STATE COMMITTEE FOR ECOLOGY AND ENVIRONMENT PROTECTION OF THE REPUBLIC OF UZBEKISTAN

CONCLUSION
of the State Ecological Expertise

For the project:	Environmental impact assessment of construction of the combined cycle plant with a total capacity of 1200-1600 MW in Bayavut district of Syrdarya region (EIA project)
Owner:	JURU ENERGY CONSULTING LLC
TIN:	303454532
Category:	1, p.32, DCM RUz No. 541 dd. 07.09.2020.
Developer:	JURU ENERGY CONSULTING
Expert:	Tusheva L.G.

To: ISMAILOV J.Sh., Director of JURU ENERGY CONSULTING LLC

Copy: Department for ecology and environmental protection of Syrdarya Region

Materials of stage 1 of the environmental impact assessment of construction of the combined cycle plant with a total capacity of 1600 MW in Bayavut district of Syrdarya region were submitted for the State Ecological Expertise.

The station planned for construction can operate in two modes - a simple cycle and a combined cycle.

The simple cycle involves generating electricity by burning natural gas in gas turbines (GT) with discharge of high temperature exhaust gases through a bypass pipe.

In the combined cycle exhaust gases are further used for steam production in waste heat boilers and additional generation of electricity from steam in a steam turbine (ST). In this case, lower temperature exhaust gases are discharged through exhaust stack behind the waste heat boiler.

The construction site of the combined cycle gas turbine (CCGT) with a total area of 55 ha is located in Bayavut district of Syrdarya region, northwest of the existing Syrdarya thermal power plant, on the right bank of the Golodnostepsky canal n.a. Sarkisov. The water supply passage passes through the town of Shirin.

The nearest residential buildings of Sarmich settlement are located in the northwest at a distance of 76.0 m from the project area border. In the southeast, there is Shirin settlement at a distance of 805.5 m from the site, and in the south, residential buildings are located at a distance

of 704.2 m, and a military unit and military camp - 1.3 and 1.6 km respectively along the Yujno-Golodnostepsky Canal.

The minimum distance from the CCGT exhaust stacks to the nearest residential buildings from the north-west (according to the plot plan) is 390 m from the bypass pipe and 406 m from the main stack behind the waste heat boiler, which does not meet requirements of the Sanitary Norms and Rules for Protection of Atmospheric Air in Populated Areas of the Republic of Uzbekistan (SanPiN No.0350-17, section 6.2, class II, p.1, the sanitary protection zone is 500 m). In this regard, the Service for Sanitary and Epidemiological Welfare and Public Health issued certificate No. 20-8/4080 dd. May 31, 2022 on possibility of 300 m reduction of the health protection zone, based on calculation results of pollutants dispersion in the air, not exceeding their hygiene standards.

In accordance with requirements of the "Regulation on procedure for holding public hearings of environmental impact assessment projects", Attachment 3 to Decree of the Cabinet of Ministers No.541 dd. 07.09.2020, the public hearings with residents of nearby houses were arranged prior to the start of the planned activities. Based on the submitted minutes dd. 24.05.2022, activities of JURU ENERGY CONSULTING LLC for construction of the combined cycle plant with a total capacity of 1600 MW in this area were approved. At the same time, it should be noted that, in accordance with p. 26 of the "Regulation on procedure for holding public hearings of environmental impact assessment projects", approved by Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 541 dd. 07.09.2020, ***provision by the Owner of deliberately false information on EIA materials of the planned and/or contemplated economic or other activities during the public hearing will lead to invalidation of the decision of the public hearing and annulment of the conclusion of the State Ecological Expertise.***

The planimetric map of the site location area presented in the draft was agreed with the regional inspection.

500 kV power transmission line passes through the land plot allocated for construction of the CCP. In the south, at a distance of 37 m from the project area, there is a solid waste landfill, a filling station (methane) - at a distance of 782.4 m; to the south-east, there are three power transmission lines at a distance of 662 m. In the west, there is a gas distribution station at a distance of 217.4 m from the project site.

Syrdarya TPP is located to the south-west on the left bank of the Yujno-Golodnostepsky Canal at a distance of 679.3 m from the project area. The residential buildings are not provided for demolition during the project implementation.

The site is built of quaternary deposits of the Golodnostepskiy complex, represented by loams and loess-like sandy loams with interlayers and lenses of sand and gravel, and less often – with pebbles.

Irrigation network is widely developed within the territory.

The largest canal flowing in north-western direction at a distance of 2.1 km is the Dustlik canal, with a width of 146 m, a depth of 5.0 m and a maximum water flow of 228 m3/s.

The closest surface watercourse to the construction site is the 70 m wide and 5.1 m deep YGC which is the intended source of technical water supply for the designed CCGT, flowing southwest of the project area at a distance of 530 m and is an irrigation canal with an average throughput of 150 m3/s and a 100- 150 m water protection zone (letter of the Basin Water Management Association No.155-4 dd. 22 April 2022 was submitted).

Groundwater depth varies from 9.0 m to 1.5 m with a fluctuation amplitude of 1-2 m. Groundwater is characterized as mineralized and highly mineralized. The dry residue value reaches 5 g/dm3. Groundwater is classified as highly corrosive to concrete on all types of cement.

The Inspectorate for Control in the Field of Ecology and Environmental Protection of Syrdarya region issued Site surveying certificate dd. 07.06.2022, stating that there are 1,972 fruit and 1,086 ornamental trees growing in the territory. In order to fulfil requirements of p. 4 of the Decree of the President of the Republic of Uzbekistan No. UP-5863 dd. October 30, 2019 "On approval of the Concept of Environmental Protection of the Republic of Uzbekistan until 2030" regarding preservation of trees and shrubs, during the plant construction it is planned to preserve tree and shrub vegetation to the greatest possible extent, as well as to transfer it to elsewhere.

The list of animal world representatives is limited to those species which could adapt to life in anthropogenic conditions.

During preparation of the national EIA, no Red Data Book plants and rare species of wild animals were identified.

Characteristics of the proposed activity

Combined cycle gas turbines (CCGTs) are the most promising and widespread in the energy sector, they are distinguished by simplicity of process flow diagram and high efficiency in production of electrical energy. Combined-cycle plants are a combination of steam turbine and gas turbine plants, combined by a common technological cycle (combined cycle). Combination of these units into a single whole allows reducing the heat loss with exhaust gases of gas turbine units (GTP), using gases behind gas turbines in a waste heat boiler expediently, gaining additional power and increasing the efficiency factor compared to steam turbine and gas turbine power plants, and reducing air emissions of nitrogen oxides. The efficiency factor of standard gas turbine plants varies between 34 and 40 per cent. In the combined cycle, efficiency factor of CCGT ranges from 50 to 60 per cent, depending on the gas turbines series. Compared to powerful thermal power plants of other types, CCGT construction takes much less time. Using the steam-gas cycle helps to improve environmental performance of energy enterprise and significantly reduce harmful air emissions.

The following structural subdivisions will be located within the site: the main production site, where the power unit No.1 - gas turbine unit No.1 (GTU 1), power unit No.2 - gas turbine unit No.2 (GTU 2), power unit No.3 - steam turbine generator (STG) will be installed; cooling towers; water intake, preparation and treatment facilities; natural gas substation; auxiliary areas, warehouses, workshops, administrative premises, hydrogen storage and supply, parking, etc.

The CCGT main fuel is natural gas, with annual consumption of 1,049,819.5 thousand Nm3/year (for 2 CCPs – 2,099,639.0 thousand Nm3/year). Gas is planned to be supplied to the site from a separate outlet gas pipeline (letter of UZTRANSGAZ JSC No. 02-11/1-304/2747 dd. 31.05.2022). The main gas pipeline will be located in the western part of the site.

A gas booster compressor station (GDKS) is used to supply natural gas to the combustion chambers of the GT.

The main advantage of the proposed design solution from the environmental perspective is reduction of nitrogen oxide emissions compared to the power units currently operating at the TPPs of Uzbekistan, which is achieved through the use of a combustion system with a reduced content of nitrogen oxides and moisture (Dry Low NOx technology).

The generated electricity will be discharged through the 500 kV and 220 kV substations, which will be built next to the site.

The output transmission power line will be connected to the projected 500/220 kV substation in the north-east direction from the site.

The access road will be connected to the existing local road located in the southwest of the plant site, while the main and secondary access roads are located in its southeast side.

Technical reclamation of disturbed lands will be carried out upon completion of construction works, which provides for the site cleaning from construction waste; ditch and trench

backfilling with soil from the embankment; backfilling or levelling potholes and pits, general improvement and landscaping.

The designed plant will be operated in a year-round, round-the-clock operating mode with the maximum possible number of hours of electric power consumption.

Construction will take 365 days. The forecasted number of working personnel during the construction period is 1000 people.

Air impact analysis of the proposed activity

During the CCGT operation, pollutants in the exhaust gases (products of natural gas combustion) are discharged: (in the "simple cycle" (without the use of a steam turbine) through bypass pipes (2 units) installed at the GTU (height - 45 m; mouth diameter - 9.84 m); in the "combined cycle" (using a steam turbine) - through main stacks behind the waste heat boiler, (height - 60 m, mouth diameter - 9.55 m).

The station can operate in two modes, but the number of exhaust gas emission sources remains unchanged - 2 units.

According to the presented calculations, burning of 2,099,639.0 thousand nm3/year of natural gas will annually produce 2787.2133 tons of air pollutants, including: carbon monoxide - 679.8081 t/year (24.39%), nitrogen oxide - 294.5835 t/year (10.57%), nitrogen dioxide – 1,812.822 t/year (65.04%).

Analysis of the maximum ground level concentration calculations of pollutants outside the industrial site did not reveal excess of the established norms (quotas). The highest concentrations showed nitrogen dioxide - 0.12 MPC against a quota of 0.25 MPC, while concentrations of other substances will not exceed 0.1 MPC.

Prior to putting the plant into operation, when developing the final stage of the environmental impact assessment (Statement of environmental effects), it is required to clarify the gas composition (sulphurous or sulfur-free) and amend calculation of pollutant emissions from gas combustion, as well as submit calculation of pollutant emissions from equipment of auxiliary units.

Each source of emissions from CCGT units will have an automated emissions tracking system that provides for continuous instrumental measurements of pollutant concentrations (NOx, SO2, CO). It is also planned to monitor the following exhaust gas parameters: exhaust gas volume flow, temperature, pressure, content of CO, CO2, N0, SO2, NH3, H2O, CH4, etc.

During construction of the projected plant, the sources of air pollution include construction equipment: excavators, bulldozers, front loaders, road rollers, crawler and truck cranes, concrete mixer trucks, dump trucks, welding equipment, painting equipment, etc.

According to the submitted materials, air emission of 10 pollutant types released during the construction period will total 293.7396 t/year, including: carbon monoxide - 141.1 t/year (48.04%), nitrogen dioxide - 45.152 t/year (15.37%), hydrocarbons - 42.33 t/year (14.41%), sulfur dioxide 28.22 t/year (9.61 t/year), soot - 22.576 t/year (7.69%), nitrogen oxide - 7.3372 t/year (2.5%), formaldehyde - 3.5275 t/year (1.2%), inorganic dust (Si02 20-70%) - 3.422 t/year (1.16%) and others - 0.0749 t/year (0.02%).

It should be noted that the impact on the atmospheric air during construction work is temporary and local.

Analysis of the proposed activity impact on water resources

The designed facility provides for a single water supply system for both industrial and household needs, with the Yujno-Golodnostepsky Canal planned as a source. For industrial and household needs, the canal water must be treated at treatment facilities.

Pumps for water intake from the Canal will be placed in the pumping station, located on the Canal's banks. Performance of the pumps will be designed to meet the station's maximum water demand. Flow meters will be installed at the station to measure water consumption.

The water treatment system of the thermal power plant will consist of primary filtering, demineralization using a reverse osmosis system and drinking water treatment.

Estimated water consumption for the CCGT will be 1,381 m3/h, including: cooling tower make-up – 1,220 m3/h; water supply for demineralization - 115.0 m3/h; water consumption in the boiler room - 30 m3/h; water replenishment at the steam plant in the turbine room - 3.0 m3/h; equipment cooling - 20.0 m3/h and other needs - 20 m3/h.

The circulation system uses 80,000 m3/h.

Condenser cooling is water type; the type of cooling tower is cooling towers with artificial ventilation.
The expected water flow from the Canal will be 1,381.0 m3/hour or 1,1201.291 thousand m3/year, of which 2.0 m3/hour or 16.222 thousand m3/year intended for household needs.

Wastewater of the plant includes industrial and domestic wastewater. The total predicted volume of industrial wastewater is 357.5 m3/hour or 2,899.682 thousand m3/year or 100 l/s.

The volume of industrial wastewater is formed from: discharge of blowdown water from circulating water supply system - 30.0 m3/h, discharge of blowdown water from cooling tower - 272.0 m3/h, water discharge from water treatment system (demineralization) - 39.5 m3/h, discharge from water tank for technical needs - 10.0 m3/h, water discharge from boiler room - 3.0 m3/h, discharge from steam plant in the turbine room - 3.0 m3/h.

The industrial wastewater will be discharged to the YGC. Water will be discharged through the outlet canal.

The plant will be equipped with IWT (integrated wastewater treatment), where wastewater is treated to the standard level of discharge into the canal. The system ensures collection and treatment of all wastewater flows. Wastewater flows are separated according to their origin and/or pollution type and the type of the required treatment.

Blowdown waters are conditionally clean.

After cooling turbine condensers and air coolers the water is sent to the cooling tower and then, after cooling, returns to the circulation cycle.

A system is provided for collection and purification of oil-containing waters formed when density of cooling systems is violated, followed by purification using an oil separator. The separated oil is

planned to be transferred for processing to a specialized enterprise, and the purified water from the oil separator with acceptable indicators is returned to the circulation cycle.

When washing external heating surfaces of equipment, wastewater contaminated with oil products is generated, which will be collected separately and pumped into tank trucks for disposal in specialized enterprises.

For treatment of domestic wastewater, it is planned to build biological treatment facilities. After cleaning, after reaching the standards for discharge to the terrain, the water can be used for irrigation of the territory. It is also planned to run off domestic wastewater to the city wastewater treatment plant.

The total wastewater disposal will total: industrial wastewater - 357.5 m3/year or 2,899.682 thousand m3/year, domestic wastewater - 2.0 m3/year or 16.222 thousand m3/year.

All wastewater discharged to the YGC must comply with requirements of SanPiN RUz 0318-15 “Hygienic and anti-epidemic requirements to protection of water of reservoirs in the territory of the Republic of Uzbekistan”.

In particular, according to temperature regime, summer water temperature as a result of wastewater discharge should not increase by more than 3°C compared to the average monthly temperature of the hottest month of the year over the past 10 years.

When operating the plant, it is required to establish monitoring of temperature regime and chemical composition of source water of the YGC, composition of wastewater and canal water at a distance of 100 m from the discharge point.

Before putting the plant into operation, when developing the final stage of the environmental impact assessment (Statement of environmental effects), water consumption and wastewater should be clarified, taking into account all characteristics of the installed equipment.

Water consumption during the construction period includes water consumption for drinking needs of working personnel and for hydrodedusting of construction sites. Water will be brought to the construction site by water carriers.

The total predicted volume of water consumption during the construction period will be 11,325 m3/year, including: for household needs – 9,125 m3/year, dust suppression – 2,200 m3/year.
Portable toilets will be provided for disposal of 9125 m3/year of household fecal wastewater.

Waste generation

During the plant operation, generation of 38 waste types is expected totaling 257.181 t/year, including:
- *Hazard class 1:* used medical syringes - 0.02 t/year,

- *Hazard class 2:* spent turbine oil - 3.549 t/year, spent compressor oil - 0.446 t/year, spent transformer oil - 1.242 t/year, used motor oil - 0.178 t/year, tramp oils (petroleum products) - 0.027 t/year, used batteries - 0.147 t/year;

- *Hazard class 3:* used oil filters - 0.008 t/year, oil recovery sludge - 0.541 t/year, scale - 0.607 t/year, sealant waste 0.63 t/year, non-ferrous scrap metal - 0.455 t/year, sludge from tank cleaning - 1.078 t/year, containers from paintwork materials - 0.102 t/year, used tires - 0.323 t/year, oiled rag waste (oil content - over 15%) - 0.378 t/year;

- *Hazard class 4:* spent silica gel - 0.027 t/year, boiler cleaning sludge - 6.219 t/year, cable cuttings - 0.21 t/year, thermal insulation waste - 60.85 t/year, paronite waste - 0.054 t/year, filtrate of water treatment plant (mechanical litter) - 0.56 t / year, plastic bag waste - 0.3 t / year, paper bag waste – 0.32 t / year, out-worn overalls - 0.456 t/ year, used personal protective equipment - 1.589 t/year, waste dressing material of the first-aid post - 0.02 t/year, construction waste - 1.138 t/year, solid waste - 5.0 t/year, site cleanup waste - 3.85 t/year,

- *Hazard class 5*: waste of refractory materials - 107.623 t/ year, ferrous scrap metal - 50.361 t/year, welding rod stub - 0.054 t/year, wood waste - 0.12 t/year, broken glass - 0.07 t/year, used LED lamps - 0.879 t/year, waste paper - 0.05 t/year, canteen waste - 7.7 t/year,

During the *construction period,* the following waste types are forecasted to be generated:

- Hazard class 3: waste of paintwork materials, containers of paintwork materials are planned for disposal to a construction waste landfill or to plastic products processing enterprises (if containers are not contaminated);

- *Hazard class 4:* wiping rags waste (oil content below 15%) must be disposed to recyclables collection centers for recycling; construction waste - planned for disposal to construction waste landfill; solid household waste - to solid household waste landfill;

- *Hazard class 5:* concrete and reinforced concrete waste; sand waste; non-useable building crushed stone; building brick scrap; cinders and remains of steel welding electrodes - planned for disposal to construction waste landfill, or handed over to interested parties.

Construction waste will be stored in temporary storage places in standard metal containers. During the period of construction work, building materials, construction and household waste must be stored in a strictly designated place within the boundaries of the construction site.

Wastes from operation of special equipment and vehicles are not generated directly at the site. Maintenance and repair of special equipment used in construction is carried out at the contractor's premises.

Emergencies during operation of the combined cycle plant with a total capacity of 1600 MW can be due to fire occurrence. In order to prevent the spread of fire and combustion by-products, the station is divided into fire zones. These areas are protected from fire by using passive (structural, integrated and operational measures) or active measures (portable fire extinguishers, fire protection systems) or a combination of these measures where the fire risk is high.

At the plant operation stage, the draft EIS proposes a *set of measures* aimed at preventing environmental pollution, including: continuous online monitoring of pollutants concentrations of (nitrogen oxides, carbon monoxide) in exhaust gases of the CCP; in order to preserve water resources and reduce impact of discharges of thermal and polluted effluents on surface watercourses, the project provides for using a circulating water supply system with construction of fan cooling towers for water cooling, as well as constant monitoring of quality of discharged water

for all indicators of pollutants; organization of temperature control of discharges of water outlet for cooling towers blowing into the canal; organization of places for storing generated waste and its timely removal to a disposal site, etc.

CONCLUSIONS

The State Ecological Expertise of the project showed that the submitted materials sufficiently **comply** with requirements of environmental legislation for the first stage of environmental impact assessment.

In order to reduce negative impact on the environment of the construction site of the combined-cycle plant with a total capacity of 1200-1600 MW in Bayavut district of Syrdarya Region, **JURU ENERGY CONSULTING LLC must ensure implementation of the following environmental measures:**

- ensure control over compliance with environmental legislation during construction of the combined cycle plant with a total capacity of 1200-1600 MW in Bayavut district of Syrdarya region;

- exclude off-roads passage of vehicles outside the construction site and adjacent territory;

- prevent discharge of polluted effluents onto the terrain, provide for timely removal of wastewater in places where there are portable toilet (septic tanks), by sewage trucks to treatment facilities, and provide for drainage of atmospheric precipitation from the plant construction through reinforced concrete trays, in order to prevent pollutants from entering the soil, into soils, aeration zones and then into groundwater;

- in order to maintain cleanliness of soils and surrounding surface, to construct concrete platforms for placing containers for collecting waste and their timely disposal to the nearest landfill under an agreement with a household waste collection and removal company, in accordance with the "Rules for provision of services for collection and removal solid and liquid household waste" (Attachment 1), approved by Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 95 dd. 06.02.2019;

- ensure land reclamation in the ROW and in the disturbed areas in order to reduce negative impact on the soil and vegetation cover;

- as environmental protection measures during the construction period, provide for periodic irrigation of sites and access roads;

- ensure compliance with requirements of p. 4 of Decree of the President of the Republic of Uzbekistan No. UP-5863 dd. 10.30.2019 "On approval of the Concept of Environmental Protection of the Republic of Uzbekistan until 2030**" regarding preservation of trees and shrubs, including by applying replanting practice;**

- before putting the plant into operation, develop and submit for the State Ecological Expertise the Statement of environmental effects. When developing the project materials, it is necessary to ensure implementation of the above measures; present calculation of the expected emissions, discharges, wastes and their negative impact on the environment, as well as ways to minimize them.
- The State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection hereby **agrees** on the National EIA (Phaze 1) of construction of the CCGT with a total capacity of

1200-1600 MW in Bayavut district of Syrdarya region subject **to implementation of environmental measures provided for by the National EIA (Phaze 1) and specified in the conclusion.**

The departments for ecology and environmental protection of the Syrdarya region to provide control over:

- compliance with requirements of environmental legislation during construction of the combined cycle plant with a total capacity of 1200-1600 MW in Bayavut district at the site with geographical coordinates:

- *geographical coordinates of the CCGT location:*

1. 40.240786°N, 69.100654°E,
2. 40.243186°N, 69.103394°E,
3. 40.245963°N, 69.110789°E,
4. 40.243296°N, 69.114290°E;
5. 40.242360°N; 69.113650°E,
6. 40.237539°N; 69.106210°E,

- *geographical coordinates of the substation location:*

1. 40.245646°N, 69.111677°E,
2. 40.247390°N; 69.114021°E,
3. 40.243574°N; 69.119920°E,
4. 40.240632°N, 69.1174650°E.

- timely disposal of generated waste with verification of documentation confirming their disposal methods provided for by the project;
- implementation of measures to eliminate possible contamination of soil, ground and groundwater in the event of emergency in order to prevent oil products from entering soils and groundwater; measures of collection and disposal of bio-waste and garbage in specially designated places;
- reclamation of disturbed lands.

J.S.Kazbekov
Deputy Chairman

Responsible person Tusheva L.
Tel: +998 71 203-00-22 (1008)