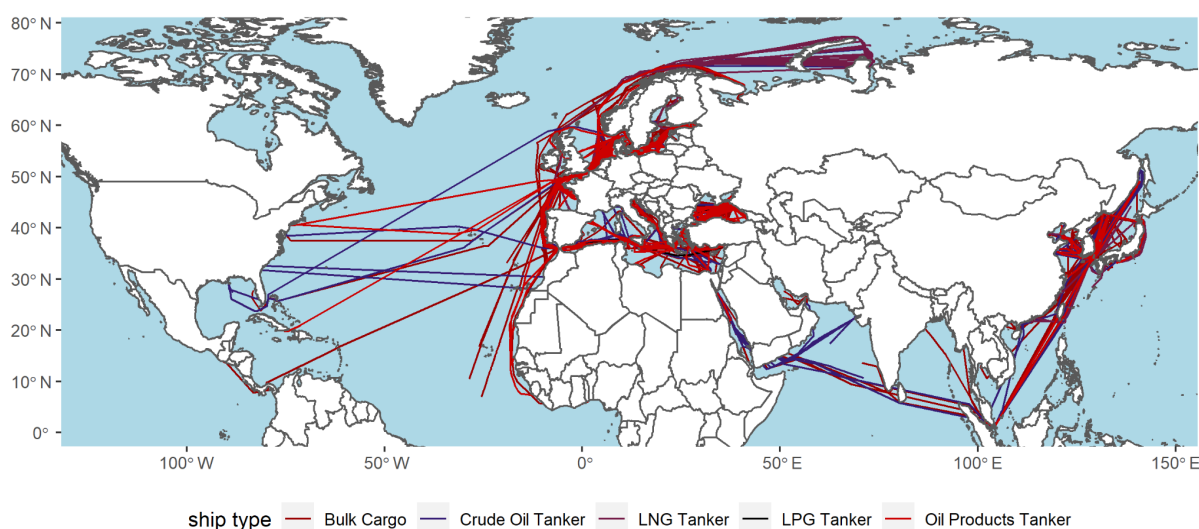


Financing Putin's war on Europe: Fossil fuel imports from Russia in the first two months of the invasion

Corrected version: we detected errors in our data on pipeline gas imports into the EU; these have been corrected. We have also improved the allocation of gas imports by country (more details on the updates [here](#) and corrections [there](#)).

Fossil fuel exports are a key enabler of Russia's military buildup and brutal aggression against Ukraine. To shed light on who purchases Russia's oil, gas and coal, and how the volume and value of imports have changed since the start of the invasion, the Centre for Research on Energy and Clean Air has compiled a detailed dataset of pipeline and seaborne trade in Russian fossil fuels.

Movements of cargo ships transporting Russian fossil fuels since Feb 24, 2022



Key findings

- 58 billion EUR worth of fossil fuels were exported via shipments and pipelines from Russia since the beginning of the invasion. The EU imported 70% of this, worth approximately 39 billion EUR.
- The largest importers in order were Germany (EUR8.3bln), China (EUR7.1bln), Netherlands (EUR6bln), Italy (EUR4.3bln), Poland (EUR3.4bln), Turkey (EUR2.7bln) and France (EUR2.4bln).
- Even in the absence of import bans, avoidance of Russian supplies is reducing seaborne imports. Oil deliveries from Russia to foreign ports fell by 20% in the first three weeks of April, compared with the January-February period before the invasion. Coal increased by 20%, while LNG deliveries increased by 50%. The fall in crude oil accelerated after mid-March.
- Deliveries of oil to the EU fell by 20% and coal by 40%, while deliveries of LNG increased by 20%. EU gas purchases through pipeline increased by 10%. Oil deliveries to non-EU destinations increased by 20%, and with major changes in destinations. Deliveries of coal and LNG outside the EU increased by 30% and 80%, respectively.
- Russia is struggling to divert cargoes not taken up by European buyers: there has been a sharp increase in vessels leaving Russian ports without a definite destination.
- A quarter of Russia's fossil fuel shipments arrived in just six EU ports: Rotterdam (Netherlands), Maasvlakte (Netherlands), Trieste (Italy), Gdansk (Poland) and Zeebrugge (Belgium).
- Major oil firms, power utilities and industrials continued to buy Russian fossil fuels: we detected deliveries to facilities or with ships linked to oil companies Exxon Mobil, Shell, Total, Repsol, BP, Lukoil, Neste and Orlen and Trafigura; power utilities RWE, KEPCO, Taipower, Tohoku Electric Power, Chubu Electric Power, TEPCO, Kyushu Electric Power; and industrial companies Nippon Steel, POSCO, Formosa Petrochemical Corporation, Mitsubishi, Hyundai Steel, Sumitomo and JFE Steel.
- There is a clear pick-up in oil shipments to India, Egypt and other "unusual" destinations for Russian exports. However, the shipments to these new destinations are nowhere near enough to make up for the fall in exports to Europe.

Introduction

Two months have passed since the beginning of Russia's unprovoked and unjustified assault of Ukraine. Over that period of time, the deliberate atrocities committed by the Russian military include indiscriminate bombing of civilians and civilian infrastructure, mass killing of civilians, shelling of humanitarian corridors, widespread torture, rape and abductions, as well as environmental war crimes.

Economic sanctions that undermine the ability, if not the willingness, of the Kremlin to wage war on Ukraine are an essential part of the response to the invasion. These sanctions have however been undermined by continued fossil fuel imports from Russia, particularly to the EU. Europe's desire to keep the door open to fossil fuel shipments and payments for them has prevented more comprehensive sanctions on Russian banks, financial institutions and trade. The inflow of cash worth hundreds of millions of euros per day has supported the ruble exchange rate and weakened the effect of the sanctions.

The European Union and many Member States have responded to the crisis by announcing new clean energy and energy efficiency targets, policies and measures. These steps will provide a replacement for Russian fossil fuels over the next few years, but they have essentially no effect on Russia's fossil fuel export revenue in the short term.

Import volumes already have fallen due to self-sanctioning, corporate and national decisions to stop purchases.

In the short term, Russia has no replacement for Europe as the source of demand. The majority of the country's fossil fuel exports are transported to Europe via pipelines, as well as ports on the Baltic Sea and Black Sea. The LNG terminals or alternative pipeline connections to divert pipeline gas exports elsewhere simply do not exist. The varieties of crude oil and coal exported to Europe struggle to find other buyers as there are few refineries and power plants designed to use them.

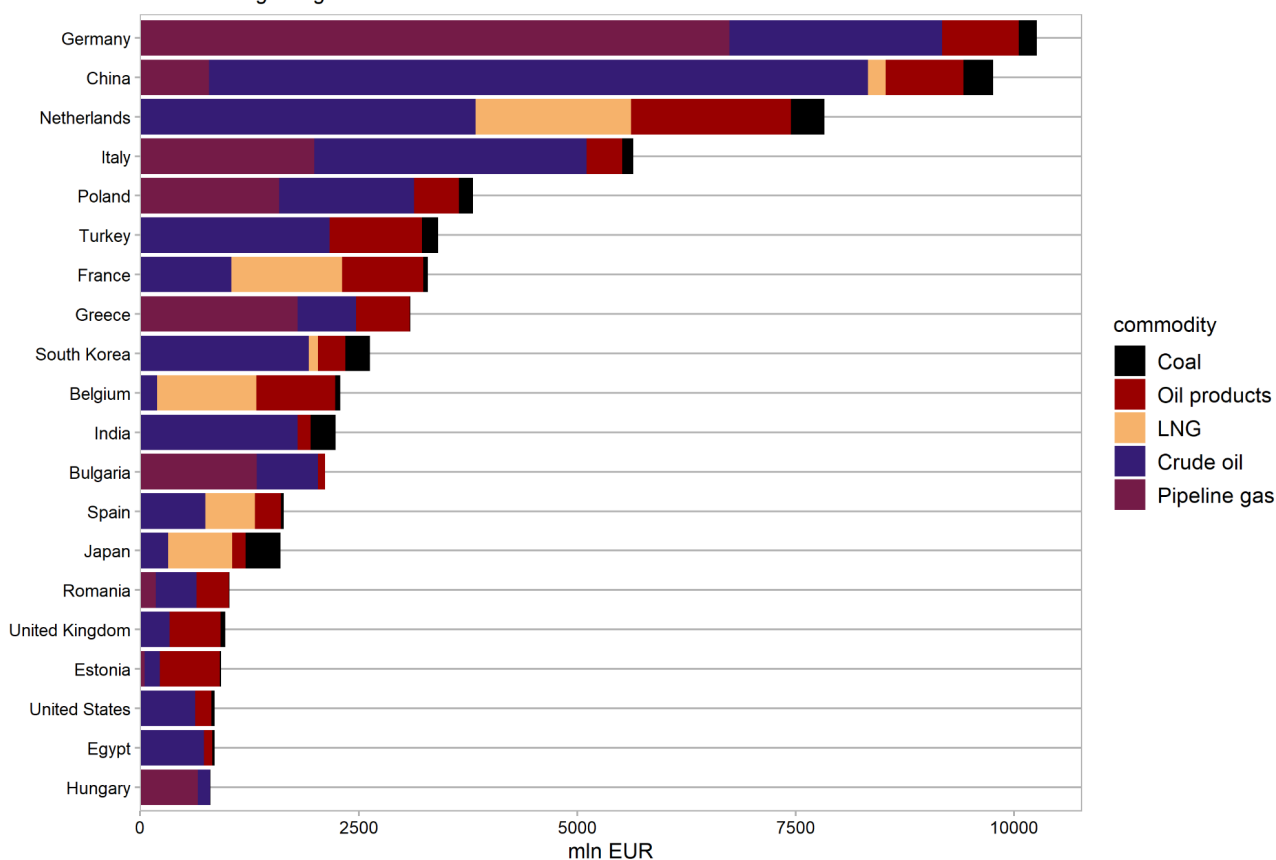
In recognition of these factors, the IEA [forecasts](#) an almost 15% fall in oil production by the end of April and 25% in May. However, without much stronger steps, the increase in fossil fuel prices more than offsets the reduction in volumes.

Russia exported 58 billion EUR worth of fossil fuels; EU is by far the largest buyer

- 58 billion EUR worth of fossil fuels were exported from Russia since the beginning of the invasion. The EU imported 70% of this, worth approximately 39 billion EUR. The share of the EU was approximately 30% for coal, 50% for crude oil, 80% for LNG, 70% for oil products and 90% for pipeline gas.
- The largest importers in order were Germany (EUR8.3bln), China (EUR7.1bln), Netherlands (EUR6bln), Italy (EUR4.3bln), Poland (EUR3.4bln), Turkey (EUR2.7bln) and France (EUR2.4bln).

Largest importers of fossil fuels from Russia

since the beginning of the invasion

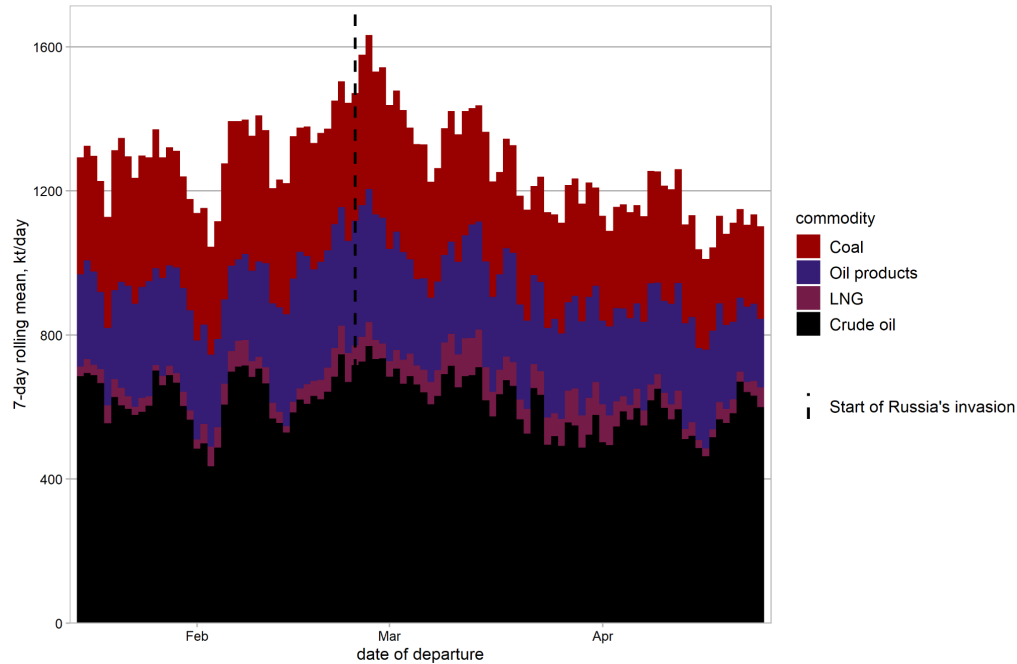


Sanctions work: Russia's export volumes are falling

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- Deliveries of oil to the EU fell by 20% and coal by 40%, while deliveries of LNG increased by 20%. EU gas purchases through pipeline increased by 10%. Oil deliveries to non-EU destinations increased by 20%, and with major changes in destinations. Deliveries of coal and LNG outside the EU increased by 30% and 80%, respectively.
- Seaborne shipments made up approximately half of Russia's exports by value in the two-month period, so the contraction is significant.
- Shipping data shows that Russia is struggling to divert cargoes not taken up by European buyers: there has been a sharp increase in vessels leaving Russian ports without a definite destination (either "for orders" or reporting an intermediate destination such as the Bosphorus or Gibraltar).
- Oil shipments to India, Egypt and other "unusual" destinations for Russian exports have attracted a lot of attention, and our data shows a clear pick-up from a base of almost zero. However, the shipments to these new destinations are by far not sufficient to make up for even the modest fall in exports to Europe.

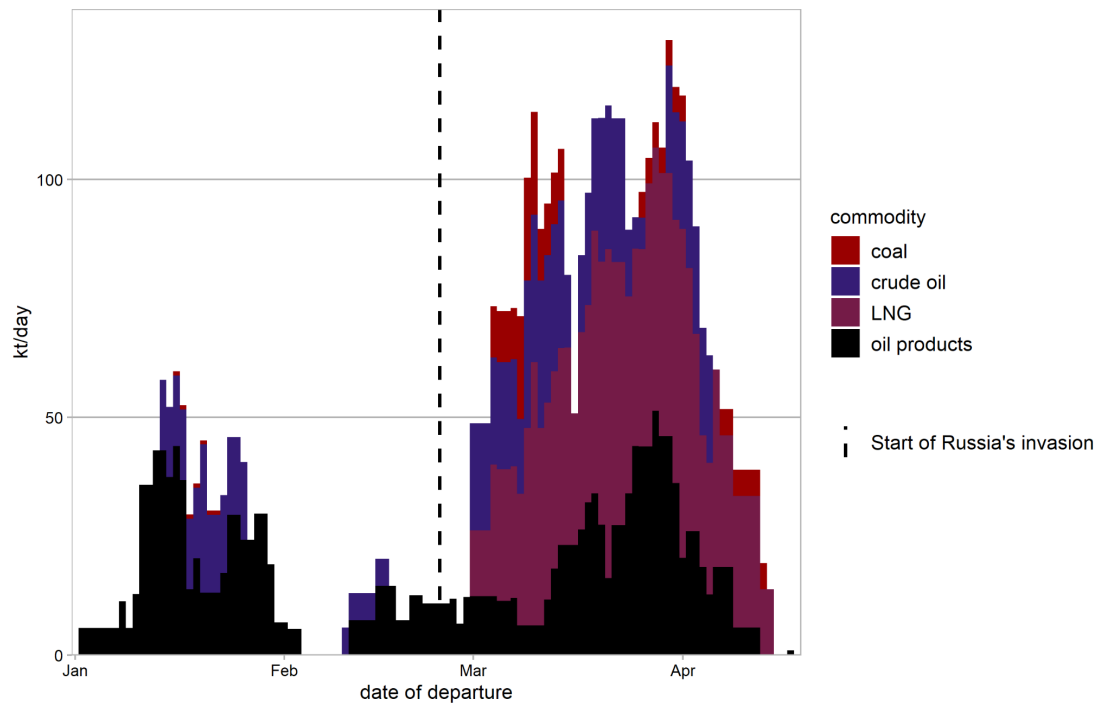
Shipment volumes

Departures of fossil fuel shipments from Russian ports



Glut of unsold cargoes

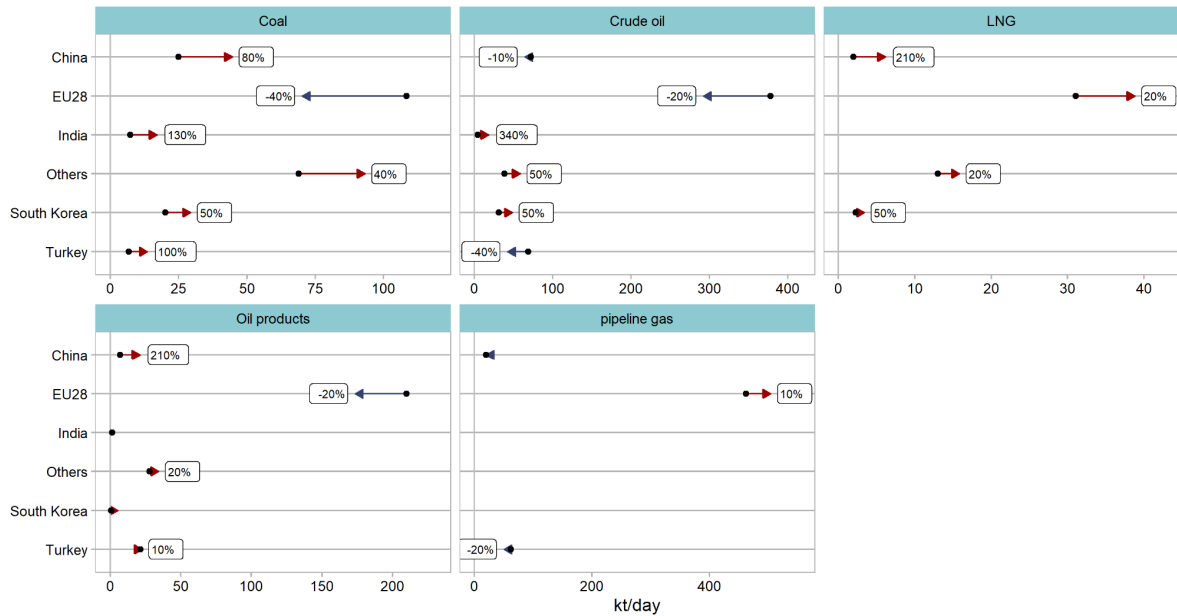
Departures from Russian ports "for orders"



Updated May 17, 2022

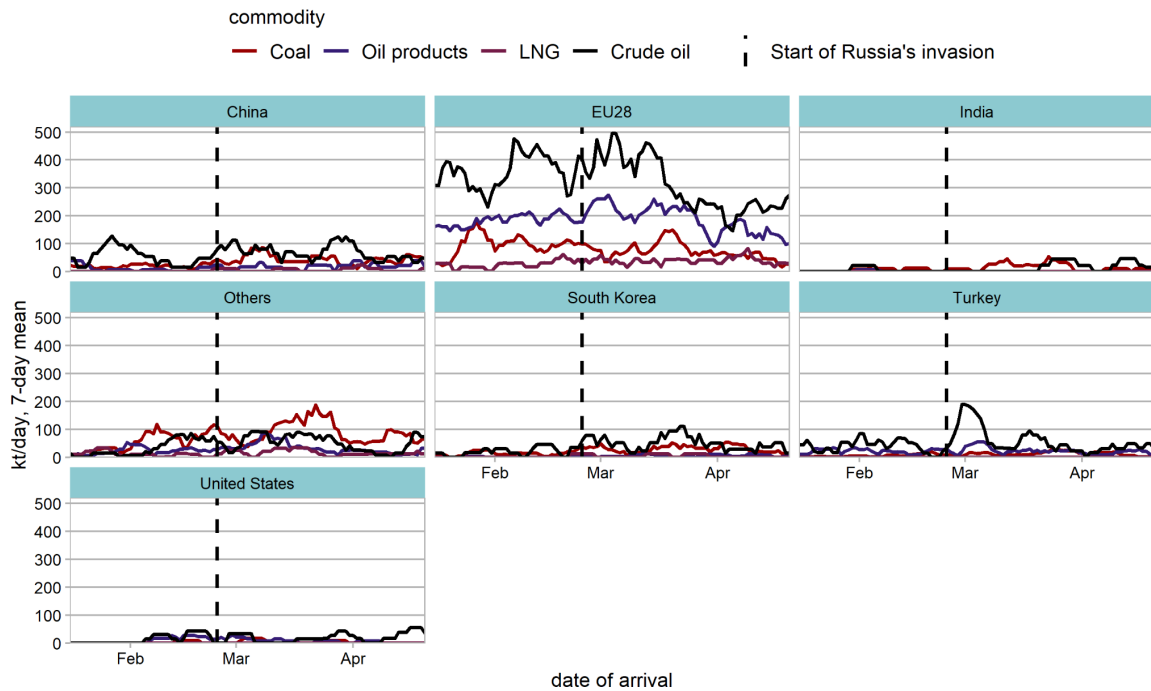
Changes in import volumes

First three weeks of April compared to Jan-Feb before invasion



Fossil fuel shipments from Russia

Combined tonnage of ships arriving in ports outside Russia by destination



Largest importing ports: 6 EU ports were responsible for a quarter of seaborne imports

- A quarter of Russia's fossil fuel shipments arrived in just six EU ports. The largest ports receiving fossil fuels from Russia are Rotterdam (estimated value of shipments EUR 1,500 mln) and Maasvlakte (EUR 1,200 mln) in the Netherlands, followed by Trieste (EUR 1,000 mln) in Italy, Gdansk in Poland, and Zeebrugge and Antwerpen in Belgium. Stopping shipments to these ports alone would have eliminated 23% of seaborne demand.

Ten largest ports by value of Russian fossil fuel shipments in the first two months of the invasion (values in mln EUR)

| port | country | coal | crude oil | LNG | oil products | total |
|---------------------|-------------|------|-----------|-----|--------------|-------|
| Rotterdam | Netherlands | 0 | 1478 | 0 | 629 | 2107 |
| Maasvlakte | Netherlands | 119 | 837 | 264 | 63 | 1282 |
| Yeosu | South Korea | 0 | 817 | 0 | 138 | 955 |
| Trieste | Italy | 22 | 750 | 0 | 157 | 929 |
| Gdansk | Poland | 5 | 664 | 0 | 178 | 847 |
| Zeebrugge | Belgium | 0 | 0 | 797 | 0 | 797 |
| Antwerpen | Belgium | 9 | 122 | 0 | 471 | 602 |
| Körfez | Turkey | 0 | 342 | 0 | 199 | 541 |
| Constanta | Romania | 1 | 274 | 0 | 256 | 531 |
| Montoir-de-bretagne | France | 0 | 0 | 520 | 0 | 520 |

Major oil firms, power utilities and industrials continue to buy Russian fossil fuels

- While most of the shipments go into nondescript handling and storage terminals, we detected deliveries to facilities linked to oil companies Exxon Mobil, Shell, Total, Repsol, BP, Lukoil, Neste and Orlen. Out of major fossil fuel producers and traders, ships chartered by Shell, Exxon, Total and Trafigura have continued to carry Russian fossil fuels in April. Power utilities and industrial companies importing Russian fossil fuels include RWE, KEPCO, Taipower, Chubu Electric Power, TEPCO, Kyushu Electric Power, Nippon Steel, Tohoku Electric Power, POSCO, Formosa Petrochemical Corporation, Mitsubishi, Hyundai Steel, Sumitomo and JFE Steel.

Largest identified oil importers

| owner | ports | countries | latest delivery | estimated total value, MEUR | tonnage, kt | number of shipments |
|--|-----------------------|-------------|-----------------|-----------------------------|-------------|---------------------|
| Seastock S.r.l. | Trieste | Italy | 2022-04-16 | 950 | 1374 | 12 |
| Vopak | Rotterdam, Waalhaven | Netherlands | 2022-04-06 | 760 | 1109 | 11 |
| PERN | Gdansk | Poland | 2022-04-09 | 750 | 1128 | 14 |
| Maasvlakte Oil Terminal (Vopak, Aramco Overseas, BP, ExxonMobil, Shell, Total, Lukoil) | Maasvlakte, Rotterdam | Netherlands | 2022-04-05 | 530 | 782 | 7 |
| Lukoil | Burgas | Bulgaria | 2022-04-08 | 450 | 691 | 6 |
| Oil Terminal S.A. | Constanta | Romania | 2022-04-10 | 420 | 594 | 14 |
| JANAF Oil & Natural Gas Co, | Omialj | Croatia | 2022-04-10 | 360 | 546 | 4 |
| SOCAR state oil company of Azerbaijan | Nemrut Bay | Turkey | 2022-04-13 | 340 | 497 | 4 |
| Sea Invest Group | Antwerpen | Belgium | 2022-04-14 | 320 | 444 | 9 |
| ESSR B.V. | Rotterdam | Netherlands | 2022-04-13 | 310 | 451 | 4 |

Largest identified coal importers

| owner | ports | countries | latest delivery | estimated total value, MEUR | tonnage, kt | number of shipments |
|--|--|----------------------|-----------------|-----------------------------|-------------|---------------------|
| Hamburg Port Authority | Hamburg | Germany | 2022-04-06 | 100 | 515 | 6 |
| EMO | Maasvlakte | Netherlands | 2022-04-10 | 87 | 388 | 4 |
| KEPCO | Dangjin, Incheon | South Korea | 2022-04-03 | 70 | 332 | 4 |
| Taiwan International Ports Corporation | Kaohsiung, Taichung | Taiwan | 2022-04-09 | 60 | 266 | 7 |
| North Sea Port | Everingen, Gent (ghent), Terneuzen, Vlissingen | Netherlands, Belgium | 2022-04-07 | 45 | 193 | 9 |
| RWE | Eemshaven | Netherlands | 2022-03-26 | 42 | 177 | 4 |
| JFE Steel | Fukuyama, Hiroshima, Kawasaki, Chiba | Japan | 2022-04-14 | 41 | 177 | 6 |
| Chubu Electric Power, TEPCO | Hitachinaka, Amsterdam | Japan, Netherlands | 2022-03-30 | 40 | 172 | 2 |
| Hyundai Steel | Pyeongtaek | South Korea | 2022-04-14 | 40 | 221 | 3 |
| Formosa Petrochemical Corporation | Mai-liao | Taiwan | 2022-03-20 | 40 | 170 | 1 |

Largest identified LNG importers

| owner | ports | countries | latest delivery | estimated total value, MEUR | tonnage, kt | number of shipments |
|--|---------------------|-----------------|-----------------|-----------------------------|-------------|---------------------|
| Fluxys | Zeebrugge, Dunkirk | Belgium, France | 2022-04-14 | 930 | 842 | 14 |
| Elengy | Montoir-de-bretagne | France | 2022-04-17 | 400 | 388 | 4 |
| Bahia Bizkaia Gas | Bilbao | Spain | 2022-03-29 | 320 | 291 | 3 |
| Chubu Electric Power, TEPCO, Tokyo Gas | Anegasaki, Yokohama | Japan | 2022-03-08 | 160 | 148 | 2 |
| Kogas S(state owned) | Anjeong | South Korea | 2022-03-13 | 94 | 85 | 1 |
| Chubu Electric Power, TEPCO | Yokkaichi | Japan | 2022-03-11 | 88 | 80 | 1 |
| Chubu Electric Power | Nagoya, Aichi | Japan | 2022-03-18 | 82 | 74 | 1 |

Policy recommendations

CREA encourages all governments and corporate buyers of Russian fossil fuels to

- end all purchases, in order to strengthen the effect of the sanctions and help end the war and the crimes against humanity committed by the Russian military.
- end transshipments of Russian fossil fuels to third parties.
- during any wind-down or transition period, or if a full ban isn't plausible, institute tariffs on imports from Russia. Sufficiently high tariffs would encourage buyers not to purchase from Russia whenever possible, and curb the price paid to Russian suppliers on spot markets.
- create a plan to replace Russian fossil fuels with clean (non-fossil) energy, energy efficiency and energy savings measures as soon as possible. This will be far more impactful than just re-arranging the global trade flows of fossil fuels, and will have far greater economic, health and national security benefits.

Methodology

Seaborne shipments

We track ship voyages between Russian ports and ports in other countries using data from MarineTraffic.com and Datalastic, derived from ship location (AIS) data.

A voyage consists of a ship taking on cargo and departing from a Russian port, arriving in a non-Russian port and discharging cargo. More complex trips such as loading cargo from both a Russian and a non-Russian port are excluded.

For crude oil tankers and LNG tankers, the type of cargo is known. We assume that oil products tankers and oil/chemical tankers carry oil products. Coal is transported by bulk carrier and general cargo ships which also carry many other types of cargo. We identified 25 “coal export terminals” within Russian ports that export coal. These are specific port locations that are associated with loading coal. When a vessel takes on cargo at one of these locations, we assume that the shipment is a coal shipment.

The amount of fuel transported in a shipment is estimated based on the cargo capacity (deadweight tonnage) of the ships, adjusted by the average ratio of ship capacity to reported customs volume. We validated this approach by aggregating the cargo capacity of shipments in the latest month with complete trade data (December 2021), and comparing these values to reported export volumes.

Trade volumes and pricing of fossil fuels (i.e. oil, coal, and gas) are often not available on hourly or daily basis, and neither are the terms for long-term contracts. To develop this counter, we therefore relied on some assumptions, as detailed below.

Other physical flows

For Europe, including Turkey, two main sources are being used for the following flows:

| | Crude oil | Oil products | Fossil gas | Coal |
|----------|-----------|--------------|------------|----------|
| Pipeline | Eurostat | Eurostat | ENTSO-G | Eurostat |
| Seaborne | AIS data | AIS data | AIS data | AIS data |

ENTSO-G data is available on a daily and near real-time basis.

Eurostat data, however, is only available on a monthly basis till the end of 2021. To derive 2022 trade flows, we scale 2021 trade flows using y-o-y ratios in November-December 2021. Oil pipeline flows to the EU and China and gas pipeline flows to China are assumed to continue at 2021 levels. China's pipeline import flows are based on latest figures given in news reports for winter 2021–22.

Pricing

Fossil fuels are sold on a variety of contracts including fixed-price, indexed to average oil prices and indexed to other spot prices. This means that the revenue to the exporter is not directly proportional to the current spot price.

To estimate prices of fossil fuel trades in 2022, we first derive historical monthly average prices for imports from Russia to the EU from Eurostat, and to the rest of the world from UN COMTRADE, since the trade values are indicated both in physical and monetary terms. We then fit models between these historical prices and average monthly spot prices for the current month and with lags (Brent crude oil, TTF gas, Newcastle steam coal, Asian LNG, ARA coal). Models are built for main trading partners individually, and for the rest of the world as a whole.

After the start of the invasion, the reluctance of many traders to take cargoes from Russia has driven discounted pricing of Russian oil. We apply the discount between Brent and Urals crude prices to crude oil exports to Europe and the discount between Brent and ESPO to exports to Asia.

Oil-indexed gas contracts have become less common over time, so we include a time interaction term in the model for pipeline gas prices. These models are then applied to current spot prices to estimate contract prices.

References

- Eurostat: <https://ec.europa.eu/eurostat/databrowser/>
- ENTSO-G transparency platform: <https://transparency.entsog.eu/>
- UN COMTRADE <https://comtrade.un.org/Data/>



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About CREA

Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions to air pollution. CREA uses scientific data, research and evidence to support the efforts of governments, companies and campaigning organizations worldwide in their efforts to move towards clean energy and clean air, believing that effective research and communication are the key to successful policies, investment decisions and advocacy efforts. CREA was founded in December 2019 in Helsinki and has staff in several Asian and European countries.

In our [statement of support](#) for Ukraine, CREA absolutely condemns the Russian military's unprovoked and unjustified attack against another sovereign nation, Ukraine. The assault goes against the fundamental values of human wellbeing, safety, and dignity that our organisation seeks to advance. We urgently call for an end to the assault and stand in solidarity with the Ukrainian and Russian people calling for peace.