

Keeping the lights on

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15th October 2024

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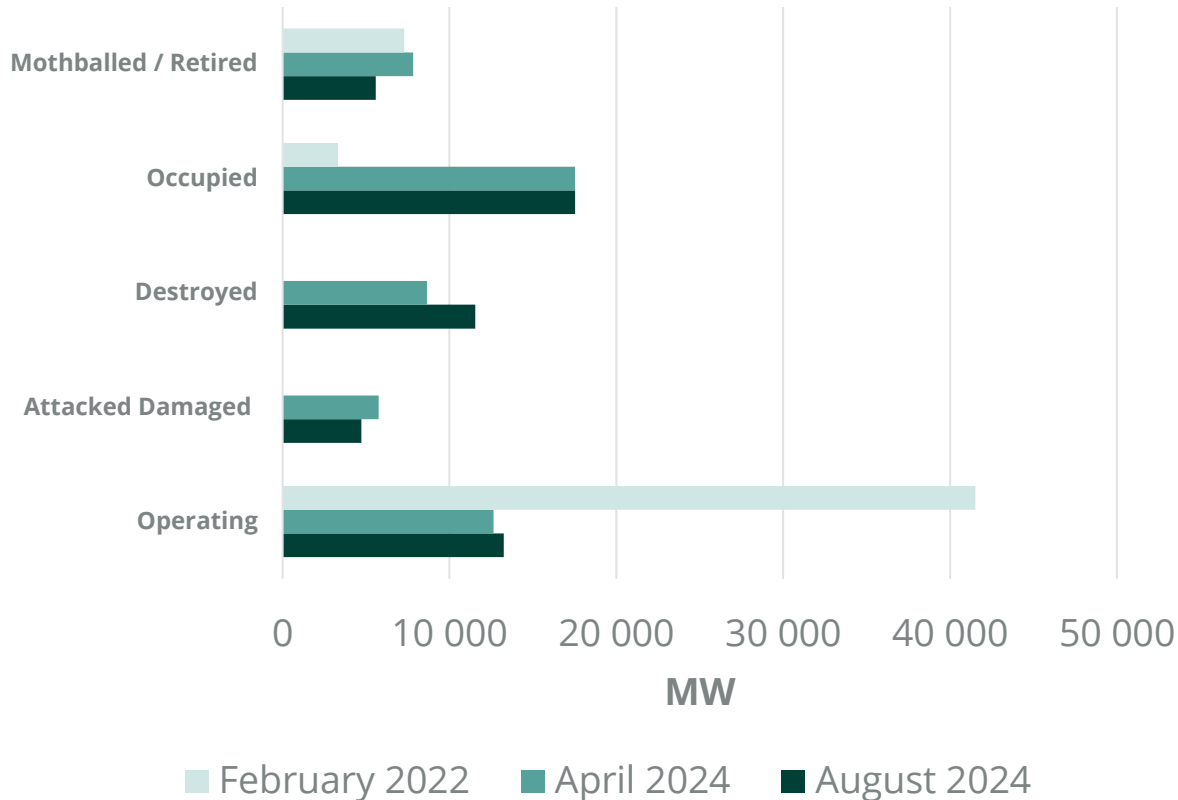
DRASTIC LOSS OF OPERATING CAPACITIES SINCE THE BEGIN OF THE WAR

Assessment based on public sources:

Occupied: ~ 18,000 MW

Destroyed: ~ 8,000 MW

Attacked/damaged: ~ 5,500 MW



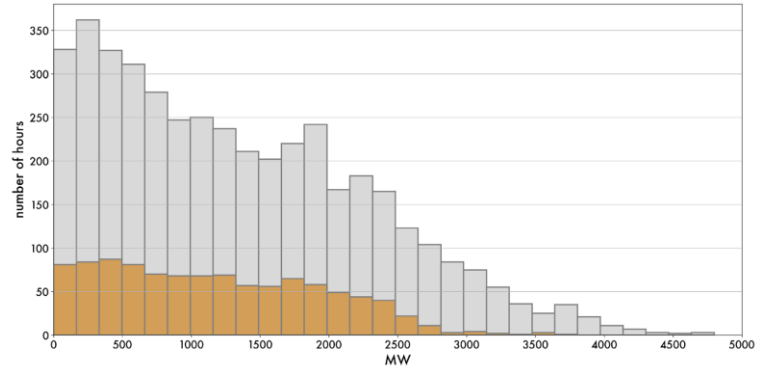
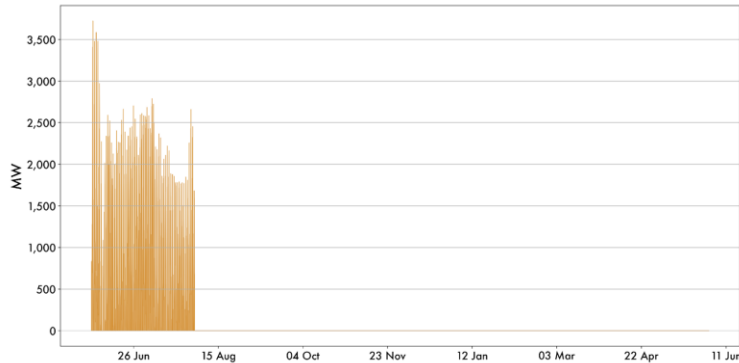


COMPLIMENTARY TECHNICAL SOLUTIONS ARE IN PRINCIPLE AVAILABLE

“limited repairs” + 1.5 GW OCGT + 1 GW wind + 5 GW PV + 2.5 GW batteries + 1 GW import capacity can reduce load shedding from 18% to 1% of annual demand

SCENARIO: ALL-OF-THE-ABOVE

Load shedding of **1.4 TWh** –
1% of annual demand



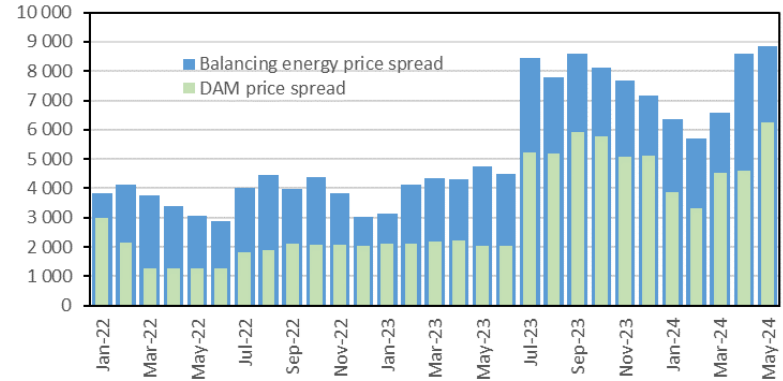
980 hours with at least some load shedding –
11% of the time

MARKET REVENUES COULD DRIVE INVESTMENTS – BUT EXCESSIVE RISKS HOLD BACK PRIVATE SECTOR

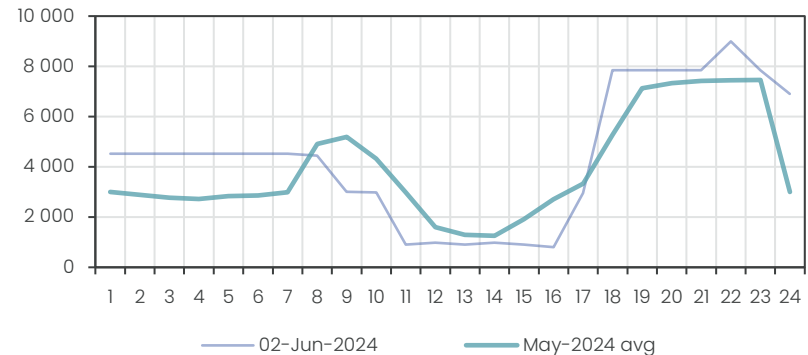
- Private investments will be crucial for efficient restoration, development and operation of Ukraine’s power system going forward
- In principle, investments in battery energy storage systems and flexible generation can be profitable in Ukrainian electricity market, while bankability of such projects remains an issue
- Substantial economic and political risks, as well as regulatory barriers and uncertainty discourage private investments
- Donors, Ukrainian authorities and investors should jointly develop mechanisms to address key bottlenecks, including off-take risks

Price arbitrage potential

MAX daily spreads (average for a month), UAH/MWh



DAM price profile, UAH/MWh



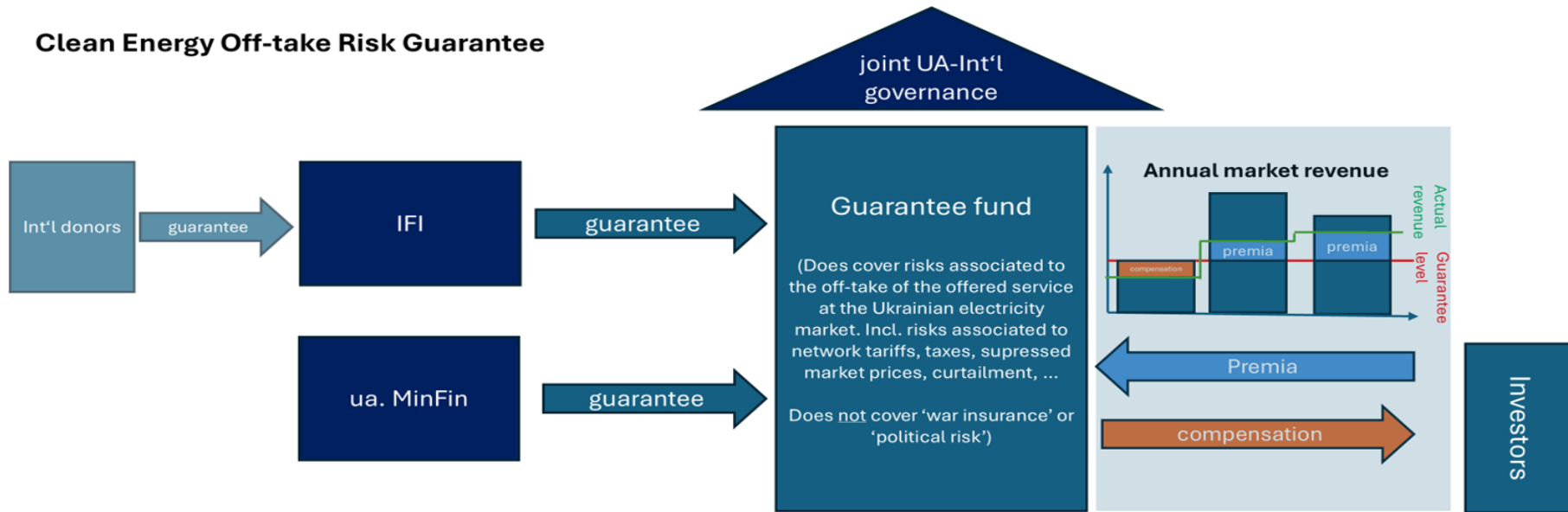


BETTER GOVERNANCE NEEDED TO GET THE RIGHT INVESTMENTS IN PLACE

Rapid implementation of supply improvements requires significant resources and effective coordination. To achieve this, we suggest to discuss:

- The creation of an '**energy situation room**' to improve information sharing and coordination of Ukraine's energy resilience strategy
 - > well-staffed secretariate with access to timely data from key actors; and tools
 - > high-level political involvement (like NSDC) to determine solutions and responsibilities
 - > need-to-know data sharing with partners/stakeholders
- A mechanism to **empower municipalities** to invest in targeted solutions
 - > municipalities might lease needed energy installations from private developers, with International financial institutions underwriting such leasing contracts
- A mechanism to **empower private actors** to invest in systemic solutions
 - > a joint trust fund that guarantees a minimum level of market revenue for private investors in technologies compatible with decarbonization

Clean Energy Off-take Risk Guarantee



Questions:

- How to define 'market revenues' (e.g., sharing volume risks)?
- Which types of generation/storage (e.g., RES, gas-peakers, ...)?
- Only new installation?
- How to allocate and to price the guarantees (e.g., FCFS or auction)?
- How to link to the Ukraine Facility (Pillar 2)
- How to prevent skimming off?



ENVISAGED FURTHER RESEARCH

- Demand reduction (80% block-tariff?)
- Regional price impacts of electricity exports to Ukraine
- Guarantee fund for de-risking private investments
- Power grids 2030

green deal UKRAINA

THANK YOU FOR YOUR ATTENTION



HZB Helmholtz
Zentrum Berlin

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