New oil map:

Impact of Russia's war on Ukraine on supply and demand

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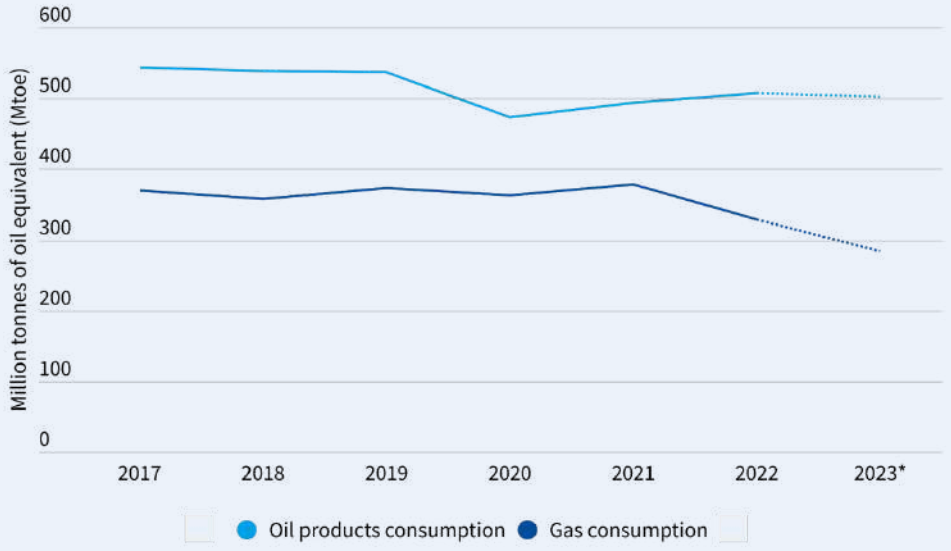
Executive Summary

The EU did not take adequate measures to reduce oil consumption since the beginning of the Russia-Ukraine war.

The invasion of Ukraine by Russia followed a long-lasting period of limitations to global mobility due to the diffusion of COVID. Both crises highly impacted trends in the EU's fossil fuel consumption as well as the energy and climate political agenda. They also made the topic of fossil fuel dependency and its geopolitical implications more visible and debated among policymakers and the general public. There were high expectations that political measures taken during those exceptional times might prompt a 'green recovery', and that the EU would not get back to a business-as-usual dependency to fossil fuels.

While there is clear evidence of a current surge in renewable energy roll-out in the EU as well as a renewed political ambition to speed up the energy transition, trends in oil demand and sobriety measures seem to have been somehow overlooked. Most of the EU political debate on oil has been focused on discussing and implementing price cap and import ban measures on Russian oil.

As it turns out, our analysis shows that the demand has almost fully recovered from pre-pandemic levels. There is a clear discrepancy between oil and gas demand trajectories: while gas demand fell by 15% since the invasion of Ukraine by Russia, oil demand is 2% higher. This can be explained by political factors, as the EU has set up clear targets for cuts in gas consumption, but not for oil. European countries also heavily subsidised oil consumption when oil prices increased, as previous T&E analysis has shown.



*2023 based on Jan-Mar data from Eurostat and extrapolating the rest of the year by applying a Jan-Mar 2023 / Jan-Mar 2022 ratio to Apr-Dec 2022 data.

Source: Transport & Environment based on data from Eurostat (2023)

The EU diversified away from Russia, but loopholes in sanctions and lack of cuts in oil consumption maintain Russian and global oil dependency.

Thanks to sanctions, the EU seems to have successively diversified away from Russia over the period: the share of Russian oil among all extra-EU imports went from 31% in January 2022 to 3% in March 2023. However, Russian oil imported in the form of products refined in other countries is still allowed in the EU, which is increasingly importing from India and China. Imports from those 2 countries have grown by 70% and 13% respectively over the past year. The lack of political will to cut oil consumption in Europe and globally also allowed Russia to reroute its production to other markets at a lower price, which is ultimately bad for the climate and maintains Russia's fossil fuel revenues. Despite Western sanctions, Russian oil production stagnated in 2022 and early 2023 figures indicate only a marginal 2% decrease.

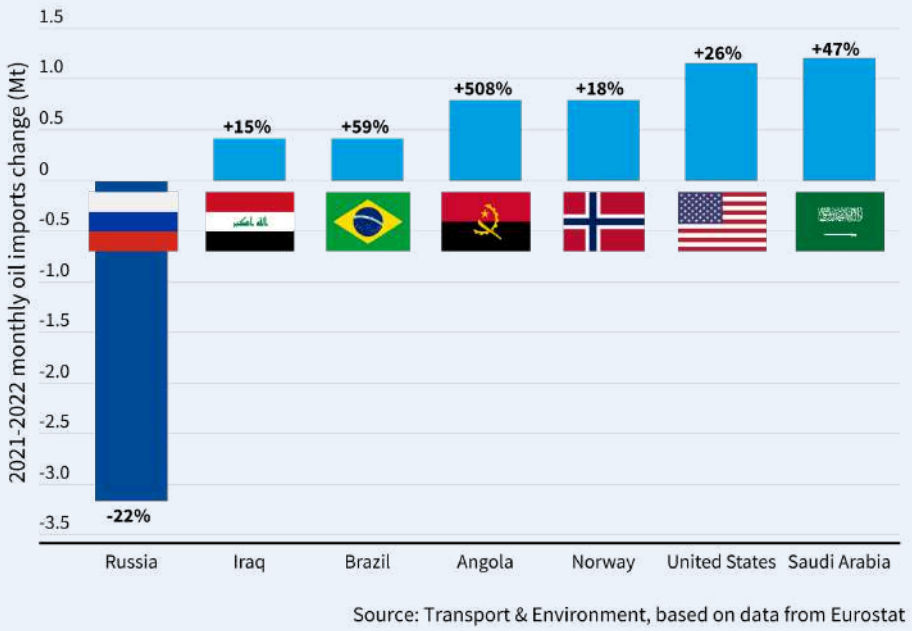
At the global level, oil production and exports surged by 5% between 2021 and 2022, with 65% of the increased exports directed to the EU market. The EU was indeed a major driver of oil demand over the period, as local demand was recovering and Asian countries were still affected by COVID restrictions.

EU supply shifts favouring a boom in exports in top oil producers.

The decrease in Russian crude oil imports into the EU led to a strengthened market power of existing suppliers to the EU. Analysis of import shifts showed that six main countries benefited from the decrease in Russian imports. The United States replaced Russia as Europe's number one exporter at the end of 2022, accounting for 11% of the EU imports, from 9% in 2021. Norway and Saudi Arabia followed closely with 10% and 9% shares in 2022 respectively.

Some less scrutinised countries also saw a jump in oil exports to the EU: Angola monthly oil exports to the EU witnessed a 500% jump between 2021 and 2022. In addition, monthly oil imports from Brazil and Iraq increased by 60% and 15% respectively.

T&E's analysis shows that some countries did not merely reshuffle their suppliers from Asia to the EU: the US notably saw a 6% surge in oil production, of which 70% were directed towards Europe.



Biggest monthly oil import changes in the EU between 2021 and 2022

EU growing oil imports are highly concentrated on a few fields, with severe environmental consequences.

While the EU post Russia-Ukraine war supply chains are slightly more diversified, our analysis of oil fields data shows that 80% of the surge in oil exports to Europe came from only ten fields. The largest part of the export growth came from the aggregate of Texas oil fields, followed by Norway's biggest field Johan Sverdrup, and Brazil's Lula field.

Previous on-the-ground research has documented the detrimental impact of oil extraction in those regions on the environment and health, notably in the US Gulf coast, in Brasil, and in Angola. In Iraq, recent investigations have shown that air pollution caused by flaring led to many cancers and blood disorders near the Rumaila oil field, a field where the EU heavily increased its imports of oil from.

Different pathways for the EU's oil imports throughout 2030

The International Energy Agency's oil market outlook forecasts global oil production to increase by 5% by 2028 compared to 2022, in contradiction with a large consensus across multiple modelled climate and energy pathways, echoed by IEA's conclusions, that developing new oil and gas projects is incompatible with the 1.5°C target.

Countries that increased their market share to the EU in recent years, notably the United States and Saudi Arabia, could expand their production by respectively 10% and 15% between 2022 and 2030. Brazil's oil production is likely to grow between 10% and 24% between 2022 and 2028, according to Stratas Advisors and the IEA.

T&E has analysed the impacts of the EU's continuous reliance on oil throughout 2030 and has identified 18 different climate bombs from which Europe will keep importing its oil.

Alternatively, our modelling has shown that the EU could reduce its oil consumption and imports by a third by 2030, if additional policy measures were taken.

Recommendations

- European countries should set targets for oil consumption cuts, and implement short and medium term oil saving measures in the transport sector. Modal shift policies, aerodynamic fittings on trucks, reduction in car use or phase out of fuel duty cuts have proven effective in reducing oil consumption.
- EU sanctions on Russian oil should be strengthened by prohibiting the import of refined petroleum products from refineries using Russian crude.
- The ambition of climate regulations which are still being discussed as part of the EU FitFor55 package should be raised, such as the review of the truck CO_2 standards.
- The EU should also plan for long term sobriety measures in growing oil demand sectors such as aviation. This plan could encompass measures such as a pause in airport expansion plans, increased taxation, or ones promoting modal shift from air to rail.

Table of contents

1. Introduction

Crude oil and its derivatives are the most consumed energy products in the EU, accounting for about 35% of final energy consumption and 64% of energy imports in 2021 [1]. EU oil imports have been increasing between 2015 and 2020, as previous T&E research has shown [2].

In spring 2020, national lockdowns and travel restrictions caused an unprecedented slowdown in global mobility and disrupted the main driver of the EU's oil demand: transport. The European Union and Member States mobilised significant public funding in order to stimulate an economic recovery that would take into account the need for a 'greener' and 'more resilient' Europe [3].

Two years later, the invasion of Ukraine by Russia significantly disturbed energy supplies and prompted the EU to adopt other emergency measures. In May 2022, the RePowerEU Plan was adopted. One of its objectives was to 'reduce overall reliance on fossil fuels faster' [4]. Other policy measures were also implemented to cut the EU dependence on Russian fossil fuels, significantly affecting supply chains into the EU.

This report aims at analysing trends in the European oil demand and imports over the past few years, in order to assess whether European countries are on the right path to successfully reduce their dependency to oil imports. The report also aims at assessing the impacts of the EU's oil supply diversification policies that have been promoted in order to reduce the imports of Russian oil. The research will pay specific attention to the environmental impacts of oil production in exporter countries, with granular data at the oil field level.

2. Trends in EU oil consumption: COVID recovery and impact of Russian-Ukraine war

2.1. Oil demand approaching pre-crisis levels

COVID-related oil demand drop and recovery

In the EU, the daily use of petroleum-based products in transport declined by 1.2 million barrels per day (MBPD) between 2019 and 2020, equivalent to a 16% cut in consumption, according to data from Stratas Advisors [6].

Despite expectations that public measures taken during COVID in the EU might have prompted a 'green recovery' [7]**, the consumption of oil is getting closer to 2019 levels**. As shown in Figure 1, the EU's oil consumption in the transport sector increased by 7% in 2021, 6% in 2022 and 2% in early 2023, so that it was only 3% below pre-pandemic levels at the beginning of the year.

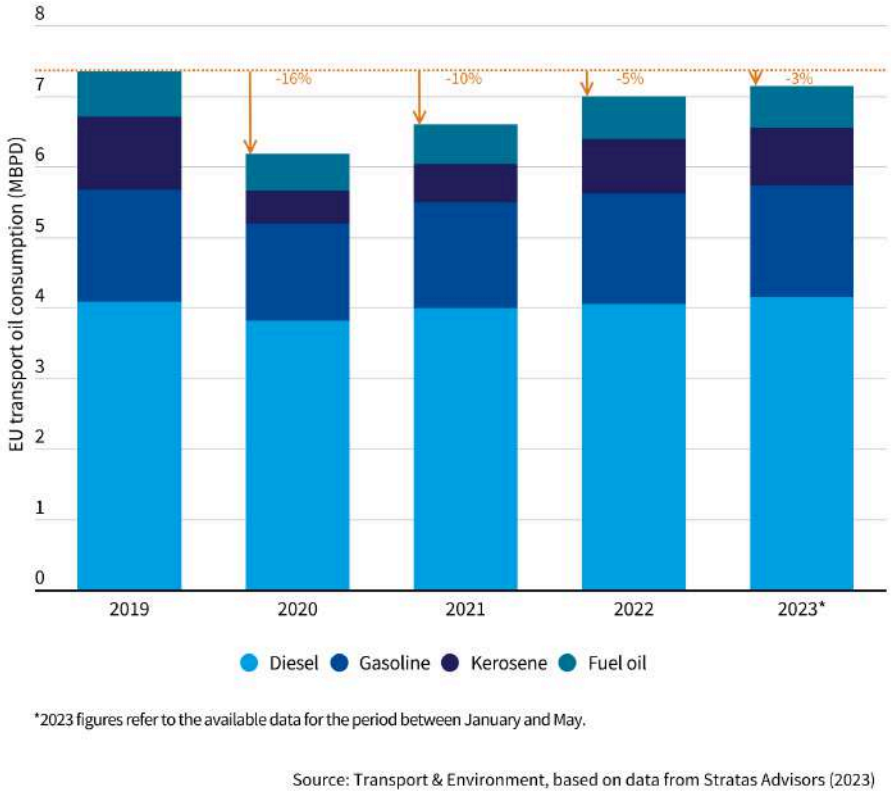


Figure 1: EU oil consumption in transport (Stratas Advisors)

Oil demand recovery driven by aviation in 2023

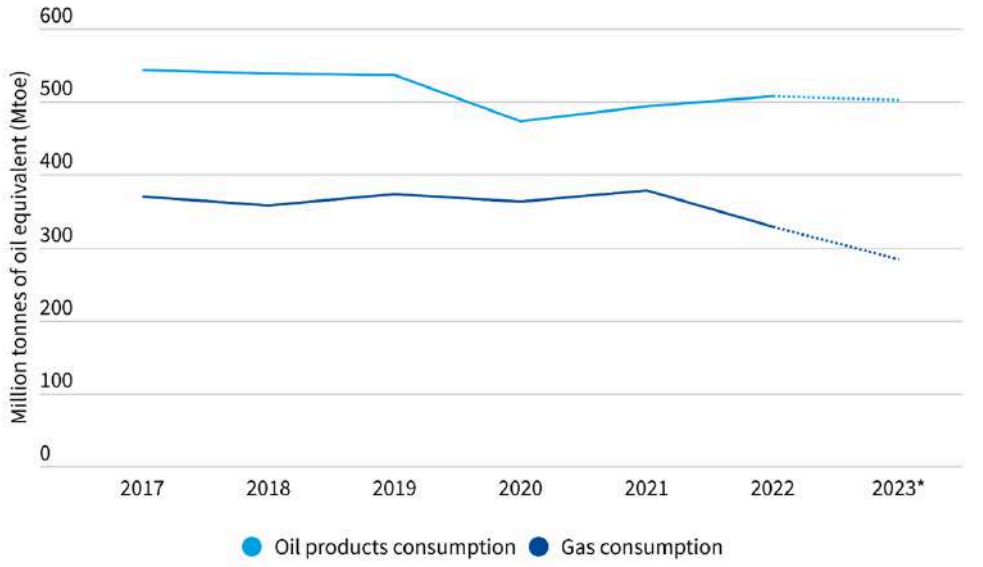
The recovery of oil demand in the EU was first spurred by the road and shipping sectors' fuel uptake, which recovered by 98% and 92% respectively at the end of 2022. By the same time, the consumption of jet-fuel in the EU was still 25% below its 2019 level. It is expected that kerosene consumption levels could recover and even exceed pre-Covid levels in 2023 globally[8], and next year in the EU [9]. With China's lift

of restrictions and the expected continued growth of air traffic, global oil demand could hit the all-time record of 102 billion barrels per day in 2023, according to the International Energy Agency (IEA) [10].

The Russian-Ukraine war did not impact significantly the recovery of oil consumption in the EU

The invasion of Ukraine by Russia highly impacted fossil fuel supply chains to the EU and globally. Before the war started, 45% of the EU's gas [11] and 25% of the EU's oil [12] came from Russia. Recognising that fossil fuel imports are direct enablers of Russian military spending [13], various measures were taken by the European Union to both reduce Russia's income in the short term, and cut fossil fuel dependency in the medium term (see Infobox next page for more details). **Although specific embargo measures were implemented by the EU to cut Russia's oil income, no target or specific measures were set up to cut oil consumption** [14], still allowing Russian oil to keep flowing to global markets [15].

As a result, there is a significant discrepancy between the evolution of oil and gas demand since the beginning of the war: **while gas demand was cut by 15% between February 2022 and February 2023 in comparison to the same period one year before, the consumption of oil increased by 2%,** as can be seen in Figure 2. Early 2023 data suggest that gas demand will keep decreasing while oil demand stagnates[1], further increasing the gap between both sectors.



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Source: Transport & Environment based on data from Eurostat (2023)

Figure 2: Oil and gas consumption in the EU (Eurostat)[2]

[1] The difference with transport oil demand recovery shown in Figure 1 could be explained by the demand from other sectors including industries which have been more impacted by the economic crisis.

[2] The oil consumption was estimated thanks to the gross available energy of different oil products, taking into account indigenous production, net imports, recovered and recycled products as well as stock changes, following Eurostat's energy balance methodology [16]. A simplified 1:1 factor was assumed to convert non crude oil products

Oil policies in the EU since the Russia-Ukraine war

RePowerEU

In May 2022, the European Commission presented the RePowerEU Plan. One of its key objectives was to reduce the EU's dependance on Russian fossil fuels and diversify energy supplies, but also to lower the bloc's overall reliance on fossil fuels through energy savings and roll out of clean energy policies.

The Plan proposed more ambitious actions than the EU FitFor55 Package, notably increasing the 2030 energy efficiency target from 9% to 13%, and increasing the renewable energy target from 40% to 45%. Those targets were lowered as part of the political agreement found by the Council and the European Parliament on the recast of the Renewable Energy Directive, which established a 11.7% target for energy efficiency and a 42.5%, aiming for 45%, target for renewable energy [17].

As part of this strategy, the European Commission also presented several plans to cut gas consumption in July 2022. In August, Member States agreed on a voluntary 15% cut in the EU gas consumption between August 2022 and March 2023 [18]. In March 2023, the target was extended until March 2024 [19].

On oil, the Commission only proposed to present efficiency measures as part of a 'Greening of Freight' package and mentioned that it will consider a legislative proposal on the corporate car fleet. To date, only the 'Greening of Freight' plan has been presented, on July 11th 2023. It will encompass revising weight thresholds for electric trucks and a new regulation on capacity management of Europe's rail tracks. The impact of these proposals on oil consumption savings remain uncertain, especially in the short and medium term. Additionally, the proposal on the corporate car fleet is still being awaited [20].

National policies linked to surge in oil prices

Russia's invasion of Ukraine triggered severe crude oil and fuel price increases globally. To reduce the impact for drivers at the pump, many EU countries reacted by cutting fuel duties. Previous research done by T&E estimates that these fuel tax rebates were granted by EU governments amounted to €35 billion by January 2023 [21].

Embargo and price cap measures on Russian oil

In June 2022, The EU decided to prohibit the purchase, import or transfer of crude oil and certain petroleum products from Russia. An embargo on Russian crude oil came into force in December 2022, and in February 2023 for refined products. An exception was granted for imports of crude oil by pipeline. Moreover, Bulgaria and Croatia secured temporary derogations concerning the import of Russian seaborne crude oil and vacuum gas oil (until the end of 2023 for Croatia and 2024 for Bulgaria) [22].

from tonnes to tonnes of oil equivalent. The gas consumption corresponds to the monthly calculated inland consumption.

On 6 October 2022, the Council adopted Decision (CFSP) 2022/1909. This lifted the prohibition on providing maritime transport and related technical assistance, brokering services, financing or financial assistance to third countries of Russian crude oil or petroleum products, so long as they are purchased at or below a pre-established price cap agreed by the Price Cap Coalition.

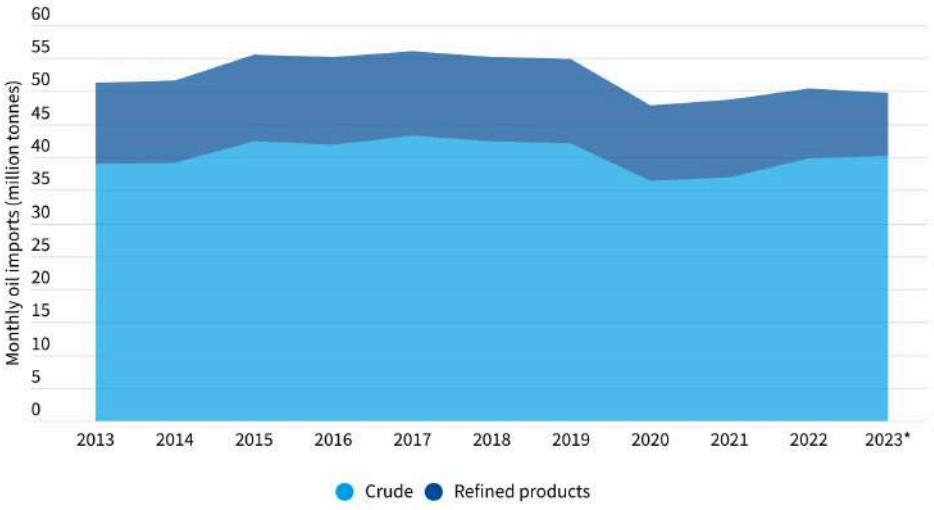
On 3 December 2022, the Council adopted Decision (CFSP) 2022/2369 , which established the price cap for crude oil at $60 per barrel. The cap applied from 5 December 2022 for crude oil and from 5 February 2023 for petroleum products and is adjustable over time.

In June 2023, the EU adopted its 11th package of sanctions against Russia. As part of this package, it was mentioned that the temporary derogation granted to Germany and Poland for the supply of crude oil from Russia through the northern section of the Druzhba oil pipeline should come to an end. However, the oil which originates from Kazakhstan or other third countries will be able to continue to transit through Russia and be imported into the EU via the Druzhba oil pipeline [23].

2.2. Oil imports rebound

The EU imports and refines more crude oil

Imports of oil to the EU closely followed the consumption trends detailed above. Combined imports of crude oil, refined products and other derivatives reached more than 600 Mt in 2022 [24]. While this is still 8% below 2019 levels, it has been steadily increasing, with annual changes of +2% in 2021 and +3% in 2022 (Figure 3). Q1 2023 data suggests a slight 2% decline in imports compared to 2022. The rest of the year will confirm whether this trend is temporary or not.



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Source: Transport & Environment, based on data from Eurostat (2023)

Figure 3: Extra-EU imports of oil products (Eurostat)

Crude oil still represents 80% of all extra-EU oil imports. Refined jet-fuel imports increased by 20% between 2021 and 2022, following the recovery of the aviation sector. Diesel imports also went up by 5%, whereas gasoline and fuel oil imports were cut by 25% and 35% respectively. While the decrease in imports of gasoline and fuel oil seems to contradict the demand trends detailed previously, the analysis of intra-EU imports shows increases of 1% and 3% respectively, **suggesting an increase in domestic refining of these products.** This is consistent with Eurostat's data on refinery output, which grew by 5% between 2021 and 2022 [25]. Other sources even state a crude oil oversupply to European refineries in 2022 amid fears of shortage before the sanctions on Russian oil were implemented [26].

Imports across EU countries and intra-EU shifts

In 2022, the largest importers of oil products remained Germany, the Netherlands, Italy, Spain and France, which accounted for 65% of all imports. Figure 4 shows the evolution of crude and refined volumes imported by these countries between 2022 and 2021.

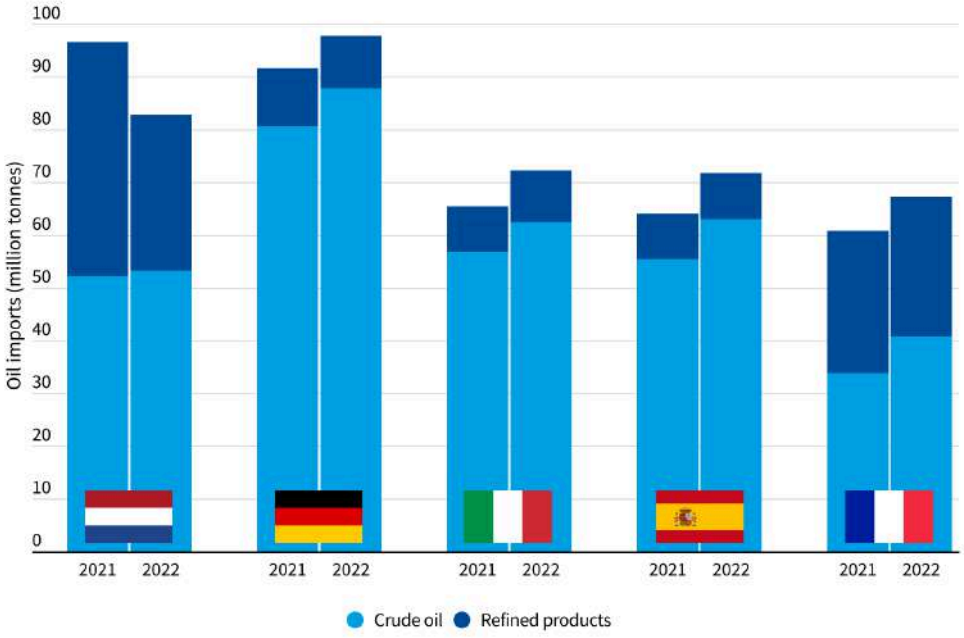


Figure 4: Top importers of extra-EU oil products (Eurostat)

Comparing 2021 and 2022 data, Spain, France and Italy had the largest increases in overall imports (+12%, +11% and +11% respectively), followed by Germany with +7%. Interestingly, the Netherlands decreased their overall extra-EU oil imports by 15%, mainly driven by a cut in refined product imports (-33%). However, Dutch imports of refined products from other Member States saw a 50% surge, leading to an overall 3% increase in imports over the period. This shift in refined products imports from extra-EU to intra-EU countries seems to originate mainly from Belgium and Germany (61% of Dutch intra-EU imports of refined products in 2022, +48% compared to 2021). The Port of Rotterdam, which is the main import hub in the Netherlands and in Europe witnessed a 10.8% decline in its throughput of petroleum products in 2022 due to "a structural fall in the imports and re-exports of fuel oil and the sanctions targeting

Russia" [27]. These shifts were also reflected in the origin of the oil flowing into the Netherlands. More details on the oil imports in these countries can be found in the Annex.

3. Oil supply chains to the EU

3.1. Impact of Russia-Ukraine war on Russian imports

Russian oil used to flow west to Europe through a network of pipelines and port terminals. In 2021, about 70% of Russian oil imports were shipped to the EU from Russian ports located on the Baltic sea and the Black sea or from Arctic coast terminals [12]. The rest was transported directly to European refineries through the Druzhba pipeline network, either North to Poland and Germany or South to Slovakia, Hungary and Czechia. This section assesses whether the political measures taken by EU countries following the invasion of Ukraine by Russia significantly altered the EU's dependency on Russian oil.

Decline of Russian oil imports

In 2021, the European Union imported around 170 million tonnes of oil and petroleum products from Russia. Russian oil accounted for 25% of the EU's crude oil imports and 33% of refined product imports. Figure 5 shows how this predominance started to shrink from early 2022, before the EU implemented a formal package of sanctions against Russia. In twelve months, between January and December 2022, monthly Russian crude oil imports were divided by four, while imported refined products decreased by 25%. As a result, the overall share of Russian oil products among all extra-EU imports declined from 28% in 2021 to 21% in 2022.

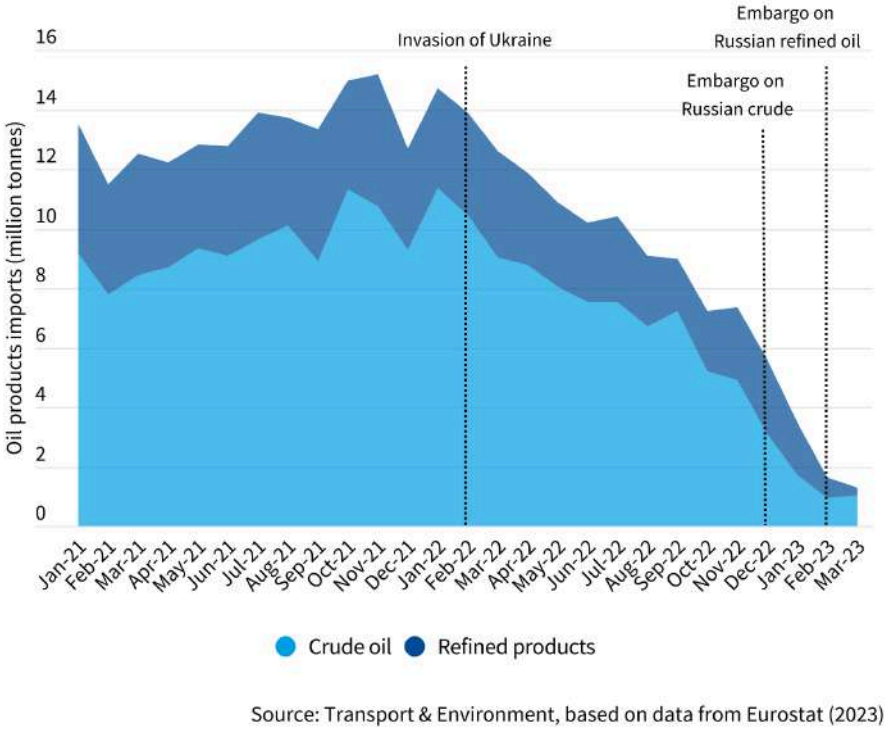


Figure 5: Monthly imports of oil products from Russia (Eurostat)

Our analysis of monthly imports indicates that Russian crude imported into the EU declined by almost 40% in December 2022, when the first embargo was implemented. Crude oil imports kept decreasing during the first months of 2023, reaching one million tonnes in February 2023, 90% less than one year before. In January 2023, before the second embargo started, Russian refined product imports were 50% down compared to the same period one year earlier. When the embargo kicked-off, these volumes further decreased to 700 thousand tonnes, 80% less than in February 2022. **As a result, the share of Russian oil among all extra-EU imports went from 31% in January 2022, to 3% in March 2023.**

Remaining imports of Russian oil

While the imports of oil products from Russia drastically decreased in 2022 and 2023 due to the implementation of sanctions, some oil kept flowing into the EU. March 2023 import data show that around 1,400 thousand tonnes of oil products and derivatives were still imported from Russia by EU countries (Figure 6). This lasting dependency can be explained by exceptions set up in the sanctions to landlocked countries: Slovakia, Czechia and Hungary [28]. These countries indeed relied almost exclusively on Russian crude oil imports through the Druzhba pipeline. Additionally, their national refineries are mainly designed to process Ural blends [29].

March 2023 data shows that Slovakia exclusively imported Russian oil, while Hungary, Czechia and Latvia still bought 68%, 65% and 55% of their extra-EU oil from their vast eastern neighbour. Taking intra-EU imports into account, these four countries respectively imported 59%, 42%, 39% and 21% of their oil from Russia.

Germany, Poland, Latvia and Bulgaria also continued to import refined products after the February embargo. This can be explained by exemptions granted in the sanctions for specific oil derivatives such as liquid petroleum gases (LPG).

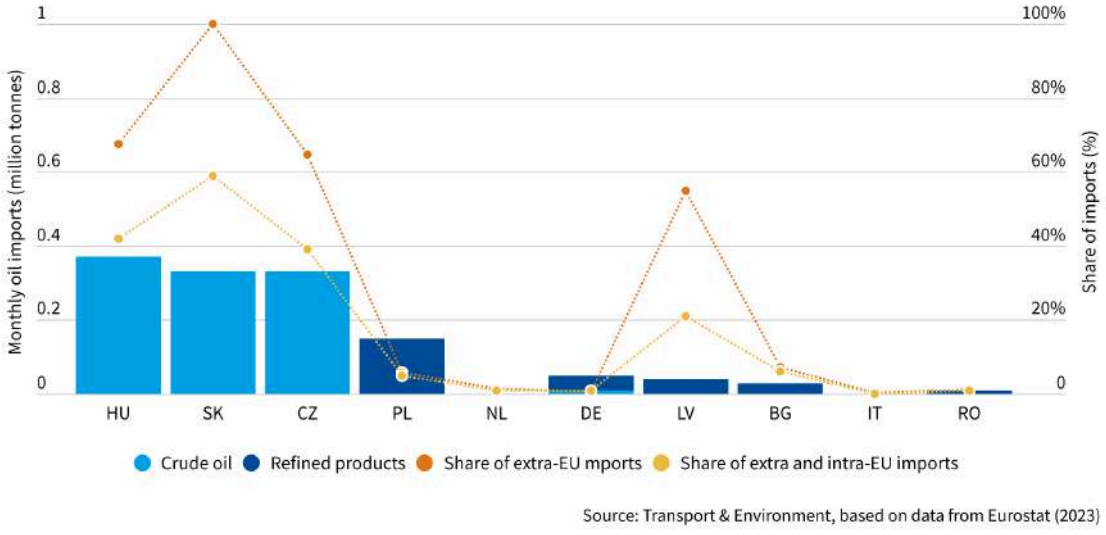


Figure 6: Remaining Russian oil import to the EU in March 2023 (Eurostat)

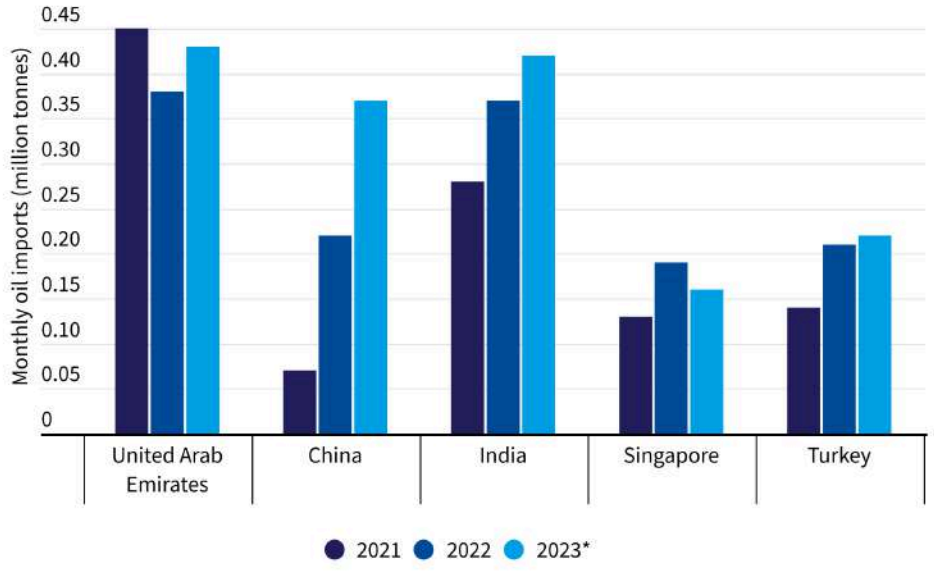
On June 23rd 2023, the EU put an end to derogations in the sanctions regime for imports to Germany and Poland through the Druzhba pipeline [23]. According to Bloomberg, Germany and Poland had already stopped receiving oil from Russia through the pipeline [30]. However, oil which originates in Kazakhstan or another third country is still able to continue to transit through Russia and to be imported into the EU via the Druzhba oil pipeline.

3.2. Refined products: Russian oil being imported through the backdoor

The European embargo on Russian refined products came into force in February 2023 and stopped the imports of most petroleum products, with some exceptions, as we have seen in the previous section. This section looks at the shifts in supply chains of refined products into the EU. It shows that the EU switched to other suppliers, including to countries that still heavily import Russian oil.

Previous research by the Center for Clean Air and Energy (CREA) has identified five main 'laundromat' countries for Russian crude: India, China, Turkey, the UAE, and Singapore. Their investigation showed how those countries have significantly increased their imports of crude oil over the period, creating a 'laundromat' effect by which the EU keeps importing Russian oil through the backdoor [31].

As can be seen in the Figure 7, imports of refined products from China increased significantly by 220% between 2021 and 2022 and Q1 2023 data suggests an additional 70% growth compared to 2022. Refined products imported from Singapore, Turkey and India also grew by 51%, 48% and 31% respectively over the same period and by -16%, 7% and 13% in early 2023.



*2023 values refer to imports between January and March as more recent data could not be accessed.

Source: Transport & Environment, based on data from Eurostat (2023)

Figure 7: EU refined products imports from Russian oil 'laundering' countries

Diesel and jet fuel imports represented the largest share of the refined products imported from these countries. Monthly import data for Q1 2023 suggest that China significantly increased its diesel exports to the EU (+280%) compared to the previous year, while India and the United Arab Emirates also boosted their exports of diesel to the EU by 70% and 40% respectively.

On the other hand, kerosene imports grew by 20% between 2021 and 2022, following the rebound in aviation demand, as detailed in Section 2.1. Russian jet fuel imports were already limited in 2021 (around 4% of extra-EU kerosene imports) and further declined in 2022, making only 1% of imports. However, jet fuel imports from the identified "laundromat" countries significantly increased over the period, in particular from China (+190%), India and Turkey (+50% both).

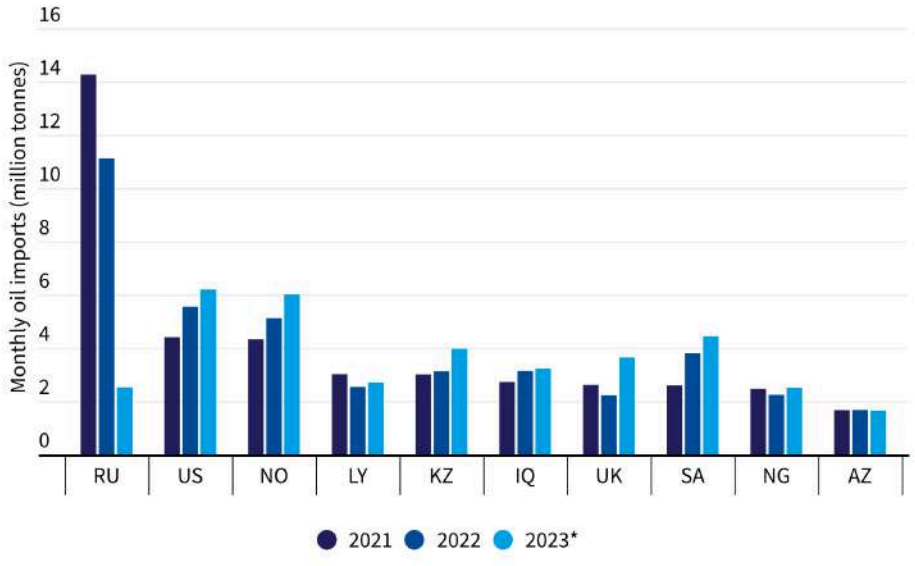
As a result **the share of refined products imported from these countries grew from 9% in 2021 to 13% in 2022 and 18% in early 2023**. The country of origin of these products can be found in the Annex.

3.3. Shifts in oil imports' foreign origin

As a result of the drastic reduction in imports of petroleum products from Russia described above, the EU switched its main oil suppliers. This section analyses the main new oil supply chain routes into the EU.

Shift to the US, Saudi Arabia and Norway

Looking at the ten largest oil exporters to the EU (Figure 8), a clear shift from Russia to other countries can be observed. The decreased imports from Russia have been absorbed by existing exporters to the EU, with the same countries appearing in the ranking in 2021, 2022 and 2023.



*2023 values refer to imports between January and March as more recent data could not be accessed.

Source: Transport & Environment, based on data from Eurostat (2023)

Figure 8: Top ten oil exporters to the EU (Eurostat)

However, the three largest oil exporters to the EU evolved. The United States replaced Russia as Europe's number one exporter at the end of 2022, accounting for 11% of the EU imports, from 9% in 2021. This share went up to 12% of extra-EU imports in March 2023. Norway and Saudi Arabia followed closely with a 10% and 9% share in 2022 respectively. **Altogether the increase of oil imports from these three countries almost entirely compensated the decrease of Russian oil imports[3].**

Imports from Iraq also witnessed a 15% increase over the period.

Looking at the biggest proportional increases in countries' oil exports, **two other countries than the top 10 ones also significantly increased their oil exports to the EU between 2021 and 2022: Angola and Brazil.**

Angola's monthly volumes of oil exports to the EU grew by almost 0.8 Mt, or six million barrels, close to Norway's export increase (Figure 9). This represents **a proportional 500% jump in oil exports between 2021 and 2022.** This significant surge started around February 2022, at the beginning of the Russia-Ukraine war: Angolan oil flows towards the EU were then multiplied by four over one month.

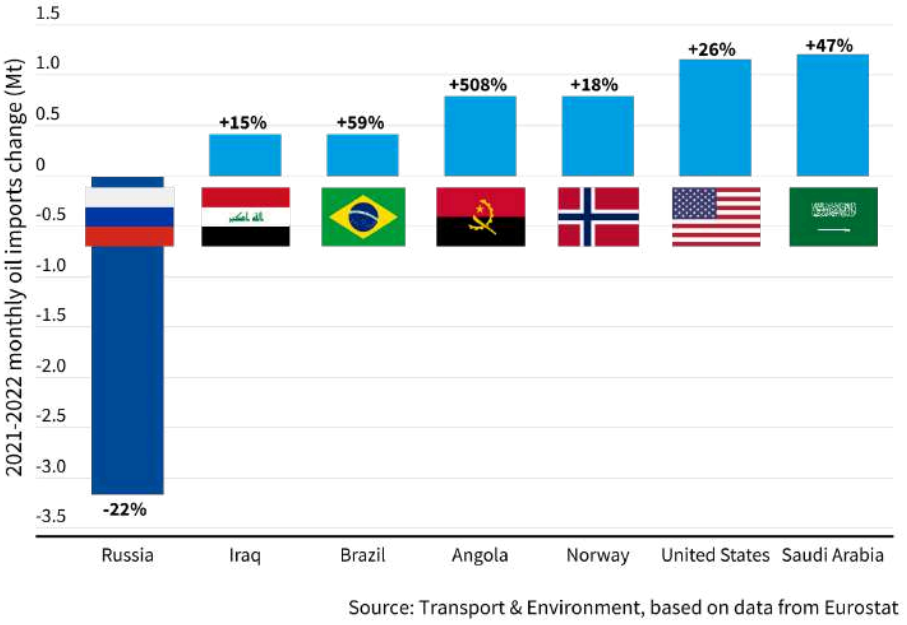


Figure 9: Biggest monthly oil import changes to the EU between 2021 and 2022 (Eurostat)

Moreover, monthly oil imports from Brazil progressed by 0.4 Mt in 2022 compared to 2021, corresponding to a 60% increase. Looking at 2022, imports from this country almost doubled between the start and the end of the year.

Overall, the increase of monthly imports from those six countries totalled 4.8 Mt in 2022, exceeding by 51% the decline in Russian oil imports.

[3] Russian monthly imports decreased by 3.16 Mt in 2022, while the increase of imports from the US, Norway and Saudi Arabia totalled 3.14 Mt.

Early 2023 import data suggest that those trends are continuing, except for an increase in imports from Kazakhstan and the United Kingdom, which boomed between January and March 2023 (+27% and +65% compared to the average of 2022).

Looking at regional trends, countries of the Organization of the Petroleum Exporting Countries (OPEC), which is an intergovernmental organisation of 13 oil producing countries [31], widely benefited from those shifts and increased their market power, as can be seen in Figure 10.

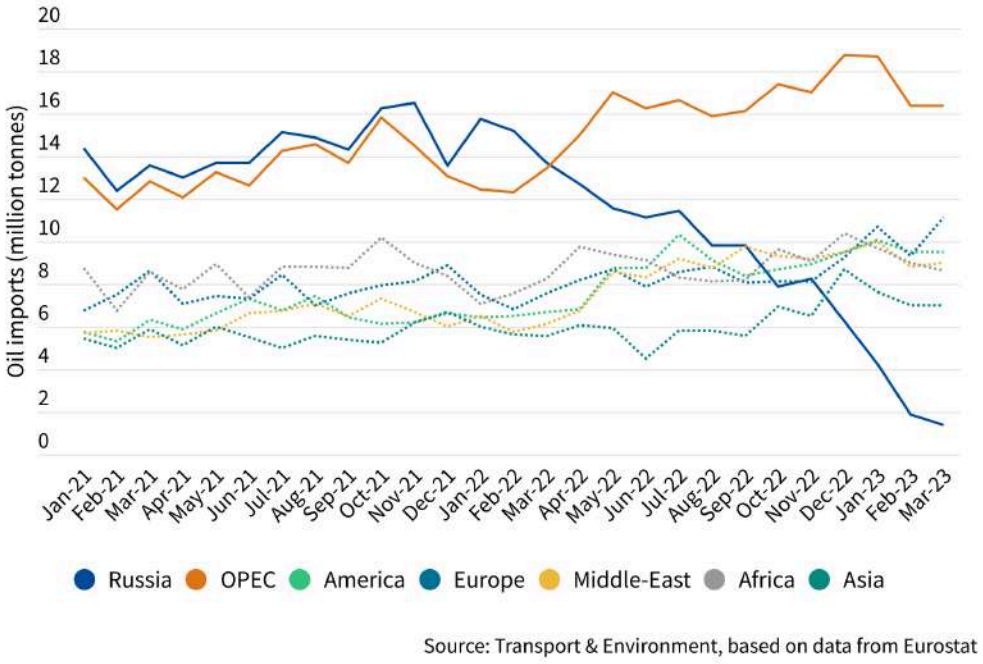


Figure 10: Regional shifts in EU oil imports (Eurostat)[4]

The following section goes more in depth into production trends within those six countries which increased their oil exports to the EU the most following the Russia-Ukraine war.

4. Current and forecasted impacts of oil imports to the EU

4.1. Shifts in oil flows or increased production?

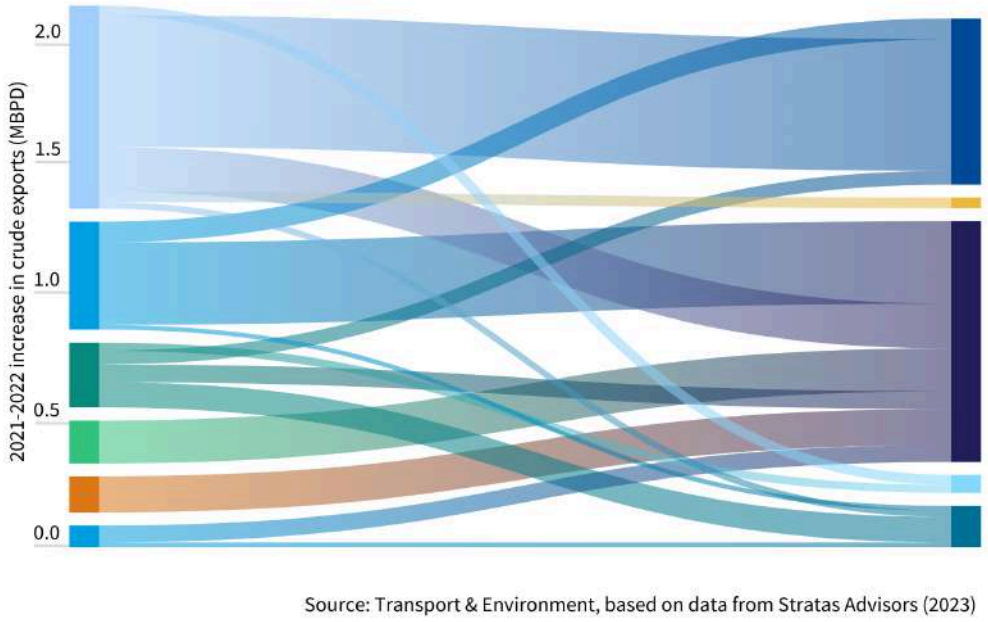
Between 2021 and 2022, global oil production and exports surged by 5%. With Asian countries still affected by COVID restrictions and sanctions being implemented against Russian oil, American countries and Europe were responsible for most of the demand growth. **The EU received 65% of the increased global exports of oil products over the period**. On the other hand, Asia and Oceania secured 27% of the

[4] Non-OPEC regions displayed on this chart can include OPEC countries (e.g. Angola in Africa).

new export flows and Americas 7%, since its production increase was used to meet most of its domestic demand growth [32].

Despite Western sanctions, Russian oil production stagnated in 2022 and early 2023 figures indicate a marginal 2% decrease[5]. As we have seen in the previous section, Russian oil was redirected from Europe to other regions and particularly to Asia.

Figure 11 shows that in 2022, the USA, Saudi Arabia, Norway, Angola, Iraq and Brazil mostly increased their exports to supply European countries (62%). Asian countries accounted for 22% of these shifts.



Source: Transport & Environment, based on data from Stratas Advisors (2023)

Figure 11: Sankey diagram of the selected countries' increased exports in 2022 (Stratas Advisors)

In order to assess how the EU oil imports diversification trends impacted the production profile of the top six exporter countries, we compared the 2021-2022 change in countries' crude production with the change in total exported volumes on the one hand, and in exported volumes to the EU, on the other hand.

The United States increased their oil production by 6% over the timeframe, 70% of which were directed towards Europe. Saudi Arabia and Iraq also significantly increased their crude production and their exports to Europe, but most of these additional crude volumes were exported to Asia and the surge in oil exports to Europe only represented 22% and 32% of their overall exports increase.

Figure 12 indicates that some other countries, such as **Norway or Angola**, **did not increase significantly their crude production to meet the EU's oil demand after the Russian invasion of Ukraine**, but rather shifted most of their existing exports towards Europe[6]. The analysis of oil flows from these countries

[5] In Q1 2023, Russian oil production was around 11.14 MBPD compared to 11.38 MBPD in Q1 2022 according to the IEA [33].
[6] EU27+UK in this dataset.

indeed shows a decrease in exports to Asian countries, while oil exports to Europe increased by similar volumes. Prominently, crude exports to Europe represented 90% of Norway's oil exports in 2022.

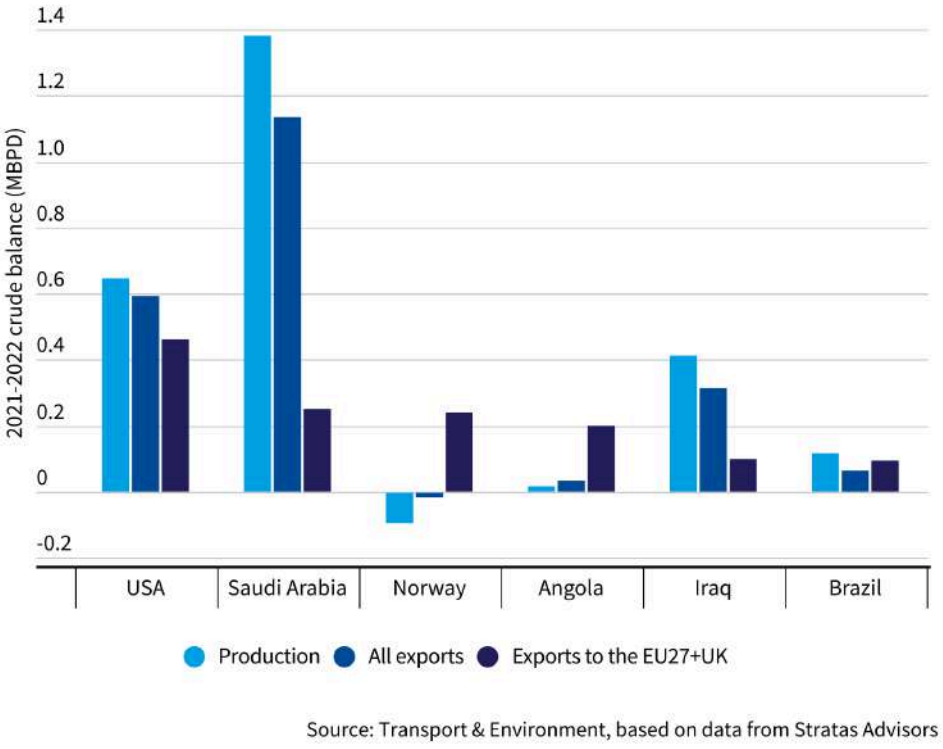


Figure 12: 2021-2022 crude balance in selected countries (Stratas Advisors)

Other countries such as Brazil both increased their crude production (+4%) and shifted some of their exports from Asia (-8%) to Europe (+58%) over the time period.

4.2. Oil fields supplying the EU

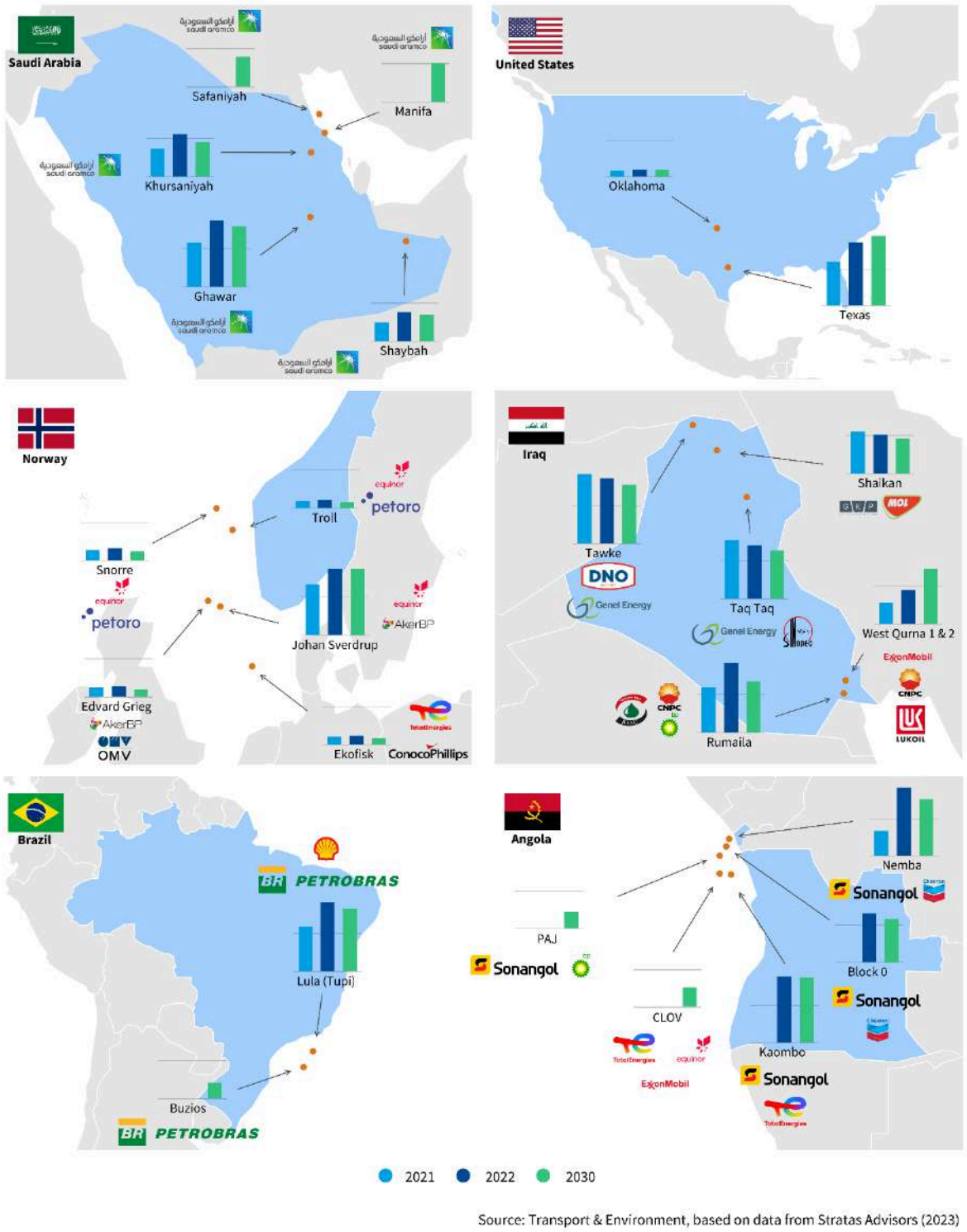
As detailed in the previous sections, increased crude exports to Europe between 2021 and 2022 mainly came from six main countries. The analysis of oil field data from these countries indicates that a few fields contributed to most of this increase: **80% of the surge in oil exports to Europe came from only ten fields**[7].

The largest part of the export growth came from the aggregate of volumes coming from Texas oil fields (32% of the 2021-2022 increase), Norway's biggest field Johan Sverdrup (8%), and Brazil's Lula field (7%).

Figure 13 shows where the most important oil projects are located in the selected countries. Historical and projected export data for those fields, retrieved from Stratas Advisors, is also mapped out. A complementary desk-based research helped to identify the companies which own stakes in these oil

[7] Stratas' methodology rests on a match between oil supply and demand and between different parameters including crude quality (sweet and sour, light and heavy), configuration and utilisation rate of domestic refineries but also projects, infrastructure and geopolitical developments.

fields (the main companies are mapped out, with the exception of the US where no field data was available. Full detail of companies stakes can be found in the Annex).



Source: Transport & Environment, based on data from Stratas Advisors (2023)

Figure 13: Main oil fields supplying Europe, historical and projected export volumes (Stratas Advisors)

Our analysis highlights the significant involvement of state-owned companies such as Petrobras, Saudi Aramco, Equinor or Sonangol, which are partially or fully state-owned. However, most projects, with the notable exception of Saudi Arabia's, are done in partnership with European and American international oil majors, such as Total Energies, British Petroleum (BP), Exxon Mobil or Chevron.

Climate, environmental and health impacts of oil extraction

While more than 85% of oil projects' climate impact is linked to the combustion of petroleum products [34], other emissions and environmental impacts happen at the production and transformation stages.

Methane leaks and flaring[8] are common practices happening along the oil extraction and transformation processes. They are associated with the emission of hundreds of million tonnes of greenhouse gases in the atmosphere and are particularly present in Russia, Iraq, Iran, the United States and Algeria, according to the IEA [35]. As an example, accounting for these additional emissions, oil and gas extraction in the Gulf of Mexico appears to have twice the climate impact of official estimates [36].

Flaring is also associated with severe impacts on human health, including leukaemia and other types of cancer. A recent investigation conducted in Iraq in the communities living near the Rumaila oil field found evidence that air pollution caused by flaring led to increased rates of blood and bone cancer [37]. **Owned by the Basra oil Company, the Rumaila field was managed by a company in which BP holds shares** [38] [39]**. This oil field exported 15% of its production to Europe in 2022 according to data from Stratas Advisors**.

Oil extraction also entails consuming water, which is particularly detrimental in high water stressed regions impacted by repeated droughts. In Iraq's Basra region, where five million persons live, around 25% of the daily water consumption is reportedly used by oil companies in their treatment plant [40].

Oil spills' pollution also heavily impact the environment and communities. Several examples of such pollution have been recently reported in Angola, where the deposit of solid and liquid waste from oil and mining has been increasing in coastal areas [41]. **Chevron, the American oil major, has been explicitly accused of spilling drilling effluents near the enclave of Cabinda** [42]. This waste, generated from deep-water offshore exploration, leads to hazardous pollution and extreme damages on marine ecosystems and coastal areas. Several oil fields identified in Figure 13, such as Nemba and Block 0, are located in the Cabinda area.

Examples of oil spills have also been documented in other regions, including in wealthier countries. In the Gulf of Mexico, a crude oil spill from a cracked pipeline was recently reported near Corpus Christi [43], which is a major oil export hub.

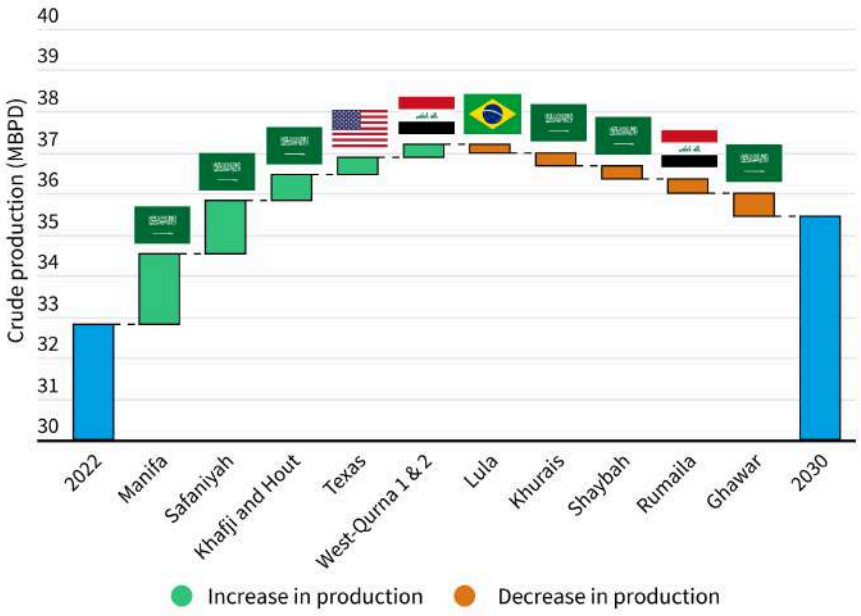
Decline in production will be compensated by new projects

Forecasts suggest that most of the production from oil fields currently exporting to Europe will slowly decline by the end of the decade. For instance, Ghawar was in 2022 by far the largest producing field in Saudi Arabia, totalling 28% of the kingdom's production. According to Stratas, the field's production is

[8] Gas flaring is the burning of the natural gas associated with oil extraction.

going to decrease by 19% by the end of the decade, and will then represent 20% of the national crude production (Figure 14).

On the other hand, new projects or extensions are expected to either compensate for the decline of existing fields or even increase the countries' national crude production. This is the case for Iraq's West Qurna 1 & 2 projects, for Brazil's Buzios field or for Saudi Arabia's Safaniyah or Manifa fields.



Source: Transport & Environment, based on data from Stratas Advisors (2023)

Figure 14: 2022-2030 oil fields production in the selected countries

4.3. Future trends in oil production and demand

This section looks at trends in global oil production up to 2030, to assess whether countries that increased their exports following the war in Ukraine intend to maintain or even increase their production and market share in the next few years. The data used is based on oil market forecasts from Stratas Advisors and the IEA.

Global and regional production forecasts in 2030

Recent shifts in global oil supply chains, combined with outlooks for oil consumption, drove a surge in oil export and production in specific geographies, as we documented previously. Oil production outlooks show that this short-term increase is forecasted to continue in the coming years. Figure 15 indicates that **the United States and Saudi Arabia could expand their production by respectively 10% and 15% between 2022 and 2030,** according to Stratas Advisors. Combined, these two big producers would therefore increase their market share of the global oil production from 25% to 30% by the end of the decade.

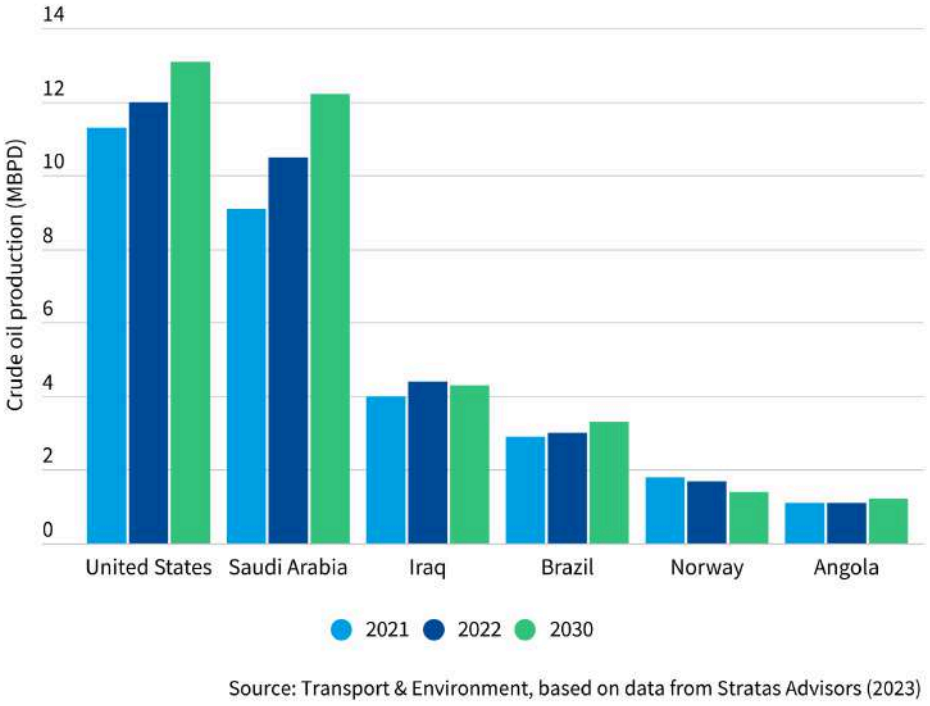


Figure 15: Projected crude oil production in the selected countries (Stratas Advisors)

Following a production surge in 2022, Iraqi crude oil production is expected to slightly decline in 2023 and 2024, before increasing again at the end of the decade, according to both Stratas Advisors and the IEA [33]. This slight slowdown is likely to be linked to the announced production cuts by OPEC countries, in order to maintain crude prices at high levels, and to uncertainties around the closure of the pipeline between Iraq and Turkey (see Section 4.3 for more details) [44].

Similarly, crude production in Norway is forecasted to culminate in the years to come before declining, even though plans for oil and gas expansion are currently supported by the Norwegian government [45]. Stratas Advisors forecast a peak production in 2023 and a decline down to 11% below 2022 levels in 2028, while the IEA foresees a peak in 2025 and a 7% decrease in 2028 compared to 2022 production levels.

Angola's production is either expected to maintain, according to Stratas Advisors, or to decline, according to the IEA, while new projects are being considered to compensate for the operational and technical issues faced by its high-cost deepwater oil fields.

Finally, Brazil's oil production is likely to grow between 10% and 24% in 2028 compared to 2022, according to Stratas Advisors and the IEA respectively. Brazil's oil surge explains the forecasted major increase in Latin American oil production: +32% until 2028, according to the IEA.

Looking at regional trends (Figure 16) over the time period, IEA forecasts Latin America to experience the greatest proportional increase in oil production. The greatest increase in volumes will come from the Middle-East and North America, with a respective increase of 8% and 10%, making around 60% of the

world's production. Production in other regions is forecasted to decline, by 2% in Africa, 4% in Russia, 12% in Asia, and 14% in Europe.

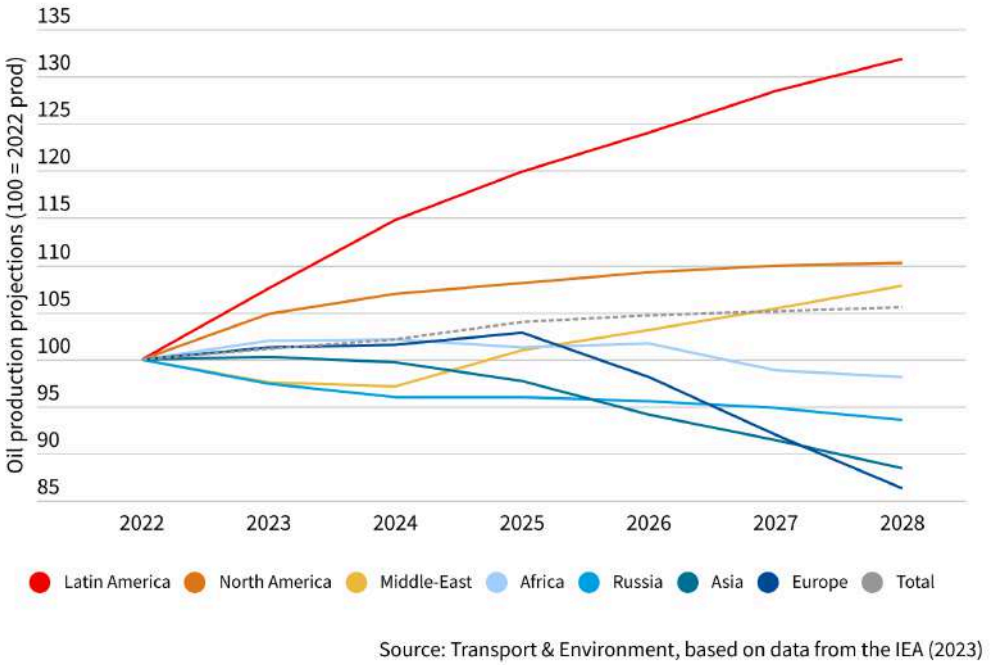


Figure 16: Normalised regional oil production forecasts (IEA)[9]

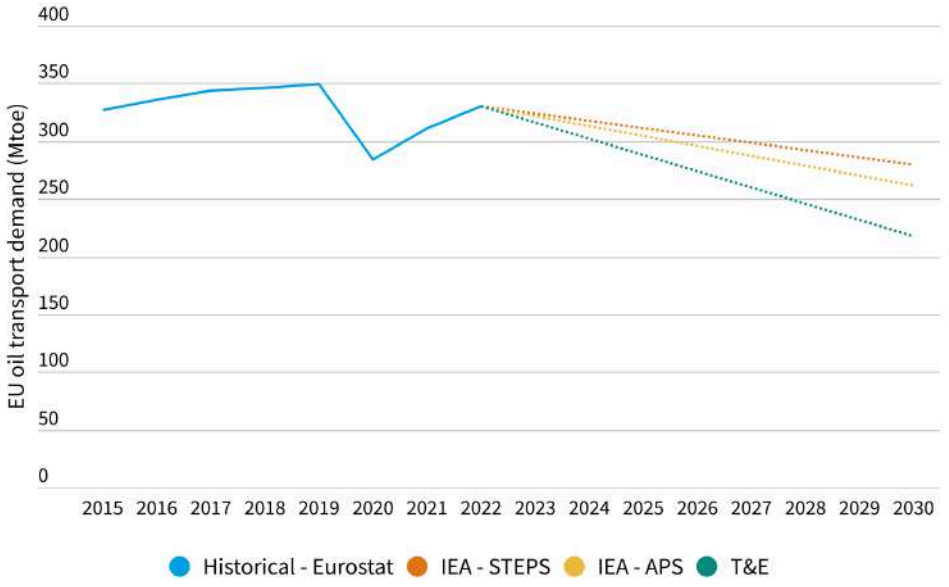
Overall**, the IEA forecasts a 5% increase in the global production of oil in 2028, compared to 2022.** Those trends are in contradiction with the median of selected IPCC scenarios and the IEA's Net Zero Emissions by 2050 (NZE) scenario, which show that global oil and gas production should decline between 15% and 30% by 2030, compared to 2020 levels [46].

Similarly to production trends, global demand is forecasted to increase by 5% between 2022 and 2028 in the IEA's market outlook. Projections differ widely among regions, with Asia expected to drive most of the surge in oil demand (75%), while increasing its consumption by 15% over the period. Africa, Latin America and the Middle-East's oil consumption is also projected to grow by 14%, 10% and 9% by 2028. On the other hand, Russia, North America and Europe will marginally decrease their oil demand by 3%, 4% and 5% respectively.

Europe's supply and demand trends in 2030

While IEA's oil market outlook only forecasts a marginal decrease in the EU's oil consumption, other scenarios show that the bloc can further decrease its reliance on oil and thus its climate impact. As shown in Figure 17, the EU could reduce by 16% the EU's oil consumption between 2021 and 2030 if it meets its current climate objectives. T&E's scenario shows that additional measures could shrink the EU's dependence on oil by 30% over the same period[10].

[9] These forecasts include not only crude oil but also natural gas liquids and some biofuels.
[10] Or a third compared to 2019, as originally modelled in our past reports [47].



IEA scenarios refer to the Stated Policies Scenario (STEPS) and Announced Pledges Scenario (APS). T&E's scenario refers to its modelling of oil savings following the Russian-Ukraine war (2022).

Source: T&E, based on data from the IEA (2022) and Eurostat (2023)

Figure 17: Europe oil transport demand scenarios (IEA, T&E)

The increase of oil consumption in Europe under a business as usual scenario will also imply an increased use of oil export infrastructure, leading to expansion plans throughout 2030. Figure 18 shows the main infrastructures used for crude oil exports to Europe in the six countries studied, according to data from Stratas Advisors. American crude exports largely come from the Gulf of Mexico. Stratas Advisors' data does not provide enough granularity to identify the specific port infrastructure where the American oil is being shipped from. However, other sources suggest that the largest export facilities are located in Texas, such as Corpus Christi or Houston [48]. **These exports are projected to keep growing to Europe, with a forecasted 11% increase at the end of the decade compared to 2022 levels**. The US is also one of the countries with the most pipeline expansion projects in the world. One of the largest pipeline projects is the Seahorse pipeline: the proposed project, according to Global Energy Monitor, aims to transport crude oil from the Permian basin to the Gulf Coast for export. This would come along with proposed oil export terminals [49].

Crude exports from Norway to Europe are concentrated in the Mongstad & Sture industrial complex, where the oil is shipped but also refined onsite. Stratas Advisors forecast a 13% decline in oil exports from this hub by 2030 compared to 2022, but the volumes would still be slightly higher than the ones exported to Europe in 2021.

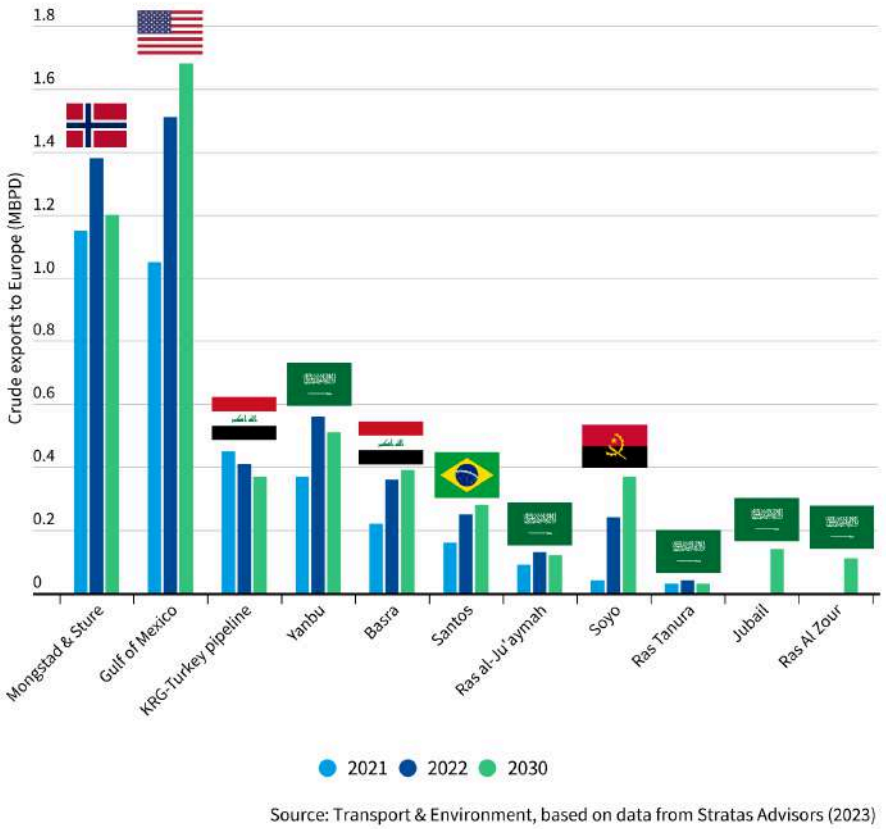


Figure 18: Selected countries' infrastructure, historical and projected exports to Europe (ports and pipeline, based on Stratas Advisors)

Due to the country's geography and access to both the Red Sea and the Persian gulf, Saudi Arabia's exports are more distributed across the country. In 2022, 80% of the oil shipped to Europe was shipped from Yanbu, which is located on the Red Sea and therefore has privileged access to the Suez canal. Due to its location in the Persian gulf, the port of Ras Tanura, which is close to the Ras Al-Ju'aymah terminal, also exported a small portion of crude volumes to Europe [50]. **According to Stratas, the expansion of the Jubail and Ras Al-Zour port facilities will also contribute to crude exports to Europe in the coming years.** Recent announcements also project major industrial expansion in these cities with the objective to develop crude-to-petrochemicals production [51].

Exports to Europe from Brazil's Santos and Angola's Soyo port facilities are expected to grow in the next few years. While Brazil's export increase (+11% between 2022 and 2030) is aligned with the forecasted surge in production, the growth in Angola's exports to Europe (+54%) seems to be contradictory with the expected stagnation or decline in production. This suggests that Angola will continue shifting its volumes from Asia to Europe in the near future.

Finally, Iraqi exports to Europe are forecasted to slightly decrease by 2030, as mentioned in the previous section. However, this trend will affect its export facilities differently. The use of the KRG-Turkey pipeline, connecting Iraq with the Mediterranean Sea, is indeed expected to decline by 10% by the end of the

decade. Oil flows going through the pipeline already stopped in March 2023, reportedly amid geopolitical tensions between the semi-autonomous Kurdish Regional Government (KRG), Iraq and Turkey [52]. An alternative project, the Basra-Aqaba pipeline, planned to connect Iraq to the Suez canal through the Red Sea, but remains uncertain [53]. On the other hand, exports from the Basra port terminal to Europe are expected to grow by 9% between 2022 and 2030.

European reliance on climate bombs

While there is a large consensus across multiple modelled climate and energy pathways, echoed by IEA's conclusions, that developing new oil and gas projects is "incompatible" with the 1.5°C target, new oil projects are still being planned globally and in the key countries supplying the EU with oil. Among them, 200 existing or planned projects are so-called oil and gas "climate bombs", which will emit more than 1 gigatonne of CO_2 over their lifetime and will exceed by far a 1.5°C carbon budget [54]. About 80 of these climate bombs are coming from new oil and gas fields.

Combining Stratas Advisors' export data in the selected countries with data on climate bombs projects[11], **T&E could identify 18 different climate bombs from which Europe will keep importing its oil,** at least until 2030. Those are the Buzios and Lula fields in Brazil, the Rumaila, West Qurna, Majnoon and Zubair fields in Iraq, the Troll and Johan Sverdrup fields in Norway, and the Ghawar, Safaniyah, Khurais, Manifa, Shaybah, Zuluf, Khursaniyah, Marjan, Abqaiq and Harmaliyah fields in Saudi Arabia.

5. Conclusions

Our research has examined the shifts in European oil demand and supply patterns following Russia's invasion of Ukraine. The findings reveal a notable disparity between oil and gas consumption trends in the EU. While gas consumption has decreased in recent years, oil consumption remains close to pre-pandemic levels. Consequently, oil imports to the EU have continued to rise compared to previous years. The EU's oil supply chains have undergone significant restructuring, with six countries absorbing most of the decline in Russian supplies. However, a considerable amount of Russian oil products continue to be imported through intermediary nations, known as 'laundromat' countries, in the form of refined products.

Furthermore, the EU has played a significant role in the global increase in oil exports between 2021 and 2022. Our research has traced the origin of the oil flowing into the EU during this period, uncovering severe environmental and health consequences in some of the main exporting countries.

Moving forward, the EU has several options to reduce its oil consumption by 2030, which will determine its impact on the projected increase in new fossil fuel projects and infrastructure, which remain incompatible with a climate safe world.

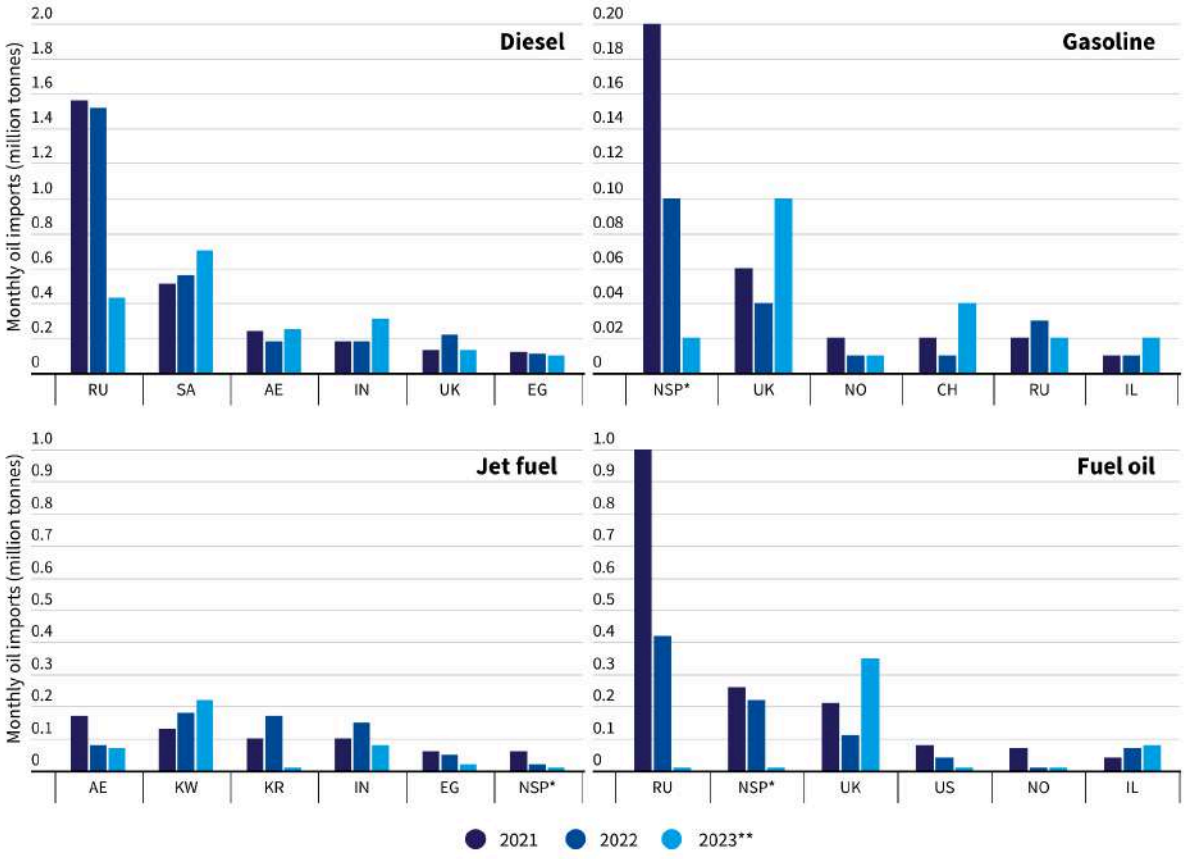
T&E suggests the following recommendations to EU decision-makers and national authorities:

[11] The accessed US export data to Europe did not provide enough granularity and was excluded from this specific analysis, but this country still accounts for more than 20 climate bombs in the world.

- Set targets for oil consumption cuts, and implement short and medium term oil saving measures in the transport sector. Modal shift policies, aerodynamic fittings on trucks, reduction in car use or phase out of fuel duty cuts have proven effective in reducing oil consumption.
- Strengthen sanctions on Russian oil by prohibiting the import of refined petroleum products from refineries using Russian crude.
- Raise the ambition of climate regulations which are still being discussed as part of the EU FitFor55 package, such as the review of the truck CO_2 standards.
- Plan for long term sobriety measures in growing oil demand sectors such as aviation. This plan could encompass measures such as a pause in airport expansion plans, increased taxation, or ones promoting modal shift from air to rail.

Annex

Origin of imported refined products to the EU



*NSP refers to Not Specified. **2023 values refer to imports between January and March as more recent data could not be accessed.

Source: Transport & Environment, based on data from Eurostat (2023)

Figure 19: Main exporters of refined products to the EU

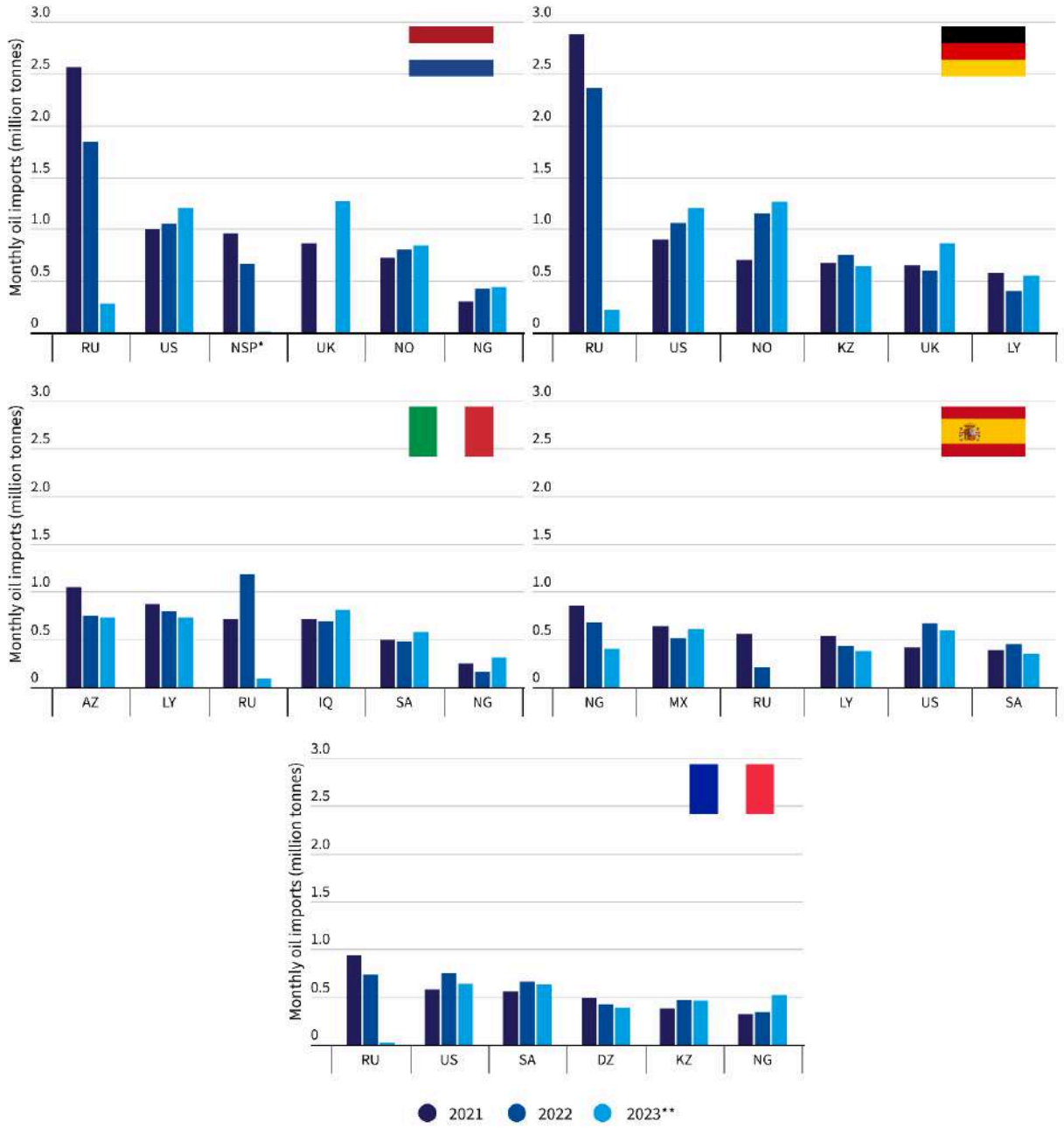
Member States oil import trends

While Section 3 detailed general shifts in oil supply chains for the whole European block, those trends might differ among the various European countries. This section provides an overview for the five largest EU importers described in Section 2.2: the Netherlands, Germany, Italy, Spain and France.

Netherlands

As explained in Section 2.2, the Netherlands was the largest importer of oil products in the EU in 2021. However, the country decreased its extra-EU oil imports in 2022 following the Russian war. Figure 20 indeed shows a 28% decline in Russian oil imports in 2022, which seems to have further decreased by

80% in the first months of 2023. This drop in Russian imports seems to have been responsible for most of the decline in extra-EU imports (75%).



*NSP refers to Not Specified. **2023 values refer to imports between January and March as more recent data could not be accessed.

Source: Transport & Environment, based on data from Eurostat (2023)

Figure 20: Top oil exporters to largest EU countries (Eurostat)

Following wider EU trends, the country increased its imports from other major oil exporters such as the US (+5%) or Norway (+11%). However, the largest growth in monthly volumes came from Saudi Arabia (+160%) and Iraq (+325%) but also from Nigeria (+40%), Angola (+463%) and China (+230%).

Early 2023 data suggest a significant increase in imports from the UK, after a total cut in 2022. Imports of unknown origin also made up a considerable share of 2021 and 2022 imports (around 10%), potentially interfering with the above results.

Germany

Germany's extra-EU imports of oil grew in 2022, making it the first EU importer at the end of the year. This can be attributed to the rather limited decrease in Russian oil imports throughout 2022. While the share of Russian oil among imports went down from 42% to 21% between January and December 2022, the actual volumes imported from Russia only decreased by 18% in 2022 compared to 2021. As detailed in Section 3.1, this could be explained by the high reliance of Germany on the Druzhba pipeline.

Figure 12 also shows an increase in imported volumes from the US (+18%), Norway (+63%) and from Kazakhstan (+13%). While Kazakh oil imports seem to be limited in the first months of 2023, they are likely to increase in the future. Announcements suggest that Germany will indeed shift to Kazakhstan to replace its remaining Russian oil imports to, as the Kazakh state-owned oil company KazMunayGas declared that 1.2 million tonnes of crude oil will be piped to Germany in 2023, according to Eurasia Daily Monitor [55]. However, according to the same source, this agreement will only work as long as Transneft, the Russian state-owned pipeline operator, allows Kazakh crude to flow across the Druzhba network.

Finally, the shift in oil supplies to Germany also originated from less expected suppliers such as Latin-American countries, as Eurostat monthly data indicates. Data from the German Federal Statistical Office suggests that these oil imports could have been sourced from Guyana, with monthly exports to Germany multiplied by 70 on average between 2021 and 2022 (from below 2 kt to 120 kt of oil products imported) [56].

Italy

While Italy only imported 13% of its extra-EU oil from Russia in 2021, oil flows from Russia surprisingly increased in 2022 by 65%, thus making about 19% of Italian imports. This can mainly be explained by the presence of a Russian-owned refinery named ISAB in the Sicilian port of Augusta, according to the Financial Times [57]. Before the Russian war, this refinery reportedly used to operate with various crude blends. When the sanctions over Russian oil products started, the refinery shifted from processing 30% to processing Russian crude at a 100% rate, as it could only rely on supplies from its parent company, Lukoil, according to the same source. With the ISAB refinery processing one fifth of Italy's crude oil, it resulted in a surge in overall Russian crude imports in 2022. However, monthly oil imports show that Italy imported very low volumes of Russian oil since the embargo on Russian crude oil kicked-off (-90% between November and December 2022). In the meantime, the completion of the sale of the Lukoil refinery to a Cypriot company was announced.

Besides buying Russian oil, Italy used to mainly source its oil from Azerbaijan and Libya. 2022 monthly import data suggest that imports from these countries decreased by 28% and 9% respectively compared to 2021. Early 2023 data shows which countries compensated for the decline of Italy's top three exporters: Iraq became the largest exporter to the country with a 15% surge between 2021 and early 2023. Imports from the US also jumped by 140%, so that the country entered Italy's top five oil exporters. Kazakh imports represented the highest growth, (+460% compared to 2021), which made the country Italy's sixth-largest exporter in 2023. Other top existing exporters also significantly increased their share among Italy's oil imports: such as Saudi Arabia which stayed at the fifth rank with a 17% increase.

Spain

Only 10% of Spain's extra-EU oil import came from Russia. This share fell down to 3% throughout 2022 and to zero in the first months of 2023. Spain also historically relied on imports from Nigeria and Mexico, which both declined by 21% and 20% in 2022.

On the other hand, in 2022, Spain increased its oil imports from several countries, such as Brasil (+170%) and the US (+60%) but also Angola (+240%), Iraq (+40%) and Canada (+62%). Early 2023 data also show an increase of imports from other Latin-American countries, including Colombia, Venezuela, Ecuador and Trinidad-and-Tobago, according to El Pais [59].

Besides directly importing Russian oil, Spain also contributed to facilitating its trade through the Spanish enclave of Ceuta in North Africa, which reportedly became one of the main transfer hubs of Russian oil, bypassing the European sanctions. According to tracking data from Bloomberg, ship-to-ship oil transfers happened on a regular basis a few miles off Ceuta, effectively enabling shipping companies to transport Russian oil to other regions [60].

France

Russian oil imported in France declined by 22% between 2021 and 2022. As such, Russian oil represented 13% of the total extra-EU imports of the country in 2022. While experiencing a slight increase in oil imports between 2021 and 2022, France also switched to Angola (+570%), the US (+28%), Saudi Arabia(+18%) and also Kazakhstan (+24%) and Kuwait (+150%), to supply its oil.

Companies stakes in oil fields in selected countries

Country	Field	Participation interests
Angola	Kaombo	Total Energies (30%), Sonangol EP (33%), Exxon Mobil (15%), China Petrochemical (11%), Galp Energia SGPS (5%), New Bright International Development (6%) [61]
	Nemba	Sonangol EP (41%), Chevron (39,2%), Total Energies (10%), Eni (9.8%) [62]
	Block 0	Sonangol EP (41%), Chevron (39%), Total Energies (10%), Eni (4.9%), BP (4.9%) [63]
	PAJ[12]	Sonangol EP (47%), BP (13%), Eni (13%), Equinor (13%), China Petrochemical (8%), New Bright International Development (4.7%) [64]
	CLOV	Total (38%), Equinor (22.2%), Exxon Mobil (19%), BP Exploration Angola Ltd. (15.8%), Sonangol P&P (5%) [65]
Brazil	Lula (Tupi)	Petrobras (67.2%), Shell (23%), Galp Energia (9.2%), Pre-Sal Petroleo (0.5%) [66] [67]
	Buzios	Petrobras (88.9%), Petroleum Brasil Ltda (CNOOC) (7.3%), Brasil Petróleo e Gás Ltda (CNODC) (3.7%) [68] [67]
Iraq	Twake	DNO (75%), Genel Energy (25%) [69]
	Rumaila	Owned by Basra Oil company. Managed by Basra Energy Company (BP & PetroChina, undisclosed share %) [70] [71]
	Taq Taq	Genel Energy (55%), Addax Petroleum Corp (45%, parent company: Sinopec) [72]
	Shaikan	Gulf Keystone Petroleum (80%), MOL Hungarian Oil and Gas (20%) [73]
	West Qurna 1 & 2	West Qurna 1: ExxonMobil Iraq Limited (Parent company ExxonMobil) (22.7%)[13], PetroChina (32.7%), CIECO West Qurna Limited (Parent company ITOCHU Corporation) (19.6%), PT Pertamina Iraq EP (Parent company Pertamina) (20%), Iraqi Oil Exploration Company (5%) [75] West Qurna 2: Lukoil Oil (75%), Iraq Ministry of Oil (25%) [76]
Norway	Johan Sverdrup	Equinor (42.6%), Aker BP ASA (31.5%), Petoro (17.4%), Total Energies EP Norge (8.4%) [77]
	Snorre	Equinor (33.3%), Petero (30%), Var Energi ASA (18.6%), Wintershall Dea Norge AS (8.6%), Inpex Idemistu Norge AS (9.6%) [78]
	Edvard Grieg	Aker BP ASA (65%), OMV Norge (20%), Wintershall Dea Norge (15%) [79]
	Ekofisk	Total Energies EP Norge AS (39.9%), ConocoPhillips

[12] Palas, Astraea, Juno.

[13] Different sources mention ongoing discussions between Exxon and Pertamnia on the sale of Exxon' shares in West Qurna 1 project [74].

		Skandinavia AS (35.1%), Var Energi (12.4%), Sval Energi AS (7.6%), Petoro AS (5%) [80]
	Troll	Petoro AS (56%), Equinor Energy AS (30.6%), A/S Norske Shell (8.1%), Total Energies EP Norge AS (3.7%), ConocoPhilips Skandinavia AS (1.6%) [81]
Saudi Arabia	Ghawar	Aramco (100%) [82]
	Manifa	Aramco (100%) [83]
	Khursaniyah	Aramco (100%) [84]
	Safaniyah	Aramco (100%) [85]
	Shaybah	Aramco (100%) [86]

Table 1: Companies stakes in oil fields in the selected countries, based on public data available at time of publication

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