Country Analysis Brief: Ukraine

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Overview

Table 1. Ukraine's energy overview, 2023

	Crude oil and other petroleum liquids	Natural gas	Coal	Nuclear	Hydro	Other renewables	Total
Primary energy production (quad Btu)	0.00	0.60	0.34	0.56		0.06[a]	1.57
Primary energy production (percentage)	0.0%	38.0%	21.9%	36.0%		4.1%	100.0%
Primary energy consumption (quad Btu)	0.38	0.69	0.48	0.56		0.06[a]	2.18
Primary energy consumption (percentage)	17.4%	31.9%	21.9%	25.9%		2.9%	100.0%
Electricity generation (TWh)	0.13	11.88[b]	21.79	51.94	10.71	6.68	102.57
Electricity generation (percentage)	0.1%	11.6%	21.2%	50.6%	10.4%	6.0%	100.0%

Data source: U.S. Energy Information Administration, International Energy Statistics
Note: We aggregate hydroelectricity and renewables as *other renewables* for primary energy production and consumption.
Quad=quadrillion British thermal units, TWh=terawatthours
[a] Includes hydroelectricity
[b] Includes other gases

- Since Russia's invasion in February 2022, Ukraine has accelerated integration of its energy trade and infrastructure with Europe, moving away from its historical ties with Russia. This integration includes trade and infrastructure related to oil, natural gas, coal, electricity, and other energy sources. Ukraine halted natural gas trade with Russia and natural gas transit from Russia as of January 1, 2025.[1]
- Until 2025, three major pipeline systems transported Russia's natural gas through Ukraine to Western Europe. The Bratstvo (Brotherhood) pipeline, which originates from the Urengoy natural gas field, crosses from Ukraine to Slovakia and splits into two to supply northern and southern European countries. The Soyuz (Union) pipeline, which originates in the Orenburg natural gas field, links Russia's pipelines to natural gas networks in central Asia and historically supplied volumes to central and northern European countries such as Slovakia, Hungary, and Romania. A third pipeline system runs through southern Ukraine and Moldova and connects to the Trans-Balkan pipeline in Romania, which previously delivered Russia's natural gas to the Balkan countries and to Türkiye (Figure 1).
- At the end of December 2024, DTEK, Ukraine's largest private energy producer, received its first U.S. liquefied natural gas (LNG) shipment of 3.5 billion cubic feet (Bcf) via the Greek LNG terminal Revithoussa.[2, 3, 4]
- Ukraine's emergency synchronization of the power grid with European Union (EU) countries is now permanent, increasing electricity trade capacity.[5]
- Russian airstrikes have partially or completely destroyed much of Ukraine's energy infrastructure, and Russia-occupied areas have separated Ukraine from a sizable portion of its

oil, natural gas, and coal reserves, particularly in the Dnieper-Donetsk region and the contested Black Sea region off the Crimean Peninsula.

Figure 1. Map of Ukraine's major pipeline infrastructure

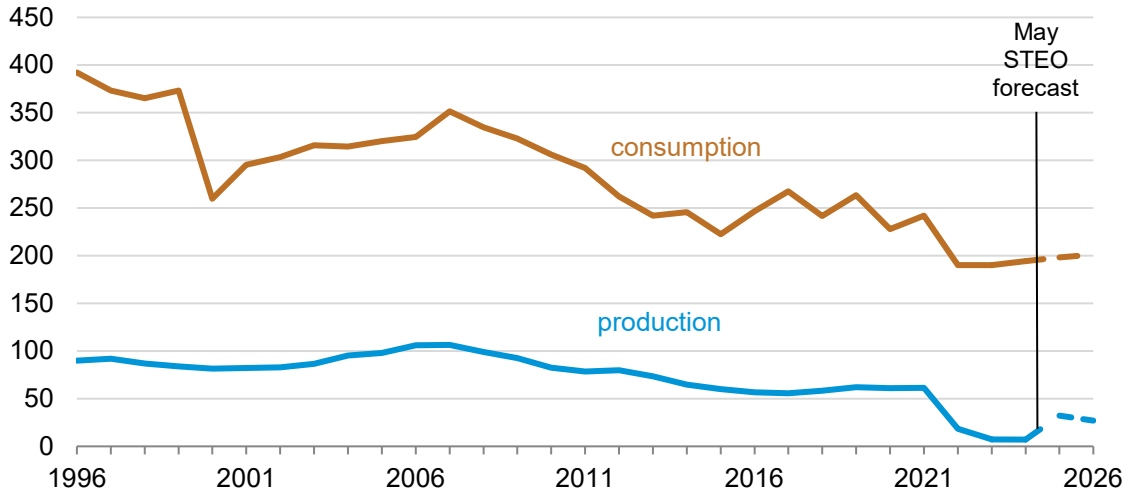
Source: EIA

Petroleum and Other Liquids

- Ukraine's oil and natural gas exploration has mainly been in the Dnieper-Donetsk region, Yuzivska Square, and the Carpathian region along the Black Sea.[6]
- Ukraine's oil production decreased dramatically after the Russian invasion, from 61,500 barrels per day (b/d) in 2021 to 7,100 b/d in 2023 (Figure 2), and remains at 7,100 b/d in 2024. We forecast Ukraine's oil production to continue to rise into 2025 before decreasing slightly again in 2026.
- Ukraine's oil consumption also fell after the Russian invasion, dipping to 190,100 b/d in 2022, and slightly rose to 194.3 b/d in 2024 (Figure 2).
- Naftogaz, Ukraine's state-owned oil and natural gas company, is responsible for most of the country's oil and natural gas acquisition, exploration, development, production, storage, processing, distribution, sales, and transportation.[7]

- Ukraine has six oil refineries that have sat largely idle for more than a decade because of either a lack of investment or because their locations in eastern Ukraine are near the conflict.[8] Kremenchug (18 million metric tons per year capacity), previously the only operating refinery still under Ukrainian control, was reportedly destroyed or made indefinitely inoperable after air strikes.[9] Ukraine seized the previously idle Odessa refinery from Russian ownership despite the refinery reportedly being destroyed during missile attacks. [10, 11]

Figure 2. Ukraine petroleum and other liquids production and consumption, 1996–2026
thousand barrels per day



Data source: U.S. Energy Information Administration, International Energy Statistics and *Short-Term Energy Outlook*

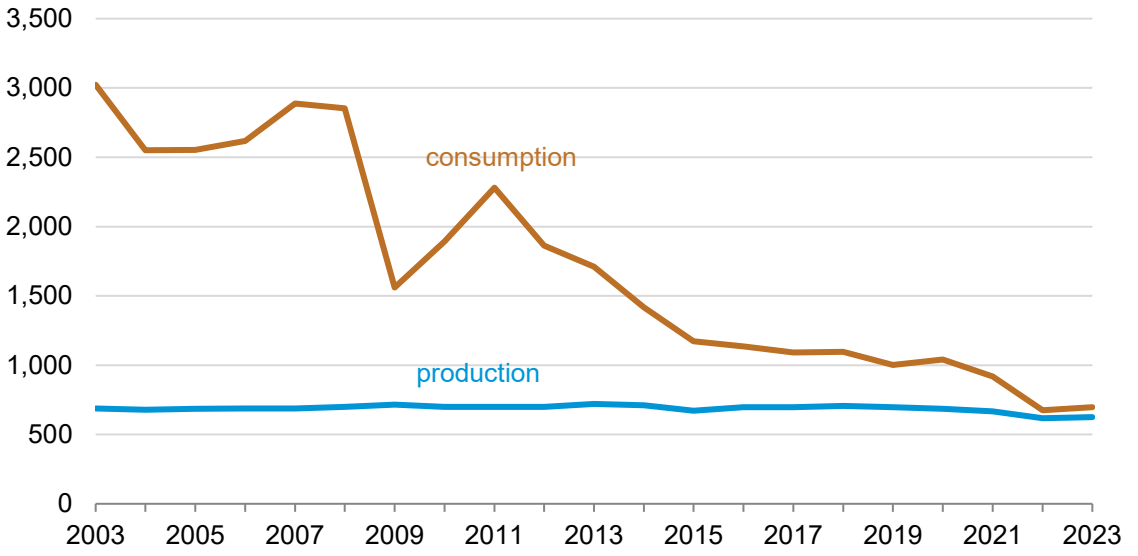
Natural Gas

- Ukraine's dry natural gas consumption totaled 696 Bcf in 2023, approximately 3% higher than in 2022. However, natural gas consumption has been trending down since 2011 (Figure 4). Ukraine has shifted away from Russia-sourced natural gas, relying instead on its European neighbors such as Hungary and Slovakia for imports.[12] The recent decline in consumption, from 918 Bcf in 2021 to 675 Bcf in 2022, is primarily attributed to disruptions from the war.[13] Ukraine's natural gas production fell slightly during the same period from 668 Bcf to 617 Bcf (Figure 4).
- Ukraine has a large natural gas pipeline system that connects Europe to Russia (Figure 1). Ukraine halted all natural gas trade with Russia and natural gas transit from Russia through Ukraine as of January 1, 2025.[14]
- Natural gas production at Naftogaz has risen since 2022 due to the commissioning of new wells (83 new wells total in 2024 alone) and redevelopment of legacy wells, according to company reports.[15,16] Naftogaz further reported in July 2024 that commissioning a new high-performing well increased production by 17%, to 9.7 million cubic feet per day, at an undisclosed location. Exploration activities have focused on the Dnieper-Donetsk Basin (Yuzivska natural gas field), the Carpathian region, and the Black Sea.[17, 18]

- Ukraine's natural gas production in the Poltava and Kharkiv regions and natural gas storage primarily in western regions of Ukraine have been subject to several Russian attacks. Naftogaz reported that production fell after the attacks, and underground natural gas storage reserves remained low, increasing the need for imported natural gas from Hungary, Slovakia, and Poland.[19]

Figure 3. Ukraine dry natural gas production and consumption, 2003–2023

billion cubic feet



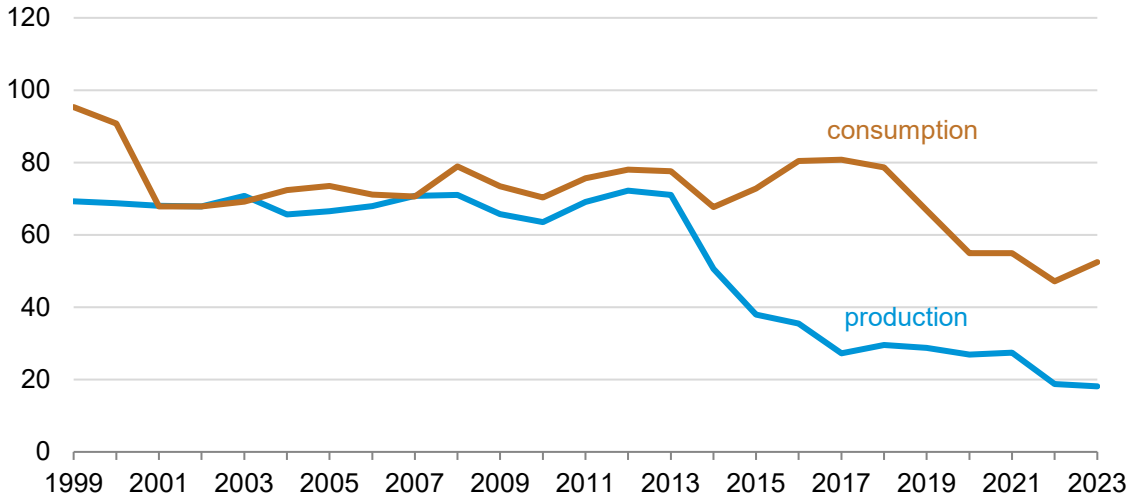
Data source: U.S. Energy Information Administration, International Energy Statistics

Coal

- Ukraine had 38 billion short tons in coal reserves in 2023, which was the eighth largest in the world after the United States, Russia, China, Australia, India, Germany, and Indonesia. Notably, most of that coal is in the Donbas-Donets Basin in Russian-controlled eastern Ukraine. The Ukrainian government has refused to buy coal from the Russian-occupied Donbas region.[20, 21] Russia used to be the primary source of coal for Ukraine, but now most of its coal comes from Poland, the United States, and Australia as of 2024.[22]
- Ukraine produced 18.1 million short tons of coal in 2023, primarily bituminous coal, which is used in power plants to generate electricity. Coal production has declined steadily from 72.2 million short tons in 2012 (Figure 4). The decline in production was accelerated in part due to the ongoing dispute in the coal-rich Donbas-Donets Basin. Most recently, production in 2025 may have been partially disrupted due to Russian troop advancement near Pokrovsk.[23]
- Production by state-owned coal mines rose by 24% in the first quarter of 2024. Average production rates were 4,100 tons per day in September 2023 and 7,100 tons per day as of March 2024.[24]

- Ukraine's coal consumption has declined from a high of 80.8 million short tons in 2017 to an estimated 47.2 million short tons in 2022 (Figure 4). This decline is due to inoperable coal-fired thermal power plants, such as PJSC Centrenergo.[25]
- Ukraine's coal production industry has faced labor shortages because of the war. DTEK reports 3,000 of its 20,000 mineworkers were fighting in the war as of the end of 2023. As a result, women, previously barred from coal mining jobs by the government, have begun to fill staffing shortages.[26]

Figure 4. Ukraine coal production and consumption, 1999–2023
million short tons



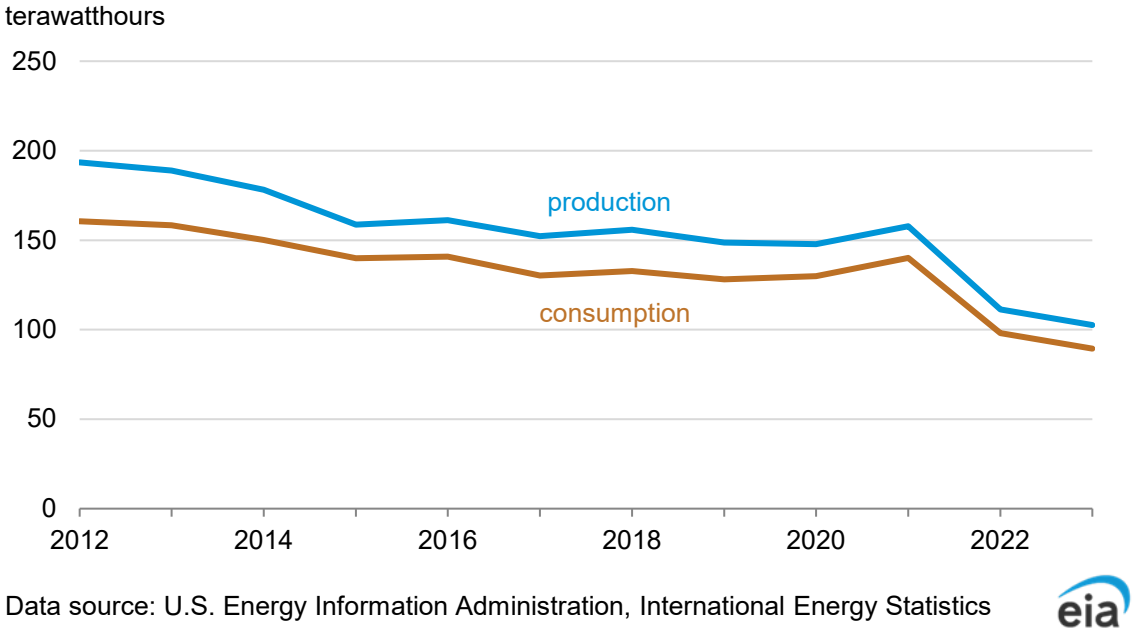
Data source: U.S. Energy Information Administration, International Energy Statistics

Electricity

- In 2023, Ukraine generated 103 terawatthours (TWh) of electric power (Figure 5), down from 158 TWh in 2021, before the invasion. The country has maintained an installed generation capacity of 60 gigawatts (GW). Nuclear power is Ukraine's main source of electricity generation, totaling 52 TWh in 2023, and coal was the second-largest source, at 22 TWh (Table 1 and Figure 6).
- Ukraine has reported that half of its power-generating capacity has been disrupted due to Russian attacks on energy infrastructure, which resumed March 2024. Russian targets since March 2024 have included:
  - Ukraine's largest dam, the DniproHES hydroelectric power facility in southern Zaporizhzhia, which lost 50% of its generating capacity
  - Five of six DTEK power stations
  - The power grid in Kyiv, which was partially damaged
  - A major underground natural gas storage site in western Ukraine's Chervonohrad district
  - The Kaniv hydroelectric plant

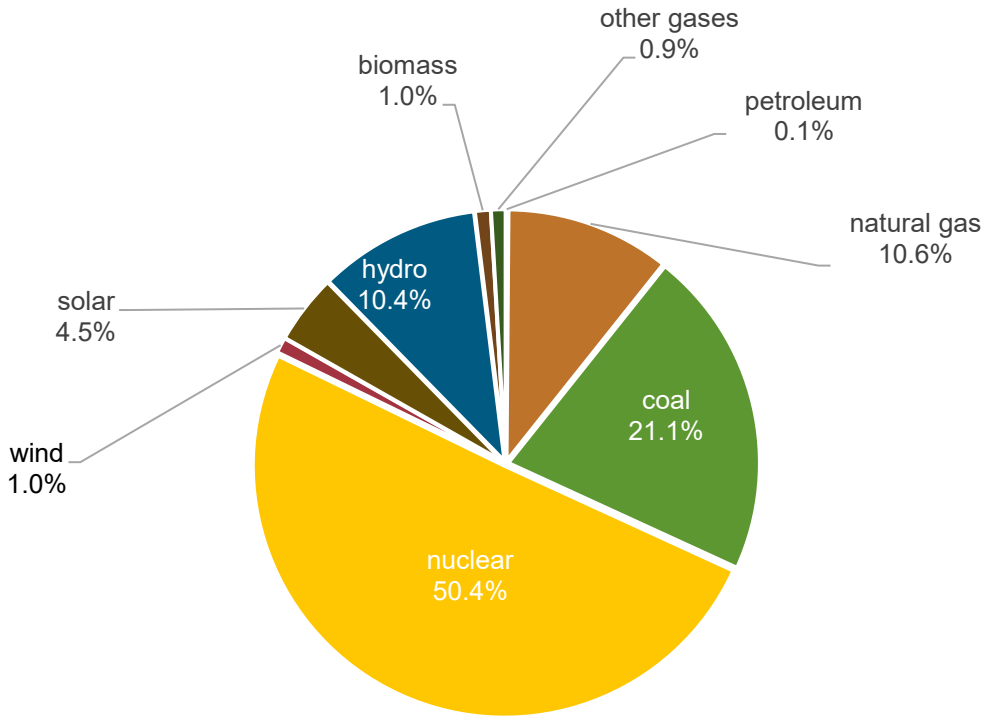
  - The largest power plant near Kyiv at 1.8 GW of capacity in Trypilska, which was destroyed[27]
- Shortly after the Russian invasion in 2022, Ukrenergo carried out a long-planned switch to synchronizing with the European power grid instead of the country's previous connection with Russia to avoid conflict-related blackouts. Ukrenergo estimates electricity imports from Europe increased 94% from 415 million kilowatthours to 935 million kilowatthours after the interconnection.[28]
- Zaporizhzhia, Europe's largest nuclear power plant, with a combined capacity of 5,700 megawatts (MW), has been occupied by Russian troops since March 2022. The plant is largely not generating electricity, which has led to an estimated $5.2 billion in lost revenue for Energoatom, Ukraine's nuclear energy agency. The plant's sole 750- kilovolt power line supplies electricity needed to cool the plant's six reactors, which are currently in cold shutdown.[29, 30, 31, 32]
- Ukraine's wind and solar capacity grew from 88 MW in 2010 to 9,823 MW at the beginning of 2022 (8,062 MW of solar capacity and 1,761 MW of wind capacity). A feed-in-tariff scheme adopted by Ukraine in 2009, which guaranteed price and a buyer for renewable power, drove private investment in renewable energy.[33] Reports suggest that Ukraine's largest private energy producer DTEK lost approximately 70% of wind capacity located in now Russian-occupied territory, and the two largest solar plants, at a combined 600 MW in capacity, are in occupied parts of Dnipropetrovsk Oblast.[34]
- Several projects to expand generation capacity are planned, including four new nuclear reactors: two Soviet-era VVE-1000 units from Bulgaria in the Khmelnytskyi region and two Westinghouse AP-1000 units in the Mykolaiv region. Construction of its two new Westinghouse AP1000 reactors is underway at the South Ukraine Nuclear Power Plant in Mykolaiv, and the Khmelnitsky VVE-1000 reactors from Bulgaria were approved by Ukraine's parliament in February 2025.[35, 36, 37] In addition, Vestas and DTEK signed a Memorandum of Understanding at the end of 2023 to expand the Tyligulska wind project from 114 MW to 498 MW.[38] Other initial plans include an additional 650-MW wind farm in Poltava and a 1,000-MW wind farm in Chernobyl.

Figure 5. Ukraine electricity production and consumption, 2012–2023



Data source: U.S. Energy Information Administration, International Energy Statistics

Figure 6. Ukraine electricity generation by fuel, 2023



Data source: U.S. Energy Information Administration, International Energy Statistics

Energy Trade

Petroleum and Other Liquids

- In late 2019, Ukraine's pipeline operator, Ukrtransnafta, extended its contract with Russia's Transneft to transport crude oil through 2030. In 2024, 230,000 b/d of Russia's crude oil transited Ukraine, down 15% from 2023.[39] Of this, Hungary imported 42% (96,000 b/d), Slovakia imported 35% (80,500 b/d), and Czechia imported 23% (52,900 b/d) via the southern branch of the Druzhba pipeline network.[40, 41]
- However, in 2024 Ukraine imposed sanctions halting oil deliveries from Lukoil (Russia's second-largest producer) via the Druzhba pipeline to Slovakia, Hungary, and Czechia.[42]
- Ukraine crude oil imports have decreased from 11,400 b/d in 2021 to 3,700 b/d in 2023 (Figure 7). Crude oil imports, sourced increasingly from Azerbaijan and Kazakhstan, supplied the Kremenchug facility, which was Ukraine's only operating refinery prior to its destruction.[43, 44]

Ukraine imports most of its petroleum products from Belarus, Russia, and Germany. Ukraine's petroleum product imports decreased slightly, with a larger drop in petroleum product exports, since the Russian invasion (Figure 9).

Natural Gas

- Historically, Ukraine received most of its natural gas imports from Russia and served as a key transit point for Russia's natural gas to Europe. However, after Russia annexed the Crimean Peninsula, Ukraine halted direct natural gas imports from Russia and replaced those imports with natural gas from European countries.[45, 46, 47] Numerous countries received Russia's natural gas partly or exclusively through Ukraine, including Austria, France, Germany and others.
- Since Russia's invasion, some of these countries have ended or decreased their reliance on Russia's dry natural gas, replacing it with pipeline natural gas from Norway or with LNG imports.[48]
- Ukraine natural gas imports slightly increased from 53.0 Bcf in 2022 to 71.6 Bcf in 2023 but are down dramatically from a decade earlier. Ukraine's natural gas exports declined to zero in 2022, from 4.8 Bcf in 2021, following the Russian invasion (Figure 8).[49]
- Ukraine stopped transporting natural gas from Russia on January 1, 2025, after a five-year natural gas transit deal with Russia expired. Russia has primarily used alternative pipeline routes such as TurkStream through the Black Sea and LNG to access Europe's natural gas market.[50, 51] Ukraine will lose up to $1 billion in transit fees, and Russia's Gazprom stands to lose $5 billion in natural gas sales.[52] One of the leading alternative proposals is to have Azerbaijan replace some of Russia's previous volumes through existing Ukraine-Russia connected pipeline infrastructure; however, Azerbaijan does not have the capacity to completely replace Russia's natural gas.[53, 54]
- Ukraine accepted its first U.S. LNG shipment (3.5 Bcf) at the end of December 2024 at the Revithoussa LNG terminal in Greece.[55] This shipment is part of Ukraine's 2024 agreement with Venture Global to import U.S. LNG. Ukraine contracted 2 million metric tons per year to be shipped as regasified LNG via pipeline over the next 20 years.[56]

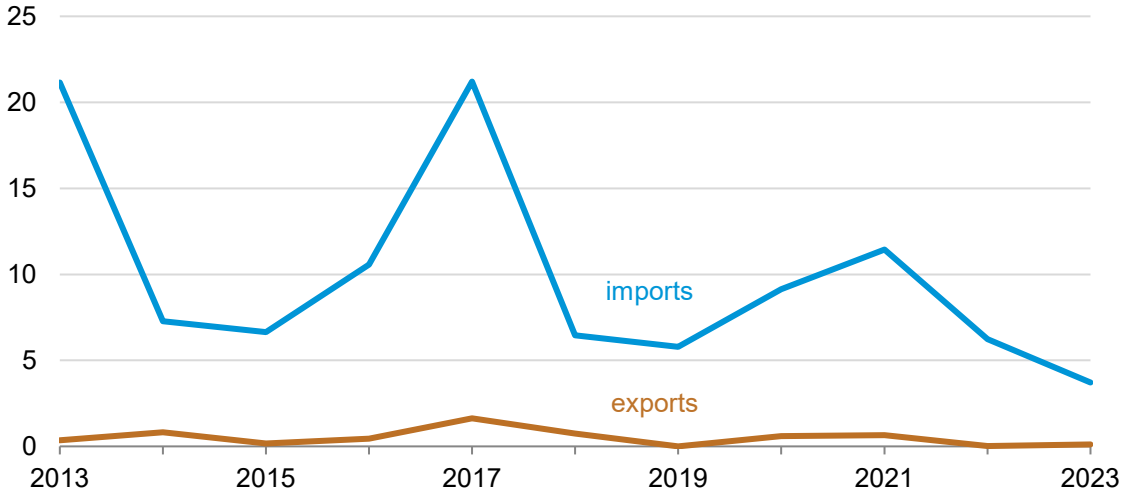
Coal

- Prior to the invasion, Ukraine primarily imported coal from Russia, but in 2013 Ukraine imported 5.6 million short tons in total, primarily from Poland, the United States, and Australia (Figure 10). Imports are reported to have decreased to 2.0 million short tons in 2024, which is significantly below pre-invasion (2015-2021) average of 20.1 million short tons.[57]
  Ukraine's coal exports have fallen dramatically over time to 22.1 thousand short tons in 2023 (Figure 10).[58]

Electricity

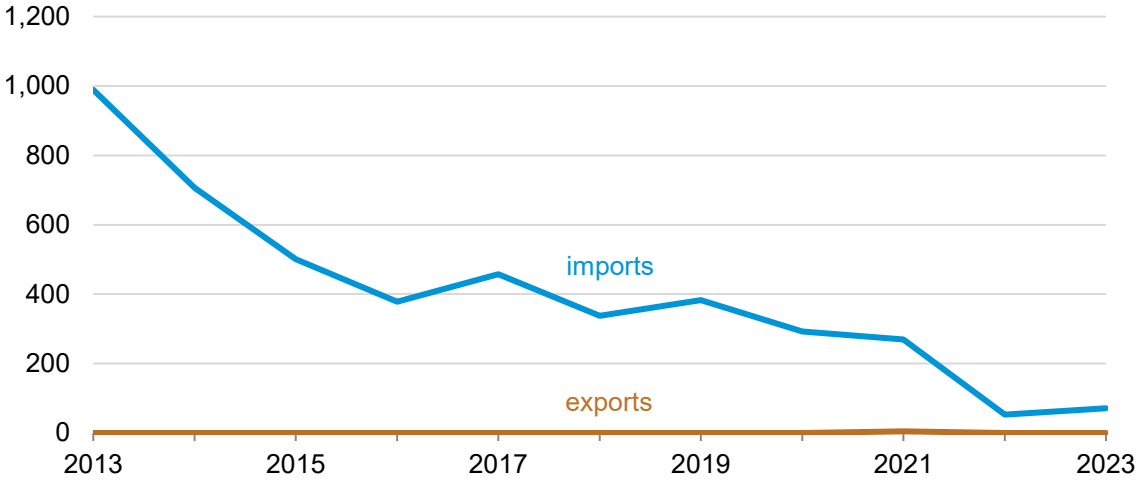
- Ukraine's electricity exports remained at 6.1 TWh in 2022 and 2023. Electricity imports decreased to 3.3 TWh in 2023 from 4.1 TWh in 2022 (Figure 11). The synchronization of Ukraine's and Moldova's electric grids to continental Europe, originally established to avoid power outages at the beginning of Ukraine's conflict with Russia, was made permanent at the end of 2023. Ukraine and Moldova are now authorized to trade 1,700 MW, up from 1,200 MW previously.[59, 60]

Figure 7. Ukraine crude oil imports and exports, 2013–2023
thousand barrels per day



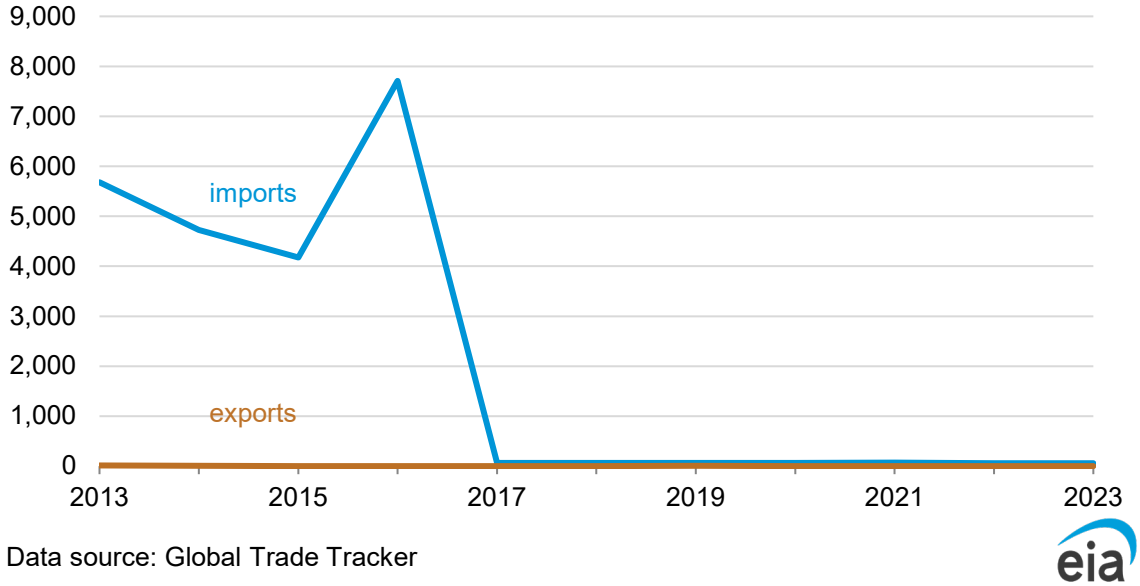
Data source: Global Trade Tracker and U.S. Energy Information Administration, International Energy Statistics

Figure 8. Ukraine natural gas imports and exports, 2013–2023
billion cubic feet



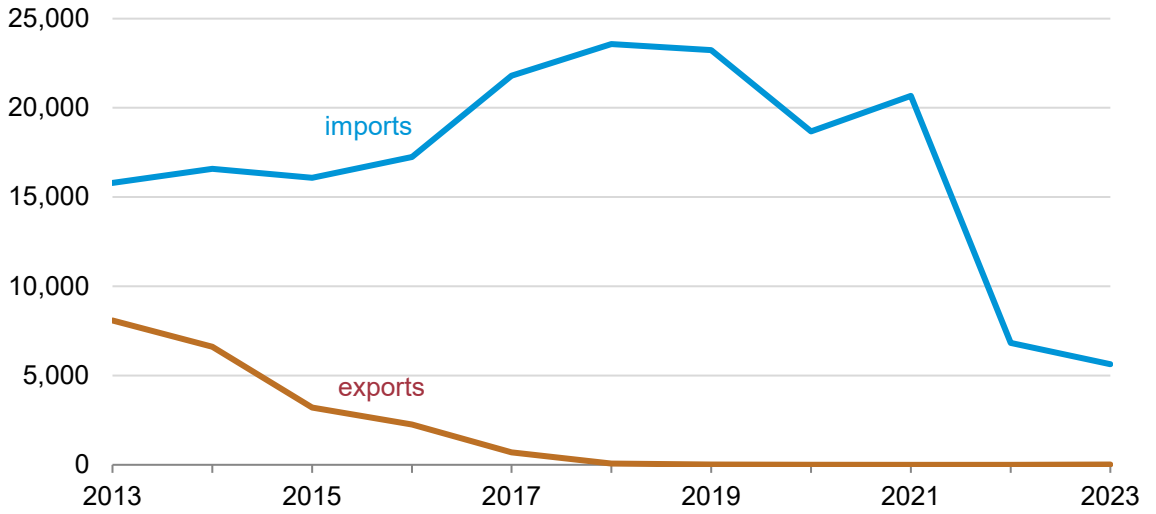
Data source: U.S. Energy Information Administration, International Energy Statistics

Figure 9. Ukraine petroleum products imports and exports, 2013–2023
thousand barrels per day



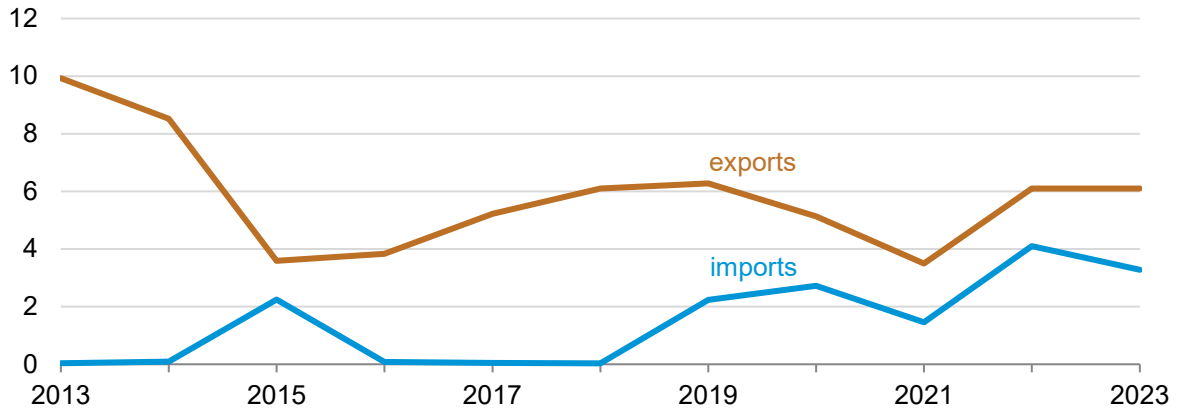
Data source: Global Trade Tracker

Figure 10. Ukraine coal imports and exports, 2013–2023
thousand short tons



Data source U.S. Energy Information Administration, International Energy Statistics

Figure 11. Ukraine electricity imports and exports, 2013–2023
terawatthours



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