Non-technical Summary
for the PAVLODARENERGO, JSC's Investment Projects
on Environmental Impact Assessment

Policy of PAVLODARENERGO, JSC determines principles, objectives, tasks, and key focus areas of the Company in the field of reconstruction and modernization of CHP primary equipment. Essential obligations of policy of the PAVLODARENERGO, JSC management are aimed at the increase in electrical and thermal capacity of the plant, reduction in primary equipment wear and tear, increase in fleet life, increase in efficiency of plant operation, and reduction in negative environmental impact of the enterprise.

PAVLODARENERGO, JSC has been implementing long-term investment program aimed on energy complex modernization for the purposes of the equipment economic life extension, electric and thermal power increase, environmental emissions reduction, and energy preservation.

I. Current Practice of the Investment Projects' Environmental Impact Assessment

Environmental policy of PAVLODARENERGO, JSC is an integral part of the quality, energy management, occupational health and safety, and environment integrated policy. It identifies principles, goals, tasks, and objectives of the company's environmental protection and safety activities. Execution of respective law and regulations related to ecology, improvement of technological energy generation processes, as well as information availability and accessibility to all stakeholders are the key policy liabilities.

Within the process of developing technical projects, which implementation may directly affect the environment and citizens' health, the company mandatorily develops the "Environmental Impact Assessment" (EIA) volume. Within the environmental impact assessment of the project decisions in accordance with "Guidelines on assessment of environmental impact of projected economic or other activities within the pre-plan, pre-project and project documentation development" (Astana, Ministry of Environmental Protection of the Republic of Kazakhstan, 2007) as amended by the Order of the Minister of Energy of the Republic of Kazakhstan No.253 dated June 17, 2016, the company assesses atmospheric effects, impact on surface and underground waters, soil, subsoil, plant and animal life, physical environmental impact, as well as that on socio-economic sphere. After the project development, in order to comply with the Article 57 of the Environmental Code of the Republic of Kazakhstan requirements in terms of observing transparency principle of the government ecological expertise and involve public into decision-making processes, the company announces public hearings through mass media. For providing clear and reliable information on forthcoming works and the company's environmental impact, public hearings involve all interested parties: representatives of local authorities (Akimat), environmental protection authorized agencies, mass media, motivated community members, and population. The events are recorded, published by mass media, and records are posted on website of a local executive authority (Akimat) and environment protection authorities, then EIA projects are eventually submitted to respective authority for the government ecological expertise.

Pursuant to approved long-term investment program aimed at the modernization of power complex of PAVLODARENERGO, JSC for 2016-2020, the "Environmental Impact Assessment" (EIA) projects were developed and the conclusions of the State Environmental Expert Review (SEER) were obtained for the following investment projects:

- Conclusion of SEER No.KZ06VCY00014817 dated 13.08.2014 on environmental impact assessment for the "Ekibastuz CHP. Construction of section 2 of ash dump in the Tuz lakebed" Project;
- Conclusion No. SEE S3-0021/16 dated 04.02.2016 for the "Restoration of line 1 of the PAVLODARENERGO, JSC's CHP-2 ash dump" Project;
- Conclusion No. SEE S01-0040/16 dated 11.08.2016 for the "Topping of the 2nd Stage of Ash Dump of the PAVLODARENERGO, JSC's CHP-3" Project;

- Conclusion No. SEE KZ12VDC00052526 dated 09.09.2016 for the "Liquidation of Kuat and Zhyly Su Pits " Project;
- Conclusion No. SEE S01-0039/16 dated 11.08.2016 for the "Reconstruction of T-100/120-130-3 Turbine Generator Set of St. No.6 with the Replacement of Generator at CHP-3" Project.
- "Residual complex with built-on corner 3-stroyed block in Usolsky microdistrict No.1A in Pavlodar city" (conclusion GE No. 16-0189/17 dated 16.08.2017) Project;
- "Construction of 3rd stage of ash dump at CHP-3 in Pavlodar city" (conclusion No. GE01-0414/17 dated 25.08.2017) Project;
- "Search and appraisal works on clay rocks at "Beta" site at the Northern industrial region of Pavlodar city" (conclusion of SEE No. KZ61VDC00067358 dated 28.12.2017)" Project.

At the implementation stage, the following investment projects:

- "Ekibastuz CHP. Construction of Section No. 2 of the ash dump in the Lake Tuz lakebed";
- "Construction of 3rd stage of ash dump at CHP-3 of PAVLODARENERGO JSC;
- Reconstruction of turbo unit T-100/120-130-3 No. 6 with replacement of the generator at CHP-3;
- Liquidation of Liquidation of Kuat and Zhyly Su Pits"

II. Description of Implemented and Continuing Investment Projects

1. Construction of Ash Dumps of CHP-2, CHP-3, and ECHP

In 2015, construction of embankments of ash dumps (2nd Stage) of CHP-2 and CHP-3 was completed. New ash dump construction with the use of special geomembrane liner provides 100%-hydro-insulation. It is resistant and durable water-tight screen, protecting surface and underground waters from pollutions, and therefore eliminating underground waters' chemical pollution thanks to the chemical components contained in water. This measure's technical effect is expressed by the company's ability to support production load, as electric power generation and thermal power dispatch are impossible without an ash dump.

In 2016, works under design solutions: furnishing of access roads, lighting, drilling of observation well for monitoring, construction and finishing works at drainage water pumping stations, reconstruction of clarified water pumping station with the replacement of electrical and process equipment were continued at the specified ash dumps, and construction works with respect to discharging pavilions were commenced. In 2017 the works on design solutions for ash dumps (2nd stage) of CHP-2 and CHP-3 have been completed and the works have begun on the construction of the third stage of the ash dump at CHP-3. The cost of works performed for this event in 2017 amounted to 37,885 million tenge, including VAT.

In 2016, works on construction of the 2nd compartment of ash dump of the Ekibastuz CHP in the Tuz Lake bed under the largest investment project – construction of new ash dumps of PAVLODARENERGO, JSC started in 2009 were also continued. Works on topping the embankment of the 2nd Stage of CHP-3 ash dump, which is required to increase the accumulating capacity of existing ash dump before the construction of the 3rd Stage of CHP-3 ash dump in order to arrange storage of bottom ash waste forming during the production activity of the plant, were commenced.

In 2017, all works envisaged by the Project "Building of the dams of the 2nd stage of the ash dump of CHP-3" were carried out in full, in accordance with the Acceptance Certificate No. 320-17 dated December 26, 2017. This project was to be carried out to increase accumulating capacity of the existing ash dump before the construction of the third stage of the ash dump of CHP-3 in order to organize the storage of ash and slag wastes generated during the plant's production activities.

The construction of the 2nd section of the ash dump at Ekibastuz CHP in the bed of lake Tuz continues. The cost of works performed in 2017 is 88, 562 million tenge, including VAT.

2. Reconstruction of T-100/120-130-3 Turbine Generator Set of St. No.6 of CHP-3

In order to increase electric and thermal power dispatch from CHP-3 for current and future consumers' needs, as well as enhancement of security of electric, steam and thermal power supply to consumers, a reconstruction of T-100/120-130-3 turbine generator set of St. No.6 of CHP-3 with the replacement of HPC (High Pressure Cylinder), MPC (Medium Pressure Cylinder), and generator was commenced.

Installed capacity of turbine generator set of St. No.6 will increase after reconstruction from 110MW to 125MW. Capacity gain after reconstruction will be 15MW. Additional power output on an annual basis will be 97.5 MIO kWh at nominal operating hours of 6500 hour/year. Reconstruction of T-100/120-130-3 turbine generator set of St. No.6 of CHP-3 will allow reducing the gross heat rate by 500-900kWh/Gcal depending on turbine generator set operating mode that will result in reduction of specific reference fuel consumption to 3-5g/kWh, which will finally facilitate the reduction in emissions of harmful substances into the city air.

Electrical load of CHP-3 will increase by 15MW and will be 555MW as turbine generator set of St. No.6 will be commenced. Final period of implementation is 2018. Pursuant to the project, to make-up the existing circulating water system the consumption of fresh process water is provided for during operation of the designed facility. Circulating water is used for cooling condensers of turbine and auxiliary equipment of the turbine generator set of St. No.6, at that, water requirement for cooling is reducing at the expense of installation of an air-cooled generator.

Impact of the designed facility on atmospheric air, water resources, soil covering, flora and fauna during the reconstruction and operation are admissible, on subsoil – no impact, influence of physical factors stays within the main building and industrial site of CHP-3.

3. Recultivation of the 1st stage of CHP-2 ash dump

In 2016, the 1st stage of CHP-2 ash dump recultivation on was finished. In order to prevent the ash dump surface dusting at worked-out section within the project the work of creating protective layer by dint of sandy clay, planning grass, access ramp arrangement was conducted. Filled section was covered by protective layer of local sandy-loam soil with thickness of 0.5m, and regressing was performed, which complies with 1.04-14-2003 sanitary regulations and norms of the Republic of Kazakhstan "Toxic industrial wastes deactivation and burial areas". During the recultivation, was performed of activities on reducing environmental impact of the CHP-2's ash dump restoration works: using developed lands, territory and roads sprinkling, covering the dump trucks' skips with tents when transporting crumpling and dusting materials. The internal acceptance certificate of the site was commissioned on 02.12.2016.

In the second quarter of 2017, the commission survey of the site was carried out with the involvement of authorized bodies for the subsequent delivery of the land plot to the city's balance sheet. As of December 31, 2017, this land plot passes the procedure of acceptance-transfer to the city's balance sheet.

4. Liquidation of Kuat and Zhyly Su Pits

The Kuat and Zhyly Su pits are intended for open-pit mining sandy-clayey soils for banking of flood-breaking dams, and for construction of new ash disposal pits of CHP-2 and CHP-3. In 2015, development of sites was completed under the subsoil use permit. In 2016, a pit liquidation (recultivation) project with the implementation period of 2016-2017 was developed. An engineering stage that includes a set of works on formation and preparation of territory for a biology stage of recultivation is implemented in the first year. Commencement of the liquidation (recultivation) engineering stage is a pit wall slope flattening (ore laying along the dump slopes up to the normal angle under requirements of the landscape recultivation). The pit wall slope flattening is quite simple and the cheapest way to turn the disturbed natural area into a healthy, faultlessly operating landscape. The pit is put into more correct shape; slopes are flattered smoothly; pit bottom is partially leveled out.

The biological stage of liquidation (recultivation) contains the following works:

- selection of perennial grass species,
- preparation of soil, sowing grass mixture together with fertilization;

- sowing and crop tending;
- snow retention (2 times).

Two years are fair enough to form a stable grassing down and restoration of soil natural state.
In 2016, the engineering stage of recultivation at Kuat and Zhyly Su sites was performed. In two years after sowing of grasses the territory of recultivated pits will be transferred to an authorized agency for further intended use.
In 2017, the biological stage of recultivation of soil extraction pits "Kuat" and "Zhylu su" is implemented in full. The cost of the complex of works that make up the content of the biological stage of reclamation of pits is KZT 2,874 million. In the second half of the year 2018 the commissioning of the considered recultivated sites to the authorized body is planned.

III. Environmental Impact Assessment

The projects play important economic and social role, measured by scope and share of electric and thermal power generation in Pavlodar load center. Approved technical decisions on the investment projects lead to the following conclusions on environmental, economic and social impact.

1. Atmosphere Air

All projects stipulate activities on preventing (reducing) pollutant substances emissions to the atmosphere.
Main sources of impact on environment components during building and assembly works for reconstruction of the turbine generator set, completion of construction, recultivation, and topping the embankments of ash dumps, liquidation of pits are: motor and construction vehicles' engines, construction machinery charging with combusting and lubricating materials, soil, stones, clay gravel, sand and gravel mix, sand transfer, welding and cutting, painting and hydro-insulating works, etc.

Construction of Ash Dumps of CHP-2, CHP-3, and ECHP

In order to avoid a process of ash and slag waste weathering, the project provides for an irrigation of above-water ash and slag beaches in case of drying-up thereof using the ДД-80 sprinkler systems during operation of the 2nd section of the ECHP's ash dump in Tuz lakebed. It is planned to deliver water to sprinkler systems via a designed dust suppression water conduit from the existing pump station.
Ash and slag waste shall be hydraulically disposed in ash dumps of the 2nd stage of CHP-2 and CHP-3, i.e. under water layer. In this connection, there is no atmospheric air pollution and air emission sources while meeting the technical regulations for disposal of ash and slag waste.

Reconstruction of T-100/120-130-3 Turbine Generator Set of St. No.6 of CHP-3

Operation of the turbine generator unit itself does not result in environmental emissions. Increase in emissions, resulting from the fuel combustion within this project, is not expected, as the boiler units' capacity and coal consumption per hour all over the station stay the same. The boilers' steam production capacity stays at the same level. According to current maximum permissible emissions allowance for TTP-3 project (MPE), maximum fuel consumption for the entire company is adjusted to all boiler units' typical operation mode. Total station's pollutant substances emissions after putting turbine generator set in operation will not exceed MPE, set up for CHP-3. Calculations of dissemination for the period of the equipment reconstruction and operation proved surface concentrations of all ingredients to not exceed 1 maximum permissible concentration on the company's sanitary protective zone boundary.

Recultivation of the 1st stage of CHP-2 ash dump

In order to minimize an adverse aerial environment impact and protect atmospheric air during the recultivation works, the following measures are provided for:

- adjustment of motors of all used construction equipment, machines, and vehicles with respect to a minimum exhaust emission;

- use of containers, special-purpose vehicles, shelters for storage, loading, and transportation of loose, dust-forming, and wet materials;
- reduction of dusting by moisturizing the territory in the course of recultivation works.

Liquidation of Kuat and Zhyly Su Pits

Liquidation of the Kuat and Zhyly Su sites, as well as works on completion of CHP-2 and CHP-3 new ash dumps construction, embankment topping, and restoration of worked-out ash dump's line are accompanied by the emissions of polluting substances into the atmosphere from loading-unloading operations, as well as dusting of the work site and roads due to construction machinery and motor vehicles traffic. To avoid dusting the project provides for a road watering in dry days of summer. Analysis of scattering calculation results showed that maximum ground level concentrations created by emissions from the implementation of such measures at the boundary of sanitary protection zone does not exceed specified values of MPC (maximum permissible concentrations) with respect of emitted contaminants.

2. Water Resources

The projects stipulate measures on preventing and reducing impact on water resources.

Construction of Ash Dumps of CHP-2, CHP-3, and ECHP

The project "Construction of Section 2 of the Ash Dump at ECHP in the Tuz Lakebed" does not stipulate the water source to be changed; water consumption does not increase. In order to protect environment and reduce the ECHP's ash dump's impact on hydrosphere, protect surface and underground waters from pollutions, reduce fresh water consumption, the return system of the water supply of the hydraulic ash sluicing facilities will be employed. The HAS will be fed by the ECHP's sewage waters; no fresh water will be used for this purpose.

To decrease the harmful effects of ash dumps CHP-2 and CHP-3 to a minimum, protection of surface and groundwater pollution, reducing consumption of fresh water at the project for construction of the 2nd stage of ash dumps was provided for a set of measures, which include:

- full hydraulic ash removal system cycle
- impervious screen device made of the Canadian polysynthetic geomembrane on the bottom and slopes of the projected section;
- interception and return the seepage water to the cycle of hydraulic ash removal of pumping station drainage water
- collection and return the seepage water to the cycle when operating ash dumps via dewatering drainage;
- new drainage pumping station.

Reconstruction of T-100/120-130-3 Turbine Generator Set of St. No.6 of CHP-3

Pursuant to turbine generator set reconstruction project, consumption of fresh process water for makeup of the existing circulating system is provided for during the operation of designed facility. Circulating water is used for cooling the turbine condensers and auxiliary equipment of the turbine generator set of St. No.6, at that, cooling water requirement is reduced at the expense of installation of an air-cooled generator.

There are no surface water bodies close to the designed facility; therefore, they cannot be directly affected.

Recultivation of the 1st stage of CHP-2 ash dump

In the course of restoration of line 1 of the CHP-2's ash dump, water will be also used for irrigation, protective layer compaction and grass sprinkling. There is almost no risk of polluting underground waters, as they underlay rather deep - 18.8 m.

In order to prevent impact on underground waters within all projects, activities will be implemented on preventing mastic, resolvents, combusting and lubricating materials used for construction purposes and vehicles and machinery exploitation, from entering soil and underground waters;

preventing wastes and garbage improper and illegal dumping. In case of the construction regulations compliance, ground waters are not going to be polluted.

Liquidation of Kuat and Zhyly Su Pits

Underground water and surface stream pollution in the course of liquidation works on the Kuat and Zhyly Su sites will be prevented by dint of the following activities:

- collecting wastes in locations, complying with sanitary norms and regulations, their timely disposal for proper allocation and utilization;
- charging vehicles and mechanisms with combusting and lubricating materials in the manner, preventing oil products' leakage.

For the purpose of the underground waters monitoring, observation wells network will be created.

3. Soil. Wastes

The projects stipulate the reduction of impact on the soil mantle.

Construction of Ash Dumps of CHP-2, CHP-3, and ECHP

To protect adjacent land from flooding with the project for the construction of the 2nd stage of ash dump on CHP-2 provides: anti filtration screen, drainage ditch with pumping to return filtered water back into the ash dump. During the operation of the ash dump as the main measures to protect the land cover from dusting of ash is provides the waste ash content beaches wet. The land for construction of section 2 of the ash dump in the Tuz lakebed was given to the PAVLODARENERGO, JSC on the basis of using at a charge. To reduce the influence on land resources the Project provides for the following measures:

- preservation of sections No.1 and No. 5 of the old ash dump with sowing of grass after completion of operation;
- 0.2m stripping excavation with stocking in a temporary ash dump followed by subsequent use.

Reconstruction of T-100/120-130-3 Turbine Generator Set of St. No.6 of CHP-3

Turbine generator set will be located within the company's actual land allotment; the soil fertile layer is not to be removed, as the reconstruction site is located within the entity's main building.

The works on the elimination of the Kuat pit was conducted within the boundaries of the mining allotment of 64.51 ha, the Zhyly su pit within the boundaries of the mining allotment of 15.49 ha.

In order to reduce an adverse impact of waste on environment there is a strict arrangement of collection, storage, and removal of waste in places where it is located.

To prevent contamination with production and consumption waste the project mandatory provides for the following measures:

- furnishing sites with wastes containers;
- collecting utility and production wastes in different containers followed by regular removal;
- repairing motor vehicles only in specially allotted places, which prevented soil pollution with wastes and oil products.

All kinds of waste generated during the reconstruction process are transferred to specialized enterprises for their placement or processing in accordance with the concluded agreements.

Information signs prohibiting mixing of waste with various hazard levels are placed in the territory of the enterprise in points of waste temporary collection.

A guide for handling with production and consumption waste in the territory of CHP-3 of PAVLODARENERGO, JSC was updated and brought to notice of personnel of the enterprise and contracting organizations that perform works in the territory of CHP-3 of PAVLODARENERGO, JSC.

Recultivation of the 1st stage of CHP-2 ash dump

The ash dump shall be recultivated by a natural resource user to bring into line land plots after completion of ash and slag waste emplacement to reduce consequences of activity of the enterprise. The project is aimed at the ash dump recultivation and restores industrial territories to their original

appearance. Planting of territory of the recultivated ash dump will contribute to the increasing green territories and refining the industrial landscape.
Waste management when performing works on the ash dump recultivation will be implemented within the frames of existing waste management system of CHP-2. The waste management system includes inventory check, accounting, collection, and transportation of waste; sale, neutralization, and disposal of waste.
All types of waste will be transported by vehicles that exclude the possibility of losses on route and environmental contamination. The waste shall be dispatched on specialized enterprises, which have a license for waste management, on a contractual basis.

Liquidation of Kuat and Zhyly Su Pits
The Kuat pit liquidation was conducted within the company's mining allotment of 64.51 hectares, the Zhyly Su pit – within the mining allotment of 15.49 hectares. In order to reduce the wastes negative environmental impact, they are properly collected, stored and disposed to respective locations.
For the purpose of preventing pollutions by production and consumption wastes, the projects stipulated the following activities:
- furnishing sites with wastes containers;
- collecting utility and production wastes in different containers followed by regular removal from the territory;
- repairing motor vehicles only in specially allotted places, which prevented soil pollution with wastes and oil products.

All kinds of waste generated during the reconstruction process are transferred to specialized enterprises for their placement or processing in accordance with the concluded agreements.

4. Subsoils

No new lands are withdrawn for the projects' purposes (excluding the one in the Tuz lakebed), which prevents:
- building on sites with useful mineral deposits;
- destroying rare geological outcrops, mineral formations, paleontological objects and subsoil sites, announced conservation areas, natural sanctuaries, history and culture monuments.

Liquidation of Kuat and Zhyly Su Pits
Upon termination of the mining works on the Kuat and Zhyly Su sites, the engineering stage of recultivation was performed. In 2017, the biological stage of pit recultivation will be conducted.

5. Plant and Animal Life

Analysis of flora and fauna of territories, which have been operating for a long time, shows that due to a long-term man-made load the structures of flora and fauna are simplified, which is connected, first of all, with a displacement factor. There are no rare and red-listed plants, as well as habitat areas of rare and red-listed animals around the Kuat and Zhyly Su sites and ash dumps.

Construction of Ash Dumps of CHP-2, CHP-3, and ECHP
Operation of the previous sections of ash dumps of CHP-2, CHP-3, and ECHP showed the absence of impact on flora and fauna, since habitats of animals and plants changed in the result of previous man-made load of production. Construction of ash dumps of CHP-2, CHP-3, and ECHP will not result in violation of existing structures of flora and fauna.

Reconstruction of T-100/120-130-3 Turbine Generator Set of St. No.6 of CHP-3
Reconstruction of the T-100/120-130-3 turbine generator set of St. No.6 of CHP-3 will not result in destroying the technical landscape, plant and animal life structures.

Recultivation of the 1st stage of CHP-2 ash dump

There are no rare and red-listed plants, as well as habitat areas of rare and red-listed animals located in the region of recultivation of ash dump of the CHP-2 1st stage, therefore, performance of works under this project will not result in violation of existing structures of flora and fauna.

Liquidation of Kuat and Zhyly Su Pits
Condition of the vegetation cover at the Kuat and Zhyly Su sites and ash dumps is characterized by absence of any phytocoenosis and poor flora diversity.

6. Physical Impact on Environment

All projects stipulate activities on reducing physical impact on environment.

Construction of Ash Dumps of CHP-2, CHP-3, and ECHP
The project for the construction of the 2nd stage of ash dump of CHP-2 and CHP-3 provides for measures to decrease the noise: placing pumps in the building, on the door of the pump arranged sound-absorbing pads; internal walls and partitions are recommended with stitches filling the entire thickness (without racked joint).

Reconstruction of T-100/120-130-3 Turbine Generator Set of St. No.6 of CHP-3
The turbine generator set to be installed and accompanying equipment being installed cause the following physical impact: noise, vibrations, thermal and electromagnetic emissions.
In order to reduce the physical impact, the following activities are to be implemented under the project:
- use of modern installations, which do not create noises and vibrations that exceed acceptable values;
- laying separate foundations for equipment;
- covering the turbines cylinders, high-temperature equipment, and pipelines with special thermal acoustic evaporate insulation;
- placement of equipment in special rooms and enclosures (cages, mantles);
- using silencing heads, flexible connections (couplings), elastic gaskets, spring supports, and suspensions on the equipment being installed.

Physical impact of the designed facility is eliminated through the above mentioned activities within the entity's main building and site.
In general, there will be no increase of the enterprise-wide physical impact, since obsolete equipment will be replaced by the turbine generator set.

Recultivation of the 1st stage of CHP-2 ash dump
Noise impact created at the recultivation will have a temporary nature. Taking into account that the ash dump is located in an industrial zone, which, in its turn, is away from residential areas and located at the distance of 9 km from Pavlodar and 6.7 km from Muyaldy settlement, the noise impact on population is not predicted.

Liquidation of Kuat and Zhyly Su Pits
A source of noise when liquidating the Kuat and Zhyly Su and ash dump sites, at which the embankment is topped or finishing operations are performed, is a progress of equipment operation, but taking into consideration a factor of considerable remoteness from residential area, there is no noise negative impact. There are neither thermal nor electromagnetic radiation sources on the Kuat and Zhyly Su sites and ash dumps construction sites.

7. Social and Economic Environment

Environmental and local population's health risks, as well as social and economic impact, are being assessed within all projects.
Reconstruction of the CHPs' facilities does not result in any social nor economic consequences for the local population, nor affects its labor activities nature. Implementation of the investment

projects on the CHPs' facilities reconstruction serves for improving the stations' territories' sanitary and epidemiological conditions, due to the non-organic dust gross emissions in the atmosphere.