



CONSTRUCTION OF GAS ENGINE POWER PLANTS AND ENERGY STORAGE FACILITIES

LOCATION: ZAKARPATTYA REGION, UKRAINE

**NON-TECHNICAL SUMMARY
LLC "POWER 1"**

1. INTRODUCTION

The European Bank for Reconstruction and Development (EBRD) is considering providing a loan to LLC “POWER 1” (hereinafter referred to as the Company or the Client) to finance the construction of gas engine power plants and energy storage facilities. These efforts aim to support the restoration of Ukraine’s energy sector (in particular, generation capacity), following targeted missile and drone attacks by the Russian Federation since 2022.

The construction of distributed gas engine power plants is a critical component in rebuilding and reinforcing Ukraine’s power system amid ongoing aggression. The proposed infrastructure will not only rapidly compensate for capacity losses caused by bombardments but also lay the groundwork for a more resilient, flexible, and environmentally sustainable energy model for the future.

This Non-Technical Summary (NTS) presents a clear and accessible overview of the findings of the national Environmental and Impact Assessment (EIA) report. The purpose of the NTS is to assist the public in understanding the project rationale, scope, EIA process, potential environmental and social impacts, and planned mitigation measures.

The Project has been categorized by the EBRD as Category B, as each site is well below 300 MW thermal and this summary provides information on the environmental and social impacts, benchmark against EU standards. The project is aligned with the Bank’s Energy Sector Strategy and related Partial Derogation on fossil fuels in the Context of Emergency Support to Ukraine. Due to the restriction at time of martial law in Ukraine, some information has been restricted and the NTS will be updated within 1 year of martial law being in lifted.

2. PROJECT RATIONALE

Due to large-scale missile and drone strikes by the Russian Federation on Ukraine’s energy infrastructure between 2022 and 2024, the country has experienced substantial losses in power generation capacity. Thermal and hydroelectric power plants, which traditionally played a balancing role in the energy system, have been severely damaged or destroyed, resulting in a significant electricity deficit, especially during peak consumption hours.



While nuclear power plants remain the cornerstone of electricity generation in Ukraine, their operation is constrained by technical, safety, and geographic factors. The lack of adequate backup and dispatchable capacity leaves the energy system highly vulnerable to further attacks and increases the risk of prolonged blackouts for millions of consumers.

In response, there is an urgent need to deploy new decentralized generation sources capable of swiftly adapting to load changes and operating autonomously in the event of damage to the transmission grid.

Why gas engine power plants?

1. Speed and flexibility

Gas engine power plants (GEPPs) can be constructed within a relatively short timeframe (up to 9 months), allowing for the rapid restoration of balancing and reserve capacity.

2. Decentralization and resilience

Deploying several smaller plants across various regions in Ukraine reduces the risk of widespread generation failure due to targeted strikes. This decentralization enhances the overall resilience of the power system.

3. Energy efficiency and environmental benefits

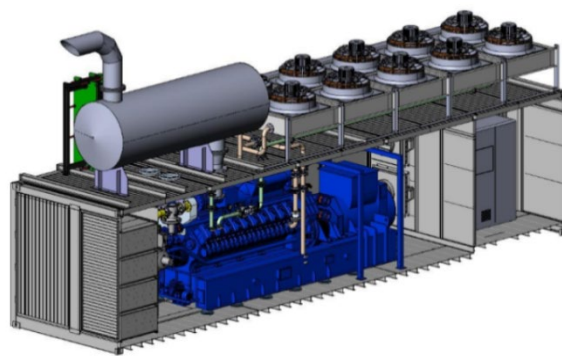
Modern gas engine units offer high efficiency (up to 45% for electricity generation, and over 90% in combined heat and power applications) and significantly lower emissions compared to traditional coal or oil-fired plants.

4. Compatibility with renewable energy transition

GEPPs are well-suited to operate alongside renewable energy sources (such as solar and wind), providing essential balancing and backup services during periods of intermittent renewable generation.

5. Energy security

Utilizing natural gas—potentially including biomethane or hydrogen in the future—ensures a robust and independent energy recovery mechanism, resistant to external threats.



Gas piston engine in a container

Anticipated Project Outcomes

- Restoration of 36.8 MW of flexible capacity based on GEPPs and 31 MW of capacity based on Battery Energy Storage Systems (BESS) within the next two years.
- Reliable electricity supply for critical infrastructure, industrial facilities, and residential users.
- Reduced vulnerability of Ukraine's energy system to future attacks.
- Enhanced energy security and reliability of the United Energy System of Ukraine.
- Creation of conditions for the further development of renewable energy.

3. PROJECT DESCRIPTION

3.1 Key Components of the Project

The project includes the construction of the following power generation and energy storage facilities in the Zakarpattia region:

- Gas Engine Power Plant – Site 1
- Gas Engine Power Plant – Site 2
- Battery Energy Storage System (BESS) – Site 3
- Gas Engine Power Plant / BESS – Site 4 (2 locations in close proximity)
- Battery Energy Storage System – Site 5
- Battery Energy Storage System – Site 6 Gas Engine



Gas peaker container



BESS container

All facilities will be deployed in the Zakarpattya region, which offers network benefits and enhanced security due to its relative distance from areas frequently targeted by missile attacks. For security reasons, specific locations are not disclosed publicly to avoid the risk of targeted strikes by the Russian Federation. With respect to the associated facilities, namely the overhead transmission line and the gas pipeline connection points, these are of limited scale. Detailed verification has been undertaken, and no material environmental or social impacts have been identified. No resettlement will be associated with the project as the land required for sites

have been acquired via commercial lease and easement agreements with the private owners. Cadastral data outside project area is currently not available due to martial law, however, impact on livelihoods and conversion of agricultural land into construction land will be assessed by the Client as ESAP commitment once martial law is lifted.

3.2 Site Descriptions

Site 1 – Gas Engine Power Plant (GEPP)

The project involves new construction of a GEPP in Zakarpattya Oblast, aimed at improving power supply reliability for local consumers. The new plant will contribute additional capacity to the regional distribution network, supporting increased consumption and new connections.

The site is located outside populated areas, on a raised river terrace. It is remote and not adjacent to any sensitive sites, such as protected areas, ecologically sensitive zones, or residential districts.

An Environmental Impact Assessment (EIA) has been completed for this site, with no critical factors identified that would prevent project implementation. Equipment specifications indicate noise levels not exceeding 65 dB (in line with Ukrainian DBN 360-92 building norms), and NO_x emissions below 250 mg/Nm³ @5%O₂ — compliant with EU Directive MCPD 2015/2193/EU (Annex II, Table 1). No additional noise or emission reduction measures are required.

Site 2 – Gas Engine Power Plant (GEPP)

Similar in scope to Site 1, this project involves the construction of a GEPP in Zakarpattya. It aims to enhance the reliability of the local power supply by adding flexible capacity to the regional grid.

Although the site is located near a residential area (approximately 300 meters away), the development will be confined to a section adjacent to a former industrial site and more than 300 meters from the nearest residence. All equipment will be installed in sound-insulated containers, with additional silencers as needed.

An EIA has been conducted, identifying no critical barriers to implementation. Noise levels will remain under 65 dB, and NO_x emissions will not exceed 250 mg/Nm³ @5%O₂, meeting all applicable EU standards.

Site 3 – Battery Energy Storage System (BESS)

This site will host a new BESS installation, developed to address the critical lack of ancillary services resulting from damaged generation assets. The BESS will support Ukraine's transmission system operator (Ukrenergo) in balancing the national grid and maintaining system integrity.

The site is located in an industrial park, well away from residential areas and sensitive environmental zones. No water bodies are located near the installation zone. Although a river is present nearby, the BESS will be sited on the opposite side of the plot, ensuring minimal impact on the aquatic environment and flood risk.

BESS facilities are silent in operation and pose no noise-related impacts to adjacent communities.

Site 4 – Gas Engine Power Plant / BESS – Site 4 (2 separate locations in close proximity)

Located within an industrial zone and away from protected or sensitive environmental areas, the GEPP units will be installed in containers deep within the plot to minimize noise exposure to nearby residential areas. Noise levels will remain below 65 dB at 10 meters. The BESS units, with a noise level below 45 dB, will be sited closer to the residential boundary but still within the industrial zone designated by the municipality.

An EIA is currently under preparation. Preliminary assessments have identified no critical environmental or social constraints. If any parameter, including NO_x emissions, exceeds regulatory thresholds, a corrective action plan will be developed and implemented in line with MCPD 2015/2193/EU or relevant standards.

Site 5 – Battery Energy Storage System (BESS)

This remote site is not located near any sensitive, protected, or residential zones and is not adjacent to any water bodies.

The EIA is in the early stages of development. No critical issues have been identified to date. If any exceedances of environmental norms are discovered, mitigation measures will be developed accordingly.

Site 6 – Battery Energy Storage System (BESS)

Similar to Site 5, this site is remote and not located in or near any protected, ecologically sensitive, or residential zones. There are no nearby water bodies.

As with Site 5, the EIA process is underway. Preliminary analysis has not identified any risks that would hinder implementation. Mitigation measures will be implemented if needed based on further findings.

3.3 Technologies to Be Used

The project will utilize gas engine systems based on advanced technology from globally recognized manufacturers. These engines meet contemporary EU standards for environmental and operational safety. Their intelligent control systems ensure noise levels below 65 dB at 10 meters and NOx emissions not exceeding 250 mg/Nm³ @5%O₂ — significantly lower than emissions from conventional thermal power plants.

The high efficiency, operational flexibility, and quick response capability of these systems will strengthen Ukraine's energy security while supporting environmental performance and future integration of renewable energy sources.

All engines will be housed in insulated containers to further reduce noise emissions.

The BESS technology provider is certified in accordance with international standards ISO 9001, ISO 14001, ISO 45001, and SA8000.

3.4 Project Timeline

The first three facilities are expected to be constructed and commissioned by November 2025. The remaining three are planned for completion by April 2026.

4. STAKEHOLDER ENGAGEMENT ACTIVITIES

To date, the Company has conducted meetings and interviews with relevant stakeholders, including local municipal communities and residents of nearby residential areas (for sites where this is applicable). The Stakeholder Engagement Plan (SEP) has been created.

Local communities may obtain additional information about the Project or submit inquiries via the "Contact" page on the Company's website: <https://power1.energy/contacts>. In addition, the Company has established a Grievance Mechanism to enable communities to raise concerns or submit feedback related to the Project.

Disclosure of the Environmental and Impact Assessment (EIA) will be organized in consultation with local authorities and communities in line with best international practices and EBRD requirements, once martial law in Ukraine is lifted.

Due to security concerns for both personnel and infrastructure, the Company will not publicly disclose information that could directly or indirectly reveal the precise locations of new power plants. However, the Company acknowledges the importance of open dialogue with all stakeholders. Therefore, public consultations and stakeholder discussions will be conducted one year after the official end of martial law, and EIA reports will be published on the Company's website at that time.

5. LEGAL FRAMEWORK AND COMPLIANCE WITH ENVIRONMENTAL AND SOCIAL REGULATIONS

The construction of the gas engine power plants and associated infrastructure in Ukraine will be implemented in full compliance with National legislation, and The EBRD's environmental and social policy requirements.

National Legal Compliance

The Project will adhere to the following Ukrainian laws and regulations:

- Law of Ukraine “On the Electricity Market” No. 2019-VIII of 13.04.2017
- Law of Ukraine “On the National Energy and Utilities Regulatory Commission” No. 1540-VIII of 22.09.2016
- Resolution of the NEURC on licensing conditions for electricity generation activities
- Law of Ukraine “On Environmental Protection” No. 1264-XII of 25.06.1991
- Law of Ukraine “On Environmental Impact Assessment” No. 2059-VIII of 23.05.2017
- Law of Ukraine “On Atmospheric Air Protection” No. 2707-XII of 16.10.1992
- Law of Ukraine “On Waste” No. 187/98-VR of 05.03.1998
- Law of Ukraine “On Land Protection” No. 962-IV of 19.06.2003
- Law of Ukraine “On Drinking Water and Water Supply” No. 2918-III of 10.01.2002
- Water Code of Ukraine No. 213/95-VR of 06.06.1995
- Forest Code of Ukraine No. 3852-XII of 21.01.1994 (if forest lands are used)
- Law of Ukraine “On Regulation of Urban Development” No. 3038-VI of 17.02.2011

Construction and Labour Regulations

- State Building Codes (DBNs) applicable to industrial facilities, including:
 - DBN V.2.5-20-2018 “Gas Supply”
 - DBN V.2.5-39:2008 “Heat Networks”
 - DBN A.3.1-5:2016 “Organization of Construction Production”
- Labour Code of Ukraine (KZpP)
- Law of Ukraine “On Labour Protection” No. 2694-XII of 14.10.1992
- Law of Ukraine “On Collective Agreements and Contracts” No. 3356-XII of 01.07.1993
- Law of Ukraine “On the Basic Principles of Social Protection of Persons with Disabilities” No. 875-XII of 21.03.1991

All necessary permits and licenses will be obtained, including those for construction, air emissions, water use, and waste management.

Contractual and corporate activities will be implemented in accordance with the Civil Code of Ukraine and relevant corporate and tax legislation.

Environmental Commitments

The project design includes a mandatory Environmental Impact Assessment (EIA) process in accordance with the Law of Ukraine “On Environmental Impact Assessment”.

All activities will align with the EBRD Environmental and Social Policy (ESP) and Performance Requirements (PRs), including Air emission and noise control, Waste management, Energy efficiency standards.

The use of modern gas engine technology ensures substantial reductions in CO₂ emissions compared to coal- or oil-fired power generation. All systems will meet applicable EU environmental standards.

Social Commitments

The construction and operation of the facilities will create new jobs in the region in compliance with Ukrainian labour laws and safety regulations

Stakeholder Engagement Plan (SEP) will be followed, including public hearings and community updates

Special attention will be paid to protecting the health, safety, and well-being of employees and residents in surrounding areas.

6. CONSIDERED ALTERNATIVES

During the preparation of the Project, a comprehensive analysis was carried out to evaluate available technological alternatives for restoring generation capacity in Ukraine. The options reviewed included:

- Construction of new thermal power blocks
- Development of large-scale renewable energy projects (solar and wind)
- Construction of pumped hydro energy storage systems

While each of these options presents long-term benefits, they also require significant capital investments and extended implementation timelines — ranging from several years to over a decade. As such, they are not aligned with Ukraine’s urgent energy recovery needs in the face of ongoing daily attacks on energy infrastructure.

In contrast, the selected solution—decentralized generation using gas engine power plants combined with battery energy storage systems—offers the following advantages:

- Rapid deployment within months
- Grid balancing capabilities
- Scalable, flexible, and resilient infrastructure
- Improved energy supply security for households, industry, and critical infrastructure

This technical approach enables fast-track implementation, reliable grid connection, and the ability to meet critical energy demand during the upcoming heating season.

In summary, the proposed configuration offers a balanced combination of speed, reliability, and environmental performance, making it the most viable and effective solution under current national circumstances.

7. SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROJECT

Noise

All gas engine units will be equipped with modern sound-attenuating systems to ensure that noise levels do not exceed 65 dBA at a distance of 10 meters, in line with the EU Environmental Noise Directive 2002/49/EC and national sanitary norms of Ukraine (DSN 3.3.6.037–99). Therefore, the impact of noise on the population and the environment is expected to be minimal.

Noise monitoring will be undertaken post construction at each site, and if necessary additional noise reduction will be used. The engines will be enclosed to limit the noise impact.

Emissions

The equipment will comply with the EU Industrial Emissions Directive 2010/75/EU, particularly the emission limits for nitrogen oxides (NO_x). The maximum NO_x emissions will not exceed 90 mg/Nm³ O₂, which is significantly lower than emissions from traditional thermal technologies and fully compliant with the EU MCPD Directive 2015/2193/EU (Annex II, Part 2, Table 2). Air emissions have been modelled by the Company and this has shown that given the plant will adhere to MCPD emission standards and location of each site the project will not have a material negative impact on the air quality and will not impact residential areas. This will be monitored and verified within a year of operations. An ESAP has been agreed and if there is any breach of air quality additional air abatement will be installed on the gas engines.

It is important to note that air quality is also dependent on the fuel quality and therefore good operational management and fuel quality monitoring will be undertaken as part of the E&S management system.

Air monitoring will be undertaken post construction at each site and emission monitoring installed on the gas engines. Should any capacity extension at a site result in the total thermal input exceeding 50 MW, the installation will be required to fully comply with the IED Best

Available Techniques (BAT) standards, including the implementation of appropriate abatement measures such as a deNOx system."

Geology and Hydro-ecology

The construction and operation of the facilities will not significantly impact soil or water resources. The technology employed does not require large volumes of water and does not generate wastewater that could alter natural balances. All works will be conducted on pre-allocated industrial or designated land plots.

Waste and Resource Management

The gas engine plants will generate only minimal amounts of waste, mainly consisting of technical byproducts (e.g. used oil, filters), which will be collected and disposed of in accordance with national regulations. Furthermore, the project's technical design allows for the future use of biogas as an alternative fuel, promoting a shift to greener energy and reducing dependence on fossil fuels.

Social and Socioeconomic Impact

The Project is expected to enhance energy security and the reliability of electricity supply, benefiting both local communities and industry. The construction and subsequent operation of the facilities will create new employment opportunities and stimulate local economic activity through engagement of contractors and suppliers.

Public Health and Safety

Strict compliance with noise and emission standards will ensure minimal health risks for the population. Uninterrupted power supply is especially critical for hospitals, educational institutions, and water/heating infrastructure, directly improving public health and quality of life during crisis conditions.

Occupational Health and Safety

The Project will be implemented in accordance with the relevant International Labour Organization (ILO) Conventions and Ukrainian labour protection legislation. The operational teams will receive regular training, be equipped with personal protective equipment (PPE), and operate under a workplace risk management system, ensuring minimal occupational risks and safe working conditions.

8. PROJECT MANAGEMENT AND MONITORING

A dedicated Project Implementation Unit (PIU) will be established to ensure effective coordination and control. The PIU will consist of:

Client representatives:

- Mr. O.M. Chopovyi (Director, LLC POWER 1)
- Mr. D.V. Shyniagin (Head of Production Support Department, LLC POWER 1)

Technical consultant:

- Mr. O.L. Pedash (LLC “Negen”)

Representatives from contractor organizations

Core PIU Responsibilities:

- Overall project coordination, schedule and budget control
- Contractor selection and supervision of construction and installation works
- Ensuring compliance with EBRD standards in environment, social responsibility, occupational health, and safety
- Regular communication and reporting to stakeholders, including local authorities, communities, and donors

Monitoring System

Monitoring will be integrated across all stages of the project, from construction through operation:

- Environmental Monitoring:
 - Noise level control
 - Emissions monitoring
 - Waste management — all in accordance with EU Directives and Ukrainian legislation
- Social Monitoring:
 - Tracking impacts on local communities
 - Public communication and feedback
 - Monitoring job creation and local benefits
- Health and Safety Monitoring:
 - Internal audits on labour safety compliance
 - Provision of PPE
 - Incident logging and response

In addition to internal controls, the Company will engage an independent auditor to conduct annual external audits of compliance with EBRD environmental and social standards.

A full audit will be undertaken within a year of martial law being lifted, inclusive of noise and air monitoring to verify the performance of each power plant. If any breaches of EU or National law are observed, these will be mitigated through additional abatement measures.

An ESG management system will be developed and implement to manage all operations.