



UKRNAFTA

**New construction of a CHP plant
with a capacity of 250 MW of electricity
in Kamianskyi district, Dnipropetrovsk region**

Non-Technical Summary



Baytown Energy Center (Credit: Calpine)

Prepared in cooperation with:

Multiconsult

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1 Introduction

The European Bank for Reconstruction and Development (the “EBRD” or the “Bank”) is considering providing finance to PJSC “Ukrnafta” for the new construction of a CHP plant with a capacity of 250 MW of electricity in Kamianskyi district, Dnipropetrovsk region, Ukraine.

PJSC "Ukrnafta" is the largest oil producer in Ukraine. The Company's structure includes two business units "Ukrnafta East" and "Ukrnafta West", which include six oil and gas production divisions and three gas treatment plants, an Oilfield Services Division, which provides a full range of services to the petroleum industry, and Ukrnafta Drilling Division, engaged in exploration and production drilling.

PJSC "Ukrnafta" holds 86 production licences and 3 licences for geological exploration (including pilot development). The Company operates in the Sumy, Poltava, Chernihiv, Lviv, Ivano-Frankivsk, Chernivtsi, Dnipro, and Kharkiv regions of Ukraine. As of 01.03.2025, the Company produced 1,810 oil and 161 gas wells.

UKRNAFTA's monobrand gas station includes 545 filling stations in almost all regions of Ukraine.

Ukrnafta's headquarters are located in Kyiv. Naftogaz of Ukraine owns 50% + 1 share in the Company. On November 5, 2022, the Supreme Commander-in-Chief of the Armed Forces of Ukraine resolved to transfer to the State a share of the Company's corporate rights held by private owners. This share is managed by the Ministry of Defence of Ukraine.

The Project will potentially be financed by European Bank for Reconstruction and Development (EBRD), therefore compliance with EBRD Environmental and Social Requirements and applicable Ukrainian regulations was confirmed by independent consultants.

The purpose of this project is to ensure an uninterrupted supply of power, heat and process steam to the territorial community of the Dnipropetrovsk region.

Currently the Project is in the first stages of the Feasibility study, which means that many of the estimated environmental or social impacts are based on preliminary and therefore possibly inaccurate information that may change during Project development. **The full Environmental and Social Impact Assessment (ESIA) report will be prepared following the Feasibility study is completed and all technical details of the investment are agreed.**

Currently it is expected that new connections are required for at least gas and electricity transmission to the existing connection points. The route alternatives have not yet been planned or assessed from an environmental and social point of view. It is still assumed that the new route alternatives would utilize the industrial area avoiding most environmental and social impacts.

It is currently not known where the wastewater will be discharged to. The feasibility study needs to proceed further before this information is available.

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At this moment, there is little or no information on baseline conditions of the site and its surrounding areas.

Ukrnafta has already introduced HSE Policies based on ISO 9001, ISO 14001 and OHSAS 18001. For the CCGT Project the management systems and environmental, health and safety and social issues management will be developed in cooperation with EBRD to agree a system that is practical and proportional to the environmental impact. Currently, operational management of all environmental and social issues at the development stage lies with Ukrnafta team and its advisors - AFRY.

It is envisaged that a dedicated team for EHS issues management will be assigned to ensure on-going compliance with respective requirements during construction and operational phase. The EHS management system will include periodic audits during construction and subsequent operations and reporting to the Lender and stakeholders.

More specific information about the Project will be published within a year after the Martial Law is revoked.

2 What is the rationale of the Project?

Ukraine's energy sector remains in a critical state as a result of damage caused by systemic missile and drone strikes by the Russian Federation against Ukraine's energy facilities in 2022-2024.

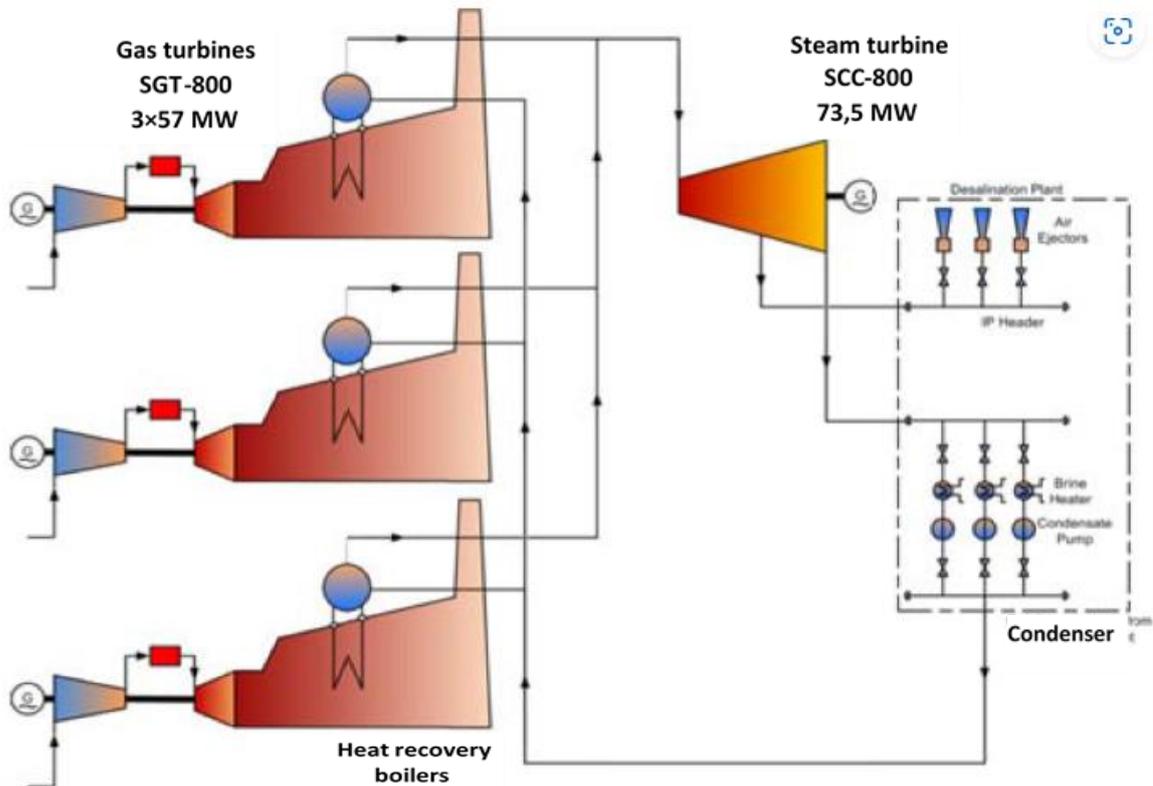
In view of the above, there is a need to strengthen the resilience, flexibility and decentralization of Ukraine's power system by increasing the amount of available generating capacity in a short time.

The installation of cogeneration units (gas turbine, gas piston, etc.) is a top priority to cover the power shortage in Ukraine's energy system and ensure reliable electricity and heat supply to consumers and critical infrastructure facilities, especially in the autumn and winter.

The purpose of this project is to ensure an uninterrupted supply of power, heat and process steam to the territorial community of the Dnipropetrovsk region and the supply of electricity to the Ukrainian Energy Supply system both in the basic mode and in the mode of auxiliary services of the power system.

3 Short description of the Project

The project comprises a complete functional gas fired multi-shaft combined cycle CCGT plant connected to an existing 150kV switchyard near the site including necessary interfacing to power grid, gas distribution network, steam piping, district heating network, soil, ambient air, fuel, cooling water, raw water, effluents, utilities and dispatch centre.



The plant includes all the process units, equipment, and facilities required for the production of the final product, such as GTGs, HRSGs, STG, transformers, switchyard, plant auxiliary processes including pumps, vessels and piping and electrical and control facilities.

Essentially, supplementary facilities encompasses everything necessary for the core production process within the plant's defined limits, including the main interconnection facilities and utilities located outside the primary process area.

The picture below illustrates the overall Project concept.

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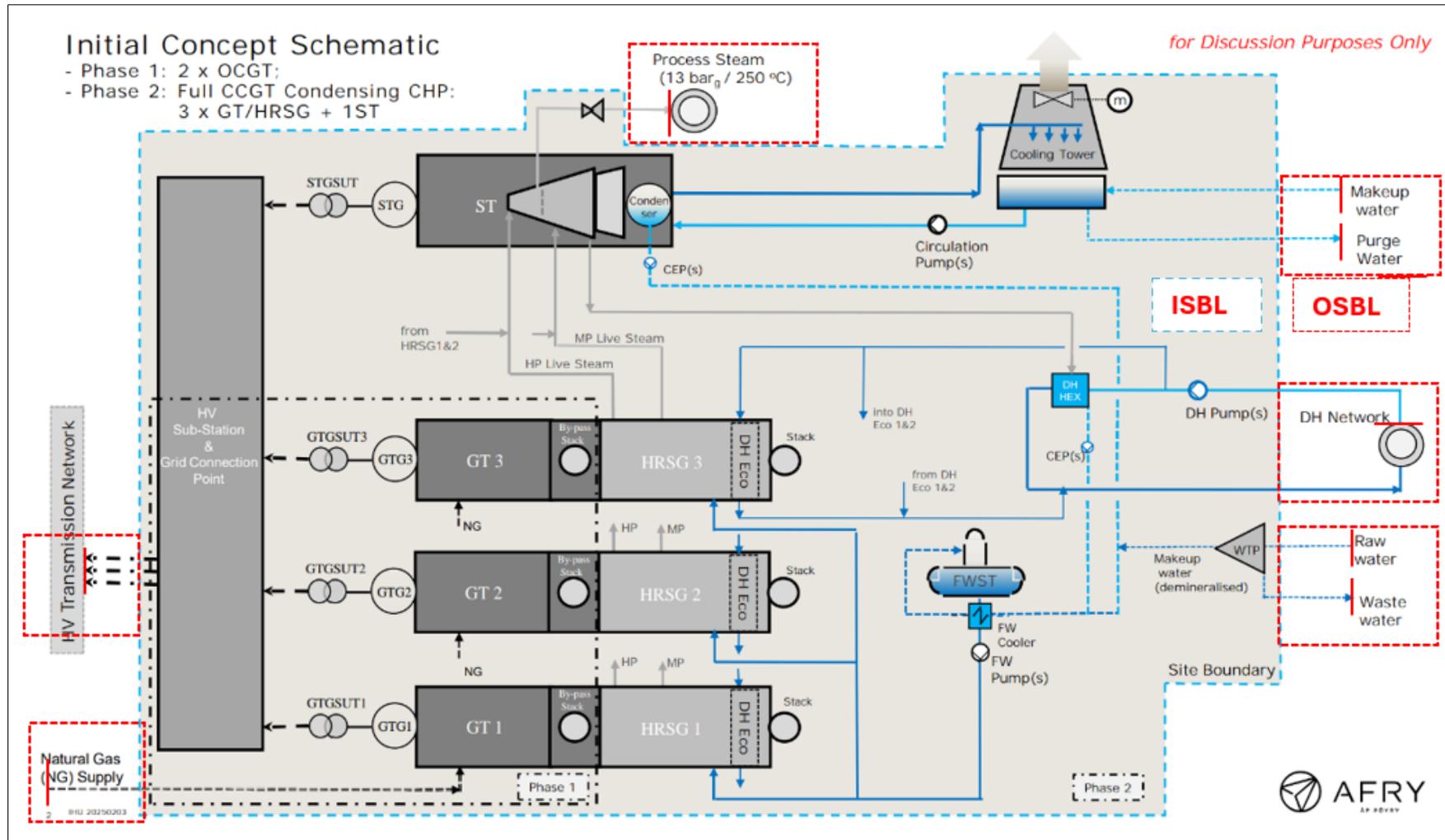


Figure 1. Initial Concept Schematic image of the facility (AFRY).

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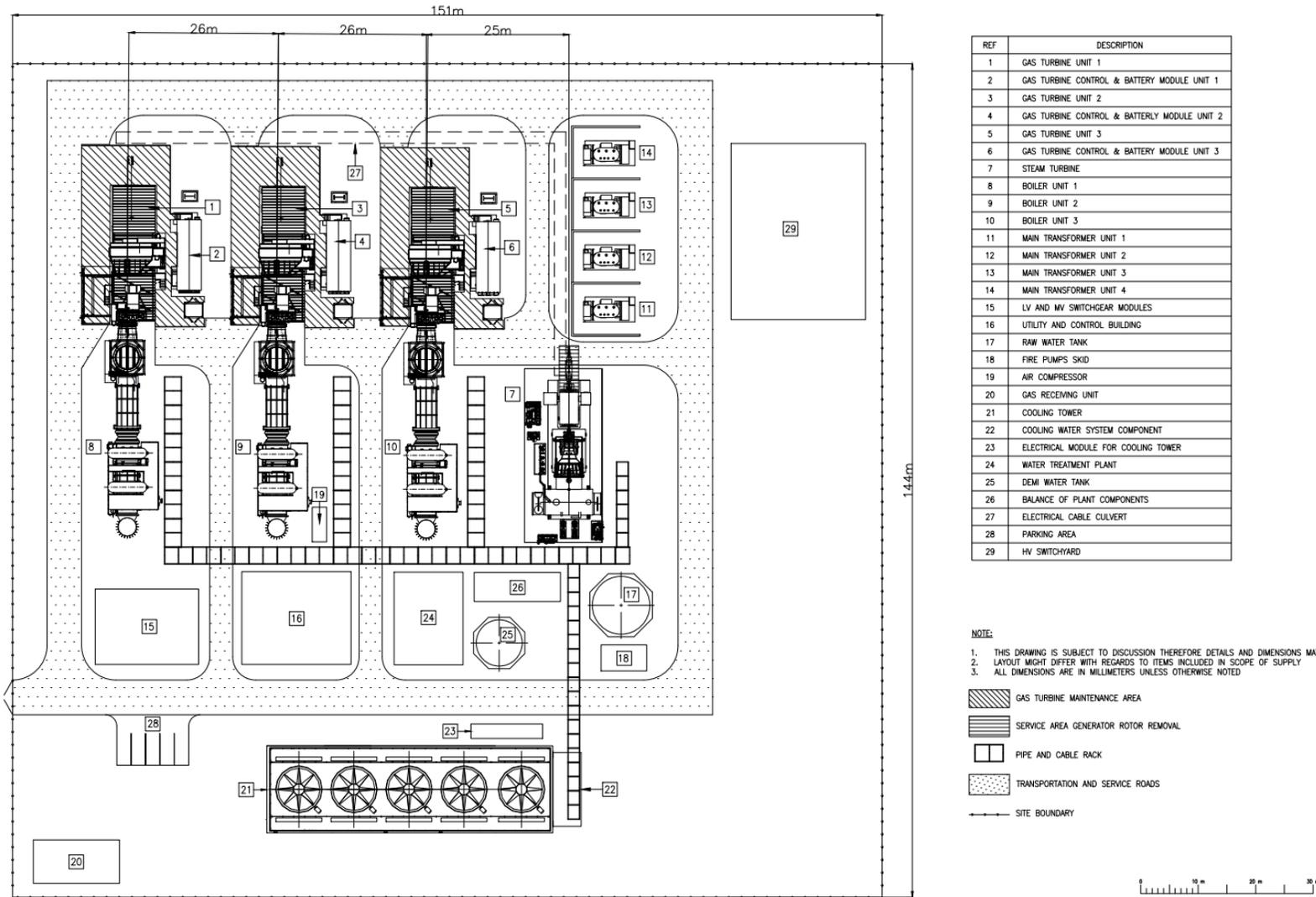


Figure 2. Indicative layout of the plant.

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CCGT CHP plant

The new CHP plant process will comprise the following facilities/installations:

- Main power block
 - o Gas Turbine (GT) packages with associated by-pass stacks
 - o Heat recovery steam generators (HRSG) with stacks
 - o Steam turbine (ST) building
 - o Necessary water-steam cycle process
 - o Electrical power train including the generator, generator circuit breaker bay and main step-up transformers up to plant 150 kV switchyard
- Electrical and Control building including necessary office facilities
- Water treatment plant with chemical storages
- Water cooling system with mechanical drought cooling tower
- District heating and process steam supply systems
- Necessary electrical and control & instrumentation systems
- Gas receiving and metering station
- 150 kV switchyard

Outside Connections

For the CCGT CHP plant, there will be connections to the gas network, 150 kV electricity grid, raw water supply and wastewater discharge, as well as a steam connection to the nearby industrial facilities and a hot water connection to the district heating network.

4 Where the Project will be located?

The project is located in the Dnipropetrovsk region in the central part of Ukraine.

The current facilities on site are owned by the municipality. The facilities are old and currently in a poor technical state. The new plant will replace the old equipment, although the old boilers will be maintained as a reserve as long as the war and martial law continues.

5 What is the scale of the Project and how will it impact protected areas?

The Project includes construction of a CCGT plant within a “brownfield” industrial area covering ca 5 ha. The location was selected keeping in mind the site setting, availability of gas and water supply and possibility to utilise the steam and heat for supply of local district heating and neighbouring industrial plants.

The area of the Project is located outside forest complexes, marshy areas, areas identified as valuable for scientific interest. The Project is in development phase (no construction works have been started).

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6 What are the Environmental and Social impacts of the Project?

The impacts of the Project are assessed based on limited data availability. The Project is in the first stages of Feasibility study, therefore many of the impacts are judged based on initial assumptions and consultants experience working on similar projects.

The full-scope Environmental and Social Impact Assessment, in line with EBRD requirements and Ukrainian regulations will be developed at a later stage, when the technical details of the investment are agreed with the interested parties.

6.1 EU BAT compliance

The plant will be designed in compliance with EU LCP BAT conclusions. The gas turbines have modern Dry-Low-Emission (DLE) burners that will meet EU emission standards. No SCR or SNCR are needed. Continuous emission monitoring system will be installed at the stack of the CHP to monitor:

- **key process parameters** (periodically or continuously) including flow, oxygen content, temperature, and pressure, and water vapour content, as well as
- **emissions to air**, including NO_x and CO (continuously), formaldehyde and CH₄ (once per year).

Instruments for the measurement of air quality at the stack will be inspected and calibrated annually. The rate of NO_x emissions from the stack will be controlled not to exceed the BAT-associated emission levels (BAT-AELs) in the LCP BAT as follows:

- Combustion plant total rated thermal input (MW_{th}): ≥ 50
- Yearly average 10–30 mg/Nm³
- Daily average or average over the sampling period 15–40 mg/Nm³

The stack height for the dispersion modelling study was assumed 35m high.

Different wastewater streams will be segregated and treated separately.

6.2 Air Emissions

The gas turbines have modern Dry-Low-Emission (DLE) burners that will meet EU emission standards (see more information in 6.1). As confirmed during initial dispersion modelling, no exceedance of permissible limits is expected (the permitted limit is 200 µg/m³).

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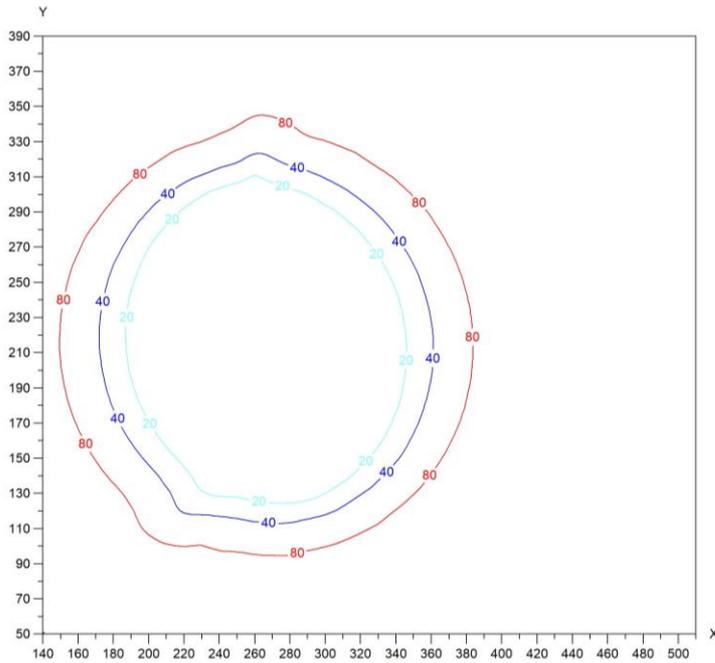


Figure 3. Maximum NOx concentrations [$\mu\text{g}/\text{m}^3$]

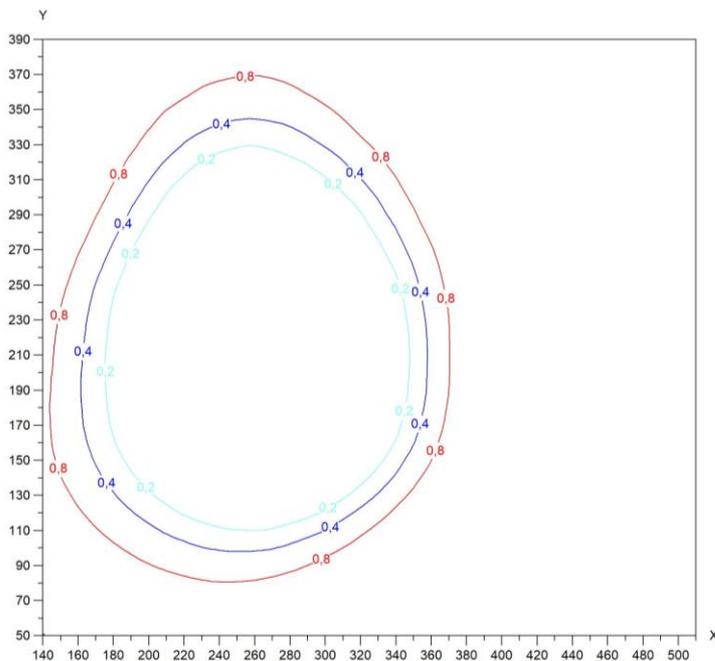


Figure 4. Average annual NOx concentrations [$\mu\text{g}/\text{m}^3$]

6.3 Noise Emissions

The Gas Turbines (GT), Steam Turbine (ST) and other rotating machines are the biggest noise emission sources.

- GT will be placed in a dedicated compartment limiting the noise to an acceptable level. The GT stack will be equipped with a silencer limiting the noise from the stack outlet.

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- The ST will be placed in a building limiting the outdoor noise. The major pumps (i.e. feed water pumps) will be located in a building or in a compartment to limit the noise levels.

Efficient noise reduction will be taken into account in the design and equipment procurement, so that noise generated by the plant and other operations of the area does not exceed 55 dB at daytime and 45 dB at nighttime in the yards of the nearest residential houses.

The simulations of noise spread in the vicinity of the nearest acoustically protected areas, regardless of the location variant, did not show exceedances of the permissible sound level.

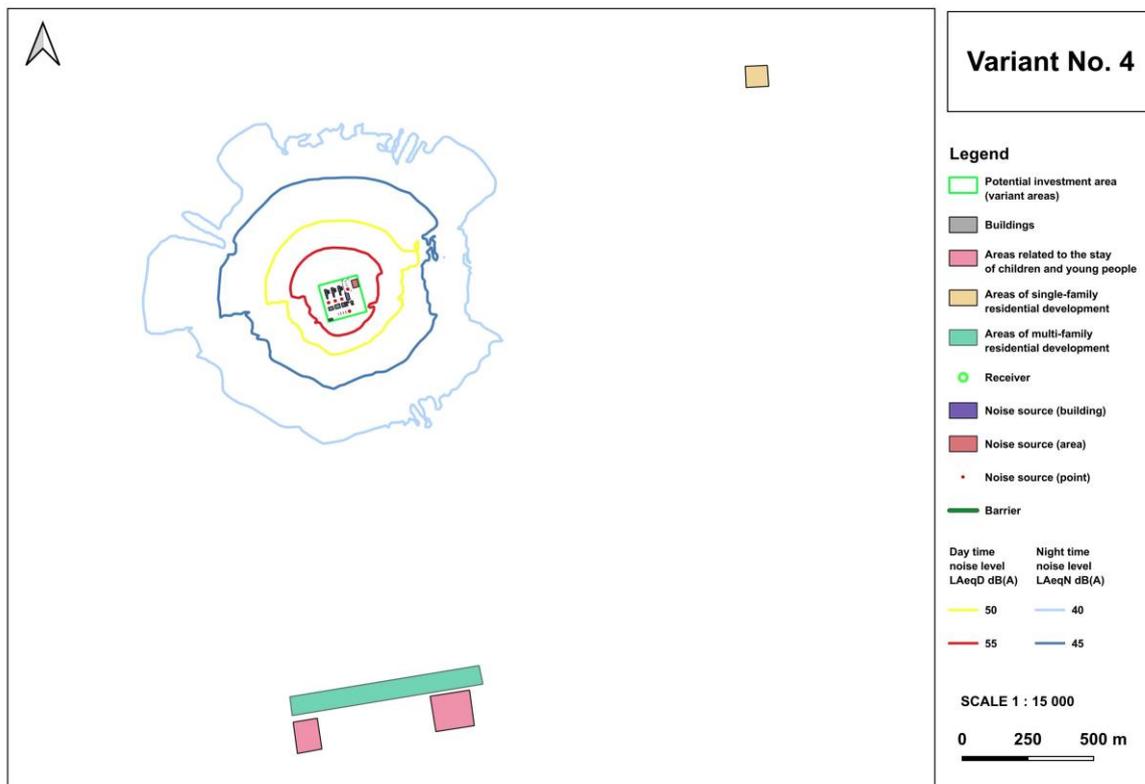


Figure 5. Noise dispersion modelling for worst-case variant

6.4 Water Supply

It is expected that the new facility will utilize the water resources from the local municipal Vodokanal system, which abstracts raw water from the river.

The project requires between 170 and 260 m³ of water per hour, which increases the peak water demand in the network by approximately 70%. Detailed analysis of the availability and the possibility to supply the required volume of water will continue.

6.5 Wastewater

Main streams of expected wastewater are described below.

Cooling Tower Blowdown: 25...50 m³/h

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- This is the primary wastewater stream, resulting from the need to control the concentration of dissolved solids in the cooling water. It is concentrated (typical concentration factor is 4-5) and treated raw water from the municipal Vodokanal system.

Boiler Blowdown: ~3 m³/h

- This stream comes from the HRSG steam generation process, where impurities in the boiler water are periodically removed to maintain water quality and prevent scaling and corrosion in the boiler. This water can typically be recirculated back to Water Treatment Plant or as makeup to the CT circuit.

Wastewater from Water Treatment Plant: 13...20 m³/h

- This includes reject streams from reverse osmosis (RO) systems and ion exchange regeneration waste. This water will be treated and neutralised in the Water Treatment Plant before discharge to the sewage.

GT Washing waters: ~2-4 m³/washing

- Gas turbine is off-line washed periodically (3-4 months intervals) with demineralised water and washing detergent. The washing effluents are collected to a storage tank for controlled disposal by a disposal company for special treatment.

Miscellaneous Drains:

- These can include water from equipment washdowns, floor drains, and other minor sources within the plant. If risk of oil contamination is imminent then the drains are led to oil separators before releasing to the sewage or site drainage.

It is currently not known where the wastewaters will be discharged. The feasibility study needs to proceed further before this information is available.

6.6 Chemical storage and use

Storage and handling areas of chemicals will be designed according to the requirements of national legislation:

- areas for storing and handling of chemicals shall be on impermeable base,
- access of outsiders to the storage area will be prevented,
- chemical tanks and containers must be equipped with safety basins or placed in embankments,
- location of tanks and safety basins shall consider properties of chemicals, prevention of collision and vandalism, and prevention of overfilling,
- loading and unloading areas shall be designed so that potential leaks can be detected and collected,

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- for tanks located indoors the safety basin can be replaced by thresholds or other safety systems that provide a similar level of protection,
- safety basins must be constructed to be impermeable to water and chemicals used at the plant,
- handling and storage areas and leak control systems shall be monitored regularly and damages repaired without delay,
- the plant will be prepared to immediately detect leaks e.g. with leaks detectors.

6.7 Waste management

Currently, there is no detailed information about the waste management at the plant. Typical solid and liquid waste of the CCGT plant include:

- Waste oil
- Sludge
- Waste metals
- Gaseous discharge lamps
- Batteries
- GT compressor washing water

Where it is possible to recycle components, such as metals, paper, oils or glass, then recycling will be done. Otherwise, the waste will be disposed by licensed contractors to licensed disposal sites.

All waste on site will be collected and stored in designated and controlled storage areas prior to disposal. The only significant hazardous waste generated by the plant is waste lubrication oil. A licensed disposal company will be contracted, who carries out waste oil processing. Some small amounts of hazardous waste such as light fittings and batteries will arise from time to time and will be disposed to licensed recyclers or disposal companies.

The effluent waste of washing the gas turbine compressor will be collected to a dedicated storage tank and transported by a special company to a waste handling plant.

6.8 Social issues

As part of the project identification and preparation, Ukrnafta has been in touch with selected statutory stakeholders, including the Municipal Council and the district heating company, as well as water provider, regional electricity provider, gas national provider.

Due to current martial law and security situation in Ukraine, some of standard stakeholder consultation activities, such as large public meetings, can be restricted or not allowed.

6.9 Summary of impacts and mitigation measures

The summary of key impacts of the CCGT Plant operation is provided in the table below:

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Aspect	Description	Comments
Environmental and social management	<p>Ukrnafta has already introduced HSE Policies based on ISO 9001, ISO 14001 and OHSAS 18001.</p> <p>The Project will meet all relevant BAT requirements</p>	<p>In line with requirements of LCP BAT Conclusions the Environmental and Social Management System will need to address specific issues, e.g. fugitive emissions from the Plant.</p> <p>Therefore Ukrnafta will agree with EBRD an Environmental and Social Action Plan (ESAP) i.a. to implement the ESMS and achieve full compliance with BAT.</p> <p>The progress of ESAP implementation will be reported to the Bank on annual basis.</p>
Air emission	<p>The gas turbines have modern Dry-Low-Emission (DLE) burners</p> <p>Continuous emission monitoring system (CEMS) will be installed at the stack of the CHP</p>	<p>The DLE burners meet EU emission standards.</p> <p>The modelling of air emission from the Plant confirm that no exceedance of permissible values is expected in residential areas.</p>
Noise	<p>The noisiest equipment (gas turbines, steam turbine and pumps) will be placed in buildings or shelters to limit noise propagation.</p>	<p>Noise emission modelling indicate that the noise impact of CCGT Plant will be minimal and no issues are expected during normal operations.</p>
Water / wastewater	<p>Water for the CCGT Plant will be provided from local supplier (Vodokanal). Different wastewater streams will be segregated and treated separately. All the wastewater streams will be directed to external networks.</p> <p>No direct water abstraction or wastewater discharge into natural water body is expected</p>	<p>As the water resources of existing supply system appear to be restricted, Ukrnafta is considering using dry cooling. This system allows for significant reduction of water use, but influences the production capacity and efficiency of the Plant.</p> <p>This will be further investigated during the Feasibility Study and technical Due Diligence.</p>

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Aspect	Description	Comments
Waste management	Typical waste generated at a CCGT plant is easily manageable, as it includes mainly used oils, sludges and waste metal.	Recycling will be primarily considered for waste utilisation, other waste will be transferred to licenced contractors for disposal.
Soil / groundwater	Storage of chemicals will be designed to meet good industry practice and Ukrainian regulations, including leakage-proof surfaces and embankments	No soil or groundwater contamination is expected as a result of CCGT plant operations.
Radiation	Ukrnafta has already conducted radiation monitoring at the site and the results confirm lack of elevated levels of γ radiation	No issues are expected during future operation of CCGT Plant.
Social impact	The CCGT will have positive impact on local community (mostly on labour market, as ca. 60 people will be working at the Plant during normal operations), as well as improve living conditions in the area by uninterrupted heat and electricity supply.	Limited nuisance may be associated with the construction phase, but given the distance from residential buildings, no issues are expected.

7 What is the legislative context of the project and were there any public consultations?

According to the Energy Strategy of Ukraine, adopted by the Order of the Cabinet of Ministers of Ukraine No. 907-r dated August 4, 2021, Ukraine's fuel and energy complex was in a critical condition even before the onset of the full-scale armed aggression by the Russian federation against Ukraine. Despite joining ENTSO-E and the significant increase in investments in Ukraine's energy system during 2022-2024, the energy sector of Ukraine continues to be in a critical state due to damage inflicted by systematic missile and drone strikes by the Russian federation on Ukraine's energy infrastructure during 2022-2024.

In response to these challenges, PJSC "Ukrnafta" is actively involved in addressing the issue of unstable power generation. Specifically, a strategic decision has been made to focus on power generation using natural gas. One of the areas that the company is actively developing is the production of power and heat energy (cogeneration) using steam and/or gas turbine units.

The installation of generating units (gas turbines, gas engines, co-generation units, etc.) is a priority task to cover the power deficit in Ukraine's energy system and ensure reliable electricity supply to consumers and critical infrastructure, especially during the autumn-winter period.

Promoting the integration of co-generation units into Ukraine's energy system also aligns with Ukraine's aspirations for further integration with the European Union. According to the European Parliament and Council Directive 2012/27/EU of October 25, 2012, on Energy

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Efficiency, Member States are to adopt policies that encourage proper consideration at the local and regional levels of the potential for using efficient heating and cooling systems, including those utilizing high-efficiency cogeneration. The potential for developing local and regional heating markets must be considered.

The Energy Strategy of Ukraine for the Period of up to 2050, adopted by the Order of the Cabinet of Ministers of Ukraine No. 373-r dated April 21, 2023, is guided by key principles including economic justification, environmental sustainability, accessibility, social equity, and market orientation.

Due to the current state of martial law in Ukraine, and significant damage to energy infrastructure caused by airstrikes, the Cabinet of Ministers of Ukraine introduced temporary changes to the legislation to simplify and/or suspend certain environmental and land acquisition requirements in order to enable swift commissioning of new CHP plants. These changes concern temporary withdrawal of the EIA or consultation requirements, and significant simplification of the land acquisition process for CHP projects.

8 Is additional information available?

Due to current martial law and security situation in Ukraine, some of standard stakeholder consultation activities, such as large public meetings, are restricted or not allowed altogether (this restriction may depend on specific region, but this project is in high-risk zone). It is however possible to carry out public consultations online via videoconferencing and have individual off-line meetings with targeted stakeholders.

Ukrnafta will accept all comments and complaints associated with the project. The comments or complaints will be summarized and listed in a Complaints and Comments Register.

All comments and complaints will be responded to either verbally or in writing, in accordance with preferred method of communication specified by the complainant. Comments will be reviewed and taken into account in the project preparation and implementation.

Direct requests can be addressed to:

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Power Generation Department

PJSC Ukrnafta

Email: Iryna.Kyryliuk@Ukrnafta.com