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POLICY BRIEFING UKRAINE

The impact of electricity imports on domestic prices and industry

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1. Introduction

Motivation

- Russia's full-scale invasion of Ukraine and its targeted attacks on the energy system forced Ukraine to **halt commercial electricity exports** to neighbouring ENTSO-E countries in Oct-22
- Wholesale **electricity prices** in Ukraine are considerably lower than in neighbouring **ENTSO-E countries** as the latter are **not regulated by price caps**
- Higher costs for **imported electricity would put additional economic stress** on Ukrainian industries which are already suffering from war, power outages, and economic turmoil
- Ukraine has resumed electricity exports to the EU since spring-23

Purpose of this Policy Briefing

- Assessment of **electricity trade developments** between Ukraine and neighbouring ENTSO-E countries
- **Identification of most electricity-intensive sectors** in Ukraine, which may be affected by price shocks

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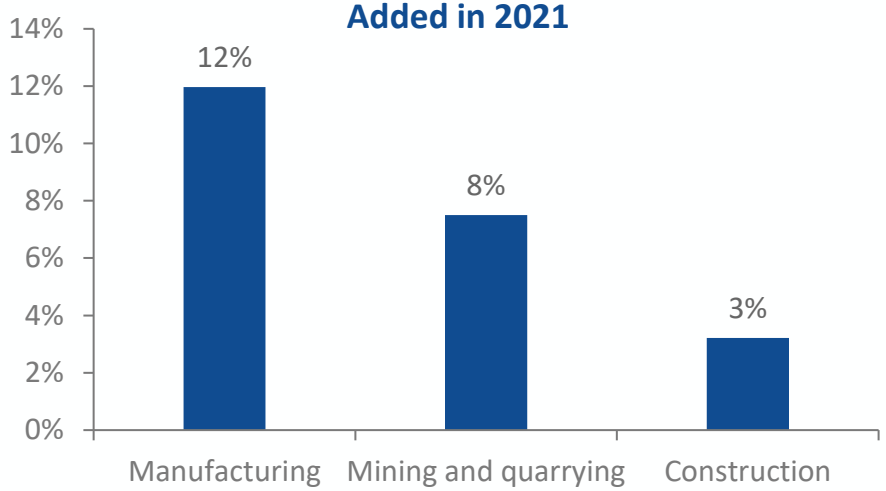
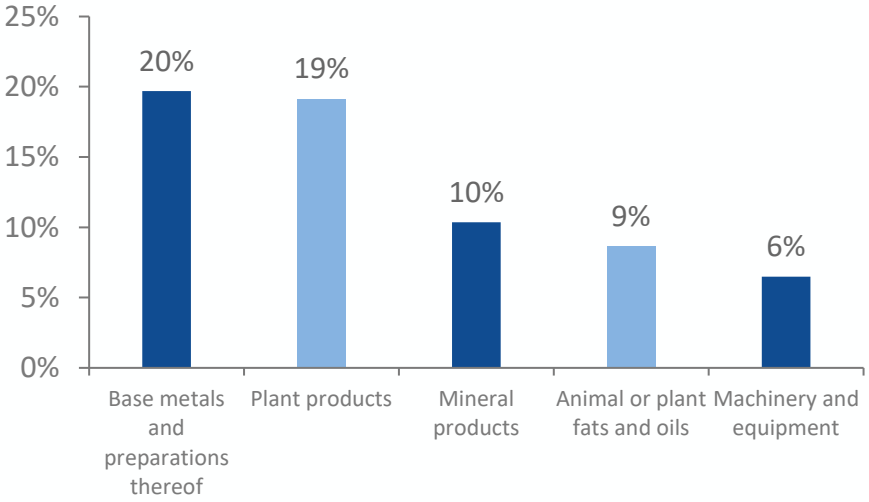
2. Industry structure in Ukraine

Industrial segment as percentage of Gross Value Added in 2021



Source: Ukrstat

Top five export categories in 2021



Source: Ukrstat

Strong industrial core

- Heavy (energy-intensive) industries play an important role in Ukraine's economy.
- Industry accounted for approx. **23% of GVA in 2021,** with manufacturing accounting for more than half

Industry's share in Ukraine's exports

- Industrial sectors such as metals, mineral products, and machinery accounted for almost **36% of total export volume in 2021**
- In comparison, the second largest export category comprised **28%** (agriproducts: **plants products**, and **animal/plant fats and oils)**

➢ **Industrial sectors compose a significant share of GVA and total exports of Ukraine, and are vital for the functioning of the economy**

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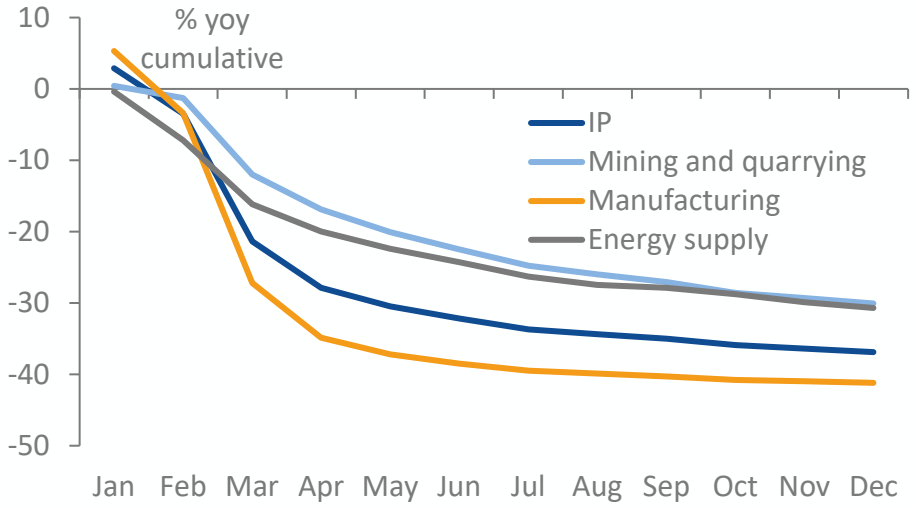
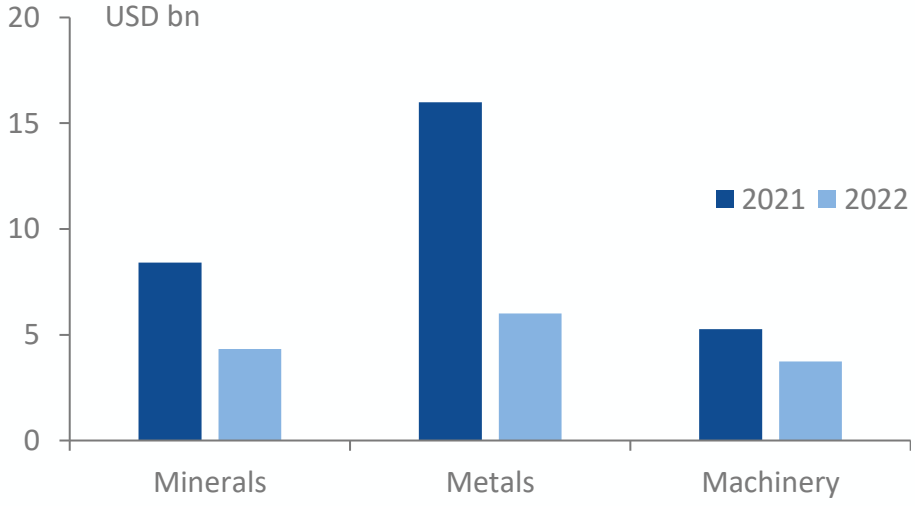
3. Recent developments in the industry sector

Industry production in 2022



Source: Ukrstat

Export dynamic of industrial



Source: Ukrstat

- Industrial production (IP) faced a **strong decline** due to the occupation and destruction of Mariupol as well as war related supply chain disruptions more broadly
- IP fell by 37% yoy in 2022, more than the decline in GDP
- While mining and energy industries declined by 31% yoy, manufacturing fell by 41%
- War-related **damage** to enterprises and industry assets amounted to over **USD 11 bn**

➢ **Russia's full-scale war leads to a declining share of the sector within Ukraine's GDP**

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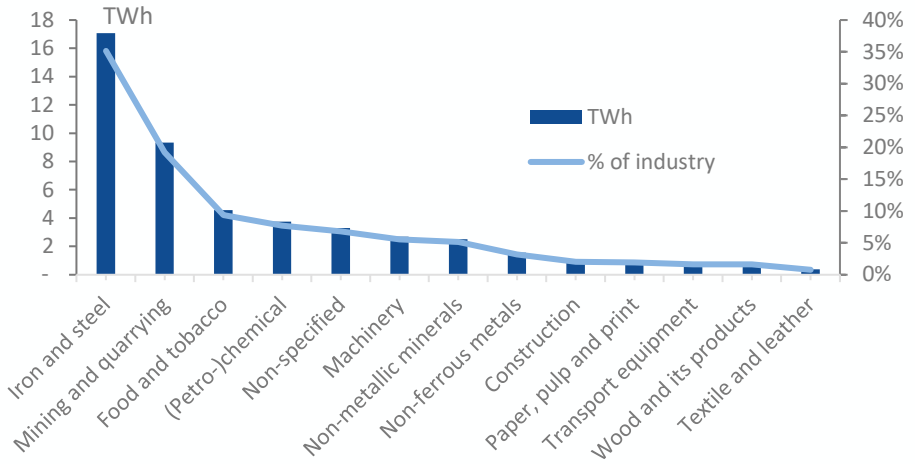
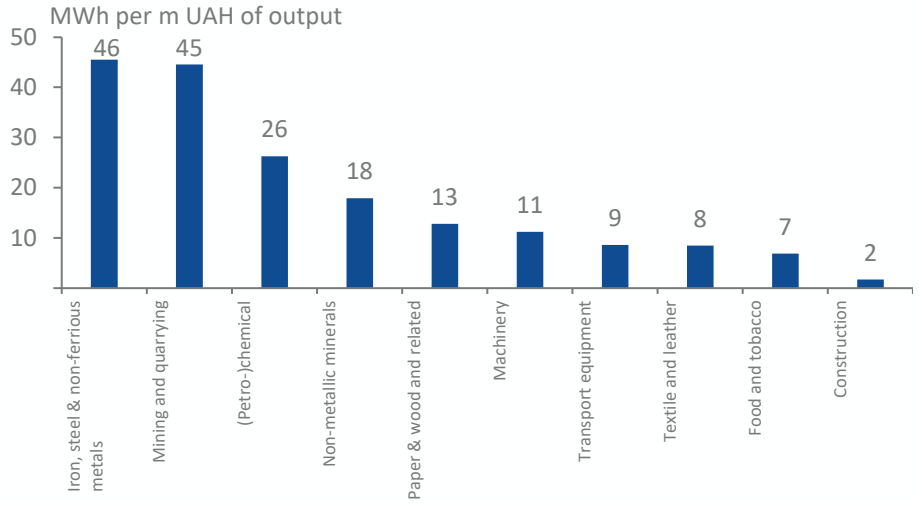
4. Industrial electricity consumption

Industrial electricity consumers



Source: Energy Balance Ukraine 2019

Electricity intensity



Source: UKRSTAT, Input-Output Table 2019 and energy balance, *NACE classifications were matched with EUROSTAT energy balance categories as close as possible

Electricity consumers

- Ukraine's **largest industrial electricity consumers** were iron, steel, mining, food, and chemical industries (2019)
- Industry accounts for about 42% of total electricity consumption (2019)

Electricity intensity

- The **most electricity-intensive industries** were metal industry, mining and chemical industry
- If these industries increasingly rely on more expensive imported electricity, then their production costs will increase
- Moreover, the most intensive subsectors faced a strong decline due to the war in 2022
  - Mining of iron ore: -62% yoy
  - Manufacturing of iron ore: -69%
  - Chemical products: -62% yoy

➢ **Iron, steel, mining, chemical industries are the most sensitive to price changes**

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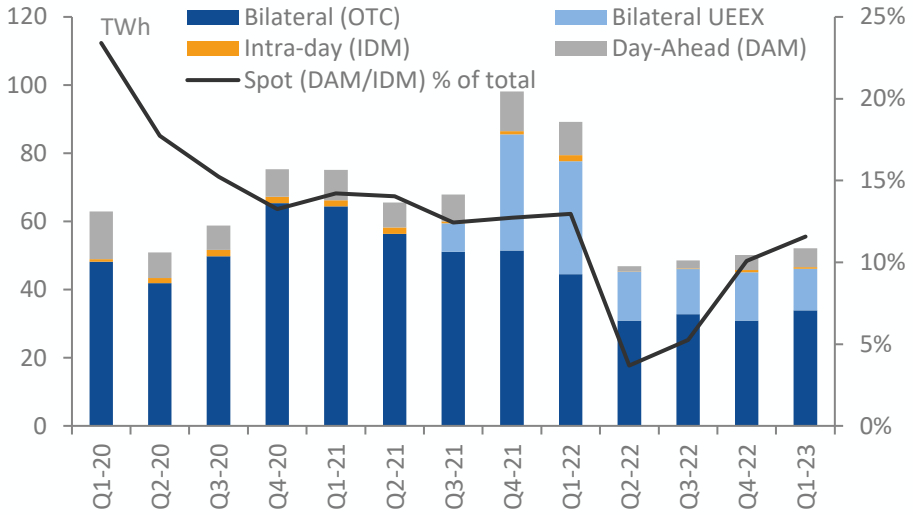
5. Wholesale power market and industry prices

Purchased electricity volumes in Ukraine*



*Source: NERC wholesale market monitoring, Dixigroup *Includes both IPS and Burshtyn island*

Average industrial electricity price in 2021

	EUR/MWh
Slovakia	148
Romania	132
Poland	116
Hungary	110
Ukraine	71

Source: Global Climate Scope (2022)

Bilateral markets

- **Most trade occurs bilaterally** - mostly in the **unregulated OTC market**
- A small share of private actors also via the Ukraine's Energy Exchange (UEEX)
- **A few large companies receive electricity** from companies within the **same group** (e.g. DTEK) at lower prices
- **Industrial electricity prices are significantly lower than in neighbouring countries**

Spot market

- The **spot market only accounts for a small share** of electricity volumes sold (12% in Q1-23)
  - Most private thermal power plants are not participating
  - Bilateral/forward markets are disconnected from short-term markets which do not necessarily serve as a reference price
- **Domestic spot market prices have only small influence on overall electricity prices for large industrial consumers**

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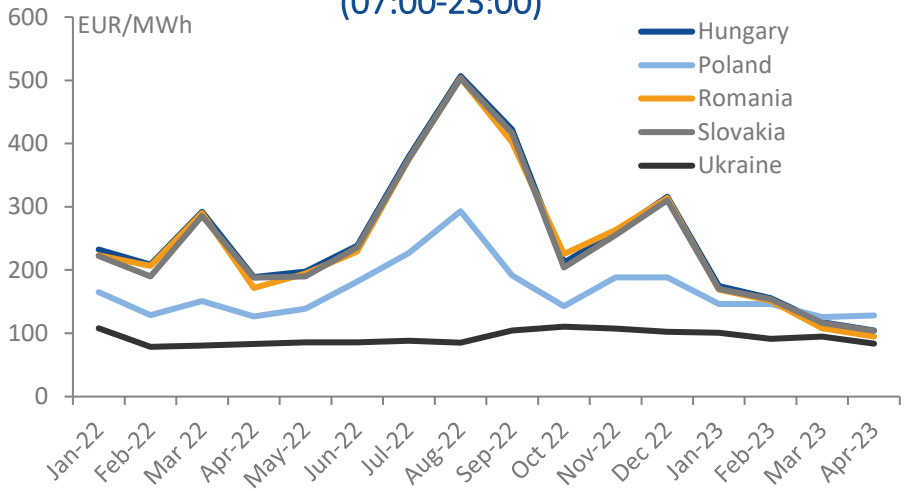
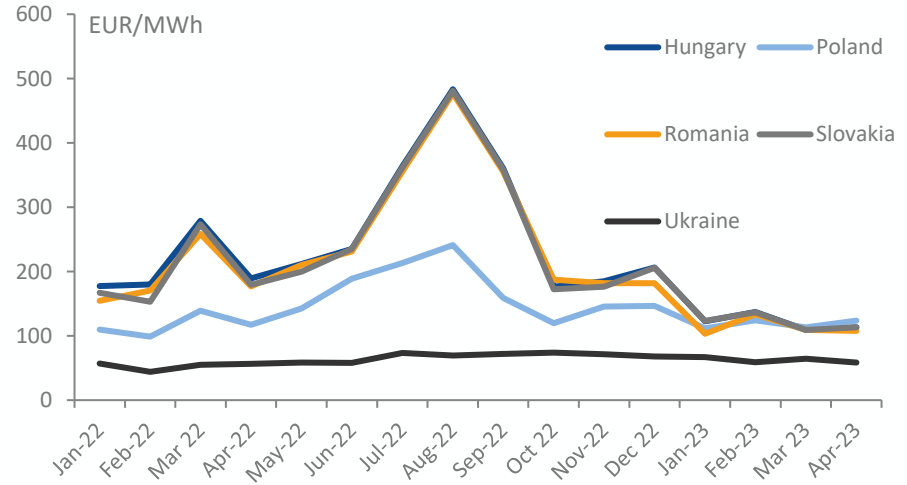
6. Import prices

Average day-ahead market prices in 2022-23, peak hours (07:00-23:00)



Average day-ahead market prices in **2022-23**, off-peak hours (00:00-07:00; 23:00-24:00)



Sources: Dixigroup, UA Energy Map

Price differential

- Spot prices in neighbouring countries showed much higher prices than in Ukraine throughout most of 2022
- **Commercial electricity imports** from neighbourhood ENTSO-E countries could come at **substantially higher prices**

Guaranteed supply

- In January 2023, a regulation on electricity imports was adopted but ended in Apr-23:
  - Industrial consumer were able to import electricity from abroad, but had to pay foreign spot market prices
  - **For imports, there was a guaranteed uninterrupted supply (no scheduled outages)** - excluding non-planned emergency outages
- **Industrial consumers may have purchased electricity at import prices that are substantially higher than domestic ones to ensure continuous supply**

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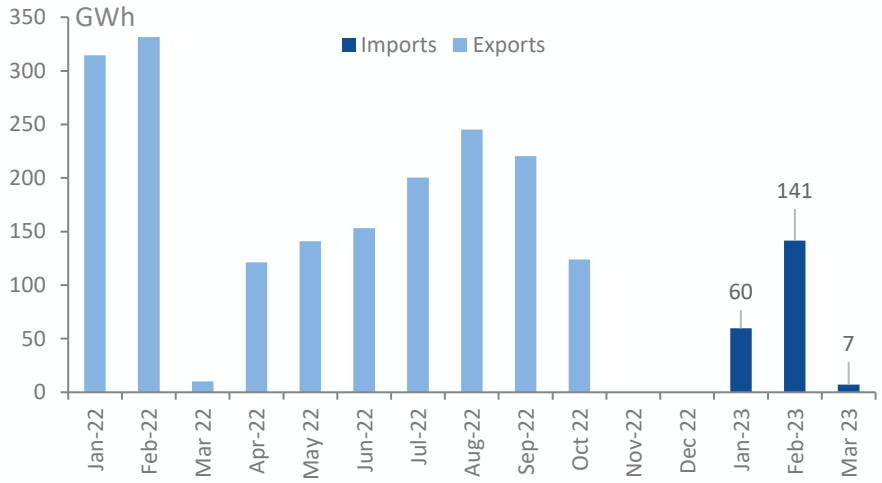
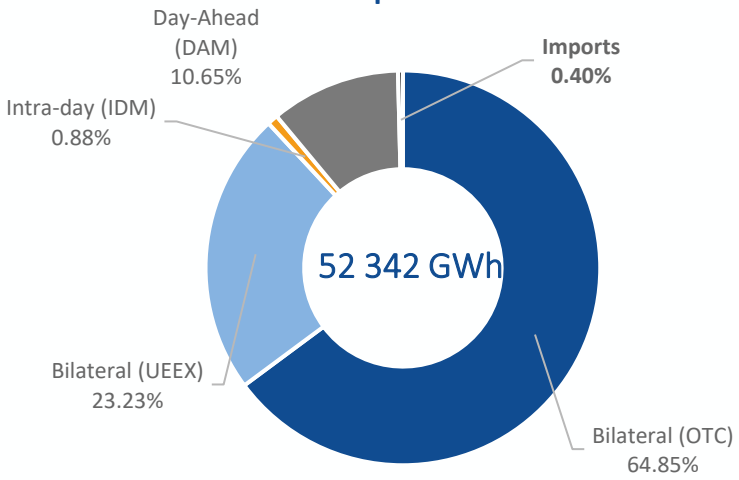
7. Electricity trade with ENTSO-E countries

UA commercial electricity trade with ENTSO-E*



*Source: ENTSO-E Transparency Platform, NERC, Dixigroup, *Romania/Poland/Hungary/Slovakia/Moldova*

Purchased electricity volumes in UA Jan-Mar 23, including imports



Source: ENTSO-E Transparency Platform, NERC, Dixigroup
**Romania/Poland/Hungary/Slovakia/Moldova*

Emergency synchronisation

- In Mar-22, Ukraine became fully **synchronised with the ENTSO-E grid helping to address short-term imbalances**
- **Technical capacity to import from ENTSO-E was increased several times**

Commercial electricity trade

- Ukraine was predominantly an **exporter of electricity** during 2022. **Exports stopped following attacks on the power system in Oct-22**
- In Q1 2023, there was a spike in **commercial imports from Slovakia and Moldova but since Apr** Ukraine restored proper functioning of its system and **exports to EU resumed**
- **Import volumes are negligible** compared to overall sales volume. Information about buyers and exact prices are not disclosed
- **Ukraine's electricity trade balance heavily depends on the outcome of Russian missile strikes**
- **Commercial imports are unlikely to have a large effect on industries**

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8. Conclusion

- Following Russian attacks on power infrastructure, Ukraine faced **severe electricity shortages.** Its synchronisation and increased capacity interconnections with the ENTSO-E grid helps to address physical imbalances by **adding stable electricity supply sources**
- **Iron and steel, mining and chemical industries** are most sensitive to electricity price changes due to their high electricity intensity, and are facing already declining production
- In Q1 2023, Ukraine **turned into a net commercial importer** of electricity but resumed to be a net exporter again in early Q2-23
- Industry consumers were able to purchase electricity from abroad at higher prices to avoid domestic shortages between Jan-Apr-23.
- **Overall effects on industrial consumers from imports in Q1-23 will be rather small**, as most of their electricity is purchased domestically via long-term contracts in the OTC market
- **Capacity of physical interconnections** with neighbouring ENTSO-E countries should be increased continuously to add further resilience
- **Better commercial integration** with power exchanges in ENTSO-E markets and the development of a liquid futures markets would provide industrial groups with a wider range of products and services to manage risk exposure
- **The installation of decentralised non-grid dependent generation capacities on industrial sites could help industrial consumers keep producing independently of shutdowns**

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About the German Economic Team

Financed by the Federal Ministry for Economic Affairs and Climate Action, the German Economic Team (GET) advises the governments of Ukraine, Belarus*, Moldova, Kosovo, Armenia, Georgia and Uzbekistan on economic policy matters. Berlin Economics has been commissioned with the implementation of the consultancy.

**Advisory activities in Belarus are currently suspended.*

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