

Lessons from last winter

Ten measures for winter 2026/2027
Long version

Rouven Stubbe, Julia Usenko, Georg Zachmann, with contributions
by Robert Carr, Frank Meissner, Vladyslav Mykhnich, Susanne Nies



25/03/2026

SPONSORED BY THE

Why this analysis? From lessons of last winter to priorities for winter 2026/27

- **Last winter 2025/26 exposed both the vulnerability and resilience of Ukraine's energy system.** Despite heavy Russian attacks on electricity generation, grid, heating and gas infrastructure, system collapse was avoided.
- However, the system remains highly vulnerable. Further attacks and limited dispatchable capacity mean that **additional resilience measures are urgently needed** before winter 2026/27.

This deck proposes 10 high-impact, no-regret measures for winter 2026/27:

- Focus on **actions deliverable within ~6–8 months**
- Not a comprehensive list – intended to **stimulate policy debate and guide planning**

Short- vs. medium-term trade-off:

- Many measures cannot be implemented before next winter
- Additional focus should be on policies that increase system resilience for 2027/28

Structure

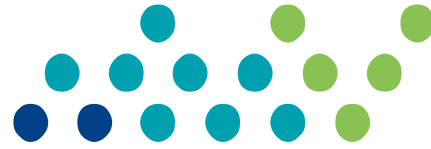
A. How bad was 2025/26, and what worked well? Key vulnerabilities and lessons learned from last winter

- *Big picture:* System performance throughout last winter
- *Zooming in:* Case studies of successful policies from different Ukrainian cities

B. Ten high-impact, no-regret measures for next winter 2026/27

Covering measures among the following areas:

- Air defence
- Strengthening domestic and cross-border grids
- Integrating additional flexible capacities and renewables
- Demand-side policies



PART A:

**How bad was 2025/26, and what worked well?
Key vulnerabilities and
lessons learned from last winter**

Russian strategy to damage UA energy infrastructure evolved over time

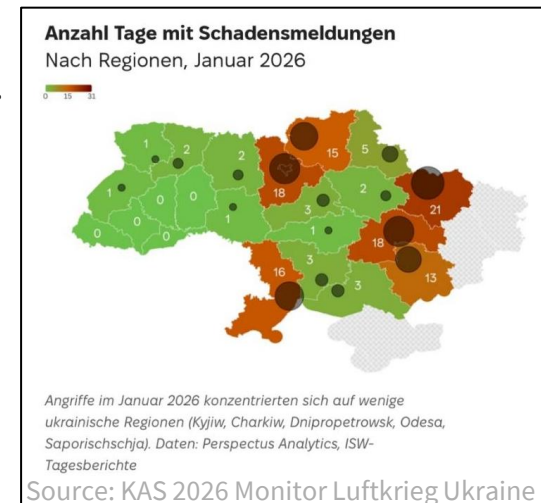
Previous winters:

Widespread attacks on energy infrastructure to trigger rolling blackouts and ultimately collapse the electricity grid

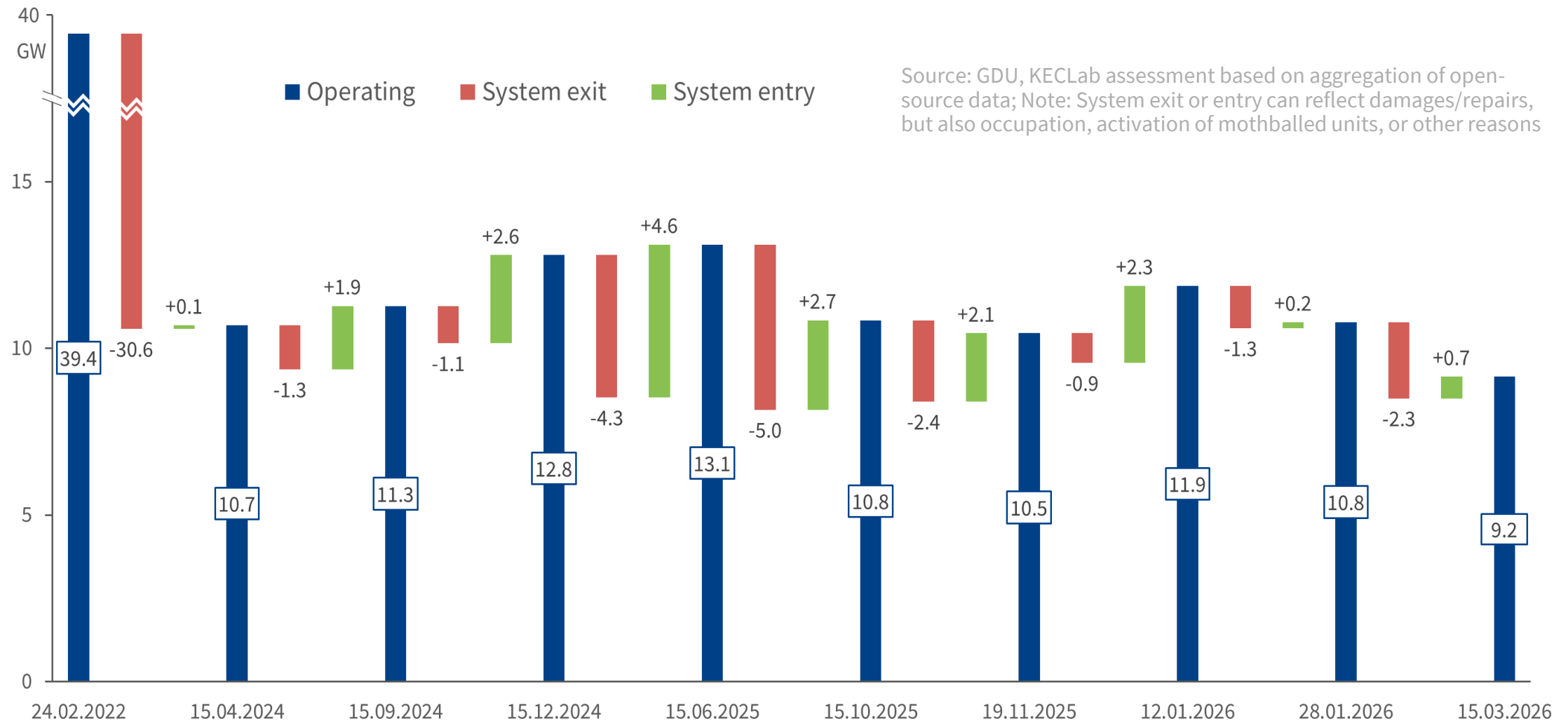
Winter 2025/26:

Concentrated attacks on major cities aimed at plunging them into cold and darkness (e.g., Kyiv)

- Initially, the aggressor favored disruption over destruction, seeking to preserve the system for rapid restoration post-occupation. Attacks focused on the **high-voltage grid**, esp. substations.
- Since the second winter (2023/24), attacks also systematically targeted thermal and hydro generation, incl. **turbines, boilers**, etc. (infrastructure that takes longer to restore).
- Since 2024, **gas production** and **storage** was also targeted in major attacks – direct impact was limited, but it might have contributed to a reluctance of storing EU gas in Ukraine.
- Winter 2025/26 saw a shift toward **systematic, concentrated strikes on major cities**, seemingly intended to precipitate a humanitarian crisis. Attacks pivoted to structurally destroy **district heating infrastructure**.
- Medium/low-voltage substations** of the Distribution System Operators, especially (but not exclusively) in areas close to the frontline, are also increasingly targeted.
- Attacks on **thermal** and **hydroelectric power plants** as well as **high-voltage substations**, especially those required for West-East transfer or serving Kyiv and other larger cities, continue.



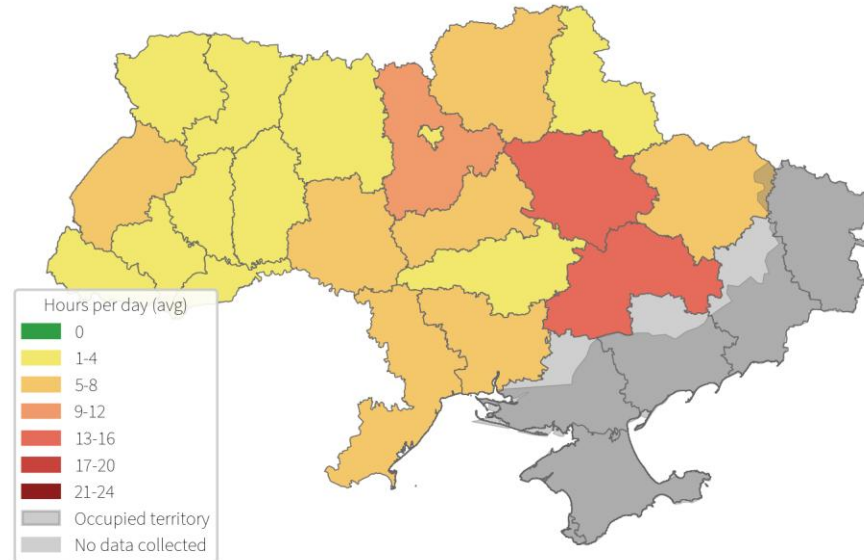
Ukraine's conventional power plants are in a cycle of destruction and repairs



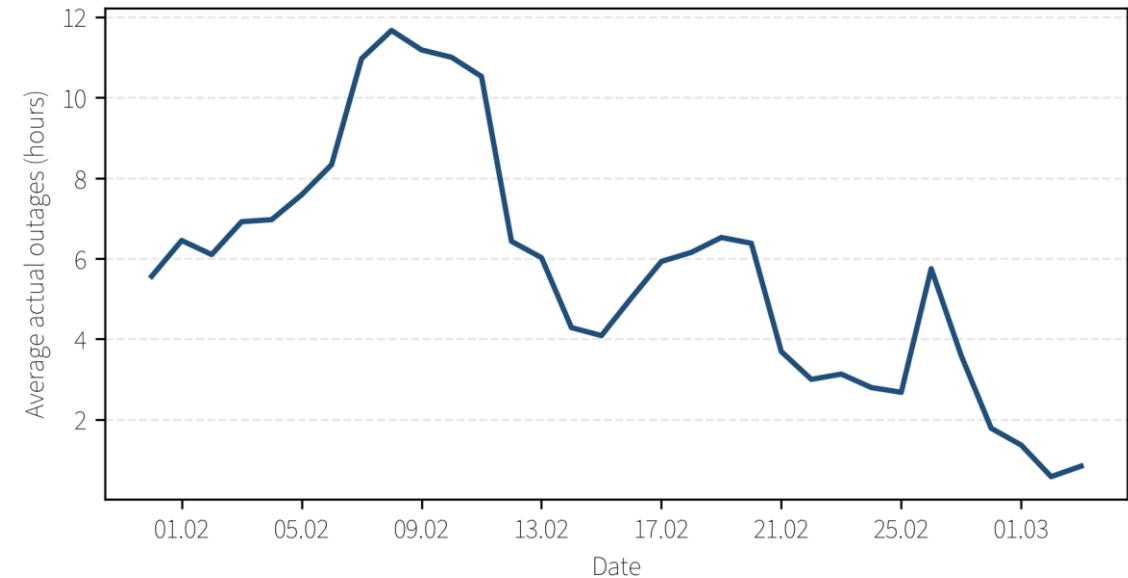
- Repeated attacks on power plants reduced operating conventional capacities to **10.5 – 12 GW** last winter
- Against an **estimated peak load of 18 GW** during cold periods, this led to **widespread outages**

Attacks led to widespread power outages across Ukraine

Average outages per oblast (Jan 31* - Mar 3, 2026)



Average outages per day (Jan 31* - Mar 3, 2026)

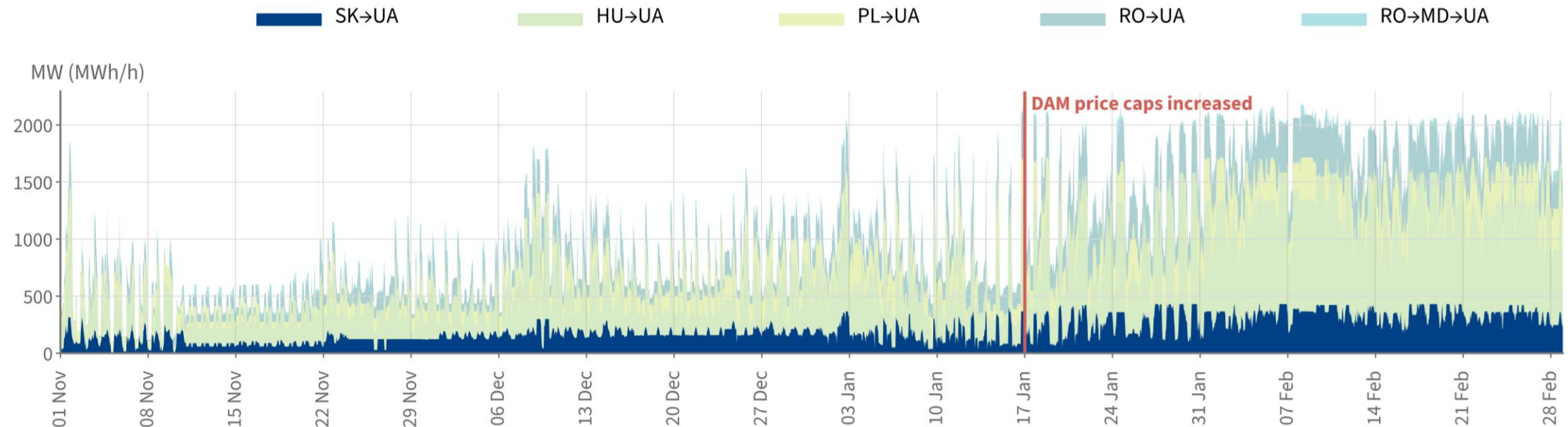


Source: GDU based on primary survey data collected daily by Center for Applied Research (CPD). Note: Survey was expanded on Feb 11, and again on Feb 19, to include more oblasts. *Data for Chernihiv, Chernivtsi, Mykolaiv, and Ternopil only from Feb 11. Data for Sumy and Kirovohrad only from Feb 19. Actual power outages displayed. See daily scheduled and actual power outages per oblast at: Green Deal Ukraine (2026). State of the Ukrainian Energy System Dashboard. Produced by Carr and Meissner. Contribution from Stubbe and Mikhnych. Available at: <https://greendealukraine.org/gd-tracker/state-of-the-ukrainian-energy-system>.

- **Average outages** across Ukrainian oblasts reached almost **12h per day** on February 8, before gradually falling below 2h per day in late February / early March. Three major waves of attacks are visible in the data.
- **Eastern oblasts** are **impacted significantly stronger** than Western oblasts during most days, with some exceptions
- Oblasts in the **West / Southwest** might also benefit more from **electricity imports**, which cannot always be transferred to Central/Eastern oblasts due to internal grid bottlenecks

Higher electricity imports, in particular since price caps increased

Commercial electricity imports from EU to Ukraine by import route (November 2025 to February 2026)

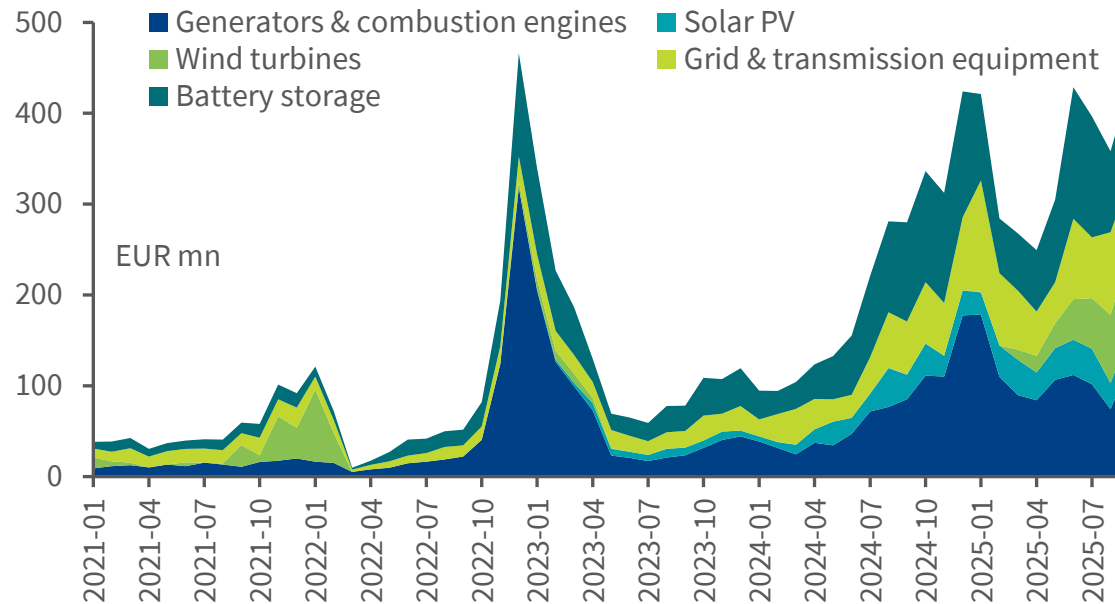


Source: GDU based on ENTSO-E Transparency Platform data aggregated by Fraunhofer ISE

- **Price caps in day-ahead market (DAM) were increased** on January 17th to 15,000 UAH/MWh (~300 EUR/MWh) in all hours, which allowed scarcity to be reflected in spot market prices, increasing economic incentives for (urgently needed) imports
- **Electricity imports to UA increased significantly** from avg. 775 MW (before January 17th) to over 1700 MW since
- **Often reaching the maximum value** of ~2080 MW (85% of 2450 MW import limit for the joint UA-MD control area)

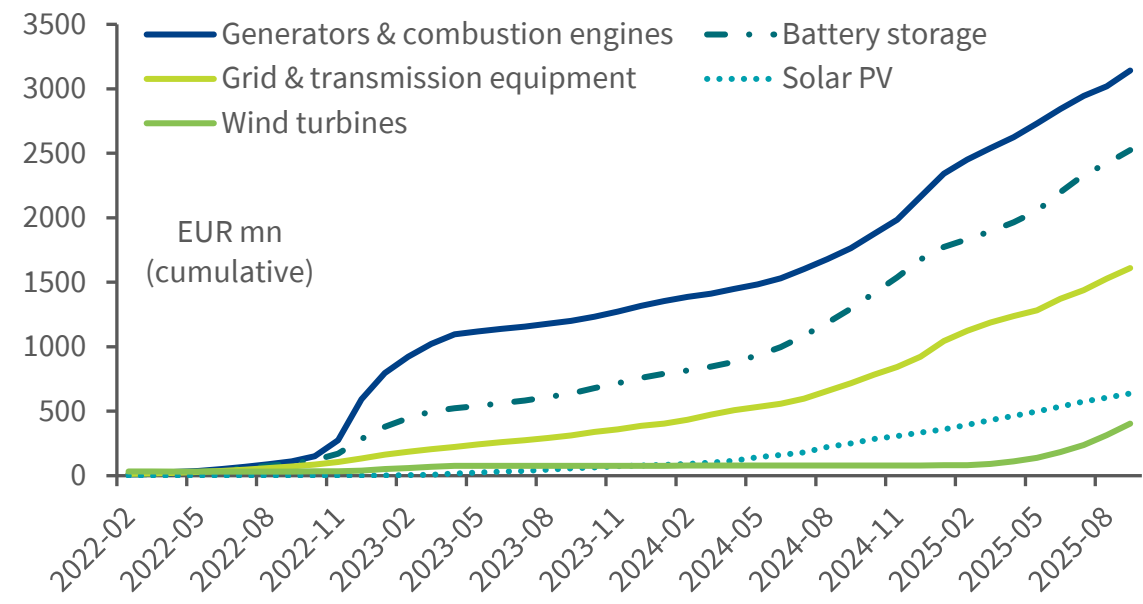
Imports point to investments in distributed energy generation, storage and grid

Monthly imports of energy equipment by technology



Source: GDU based on UN Comtrade data

Imports of energy equipment (cumulative since Feb-2022)

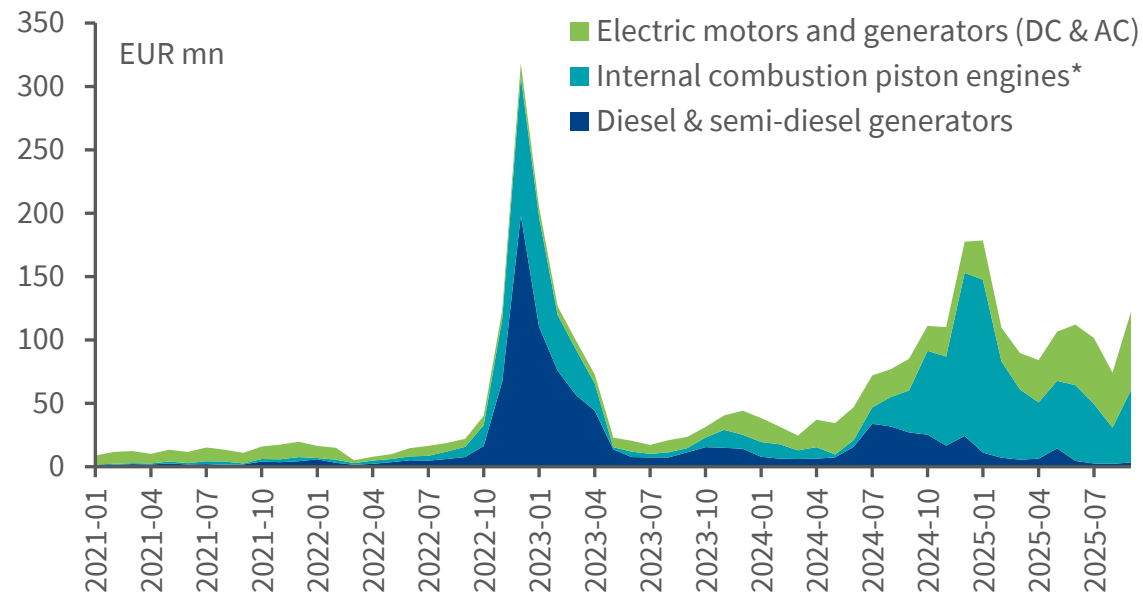


Source: GDU based on UN Comtrade data

- Strong increase in **imports of energy equipment** since 2024, after a first wave in winter 2022/23
- **Generators and combustion engines** make up the largest component (for details, see next slide)
- **Battery storage** as second largest category with **over EUR 2.5 bn in cumulative imports** by 09/2025
- **Grid and transmission equipment** imports increased significantly, highlighting high needs for spare parts
- **Steady imports of solar PV**, esp. since 2024, and some wind turbines more recently

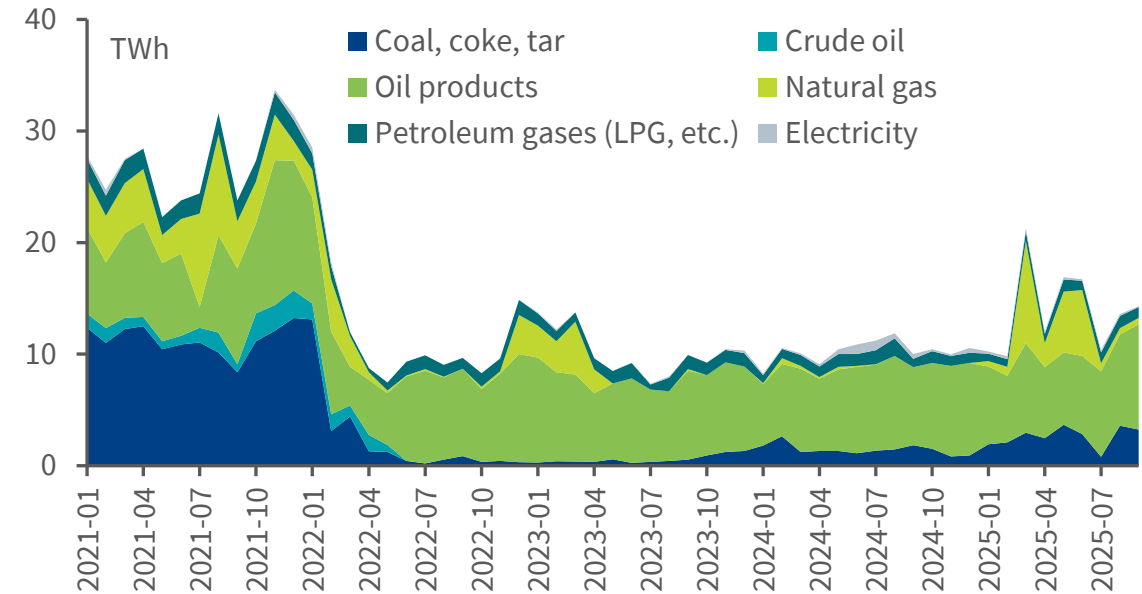
More imports of gas-fired units than diesel generators since mid-2024

Imports of generators and combustion engines (by subcategory)



Source: GDU based on UN Comtrade data; *with spark ignition

Monthly imports of fuel by type



Source: GDU based on UN Comtrade data

- **More gas / fuel-oil fired combustion piston engines** (with spark ignition) imported since mid-2024
 - *Good sign:* Gas-fired units usually have a higher share of **grid-connected assets** vs. diesel generators
- **Oil products** make up the **majority of fuel imports** since the beginning of the full-scale invasion
 - Imports of oil products on a **relatively constant level** since February 2022
- **Natural gas imports** up again since 2025, especially since Q4 (not displayed) after attacks on domestic production

What worked well during winter 2025-2026? Air defence for key energy assets and rapid repair crews

Protection of critical grid assets:

- Priority air defence coverage for key transmission nodes and **nuclear power plant substations**
- Protection of **large autotransformers** (750/330 kV) and switchgear infrastructure reduced risk of system-wide outages
- More ammunition for air defence (esp. Patriot, SAMP/T) could have significantly increased effectiveness

Rapid repair and restoration capacity:

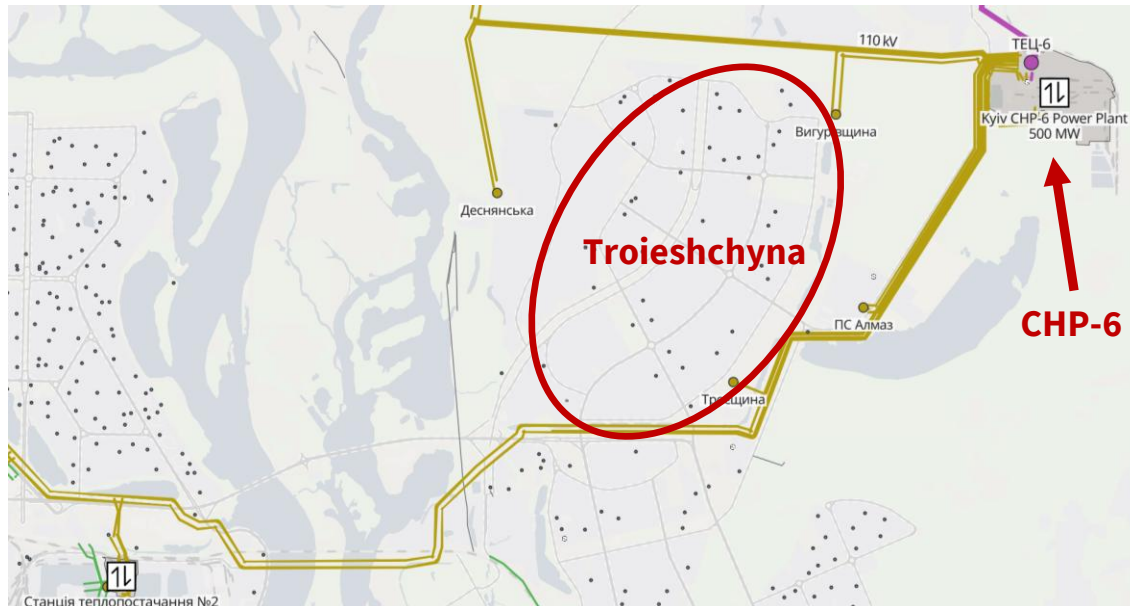
- Specialized repair crews, equipment reserves, and improvised solutions enabled fast restoration of damaged grid infrastructure (at a high toll, with over 300 energy workers who lost their lives since 2022)
- Transmission assets were often repaired within hours or days, limiting outage duration

System resilience impact:

- Despite repeated attacks, system operation was maintained and system-wide blackout avoided
- Demonstrates the importance of combining protection (air defence) with rapid repair capabilities

Difficulties with heat and/or electricity supply to certain neighbourhoods

Open infrastructure map of Troieshchyna (Kyiv) and CHP-6



Source: openinframap.org/#11.76/50.5173/30.5823

Large multi-storey panel houses in Troieshchyna (Kyiv)



Source: fuckyeahplattenbau.tumblr.com

- Large challenges with supply of water, heat in multi-storey buildings, especially in Kyiv, under very cold conditions (-20°C)
- Especially supply of parts of cities or regions that depend on only one sub-station and/or one power or heat plant
- Example: Troieshchyna (Kyiv), with 260,000 inhabitants, depending on a single high-voltage substation and CHP-6, with challenging grid topology and geography near river Dnipro (isolated)

What worked well during winter 2025-2026? Case studies from cities in Ukraine

Case study 1: Integration of small CHPs in district heating systems, incl. island-capable CHPs for critical infrastructure (Zaporizhzhia, Mykolaiv, others)

- **Zaporizhzhia** already integrated **12.5 MW** into the district heating system which enabled the city's large boiler plants to operate in fully autonomous mode during the 2025–2026 winter peaks. **4x 1.5 MW** CHP units were successfully commissioned for the water utility and hospitals, decreasing the risk of water supply shutdowns during power outages. Aim is to install **81 MW** (34 installations) in total.
- **Mykolaiv** is constructing a network of **18 modular block-boiler plants** (various sizes) for residential heating

Case study 2: Improved coordination of water and heating utilities (Kharkiv)

- In April 2025, a **strategic merger of the water and heating utilities** into a single enterprise took place. This allowed the pooling of resources and the creation of a **shared backup power system**. New cogeneration units are integrated into unified hubs, enabling the heating utility's co-generated electricity to ensure the uninterrupted operation of water pumping stations.
- Installation of **~20 MW** in CHP capacity for the municipal district heating network is underway (additional **~22 MW** with City Metro). In the long term, the city plans to install **~150 MW** in CHP capacity in total

What worked well during winter 2025-2026? Case studies from cities in Ukraine

Case study 3: Decentralised boiler houses proved more resilient than centralised plants

(Kyiv, right-bank)

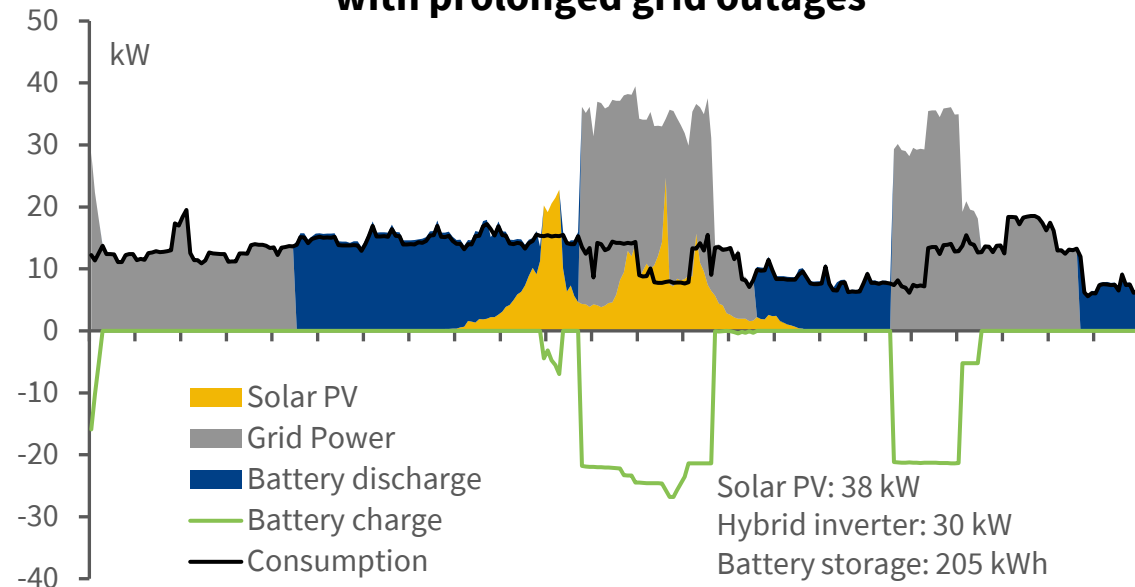
- **Destruction of centralised CHPs** led to serious problems with heating supply on left-bank
- Right-bank more resilient after attacks on large CHPs due to existing **small boiler houses**, installation and **fortification** of CHP units, incl. specialized protective structures (concrete or underground facilities)

Case study 4: Integrated approach (Cherkasy)

- Got through the winter relatively well
- Diversified and decentralized generation with multiple fuels incl. CHP;
- Own electricity line for critical infrastructure;
- Usage of batteries;
- Digitalized information available (GIS, Scada);
- Centralized control room /emergency center

Example: Mykolaiv water utility – resilience through solar PV & battery storage

Supply and consumption during January 14, 2026 with prolonged grid outages



Source: Ecoclub Rivne

Hybrid solar power plant (PV + storage) at Mykolaiv water utility



Source: Department of Energy via nikvesti.com; Note: Representative image

- **Hybrid solar PV + battery systems maintained water supply during outages**
 - For example, on 14 Jan 2026, pumps operated continuously despite a ~12-hour grid blackout
 - 5–15 Jan: 344 kWh solar PV generation (~17% of demand) despite winter and freezing temperatures
- **Batteries were critical:** charged from grid/solar when available and powered pumps during outages
- **PV + storage significantly improves resilience** of critical infrastructure, even during winter and prolonged outages

What worked well? Review of the “SvitloDIM” initiative**

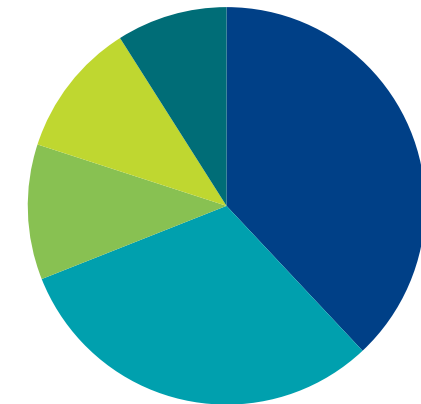
Program design – fast and targeted support through existing Homeowner Associations :

- Large problems with electricity and heat supply, esp. to high-rise residential buildings
- State subsidy program for **existing Homeowner Associations** to install **backup power and energy equipment**
- **Rapid approval** (≤5 working days) and funding **targeted by building size** (*main focus*: larger multi-apartment blocks)
- Piloted in Kyiv City and Oblast

Early results (Feb 2026):

- UAH 800 m (EUR 16 m) pilot budget allocated (from the State Budget Reserve Fund)
- UAH 107 million (EUR 2 m) already disbursed to 400 buildings within the first month
- *Strong demand*: 1,150+ applications submitted in February alone
- Equipment installed mainly:
 - Batteries (38%), inverters (31%), solar PV and BMS* (11% each)
- **Impact and scalability:**
- Full pilot budget could deploy **~40–45 MW of decentralized backup capacity** in Kyiv region
- Demonstrates **high demand** for household-level resilience solutions
- **Scalable model** for nationwide rollout with additional funding and donor support

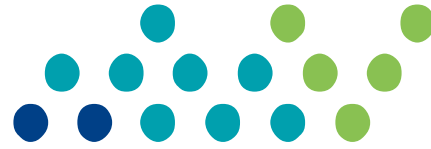
Allocation by type of equipment



■ Batteries ■ Inverters ■ Solar PV ■ BMS* ■ Generators

Source: Ministry for Development of Communities and Territories of Ukraine

*high-voltage Battery Management Systems
**CMU Resolution No. 106 dated 28.01.2026



PART B:

**Ten high-impact, no-regret measures
for next winter 2026/27**

1. Air defence and deep-strike capabilities*

Rationale:

- Protecting key assets is usually cheaper than reconstruction.
- Reducing damages from Russian ballistic, cruise missiles, and drones to energy infrastructure is a key priority.

Needs:

- **More air defence ammunition** – especially for Patriot and SAMP/T (ballistic missile interception)
- **Low-cost active drone protection at smaller substations**, incl. renewable assets
e.g. automated short-range air-defence systems (fixed gun systems / interceptor drones) deployed on-site
- **Deep-strike capabilities** – long-range ballistic and cruise missiles for destroying Russian missile and drone factories, storage depots, airbases and launch sites

* This is not our area of expertise but has been highlighted as **top priority** by every counterpart we spoke to.



Measures 2–5:

**Resilience of domestic transmission grid and
increasing cross-border import capacities**

2. Scaling-up domestic manufacturing of high-voltage transformers and switchgear

General explanation:

Spare parts for high-voltage transformers and switchgear have become one of the key bottlenecks in response to Russian attacks on Ukraine's civilian power system. Global markets for high-voltage grid equipment are tight, with long procurement lead times. Ukraine hosts an experienced producer of such equipment (Zaporozhtransformator) and should aim to ramp up domestic production, possibly in joint-venture with Western suppliers such as Siemens/Hitachi/GE, following successful examples in defence manufacturing.

Who needs to become active? Ministry of Economy, Ministry of Defence (knowledge transfer on successful ramp-up of defence manufacturing), Zaporozhtransformator, Ukrenergo (for needs assessment, and potentially for supporting development of more resilient and/or more easily repairable equipment from field experience)

Barriers / challenges:

- Access to qualified, trained personnel
- Securing financing
- Protection of production sites against missile/drone strikes

Policy implications:

- Existing capabilities and potential for scale-up of Zaporozhtransformator should be assessed, with priority funding allocated and exemption for key qualified personnel from conscription if scale-up potential exists
- Secure new production sites against missile/drone attacks
- Explore international partnerships, de-risking

3. Partial undergrounding and hardening of critical substations

Rationale:

Large transformer substations (330 / 750 kV nodes) are among the most critical and vulnerable assets in Ukraine's power grid. Resilient designs can place key functions underground using Gas-Insulated Switchgear (GIS) and Gas-Insulated Lines (GIL) in compact enclosed facilities, reducing exposure to missile blast, drones and fragments.

Technical feasibility / precedents:

- Underground extra-high-voltage substations already operate up to ~500 kV (e.g. Tokyo, Zurich, Shanghai, Taiwan) and are planned in other dense urban systems such as Singapore and Massachusetts
- GIS/GIL technology exists up to ~800 kV, but no existing precedents of fully underground 750 kV nodes

Cost / trade-off:

- GIS equipment cost premium is moderate, but underground civil works (tunnels, cooling, fire protection, drainage) make projects significantly more complex and expensive (*rough estimate*: 3x of regular substation)

Policy implications:

- Prioritise partial undergrounding of critical components (switchgear, control systems, cable exits) at selected strategic nodes, particularly key 750 kV substations at Nuclear Power Plants
- Combine with redundancy, dispersed transformers, and mobile substations (110-330 kV) to strengthen grid resilience

4. Improve grid performance and build more interconnectors*

General explanation:

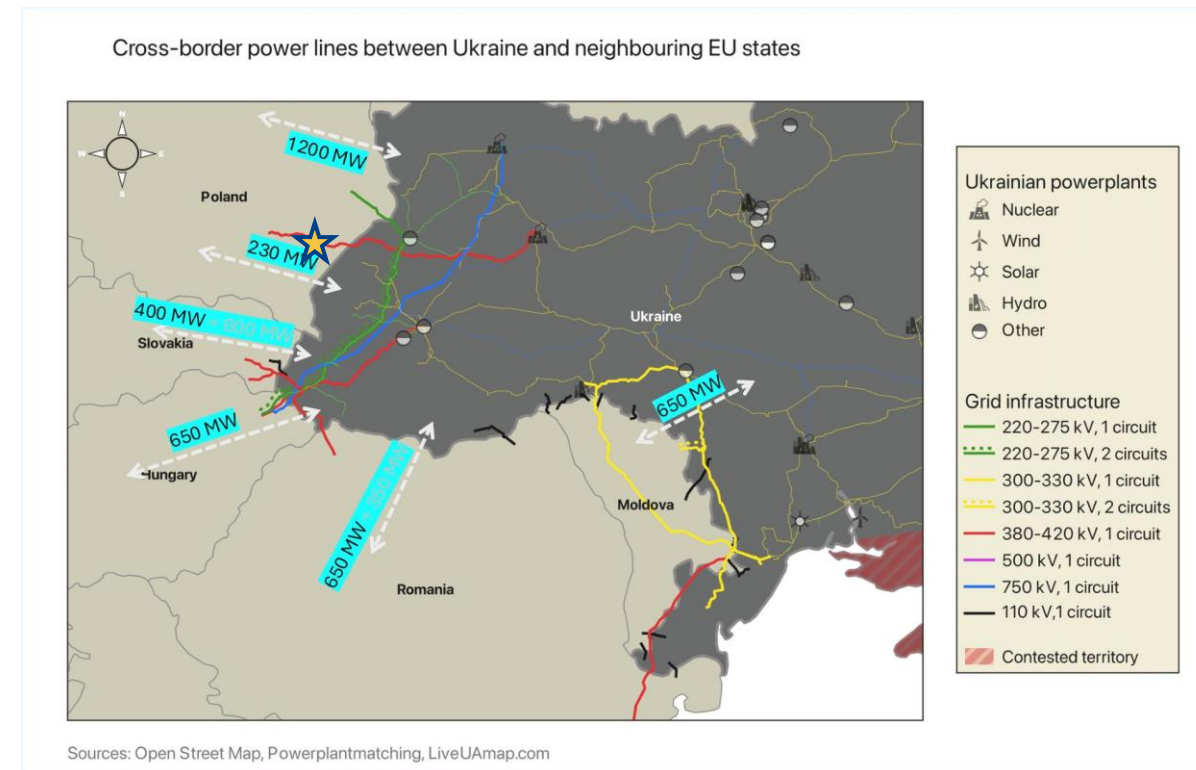
Dynamic Line Rating (DLR) increases transmission capacity by adjusting thermal limits in real time based on weather conditions. Sensors and digital monitoring allow higher power flows than conservative static ratings, unlocking unused capacity without building new lines. FACTS devices on the Rzeszów–Khmelnyskyi line could reduce impedance and increase import capacity across all interconnectors, while new interconnectors can further expand imports.

Additional potential:

- **DLR:** +15–30% transfer capacity on existing lines and interconnectors, can help increase electricity imports and improve West–East transfers inside Ukraine
- **FACTS devices** for Rzeszów–Khmelnyskyi cross-border line: +500 MW import capacity to UA
- **New cross-border lines** Mukachevo – Veľké Kapušany and Isaccea–Yuzhnoukrainsk: +2.4 GW import capacity**

Policy implications:

- Deploy DLR pilots on key transmission corridors and cross-border interconnectors as a fast-track measure before winter 2026/27
- Accelerated planning, permitting, construction of FACTS devices for Rzeszów–Khmelnyskyi before next winter
- Build swiftly (by 2028) the interconnections to Slovakia and Romania/Moldova



*new interconnectors are not a measure for next winter but are mentioned for completeness; **additional capacities with the planned Chernivtsi – Suceava line

5. Increasing or removing price caps on the day-ahead and intraday markets

Rationale:

Administrative price caps on Ukraine's day-ahead (DAM) and intraday markets distort price signals and reduce incentives for imports and flexible generation. Raising the DAM cap in **January 2026** already demonstrated the effect: higher price ceilings allowed scarcity to be reflected in market prices and **significantly increased electricity imports**.

Impact on system operation:

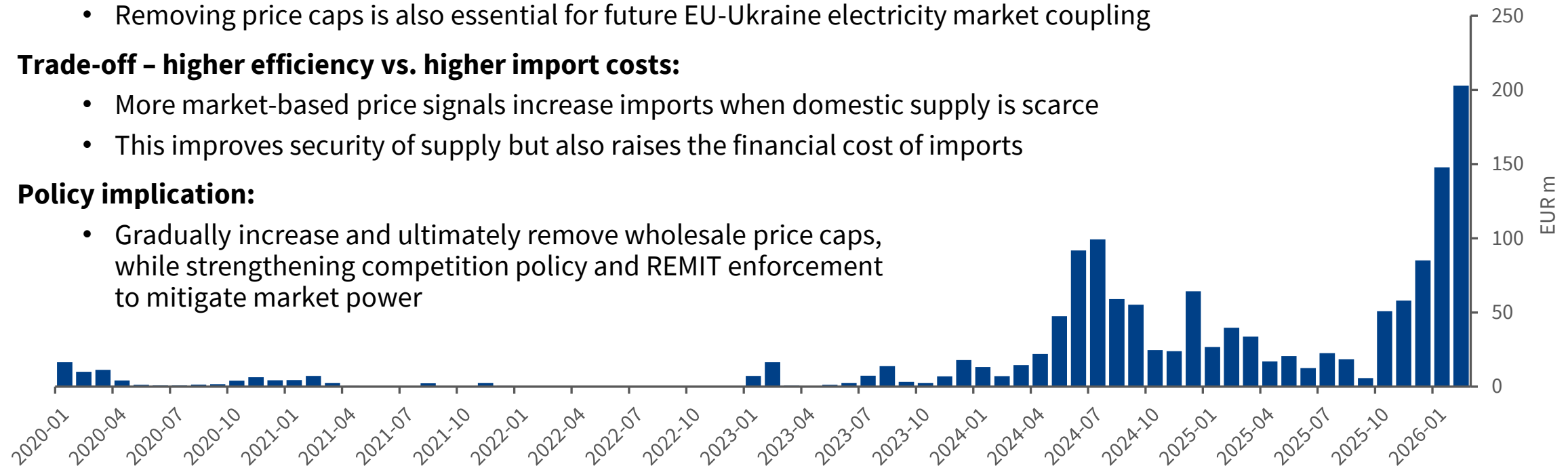
- Stronger price signals help mobilise electricity imports, as well as investments in storage and flexible generation
- Removing price caps is also essential for future EU-Ukraine electricity market coupling

Trade-off – higher efficiency vs. higher import costs:

- More market-based price signals increase imports when domestic supply is scarce
- This improves security of supply but also raises the financial cost of imports

Policy implication:

- Gradually increase and ultimately remove wholesale price caps, while strengthening competition policy and REMIT enforcement to mitigate market power



Estimated electricity import costs by month. Source: GDU based on Market Operator, ENTSO-E data aggregated by Fraunhofer ISE



**Measures 5–9:
Integrating additional flexible
capacities and renewables**

6. Improving economic incentives for distributed flexible capacities and renewables

Rationale:

Distributed flexible generation (gas engines, small modular CHPs), battery storage and renewables can be deployed quickly and improve system resilience. However, weak market credibility and financing constraints currently deter investment.

Key challenges:

- *Unreliable balancing market revenues:* payment delays and non-payment risks undermine investment cases for flexible generation; regulatory uncertainty regarding price caps (see previous measure)
- *Large electricity market debts:* Ukrenergo is owed ~UAH 66.5 bn (mid-2025), with ~63% linked to balancing market debt, weakening liquidity and market confidence
- *High cost of capital:* war risks and limited municipal creditworthiness constrain project financing
- *Connection and regulatory bottlenecks:* fragmented DSO practices and unused reserved capacity slow deployment
- *Underutilised distributed assets:* many generators operate only in isolated mode instead of providing flexibility to the system

Policy implications:

- *Restore balancing market credibility:* resolve accumulated debts and enforce payment discipline
- *Improve investment conditions:* introduce IFI-backed guarantees and war-risk insurance for flexible generation and storage
- *Enable faster deployment:* standardise DSO connection procedures and release unused grid capacity (e.g. through a reform of grid tariffs, introducing capacity payments)
- *Incentivise island generation capacity to connect and dispatch to the grid* (e.g. consider temporarily extending the net-billing scheme to gas engines and diesel generators during martial law)

6b. A PV-booster by winter 2026/27

Rationale:

- Solar panels have significantly lower generation during winter days. But production is far from zero. The generation of additional 1,000 MW of PV could theoretically have reduced load-shedding in January 2026 by 10%.
- *High value of solar PV output:* 1,000 MW of solar in Ukraine in 2025 would produce electricity worth between 83 mln Euros (Kyiv) and 93 mln Euros (Zaporizhia) at the wholesale market – putting it at the top end of EU countries in terms of revenue from solar PV

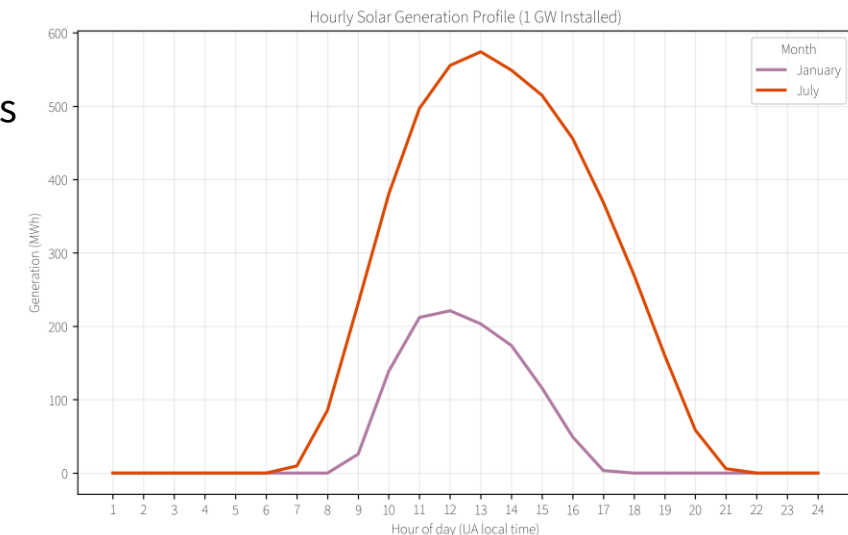
Key challenges:

- *Commercial, regulatory, physical and connection risk (see previous slide)*

Policy proposal:

- Investment subsidy for newly grid-connected wind, solar and battery assets
- Depending on technology (wind > PV + battery > PV) and region (East > West) a fixed Euro/MW premium to remunerate quick additions with the highest system value
- Mechanism should ensure, that it does not incentivise veto actors to delay connection in order to extract additional payments from the investor

Winter and summer generation profile of PV in Ukraine



Source: GDU based on Renewables.ninja

7. Deal with Moldova/Transnistria to retrofit MGRES for UA coal and share power

Background:

Transnistria's economic model has collapsed following the sharp reduction of free Russian gas supplies and the loss of electricity exports. Industrial output, GDP and exports have sharply declined, while Transnistria's very big MGRES-power plant (2,500 MW) is underutilised and no longer generates export revenues. Retrofitting MGRES to run on Ukrainian coal and enabling exports to Ukraine would restore revenues, improve energy security, and provide a new economic anchor for de-facto authorities.

Additional potential: 600-800 MW (5-7 TWh/year)

What is proposed?

- Retrofit MGRES units for UA bituminous coal (approach proven at UA TPPs after loss of anthracite mines 2014/15)
- Scope: limited boiler modifications (burners, mills, air/flue gas systems)
- Timeline / cost: ~6-8 months; ~€30m (six steam units)
- Model: UA coal via rail, coal-for-power swap (electricity exports to UA)

Who needs to become active? UA/MD leadership (heads of state), Transnistrian de-facto authorities, Ministries of Energy, DTEK/Centrenergo/Donbasenergo (for TPP retrofit experience to bituminous coal), MGRES operator

Barriers / challenges:

- Political complexity (UA–MD–Transnistria deal structure)
- Logistics & security risks (rail links, bridges, infrastructure)

Policy implications: Fast-track trilateral deal, accelerate retrofit & rail repairs, define clear barter deal framework (retrofit support, coal-electricity swap volumes, dispatch rules)

8. Cross-recipient coordination: Initial thoughts on a mechanism to allocate donated equipment for distributed generation

Rationale:

International donors have provided large volumes of distributed generation equipment (CHP units, gas engines, solar systems), but allocation across recipients is often fragmented and ad-hoc, limiting system-wide impact. A stronger national coordination mechanism can ensure equipment reaches locations with the highest resilience and system value.

Current coordination mechanism:

- The Coordination Centre for Distributed Generation¹ (created in Feb-2026) coordinates deployment of distributed generation across regions and tracks installation and grid connection progress

Why cross-recipient coordination matters:

- Prioritises critical infrastructure (heat, water, hospitals) in the most vulnerable regions
- Enables replication of successful city models (e.g. CHP-based “energy islands” in Kharkiv and Zaporizhzhia)
- Helps reduce peak deficits and pressure on the national grid

Policy implications:

- Strengthen the Coordination Centre’s role in prioritising projects with the highest system resilience impact
- Consider voucher-based allocation scheme for donated equipment, facilitated by Coordination Centre (initial allocation of vouchers based on damages or needs assessment, allowing municipalities to express willingness to pay)
- Establish a national registry of distributed generation equipment and deployment status
- Harmonise connection standards across distribution system operators to accelerate deployment

9. Within-municipality coordination: integrating district heating, power and critical infrastructure for local energy resilience

Rationale:

City case studies show that distributed generation improves resilience most when integrated with district heating, water utilities and other critical infrastructure. Isolated generator projects have limited impact without coordinated municipal energy planning.

Key lessons from winter 2025–2026:

- Decentralised boiler houses and small CHP units proved more resilient than large centralised plants
- Coordination between municipal utilities (heat, water, transport) enables shared backup power systems and more efficient use of generation assets
- Distributed generation can create local “energy islands” capable of maintaining essential services during outages

Remaining barriers:

- Fragmented governance of municipal utilities (separate heat, water, electricity entities)
- Regulatory and market barriers (non-cost-reflective heat tariffs) for private CHP investment in district heating systems
- Limited frameworks for third-party access to district heating networks

Policy implications:

- Strengthen integrated municipal energy planning linking heat networks and distributed generation
- Introduce third-party access to district heating networks to enable private CHP investments
- Reform district heating tariffs toward cost-reflective pricing
- Launch a dedicated study on regulatory and tariff reforms needed to mobilise private investment in CHP and distributed generation within district heating systems

10. Reducing load shedding through cost-reflective marginal pricing

Rationale:

Household electricity tariffs remain regulated through the Public Service Obligation (PSO), which keeps retail prices below market levels and weakens incentives to reduce consumption during shortages. This suppresses demand response and increases the need for load-shedding.

Current challenge:

- The PSO subsidises household tariffs, with costs largely borne by state-owned generators (notably Energoatom)
- Regulated tariffs prevent electricity prices from reflecting system scarcity and marginal generation costs, limiting consumers' incentives to reduce demand
- When prices cannot adjust, system operators must balance the system through administrative load shedding rather than market-based demand response
- Subsidised tariffs also contribute to financial imbalances and debt accumulation across the electricity sector

Policy option: introduce marginal price signals

- Gradually phase out the household electricity PSO and move toward cost-reflective retail tariffs
- Introduce block tariffs or marginal pricing (e.g. higher prices for consumption above a baseline level)
- Pilot demand-response tariffs for households to reduce peak consumption
- Couple reforms with targeted compensation for vulnerable consumers (lump-sum transfers)

Expected impact:

- Reduced peak demand and lower need for load shedding during supply shortages
- Stronger price signals for energy efficiency, distributed generation and storage
- Improved financial sustainability of the electricity sector and reduced subsidy burden

	List of measures	Prioritisation	Budget cost*	Uncertainty (dependence on partners)
1	Air defence and deep-strike capabilities	Very high	High	High
2	Scaling-up domestic manufacturing of high-voltage transformers and switchgear	High	(unclear)	Low
3	Partial undergrounding and hardening of critical substations	Medium	High	Low/Medium
4	Improve grid performance and build more interconnectors	Very high	Low	Medium
5	Increasing or removing price caps on the day-ahead and intraday markets	High	Medium	/
6	Improving economic incentives for distributed flexible capacities and renewables	High	depends on sub-measure	Low/Medium
7	Deal with Moldova/Transnistria to retrofit MGRES for UA coal and share power	Medium	Low	High
8	Cross-municipality coordination: Initial thoughts on a mechanism to allocate donated equipment for distributed generation	Medium	Low	/
9	Within-municipality coordination: integrating district heating, power and critical infrastructure for local energy resilience	High	Low	/
10	Reducing load shedding through cost-reflective marginal pricing	Very high	Negative (savings)	/

*fiscal and quasi-fiscal cost (incl. costs to publicly-owned enterprises)

Note: In addition to short-term measures, longer-term actions to enhance system resilience for winter 2027/28 and beyond should be initiated without delay.