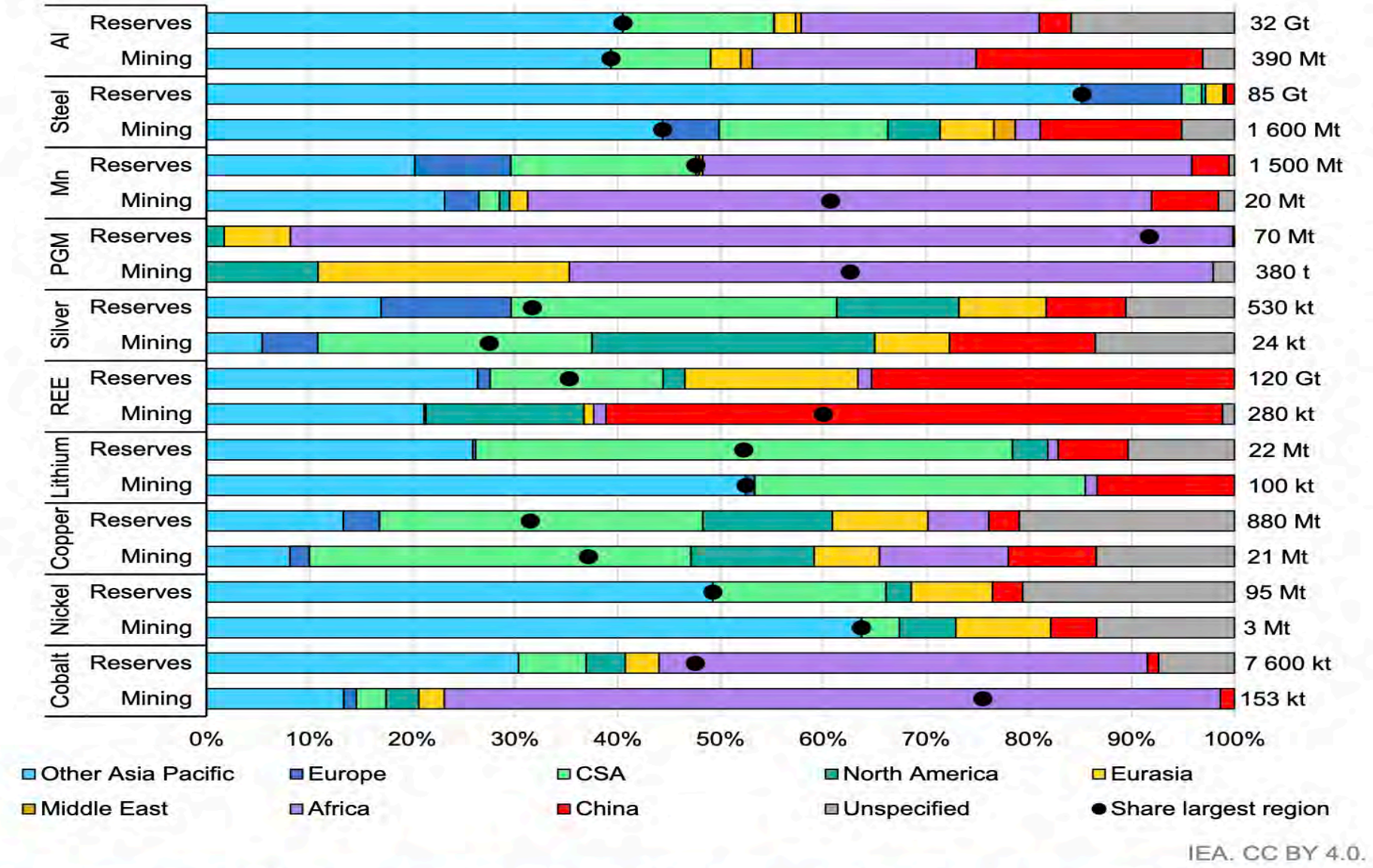
Importance of MENA Fossil Fuel Resources vs. Other Critical Materials: Part One - Energy Resources



Notes: CSA = Central and South America. Uranium resources are identified uranium resources assuming an international market price of USD 130/kg. Fossil fuel resources consider the remaining technically recoverable resources.
Sources: IEA analysis based on IEA data; WISE Uranium Project (2020).

IEA, *Energy Technology Perspectives 2023*, p.86, https://iea.blob.core.windows.net/assets/a86b480e-2b03-4e25-bae1-da1395e0b620/EnergyTechnologyPerspectives2023.pdf

Importance of MENA Fossil Fuel Resources vs. Other Critical Materials: Part Two – Critical Materials

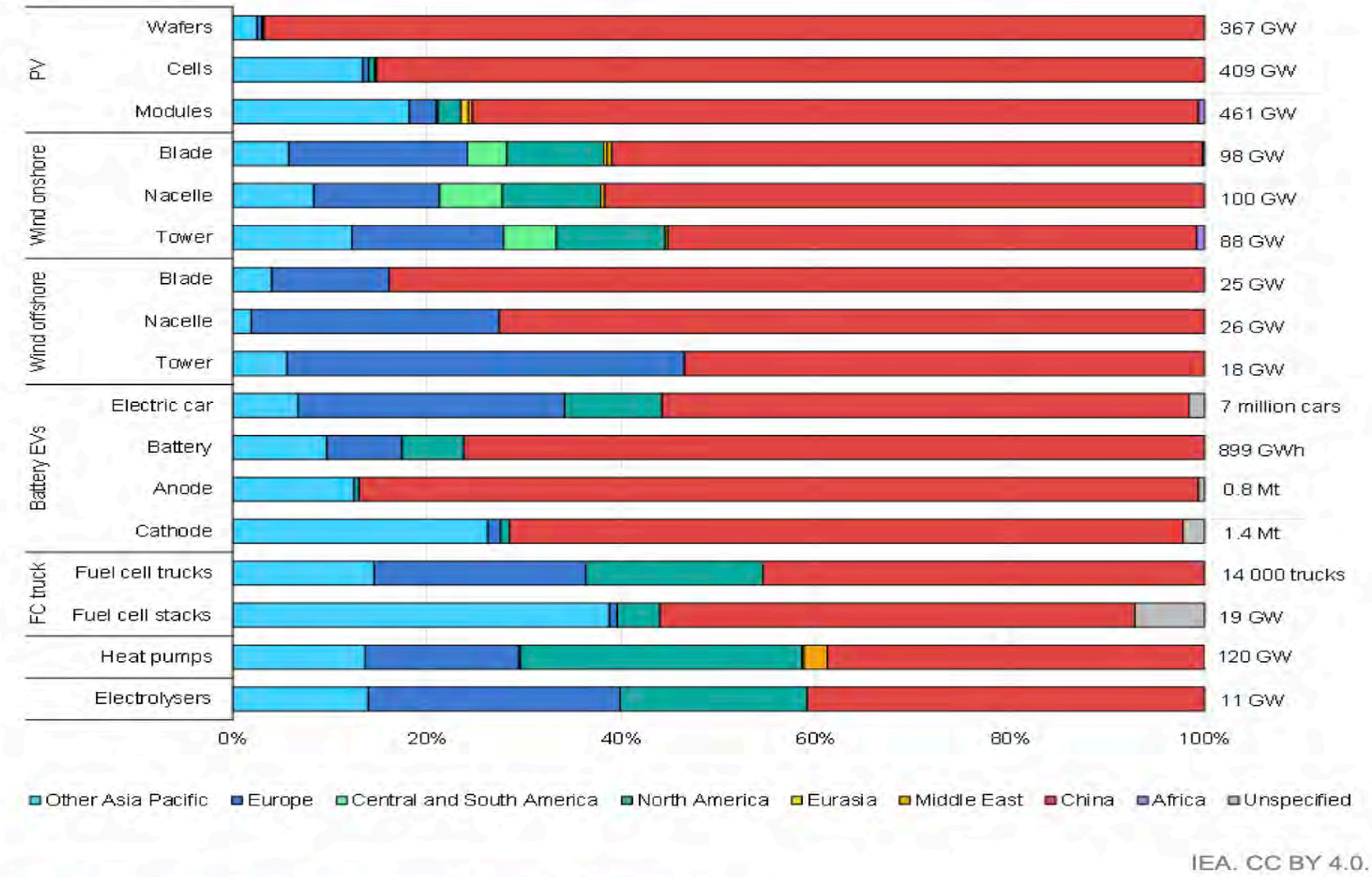


Notes: Al = aluminium; Mn = manganese; PGM = platinum group metals; REE = rare earth elements; CSA = Central and South America. PGM mining includes only platinum and iridium. Reserves data are uncertain as companies and countries do not always disclose their full reserves.

Sources: IEA analysis based on USGS (2022); S&P Global (2022a).

IEA, *Energy Technology Perspectives 2023*, p.87, https://iea.blob.core.windows.net/assets/a86b480e-2b03-4e25-bae1-da1395e0b620/EnergyTechnologyPerspectives2023.pdf

Importance of MENA Fossil Fuel Resources vs. Other Critical Materials: Part Three – Mass Manufacturing Capacity for Clean Energy Resources



Notes: FC = fuel cell. Heat pumps capacity refers to thermal output.
Sources: IEA analysis based on InfoLink (2022); BNEF (2022); BNEF (2021b); Benchmark Mineral Intelligence (2022); GRV (2022); UN (2022a); Wood Mackenzie (2022).

IEA, *Energy Technology Perspectives 2023*, p.87, https://iea.blob.core.windows.net/assets/a86b480e-2b03-4e25-bae1-da1395e0b620/EnergyTechnologyPerspectives2023.pdf

Strategic Importance is a Function of Global Lines of Communication as Well as Oil and Gas Exports

There are two other areas where the Middle East and North Africa have a broad strategic impact on the rest of the world. One is that it acts a key global line of communication through the Red Sea and the Suez Canal and pipeline, the Strait of Hormuz, and increasing air traffic between east and west, as well as has a strategic impact on the Mediterranean and Indian Ocean. The other is its current and potential impact on population migration.

The following slides show that the Red Sea and Suez Canal, and Strait of Hormuz, are two of the world's most important maritime chokepoints. The Red Sea and Suez Canal are becoming steadily more important maritime shipping routes, as well as routes for moving oil and gas supplies to Europe. The expansion of the Suez Canal has increased its capacity to handle the large container vessels – a critical aspect of shipping in meeting increased dependence on the efficient and quickly delivery of components and goods in global trade.

They also show the critical importance of the Strait of Hormuz to the efficient ship of oil and gas – a role that will become steadily more important through at least 2050 unless the effort to limit global warming leads to far more serious cuts in oil and gas use in spite of Asia's need for more energy.

Here, it should be noted that although the U.S. is far less dependent on oil and gas imports, it it is still become more and more dependent on imports of manufactured goods from nations in Europe, and like Japan and South Korea, and Taiwan that remain critically dependent on MENA oil and gas imports. In practical terms, the U.S. is remains dependent on the successful movement of oil and gas to its trading partners, and its energy independence is a myth.

Volume of Crude Oil and Petroleum Products Transported Through Global Chokepoints and the Cape of Good Hope, 2011-2016 (million b/d)

Location	2011	2012	2013	2014	2015	2016
Strait of Hormuz	17.0	16.8	16.6	16.9	17.0	18.5
Strait of Malacca	14.5	15.1	15.4	15.5	15.5	16.0
Suez Canal and SUMED Pipeline	3.8	4.5	4.6	5.2	5.4	5.5
Bab el-Mandab	3.3	3.6	3.8	4.3	4.7	4.8
Danish Straits	3.0	3.3	3.1	3.0	3.2	3.2
Turkish Straits	2.9	2.7	2.6	2.6	2.4	2.4
Panama Canal	0.8	0.8	0.8	0.9	1.0	0.9
Cape of Good Hope	4.7	5.4	5.1	4.9	5.1	5.8
World maritime oil trade	**55.5**	**56.4**	**56.5**	**56.4**	**58.9**	**n/a**
World total petroleum and other liquids supply	**88.8**	**90.8**	**91.3**	**93.8**	**96.7**	**97.2**

Note: Data for Panama Canal are by fiscal year.

Sources: U.S. Energy Information Administration analysis based on Lloyd's List Intelligence, Panama Canal Authority, Argus FSU, Suez Canal Authority, GTT, BP Statistical Review of World Energy, IHS Waterborne, Oil and Gas Journal, and UNCTAD, using EIA conversion factors.[4]

Source: https://www.eia.gov/international/content/analysis/special_topics/World_Oil_Transit_Chokepoints/images/figure1.png

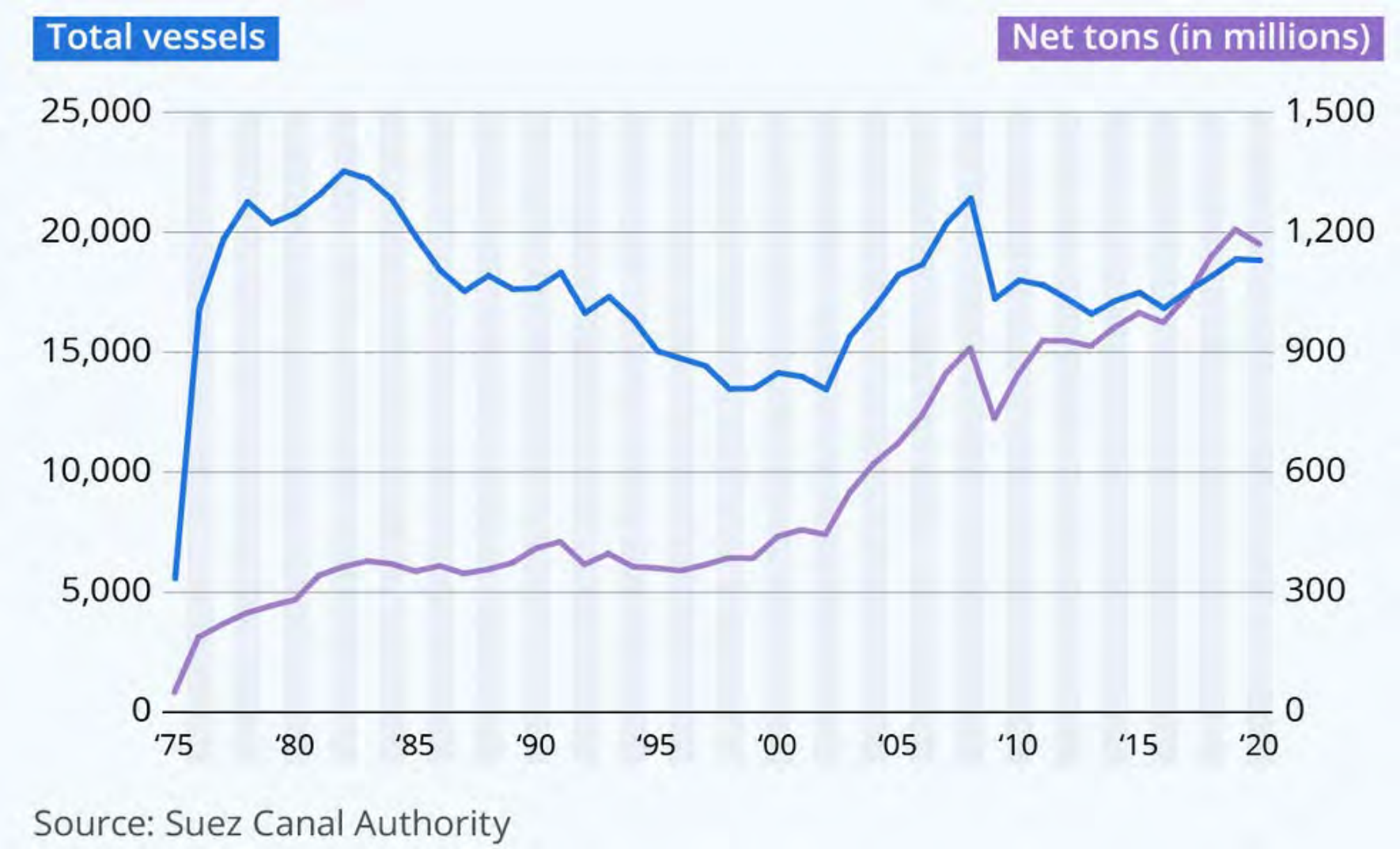
Suez Canal and Red Sea

Sources: https://www.google.com/search?client=firefox-b-1-d&q=Map+of+Red+Sea+%26+Suez+Canal#imgrc=v60Ss6LtZFxqrM, and https://en.wikipedia.org/wiki/Red_Sea.

Growing Traffic through the Suez Canal: The "Container Impact"

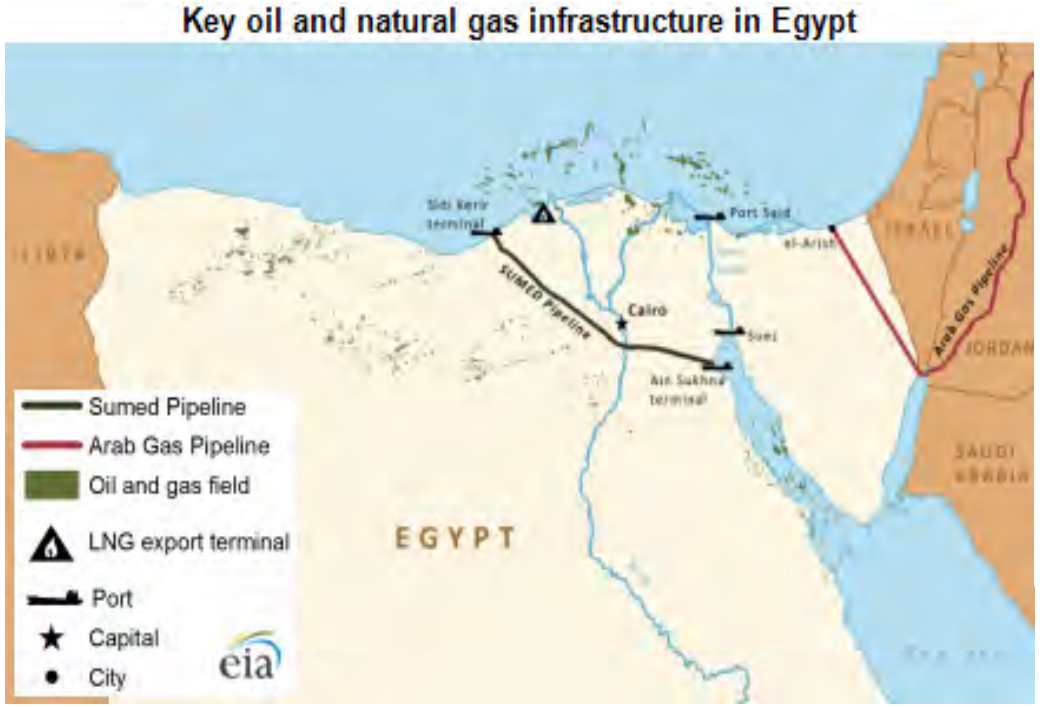
Suez Canal made its highest monthly revenue ever in April 2022 with $629 million. The canal's navigation had seen the transit of 1,929 ships that month, compared to 1,814 ships in April 2021 — a difference of 115 ships and a 6.3% increase. Also, 114.5 million net tons were carried throughout the canal — the largest monthly tonnage in the canal's history

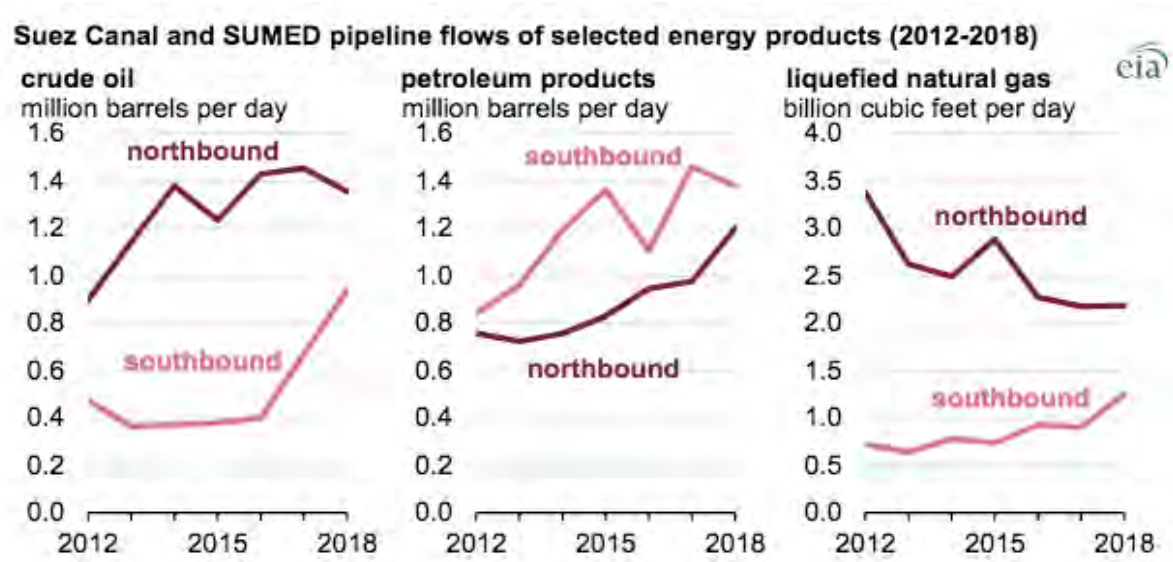
Read more:

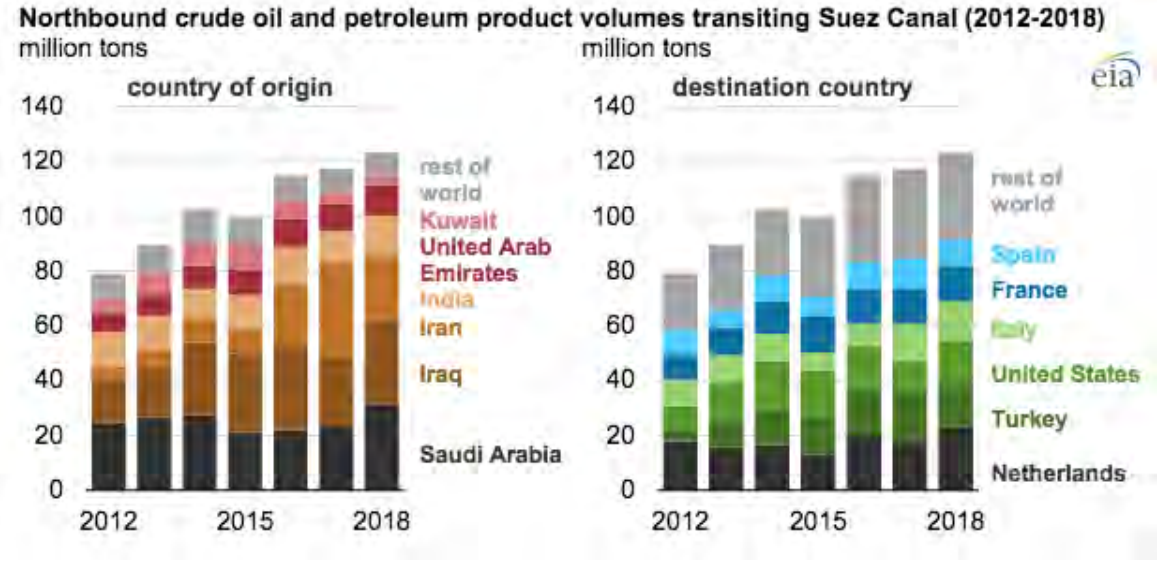


Source: Statista, "Evolution of Traffic Transiting the Suez Canal," https://cdn.statcdn.com/Infographic/images/normal/24511.jpeg; and Azza Guergues. "Ukraine war drives more traffic to Egypt's Suez Canal, increasing revenues," Al Monitor, May 14, 2022. : https://www.al-monitor.com/originals/2022/05/ukraine-war-drives-more-traffic-egypts-suez-canal-increasing-revenues#ixzz7nfedax5J https://www.al-monitor.com/originals/2022/05/ukraine-war-drives-more-traffic-egypts-suez-canal-increasing-revenues#ixzz7nfeNGbJ4.

Suez Sumed and Arab Gas Pipelines



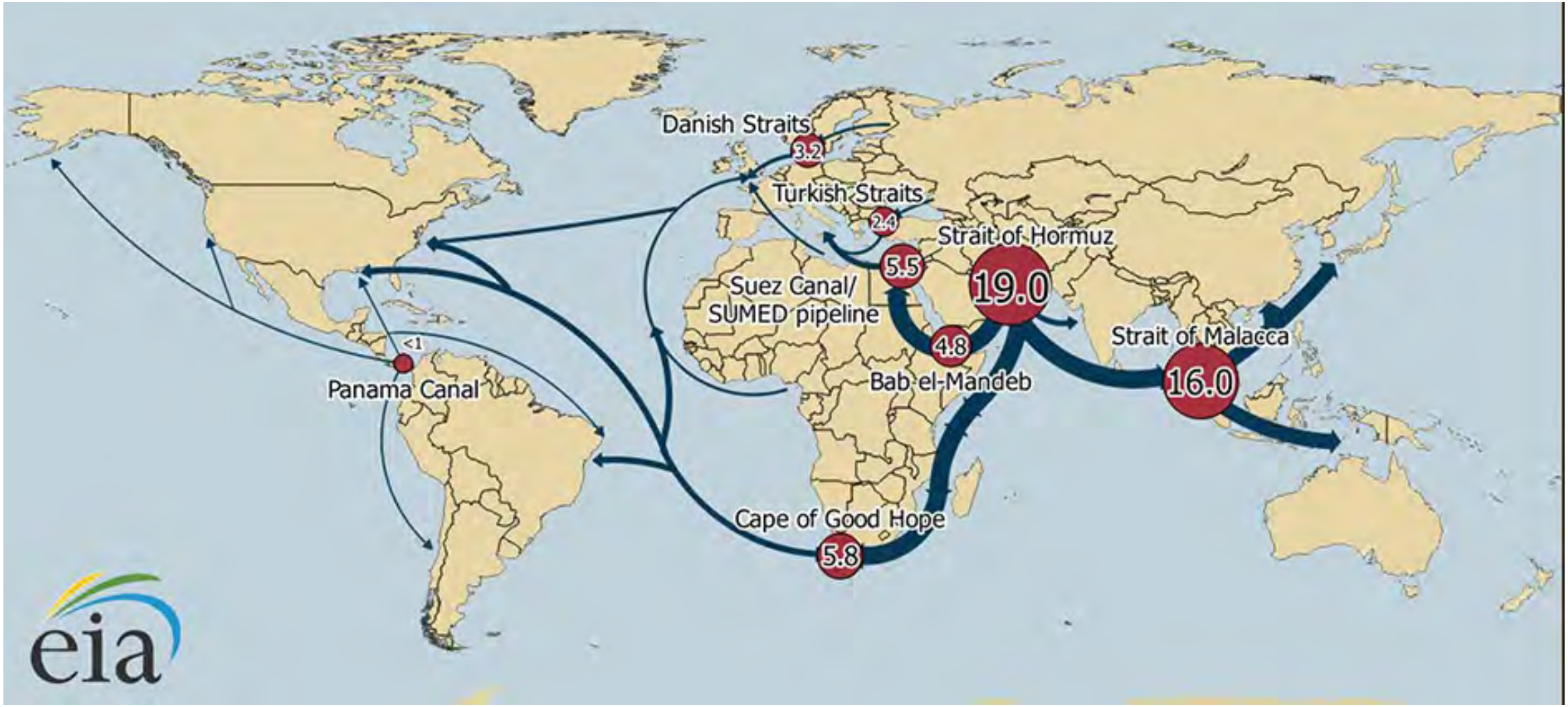




The Suez Canal and Sumed Pipeline are important routes for shipping both oil and natural gas, and their importance may increase with the added production of natural gas in the eastern Mediterranean, and if the reductions in Russian exports continue to make Europe more dependent on imports from the MENA region

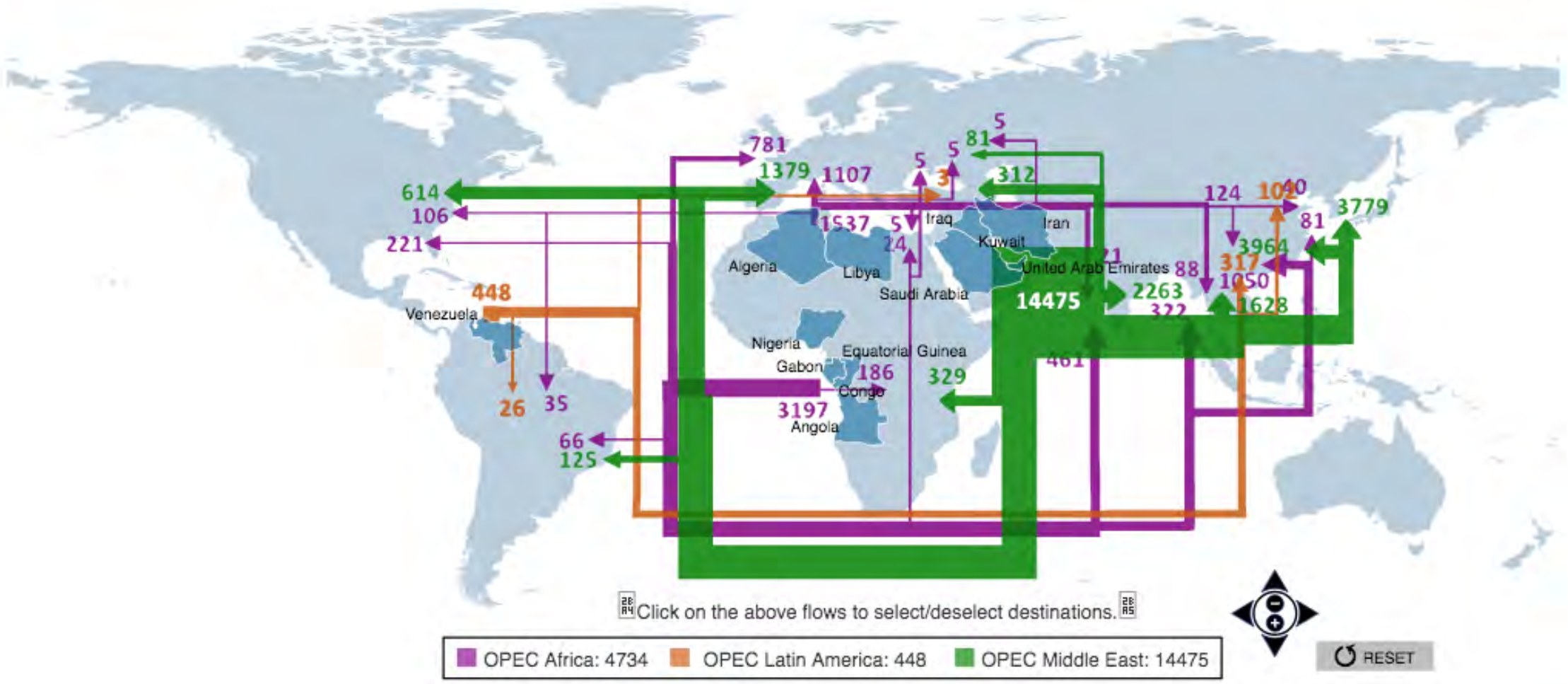
Source: EIA and NRG Edge, "TODAY IN ENERGY: The Suez Canal and SUMED Pipeline are critical chokepoints for oil and natural gas trade, July 24, 2019," https://www.nrgedge.net/article/1563944717-today-in-energy-the-suez-canal-and-sumed-pipeline-are-critical-chokepoints-for-oil-and-natural-gas-trade."

EIA Map of Routes for Transit of Petroleum Exports : 2016



Source: https://www.eia.gov/international/content/analysis/special_topics/World_Oil_Transit_Chokepoints/images/figure1.png

How Middle Eastern Members of OPEC Dominated the Global Flow of Crude Oil in 2021



Source: OPEC, *OPEC Annual Statistical Bulletin 2022*, 14.12.22, https://asb.opec.org/ASB_Maps.html.

Strait of Hormuz - I

Source: U.S. State Department, https://www.eia.gov/international/analysis/special-topics/World_Oil_Transit_Chokepoints

Straight of Hormuz-II

The Strait of Hormuz, located between Oman and Iran, connects the Persian Gulf with the Gulf of Oman and the Arabian Sea. The Strait of Hormuz is the world's most important oil chokepoint because of the large volumes of oil that flow through the strait. In 2018, its daily oil flow averaged 21 million barrels per day (b/d), or the equivalent of about 21% of global petroleum liquids consumption.

Chokepoints are narrow channels along widely used global sea routes that are critical to global energy security. The inability of oil to transit a major chokepoint, even temporarily, can lead to substantial supply delays and higher shipping costs, resulting in higher world energy prices.

Although most chokepoints can be circumvented by using other routes that add significantly to transit time, some chokepoints have no practical alternatives.

Volumes of crude oil, condensate, and petroleum products transiting the Strait of Hormuz have been fairly stable since 2016, when international sanctions on Iran were lifted and Iran's oil production and exports returned to pre-sanctions levels. Flows through the Strait of Hormuz in 2018 made up about one-third of total global seaborne traded oil.

Source: EIA and https://www.geographicguide.com/asia/maps/strait-hormuz.htm

Migration and the Strategic Importance of the MENA region

Migration is also key aspect of the MENA region's strategic importance. Its wealthiest oil exporters import massive amounts of labor from South Asia and other regions, and its poorer and more violent states have been the source of major flows of refugees and migrants to Europe and the West, especially since the cycles of violence that began with the Arab spring.

The following two slides summarizes these patterns of migration through October 2022:

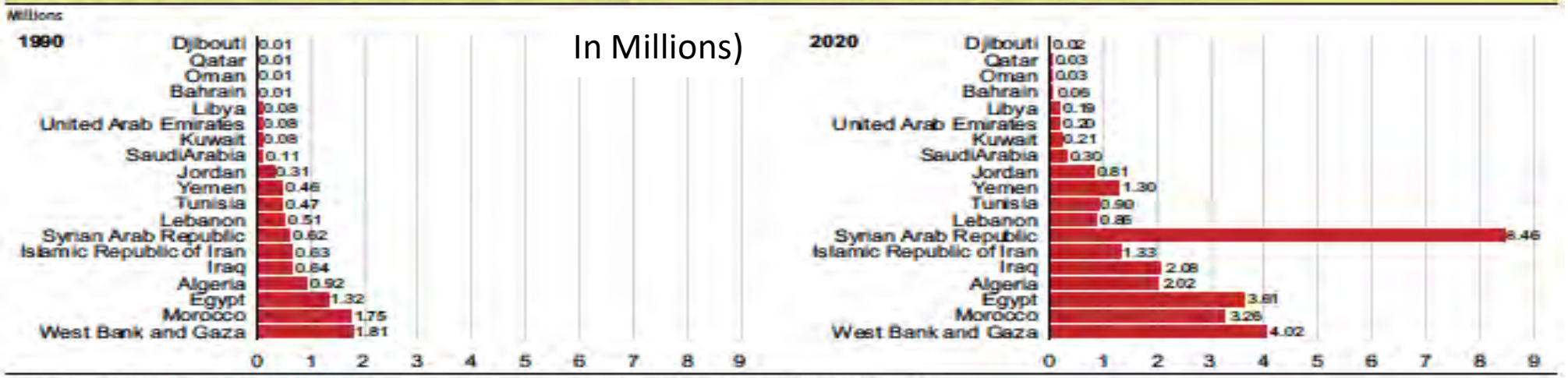
Migration as a Measure of the Strategic Impact of the MENA Region provides only a limited picture of the trend involves since it does not include major migration out of Sub-Saharan Africa though North Africa, and massive imports of labor into the Gulf region.

Refugees And Asylum Seekers as a Measure of the Strategic Impact of the MENA Region provides a grim reminder of how the MENA region's violence, extremism, and repression has hurt its population since the beginning of the "Arab Spring."

It should be noted that both ongoing and new wars, and global warming, could trigger new waves of migration out of the region. So could new wars or major political upheavals, and the impact of population growth in the MENA region – which has so far fallen far short of creating the new jobs needed to hire its young men and women and deal with population growth.

Migration as a Measure of the Strategic Impact of the MENA Region

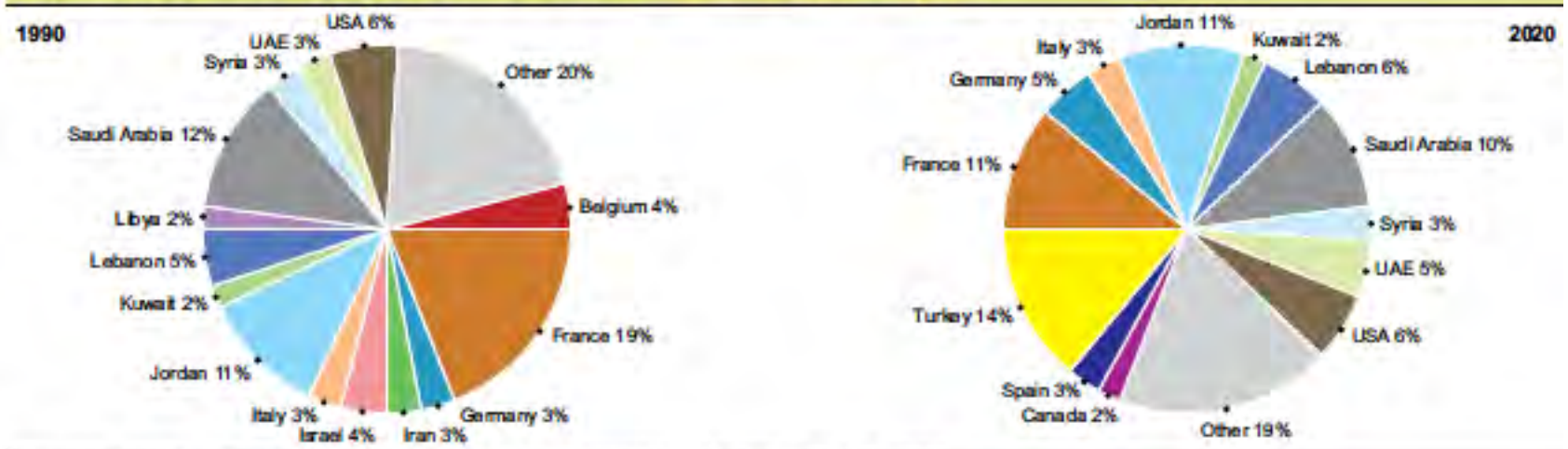
Figure 1. International migrants in the Middle East and North Africa, according to origin country



In Millions)

Source: UNDESA 2020 (https://www.un.org/development/desa/pd/content/international-migrant-stock), accessed March 25, 2022.

Figure 2. Destination countries of Middle Eastern and North African emigrants

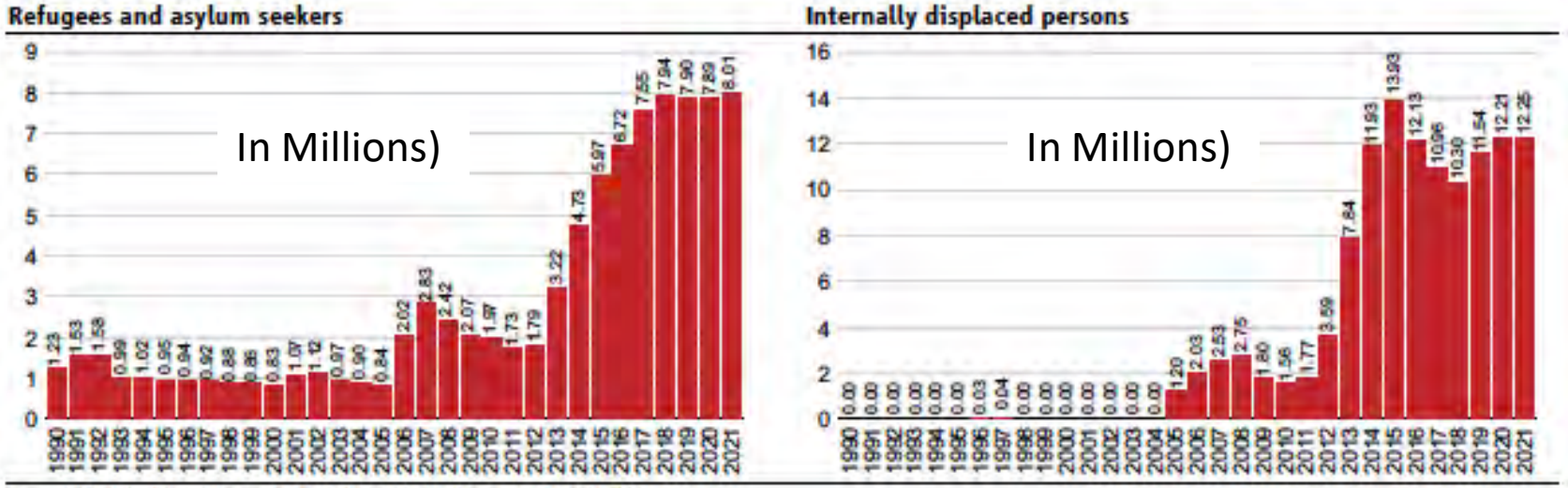


Source: UNDESA 2020 (https://www.un.org/development/desa/pd/content/international-migrant-stock), accessed March 25, 2022.

World Bank, *Middle East and North Africa Region, Economic Update*, October 2022, pp. 154-155

Refugees And Asylum Seekers as a Measure of the Strategic Impact of the MENA Region

Figure 3. Refugees, asylum seekers, and internally displaced persons from Middle Eastern and North African countries



Source: UNHCR 2021 (https://www.unhcr.org/refugee-statistics/), accessed March 31, 2022.

Figure 4. Countries of asylum of refugees and asylum seekers from the Middle East and North Africa in 2020

Source: UNHCR 2021 (https://www.unhcr.org/refugee-statistics/), accessed March 31, 2022.

World Bank, *Middle East and North Africa Region, Economic Update*, October 2022, pp. 154-155