The main categories of requested energy equipment are presented below:

I. Power Supply

1. Power Equipment

1.1. Power Transformers and Autotransformers

- Autotransformers:
- Autotransformer 200 MVA, 330/110 kV — 1 pc.
- Autotransformer 250 MVA, 220/110 kV — 1 pc.
- Autotransformer 400 MVA, 150/330 kV — 1 pc.
- Autotransformer 250 MVA, 150/330 kV — 1 pc.

Power transformers:

- Power transformer 40000 kVA, 110/10/10 kV — 1 pc.
- Power transformer TDTN-40000/115-U1 — 2 pcs.
- Power transformer TDTN-40 MVA 150/35/10 kV — 1 pc.
- Power transformer TMN-10 MVA 35/10 kV — 2 pcs.
- Power transformer TDC-250000/330, 250000 kVA, 347/15.75 kV or equivalent — 2 pcs.
- Power transformer TRDNS-32000/35-U1 or equivalent — 4 pcs.
- Power transformer TDC-400000/330 or equivalent — 6 pcs.
- Power transformer 25 MVA, 110/35/10 kV — 7 pcs.
- Power transformer 25 MVA, 150/35/6 kV — 10 pcs.
- Power transformer 16 MVA — 6 pcs.
- Power transformer 10 MVA — 6 pcs.
- Power transformer 6.3 MVA — 14 pcs.
- Power transformer 4 MVA — 12 pcs.
- Power transformer 2.5 MVA — 5 pcs.
- Distribution transformers 0.16–1 MVA — 14 pcs.

Additionally:

- Block transformers 200–400 MVA — 9 pcs.
- Start-up and reserve transformers 20–40 MVA — 5 pcs.
- Auxiliary transformers 32 MVA — 4 pcs.
- Transformers for gas-piston and cogeneration facilities — 8 pcs.

This includes urgent requirements for restoration of critical generation and substation infrastructure, including damaged high-voltage nodes.

Quickly available: distribution transformers and standard HV units from stock.

Long production cycle: 330–750 kV transformers and autotransformers (up to 12–24 months).

1.2. Circuit Breakers

SF_6 circuit breakers:

- 750 kV — 10 sets (3 phases)
- 330 kV — 32 sets
- 220 kV — 2 sets (3 phases)
- 150 kV — 8 pcs
- 110 kV — 67 pcs

Vacuum circuit breakers:

- 35 kV — 23 pcs
- 10 kV — 20 pcs

Quickly available: vacuum breakers 6–35 kV, standard 110 kV SF_6.

Long production cycle: 220–750 kV equipment.

1.3. Disconnectors (Isolators)

- 750 kV — 12 sets.
- 330 kV — 40 pcs./sets.
- 220 kV — 6 pcs.
- 150 kV — 7 pcs.
- 110 kV — 35 pcs.
- 35 kV — 52 pcs.

Quickly available: standard 35–110 kV.
Long production cycle: 220–750 kV configurations.

1.4. Current and Voltage Transformers

Current transformers:

- 750 kV — 20 pcs.
- 330 kV — 24 pcs.
- 150 kV — 21 pcs.
- 110 kV — 107 pcs.
- 35 kV / 10 kV — 61 pcs.

Voltage transformers:

- 750 kV — 12 pcs.
- 330 kV — 35 pcs.
- 150 kV — 27 pcs.
- 110 kV — 31 pcs.
- 35 kV / 10 kV / 6 kV — 31 pcs.

Quickly available: 35–110 kV.
Long production cycle: 330–750 kV high-accuracy units.

1.5. Surge Arresters

- 750 kV — 2 sets.
- 330 kV — 2 sets.
- 220 kV — included in mixed packages.
- 150 kV — 51 pcs. + 2 sets.
- 110 kV — 82 pcs. + 10 sets.
- 35 kV — 262 pcs. + 1 set.
- 10 kV — 300 pcs.

Quickly available: standard MV/HV designs.
Long production cycle: EHV class equipment.

1.6. Insulators and Bushings

- High-voltage bushings 10–330 kV — 278 pcs.
- Insulators — 3,102 pcs.

Quickly available: standard 10–110 kV.
Long production cycle: 330 kV+ equipment.

2. Switchgear and Substation Equipment

- 6 kV switchgear cubicles — 6 pcs.
- 10 kV switchgear — 4 pcs.
- 35 kV switchgear / GIS — 3 pcs.
- Gas-insulated switchgear 35 kV — 2 pcs.
- Compact switchgear (KRPZ/KRU) — 7 pcs.
- SMA medium-voltage inverter substations — 5 pcs.
- Outdoor switchgear cabinets for cogeneration units — 2 sets.
- Bus ducts 15.75–20 kV / 6.3 kV — 13 pcs.

Quickly available: standard MV solutions.

Long production cycle: GIS and customized solutions.

3. Cable Products

- Power cables — approximately 405 km.
- Control cables — approximately 14.6 km.
- Overhead conductors / SIP / ABC — approximately 59 km + 10 t ACSR.
- 110 kV cable — 556 m.
- Cable joints and terminations — over 400 pcs.
- Control cable type KVVHng 19x2.5 — 3,640 m.

Quickly available: standard cable products.
Long production cycle: specialized cable types.

4. Auxiliary Equipment

- Transformer oil — 570 t + 32,000 l.
- Turbine oil TP-22S — 400 t.
- Batteries / DC systems / DC boards — at least 17 sets/items.
- Modular battery blocks Fluence Smart Stack — 56 pcs.
- DC busbar-cable assemblies — 11 pcs.

4.1. Relay Protection & Automation

- Protection and control cabinets — over 20 pcs.
- Telemechanics and telesignalling cabinet — 1 pc.
- SCADA telecommunications cabinet — 1 pc.
- Microprocessor relay terminals — 10 pcs.
- Generator-transformer protection systems — 4 sets.
- Excitation systems — 4 sets.
- Software and hardware complexes with cable products — 4 sets.
- Schneider Electric PLC module 140 CRP 932 00 RIO Head — 1 pc.
- Schneider Electric PLC module 140 CRA 932 00 RIO Drop Adapter — 2 pcs.
- Splitter AEG Modicon MA-0185-100(C) — 4 pcs.

4.2. Distributed and Backup Generation

- Diesel generators — 3 pcs.
- Gas turbine units (5.67–16.5 MW) — 3 units.
- Gas piston / gas generator / cogeneration units — approximately 58 units.
- Gas pumping units 16 MW — 5 sets.
- Mobile block-modular gas distribution stations 10,000 m^3/h — 3 pcs.
- Mobile block-modular gas distribution stations 50,000 m^3/h — 5 pcs.
- Mobile block-modular gas distribution stations 120,000 m^3/h — 1 pc.

4.3. Pumping & Mechanical Equipment

- Pumping units — 20 pcs.
- Compressors — 4 pcs.
- Electric motors — ~10 pcs.
- Feed pumps — 2 pcs.
- Smoke extractors with motors — 2 units.

Electric-operated valves and actuators — included in urgent requests.

4.4. Construction Materials

- Steel pipes — 1,891 t + 67,810 m.
- Brass pipe — 15 t.
- Steel channel sections — 1,920 running metres.
- Rectangular steel pipe — 310 pcs.
- Roofing and façade materials — 1,727 m^2 + 2,580 pcs. .

- Sandwich panels — 950 pcs.

4.5. Special Equipment

- Reclosers 6–35 kV — 255 pcs./sets.
- Mobile electrical laboratories — 2 pcs.
- Emergency repair workshops — 5 units.
- Truck with crane manipulator — 1 unit.
- Self-propelled boom crane 100 t — 1 unit.
- Mobile crane, 50-ton capacity — 1 unit.
- Aerial work platforms, AGP/AP — 15 units.
- Excavators / drilling machines / backhoe loaders — 11 units
- Dump trucks — 2 units.
- Telescopic forklift — 1 unit.
- Diesel forklift — 1 unit.
- Emergency and rescue vehicles — 2 units.
- Portable battery-powered X-ray devices — 3 pcs.

5. Electricity Generation (Diesel and Backup Power)

5.1. Diesel and Autonomous Generators (Consolidated including energy facilities, district heating, water supply companies, and mobile reserve stock)

Total requirement: over 1,950 units with a total installed capacity exceeding 530 MW.

By capacity range:

- 0.1 MW — approximately 1,100 units
- 0.1–0.6 MW — approximately 460 units
- 1–5 MW — approximately 230 units
- ≥5 MW — approximately 50 units

For the connection of consumers to generation units, copper power cables with cross-sections ranging from 25 mm² to 400 mm² are required, depending on generator capacity and connection scheme, including parallel cable runs for higher-capacity generators.

Additionally, for the connection of approximately 1,500 generator units with capacities ranging from 50 kVA to 1.5 MVA, approximately 84 km of copper power cable are required.

The consolidated cable requirement includes:

- copper cable 4×25 mm² — 4.0 km;
- copper cable 4×35 mm² — 5.0 km;
- copper cable 4×50 mm² — 6.0 km;
- copper cable 4×70 mm² — 8.0 km;
- copper cable 4×95 mm² — 7.0 km;
- copper cable 4×120 mm² — 6.5 km;
- copper cable 4×150 mm² — 7.0 km;
- copper cable 4×185 mm² — 6.0 km;
- copper cable 4×240 mm² (single run) — 16.5 km;
- copper cable 4×240 mm² (parallel runs, 2–4 runs) — 18.0 km.

Additionally, cable lugs for copper conductors with cable cross-sections ranging from 25 mm² to 240 mm² are required in an estimated total quantity of approximately 12,100 pcs, depending on generator capacity and connection configuration.

Detailed requirements for cable products and cable lugs are provided in the **Annex "Information Note on Cables and Cable Lugs for Connecting 1,500 Generators".**

II. GAS supply

Urgent emergency equipment needs of the Gas TSO of Ukraine and the Naftogaz Group include:

- Compressor Ariel KBK/4 CU (3-stage reciprocating compressor) with engine – 2 units
- Compressor Ariel KBE/4 CU (2-stage reciprocating compressor) with engine – 2 units
- Compressor Ariel KBK/4 CU (1-stage reciprocating compressor) with engine – 2 units
- Gas processing unit (packaged equipment for gas treatment) – 2 units
- Gas turbine unit with a capacity 16 MW – 8 units

- Gas turbine unit with a capacity 13 MW – 3 units
- Gas turbine unit with a capacity 6 MW – 16 units
- Gas turbine unit with a capacity 8 MW – 6 units
- Gas turbine unit with a capacity 2-3 MW – 3 units
- Gas motor compressor unit with a capacity 2-3 MW – 12 units
- Gas motor compressor unit with a capacity 1.1 MW – 1 unit
- Gas processing unit Titan 130 – 1 unit
- Gas processing unit Centaur 40 – 3 units
- Compressor Ajax DPC 2804 – 4 units
- Compressor Caterpillar + Ariel – 1 unit
- Turbine Taurus 70 or similar – 4 units.

III. Heat Generation

6. Cogeneration and Heat Generation Equipment

6.1. Cogeneration Equipment

- 0–1 MW: 196 units (51.23 MW)
- 1–2 MW: 51 units (60.4 MW)
- 2–5 MW: 54 units (162.1 MW)
- 5–10 MW: 24 units (190.3 MW)

6.2. Modular Boiler Houses

Total: 254 units, total installed capacity >1,200 MW

- 0.04–2 MW: 73 units (114.78 MW)
- 2.1–4.8 MW: 92 units (294.07 MW)
- 5–7 MW: 51 units (307.3 MW)
- 7.5–15 MW: 28 units (308.26 MW)
- 15–18 MW: 4 units (64.66 MW)
- 20–25 MW: 6 units (129 MW)

IV. Water Supply and Heat supply Companies

9. Diesel generators water supply: represent 869 units (335.3 MW)

- **0.6–5 MW: 107 units (203.82 MW) first priority**
- **5 MW: 7 units (75.3 MW) first priority**
- 0–0.1 MW: 586 units (17.54 MW)
- 0.1–0.6 MW: 169 units (38.64 MW)

10. Diesel generators heat supply: represent 543 units (196,66 MW)

- **1 – 5 MW: 45 units (98,76MW) first priority**
- **5 – 22,5 MW: 4 units (52,5 MW) first priority**
- 0–0.1 MW: 364 units (13,04 MW)
- 0.1–0.6 MW: 121 units (25.2 MW)
- 0.6 - 1 MW: 9 units (7.16 MW)

The total requirement water and heat supply amounts to – 1412 units (531,96 MW)

V. Mobile Equipment Fund/Reserve Stock of equipment:

Operator: SARDI: STATE AGENCY FOR RESTORATION AND DEVELOPMENT OF INFRASTRUCTURE

Mobile Equipment Fund - on a chassis, for moving to different locations

Block-modular boiler houses:

- 1–3 MW: 586 units (1,284,185.23 kW heat power)

Diesel generators:

- 0.1-3 MW (1-3 MW priority): 136 MW (funded via state budget)

VI. Urgent need for cogeneration for the city of Kyiv (Kyivteploenergo Municipal Enterprise)

- Gas reciprocating unit (GPU) 2.3 MW 11 units
- Gas reciprocating unit (GPU) 2.5 MW 19 units
- Gas reciprocating unit (GPU) 4.5 MW 20 units
- Gas reciprocating unit (GPU) 5.0 MW 2 units
- Gas reciprocating unit (GPU) 10.0 MW 5 units
- Gas turbine unit (GTU) 57 MW 2 units
- Steam turbine unit (STU) 46 MW 1 unit
- Battery energy storage system (BESS) 10 MW 2 units

Electric Motors (or equivalents)(for district heating enterprises)

- 4AZM 5000/6000, 6 kV, 5000 kW, 2982 rpm - 1 unit
- DAZO-15-49-8/10, 6 kV, 630/320 kW, 734/595 rpm - 6 units
- AO2-92-4U2, 0.4 kV, 11 kW, 750 rpm - 2 units
- 4AM160M8UZ, 0.4 kV, 11 kW, 730 rpm - 2 units
- AIR160M8UZ, 0.4 kV, 11 kW, 730 rpm - 1 unit
- A02-81-2, 0.4 kV, 40 kW, 2920 rpm - 1 unit
- 4AMN225M2, 0.4 kV, 90 kW, 2930 rpm - 3 units

VII. Emergency Equipment Requirements of LVDS "Brody" of the Druzhba Oil Pipeline

The Linear Production and Dispatch Station (LVDS) "Brody" of the Druzhba oil pipeline is a critical infrastructure facility within the main oil pipeline system of Ukraine and is operated by JSC Ukrtransnafta.

In order to ensure uninterrupted operation of the facility and enable rapid restoration a list of emergency requirements for electrical, technological, and automated equipment has been developed, namely:

Power transformers

- Power transformer 150/6 kV, 16 MVA – 1 pc
- Power transformer 110/10 kV, 16 MVA – 1 pc
- Power transformer 110/6 kV, 16 MVA – 1 pc

Process equipment

- Mixer Plenty 30(28)P-70-S TM-30 (50HP) or equivalent – 3 pcs
- Electric-operated flanged gate valve DN500 PN16 (complete set: valve, gearbox, electric actuator) – 3 pcs
- Electric-operated flanged gate valve DN600 PN16 (complete set: valve, gearbox, electric actuator) – 1 pc
- Electric-operated flanged butterfly valve DN500 PN16 (complete set: valve, gearbox, electric actuator) – 3 pcs
- Electric-operated flanged butterfly valve DN600 PN16 (complete set: valve, gearbox, electric actuator) – 1 pc
- Limitorque MX-40 electric actuator or equivalent – 2 pcs

Cable products

- Cable VBBShv 5×2.5 – 2,662 m
- • Cable VBBShv 5×10 – 400 m
- • Cable VBBShv 5×4 – 350 m

- • Cable VBBShv 3×6 – 400 m
- • Cable VBBShv 5×16 – 500 m
- • Cable VBBShv 5×35 – 300 m
- • Cable KVBBShv 7×1.5 – 500 m
- • MG-10 wire – 300 m
- • EuroSat RG-58 coaxial cable – 300 m
- • MKEKShV 4×2×1.0 control cable – 200 m

Electrical installation materials

- Connecting coupling 0.4 kV (150–240) – 20 pcs
- Connecting coupling 0.4 kV (16–50) – 25 pcs
- Connecting coupling 0.4 kV (50–95) – 20 pcs
- Connecting coupling 0.4 kV (1.5–2.5) – 20 pcs
- End connector 0.4 kV (150–240) – 15 pcs
- End connector 0.4 kV (70–120) – 20 pcs
- Explosion-proof distribution box 300×350 – 15 pcs

Automation and control systems

- Schneider Electric PLC module 140 CRP 932 00 RIO Head – 1 pc
- Schneider Electric PLC module 140 CRA 932 00 RIO (Remote I/O) Drop Adapter – 2 pcs
- Splitter AEG Modicon MA-0185-100(C) – 4 pcs

Fire-fighting and emergency equipment

- Fire truck (fire tanker) – 2 pcs
- PH-Poseidon 1 portable floating fire pump or equivalent – 2 pcs
- Genergy Limited 3000 portable petrol generator or equivalent – 2 pcs
- Lukas SC 358E3 battery-powered combination tool (spreader and cutter) – 2 sets
- Lukas R 521E3 battery-powered jack – 2 sets
- Streamlight Survivor personal flashlights with charger – 8 pcs
- Streamlight Fire Vulcan multi-lamp units with charger – 5 pcs
- Protek Style 366 multi-mode combination hand-held fire hose – 6 pcs
- Foam dispensing nozzles for Protek Style 213 hose – 6 pcs

Fire hoses

- Fire hose Ø51 mm (20 m) – 40 pcs
- Fire hose Ø66 mm (20 m) – 30 pcs
- Fire hose Ø77 mm (20 m) – 40 pcs

Protective equipment and tools

- Fireproof fire-fighting gloves – 100 pairs
- Petrol chainsaw (Husqvarna / Stihl / Makita or equivalent, with spare cut-off wheels and oil) – 2 sets
- Chainsaw (Husqvarna / Stihl / Makita or equivalent) – 2 sets

Focal points

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Annex

"Information Note on Cables and Cable Lugs for Connecting 1,500 Generators"

Standard Generator Capacities from 50 kVA to 1.5 MW

Lower capacities (commonly used for backup power supply to buildings)

- 50 kVA — 80 units
- 63 kVA — 100 units
- 80 kVA — 120 units
- 100 kVA — 160 units
- 125 kVA — 140 units
- 160 kVA — 130 units
- 200 kVA — 140 units

Medium capacities (distributed generation units)

- 250 kVA — 120 units
- 300 kVA — 110 units
- 320 kVA — 70 units
- 330 kVA — 40 units
- 400 kVA — 80 units
- 440 kVA — 30 units
- 500 kVA — 60 units
- 550 kVA — 20 units
- 600 kVA — 35 units
- 650 kVA — 10 units
- 700 kVA — 15 units
- 750 kVA — 10 units
- 800 kVA — 10 units
- 900 kVA — 8 units

Upper range up to ~1.5 MW

- 1,000 kVA — 6 units
- 1,100 kVA — 2 units
- 1,200 kVA — 2 units
- 1,250 kVA — 1 unit
- 1,500 kVA — 1 unit

Cable Requirements

To connect 1,500 generator units with capacities ranging from 50 kVA to 1.5 MVA, approximately 84 km of copper power cable with cross-sections from 25 mm² to 240 mm² is required, taking into account parallel cable runs for higher-capacity generators.

Consolidated Summary by Cable Type:

- Copper cable 4×25 mm² — 4.0 km
- Copper cable 4×35 mm² — 5.0 km
- Copper cable 4×50 mm² — 6.0 km

- Copper cable 4×70 mm² — 8.0 km
- Copper cable 4×95 mm² — 7.0 km
- Copper cable 4×120 mm² — 6.5 km
- Copper cable 4×150 mm² — 7.0 km
- Copper cable 4×185 mm² — 6.0 km
- Copper cable 4×240 mm² (single run) — 16.5 km
- Copper cable 4×240 mm² (parallel runs, 2–4 runs) — 18.0 km

Cable Lug Requirements

(for generators from 50 kVA to 1.5 MVA, 0.4 kV, copper conductors, 4-core connection scheme, including parallel runs)

Summary by Lug Size

- 25 mm² lugs — 640 pcs
- 35 mm² lugs — 800 pcs
- 50 mm² lugs — 960 pcs
- 70 mm² lugs — 1,280 pcs
- 95 mm² lugs — 1,120 pcs
- 120 mm² lugs — 1,040 pcs
- 150 mm² lugs — 1,120 pcs
- 185 mm² lugs — 960 pcs
- 240 mm² lugs — approx. 6,176 pcs

Overall Summary

Total number of cable lugs: approximately 12,100 pcs
Application: connection of generator units with capacities from 50 kVA to 1.5 MVA
Material: copper
Cable cross-section range: 25 mm² to 240 mm²