

Image: Reuters

ESCALATION OF TARGETED ATTACKS ON ENERGY SYSTEM SINCE 10 OCTOBER

Several hundred missiles and drones were shot to bring the energy system down. Every wave of attacks had its own set of targets:

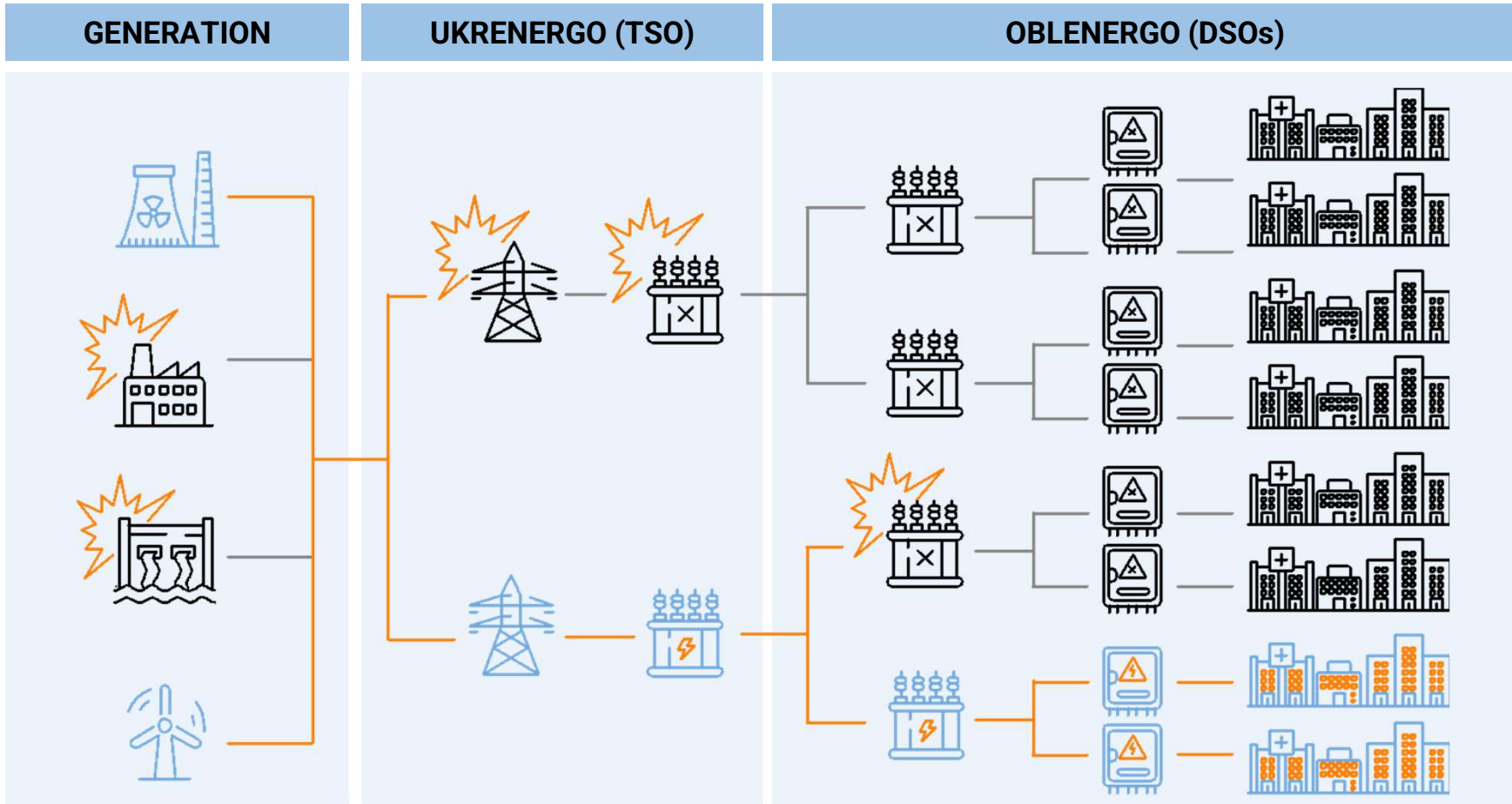
- **big 750 kV and 330 kV power substations** – the backbone of the energy system;
- **maneuverable power generation** (heat-powered power stations and hydro stations);
- power supply substations **transmitting power from nuclear power plants (NPPs)**.

The only strategy that the enemy has not tried yet is a direct attack on the NPPs.

NPPs provide 50%+ of the power supply; locking them down will mean full and long blackouts.

Center and East are affected the most.

RUSSIA HITS KEY NODES TO INFLICT MAXIMUM PAIN



HOW TO HELP?



Image: Ukrenergo

PRIORITIZING EMERGENCY REPAIRS NEEDS

Emergency repairs are required in a **wide range of infrastructure objects and facilities**.

Repair requests are prioritized according to their impact on restoring energy supply to:

1. **household consumers** – by number of affected consumers;
2. **facilities ensuring livelihood security** (utilities, food supply, medical facilities, security services) – by number of affected household consumers;
3. **businesses and industrial capacities** – by number of jobs, importance for defense, tax revenue;
4. **other consumers.**

**Prioritization done by the Ministry of Energy.*

TOP-PRIORITY EMERGENCY REPAIR NEEDS

High-voltage (750-110 kV) equipment for TSO Ukrenergo (annex)

Estimated cost up to EUR 200 mln

- autotransformers
- voltage and current transformers
- 750 kV shunt reactors
- control and relay panels
- high-voltage inputs
- SF6 busbar systems
- SF6 and vacuum switches
- circuit breakers and disconnectors
- surge arresters
- other

- new
- used
- repairable
- not necessarily fully fitting technical specifications
- available in warehouses and those that require minimal manufacturing time



Image: Pfiffner

TOP-PRIORITY EMERGENCY REPAIR NEEDS

Mid-voltage (115 kV and below) equipment for DSOs (annex)

Estimated cost up to EUR 300 mln

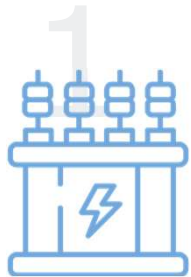
- power transformers
- voltage and current transformers
- complete transformer substations
- high-frequency stoppers (jammers)
- SF6 and vacuum switches
- circuit breakers and disconnectors
- high-voltage inputs
- vacuum reclosers
- surge arresters
- other

- new
- used
- repairable
- not necessarily fully fitting technical specifications
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Image: Pfiffner

OTHER EMERGENCY REPAIR NEEDS



Other equipment

- Substation compressors
- Arc extinguishing chambers
- Disconnecter support columns
- Distributing current retractable equipment
- Insulators, fuses
- Wires, cables



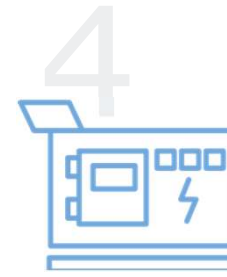
Transport

- Autotowers
- Mini-excavators
- Mobile cranes
- Cargo lifting mechanisms
- Cargo vehicles
- Passenger vehicles



Tools, materials

- Electrical engineering laboratories
- Chainsaws
- Armature, traverses, clamps
- Reinforced concrete supports
- Satellite phones, means of telemechanics and radio communication



Power backup, fuel

- Batteries and UPS devices
- Diesel generators
- Gasoline power stations
- Diesel and gasoline
- Transformer oil

HOW TO SPEED UP THE HELP?



Image: Ukrenergo

KEY CHALLENGE – LACK OF READILY AVAILABLE HIGH VOLTAGE EQUIPMENT AND FINANCING VEHICLES

To streamline the process, we suggest that partners agree on areas of responsibility.

A partner (or a small group of partners) to organize the complete process of support to selected area, in coordination with the corresponding ministry.

The process should include the following components:

1. Set up a dedicated team with necessary technical qualifications to process requests from impacted companies and identify potential suppliers/donors.
2. Organize funding, payment channels and procurement process to enable fast purchases of identified equipment.
3. Ensure logistics, delivery and transfer of procured equipment to a specified warehouse in Ukraine and/or end recipient.

Initiatives, which are not providing the complete cycle yet, should be expanded or grouped with other initiatives accordingly to increase efficiency and remove bottlenecks.

The specializing partner to coordinate the entire chain.

AUTOMATION AND TRANSPARENCY

AID ENERGY PLATFORM

DATA MANAGEMENT

PARTNERS AND PROPOSALS

RECIPIENTS AND REQUESTS

SUPPLIERS AND OFFERS

WAREHOUSING AND
LOGISTICS

AUTOMATION OF PROCEDURES

PRIORITIZATION OF NEEDS

POLLING OF RECIPIENTS

DISTRIBUTION OF AID

CONTROL AND REPORTING

AUTOMATION OF DAMAGE DATA COLLECTION AND PROCESSING

(with security and confidentiality restrictions)

DAMAGE RECORDING AND ANALYSIS

DAMAGE RECOVERY SUPPORT

AID ENERGY PLATFORM (DISCUSSED WITH EBRD)

Safety is critical. Detailed breakdown on damages and final recipients is confidential. Basic humanitarian aid module with warehouse CRM integration, ability to select needs by donors to remove duplication and make updates automatic described below.

- **Suggested platform:** Microsoft BI
- **Estimated term of roll-out:** 1 month
- **Estimated cost:** EUR 50 000
- **Integration with similar platforms** serving other needs (Ukrenergo's CRM, Damaged.in.ua, Uneeds)
- **Estimated need of additional personnel:** 11 persons, incl.
 - 3 persons working with the Ministry of Energy
 - 8 persons dedicated to Khmelnytskoblenergo