**NON-PAPER**

**KEY PRIORITIES FOR WINTER 2024/25 IN THE ENERGY SECTOR OF UKRAINE**

**Prepared summary by the Working Group under the auspices of the Ministry of Energy of Ukraine in coordination with the Ministry of Infrastructure and Regional Development upon the consultations with relevant stakeholders focusing on emergency and rapid response.**

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# Summary

Up to 5 GW of the total capacity of the most priority units that need repairing, back up energy generating installations and maneuvering energy generating capacities, overview of which is prepared in this document.

Only repairing and restoration of energy infrastructure facilities urgently requires financing in the amount of EUR 181.16 mln to complete the works before the winter period and supply energy to 10,2 mln Ukrainian citizens.

In parallel 29 units of 290 MW total maneuverable capacity are to be installed to enhance energy generation locally and to improve resilience against disruptions requiring financing in the amount of EUR 156,2 mln.

Given the substantial demand for generators, the Ministry of Energy has prioritized the water supply, drainage, heating, and fuel and energy sectors for immediate attention. The estimated requirement for these sectors is 1,734 generators with a total capacity of 220.3 MW.

Regarding the development of the sustainable heat supply, in February 2024 Cabinet of Ministers of Ukraine adopted Government's Priority Action Plan for 2024 and for that Ministry of Infrastructure has developed a draft resolution of the Cabinet of Ministers of Ukraine "Certain Issues of Implementing State Policy in the Field of Heat Supply," which is currently being submitted for approval by the interested central executive bodies.

In this paper the needs are outlined in the order of their priorities.

# **Repair and restoration of energy infrastructure facilities**

**Focus on restoring and repairing energy infrastructure facilities to ensure reliable energy supply during winter 2024-2025.**

We request support in restoration and repair for 13 energy companies of Ukraine with the total capacity of **electricity around** **3,4 GW** and **heat supply 7036 Gcal** in several regions of Ukraine, including Dnipro, Kharkiv, Kherson, Kryvyi Rih, Kyiv, Mykolaiv, Odesa regions, etc. Energy companies which applied about their needs after finishing repairs and restorations will be able to **supply heat and electricity to 10,2 mln people**, majority of energy will be supplied by DTEK (to 8 mln people). However the additional funding is still needed in the **amount of EUR 181.16 mln**. It is crucial to finalize all the works before the winter period.

*Table 1. List of the restoration and repair requests by the energy companies in Ukraine*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Energy company** | **Region** | **Total capacity after repairs, MW/Gcal** | **Additional funding needed, Million EUR** | **Number of consumers who benefit, thousand people** | **Comment** |
| 1 | KHARKIV CHPP-5, 3 Units | Kharkiv | 540 MW | 0.78 | 420 | The equipment is needed for the commissioning of the CHP. Given the small amount of financing needed USAID is kindly requested to assist with the procurement of the requested equipment/materials. Procurement worth USD 2.5 million ongoing |
| 2 | KHARKIV CHP-2 (Eskhar), 1 unit | Kharkiv | 50 MW | 2.57 | 36 |  |
| 3 | NAFTOGAZ JSC "Odesa CHP", 1 unit | Odesa | 68 MW (779 Gcal) | 0.56 | 300 |  |
| 4 | NAFTOGAZ JSC "KRYVORIZKA TEPLOSENTRAL" 4 units | Kryvyi Rih | 5600 Gcal | 2.02 | 220 |  |
| 5 | NAFTOGAZ JSC “Kherson CHP” Unit 1 | Kherson | 80 MW | 0.80 | 30 |  |
| 6 | NAFTOGAZ JSC “Dniprovs'ka“ CHP Unit 1 | Dnipro | 80 MW | 0.90 | 55 |  |
| 7 | NAFTOGAZ JSC Mykolaivska CHP, Unit 1 | Mykolaiv | 40 MW (410 Gcal) | 2.21 | 160 |  |
| 8 | KREMENCHUK CHP, Unit 1 | Poltava | 50 MW (247 Gcal) | 0.85 | 218 |  |
| 9 | CHERNIHIV CHP, unit 1 | Chernihiv | 60 MW | 1.95 | 70 |  |
| 10 | BILA TSERKVA CHP, unit 1 | Kyiv | 120 MW | 2.98 | 100 |  |
| 11 | CENTRENERGO Trypilska TPP, 3 Units | Kyiv | 300 MW | 15.5 | 600 |  |
| 12 | UKRENERGO | Multiple | 464 MW | 15.12 | 0 | High-voltage transmission grids |
| 13 | DTEK 22 Units | multiple | 1526 MW | 135.37 | 8000 |  |
|  | **Total** |  | **7036 Gcal)** | **181.16** | **10209** |  |
|  |  |  | **3378 MW** |  |  |  |

# **Second level of protection prioritized list and responsible entities**

Additional priority needs for Level II protective shelters at substations operated by PrJSC “NPC “Ukrenergo” are listed in the table #2.

There are also **other sites that are critical for the system** but are not included into the 85-items list related to TSO PrJSC “NPC “Ukrenergo” (Energoatom, UkrHydroEnergo, TPPs etc) . Such sites are listed in the table #3.

*Table 2. Additional priority needs for Ukrenergo Level II protection*

|  |  |  |
| --- | --- | --- |
| № | Object name | Elements |
| 1. | Mukachevo Substation 400 kV | Autotransformer-4 + building relay pannels |
| 2. | Vinnitsia Substation 750 kV | Autotransformer-2 + backup control station |
| 3. | Kremenchuk Substation 330 kV | Autotransformer-1 + Autotransformator-2 + complex switchgear |

*Table 3. Power generation facilities autotransformers*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object name | | Autotransformer | Voltage class | Output, MVA |
| NPP | Rivne NPP | 9АТ | 750/330 | 1000 |
| Khmelnytskyi NPP | АТ-1 | 750/330 | 1000 |
| АТ-Rzeszow | 750/400 | 1000 |
| South Ukraine NPP | 3АТ | 750/330 | 1000 |
| Chornobyl NPP | 3АТ | 750/330 | 1000 |
| 4АТ | 750/330 | 1000 |
| TPP | Burshtyn TPP | 3АТ | 400/220 | 400 |
| 6АТ | 400/330 | 630 |
| Zmiivska TPP | АТ-А | 330/110 | 200 |
| Trypilska TPP | АТ-2 | 330/110 | 125 |
| Kyiv CHP-5 | АТ-1 | 330/110 | 200 |
| Kryvyi Rih TPP | АТ 1 | 330/150 | 250 |
| HPP | Dniester HPP | АТ-2 | 330/110 | 200 |

The U.S. delegation is currently visiting the selected sites (NPPs, substation Chornobyl, Burshtyn TPP, and key substations of Ukrenergo) to update and complete the DoE designed solution.

## **Responsible authorities**

By Article 11 of the Law of Ukraine on the Functioning of the Energy and Fuel Sector of Ukraine during Special Period, the Ministry of Energy of Ukraine is responsible for overall coordination with those responsible for the  second level of protection:

* the Agency for Restoration (Ministry for Communities, Territories and Infrastructure Development of Ukraine) in charge for the 22 TSO “Ukrenergo” facilities;
* TSO “Ukrenergo” in charge for 63 its substations;
* Operators of critical infrastructure facilities in charge for the generation facilities.

## **Exemption of workers from the mobilization**

According to the Resolution of the Cabinet of Ministers of Ukraine dated January 27, 2023, No. 76 "Some Issues of Implementing Provisions of the Law of Ukraine 'On Mobilization Preparation and Mobilization' Regarding the Reservation of Military-Age Personnel During Mobilization and Wartime," the limitation on the number of military-age personnel eligible for reservation (up to 50% of those holding positions at an enterprise, institution, or organization and subject to reservation according to the law) **does not apply** to enterprises, institutions, and organizations of the fuel and energy complex (hereinafter referred to as the FEC) **and their subcontractors**, who are engaged in the construction, repair, restoration, manufacturing, and/or supply of equipment, provide services, or carry out other engineering and technical measures aimed at ensuring the uninterrupted operation of the unified energy system and the gas transmission system of Ukraine during a special period, the list of which is approved by the Ministry of Energy.

This means that **FEC enterprises included in the corresponding list** approved by the Ministry of Energy, as well as their subcontractors carrying out the aforementioned work, including engineering and technical measures for the protection of relevant facilities, **are eligible for the reservation of up to 100% of the military-age personnel** emp at these enterprises.

Currently, 400 legal entities have been included in this list approved by the Ministry of Energy.

# **Development of Distributed Generation**

To enhance energy generation locally and to improve resilience against disruptions the development of distributed generation is in priority by JSC Naftogaz of Ukraine and Ukrzaliznytsia, UA railways (UZ Energo, LLC) of a total capacity of 290 MW. When these capacities are installed, the supply of electricity can cover needs of up to 1,5 million Ukrainian citizens.

**JSC Naftogaz of Ukraine** plans to install 21 units of gas-piston engines with 210 MW of maneuverable total capacities in Dnipro, Mykolaiv and Odesa regions. Total financing needed estimated at approximately EUR 105 mln. It includes the regions provided in the table with the projects detalization.

*Table 4. JSC Naftogaz of Ukraine projects of maneuverable capacities*

|  |  |  |  |
| --- | --- | --- | --- |
| **Region** | **Total project capacity, MW** | **Additional financing needed, EUR mln** | **Details** |
| Odesa region (6 GPUs) | 60 | 30 | 6 gas-piston engines with a capacity of about 10 MW each, to be used as maneuvering capacities in the Odesa energy hub. |
| Dnipro region (7 GPUs) | 70 | 35 | 7 gas-piston units with a capacity of about 10 MW each for the implementation of the project to install shunting capacities in the Dnipro energy hub. |
| Mykolaiv region  (8 GPUs) | 80 | 40 | 8 gas-piston units with a capacity of about 10 MW each, to be used as shunting capacities at the Mykolaiv CHP |
| **Total** | **210 MW** | **EUR 105 mln** |  |

**Ukrzaliznytsia, (UA railways - UZ Energo, LLC )** plans to install 8 gas piston units with 80 MW of maneuvrable total capacity in Dnipro, Kharkiv, Kyiv and Odesa regions. Total financing needs are estimated at approximately EUR 51,2 mln. It includes the following regions provided in the table with the projects detalization.

*Table 5. UZ Energo, LLC projects of maneuverable capacities*

|  |  |  |  |
| --- | --- | --- | --- |
| **Region** | **Total project capacity, MW** | **Additional financing needed, EUR mln** | **Details** |
| Odesa region  (2 GPUs) | 20 | 12.8 | Purchase of 2 gas piston units with a capacity of 10 MW each. Construction of a production site, voltage level 10 kV, without a step-up transformer, with a UZE system |
| Kharkiv region  (2 GPUs) | 20 | 12.8 | Purchase of 2 gas piston units with a capacity of 10 MW each. Construction of a production site, voltage level 10 kV, without a step-up transformer, with a UZE system |
| Dnipro region (2 GPU) | 20 | 12.8 | Purchase of 2 gas piston units with a capacity of 10 MW each. Construction of a production site, voltage level 10 kV, without a step-up transformer, with a UZE system |
| Kyiv region (2 GPU) | 20 | 12.8 | Purchase of 2 gas piston units with a capacity of 10 MW each. Construction of a production site, voltage level 10 kV, without a step-up transformer, with a UZE system |
| **Total** | **80 MW** | **EUR 51.2 mln** |  |

# **Leasing – baseload, dispatchable**

There are several projects considered by the Gov’t of Ukraine:

* Power ships – delta financing needed is estimated at USD40 million/year. The project is developed by the Energy Company of Ukraine, JSC.
* Leasing of gas turbines (up to 350 MW) – project is implemented by OGTSU.
* Purchasing and installing gas turbines in Moldova (up to 350 MW) – project to be implemented by OGTSU.

# **Provision of backup power generators**

Even with repairs and the development of distributed generation projects, there are risks of maintaining a significant deficit. Additionally, the unpredictability of potential attacks from the Russian Federation must be taken into account. Therefore, additional measures are being taken to provide critical infrastructure enterprises and enterprises essential for the functioning of regions with backup power sources (generators).

**Given the significant need in generators, the Ministry of Energy has prioritized the sectors of water supply, drainage, heating, fuel and energy sector for immediate coverage. For these sectors the estimated need is 1734 units of a total capacity 220,3 MW**

*Table 6. Needs in generators in the priority sectors.*

|  |  |  |
| --- | --- | --- |
| **Sphere** | **Total quantity (pcs.)** | **Capacity (MW)** |
| Water supply and drainage | 1226 | 157,2 |
| Heat supply (own needs, safety systems) | 391 | 40,9 |
| Fuel and energy sector | 117 | 22,2 |
| **Total** | **1734** | **220.3** |

## ***Management of operation and maintenance***

1. Responsibility for managing fuel, installation, operations, and maintenance costs:

The Ministry of Energy is looking for options to cover fuel costs from donors' budgets. The Recipients of the generators shall be responsible for managing fuel and storages, installation, operations, and maintenance costs.

Regional authorities are instructed to ensure proper control and oversight, and in this regard the regular meetings will be arranged starting from September to stress-test the preparedness.

(2) Dispatching a fleet of small units: Ukrainian energy system does not allow for dispatching a fleet of small units. Units over 1 MW will be dispatched by UkrEnergo subject to bilateral agreements and technical possibilities.

(3) Ownership: Recipients will own small gas- and diesel-powered generators. This is necessary for the proper accounting, also for fuel procurement.

(4) The specific types of sites where these generators would be installed:

The Ministry of Energy discusses with regional authorities and the Ministry of Infrastructure company by company and site by site to ensure compatibility and the need in the equipment. This would ensure that it is used and operational as soon as it is delivered.

# **Current status of installation of the six large-scale gas generator units provided by the United States, Japan, and the UN**

Six large-scale turbines (238 MW in total):

USAID

1 unit (28 MW) to Energoatom -  installed and operational

JICA - 2 units to GTSOU (48 MW in total)

1 unit (24 MW) -  installed and operational (generates 23 MW to the grid)

1 unit (24 MW) -  will be installed by October 2024 the latest

UNDP - 3 units (162 MW in total), 2 to Kyiv, 1 to Kharkiv

1 unit (54 MW) to Kyiv - will be installed by the end of 2024, construction ongoing

1 unit (54 MW) to Kyiv - will be installed in I quarter 2025, construction ongoing

1 unit (54 MW) to Kharkiv - not delivered yet, preparation of the site ongoing

# **Sustainable heat supply development**

To ensure sustainable and reliable heat supply system for the households, Ministry of Infrastructure, developed and adopted in November 2023 by the order of the Cabinet of Ministers of Ukraine **Concept of the State Targeted Economic Program for the Energy Modernization of Thermal Energy Production Enterprises, which are in state or communal ownership, for the period up to 2030 (Program).**

Approximate Quantitative Indicators for the Implementation of Measures Provided by the Program:

1. Construction, major repairs, reconstruction of heat energy sources, and/or connection of waste heat energy sources with a capacity of 10 GW.

2. Construction, major repairs, or reconstruction of 3,000 kilometers of heating networks.

3. Installation of 35,000 individual heating units.

4. Installation of 15,000 commercial heat energy supply metering units.

5. Development (updating) and approval of 100 heating supply schemes for municipalities with more than 20,000 inhabitants.

It is expected that the economic impact of the Program's implementation will exceed the planned volume of its financing.

In February 2024 Cabinet of Ministers of Ukraine adopted Government's Priority Action Plan for 2024 and for that Ministry of Infrastructure has developed a draft resolution of the Cabinet of Ministers of Ukraine "Certain Issues of Implementing State Policy in the Field of Heat Supply," which is currently being submitted for approval by the interested central executive bodies.

The provisions of the draft act "Certain Issues of Implementing State Policy in the Field of Heat Supply," provide for addressing the following tasks at the national level, however without quantitative specification as of now:

* Development and updating of heat supply schemes for populated areas;
* Ensuring 100% commercial accounting of thermal energy;
* Modernization of consumer heat inputs;
* Major repairs and reconstruction of district heating (DH) facilities that have exceeded their service life;
* Increasing the efficiency and reliability of DH systems;
* Reducing the consumption and substitution of natural gas in thermal energy production processes;
* Development of dispatching and implementation of energy management in heat supply enterprises.

The draft envisages state support and incentives for local governments and heat supply enterprises in solving the outlined tasks. The main support mechanism provided is co-financing by the state of certain measures to be implemented by local governments and enterprises.

Based on the review of the draft act, the estimated cost of all measures amounted to UAH 292.4 billion. Of this amount, state budget expenditures are planned at the level of 8% of the total cost (UAH 24 billion, EUR550 mln).

**Ministry of Energy of Ukraine**

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