



Pre-Feasibility Study Energy Efficiency and Public Safety Improvements Through Street Lighting in Bishkek

August 2015
Executive Summary



A. Rationale

1. Bishkek is the capital and the largest city of Kyrgyz Republic (KR). It is located in the northern part of the country in the Chuy Province, at the foothills of Tien Shan mountain range. The city's population of 900,000 (based on 2009 census) is increasing at an alarming rate, and the current population of Bishkek is estimated between 1.2 to 1.5 million. However, the condition of street lighting in Bishkek is poor, with only 47% of the existing lighting points are operational. Existing infrastructure services are outdated and require massive refurbishment work. As a result, the poor visibility of the City compromises upon safety and security of its inhabitants, especially during evening and night hours.

2. The vision of the Street Lighting Project is for Bishkek to become a well-lit city where safety and security is ensured for all. In addition, the City has also targets to reduce its energy consumption of street lighting. This project has a strong possibility of having participation from the private sector as well as linkage towards climate change mitigation.

3. Bishkek's latest comprehensive street lighting development plan dates back to the 1980s. Since then, there is no new direction as to how the street lighting system of Bishkek should be expanded in accordance to the existing City's expansion plans. The Bishkek's General Plan developed by the Kyrgyz City Planning Science and Research Institute from 2002 to 2006, which encompasses the planning period until 2025, did not include the development plan for Bishkek's street lighting network, and was only partially open for public consultations in January 2015. The overall slowdown of the KR's economy and the unstable political situation has resulted in the major lack of financial resources for Bishkeksvet to address urgent infrastructure needs of the City. It is estimated that 90% of the projects require financing from the private sector.

4. Taking into the consideration that there are a number of high-level infrastructure development priorities of the City, there is a need for strong political will for the City to prioritize this street lighting project over other infrastructure needs. Bishkek's urban infrastructure development and the engagement in public-private partnership (PPP) received strong support from the Prime Minister Office of KR as well as the Ministry of Economy of KR, as the implantation of these development projects are seen a pilot for the entire country for future execution of infrastructure projects nationwide.

B. Impact and Outcome

5. The project's impact is enhanced personal security and public safety in Bishkek, with the outcome of improving the quality of outdoor lighting in the streets, educational and medical institutions, as well as courtyards of the city to reduce the number of street crimes.

C. Current Situation of Bishkek's Street Lighting

6. As of October 2014, the inventory record of Bishkeksvet indicates that there are approximately 31,000 lighting points throughout the city. Out of which only 59% of the street lighting network are operational, while the remaining 41% are not (19% long-term non-operational and 22% short-term non-operational). Street lighting in Bishkek is concentrated in the city centre, and the quality as well as availability of lighting in outer lying suburbs of Bishkek are visibly poorer or absent. It is estimated that an additional 15,000+ street lights is required to be installed in Bishkek, which also encompass the installation of lighting poles, lamps as well as electrical infrastructures.

7. Bishkeksvet's maintenance record indicates that the replacement rate of current street lamps is at approximately 100% annually. Street lamps installed in Bishkek have

shorter lifespan compared to its supposed standards. This is due to the poor quality of lamps sourced, based on the city's criteria of least-cost procurement without any rigid technical specification and standards for the procured equipments. In addition, the poor conditions of power lines in Bishkek lead to voltage fluctuation, which causes the power lines, throttles or street lamps to break down, as well as other technical failures. At such, replacement of all existing lamps with LED lamps will likely to result in major damages on the replaced LED lamps.

8. With regard to power lines, Bishkek city's street lighting network covers 733 streets in the city and is equipped with 3,318.1 km of Bishkeksvet-operated power lines. Out of which 3,166.7 km are aerial power lines (only 1,703.5 km are operational) while the remaining 151.4 km consist cable power lines (only 141.7 km are operational). These power lines are deteriorating at an estimated rate of 60% - 65%. Out of the existing power lines, 1,472.9 km of it are repairable while the remaining 1,845.1 km need to be replaced by SSIW. However, to date Bishkeksvet has no sufficient financial resources to replace these power lines. The challenges faced by Bishkeksvet are further compounded by the fact that they were only given a printed copy of the map outlining the power lines of Bishkek's city street lighting network, developed by the Bishkek Contemporary Company in 2012. The electronic copy of the map was unavailable as Bishkeksvet did not have sufficient funds to acquire it.

9. The current conditions of street poles in Bishkek are in very poor shape. It is observed that many of the street poles are leaning, cracked, or being propped up by smaller poles as an interim measures. This is a severe safety hazard in the city of Bishkek. It is estimated that approximately 43% of the existing 24,975 poles require replacements. However, Bishkeksvet cannot perform major repairs and installation work as the authority for such engagement lies in the Municipal Construction Department (MCD) and the Public Municipal Construction Department (MPCD).

10. Currently, Bishkek city's street lighting network is operated through switch-on points (control pillars), and the centralized control panel of the city's street lighting network was built in the 1980s. However, the control panel went out of order by the early 2000s. As of 1 October 2015, there are 449 switch-on points, out of which 333 are operational while the remaining 116 are non-operational. 293 switch-on points are operated manually through stage-by-stage; 30 are operated through time relay; while the remaining 10 switch-on points are operated through the ASLM Systems, which was procured through local tender. Subsequent plans of purchasing ASLMs were not accomplished due to the City's lack financial resources.

11. Assessment on Bishkek's current street lighting situation substantiated the need for major refurbishment of the street lighting network. However, Bishkeksvet is limited by its competences and this prevented them from engaging in the much-required comprehensive development of street lighting network, major repairs as well as the construction of new infrastructures. The lack of adequate funding is also a major hindrance for Bishkeksvet to carry out these necessary refurbishments.

D. Regulatory, Financial, Social and Environmental Challenges

12. There are a number of provisions under the laws of the KR currently in place for individuals and legal entities to adhere to, which encompass standards for energy performance, energy efficiency audit, energy efficiency requirements as well as the establishment of non-state funds for the promotion of energy savings and innovations. However, it is noted again that the City is suffering from the lack of financial resources to carry out these initiatives. In addition, most of the requirements that are currently in place are deemed unworkable and are unenforced.

13. Furthermore, there is no mechanism in place for the City to foster energy savings and to introduce energy efficient technologies. This coupled with the lack of energy efficiency standards in the KR for other sectors of the economy to adhere to (with the exception of energy efficiency standards for residential buildings). In relation to the installation of LED lamps in Bishkek, the lack of national technical standards for LED lamps is an obstacle for Bishkek in its effort to modernize its street lighting network. In lieu of KR developing its own regulations and standards on this matter, it is recommended that Bishkek can adopt standards that are in practice in other countries, such as the US LED standards for the implementation of this project.

14. With regard to the financial health of Bishkeksvet, this Study concluded that current revenue is insufficient to finance the installation of proper street lighting in the City. However, it is also noted that Bishkeksvet has a healthy balance sheet without any existing debt which potentially allows the company to borrow to finance the capital costs. However, as noted later in the Report, Bishkeksvet would likely find it difficult to service any such debt.

15. The lack of street lighting in Bishkek has resulted in social insecurities, such as house thefts and street robberies. A social survey developed in December 2014 by this Study found that 69% of the surveyed population chosen street lighting as the priority public service desired, with almost half of the respondents consider the quality of present street lighting service to be below average. While 70% of street lighting in Bishkek consists of secondary street lighting, it has the largest number of dysfunctional lamps. Women, children and elderly are primarily affected by the situation, as it is unsafe for socio-economic life during dark evening hours. The survey also found that the respondents perceived quality street lighting in the City to be significant in improving the safety of the community. However, the criminal statistics provided by the General Department of Internal Affairs (GDIA) were not conclusive in linking the occurrence of crimes versus the quality of street lighting in Bishkek.

16. Poor road safety is also a major concern arises from the lack of street lighting in Bishkek. The number of road accidents in the City increased by 62.5% from 2012, with 2,898 accidents registered in the year of 2013. 60% of the accidents (1,736 registered) involved hitting of pedestrians. Number of injuries rose by 75%, while number of fatalities rose by 23.2% during the same time frame indicated.

17. In relation to the street lighting project, mercury lamps that are currently in use have the most harmful effects and the lowest energy efficiency compared with other lighting options. Faulty mercury lamps are being disposed in open waste container, and this resulted in severe health consequences and emissions of Green House Gases (GHG) in the City. Hence, provisions for recycling of mercury lamps are essential for Bishkek, to ensure that disposal of mercury lamps according to environment and health standards.

18. The main source of electricity generation in KR is from large hydropower stations across the country. There is one coal-fired CHP plant operating in Bishkek located in the centre of the city, which is a major source of air pollution. However, the City has not specified whether the source of electricity consumed in Bishkek, and particularly for street lighting is generated by the CHP, but it is unlikely that the coal plant makes a significant contributor to meeting the city's street lighting energy needs.

E. Targeted Project Benefits

19. Major social improvements can be expected from this project, such as increased visibility for drivers and pedestrian hence reduction in numbers of road accidents, increase sense of security in the City, improve the safety for children, women and the elderly, better control of unwanted spill lights and reduce light pollutions in residential areas, as well as

intangible benefits (such as more livable cities, increased urban desirability and enhanced civic pride).

20. Emissions of CO₂ are expected to be reduced over 50% from the current emissions. Other environmental benefits from this project also included carbon reduction, reduce petrol and fuel consumption due to less maintenance call outs, replacement of mercury lamps and reduce light pollution by controlling spill light.

F. Proposed Technical Solutions

21. There are several key considerations that need to be included in the proposal for the Bishkek's street lighting project. The proposal should encompass the following constraints:

- 24.1. The current street lighting solution is inadequate for the City with high level of lamp failures, high number of short-term as well as long term non-operational lamps;
- 24.2. Bishkeksvet is currently struggling to deliver their chartered responsibility of operating and maintaining a street lighting network for Bishkek;
- 24.3. Significant remedial work is required on existing infrastructure to modernized the system up to an acceptable standards, including lamp units, wiring to lamp units, street poles and IP boxes;
- 24.4. Proposed solutions will need to be able to cope with severe voltage fluctuation of up to (-) 40%;
- 24.5. Technical specifications used to calculate project parameters be strictly tendered so that the solution will deliver the benefits evaluated by the project;
- 24.6. Technical specifications that are tendered will need to be guaranteed by supplier; and
- 24.7. Reduction in energy consumption including maintenance and operational costs by Bishkeksvet.

22. Given these highlighted constraints, LED street lighting will be the most appropriate solution for Bishkek's street lighting project. This involves the reparation and modernization of the existing street lighting network, replacing the existing 31,000 street lights in Bishkek with LED street lighting, remedial work to repair existing infrastructure, as well as the expansion of the network with additional 15,300 LED street lighting points installed at the outer suburbs of Bishkek.

23. The usage of LED street lighting will have a significant impact in reducing the consumption of electricity for Bishkek's street lighting network, as LED lighting technology is an energy saving product. It is expected to lower the operational expenditure of Bishkeksvet as well, where currently the City is spending half of its annual budget on electricity. LED lighting also have a longer product lifecycle of 50,000 operation hours (approximately 12 years), uses environmentally friendly materials and have an excellent colour rendering properties. These technical properties add to the long-term sustainability impact for Bishkek in using LED street lighting.

24. Usage of LED street lighting for this project will vastly increase the lifespan of street lights. The current lifespan of Mercury street lights of an approximately 1 year could be lengthen to an approximately 12 years with the usage of LED street lights. Energy consumption for Bishkek's street lighting will decrease for an approximately 55% from the current consumption rate. To achieve these estimated improvements and energy savings, the following are the technical specifications of the LED street light recommended by this Study:

- 24.1. Input Voltage AC (85~265V);
- 24.2. Frequency (50Hz);

- 24.3. Life Span >50,000hrs;
- 24.4. LED Lighting Efficiency 110lm/W;
- 24.5. Luminaire Efficiency >90%;
- 24.6. Power Supply Efficiency >90%;
- 24.7. Power Factor >0.98;
- 24.8. Colour Rendering Index Ra>80;
- 24.9. Colour Temperature 2700K~5700K;
- 24.10. Ambient Temperature 700K~5700TempelP Rating IP65;
- 24.11. Ecoting IP65ng IP65 700K~5700K;
- 24.12. Materials LM06 equivalent Aluminium;
- 24.13. 316 Stainless Steel fasteners;
- 24.14. High intensity toughened glass.

G. Project Investment Cost

25. The overview of an estimated project costs is provided in the Table a below:

Table a - Project Cost Overview

	Qty	Unit Cost (av. USD)	USD
1.0 Existing network			24,222,121
1.1 Replacement of 31,000 with high quality LED street lighting units	30,967	578	17,898,926
1.2 Installation costs (local labour)	30,967	6	185,802
1.3 Installation support	16	1,600	25,600
1.4 Installation support overheads	1	8,000	8,000
1.5 Replacement of IP points (including wiring)	120	610	73,200
1.6 Replacement of 2343 street lighting poles	2,343	429	1,005,593
1.7 Remedial work on 16,750 lighting points	16,750	300	5,025,000
2.0 Automation system			2,731,000
2.1 Upgrade of 110 IP points	110	2100	231,000
2.2 Control automation system	1	2,500,000	2,500,000
3.0 Expansion of the network			15,908,924
3.1 Addition of 15,000 LED street lighting points, with luminaire, mounting arm, lighting pole, electrical works, installation, IP points	15,000	1,035	15,519,000
3.2 Addition of 350 LED street lighting points, with luminaire, mounting arm, electrical works, IP points	350	741	259,210
3.3 IP points for new network	214	610	130,714
SUBTOTAL			42,862,045
4.0 Engineering, Planning, Safety			2,143,102
5% of subtotal			2,143,102
TOTAL			45,005,148

26. In order to reduce the initial amount of capital investment required for this project, this Study recommends for the project to be completed in three stages. **Table b** provides the financial expenditure breakdown for the 3 stages proposed for this street lighting project in Bishkek:

- 24.1. Stage 1 involves replacement and upgrade of the existing lighting network of 19,600 street lights, represents 63% of the remedial work required to restore the existing network and would have an energy cost saving returns of over 50%. Stage 1 also includes the upgrading of the automation control system.

- 24.2. Stage 2 involves the conversation of the remaining 11,367 lighting points on the existing networking, which represents 37% of the remaining required remedial work.
- 24.3. Stage 3 involves the expansion of the existing network by 15,350 lighting points in the outer suburban areas of Bishkek that do not yet to have street lighting service. This encompasses 350 lighting points to be installed on 14km of existing roads, as well as 15,000 lighting points for roads on an area of 600km that will need to be installed in Bishkek's outer suburbs.

Table b - Project Staging Summary

Stage	Description	Total (USD)	Cumulative Total	
Stage 1	Replacement of 19,600 street lights with new LEDs; Remedial electrical work (wiring) on 10533 street lighting point; Remedial work on 1476 street lighting poles; Installation of automation control system; Labour cost	19,685,111	Stage 1	19,685,111
Stage 2	Replacement of 11,367 street lights with new LEDs; Remedial electrical work (wiring) on 6198 street lighting point; Remedial work on 867 street lighting poles; Labour cost	9,662,595	Stage 1 + 2	29,347,707
Stage 3	Additional of 15,350 new street lights in suburban areas	15,908,924	Stage 1 + 2 + 3	45,256,631
Total		45,256,631		

H. Project Implementation Scenario

27. This project will be prioritizing improvements of street lightings in the most densely populated areas as well as the poorest areas of the City. Such implementation strategy will be done in three stages, in order to generate wider acceptance from the local population with tangible social impact experienced. This Study recommends the project to be stage in 3 phases, as follows:

- 24.1. Phase 1 - Fully functional street lighting network;
- 24.2. Phase 2 - Network expansion to densely populated residential areas and in most vulnerable/poor areas;
- 24.3. Phase 3 - Network expansion in line with the city expansion plan.

28. The Chuy-Bishkek Regional Environmental Protection Agency has also offered to cooperate with Bishkeksvet to help achieve the environmental benefits of this project. Under the Agency, the Environmental Protection Fund could contribute about KGS 10-15 million (USD 160-250,000) for this street lighting project, for the strengthening of its ecological component and/or to contribute to the capacity building of Bishkeksvet. Upon request, the Agency can also offer its ecological expertise without any charges to Bishkeksvet. In addition, the Agency could engage in the assessment of the viability of reviving the mercury lamp disposal section of a worsted cloth factory for proper disposal of the replaced mercury lamps.

I. Financial Implementation Options

29. The Study constructed a financial model which is incorporated with a Free Cash Flow calculation for the analysis of Bishkeksvet's financial standing and profitability from its

operations. The timeframe adopted for the calculation is from 1 October 2014 to 31 December 2044, and is based on the financial data provided by Bishkeksvet. The Forecast period is selected for purpose of providing flexibility in the model.

30. This study produced three financial options that Bishkeksvet can engage in for the implementation of the street lighting project. These three scenarios reflect a mixture of different financing sources from concessional, commercial debts, grants and etc, based on the following assumptions:

30.1. The parameters of concessional and commercial debt are depicted below.

Concessional debt			Commercial debt		
Item	Unit	Value	Item	Unit	Value
Start year	year	2015	Start year	year	2015
Loan Tenor	year	13	Loan Tenor	year	13
Grace period	year	3	Grace period	year	3
Interest rate	%	Libor + 1%	Interest rate	%	Libor + 4%
Front fee	%	0%	Front fee	%	1.2%
Commitment fee	%	0%	Commitment fee	%	0.6%

- 30.2. The Grant does not require principal and interest repayment;
- 30.3. Used cash flow is Free Cash Flow to Equity;
- 30.4. Discount rate (cost of equity) is 20.4%;
- 30.5. The amount of Capital Expenditures is equal to USD 45 million;
- 30.6. The Company’s revenue represents reimbursement of operating expenses and inflows from ancillary services;
- 30.7. Savings from operating efficiency remains at the Company disposal.

31. **Table c** exhibits the results of the three scenarios based on the financial model for the street lighting project in Bishkek city. The results show that Bishkeksvet would potentially be able to finance this project. However, the current electricity tariff is low and there is a considerable amount of expenditure that falls under Capital Expenditure. Consequently, Bishkeksvet would not be able to repay any debts incurred via the financial savings achieved from lower energy consumption arising from the installation of LED street lightings in Bishkek.

Table c - Results of Financial Model for Street Lighting Project

	Concession al Debt	Commercial debt	Grant	CAPEX	Cost of Equity	IRR	NPV, KGS ths
Scenario 1	0.0%	55.2%	44.8%	45 mln. USD.	20.4%	20.4%	0
Scenario 2	34.0%	0.0%	66.0%		20.4%	37.0%	525,296
Scenario 3	77.9%	22.1%	0.0%		20.4%	-	820,461

J. Legal and Institutional Implementation Options

32. This study identifies two legal mechanisms – trust management and public-private partnership – that may be applied for the management of Bishkeksvet for the implementation of this street lighting project in Bishkek.

33. Trust management mechanism involves the Municipality of Bishkek to transfer the property complex of Bishkeksvet into the trust management, which have the necessary professional knowledge and skills required to manage Bishkek’s street lighting network. The best way to procure the trust management service is through a two-stage bidding process.

This process allows flexibility for the Municipality to reevaluate the terms of bids and decision-making process upon the completion of the first stage. The estimated time of completion is 4 to 6 months,

34. The Municipality may also engage a private partner for the financing, designing and building of new street lighting facilities, as well as the rehabilitation, reconstruction and management of street lighting networks in Bishkek. The preparation and holding of the tender and signing of the PPP agreement can take from several months to one year and more. However, the use of PPP might involve a number of complexities related to the imperfection of legislation and the lack of PPP practice in the KR. More importantly, as discussed further below, while a PPP arrangement may potentially be legally feasible (if difficult) it is unlikely to be financially attractive to any private party.

Table d - Risk and Solution of Legal and Institutional Implementation Options

Implementation Option	Risk(s)	Solution(s)
Trust Management	<ul style="list-style-type: none"> • Lack of experience of the Mayoralty in transferring municipal assets into trust management • Little incentives for private investors due to short term agreement (up to 5 years) • Risk of disputing the tender procedures 	<ul style="list-style-type: none"> • To ensure the properly drafted tender documents • To ensure the open and transparent tender process • To ensure the properly executed agreement between the Mayoralty and the private investor.
Public-Private Partnership	<ul style="list-style-type: none"> • Lack of experience in initiating and carrying out PPP projects • Complexities of preparing tender documents and the PPP agreement due to lack of experience • Risk of disputing the tender procedures, etc. 	<ul style="list-style-type: none"> • To ensure the properly drafted tender documents • To ensure the open and transparent tender process • To ensure the properly executed agreement between the Mayoralty and the private investor.

J. Financial Mechanism

35. Within the framework of the above proposed management mechanisms, this Study examined the different financial mechanisms that the Mayoralty / Bishkeksvet / private investors could consider for the implementation of this project. **Table e** below presents with the analysis on the feasibility / viability of the different financing mechanisms available, risk as well as solutions for each option.

Table e - Risk and Solution of Financial Mechanisms

Financing Mechanism	Feasibility / Viability	Risk(s)	Solution(s)
Grant Scheme	<ul style="list-style-type: none"> • Only limited amount of grant could be obtained from National government • Consideration of obtaining grant from foreign States or international/foreign/local organization instead. 	<ul style="list-style-type: none"> • Complexity / difficulty of securing a grant 	<ul style="list-style-type: none"> • To start grant search through international partners working in KR
Loan / Credit	<ul style="list-style-type: none"> • Problematic in receiving loan/credit due to full budgetary dependence as well as lack of revenues and liquid assets. 	<ul style="list-style-type: none"> • Complexities of loan seeking for a non-profitable project (when all costs are included) 	<ul style="list-style-type: none"> • To start negotiations with IFIs working in KR

Finance Lease	<ul style="list-style-type: none"> • Only an insignificant part of the capital expenditure that is necessary for this project. 	<ul style="list-style-type: none"> • Tax and customs consequences arising from import of equipment 	<ul style="list-style-type: none"> • To explore tax and customs consequences arising from import of the equipment acquired under finance lease.
Energy Service Contract	<ul style="list-style-type: none"> • Current electricity tariffs are too low to ensure technical feasibility and economic viability of the project and correspondingly to attract private partners. 	<ul style="list-style-type: none"> • Lack of legal regulation of relationships arising from energy service contracts and unattractive to a private party 	<ul style="list-style-type: none"> • To stipulate details in the agreement with the private investor
Involving Citizens in Co-Financing	<ul style="list-style-type: none"> • Require supports from the Mayoralty, the City Council and the general public and amendments to the laws of the KR, which may deemed it unpopular 	<ul style="list-style-type: none"> • The lack of legal regulation • Public opposition to introduction of street lighting fees 	
Increasing Bishkeksvet's Budget	<ul style="list-style-type: none"> • Not feasible due to the necessity of envisaging these amounts in the republican budget and the obligation to repay the loan within the budgetary year. 	<ul style="list-style-type: none"> • The lack of funds in the Mayoralty • The City Council's refusal to increase the budget 	<ul style="list-style-type: none"> • To make a well-substantiated and feasible technical and financial proposal stating the need and reasonableness of increasing the budget of Bishkeksvet

K. Recommendations

36. The Bishkek's Lighting Master Plan will need to be developed in line with the expansion projections of the General Plan by the Kyrgyz City Planning Science and Research Institute (General Plan developer) and Bishkek Head Architecture Department (General Plan implementer). Emphasis should be placed on the new settlements in the City (*novostroiki*) as it is estimated to cover 1/3 of Bishkek's territory which is poorly equipped with infrastructure services as well as absent of street lightings.

37. Bishkek city is unlikely to afford to modernize its street lighting network with high quality LEDs unless it can secure high financial sourcing from an International Financial Institution (IFI). A review on non-LED lighting options at the Feasibility Study (FS) stage should be included, which would be a more affordable option and likely to reduce the pollution level of current usage of mercury lamps.

38. Further data gathering and analysis on the impact of poor quality of street lighting in Bishkek city on the overall safety of the City, particularly on road safety as well as social integration of vulnerable groups (women, children and elderly) should be conducted at the FS stage.

39. Street lighting is seen as an important part of the City's development, yet not viewed as a top priority. Bishkek's street lighting project will only receive strong political backing at the higher political level if it brings about visible and tangible improvements to the City's population, in the mean time does not consume significant portion of the available funds of the City.

40. Implementation of this project should be implemented in three (3) stages (Point 26) in order to reduce the initial amount of capital investment required for this project.

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41. A detailed investment proposal on artistic street lighting to promote Bishkek's cultural and touristic attractiveness can be included in the future to improve the City's attractiveness, develop a City's identity as well as raise the City's profile regionally and internationally.
 42. The FS of this project should further examine into the energy security of KR in lieu of the overdependence on hydropower stations, which provides solid ground for energy efficiency measures. Energy efficiency target of this project should be further examined with regard to its overall contribution towards reducing the air pollution in Bishkeksvet. Provision for the disposal of mercury lamps needs to be address in the FS as well.
 43. Further exploration should be done into the potential cooperation with the Chuy-Bishkek Regional Environmental Protection Agency for this project (Point 28).
 44. The CDA and Bishkek municipality shall draw the attention of the Government of KR to the lack of legal and regulatory framework in regulating street lighting. This encompasses the absent of technical standards for street lighting and LED lamps, as well as energy performance and efficiency standards. Technical regulations of the Eurasian Economic Union shall be considered in correspond to KR's international obligations.
 45. Current institutional and structural systems are limiting the competences of Bishkeksvet in managing the operations of the street lighting network in Bishkek city. Amendments into the local acts that govern interactions between municipal bodies could be considered to provide more independence to Bishkeksvet in decision-making, in conducting its economic activities as well as eliminating the barriers to participate in state/municipal procurement.
 46. The City can consider the following the two mechanisms of Trust Management and Public-Private Partnership (Point 33, 34) to the management of Bishkeksvet, along with the applicable financial mechanism options for this street lighting projects (Point 35).