

# IMPACT OF UKRAINE'S ELECTRICITY IMPORTS ON EXPORTING COUNTRIES ELECTRICITY PRICES

The cases of Hungary, Moldova, Poland, Romania and Slovakia

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## Question: Are exports to Ukraine responsible for high prices in SEE?

- Ukraine faces a significant loss of generation capacity due to massive Russian attacks.
  - Thus, Ukraine in many hours needs imports to be able to meet its electricity demand.
  - Efforts are being undertaken to increase the transmission capacity from EU to UA from 1700 MW to 2200 MW.
- **Central and South-Eastern European countries are concerned about the potential increase in domestic electricity prices due to (increasing) exports to Ukraine.**

### Letter by the Greek Prime Minister to the President of the European Commission

Ελληνική Δημοκρατία  
Υπουργείο Ενέργειας

THE PRIME MINISTER ▾ THE GOVERNMENT ▾

Attached is the letter of Prime Minister Kyriakos Mitsotakis to the President of the European Commission Ursula von der Leyen regarding the EU energy market.

Dear Ursula,

I am writing to you about the issue of electricity prices. In the span of a few months, wholesale electricity prices in Greece have more than doubled from 60 €/MWh in April to 130 €/MWh in August.

This increase has occurred despite our remarkable progress in accelerating the energy transition. Relative to last summer, our generation from wind and solar increased by 25%, while output from lignite fell 27%. This is exactly what we want in our electricity system. Yet prices rose to levels last seen in early 2023, when we were still coping with the aftermath of the most acute energy crisis in our history.

This disconnect between an energy transition that is highly successful, and electricity prices which jump suddenly to extreme levels requires a political response. Left unaddressed, it threatens our citizens and our competitiveness. It could undermine support for our EU Green Deal.

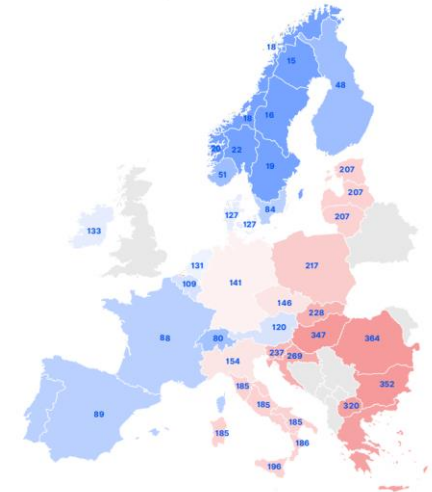
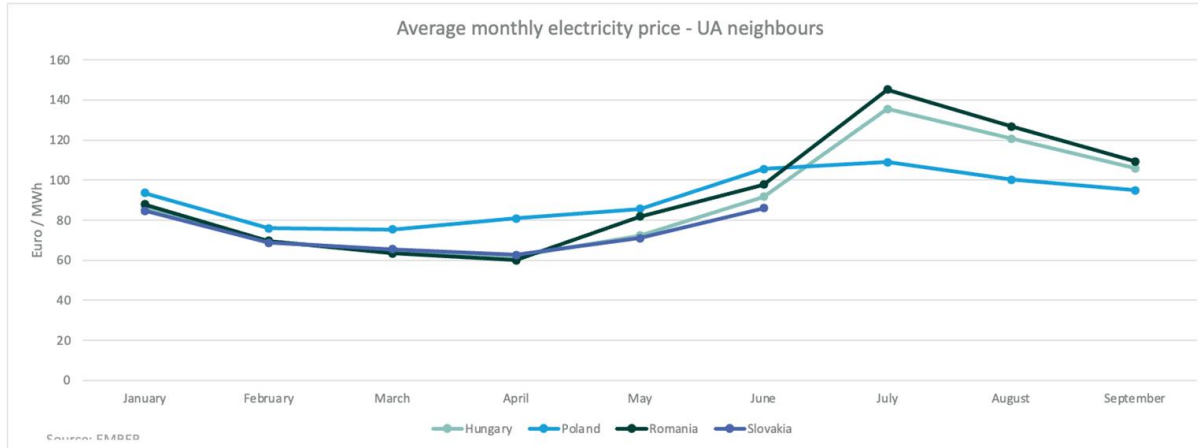
In large part, the increase in prices in Greece reflected regional factors. Similar increases were seen in Bulgaria, Romania, Hungary, Croatia, and other Member States. This is a regional crisis.

A number of factors explain this shock: very warm weather, exacerbated by climate change, outages of generation and cross-border capacity, and low rainfall during the winter, which left reservoirs with less water for the summer season.

But our region has faced an additional burden: Russia's attacks against the Ukrainian grid have turned Ukraine into a significant net importer. This deficit is being met by EU countries. This is another cost that Russia's devastating war is imposing on our economies.

## Electricity prices in countries neighbouring Ukraine diverged from prices in Western Europe

Average day-ahead prices at 19:00; between 1 July 2024 and 23 September 2024 in EUR/MWh

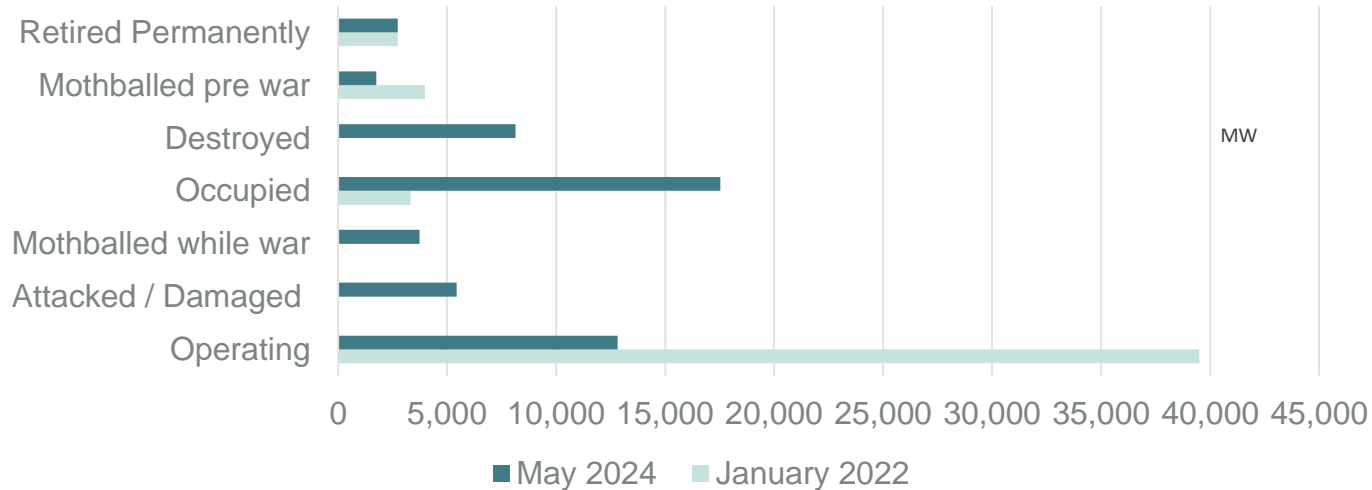


Source: ACER calculations based on ENTSO-E Transparency Platform data.

Reference: ACER(2024) [Progress of EU electricity wholesale market integration MMR 2024](#).

- From June electricity prices in Hungary and Romania start increasing substantially.
- Prices in South Eastern, and to a lesser extend Central Eastern EU member states strongly diverge from prices in the rest of the EU

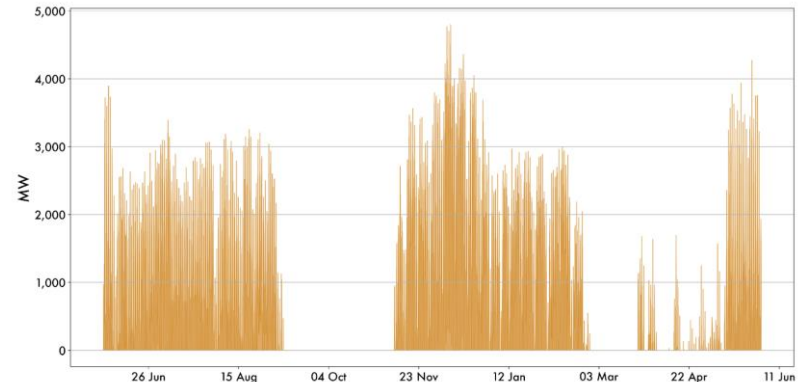
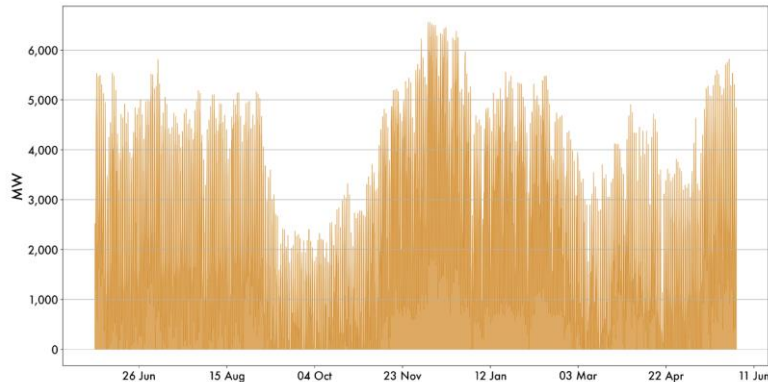
## Attacks and occupations drastically reduce the Ukrainian generation capacity



- **About 70 % of Ukrainian pre-war generation capacities are not available or require a repair.**

## Without additional measures the current supply-demand imbalance will require substantial load shedding in Ukraine 2024 – 2025

- If no repairs are made, 90% of the time there will not be enough power available.
- About 20% of demand will go unmet.
- Under the favourable assumption that 50% of the destroyed capacities can be renewed, there will be partial shutdowns in 50% of the hours.
- 6% of demand will not be possible to meet.

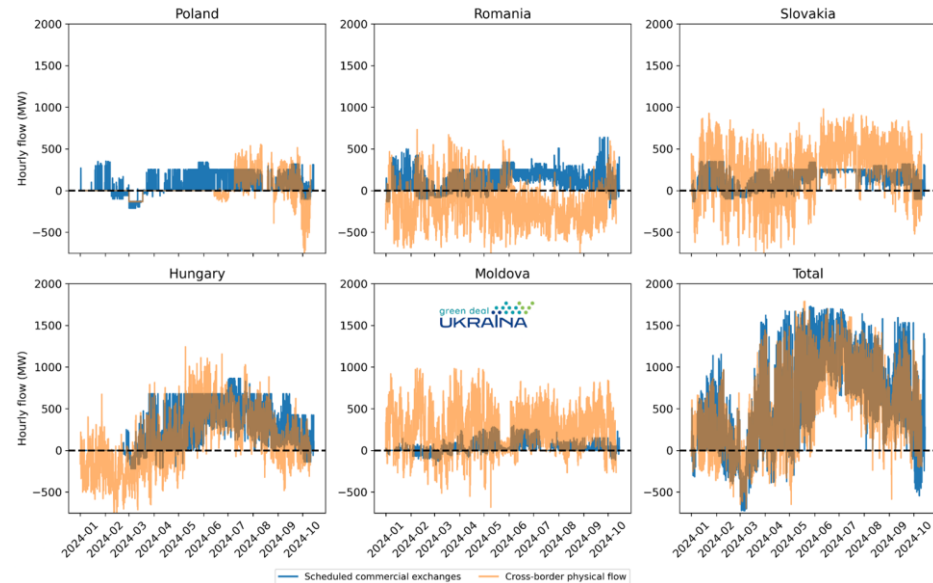


# Imports of up to 1700 MW in summer 2024 substantially reduced load-shedding needs in Ukraine

- Following the attacks on energy infrastructure in Spring 2024, Ukraine has substantially decreased exports to neighbours.
- Corresponding imports of electricity into the country have doubled.
- While most of the exported electricity was taken from the Romanian, Slovakian and Hungarian electricity markets (commercial flows); this electricity crossed the border mainly via Slovakia and Moldova (physical flows).

## Cross-border electricity flows Q1– Q3 2024

Scheduled commercial exchanges (day-ahead) and physical cross-border flows with Ukraine



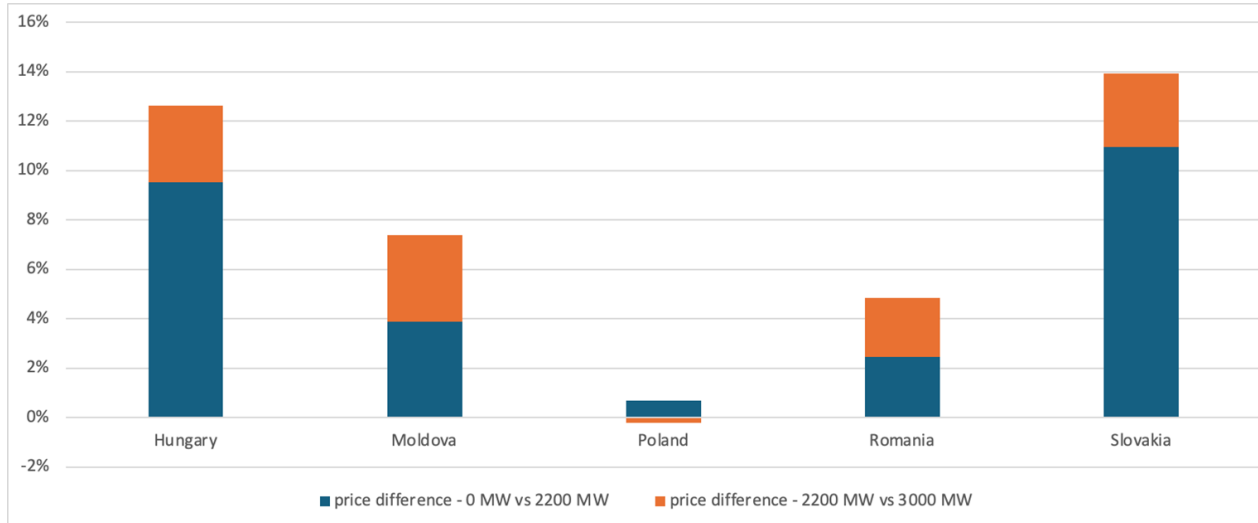
Note: Positive values indicate flows into Ukraine, negative flows are flows into neighbours.

Source: ENTSO-E Transparency Platform

## To see if exports to Ukraine substantially increase prices in the region we employ an electricity system model

- **Guiding question:** What are the possible effects of different levels of commercially available transmission capacities (0MW; 2200 MW; 3000 MW) on hourly electricity prices of Ukraine's neighbours?
- To investigate how different levels of cross-border transmission impact regional electricity prices in a controlled environment we use **power system modelling**.
- We employ a dispatch model developed and parameterised based on PyPSA, representing the EU power system (demand, supply, and transmission) including Ukraine and Moldova.

## Drastically increasing transmission capacity to Ukraine had modest impact on prices in the region



- Between April and July 2024 prices substantially increased in Poland (~40%), Hungary (~120%) and Romania (~140%).
- Increasing export capacities to Ukraine from 0 MW to 2200 MW would be responsible for price increases between 1% (Poland) and 11% (Slovakia).
- Increasing transmission capacities further to a substantial 3000 MW will lead to further modest price increases of 3%.

## Key findings

- **Poland:** Increasing export volumes to Ukraine has minimal impact on prices (<1%), likely due to Poland's ability to import additional electricity from Germany (in the model).
- **Romania:**
  - During **January-March**, increasing transmission to Ukraine from 0 MW to 2200 MW results in minimal price changes, with only slightly higher prices at 3300 MW.
  - All scenarios converge by March.
  - From **April-June**, there is a noticeable price increase when moving from 0 MW to 2200 MW, but prices stabilize with no significant difference between the 2200 MW and 3000 MW scenarios.
  - Over the whole period prices increase 2-5% compared to the 0 MW scenario.
- **Hungary & Slovakia:** Both countries show similar price dynamics.
  - The largest price differences between 0 MW and 2200 MW occur from **March to June**, while differences between 2200 MW and 3000 MW are negligible in this period.
  - During the **colder months of January and February**, the gap between the 2200 MW and 3000 MW scenarios becomes more pronounced.

## Limitations and their potential effects

- Compared to the historical prices of 2024, our results systematically overestimate the national average prices. Further analysis is required here, particularly regarding higher spatial resolution and the effects of different weather years.
- Data on hourly CHP generation are not available, we make estimations based on hourly average temperatures in 2019: **Higher CHP generation could reduce prices, and vice versa.**
- PV rooftop generation, storage, and consumption are modelled at household level: **Higher feed-in of PV rooftop to the distribution grid would reduce prices.**
- Domestic transmission constraints are not considered: **internal congestion can reduce exports and have price effects on both importing and exporting countries.**
- As continuous excess demand is assumed for Ukraine throughout, imports are overestimated: **This could lead to an overestimation in price effects for the exporting neighbouring countries.**
- We assume the same exogenously given demand for all scenarios. **We do not consider demand effects on prices, which otherwise would affect prices endogenously.**

green deal  
**UKRAINA**

**ANNEX**

**HZB** Helmholtz  
Zentrum Berlin

 **Forum  
Energii**  
Analizy i dialog

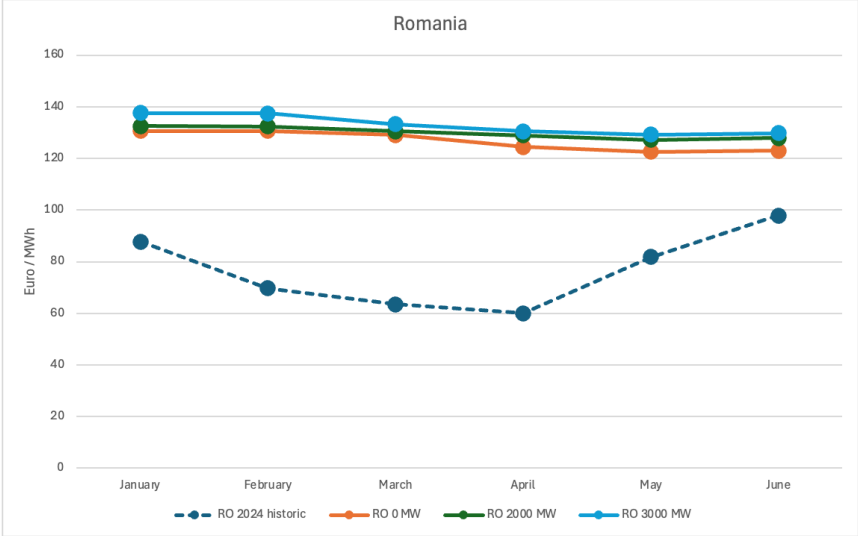
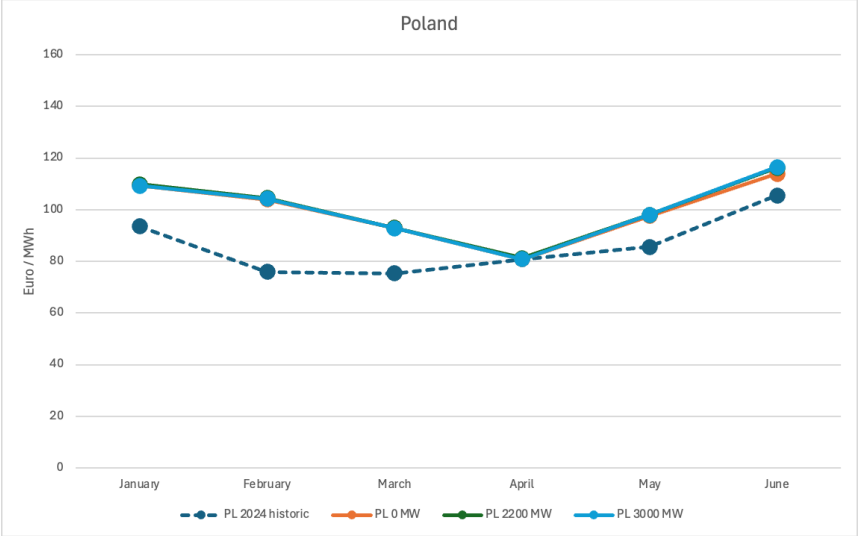
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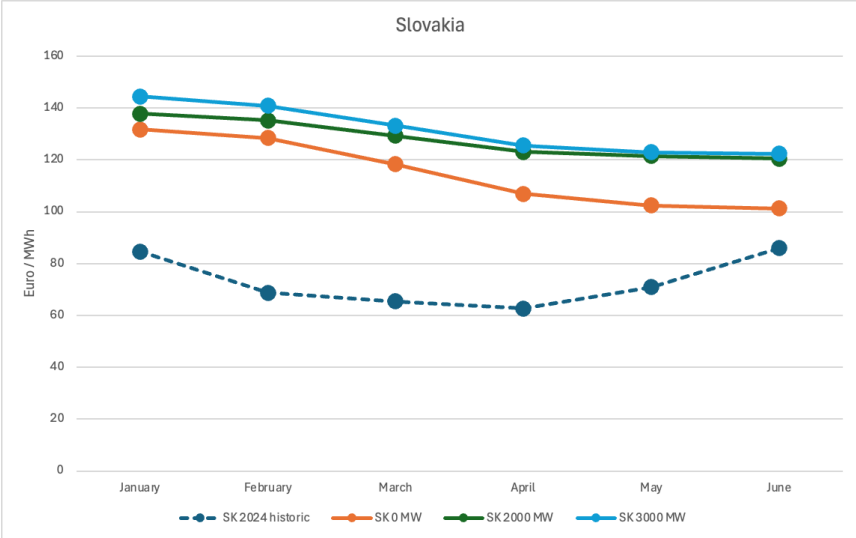
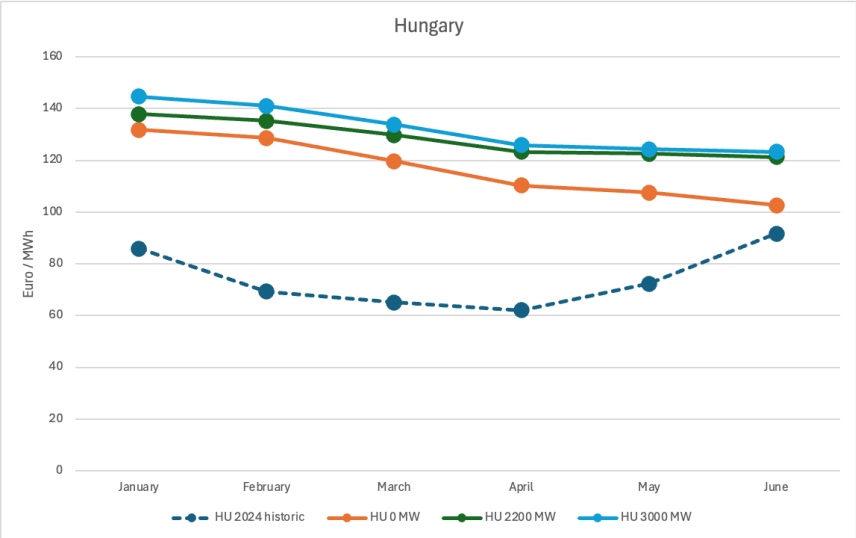
## Annex: Assumptions and Scenarios

- Three transmission limit scenarios between Ukraine and neighbours: zero transmission, 2200 MW and 3000 MW
- A “hypothetical 2025” January to June demand based on growth rates derived from 2023 to 2024.
- In all scenarios Ukraine has continuous excess demand which leads to imports into the country in all hours.
- Each EU country is represented with one main bus (with generation and non-household demand), one household (HH) bus (just with HH demand), one HH PV bus (which can supply to either HH demand or the grid), and one HH battery bus (which can receive from the HH PV and supply to the HH bus).
- Rooftop PV included, which prioritises meeting household demand before being set to the grid.
- Cross-border transfer capacities ( ) limited to 2024 historic observations of physical cross-border flows [1]
- PV-solar, wind, hydro capacity factors, and temperatures based on 2019 weather year
- Fuel and CO2 prices constant for the entire period and based on October 2024 values [2]
- Installed generation capacities based on PyPSA-Eur [3], Open-Power-System-Data [4], and Global Energy Monitor [5]

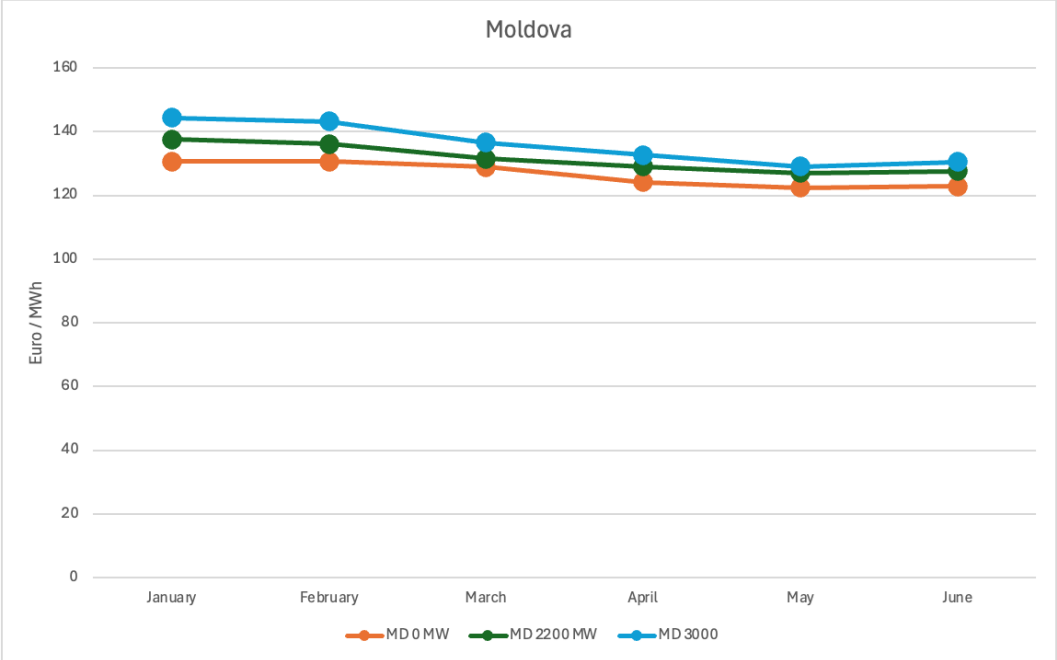
# Average monthly electricity Prices January – June



# Average monthly electricity Prices January – June



# Average monthly electricity Prices January - June



## SOURCES

[1] <https://transparency.entsoe.eu/transmission-domain/physicalFlow/show>

[2] <https://tradingeconomics.com/commodities>

[3] <https://github.com/PyPSA/powerplantmatching>

[4] <https://open-power-system-data.org/>

[5] <https://globalenergymonitor.org/>