Annex 4 – Non-Technical Summary

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1 Project Description

Kazakhstan is a landlocked, transcontinental country, located in Central Asia and Eastern Europe. It is bordered with China, Kyrgyzstan, Russia, Turkmenistan, and Uzbekistan. The terrain extends west to east from the Caspian Sea to the Altay Mountains and north to south from the plains of Western Siberia to the deserts of Central Asia. Kyzylorda, a city in Kazakhstan, is the capital of the Kyzylorda Region. The city has a population of nearly 188,682 (2009 Census results). The Syr Darya River, one of the biggest rivers of the region, passes through the city. Figure 1 is representing the area of the project.

Figure 1: Project Location

Kyzylorda's street lighting system was privatized in the late 90s as result of a countrywide privatization programme of state assets. Now the current operator (selected on a regular basis) manages the operation of the lighting network, including maintenance. The lights and poles are owned by the Kyzylorda municipality ("City Akimat"). The poles are expected to remain in the City Akimat ownership, while the luminaries will be replaced and owned by a special purpose company ("SPC" or the "Company") that will supervise operation and maintenance ("O&M") of the system,

based on a balanced contract and pre-agreed key performance indicators.

The total number of city street lights has tripled in the last four years in Kyzylorda City (the "City") from 5.6 thousand poles to 16.3 thousand. Further growth is expected given the natural expansion of the city. There are 16,021 lamps in this project, 6,428 are 25W Energy Saving lamps and 1147 are 110W LED lamps. The electricity cost saving will be mainly contributed by the replacement of the 7,057 pieces of 250W HPS lamps.

The Project components are provisionally expected to include: (i) a centralised control centre for the lighting system; (ii) a modern system monitoring solutions package; and, (iii) procurement of light-emitting diodes ("LED") luminaries to replace the existing outdated streetlights in the city.

2 Background

Growing electricity and maintenance costs have forced the City Akimat to explore long-term, sustainable options to improve the lighting system's efficiency. At present, the lighting system consumes about kWh 6.2 million per annum and the number is steadily increasing due to deteriorating power supply infrastructure, growing demand and poor system management.

It urges the City to look for alternative ways to save electricity, such as using energy saving technology like LED, and building up a centralized control and monitoring system, in order to decrease the expenses for O&M services.

Replacing existing HPS and MV lamps by LED is a successful approach. Still, utilization and disposal of the replaced lamps, which could be harmful for the environment, if disposed improperly, need to be taken into consideration.

Thus, local and international environmental laws need to be considered. Unfortunately, the existing Kazakhstan Environmental Regulations do not contain much information that is related to this project. The regulations do not cover utilization of hazardous materials related to this project and do not suggest any solutions for disposal procedures, and so, even though this report is complying with all of those regulations, some regulations and good ideas were adopted from UN and USA environmental regulation policies, namely:

(1) EU Waste Framework Directive (**Directive 2008/98/EC**) – European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (repealed directives: **Directive 2006/12/EC** of the European Parliament and of the Council of 5 April 2006 on waste (the codified version of **Directive 75/442/EEC** as amended), hazardous waste **Directive 91/689/EEC**, and the Waste Oils **Directive 75/439/EEC**) – it provides for a general framework of waste management requirements and sets the basic waste management definitions for the EU;

(2) **Decision 2000/532/EC** – establishing a list of wastes;

(3) **Regulation (EC) No 1013/2006** of the European Parliament and of the Council of 14 June 2006 – on shipments of waste.

In order to better understand why special regulations are required for the utilization of mercury and sodium, it first needs to be described, why those metals are so dangerous.

Mercury (chemical symbol Hg) is a heavy metal occurring in several forms, all of which can produce toxic effects in dangerous doses. It is one of the substances, which is most hazardous to human health. Older thermometers, some batteries, fluorescent lamps, dental amalgam and electrical products like switches etc. contain mercury.

Mercury is poisonous, and can affect the central nervous system and kidneys in humans. One teaspoon of mercury will poison a medium sized lake. Mercury is accumulated in animals, and in the human body, and it could potentially harm unborn children. In Sweden, pregnant women are advised against eating fish from fresh water lakes. According to Swedish authorities there are 50,000 lakes with a mercury level that is considered unacceptably high. Mercury poisoning (also known as hydrargyria or mercurialism) is a disease/syndrome caused by exposure to mercury, or its compounds. The toxic effects include damage to the brain, kidney, and lungs. Mercurialism can result in several diseases, including acrodynia (pink disease), the Hunter-Russell syndrome, and the Minamata disease. Symptoms typically include sensory impairment (vision, hearing, speech), disturbed sensation, and a lack of co-ordination. The type and degree of symptoms exhibited depend upon the individual toxin, the dose, and the method and duration of exposure.

Mercury can enter the environment from a number of paths (see Figure 2). For example, if a mercury-containing item is thrown into the garbage, the mercury may be released into the atmosphere from landfill vapors or leachate, or the mercury may vaporize if the trash is incinerated. If mercury is flushed through a wastewater system, the mercury will likely adhere to the wastewater sludge, where it has the potential to volatilize and be deposited elsewhere. Mercury can enter the atmosphere through these various means because it evaporates easily. It then travels through the atmosphere in a vaporized state.

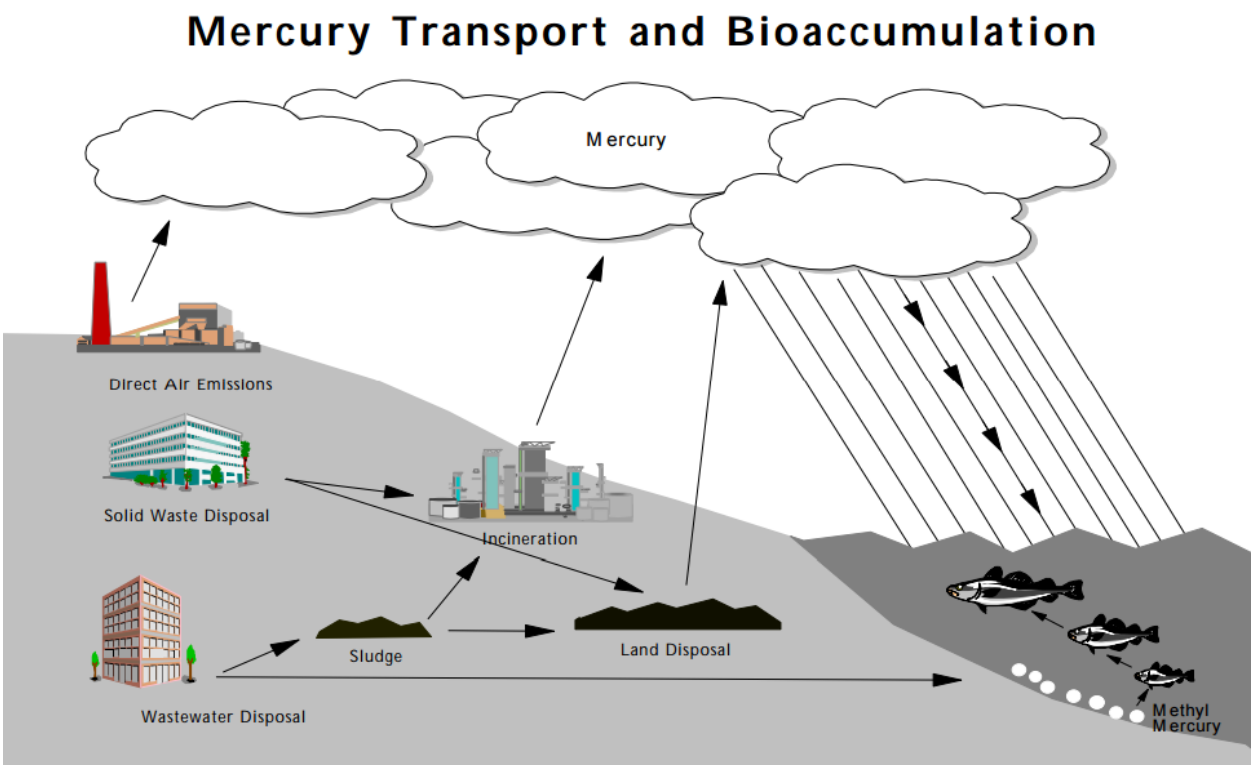


Figure 2: Mercury interchange in nature

Once mercury is deposited into lakes and streams, bacteria convert some of the mercury into an organic form called methylmercury. This is the form of mercury that humans and other animals ingest when they eat some types of fish. Methylmercury is particularly dangerous because it bioaccumulates in the environment. Bioaccumulation occurs when the methylmercury in fish tissue concentrates as larger fish eat smaller fish. A 22-inch Northern Pike weighing two pounds can have a mercury concentration as much as 225,000 times as high as the surrounding water.

These concentrations are significant when one considers the potential toxic effects of methylmercury. Methylmercury interferes with the nervous system of the human body and can result in a decreased ability to walk, talk, see, and hear. In extreme examples, high levels of methylmercury consumption have resulted in coma or death.

Many animals that eat fish also accumulate methylmercury. Mink, otters, and loons in Wisconsin have been found to have high levels of mercury in their tissue. Mercury can interfere with an animal's ability to reproduce, and lead to weight loss, or early death.

Sodium is a dangerous substance that reacts violently with water and then liberates extremely flammable gas, which causes burns. There may be other hazards that require caution during handling and disposal / recovery of sodium containing lamps. Sodium metal reacts with water in evolving heat. Crushed or broken bulbs in contact with water or damp air may evolve highly flammable hydrogen gas as well as corrosive sodium hydroxide. Further assessment may be required to determine if the waste is handled in a form likely to give rise to such hazards.

3 Process

The provisions of the EBRD Environmental and Social Policy (2014) and the Public Information Policy (2014) for public consultations and access to information have been fully taken into account while preparing this Stakeholder Engagement Plan for the Project.

EBRD Environmental and Social Policy (2014).[1] The policy covers the environmental and social dimensions of sustainable development. EBRD considers stakeholder engagement as an essential part of good business practices and corporate citizenship, and a way of improving the quality of projects. In particular, effective community engagement is central to the successful management of risks and impacts on communities affected by projects, as well as central to achieving enhanced community benefits.

According to the Policy, Environmental and Social Due Diligence should include:

- Carry out a corporate environmental, health, safety, social and labour (EHSSL) review of the existing operational performance and corporate risk management practices of the relevant Kyzylorda Oblast/City Departments. This review will focus on the Client's existing E&S capacity, management systems, corporate procedures and policies, contractor management practices, as well as operations and assets/facilities and will benchmark those against EBRD PRs, including preparation of a Compliance Summary table with the Bank's PRs.

- Identify the key environmental and social issues and risks associated with the proposed priority investments.

- Review and comment on the appropriateness of the existing environmental (among others waste management), health and safety and labour provisions for the sub-contractors (O&M contractor) and proposed the necessary improvements.

- Develop an E&S Management Plan for the refurbishment works to be included in the future tender documents and work contracts. This will need to cover appropriate disposal of the old mercury lamps, preventative management of health and safety risks to workers and public safety, and mitigation of road safety issues through appropriate temporary traffic and safety arrangements during the refurbishment works.

- Prepare an Environmental and Social Action Plan (ESAP) and a Stakeholder Engagement Plan (SEP) for the Project upon completion of ESDD and agree with the Client.

- Prepare a Non-Technical Summary (NTS) for the Project.

According to the Policy, stakeholder engagement is an ongoing process involving:

- the client's public disclosure of appropriate information so as to enable meaningful consultation

[1] http://www.ebrd.com/downloads/research/policies/2008policy.pdf

with stakeholders;

- meaningful consultation with potentially affected parties, and
- a procedure or policy by which people can make comments or complaints.

This process should begin at the earliest stage of project planning and continue throughout its life. EBRD expects clients to identify and interact with their stakeholders on an ongoing basis, and to engage with potentially affected communities through disclosure of information, consultation, and informed participation.

Performance Requirement 10 of the Policy is dedicated to the issue of stakeholders and sets out the Bank's requirements for clients to identify stakeholders potentially affected by their projects, disclose sufficient information about issues and impacts arising from the projects and consult with stakeholders in a meaningful and culturally appropriate manner. All EBRD financed projects undergo environmental and social appraisal, both, to help the EBRD decide if an activity should be financed and, if so, the way in which environmental and social issues should be addressed in planning, financing, and implementation. The client is responsible for ensuring that information disclosure and stakeholder engagement is carried out in accordance with PR 10. The Kyzylorda Street Lighting Project Stakeholder Engagement Plan includes all the elements required by PR 10.

EBRD Public Information Policy (2014)[2].The EBRD Public Information Policy sets out how the EBRD discloses information and consults with its stakeholders so as to promote better awareness and understanding of its strategies, policies and operations. The project documentation will be enclosed for the public on the EBRD website in accordance with this Policy.

4 Summary of Environmental Benefits, Potential Adverse Impacts

4.1 Waste disposal

The current waste utilization system in Kyzylorda City does not have any special procedure for utilization of hazardous materials, namely mercury and sodium, which are so important for this project. According to the information given, utilization of used light bulbs contains so far 3 main steps:

- Collection of used HPS and MV bulbs;
- Transportation to the disposal field;
- Burying them as average solid waste.

In the beginning of this chapter is fully explained why this is an inappropriate approach, how toxic mercury is, and what measures should be undertaken, to avoid catastrophic consequences.

[2] http://www.ebrd.com/downloads/policies/pip/pipe.pdf

This explains why a waste disposal factory, mainly a mechanical plant, which will treat the toxic elements, is needed for this project. However, building up a mechanical plant instead of a complete disposal factory is not cost effective.

The general scheme for a disposal factory is presented in Figure 3. If implemented the right way, it will not only dispose toxic elements, but also recycle many other materials. This will yield profit from reselling recycled parts and generate energy.

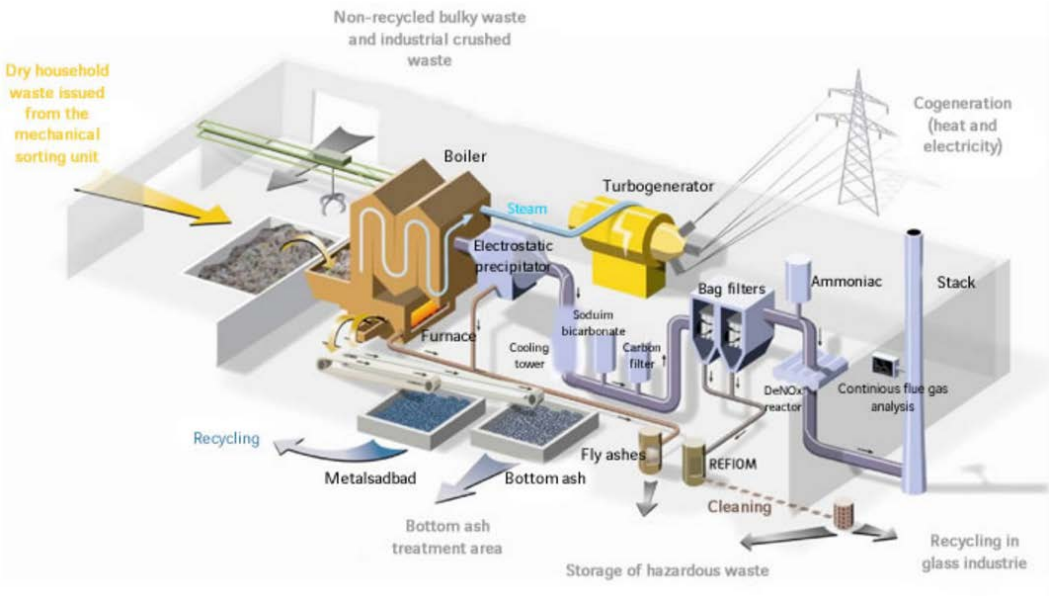


Figure 3: General structure of waste disposal factory

4.2 Air Quality Impacts

CO_2 emission is a big problem in this project. Energy consumption by Kyzylorda's street lighting system is nearly 14 GWh per year, as can be seen from previous calculation in the Inception Report, and from data, which was provided by the City of Kyzylorda. Since almost all of the energy in Kazakhstan comes from burning fossil fuel, a tremendous amount of CO_2 is being emitted during energy production.

As presented in the calculations within the ESDD report, the annual emission of CO_2 is nearly 30 Gg (gigagram) per year. It also should be mentioned, that the amount of 14 GWh of energy, which was mentioned before, is just the energy consumed by the existing lamps in Kyzylorda's street lighting system. If all related energy losses, and other energy consuming, street lighting related equipment (such as control boxes) are being calculated as well, the amount of used energy may significantly increase.

Substituting HPS and MV lamps with LED lamps will drastically decrease the amount of used energy. Energy saving is up to 50%-60% compared to current HPS lamps, and even more compared to Mercury lamps. Only on saving energy by using LED (after total program implementation), the total CO_2 emission can be reduced by up to 17 Gg per year.

4.3 Light Pollution

Light pollution, also known as photo pollution or luminous pollution, is excessive, misdirected, or obtrusive artificial light. Light pollution competes with starlight in the night sky for urban residents, interferes with astronomical observatories, and, like any other form of pollution, disrupts ecosystems and has adverse health effects.

In Kyzylorda, a few types of light pollution should be considered:

(1) Glare – difficulty seeing in the presence of bright light such as direct or reflected sunlight or artificial light such as car headlamps at night. Because of this, some cars include mirrors with automatic anti-glare functions.

(2) Light clutter – refers to excessive groupings of lights. Groupings of lights may generate confusion, distract from obstacles (including those that they may be intended to illuminate), and potentially cause accidents. Clutter is particularly noticeable on roads where the street lights are badly designed, or where brightly lit advertising surrounds the roadways.

(3) Skyglow – refers to the glow effect that can be seen over populated areas. It is the combination of all light reflected from what it has illuminated escaping up into the sky and from all of the badly directed light in that area that also escapes into the sky being scattered (redirected) by the atmosphere back toward the ground.

Light pollution has been linked to various negative health effects. While some of the effects might occur because the color spectrum of fluorescent lighting is significantly different from sunlight, other symptoms might be caused by light that is simply too intense. In particular, over-illumination has been linked to headaches, fatigue, medically defined stress, anxiety, and decreases in sexual function.

It is important to point out, that lighting pollution problems are connected to the design of the street lighting system, which includes a lot of factors, such as the position of light poles, angles of reflection and incidents, design of poles, design of lamps shell and of course lamp type. Thus, the retrofitting of the existing system should be taken from scratch, with all important issues being considered right from the beginning.

4.4 Over-illumination

Over-illumination occurs if the actual lighting intensity is higher than the appropriate intensity for this specific area would be. Over-illumination can be caused by several factors:

- Illuminating an unoccupied area
- Using electrical lights instead of natural light
- Providing lighting for an occupied area, but with too much intensity

- Installing insufficient electrical control equipment. This will result in areas that must either be over-illuminated or not illuminated at all.

Kyzylorda City is facing the problem of over-illumination as well. While analyzing the current situation in Kyzylorda, PCCC's consultants discovered another problem. Many streets are either over or under illuminated. Figure 4 presents examples of (a) over illumination (photo was taken on Al'kei Morgulan Street, HPS lamps) and (b) under illumination (photo was taken on Nigodalova Street, MV lamps). Both streets have similar width, and are residential area streets, but illuminance (32.5 lux for Al'kei Morgulan Street and 3.5 lux for Nigodalova Street) and luminance (2.58 lm for Al'kei Morgulan Street and 0.28 lm for Nigodalova Street) are about 10 times higher for Al'kei Morgulan Street. While over-illumination causes environmental problems, like an overuse of electricity, increasing skyglow and light pollution, under illumination causes social problems. If people do not have proper illuminated streets, they will not feel safe going out during night time.

It is worth to mention, that both of the lamps have an ununiformed level of luminance and illuminance. As can be seen in the pictures, there are dark shadow lines between the lamps that look like zebra stripes. The reasons are flows in design and limitation of HPS and MV lamps.

(a)

(b)

Figure 4: Examples of over (a) and under (b) illumination in Kyzylorda City

5 Summary of Social Benefits Potential Adverse Impacts

Kyzylorda is a beautiful, fast growing urban city, with a lot of potential. As mentioned before, the main purpose of this project is improving the quality of Kyzylorda's city lighting system under the condition of saving money on electricity and maintenance costs. This section is evaluating the most

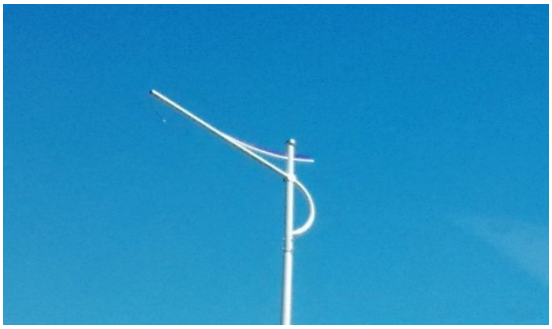
important socio-economic factors that might be influenced by retrofitting the street lighting system.

5.1 Visual Amenity

The design of lamps and poles is very flexible and can be adjusted not just for every city, but even for every district or every single street. This offers many possibilities of improving visual amenity of the city. Figure 5 gives some examples of different lamp designs for city lighting.

Figure 5: Possibilities for different pole design

It should be mentioned that Kyzylorda is already improving the visual amenity of the city street lighting drastically. Some of the current pole and lamp designs can be seen in Figure 6.

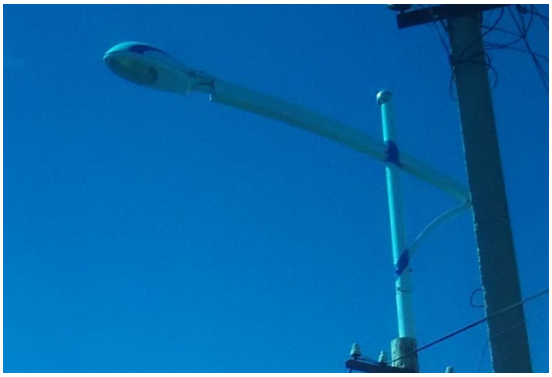


(a)

(b)

(c)

(d)



(e)

(f)

Figure 6: Examples of designs for typical street lighting poles in Kyzylorda's streets (a-f).

5.2 Illumination Quality

The quality of illumination mostly depends on the network design rather than on the specific lamp type. A well-designed network provides good illumination with any type of lamp. More parameters that define the total quality of illumination are lamp efficiency, maintenance costs and durability.

Luminous Efficiency

Figure 7 compares the luminous efficiency of different lamp types. It becomes very obvious that LED lamps do better than the remaining lamp types.

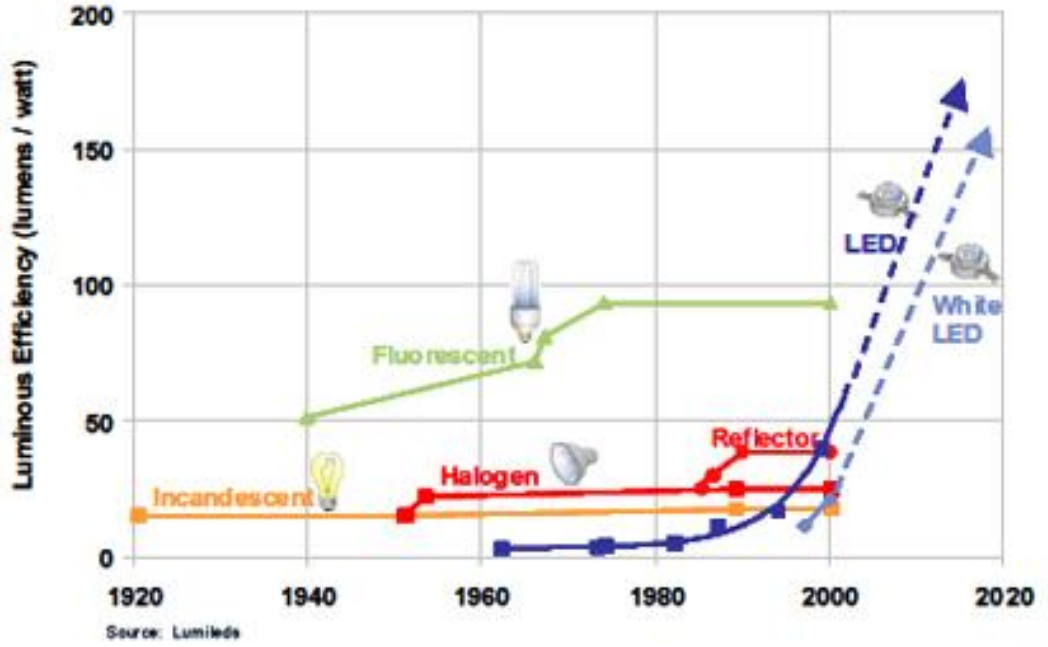


Figure 7: Luminous efficiency of different types of lamps

Life Time

To evaluate the illuminance quality of a lamp, the life span has to be taken into consideration as well. As seen in Figure 8, the total operation hours of LED lamps are double the amount of HPS operation hours, and more than triple to the amount of MV lamp operation hours. This is a very important fact for this project, as the life span of the MV and HPS lamps, currently installed in the city lighting system of Kyzylorda, is quite short. Only for one type of the 250W tubular HPS lamps of the street lights in main streets, exists a replacement record, which is more or less acceptable. The failure rate in 2014 was about 29%, which indicates that the average life time was about 3.4 years. In the residential areas, the 150 W tubular HPS lamps have the worst failure rate of 111% in 2014, which indicates that their life time is about 11 months. The failure rate of 125W MV lamps in 2014 is 63%, which indicates that their average life time is about 1.6 years.

Even for non-LED lamps this numbers are quite low. Further investigation is recommended to understand if the low numbers are due to bad quality of the purchased lamps, problems with the energy network of the city, bad maintenance or other reasons.

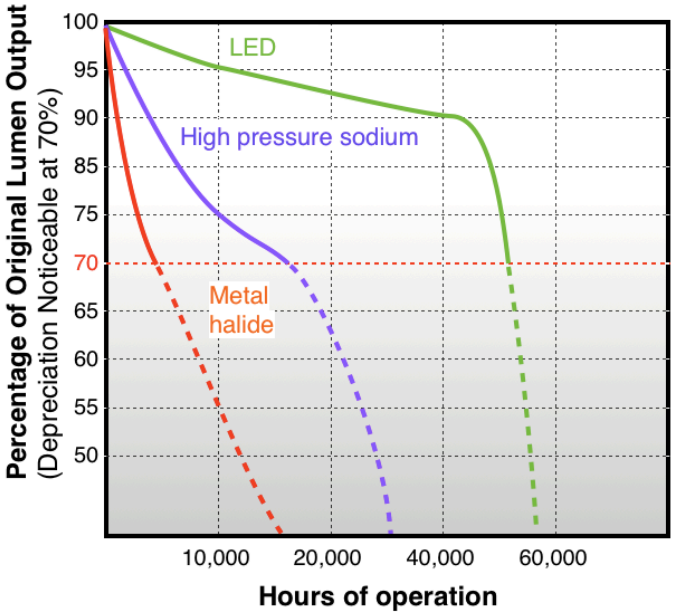


Figure 8: Lifetime of different lamp types

Durability and Maintenance Costs

Outdoor lights often become perches for birds and thus are likely to be soiled. In order to truly reduce maintenance, dirt or water should not be able to gather on the top-side of LED luminaires and the optical chamber should remain clean.

Ingress Protection (IP) ratings describe the luminaire's resistance to dust and moisture penetration. Today's LED lamps have IP 65 or more. IP 65 indicates that the lamp is "dust tight, and protected from water jets from any direction." A quick disconnect point between the light engine and the drivers will allow for field maintenance of the power supply. Keeping the maintenance contact points to this level reduces the opportunity for installation mishaps that cause reliability issues during normal use. Moreover, manufacturer warranty for LED products is five years or even more.

LED lamps perform better than HPS and MV lamps in all of the above mentioned criteria. Thus it clearly can be said that LED lamps provide the best Illumination Quality.

5.3 Noise Reduction

Noise pollution is here defined as disturbing or excessive noise that may harm the activity or balance of human or animal life. Noise at low levels is not necessarily harmful. Environmental noise can also convey a sense of liveliness in an area, and is not always considered 'unwanted'. However, the adverse effects of noise pollution affect both, health and behavior. Unwanted sound (noise) can damage psychological health. Noise pollution can cause hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects.

Even though the noise produced by some of the old lamps is not that significant, some reports on this question show that residents are concerned with this topic. LED lamps will resolve all of those

concerns, as they do not include any sound producing parts or processes, like moving parts, discharge processes, or coolers.

5.4 Impact on Business and Employment

It can be a big potential for the city development, to include programs, which are related to local businesses and city employment, into the renovation of Kyzylorda's city street lighting system. These programs should be addressed in a separate discussion, as there are quite a lot of opportunities. Using PPP models, which are discussed in other chapters of this report, could be one example. Another opportunity is using lighting poles not only for lighting purposes, but also for secondary applications, such as the installation of additional hardware, without harming the total visual amenity of the street lighting system, as shown in Figure 9. Examples are:

- Renting poles to cellphone companies, for them to place local 4G routers on the top of the poles, which can improve coverage, signal strength, visual amenity (less antennas need to be set up) and save costs.
- Attaching Wi-Fi routers to poles, to improve internet coverage in the city.
- Installation of solar panels on lighting poles. Since solar activity in Kyzylorda City is over 20 MJ/m^2, these solar panels could be used to return energy to the network and to yield earnings.
- Renting poles to security companies, for them to install security cameras on the poles.

Figure 9: Examples of alternative usage of street lighting poles: for Wi-Fi hot spot, 4G telecommunication, solar panels and video surveillance cameras

The renovation of Kyzylorda's street lighting system can create more opportunities for local businesses, create more jobs, and improve the general economic situation in Kyzylorda.

5.5 Safety

Proper and uniform illumination can help improve all safety conditions within the city. Either too high or too low level of illuminance may cause problems. The proposed LED illumination meets all important criteria sufficiently (illumination level, glare and luminous contrast) and thus will improve the illumination of Kyzylorda. Improving the illumination of city streets could be a key to reduce accidents and injuries caused by slipping, tripping or falling. Research made by AAA-LUX©

company[3], suggest that: "Poor light has been a major contributor to most incidents as employees misinterpret or miscalculate certain moves or actions due to poor visual appearances." Increasing the visibility distance improves safety for drivers and pedestrians. Some research done by The Royal Society for the Prevention of Accidents about "Street Lighting and Road Safety"[4] contain a lot of related information. Finally, yet importantly, crime rates can be decreased, and police operation time improved. Few important researches should be noted at this point. One – is improvement of safety due to the better lighting by itself. This is conclusion made in report written in 1974, due to importance of retrofit of old lamp types to HPS and MV lamps, "The impact of street lighting on street crime" by Roger Wright, et. al.[5]: "Results indicated that crimes of violence, robbery and assault were significantly deterred, while crimes against property were largely unaffected". While talking on improvement of overall safety, we also need to mention, that connection between light and crime may not be what most of us think it is, but the connection between light and our sense of safety is exactly what it's always been. Proper illumination provide reassurance to some people who were fearful in their use of public space, particularly women. Last but not least – is importance of proper illumination for effective work of CCTV surveillance cameras.[6]

5.6 Labour Issues and Standards

Part of the main law of the Republic of Kazakhstan that provides the legal framework in the field of Occupational Safety and Health Regulations, is the Labour Code of the Republic of Kazakhstan (Astana, Akorda, May 15, 2007, No. 251_III), hereinafter LC RK, which came into force on June 1, 2007. It completely covers all related questions, and goes in line with relevant EBRD's PRs and international laws.

5.7 Impacts on Existing Infrastructure and Traffic Control

According to the data collected during PCCC's trip to Kyzylorda, and looking at the fast development of the city, a renovation of the Transport and Traffic control systems can be expected in the near future. This means that the designed street lighting system should be able to satisfy all needs of a fast growing transport and traffic control systems. Regarding the city street lighting system retrofit, no conflict is to be expected between the two systems, but in order to avoid future conflicts, additional attention should be paid when redesigning the city street lighting network and control systems. Following possibilities need to be taken take into account, while implementing this project and any other projects within the City's Transport and Mobility Master Plan:

- increasing amount of transport,
- integration of lighting and traffic control systems,
- centralization of these systems within the whole city and each of the districts,
- ability to improve it if it will be needed.

[3] http://aaa-lux-lighting.com/
[4] http://www.rospa.com/road-safety/advice/roads/street-lighting/
[5] http://www.popcenter.org/library/scp/pdf/197-Wright_et_al.pdf
[6] http://www.raytecctv.com/

5.8 Community Impacts and Development Programmes

As mentioned before, this project is in line with other city renovation projects. Lighting increases a sense of community, and community pride. It brings us outdoors in our neighborhoods, helps us get to know each other. Fear keeps us out of the alley, and attraction to light and what it represents draws us to illuminated streets. Goal is to encourage increased private sector participation in this and other related projects. This could be accomplished by letting private companies take a part in this renovation or creating opportunities for private companies to invest in this project and to gain some of the benefits from project implementation. All of these initiatives need to be well discussed and signed under current Kazakhstan laws, to make sure that all steps are being implemented correctly.

Additional benefits of this project, as mentioned previously, include:

- safety improvement;
- higher illumination quality;
- noise reduction and decrease of light pollution;
- reduced amounts of toxins in the air, soil and water;
- creation of new jobs;
- reduction of energy and maintenance costs.

6 Communications

SPC and the Contractor(s) will receive and consider all comments and complaints associated with the Project. A sample of the Project Public Grievance Form is provided as an Annex with the Stakeholder Engagement Plan. Any person or organization may send comments and/or complaints in person, by phone or via post or email using the contact information which would be available later on the SPC website.

7 Environmental and Social Management Plan for refurbishment works

Project Activity, Aspects	Category	Potential Environmental & Social Impacts	Proposed Mitigation/Control Measures	Resources, Investment Needs, Responsibility
Preconstruction Phase				
Public Awareness and Community Perceptions		• The residents/ community do not fully understand the scope and goals of the project. General lack of stewardship results in wastage and lowered expectations in service delivery • Construction could potentially result in various community disruptions (traffic, electricity, access to buildings)	• Public Consultation on: - Scope of works - Project Impacts • Provide for resolution of complaints during construction works	Company's internal resources, CDP and communication consultants, management time.
Refurbishment Phase				
Refurbishment Phases: Excavations	Disruption of Public Utilities and Service Due to relocation and damage:	Even Project do not expect much excavation works; it may happen while substituting existing poles. It's may need organize some road cuts and excavation of trenches which in some cases produces the following: - Relocation of existing public utilities (water lines and electrical and telephone cables) resulting in the interruption of the services for a period of time. - Accidental damages to existing services might occur during excavation	• Consult with the utility companies to demarcate the locations and alignments of electrical cables, water mains and communication cables. • Inform Utilities prior to excavations within the 100 m of their respective alignments • Prepare a detailed works' planning and construction phasing schedule, and coordinate service interruption with public utilities and public administrations. (Works phasing shall be established in a way to reduce the disruption time). • Advise citizens in advance concerning programmed interruptions in water, and other services.	Implementer: Company Supervision: Company and CDP consultants team Coordination: public utilities
Construction phases	Traffic Concerns	• Traffic congestion and temporary road closures: - Increased risk of accidents - Also the materials supply and disposal will generate circulation of trucks on the public roads • The construction activities will necessitate partial or total traffic interruption and vehicle and pedestrian traffic deviations resulting in traffic congestion and risk of accidents. Traffic flow may also be impacted by temporary road cuts.	• Prepare and implement Traffic Management Plan • Coordinate all traffic arrangements with Traffic Police and Municipality, NDC, Regional Administration and other authorities • Delivery and discharge Trucks might be assigned restricted circulation hours (delivery hours must be set a part of planning) • Advise citizens in advance concerning road closures and rerouting of vehicle and pedestrian traffic (Public Communication Plan) • Works will be carried out on lots of limited length, in a way to minimize closure of main streets stretches (Project Planning & Scheduling)	Implementation: Company's construction team, O&M construction subcontractor Supervision: Company and CDP consultants team Coordination: local authorities, GPF

Project Activity, Aspects	Category	Potential Environmental & Social Impacts	Proposed Mitigation/Control Measures	Resources, Investment Needs, Responsibility
			• Outside of working hours, especially at night, all barriers and signs will remain at sites, with lighting and / or lighted signs placed as required to warn both vehicular and pedestrian traffic • Flagmen shall be used to warn and direct vehicle traffic around construction sites and hazards during working hours • The Contractor shall restore the project environment to the state to which it was or better, prior to construction.	
Excavation of Trenches and Road Cuts for installation of lighting poles	Access to Homes and Public Places	Limitation and disruption of access to homes, businesses and public places: - The trench excavations will create temporary difficulties of access to the adjacent buildings also on account of the traffic deviation and road cuts leading to some disturbance of the neighboring residents and users; - Impact on Businesses	• Works will be effectuated on lots of limited length, in a way to minimize disturbance (Project Phasing Plan, planning); • Excavated areas and trench crossings shall be clearly marked and temporary fencing, bridges, access routes, signage, etc. shall be constructed to facilitate access and avoid accidental falls into these areas • Prior consultation and notification to the impacted and interested.	Implementer: Company Supervision: Company and CDP consultants team Coordination: public utilities
Construction phases	Air Emissions and Air Quality: - Dust generated from earthworks - Dust generated from materials handling - Wind- generated dust from exposed areas of soil and mounds of stored soil. - Dust generated from vehicle movements	• Impaired Air quality due to emissions form vehicles and dust generated • Respiratory impacts on site workers, nearby residents and pedestrians	• Dust masks and eye protection against dust, splinters, debris etc. • Dust suppression methods such as wetting materials or slowing work should be employed as needed to avoid visible dust • Gas masks / respirators when working in closed areas such as access manholes, etc. • Document requirements and standards in the Contractors Health and Safety Plan	Implementer: Company Supervision: Company and CDP consultants team

Project Activity, Aspects	Category	Potential Environmental & Social Impacts	Proposed Mitigation/Control Measures	Resources, Investment Needs, Responsibility
	- Emissions from construction traffic and on-site machinery			
Construction phases	Noise generation (from the use of excavation machines and construction equipment)	Noise generation from the use of excavation machines and construction equipment with its impact on workers and neighborhood	• Hearing protection for working around • machinery where the noise exceeds 60 dB Limiting working hours according to the EPA requirements • Maintain vehicles and machinery according maintenance requirements • Consider noise suppression capability in the procurement of vehicle and equipment	Implementer: Company Supervision: Company and CDP consultants team
Construction phases	Handling and Storage of Construction Materials and Wastes	• Environmental Degradation due to dispersion of materials of materials in the nearby canals, streets and adjacent properties • Poor or improper management of the stored materials and wastes can result in dispersion of materials in the nearby canals, streets and adjacent properties • The construction activities will necessitate temporary on site storage of construction materials and excavated materials, poor management of the stored materials and wastes can result in dispersion of materials in the nearby canals, streets and adjacent properties;	• The contractor shall handle construction materials and waste in accordance with approved procedures • Sites for temporary piles should be agreed with Kyzylorda city Akimat and local authorities • The community should be made aware of constraints imposed on the contractor for waste collection, storage and disposal • Where possible the contract should coordinate with the Municipality and Regional Administration, to deposit construction waste in areas that are to be filled or reclaimed • The contractor shall contain excavated materials in the vicinity of the worksite within berms to prevent dispersion and sedimentation of drains, creeks, streets and adjacent properties	Implementer: Company Supervision: Company and CDP consultants team Information and consultation: CDP consultants team, local authorities
Storage of Hazardous materials	Hazardous Materials (MV and HPS lamps)	• Environmental Degradation (soil, surface water) • Risk of water and soil contamination in case of spills or leaks • Mobilization of pollutants or sediments from contaminated soils • Cross-contamination of previously non-contaminated soils. • Import of potentially contaminated materials • Increased fire risk and the resulting	• Special containment for used MV and HPS lamps to avoid contamination during operation • Some training for understanding potential risks should be part of the orientation for workers • Maintain the MSDS Sheets for hazardous materials on site	Implementer: Company Supervision and consultation: CDP consultants team

Project Activity, Aspects	Category	Potential Environmental & Social Impacts	Proposed Mitigation/Control Measures	Resources, Investment Needs, Responsibility
		mobilization of hazardous smoke or air r-borne materials		
Construction phases – open excavations	Worker and Public Safety	• Safety risks due to open excavations • The excavation of deep trenches, the open trenches and manholes can create health and safety risks for both workers and pedestrians in case of instable excavation sections, inadequate shoring, fencing and signage	• Safety conditions in the trenches during construction phase shall be ensured through the use of appropriate shoring systems and dewatering • Workers should not enter a trench more than waist deep without appropriate safety precautions such as shoring • Safe access and thoroughfare must be provided on site at all times. Dangerous areas shall be clearly identified with appropriate signs • Excavated areas and trench crossings shall be clearly marked and temporary fencing, bridges, access routes, signage, etc. shall be constructed to facilitate access and avoid accidental falls into these areas • Legible warning signs, barriers and signals shall be placed at strategic locations in sufficient number and spacing for all prominent access ways to the sites. Warning signs and other protective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles etc.	Implementer: Company Supervision: Company and CDP consultants team Information and consultation: CDP consultants team, local authorities
Construction phases	Water Quality	Environmental Degradation (water sources) due Pumping and discharging of storm water and ground water off-site: Risks of Flooding	• Storm water should be pumped from pipe trenches and foundations to the ditches, waterways and creeks existing beside the roads. • The Contractor shall temporarily stop dewatering and discharging water into the drainage canals/creeks when there is heavy rainfall or a threat of flooding • The Contractor shall ensure that the workers, the excavations and all on site materials are well protected	Implementer: Company Supervision: Company and CDP consultants team Information and consultation: CDP consultants team, local authorities
Construction/ functioning of Disposal factory	Disposal of hazardous materials	Health and Safety Risks	• Ensure that proper safety gear, harnesses, etc., are utilized • Conduct proper worker health and safety training and orientation prior to initiation of tasks • Include in contractor's health and safety plan	Implementer: Company Supervision and consultation: CDP consultants team

Project Activity, Aspects	Category	Potential Environmental & Social Impacts	Proposed Mitigation/Control Measures	Resources, Investment Needs, Responsibility
Disposal of hazardous materials				
Disposal of MV, HPS lamps		Contamination of waterways and lower surface water quality	Develop a management strategy, including protocols for handling and disposal based on investigation and pilot and bench-scale tests	Main responsibility: Utilize Consultant with Process and Materials Handling expertise. Supervision: Company and CDP consultants team
Storage of Chemicals		Exposure of workers and adjacent community	• Treatment chemicals (mercury, sodium, etc.) must be contained in appropriate containers • Develop Emergency Response Plan	Implementer: Utilize Consultant Division/Plant manager
Protection of Ground Water Resources	Ground Water Quality	• Ground water /aquifer can be contaminated through the annulus • Certain activities in the recharge area can result in contamination of the aquifer	• Prepare and Implement wellhead protection strategy • Develop plan/strategy to limit activities within the Recharge area • Define limits of area • Inventory of threats • Develop initial signage and information strategy	Implementer - Special Consultant Supervision: Company and CDP consultants team