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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$300 MILLION

AND A PROPOSED CLEAN TECHNOLOGY FUND LOAN
IN THE AMOUNT OF US$50.00 MILLION

TO

UKRAINE

FOR A

SECOND URBAN INFRASTRUCTURE PROJECT

Sustainable Development Department
Europe and Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 16, 2014)

Currency Unit = UAH
8.34 UAH = US$1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ADSCR	Annual Debt Service Coverage Ratio	KfW	Kreditanstalt für Wiederaufbau
ACS	Automatic Calling System	Minregion	Ministry of Regional Development, Construction, Housing and Communal Services
BOD	Biological Oxygen Demand	MoE	Ministry of Economic Development and Trade
CO2eq	CO2 equivalent	MoF	Ministry of Finance
CPMU	Central Project Management Unit	MWH	Megawatt Hours
CPS	Country Partnership Strategy	NPV	Net Present Value
CSO	Civil Society Organization	NRW	Non-Revenue Water
CTF	Clean Technology Fund	O&M	Operations and Maintenance
DB	Design-Build	OCCR	Operating Cost Coverage Ratio
EBITDA		ORAF	Operational Risk Assessment Framework
EBRD	European Bank for Reconstruction and Development	PAP	Project Affected Persons
EIRR	Economic Internal Rate of Return	P-RAMS	Procurement Risk Assessment Module
EMP	Environmental Management Plan	PDO	Project Development Objectives
ESAF	Environmental and Social Assessment Framework	POM	Project Operational Manual
ESMF	Environmental and Social Management Framework	RAP	Resettlement Action Plan
ESMP	Environmental Management Plans	RPF	Resettlement Policy Framework
EUR	Euro	RPMU	Regional Project Management Unit
FIRR	Financial Internal rate of Return	SIDA	Swedish International Development Agency
FM	Financial Management	SWT	Solid Waste Treatment
GHG	Greenhouse Gas	TOR	Terms of Reference
GoU	Government of Ukraine	UAH	Ukraine Hryvnia
IBRD	International Bank for Reconstruction and Development	UIP	Urban Infrastructure Project
IFC	International Finance Corporation	UPI	Utilities Performance Improvement
IFI	International Financial Institution	US	United States
IFR	Interim Financial Report	VSL	Variable Spread Loan
ISA	International Standards on Auditing	WSS	Water Supply and Sanitation

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UKRAINE
Second Urban Infrastructure Project (UIP2)

I. STRATEGIC CONTEXT

A. Country Context

1. Ukraine is a country of 46 million people, with 68 percent of the population living in urban areas. The country has five cities with a population of over 1 million, another five with a population between 500,000 and 1 million, and some 35 cities that have populations between 100 and 500 thousand. The bulk of the urban population lives in towns of less than 100,000 people. Kiev is the largest city with a population of 2.8 million, followed by Kharkiv with 1.5 million people.

2. The country is emerging from the 2008 economic and financial crisis with serious structural weaknesses. Fiscal imbalances remain significant with large social transfers, inefficient public services, and significant quasi-fiscal subsidies threatening sustainability. The financial sector is fragile and the business climate is persistently ranked among the lowest in the region. Despite an export-led recovery over the past two years, output is below pre-crisis levels, and the economy remains vulnerable to volatile commodity prices and dependent on foreign financing. The public sector is large, but the quality of many public services has been deteriorating. Surveys conducted on the eve of Ukraine's 20th anniversary of independence and recent social protests reveal widespread discontent with economic conditions and public governance.

3. In the face of well-identified social and economic development challenges, successive Ukrainian governments have struggled with implementing reforms. Behind many implementation difficulties lie fundamental challenges of economic and political governance. Corruption and state capture have been pervasive and are broadly recognized as a major development constraint.

4. Over the past decade, Ukraine's authorities have shied away from undertaking structural reforms, and public trust in the state has been undermined. This, in turn, has created public resistance to necessary but painful reforms of social transfers and public services. Consecutive governments have thus opted for short-term fiscal handouts, which have diminished the fiscal space needed for public investment and weakened the focus on strategic priorities.

5. Ukraine faces a number of complex challenges as it continues to build its agenda for socially equitable and environmentally responsible economic growth. In 2010, Ukraine adopted a National Environmental Strategy for 2020 and a National Action Plan for 2011-2015 to protect the environment. Some of the major commitments of the Plan are linked to improving urban water supply and wastewater treatment.

B. Sectoral and Institutional Context

Water and Wastewater Services

6. Over the past 20 years, access to water supply services in Ukraine has stagnated at 80 percent largely due to a lack of investment. In cities and towns, 90 percent of the population is connected to water supply. Some 85 percent of Ukraine's urban residents have access to sewerage, but only 70 percent have access to wastewater treatment. Infrastructure for collecting and treating wastewater is either nonoperational or poorly operated, and the pollution of national and international waterways continues unabated. The Black Sea receives 80 percent of Ukraine's untreated water-borne waste, with severe environmental and economic consequences.

7. Relatively high connection rates in urban areas are a deceptive indicator for sector performance, because most utilities are failing to provide safe and reliable services. Investment needs for upgrading the water and sewerage systems are far higher than what can be mobilized by the utilities, consumers, and government. It is estimated that EUR 4-6 billion is needed to bring the water and sanitation systems to operational safety, and a total of EUR 22-26 billion will be required to achieve international service standards.

8. Decades of underinvestment and poor maintenance have resulted in an asset base that is in dire need of replacement and upgrading. In many areas, water supply is intermittent because service providers have inadequately maintained infrastructure due to cash flow issues. This has created a vicious cycle whereby financial constraints limit investments needed to rehabilitate the sector, which in turn causes losses and inefficiencies within the system and these adversely affect the financial situation of utilities. For instance, in the last 15 years, average non-revenue water (NRW) rates rose to more than 40 percent of water production, which imposes a significant financial cost on utilities. NRW rates increased due to both physical losses from deteriorating infrastructure that should have long been replaced or rehabilitated, and from commercial losses due to unmetered consumption.

9. The ageing and obsolete infrastructure that often was overdesigned in combination with lack of adequate commercial management has resulted in most utilities being unable to generate adequate revenue to meet operations and maintenance costs due to both inefficient operations and low tariffs. According to the Regulator, the average water and wastewater tariff level for both businesses and households in Ukraine is 3.63 UAH/M^3 while actual costs (including depreciation of assets) are 5.43 UAH/M^3. The Government has estimated that tariffs should increase by on average 43% in order to reach cost recovery levels.[1] Nevertheless, tariffs have continued to remain below utilities' cost recovery levels due to lack of political will, inadequate sector governance, lack of engagement between consumers and utilities on the necessity to increase tariff levels, and a sense of distrust among consumers that an increase in tariffs will be accompanied by improvements in services.

10. As a result, utilities are heavily dependent on government transfers to meet operating and maintenance costs. The central government subsidies however, are often delayed, and whenever

[1] These figures were provided by the Ukrainian government's National Commission for Regulation of Communal Services according to October 2013 data.

utilities have extra funds available, or receive the delayed subsidy, they do not invest in rehabilitation, but use available funds to pay the state-owned energy company on arrears.

11. The problems have been exacerbated in recent years with the rise in real terms of electricity tariffs, given the energy intensive systems required for water production and wastewater treatment. Approximately 30% of utilities' operations and maintenance expenses are tied to energy costs. This is a result of rising energy tariffs, but is also due to inadequate upkeep and investments in infrastructure that has led to inefficient use of assets and their need for greater energy consumption.

12. Sector governance is weak and fragmented. Out of more than 6,000 water supply and sanitation utilities, 1,857 provide services to the urban population. The ownership structures of these water utilities (vodokanals) ranges from communal utilities (owned by the municipalities, and accounting for 83 percent of the total number of utilities), state utilities, and private utilities. Due to the lack of cost recovery in the sector, most utilities are not creditworthy and cannot borrow from financial markets. The National Commission for Regulation of Communal Services (the "Regulator") was established in 2011 to: (i) improve cost recovery through centralized tariff setting; (ii) establish national service standards; (iii) improve governance of the utility sector; and (iv) strengthen reporting requirements.

13. In summary, the urban water supply and wastewater sector is characterized by stagnated or deteriorating access, inadequate levels of services, inefficiency, financially constrained utilities, and weak governance. The sector requires reforms that will allow utilities to recover their costs and invest in maintenance and rehabilitation as a means to provide consumers with better services while also decreasing the environmental degradation. Overall, sector performance would benefit from an approach that focuses on: (i) improving operational and energy efficiency that can help lower the cost of providing services; (ii) adjusting tariff levels and structures; and (iii) reducing environmental degradation.

14. Investments are critical to support the transition to sustainable improvements in service provision. Without replacement and upgrading of infrastructure, the services that are provided to customers will continue to deteriorate, while non-revenue water losses will escalate and emergency maintenance will increase as a result of system and equipment failures, and hence operation and maintenance costs will escalate. Even more important, as currently experienced in Zhytomyr, the utilities will not be able to provide continuous water supply to all of their customers. Low service quality will make customers increasingly unwilling to pay for such services, and will make it very difficult to increase the tariffs as one of the tools to improve sector performance.

15. To support improvements in sector performance, the World Bank approved an Urban Infrastructure Project (UIP) in 2007 that focused on two main priorities: (i) energy efficiency; and (ii) improving the quality of urban water supply and wastewater services. Investments in energy efficiency in thirteen utilities under the UIP are expected to reduce total energy consumption of participating utilities by 15 percent, translating to significant reductions in greenhouse gas emissions. UIP is also contributing to sector reform by increasing institutional capacity and strengthening the accountability and efficiency of water utilities. In order to continue the implementation of both the environmental and governance reform agendas, the

Government of Ukraine requested a follow-up project to build upon momentum created through UIP.

Solid Waste Services

16. Solid waste collection services suffer from limited operational capacity, but also from an underdeveloped landfill infrastructure. In 2010, it was estimated that some 12 million metric tons of municipal solid waste was generated in Ukraine. The solid waste generation rates have increased significantly since the year 2000 and projections indicate that the existing operational capacity of the processing infrastructure and equipment will need to be doubled by 2025 in order to meet demands. Many municipalities rank solid waste as one of their most urgent priorities.

17. The situation in the sector is further complicated by low user fees, which makes cost recovery difficult. The current cost recovery rate is only between 5 and 7 percent (compared to 40 percent in the United States (US)). The estimated volume of investment needed in the sector is approximately EUR13 billion.

18. The key focus areas for the solid waste sector are the need to improving the quality and efficiency of services, prepare plans for expansion of the rapidly diminishing disposal space, and enhance public awareness and participation. The World Bank's Solid Waste Assessment Study in Ukraine (2013) highlights the following key issues: (i) an unstable investment climate for the private sector; (ii) low tariffs that translate into a lack of capital for investment in high quality infrastructure that meets environmental standards for landfills; (iii) a lack of waste separation that results in an unnecessarily high volume of waste being dispatched to landfills; and (iv) recently passed national legislation reduces the authority of municipalities and creates a confusing institutional framework with regard to responsibilities at the national level.

C. Higher Level Objectives to which the Project Contributes

19. This project is fully aligned with the Ukrainian government's strategic objectives within the National Environmental Strategy for 2020. The proposed project is included in the Country Partnership Strategy (CPS) for Ukraine for fiscal years 2012-2016 under Pillar 1 (improving public services and public finances: support to building relations with citizens). The project supports the pillar's Results Area 3, "Improved efficiency, quality, and governance of municipal infrastructure services" (expected outcome 8).

20. By improving the quality and efficiency of water, wastewater and solid waste services in selected cities, the project will contribute directly to reducing the burden that the water and sewerage sector currently puts on government budgets. The project will improve the financial performance of utilities by focusing on investments and institutional measures that reduce the operation and maintenance cost of service, while improving the public's willingness to pay. This will include activities aimed at guiding tariff setting, improvement in billing and collection management, increasing public awareness and education, and improving customer service. At the same time, the project will aim to reduce utilities' costs by increasing energy efficiency, reducing NRW, and increasing staff productivity in utilities.

21. The service improvements resulting from the project will also contribute to shared prosperity and poverty reduction in the selected cities. Whilst, all residents in the project areas

will benefit from improved water, wastewater and solid waste services, such benefits are expected to have a direct and significant impact on the bottom 40% of the population. Project benefits to the poor will be realized through a disproportionate reduction in coping costs associated with inadequate service delivery and the accumulation of other external and incremental benefits (such as improved environment and public health).

22. The project will, through an impact evaluation, specifically assess the results of the project and its support towards the World Bank twin goals of reducing poverty and increasing shared prosperity. In addition, the poverty-related data and poverty assessments will be part of and complement, the work planned on tariffs adjustments and design of subsidy schemes under Component 2.

II. PROJECT DEVELOPMENT OBJECTIVE

A. Project Development Objective

23. The project development objective (PDO) is to improve the quality and efficiency of water, wastewater, and solid waste services in selected cities in Ukraine.

24. This will be achieved through rehabilitation and reconstruction of water supply, sanitation and solid waste infrastructure in about nine cities. The project will also support improvements in sustainable service delivery through activities to be implemented under Component 2.

B. Project Beneficiaries

25. Project beneficiaries include existing consumers who will benefit from improved water supply, wastewater and solid waste services and people who will benefit from improved access. Other beneficiaries include participating utilities and municipality. The project will improve operational efficiency and support the utilities in their efforts towards financial sustainability.

C. PDO Level Results Indicators

26. PDO achievements will be measured by the following indicators:

- Volume (mass) of BOD pollution loads removed by the treatment plant supported under the project.
- Industrial or municipal solid waste recycled in Kharkiv.
- Improved Operating Cost Coverage Ratio for selected cities.
- Improved energy efficiency as measured by amount of energy used per m^3 of water produced or wastewater treated in utilities participating in the project.
- Tons of GHG emissions reduced or avoided.

III. PROJECT DESCRIPTION

A. Project Components

27. The proposed project will support high-priority infrastructure and services, on a demand-driven basis in select cities. All participating cities have prioritized investments aimed at improving water, wastewater and solid waste services. Using pre-defined criteria, combined with demand for investment, the project will mostly focus on the water supply and wastewater management. Given the Government's request for support in developing new approaches to solid waste, the project will also support a high-impact solid waste pilot investment in Kharkiv.

28. The project will be implemented in about nine cities[2] of different sizes[3]. The cities were selected competitively by the Ministry of Regional Development, Construction, Housing and Communal Services (Minregion), the Ministry of Finance (MoF), the Ministry of Economic Development and Trade (MoE), and the Utilities Regulator. The investment selection followed a three stage approach. The first stage started in 2011-2012 with a nationwide call for investment applications. In the second stage, the Minregion short-listed 16 cities. The selection criteria included: (i) commitment to review and increase tariffs towards financial sustainability; (ii) willingness to improve customer service and operational efficiency; (iii) high potential for development impact; (iv) advanced readiness of subproject investment; and (v) the economic viability of the proposed investment. In the final stage, ten applications (two from Kharkiv) were reviewed (with an additional two applications still under review) and approved by the MoF and the Utilities Regulator. For the MoF, the main criteria for approval were the financial capacity of the utilities, and ability to repay their loan commitments.

29. UIP2 will generate significant environmental benefits by financing energy efficient technologies (which will reduce the cost of water production and wastewater treatment). The project will continue to support activities towards strengthening institutional capacity at the central government, municipality, and utility levels. UIP2 will work closely with the Regulator to support framework reforms and the creation of an enabling environment necessary for improved services delivery. Strategic investments in physical works will also be financed in targeted cities to assist the utilities to overcome some of the key challenges listed above representing a holistic project approach which will support the transition towards more efficient and financially sustainable utilities.

30. This project will introduce new technologies designed to improve the quality and efficiency of solid waste management services. It will invest in a municipal landfill site with a recycling and sorting facility and a biogas collection system that allows for gas recovery and electricity generation. This is the first investment of its kind in Ukraine, and will provide important lessons for future replication. The related and supporting institutional interventions will focus on enhancing public awareness and participation, promoting recycling and reduction of solid waste. Together, the project's physical and institutional interventions will support

[2] The nine cities include: Kyiv, Kharkiv, Donetsk, Zhytomyr, Kirovograd, Ternopil, Kolomiya, Ivano-Frankivsk and Kramatorsk. Further cities are currently under consideration and the scope may be expanded to include these.

[3] These cities' population ranges from 60,000 people to about three million people with the total population of the nine cities amounting to about 6.5 million, this could increase to 8 million if the additional cities are included.

reduction in environmental hazards and an improvement in the quality and efficiency of solid waste management services provided.

31. The project will benefit from policy support and capacity building under the regional Danube Water Program - a trust-funded regional policy and capacity development program which covers water and sanitation sector in eleven countries of the Danube region, including Ukraine. The Program will provide a regional-level perspective on policy and utility challenges, and specific high-level support on issues of relevance to UIP2.

Component 1: Urban Infrastructure Improvement (Total US$335 million: US$285 IBRD and US$50 million CTF)

32. This component will finance the rehabilitation, reconstruction and upgrading of water, wastewater, and solid waste facilities in about nine cities. It is designed to increase the efficiency of participating utilities, reduce their costs, enhance the reliability of services, and improve the quality of water supply and wastewater services. The bulk of the investment program has been identified; yet for some investments, technical and procurement details need to be finalized. Thus, this component is divided in two parts based on sub-project readiness.

Part 1: consists of sub-projects that are at more advanced stages of readiness and for which the bidding process can be completed within the first year of implementation. Detailed designs have been prepared for US$70.0 million of planned investments. Bidding documents are also under preparation for other investments, valued at around US$115.0 million.

These include those in Kharkiv, Kyiv, Kirovograd, Ivano-Frankivsk and Zhytomyr, as outlined below.

- **Solid waste plant in Kharkiv** (US$44 million): design completed and approved by State Agencies.
- **Supply and installation of pumps for the main pumping station in Kyiv** (US$11.2 million) and **wastewater and sludge treatment in Ivano-Frankivsk** (US$ 15 million): Detailed designs completed and reviewed by relevant government agencies, including a State expert panel.
- **Wastewater and sludge treatment in Kharkiv and Zhytomyr and the Kirovograd water treatment** (about US$115 million): "Design Supply and Install" documents under preparation which will enable the utility to use the most up to date technologies and reduce design preparation and review time.

Part 2: consists of sub-projects that require more engineering and technical preparation; these are in the cities of Donetsk, Kramatorsk, Zhytomyr, Ternopil, and Kolomiya. The focus will be on facilities that reduce water losses, improve potable water quality, ensure safe disposal of wastewater, and increase reliability of services. Investments include replacement of deteriorated pipes and construction of treatment facilities. For most of these cities feasibility studies are under preparation and will be completed in 2014. As for Donetsk "Comprehensive Water and Wastewater Feasibility Study", financed by a grant from Kreditanstalt für Wiederaufbau (KfW), will be completed August 2014.

33. The Clean Technology Fund (CTF) will focus on energy efficiency investments in water and wastewater systems, and the reduction of greenhouse gas (GHG) emissions in landfills. The combined funding (International Bank for Reconstruction and Development (IBRD) and Clean Technology Fund (CTF)) will enable medium- and long-term investment planning by utilities, and replace *ad hoc* emergency responses. Investments supported by CTF funding include: (i) replacement of water and wastewater pumping equipment; (ii) installation of automated control systems; (iii) sludge thickening equipment; and (iv) landfill gas capture.

Component 2: Institutional Strengthening and Capacity Building (estimated US$10 Million)

34. This component will support a range of institutional strengthening activities to be implemented at the utility and central levels.

Sub-Component 2.1: Sub-national level agencies (utilities and municipalities)

35. This subcomponent will provide technical and financial assistance for strengthening the capacity and efficiency of participating utilities to operate and manage their systems. A "Utilities Performance Improvement" (UPI)[4] study will be prepared that will examine the following: (i) the legal and regulatory framework; (ii) the financial and operational constraints by utility; and (iii) propose measures to address these constraints including provision of support for implementation of these measures where possible.

36. This sub-component will also include support for the enhancement of social accountability mechanisms in the utilities with a view to improving service standards and performance.

Sub-Component 2.2: National level agencies

37. This sub-component will include strategic support for the water, wastewater, and solid waste sectors. It will strengthen policy dialogue and support strategy development for improved service delivery and regulation at the national level. The Minregion and the Regulator have demonstrated a strong commitment to improving utility performance and service delivery, and work has been initiated on topics such as tariff increases, alternative financing options, sector governance, public awareness, benchmarking, and accountability mechanisms.

38. This sub-component will also include: (i) development of policies and inter-sectoral instruments for water and wastewater management; (ii) development of policies for solid waste management to improve municipal service delivery and strengthen governance. This sub-component will also finance detailed design and preparation of tender documents, as required.

39. In addition, this sub-component will support the Regulator in improving the quality and availability of utility performance data (jointly with the Danube Water Program), improving tariff setting methodologies, and subsidy and other related financial policies.

[4] Preliminary assessment of the sector institutions shows the weak financial working ratio which implies that water utilities require continuous support to pay for cash operating costs even before paying for debt services maintenance and investments. The current tariff rates are low relative to average and marginal costs, tariff structure are complex and process of tariff and adjustment is cumbersome.

Component 3: Project Management and Supervision (estimated US$5 Million)

40. This component will support project management and implementation at the central and regional levels in the targeted cities. Support will include: training, staffing, and monitoring and evaluation. It will also cover feasibility studies for potential subprojects as well as the annual project financial and technical audits of district vodokanals.

B. Project Financing

41. The Borrower has selected a Variable Spread Loan (VSL), to borrow an amount equal to US$300 million on IBRD terms, with a 5 year grace period and a maturity of 18 years. A front-end fee of 0.25 percent of the loan amount (US$750,000) will be financed out of the loan proceeds (i.e., capitalized).

42. A concessional CTF loan of $50 million will co-finance the IBRD loan. The CTF loan is offered under 'harder' terms with a service charge of 0.75 percent per annum on the disbursed and outstanding loan balance with a 20-year maturity, including a 10-year grace period, and with principal repayments at 10 percent for Years 11-20. The principal and service charge payments accrue semi-annually. A management fee equivalent to 0.45 percent of the total loan amount (US$225,000) will be charged, to be capitalized from the loan proceeds, following loan effectiveness.

43. The MoF will be the Borrower. The Bank loan agreement will be signed between Ukraine through the MoF. The government, through the MoF, will on-lend to participating utilities under the same terms and conditions as stipulated in the loan agreements.

C. Project Cost and Financing

44. Total project financing requirements are estimated to be US$350 million, including 7 percent for physical contingences and 5 percent for price contingencies and a front-end fee. Out of the total project financing, US$300 million equivalent will be financed by an IBRD loan and US$50 million by a CTF loan. Table 1 provides a breakdown of project costs and financing by component and financing source.

Table 1: Project Costs and Financing Sources

Project Components	Project Cost (US$)	IBRD (US$)	CTF (US$)	% IBRD Financing
1. Urban Infrastructure Improvement	292.615	242.840	49.775	83%
2. Institutional Strengthening and Capacity Building	10.000	10.000		100%
3. Project Management and Supervision	5.000	5.000		100%
Total Baseline Costs	**307.615**	**257.840**	**49.775**	**84%**
Physical contingencies (7%)	23.750	23.750	-	100%
Price Contingencies (5%)	17.660	17.660	-	100%
Total Project Costs	**349.025**	**299.250**	**49.775**	**86%**
Front +end Fee	0.975	0.750	0.225	77%
Total Financing required	350.000	300.000	50.000	86%

D. Lessons Learned

45. The design of UIP2 was informed by lessons learned from implementation of the first UIP, and the Bank's experience in water, wastewater and solid waste projects in neighboring countries and from around the world. The most relevant lessons, and the way in which they have been incorporated into project design, are discussed below.

46. **The need for strategic, rather than ad-hoc interventions.** Sector needs are large due to delayed maintenance and inadequate investment, and thus setting priorities is a constant challenge. Project interventions were selected for their scale-up potential. Kyiv, for example, has a limited capacity to borrow and therefore investments are focused on improving the efficiency of the main pumping station. In Kharkiv, the focus is on how to manage sludge through a more environmentally sustainable process.

47. **Institutional reforms and development activities tend to be marginalized relative to operations**. During project preparation extensive discussions were held on the importance of sector strategy development, sector reform, and institutional strengthening. The dialogue involved central and local government stakeholders, utilities, donors, and the regulator. It was agreed that an integrated approach that combines institutional/capacity building with investment is vital to improve and sustain services and increase the impact of investments.

48. **Secure the continuous commitment of utilities, municipalities, and the Government**. Based on previous engagements in the sector, the role of participating utilities has been strengthened under UIP2. The selection of project cities underwent a competitive and transparent selection process based on (i) expressed interest in obtaining financing, (ii) pre-identified sub projects, and (iii) the financial capacity of utilities to repay. Subprojects were also prepared in close collaboration with the utilities that will play a key role in implementation. This highly consultative process with key functions such as procurement, financial management and contract management decentralized to the Regional Project Management Unit (RPMU) level, has been formalized into a city-specific "Project Agreement." Furthermore, the Bank has been extensively engaging the RPMUs, not just the Central Project Management Unit (CPMU),

through training, workshops, and other capacity building activities to strengthen utility performance and improved the services delivered to consumers.

49. **Ensure project readiness to enable immediate start of implementation.** Bidding documents have been prepared using the Design, Supply, and Install method so that approximately 20% of the investment program will be ready for bidding at project effectiveness. These preparatory activities will enhance implementation readiness and avoid potential delays in project initiation and disbursement. This is being accompanied by intensive training for RPMUs on Bank policies and procedures to expedite contract award and the mobilization of contractors.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

50. The project will be implemented over a period of five years starting October 1, 2014 through December 31, 2019.

51. The proposed management structure for the project incorporates lessons learned during implementation of the ongoing UIP project. Overall responsibility for project implementation lies with the Minregion which houses CPMU to oversee UIP2. The CPMU was established under the first UIP project in 2008. Under UIP2, the CPMU model will continue to function; also regional PMUs are already established. Consultants and individual experts financed under the loan would support the CPMU, as needed, to ensure appropriate fiduciary arrangements and independent audits and to provide the necessary training.

52. Each participating utility will have an RPMU that will manage project implementation activities. The utilities, in full coordination with Minregion, will be responsible for procurement, contract management, financial management (FM), disbursement, safeguards, and monitoring and evaluation. Consultants may be engaged to provide technical support as needed to RPMUs.

53. The CPMU will continue to be responsible for overall project coordination and reporting including monitoring compliance with safeguards, fiduciary, legal and other covenants. It is envisaged that the CPMU will take the lead on sector reform and institutional strengthening activities under Component 2.

54. A Project Operational Manual (POM) describing all work related to procurement, financial management, disbursement, monitoring and implementation arrangements will be prepared before effectiveness.

B. Results Monitoring and Evaluation

55. Reporting of progress towards achieving the PDO and results indicators will be the responsibility of the CPMU and the RPMUs. The RPMU staff will be trained and equipped to carry out monitoring and evaluation activities at all utilities. Quarterly reports will be prepared by the RPMUs and submitted to the Bank, Minregion and the Regulator. The reports will ensure that utility management, the Regulator and Minregion are fully informed on progress and issues encountered, and can respond in a timely manner. The CPMU will consolidate the data at the project level and produce semi-annual reports.

56. Apart from monitoring project progress, the project will finance several sector reform studies. One study will involve an annual performance assessment and benchmarking of participating utility performance in conjunction with the Danube Water Program. A specially commissioned evaluation will determine the effect of introducing new technologies in energy efficiency, solid waste disposal, and sludge management on sustainability, efficiency, and the cost of service delivery. Evaluation results will be available prior to project closure. A Customer Survey will be conducted in each participating city to assess utility performance.

C. Sustainability

57. The sustainability of investments will depend on improving the financial sustainability of utility operations and building the capacity of utilities. Tariff adjustments should be designed to help utilities recover at least operations and maintenance (O&M) costs. The project will also focus on other possible avenues for financial sustainability such as reducing O&M costs and increasing billing and collection efficiency as instruments to improve cost recovery, while simultaneously supporting improvements to the quality of services, to enhance customers' willingness to pay. In addition, the project will focus on building the capacity of utility staff through training, improving their work environment, and human resource development, including competitive and performance based salaries.

58. Effective management of the design process and quality assurance provided through the construction supervision plan, is critical to the sustainability of the physical assets. Each utility will prepare an operation and maintenance plan to ensure that: (i) routine and preventive maintenance is affordable, and (ii) the selected investment is the best option for the city considering trade-offs between higher upfront capital costs and the frequency of future maintenance and/or replacement costs.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Risk Category	**Rating**
Stakeholder Risk	Substantial
Implementing Agency Risk	
- Capacity	Substantial
- Governance	Substantial
Project Risk	
- Design	Substantial
- Social and Environmental	Moderate
- Program and Donor	Low
- Delivery Monitoring and Sustainability	Moderate
Overall Implementation Risk	**Substantial**

B. Overall Risk Rating Explanation

59. An overall risk rating of 'substantial' reflects elevated stakeholder, implementing agency and project design risks (see table above). Apart from the Country level risks, the key factors include: (i) ensuring cost estimates at feasibility stage do not vary widely from the amounts at contract award; (ii) resistance or delays to tariff adjustments; and (iii) frequent changes in the senior management of Government ministries.

60. These risks will be partly mitigated by effective project management, advanced preparation, and a focus on public awareness and education. The project builds on the capacity and knowledge developed in UIP. The bidding process will be initiated for a number of projects by effectiveness, which should help to manage cost overruns. An active and persistent public awareness campaign will aim to show consumers that tariff adjustments are needed and that their timing will be matched with a noticeable improvement in the quality of service. In addition, the project will support training for RPMU staff during both project preparation and implementation.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

Economic Analysis

61. The economic analysis followed a conventional approach in which the financial cash flows have been translated into economic cash flows by using standard conversion factors, while adding externalities where appropriate.

62. The economic analysis was undertaken at the sub project level (compared to the financial analysis done at utility level) and compares the benefits and costs in "with" and "without" project scenarios. The benefits will vary per subproject. The benefits of the project will include (i) increases in energy efficiency and subsequent cost savings; (ii) reduction in maintenance costs associated with the poor state of the water and wastewater assets; (iii) reduction in non-revenue water losses. In addition, by making the proposed investments, the water and wastewater services provided will be of higher quality, while in some utilities access to water and wastewater services will increase. The project will produce significant public health and environmental benefits in those utilities where existing wastewater and solid waste (including sludge treatment) facilities are being rehabilitated and upgraded[5]. The economic analysis has assumed no real tariff increases in the base case scenario. The investment costs and any incremental operation and maintenance costs resulting from the proposed investments are included in the analysis. The net benefit is the difference between the incremental benefits and the incremental costs of two scenarios: "with" and "without" the project. The "with" project scenario considers the proposed project and its associated targets. The "without" project scenario considers that utility consumers will face deterioration in services as is the situation in Kyiv and Zhytomyr. In the case of Kharkiv, the current landfill is close to saturation, and the current practice of sludge management will be hard to continue given land constraints. It is important to

[5] Institute for European Environmental Policy, 2008. Benefits of Environment in ENP Countries: Methodology Test Case: Ukraine. Final Report.

note that, investments are needed both in the "with" and "without" project scenarios to deal with the current capacity constraints.

63. The activities were appraised measuring their flow of costs and benefits for the lifetime of the project, estimated as 25 years. Costs and benefits were expressed in constant prices as of 2013[6]. The discount rate corresponds to the opportunity cost of capital, estimated to be 10 percent, as used in other projects in Ukraine. Standard conversion factors were used especially for electricity and labor.

64. At appraisal, 4 subprojects to be funded under UIP-2 had sufficient information to enable preparation of a financial and economic analysis (including financial statements of the utilities and project impact). These projects make up 37 percent of the total investment program of USD 335 million (excluding the TA and capacity building program). Once sufficient information on the remaining subprojects becomes available, a financial and economic analysis of these subprojects will be prepared to ensure that they are economically viable and to assess their impact on the financial performance of the utilities. Further details on the economic analysis carried out and the planned process for assessment of the remaining investments are presented in Annex 4.

Table 2 Results of the Cost Benefit Analysis without any real tariff increases

Subproject/ City	Economic CBA with economic prices			
	NPV (UAH mill.)	EIRR %	Probability of a positive NPV	Mean expected NPV (UAH mill.)
Kyiv	256	41	100%	317
Kharkiv solid waste management	78	15	100%	417
Kharkiv sludge management	120	17	100%	465
Zhytomyr	5	10	64%	11
Subtotal 4 projects	459	18	100%	1,211

The results of the risk analysis confirm the robustness of the project. The probability of having positive economic rates of return is 100 percent. The risk evaluation shows that the likelihood of a negative economic outcome – once market distortions are eliminated and the benefits captured – is low in all activities, except for the Zhytomyr component; the probability of having positive returns in this component is still 64 percent- without monetizing the benefits from improved wastewater treatment.

Financial Analysis

65. The financial analysis of the participating Water Supply and Sanitation (WSS) utilities and Kharkiv's solid waste utility has focused on ensuring sufficient cash flow to enable utilities to conduct adequate operation and maintenance of the existing and newly constructed assets and

[6] The exchange rate used was USD 1 is equivalent to UAH 8

service the debt. The financial analysis is done at the utility level taking into account not only investments financed by the project but also all the business-as-usual decisions.

66. The financial analysis is trying to assess the necessary conditions for utilities to generate sufficient cash flow to sustain Annual Debt Service Coverage Ratio (ADSCR) of at least 1.3x. The analysis proposes a combination of real tariff increases, government subsidies and efficiency achievements by the utilities. It is assumed that real tariff increases will not exceed 25% in the next five years. Due to the fact that existing WSS tariffs are below cost recovery levels, the analysis assumes that government transfers to utilities will continue to allow socially acceptable and steady real tariff increases until subsidies are phased out in about ten years from the appraisal year.

67. With the exception of Kyiv all the proposed interventions are quite significant for the prospective utilities when comparing them to their past investment experience. Investments will have a significant effect on their O&M costs and financial costs.

68. If the Government sought to further reduce its fiscal burden, and hence reduce its operating subsidies to the sector in the next five years, ADSCR will require real tariff increases of 35% to 70% for these utilities. Global experience shows that such tariff increases are unlikely to occur especially when service delivery improvements have not shown any marked improvement. Further details are presented in Annex 4.

69. Table 3 shows that the assessed subprojects have positive Net Present Values and Financial Rates of Return indicating that the investments will make the utilities better off.

Table 3: Results of the Utility Financial Analysis

Subproject	CBA with financial prices	
	NPV (USD mill.)	FIRR %
Kyiv	36	21
Kharkiv sludge management	9	12
Kharkiv solid waste management	15	14
Zhytomyr	1	10

B. Technical

70. Most vodokanal water supply and wastewater system facilities including water production, treatment, transmission, and distribution, and wastewater treatment and disposal have exceeded their economic life and are severely deteriorated, having an adverse impact on the quality and reliability of services. The project aims to address these inefficiencies in service delivery by a combing investment in key infrastructure and institutional strengthening. This includes:

- Rehabilitation, construction and management of water treatment, storage, pumping stations and distribution systems including energy efficient equipment for pumping stations and treatment plants.

- Rehabilitation, construction and management of waste water and sludge treatment, pumping stations including energy efficient equipment for pumping stations and treatment plants.
- Rehabilitation, construction and management of solid waste landfill.
- Institutional strengthening activities to enhance staff and utility performance.

71. This project intends to improve the performance of participating utilities through better planning, social accountability mechanisms, and sustainability of services. It will work with the Regulator, the central government, municipalities and utilities. It aims to support utility performance by strengthening sector governance, extracting utility productivity gains, and gradually increasing tariffs. Investments in energy efficient infrastructure will lower utility energy consumption and its environmental footprint. Finally, by reducing the number of emergency responses and lowering NRW rates, utilities can improve services, enhance cost recovery, and move toward financial viability.

72. The project will benefit from policy support and capacity building under the Danube Water Program. The Program will provide grant financing to complement activities funded under UIP2 for a regional-level perspective on policy and utility challenges, and specific high-level support on issues of relevance to UIP2. Key stakeholders from the Minregion, the Regulator and the utility industry have already attended high-level knowledge exchanges on international good practices on policies, sector governance, and regulation.

73. The Danube Program will also provide technical advice to the Regulator and Utility Association on utility benchmarking and specific regulatory challenges. The Program will organize energy efficiency and asset management programs for UIP2 utilities, and closely coordinate with the National Utility Association.

74. The municipal landfill will be a recycling and sorting facility with a biogas collection system that uses innovative technology that allows for gas recovery and electricity generation. It is the first investment of its kind in Ukraine and will provide important lessons for future replication. A high visibility public awareness campaign can potentially promote recycling, more effective landfill use, and generate electricity from captured gas emissions, thereby reducing environmental hazards and improving the quality and efficiency of services provided.

C. Financial Management

75. The Financial Management (FM) assessment and arrangements for implementation were confirmed as satisfactory. It assessed the capacity of Minregion, its CPMU, and participating utilities in all key areas of FM and flow of funds. FM arrangements build on the ongoing UIP which is currently rated satisfactory and incorporates lessons learned. The overall FM risk rating for this project is moderate, and specific risk factors and details of FM and disbursement arrangements are provided in Annex 3.

76. All participating utilities, except Kolomiya, are new to implementation of World Bank-financed projects. Each of the participating utilities established a RPMU, which includes a financial specialist. The RPMUs at the participating utilities will take responsibility for a substantial portion of the financial management and disbursement tasks. To further build capacity at RPMUs, technical training will be periodically provided.. Roles of the RPMUs and

CPMU are further elaborated in Annex 3 and will be established in project operations manual (POM). Adoption of the POM will be a condition for project effectiveness.

77. Disbursements in both IBRD and CTF financing will follow the traditional disbursements mechanism which involves direct payments, special commitments, and use of designated accounts. MoF will open designated accounts for Minregion (for its component) as well as for each of the participating utilities.

78. Consolidated quarterly Interim Financial Reports (IFRs) will be prepared quarterly during the implementation of the project, separately for IBRD and CTF. The CPMU will prepare consolidated reports with inputs from the RPMUs.

79. Annual audits of consolidated project financial statements will be required. Such audits will be carried out by an eligible audit firm in accordance with the Terms of Reference (TOR) agreed with the Bank, and submitted within six months from end of each fiscal year. Annual audit of entity financial statements of each of the participating utilities will be required. Such audits will be carried out in accordance with International Standards on Auditing (ISA) by locally licensed audit firms, and also submitted to the Bank within six months from the end of each fiscal year.

D. Procurement

80. The overall procurement risk is rated "Substantial" and the residual risk is rated "Moderate" after implementation of the discussed and agreed mitigation measures. The detailed procurement capacity assessment of each utility is provided in the Procurement Risk Assessment Module (P-RAMS).

81. An assessment of procurement capacity of participating utilities was conducted in August and October 2013 through field visits to eight cities. The assessment reviewed: current and past procurement practices; procedures; administrative and operating manuals; standard procurement documents used; the capacity of procurement staff; and the relationship between the procurement office and the technical/engineering units, administrative, and financial departments. It concluded that although the utilities have different capacities and experience in conducting both national and international procurement procedures, all of them have trained staff in national procurement rules, formally established evaluation committees, and experience in applying the rules of the Ukraine Public Procurement Law.

82. Procurement under the project will be conducted in accordance with the Bank's procurement rules and procedures, "Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants" dated January 2011; "Guidelines: Selection and Employment of Consultants Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated January 2011and the provisions stipulated in the legal agreement.

83. The Bank specialist and CPMU will provide continuous assistance to utilities in conducting procurement and help Minregion with implementation of Institutional Strengthening and Capacity Building component. Agreed mitigation measures to be completed during

preparation, by loan effectiveness and throughout project implementation are included in Annex 3- Implementation Arrangements.

E. Social (including Safeguards)

84. ***Involuntary Resettlement:*** Most of the specific project sites and investments identified during preparation do not require land acquisition. However, the land for the solid waste treatment (SWT) site for Kharkiv was obtained by the municipality in the town of Dergachev, Kharkiv region prior to the project for landfill construction. Therefore, land acquisition review was conducted by the team. It has confirmed that that the municipal land acquisition for project purposes was done with no contradiction to the principles of the Bank's OP4.12[7]. The new SWT facility is expected to create 100-120 jobs. There are about 10 (in winter) to 20 (in warmer periods of the year) waste pickers that draw an irregular income from the existing landfill. Most of them are coming from surrounding settlements. They operate in hazardous environment and are heavily dependent on weather conditions to draw their income. The administration of the landfill is committed to offer them a safe full time or part-time job once the waste sorting facility becomes operational.

85. An exact footprint of the project was not fully defined by appraisal and it was not clear whether the project investments will cause temporary or permanent economic displacement. Therefore, the Involuntary Resettlement Policy OP 4.12 was triggered and a Resettlement Policy Framework (RPF) has been prepared. . The RPF was prepared as part of the Environmental and Social Management Framework (ESMF), this was disclosed as a separate document in participating municipalities

86. ***Gender Aspects:*** The design of the project systematically applied a gender lens to ensure the project will not lead to unintended negative gender impacts. Gender perspectives were integrated into the project implementation and sector dialogue. Disaggregated data on gender will be collected, where relevant, as part of project monitoring. Given that project effects will be spread equally among all the population in the areas covered by the project investments at least 50 percent of project beneficiaries will be female.

87. ***Information Disclosure:*** At all subproject sites, public information meetings will be held. At these meetings the RPMU will present the current state of affairs and the subproject's main activities and expected results as related to the locality. Prior advertisement of the meeting will be widely disseminated. Information on the subprojects, as well as the ESMF and RPF will be placed on the websites of the utilities. Summaries of the public consultations will be disclosed. A training session was conducted to enhance the capacity of the RPMUs in holding and documenting meaningful public consultations.

88. A project –specific inquiry /grievance mechanism will be established by all RPMUs and the CPMU. The information about channels available for submission of inquiries/grievances will be placed on the project page on the website of Minregion and on the web-pages of respective

[7] The land plot for the landfill was not previously used in any way officially or informally. The land acquisition was done in consultation with the local community. Investments in improving the sanitary conditions of the functioning land field; provision of resources for cleaning of the streets along the route of waste-trucks and water supply by Kharkiv water utility were provided as community-level compensation.

utilities. The process of addressing grievances and related forms will be part of the Project Operations Manual.

89. ***Utilities' Social Accountability Capacity:*** All UIP2 participating utilities realize the importance of customer relationship management with the institutional and individual users of their services. Every utility has at least one telephone number, functioning 24/7 for dispatcher service and for consumers to provide meter readings. In all cases the calls received by dispatchers are registered and analyzed. All utilities have a hot-line for users to get information on various aspects of user-utility relations.

90. The utilities use an automatic calling system (ACS) to deliver standard messages to the clients. Some of them (Kramatorsk and Ternopil) also use the ACS to inform customers on the works planned in their area. Kharkiv vodokanal is advanced in both sharing information and in collecting feedback through issue-specific customer satisfaction surveys. The concept of Social Accountability and in particular, proactive provision of information, enabling feedback, and creating channels for citizen's participation is new to the utilities. None of the utilities has an ongoing partnership with a Civil Society Organization (CSO). The institutional strengthening component therefore includes a capacity building program to enhance capacity of the participating utilities to: (i) conduct meaningful public consultations and engage with CSOs and citizen groups, (ii) introduce citizen report cards and satisfaction surveys, and (iii) conduct innovative information campaigns, including presenting technical and water quality data in a form that is digestible by consumers.

D. Environment (including Safeguards)

91. Given the scale of the potential impact, the project is assigned Environmental Category B. Potential negative environmental impacts are local and manageable and will mainly be caused by rehabilitation and/or construction works in areas allocated for expansion and/or urban areas already occupied by various communal and transport infrastructure. The impacts are expected to be similar to those under the ongoing UIP project and broadly include air pollution and noise from trucks, other construction machinery and works, local soil disturbance, construction waste generation, and other small-scale impacts. The above impacts can be mitigated by good construction and general housekeeping practices.

92. An environmental assessment for the activities of the project has been undertaken, and Environmental and Social Assessment documents were prepared by the client. The project will have positive impacts on the environment and human health due to: (i) better water supply and sanitation services resulting from rehabilitation and replacement of obsolete infrastructure (such as water intakes, water supply networks, water supply and wastewater pumping stations, wastewater networks, and treatment plants), and (ii) improved municipal waste management in Kharkiv as a result of modernization of Kharkiv municipal landfill and associated infrastructure.

93. There are three types of documents concerning environmental and social safeguards of the proposed project. Documents (a) and (b) were disclosed in January 2014, and Document (c) will be disclosed upon completion of sub-projects' preparation at a later stage.

(a) Environmental and Social Management Plan (ESMP) for the Kharkiv Municipal Solid Waste subproject (Kharkiv ESMP) was prepared in 2013. It documented potential negative

impacts during implementation of the subproject and operation of the landfill, proposed mitigation measures, and a plan to monitor it.

(b) Environmental and Social Management Framework (ESMF) for water supply and sanitation subprojects (WSS ESMF) was prepared in December 2013, and describes the potential negative impacts and suggests mitigation measures to be implemented under the subprojects.

(c) Site-specific Environmental Management Plans (EMP) for water supply and sanitation subprojects (site-specific WSSP EMP) will be prepared at the stage of detailed design of the subprojects. The site-specific EMPs for subprojects in Kirovograd, Kramatorsk, Donetsk, Kharkiv, Kolomiya, Zhytomyr, and Ternopil will take into account comments and proposals received during public consultations on the WSS ESMF.

F. Other Safeguards Policies Triggered

94. No other safeguards policies are triggered.

Annex 1: Results Framework and Monitoring

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)

Project Development Objective

PDO Statement

The project development objective (PDO) is to improve the quality and efficiency of water, wastewater, and solid waste services in selected cities in Ukraine.

These results are at the:	Project Level

Project Development Objective Indicators

Indicator Name	Core	Unit of Measure	Baseline	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection	Comments
				YR1	YR2	YR3	YR4	YR5				
Volume (mass) of BOD pollution loads removed by the treatment plant supported under the project	✓	Tons/Year	15,285	_	_	_	18,285	18,485	Annual	Semi-annual reports	RPMU & CPMU	Quality of services- waste water
Industrial or municipal solid waste recycled in Kharkiv	✓	Tons / year	0			20,000	28,000	40,000	Annual	Semi-annual reports	RPMUs & CPMU	Quality of services- solid waste
Operating Cost Coverage Ratio Ivano-Frankivsk Kharkiv VK Kharkiv MC Kirovograd Kramatorsk Ternopil Zhytomyr		Percentage	 0.50 0.76 1.18 0.67 0.74 0.92 0.78	 0.55 0.76 1.18 0.67 0.74 0.92 0.78	 0.60 0.78 1.18 0.68 0.74 0.92 0.80	 0.65 0.80 1.20 0.69 0.76 0.92 0.82	 0.70 0.82 1.20 0.72 0.78 0.95 0.85	 0.75 0.86 1.20 0.77 0.85 0.97 0.95	Annual	Annual reports	RPMUs & CPMU	Efficiency of services – water, wastewater and solid waste
Energy efficiency as measured by amount of energy used per m3 of water produced or wastewater treated in utilities participating in the project		kWh per m3 of water produced	0.6					TBC	Annual	Annual reports	RPMUs & CPMU	Efficiency of services – water supply
		kWh per m3 of waste water treated	0.9					TBC	Annual	Annual reports	RPMUs & CPMU	Efficiency of services wastewater
Tons of GHG emissions reduced or avoided		Tons/year	0	0	0	136,400	154,400	294,891	Annual	Annual reports	RPMUs & CPMU	CTF Indicator

Intermediate Results Indicators												
Indicator Name	**Core**	**Unit of Measure**		**Cumulative Target Values**					**Frequency**	**Data Source/ Methodology**	**Responsibility for Data Collection**	**Comment**
			Baseline	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**				
Direct project beneficiaries (number)	✓	Number (million)	0	0	0	3.14	4.30	4.30	Annual	Annual Reports	RPMUs & CPMU	
Direct project beneficiaries who are female	✓	Percentage	0	0	0	50%	50%	50%	Annual	Annual Reports	RPMUs & CPMU	
Customers in Project areas reporting improved water supply services, as measured through score cards (rating 1-5)		Average Rating	TBD in first year					Increase of 20%	Twice (before and after project interventions)	Customer Score Cards	RPMUs & CPMU	Quality of water supply services
Piped household water connections affected by rehabilitation works undertaken under the project	✓	Number	0	0	0	450,650	453,650	550,000	Semi-annual	Semi-annual reports	RPMUs & CPMU	
Industrial and municipal waste disposal capacity created in Kharkiv	✓	Tons/year	0	0	0	200,000	300,000	400,000	Semi-annual	Semi-annual reports	RPMUs & CPMU	
Utility companies that the project is supporting	✓	Number	0	10	10	10	10	10	Semi-annual	Semi-annual reports	RPMUs & CPMU	Component 2 indicator
Number of utility companies implementing recommendations of Utility Performance Improvement Plan		Number	0	4	4	4	6	7	Semi-annual	Semi-annual reports	RPMUs & CPMU	Component 2 indicator
Utility companies using benchmarking systems		Number	0	4	4	4	6	7	Semi-annual	Semi-annual reports	RPMUs & CPMU	Component 2 indicator
Prepare new design standards for water supply and wastewater		Yes/ No	No	No	No	No	No	Yes	Semi-annual	Semi-annual reports	RPMUs & CPMU	Component 2 indicator
Energy savings (from energy efficiency programs)		MWh/yr	0	0	0	200	300	434	Annual	Semi-annual reports	RPMUs & CPMU	CTF Indicator

Baseline and targets values will be further verified once information are provided from all utilities

Explanatory Notes:

1. **Volume (mass) of BOD pollution loads removed by treatment plants.** This PDO indicator directly relates to the quality of wastewater services in targeted cities. This indicator measures the cumulative volume (mass) of Biological Oxygen Demand (BOD) pollution loads removed by the treatment plant supported under the project. BOD level for the raw sewerage (influent) and treated effluent (effluent) will be measured by utilities as part of their operating procedures on a daily basis. Cumulative values will be reported to the Bank on a semi-annual basis. Project interventions are designed to improve wastewater collection and treatment capacity and as such BOD loads removed are to increase in the targeted cities.
2. **Industrial or municipal solid waste recycled in Kharkiv**. This indicator measures the volume of municipal or industrial solid waste that is recycled as a result of the Bank project[8]. It is a core indicator which relates directly to the quality of solid waste management services. It will be measured by Kharkiv MC as part of their operating procedures on a daily basis. Average values will be reported to the Bank semi-annually.
3. **Operating Cost Coverage Ratio (OCCR)**. This PDO indicator directly relates to efficiency of water, wastewater and solid waste services in targeted cities. Specifically, the indicator reflects the financial performance of the utility as a ratio of total revenues and total operating expenses (including debt servicing). The OCCR will capture impacts of project interventions designed to support efficiency including reductions in operating costs and revenue enhancement. It will be measured by utilities as part of their operating procedures and average values will be reported to the Bank semi-annually.
4. **Energy efficiency as measured by amount of energy used to produce water and treat wastewater.** This PDO indicator directly relates to efficiency of water and wastewater services in targeted cities. It reflects energy consumption / requirements for each cubic meter of potable water produced and wastewater treated. It will be measured by utilities as part of their operating procedures on a daily basis. Average values will be reported to the Bank semi-annually. The project interventions (both physical and institutional) in targeted cities are designed to improve the operational efficiency of the systems and reduced energy consumed by cubic meter – supporting more efficient service delivery.
5. **Tons of GHG emissions reduced or avoided.** This is a core indicator for CTF financing. It involves an estimate of GHG emissions reduced or avoided due to interventions supported by the project. GHG estimates will primarily by derive from energy consumption and efficiency calculations
6. **Project Beneficiaries.** This indicator reflects an estimate of the population that is directly benefiting from activities / interventions supported by the project. This will be recorded as a cumulative amount, consisting of an estimate of the population which is directly benefiting from the water supply, wastewater and solid waste interventions in targeted cities. Census data will be used to determine average household size and to estimate the proportion of beneficiaries that are female.
7. **Customers in Project areas reporting improved water supply services, as measured through score cards (rating 1-5)**. This indicator directly relates to the quality of water supply services in project areas affected by the investments. It will be measured through the average ratings derived from score cards, before and

[8] Guidance on industrial solid waste: A waste is any solid, liquid, or contained gaseous material that is being discarded by disposal, recycling, burning or incineration. It can be a byproduct of a manufacturing process or an obsolete commercial product that can no longer be used for intended purpose and requires disposal. Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials); and residual waste from industrial operations, such as boiler slag, clinker, and fly ash34.
Guidance on municipal solid waste: Municipal solid waste includes everyday items such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries. These wastes come from homes, institutions such as schools, and commercial sources such as restaurants and small businesses. Industrial hazardous waste is excluded. Guidance on projected waste generation: Municipal solid waste generation is calculated based on a per capita generation factor - which is related to the urbanization rate and the economic development level – multiplied by the population size. Benchmarks - using adjusted GDP based reference - can be used to make projections for the sector. Projections for other types of waste, such as industrial waste, can be done using industrial benchmarks.
Guidance on recycling: Different categories of waste can be recycled or reused, the most common being plastics, paper, aluminum, glass, as well as organic waste. The waste can be recycled directly by its producer without entering the waste collection chain, or it can be collected through a system entailed to source separation, or together with Municipal Solid Waste and sorted at the transfer station or at the landfill, from where it is shipped to the recycling facility. It can also be collected by the informal sector directly at the source and sold to intermediaries.

after project interventions. The score card ratings will be determined through focus group sessions, designed to be representative of customer base in project affected areas. Average ratings will be determined, based on a five point scoring system (1-5), where a score of 1 represents poor services and 5 is high quality services. The project target is to increase the average rating by 1 basis point above the baseline (or 20% increase). Detailed methodology will be developed, including the identification of controls groups, in order that benefits resulting from project interventions can be correctly attributed.

8. **Piped household water connections affected by rehabilitation works.** This core sector indicator captures the cumulative number of piped household water connections benefiting from rehabilitation works. Rehabilitation works are undertaken so that existing customers see the quality of their water supply services enhanced. The utilities will record the number of c household water connections benefiting and updated and report values to the Bank semi-annually. The number of connections will be used with average household size data to estimate the total number of direct beneficiaries for water supply service interventions.
9. **Industrial and municipal waste disposal capacity created in Kharkiv**. This core sector indicator measures the municipal or industrial solid waste disposal capacity created as a result of the Bank project. This indicator can also be used to measure improvements to quality of solid waste management services. The Kharkiv MC utility company will measure the capacity of waste disposal installations including sanitary landfill sites and other final treatment plants that are financed by the project. Values will be reported to the Bank semi-annually.
10. **Utility companies that the project is supporting**. This core indicator measures the total cumulative number of utilities providing services with which the Bank is supporting under the project.
11. **Number of Utility companies that are implementing recommendations from the Utility Performance Improvement Plans (UPIP)**. As described in the PAD, an institutional assessment will be carried out at each utility, upon which a Utility Performance Improvement Plan will be developed. Recommendations and priority actions will be specific and tailored to the needs of each utility company. However, it is envisaged that the UPIP's will cover: (a) billing and collection system, (b) demand management system, (c) asset management systems, (d) customer services, complaints handling and recourse mechanisms, (e) investment planning, and (f) annual business plans. The project will monitor and record progress of the implementation of the UPIPs.
12. **Utility companies using benchmarking systems**. This indicator will monitor and reflect the progress of each utility in implementing bench marking systems. It will specifically measure the number of utilities that are submitting their performance data to centralized database, and using it for benchmarking and efficiency improvement.
13. **Prepare new design standards for water supply and wastewater.** This indicator will monitor progress of a key activity to be implemented under Component 2, which involves updating design standards for water and wastewater systems. This activity will support cost effective designs and future operational efficiencies.
14. **Energy savings**. This is a core indicator for CTF financing. It involves an estimate of energy savings as a result of interventions supported by the project. Energy consumption savings will be measured in MWh/yr, to be reported annually.

Annex 2: Detailed Project Description

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)

1. The project development objective (PDO) is to improve the quality and efficiency of water, wastewater, and solid waste services in selected cities in Ukraine. This objective will be achieved through a combination of investments in infrastructure and capacity building initiatives that are detailed below. It builds on the ongoing UIP and the World Bank's long-term engagement in Ukraine's municipal services sector. The project will support improvements in high-priority municipal services on a demand-driven basis across nine selected cities.

Component 1: Urban Infrastructure Improvement (total US$ 335.0 Million, US$285.0 million IBRD and US$50 million CTF)

2. The physical investments will include urban infrastructure development, in particular, rehabilitation and upgrade of water supply and wastewater systems as well as investments in solid waste disposal infrastructure. The project will finance rehabilitation of infrastructure as well as a number of energy efficiency investments. This will lead to cost savings for utilities as well as environmental benefits for the surrounding areas.

3. Some of the subprojects are in a more advanced state of readiness than others. With the use of Swedish International Development Agency (SIDA) grant funds from UIP, a feasibility study report has been completed for five of the nine subprojects[9]. However, because the feasibility study report was finalized only after project appraisal, information on these subprojects is somewhat limited. A first assessment from baseline reports, initial findings from feasibility study reports, and the Bank's site visits, confirmed the activities to be funded under UIP2.

4. A feasibility study and preliminary engineering design for water and wastewater in Donetsk is also under preparation and expected to be completed by August 2014. The report will include an environmental impact analysis. This work is being financed by Kreditanstalt für Wiederaufbau (KfW).

5. The Kyiv and Kharkiv solid waste subprojects will be ready for implementation as soon as the loan becomes effective. The preparation of the feasibility study report was funded by the Kyiv municipality. The detailed design for the Kyiv four subprojects was completed and is undergoing review by a government expert panel. The detailed design for the Kharkiv solid waste project was funded by the municipality and was approved by a government expert panel. The bidding documentation on the Kyiv and Kharkiv solid waste subprojects is being prepared during project preparation.

6. The description of all UIP2's subprojects' is as highlighted below. This as an indicative list of the priority investments presented by cities to be verified by the Feasibility Study (FS) consultants. The final selection and details of the proposed investments will be confirmed as the

[9] Ternopil, Zhytomyr, Kramatorsk, Kirovograd, and Kharkiv.

project progresses. The table below summarizes the planned investments and their indicative costs.

Table A2.1: Project investments per city and estimated costs

City	Proposed Project Component	Estimated Cost (Millions US$)			% of total Costs
		IBRD	CTF	TOTAL	
Kyiv	Rehabilitation of pumping station for Dnipro Water Utility; Level 3 pumping station for Desna; Pumping station of Krutohirna; Installation of energy efficient pumping stations across 20+ locations in Kyiv.	8.99	2.25	**11.24**	3.2%
Kharkiv	Design and build of wastewater and sludge treatment facility.	60.20	15.60	**75.80**	21.7%
	Construction of a solid waste treatment facility.	34.32	9.67	**43.99**	12.6%
Kirovograd	Reconstruction of water treatment facilities in Dneiper - Kirovograd Rayon. Rehabilitation of sewage pumping stations including installation of mechanical, electrical, and automation and control system.	27.42	6.88	**34.30**	9.8%
Ternopil	Construction of iron-removal facility at the water pumping station; Optimization of water distribution systems; Upgrade of intake and replacement of pumping stations (VSN No.1 and 5). Replacement of sewer pipes; Upgrade of sewerage pumping station (KNS No.9), and reconstruction of a wastewater treatment plant including sludge dewatering.	32.09	4.60	**36.69**	10.5%
Zhytomyr	Rehabilitation and upgrade of water pumping stations and treatment plant (filters). Rehabilitation and replacement of mechanical and electrical equipment at the wastewater treatment plant.	24.60	5.40	**30.00**	8.6%
Donetsk	Rehabilitation of water supply facilities (location and priority areas will be identified by the Feasibility study).	31.88	5.375	**37.26**	10.6%
Kramatorsk	Reconstruction of water treatment plant (liquid Cl2 to Sodium Hypochlorite); Reconstruction sewage treatment facilities; Replace water supply and wastewater pipes	5.25	-	**5.25**	1.5%
Kolomiya	Upgrading of water intake; Replacement of 16 km of water pipes; Construction of a new clear water storage tank of 6,000m3 capacity	3.09	-	**3.09**	0.9%
Ivano-Frankivsk	Construction of wastewater treatment plant part 2.	15.00	-	**15.00**	4.3%
Capacity Building	This component will support a range of institutional strengthening activities to be implemented at the utility and central levels.	10.00	-	**10.00**	2.9%
Operating Cost	Project implementation support to carry out activities of the project. This includes financing the CPMU and consultant services associated with project implementation	5.00	-	**5.00**	1.4%
Front end Fee		0.75	0.225	**0.975**	0.3%
Unallocated	Allocation of this amount is to be discussed at negotiations	41.41	-	**41.41**	11.8%
	Total	**300.00**	**50.00**	**350.00**	**100%**

7. **Kyiv Vodokanal (US$11.24 Million)** will: (i) rehabilitate the Dnieper River water utility pumping station with more energy efficient pumping equipment and install frequency regulation equipment at the Dnieper River water intake facilities; (ii) replace existing pumps with more energy efficient equipment at the Krutohirna pumping station; (iii) upgrade existing booster pump stations with more efficient pump sets and frequency shifters across 20 different locations in Kyiv; and (iv) reconstruct Level 3 pumps with more energy efficient and frequency control equipment at the Desna Water Supply Station. All four of these subprojects will aim to improve efficiency of equipment that is working at non-optimal levels with operational reliability decreasing every year due to aging and obsolescence. The project will invest in equipment that is expected to stabilize operations, reduce energy costs, decrease equipment wear, and reduce needs for repairs and associated labor costs.

8. **Donetsk Vodokanal (US$37.26 Million)** will upgrade water supply facilities serving the Kuibyshevskyi district of the city and other locations to be confirmed by the Feasibility study. This investment will be carried-out through four interventions: (i) upgrade of district booster pump stations (ii) hydraulic simulation and upgrade of the water supply network operation monitoring system and (iii) upgrade of water supply utility networks. Investments in this project aim to achieve energy savings; reduction in water loss; and improvements in water quality, the environmental condition of the district, and the utility's quality of services to the public.

9. **Kramatorsk Vodokanal (US$5.25 Million)** will: (i) reconstruct its existing filtering station and replace liquid chlorine with sodium hypochlorite technology for water treatment; (ii) reconstruct its municipal treatment facilities to allow for treated sewage to be used as processed water for industrial enterprises; and (iii) optimize the city's water supply and sewage disposal plan

10. Kramatorsk currently uses liquid chlorine for its water disinfection process. The existing condition of the chlorination plant does not meet sanitary, chemical, or microbiological water criteria. Additionally, because chlorine requires heavy investments in storage and ventilation, and can cause permanent environmental and disaster hazards for the city, the project will invest in an overhaul of the chlorination plant for which the liquid chlorine process will be replaced with a sodium hypochlorite process. This new process will also be used for the treatment of sewage water so that it can be sold to industry as processed water rather than discharged into the nearby Kazennyi Torets River.

11. The primary objective of the optimization plan will be to ensure enough water pressure exists at the centralized water supply system for water to reach all sites of the city. Pressure regulators, gauges, leak detectors, and meters will be arranged at control points throughout the city to transmit data to a central control station. The plan also includes installing pressure regulators in cross flow points enabling loss reduction and significant reduction in accidents. This should also reduce non-revenue water rates through a reduction in standing water.

12. **Kirovograd Vodokanal (US$34.3 Million)** will: (i) reconstruct the water treatment facility; and (ii) introduce an automated system with frequency control at the city's main sewage pumping station. Due to insufficient pressure, water flow velocity is low in the distribution system causing water to stay longer in the pipelines leading to water quality deterioration. The

project will invest in the replacement of deteriorated pipes with new pipelines made of plastic materials, which will avoid clogging, reduce accidents, and decrease non-revenue water rates that currently exceed 45%. Additional savings from investments in more energy efficient pumping equipment is expected to reduce electricity consumption by 30-40% totaling to a savings of approximately 15.5 million UAH per year. Implementation of an automated control system will allow for the collection and processing of information, optimization of the water supply and sewage disposal systems, and efficient accounting of potable water.

13. **Kolomiya Vodokanal: (US$3.09 Million)** will: (i) upgrade the intake of its water supply system (US$680,000); (ii) replace 16 km of water pipes (US$2 Million); and (iii) construct a 6,000 M^3 tank for clear water intake (US$410,000). The challenges faced in Kolmiya include insufficient coverage of water supply and deterioration of pipelines. Currently 18 km of 102 km are in emergency condition. The project will therefore invest in the replacement of at least 16 km of these pipelines. This should result in significant savings from non-revenue water loss and increase reliability of services to consumers. The project anticipates that 15,000 new customers will also connect to the new pipelines increasing access from the current 70% of the population to 98% of the population.

14. The project will also invest in a 6,000 M^3 water tank with the intention that the utility can intake water at night to save on energy costs from pumping when electricity tariffs are lower, and then distribute water from the water storage tank to the distribution network during the day.

15. **Zhytomyr Vodokanal (US$30 Million)** to finance: (1) water supply rehabilitation works and upgrades including treatment, reconstruct a Level 2 pumping station transfer and distribution infrastructure, and (2) rehabilitation and upgrading wastewater treatment and pumping facilities. The Utility confirmed that the investments had been strategically selected to improve the quality and efficiency of water and wastewater services.

16. **Ivano-Frankivsk Vodokanal**: **(US$ 15 Million)**, will complete reconstruction of the wastewater treatment plant and sludge dewatering lines with biogas extraction and electricity production totaling 3.5 million kW hours/year and resulting in decrease of produced sludge quantity by 50 times and decrease by 80% methane emissions into atmosphere. The first part construction of the treatment plant was financed under UIP. Detailed designs complete and approved by the stat expertize.

17. **Ternopil Vodokanal: (US$36.69 Million)** will: (i) replace sewer pipes and upgrade sewage pumping station; (ii) reconstruct the wastewater treatment plant including the new construction of a sludge dewatering plant; (iii) construct a station for iron removal at the water pumping station; (iv) optimize the water distribution system, intake, and replace pumps.

18. The main problem for water supply in Ternopil is a high iron content in water that causes iron oxide precipitation within the water distribution network and clear water tanks at the water pumping stations. This ultimately causes degradation of potable water and bacteriological pollution and results in consumer complaints on the visibly poor water quality. In order to clear the system of pollution and iron buildup, Ternopil has to schedule a flushing of water pipes as well as the disinfection of tanks at least twice a year, which shuts down the system for four days.

In order to prevent iron build-up and improve potable water quality, the project will invest in a Level 3 water de-ironing station at the city's main pumping site. To improve the efficiency of pumps and reduce energy costs, the project will also replace obsolete pumps.

19. In order to optimize the water distribution system, the city plans to invest in metering equipment, which will also reduce non-revenue water rates that currently exceed 30%. Some parts of the water supply network are routed too deep in the ground (7-8 meters below the surface) making it difficult for the utility's existing equipment to respond to problems at those depths when they arise. Therefore, the project will invest in some equipment and automobiles that can facilitate emergency response and actions at such depths.

20. Ternopil generates 15,000 M^3 of sludge every month. The city's existing lagoons are overfilled and the current machinery cannot manage its release. This is posing a high-risk situation for the city due to overflow, which could result in an environmental disaster or flood a nearby rail track. To prevent this problem, the project plans to construct a sludge dewatering shop.

21. **Kharkiv Vodokanal (US$75.80 Million)** will invest in replacement/construction of trunk sewer collection; rehabilitation and upgrade of the existing wastewater treatment facility and construction of sludge treatment facilities. These investments will allow the utility to reduce operation costs and improve the quality of wastewater services provided. The city receives 3,000 M^3 of fresh sludge from wastewater treatment every day. A study for the closure of the old land sludge lagoons (polygons), which currently contain 9 million M^3 of sludge that has collected over several years will be prepared including cost estimate of the activities included. These lagoons are close to the city airport and occasionally catch fire creating a significant hazard to the city and the environment. Recognizing that the current situation is unsustainable the vodokanal plans to invest in sludge treatment. The proposed process includes: (i) sand traps for the removal of sand from sludge, (ii) brewing chambers, and an (iii) incinerator plant.

22. The project aims to use the sludge treatment process to generate electrical and thermal energy. The process will produce approximately 4.0 megawatt hours (MWH) of electrical energy and 4.98 MWH of thermal energy, of which 1.2 MWH of electrical and 2.0 MWH of thermal energy will be used internally. The remaining energy will be sold to the national grid at the green tariff prices.

23. The treatment plant will incinerate 700 M^3 of sludge per day. This process will generate 30 tons of ash per day. The ash will be sold to the construction or cement industry at approximately 55-60 UAH per ton, or be transferred to the municipal landfill site where it will be compacted in layers to facilitate future land use of the site.

24. The project will improve the environment through a more controlled process of sludge treatment as opposed to the existing growing lagoons that are threatening the environment of the surrounding area. The process will also reduce GHG emissions by using the thermal and electrical energy produced from the process rather than letting it go to waste. Because the energy will be sold to the national grid, this incremental energy will replace energy produced by

more polluting alternatives from fossil fuel sources such as coal and natural gas, which comprise the majority of Ukraine's energy generation mix.

25. **Kharkiv Municipality (US$43.99 Million, Solid Waste Management:** will construct a 34 hectares (ha) solid waste disposal site with a recycling and sorting facility as well as a biogas collection system that allows for landfill gas recovery and electricity generation. This is the first project of its kind to be developed in Ukraine, and will therefore provide many important lessons to be learned for future replication to other cities across the country. The project will be funding several investments to make the landfill site operational. These investments include: (i) preparation of the land site, (ii) gas-to-energy collection and generation equipment, (iii) construction of a solid waste sorting facility for recyclables, and (iv) land improvement.

26. The full project requires an investment of US$70 million and is expected to be completed in two phases. The UIP2 project will be funding only the first phase, to be completed in two years, comprising a US$44 million investment for a 17 ha site. The site is expected to be operational for 10 years after which the second phase of 17 ha will become operational. This second phase is part of a non-Bank funded component that will require investment at some point in the future. The table below highlights the investments for the full project and shows the World Bank's involvement in financing the first phase of the project.

Table A2.2: Solid waste investments

Investment	Phase 1 (UIP2 Project)	Phase 2 Non-Bank Funded (Future Investment)	Total
	All Figures in Millions, US$		
(i) Solid Waste Landfill Works include excavation; lining, drainage system, leachate removal ; weight scales etc.	US$21.0	US$18.0	US$39.0
(ii) Electric Power Generation Generators; pumps; transformers 4 km Electricity Lines	US$10.4	US$8.0	US$18.4
(iii) Solid Waste Recycling Facility Sorting Facility; office and amenity building; equipment; recycling containers; public education campaign	US$8.0	-	US$8.0
(iv) Land Improvement Roads and Landscaping	US$4.6	-	US$4.6
Total	**US$44.0**	**US$26.0**	**US$70.0**

27. The city of Kharkiv and three surrounding counties currently use two separate landfill sites respectively located in the northern and southern parts of the city. Waste collection and transport companies collect waste from the surrounding area and bring it to one of the two sites based on proximity. Approximately 98% of the city has access to solid waste services from which about 400,000 tons of waste is collected per year. Of this amount, 77% is attributable to household domestic waste. The remaining 23% is evenly split between commercial/industrial

entities and public institutions. The city estimates that solid waste disposal has been growing and will continue to grow at approximately 1-2% per year. Neither the city's population nor industrial base is expected to increase, but higher earnings capacity of households is leading to greater consumption and material dispose.

28. The landfill site in the southern part of the city is owned and managed by a private operator. The landfill currently serves about 35% of the city. This site is nearing capacity and will be shut down within the next two years. There is no area for additional expansion at this site because it is located within 5 km of the airport and new regulations in Kharkiv limit landfill locations from being within 15 km of the airport. The private operator has been made aware of the new regulations and has agreed to terminating operations at the site once the landfill reaches capacity.

29. The landfill located in the northern part of the city is a public site owned by the Kharkiv municipality and will be the location for UIP2 investments. The site serves 65% of the city and receives approximately 900 M3of waste per day. The current landfill capacity at this site is 13 ha of which approximately 7 ha has been filled. Due to the eventual closure of the private landfill site in the southern part of the city, as well as taking into consideration the future plans for Kharkiv, the municipality plans to add an additional 34 ha to the existing site for which the World Bank will be funding the first phase (17 ha).

30. The project will install biogas collectors at both the exiting 13 ha site as well as at the new 17 ha site to collect gas from waste for production of electricity, which will ultimately be sold to the national grid at an agreed green tariff price. Based on the feasibility study calculations, this should produce 750 M3 of biogas per hour. This gas would be collected and then used for energy production yielding approximately 1.5 megawatt hours (MWH) of electricity. Once both phases of the project (the full 34 ha site) become operational, the landfill will generate as much as 3,500 M3 of biogas per hour by 2030, yielding approximately 6 MWH of electricity.

31. Adjacent to the landfill site, the project will invest in a solid waste recycling facility. Under the current situation only 0.5% of the city's total waste is recycled today. The project expects that this figure will increase to 15-17% of total waste as a result of investing in recycling containers, a public education campaign, and the installation of the recycling sorting facility. Presently, all waste goes into one container. Only TetraPak plastic bottles are collected separately, which eventually get reprocessed into thread material for export to China. The project expects that placement of recycling containers alongside the existing waste containers will facilitate the collection of other recyclables such as glass, aluminum, paper, and plastic to be sent to the recycling facility where it will be sorted and sold to industry or exported at prevailing market prices.

Component 1 Implementation Schedule

No.	Contract Description	P, R, A[2]	Cost Estimate (US$, Millions)	Contract Type[3]	Prior/Post	Year 1				Year 2				Year 3				Year 4				Year 5				Construction Period (Months)
						Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Kyiv: Rehabiliate and Upgrade Water Supply Pumping Stations																										
1	**Kyiv** - Rehabilitation of pumping station for Dnipro Water Utility; Level 3 pumping station for Desna; Pumping station of Krutohirna; Installation of energy efficient pumping stations across 20+ locations in Kyiv.	P	**11.24**	ICB	Prior																					24
		R																								
		A																								
Kharkiv: Design and Build Sludge Treatment Plant and Solid Waste Treatment Facility																										
2	**Kharkiv UC** - Rehabilitation / reconstruion of wasetwatre and sludge treatment facilities	P	**75.80**	DSI	Prior																					36
		R																								
		A																								
3	**Kharkiv MC** Reconstruction and upgrade of the solid waste treatment facilities	P	**44.00**	S&I	Prior																					36
		R																								
		A																								
Khirovograd: Rehabilitate and Upgrade Water Supply and Wastewater Facilities																										
4	**Kirovograd** – Reconstruction of water treatment facilities in Dneiper	P	**24.40**	DSI	Prior																					27
		R																								
		A																								
5	**Kirovograd** – Rehabilitation of sewage pumping stations including installation of mechanical, electrical, and automation and control system.	P	**10.00**	ICB	Prior																					24
		R																								
		A																								
Ternopil: Rehabilitate and Upgrade Water and Wastewater Facilities																										
6	**Ternopil** – Water supply rehabilitation works, including iron-removal facility, optimization distribution systems, intake and replacement of pumping stations (VSN No.1 and 5)	P	**15.80**	ICB	Prior																					36
		R																								
		A																								
7	**Ternopil** – Wastewater rehabilitation works, including replacement of sewer pipes; sewerage pumping station (KNS No.9) and wastewater treatment plant including sludge dewatering	P	**20.90**	ICB	Prior																					36
		R																								
		A																								
Zhytomer: Rehabilitate and Upgrade Water Supply and wastewater System Facilities																										
8	**Zhytomyr** - Water supply rehabilitation works, including upgrade of water pumping stations, replacement of pipes and treatment plant (filters)	P	**17.00**	S&I	Prior																					36
		R																								
		A																								
9	**Zhytomyr** - Rehabilitation and replacement of mechanical and electrical equipment at the wastewater treatment plant.	P	**13.00**	ICB	Prior																					36
		R																								
		A																								
Kolomiya: Rehabilitate and Upgrade Water and Wastewater Facilities																										
10	**Kolomiya** - Water supply works, including upgrade of water intake; replacement of 16 km pipes and construction of a new clear water storage tank - 6,000m3 capacity	P	**3.09**	NCB	Prior																					12
		R																								
		A																								
Donetsk: Rehabilitate and Upgrade Water Supply System Facilities																										
11	**Donetsk** – Water supply system upgrades in some parts of Donetsk	P	**37.50**	ICB	Prior																					36
		R																								
		A																								
Kramatorsk: Rehabilitiate and Upgrade Water and Wastewater Facilities																										
12	**Kramatorsk** - Reconstruction of water treatment plant (liquid chlorine to sodium hypochlorite); Reconstruction of sewage treatment facilities; and replacement of water supply and wastewater pipes.	P	**5.25**	NCB	Prior																					24
		R																								
		A																								
Ivano - Frankifsk: Rehabilitiate and Upgrade Wastewater Facilities																										
13	**Ivano - Fankifsk:** Construction of wastewater treatment plant - part 2 (sludge dewatering lines with biogas extraction and electricity production).	P	**15.00**	ICB	Prior																					30
		R																								
		A																								
	Total		**292.98**																							
	Unallocated (contingencies)		**42.02**																							

Techncial Assistance during first two years of Operation (Requested to be confirmed)

Construction Period

Pre-contract award (design, tender docuemnts and bidding stages)

Component 2: Institutional Strengthening and Capacity Building (estimated US$10 Million)

32. This component aims to improve the performance and efficiency of participating entities to operate and manage their infrastructure systems and services. The component will also support a range of institutional strengthen activities implemented at the national level targeted towards improving sector performance. Key activities under this component will be implemented at the sub-national and national levels under separate sub-components as described below.

Sub-Component 2.1: Sub-national level agencies (utilities and municipalities

33. This subcomponent will provide technical and financial assistance for strengthening the capacity and efficiency of participating utilities to operate and manage their systems. A "Utilities Performance Improvement" [10] (UPI) study will be carried out for each city. The study outputs will be consolidated into a UPI Plan which will include: (i) an assessment of the legal and regulatory framework; (ii) an analysis of the financial and operational constraints by utility; (iii) a review and recommendations of measures to address identified constraints; and (iv) support for the implementation of the required actions where possible. Such support, will be tailored towards recommendations and priority measures identified for each city through the UPI study, but may include:

(a) Assistance to target utilities in developing priority, medium- and long-term infrastructure investment plans with realistic budgets; introduction of better information systems, performance indicators, and benchmarking.

(b) Strengthening water and wastewater management capacity at both the local and national level. This will include: Improving transparency and customer-responsiveness through: (a) improving utilities/municipalities' capacity to handle customer complaints; (b) introducing systems for public participation and feedback, for example, citizen report cards, customers surveys, or public hearings, as well as innovative information campaigns; and (c) other tools to provide feedback to utilities on their performance; and Technical training in: (a) administration, (b) revenue generation, (c) billing and collections, (d) tariff setting, (e) financial management, (f) customer responsiveness, and (g) preparation of feasibility studies, among other needs that will be assessed in an ongoing manner.

(c) Providing guidance to utilities on international best practices for financial reporting. This will include accounting software; ensuring that statements will be produced in the local language and English; and providing utilities' financial management staff with training to produce financial reports that follow international guidelines and providing utilities with computerized billing and collection system will support increasing collection rates.

[10] Preliminary assessment of the sector institutions shows the weak financial working ratio which implies that water utilities require continuous support to pay for cash operating costs even before paying for debt services maintenance and investments. The current tariff rates are low relative to average and marginal costs, tariff structure are complex and process of tariff and adjustment is cumbersome.

34. This sub-component will also include enhancement of the utilities social accountability mechanisms in the sector with the view to improving service standards and performance.

Sub-Component 2.2: National level agencies

35. This sub-component will include strategic support for the water, wastewater and solid waste sectors. It will strengthen policy dialogue and strategy development for improved service delivery and regulation at the national level. The Minregion and the Regulator have demonstrated a strong commitment to improving utility performance and service delivery, and work has been initiated on topics such as tariff increases, alternative financing options, sector governance, public awareness, benchmarking, and accountability mechanisms.

36. This sub-component will also include: (i) development of policies and inter-sectoral instruments for water and wastewater management; (ii) development of policies for solid waste management to improve municipal service delivery and strengthen governance. It will also finance detailed design and preparation of tender documents, as required.

37. In addition, this sub-component will support the Regulator in improving the quality and availability of utility performance data (jointly with the Danube Water Program), improving tariff setting methodologies, and subsidy and other related financial policies.

Institutional Strengthening Toward Cost Recovery

38. An important aspect of component 2 of the project is the integrated approach, at the national and sub-national levels of Government, and the National Commission for Regulation of Communal Services ("Regulator") to support the transition of utilities toward being financially sustainable entities. One aspect of this solution is to increase tariffs to cost recovery levels. However, recognizing the complexity of the tariff issue in Ukraine, other possible avenues for financial sustainability will also need to be introduced. This project will therefore look to introduce a more comprehensive array of options for utilities to become more financially viable. This will include interventions that not only increase revenues, but also attempt to lower costs.

39. The institutional strengthening and capacity building component will focus on bolstering overall staff productivity, introducing and expanding automated administration and utility management processes (for example, installing computerized systems over the existing manual process in some cities), and conducting best-practices study tours for managers to visit well-run utilities in other parts of the world. Some of these interventions could lead to significant long-term cost savings and increased efficiency for utilities.

40. Non-revenue water (as high as 50% in some project cities) also poses a significant financial drain on utilities. In some cases, the project's investments – such as pipe rehabilitation – will help reduce physical losses on non-revenue water, which will translate into overall cost savings for the utilities. In other instances, where non-revenue water is problematic to utilities either due to meter tampering, poor meter placement, or other apparent losses, the project will provide strong technical assistance and guidance on best practices for reducing non-revenue water.

41. ***Danube Water Program***. In close collaboration, to ensure that activities complement each other's and promote a broader WSS sector policy and regulatory engagement the Danube Water Program will also provide direct and indirect support to WSS utilities in Ukraine; such training will be open to Project utilities to participate in the following activities:

- Utility Benchmarking: The Danube Water Program is finalizing arrangements with regional partners to organize a voluntary utility benchmarking initiative; the initiative would be based on international best practices developed by the International Water Association and the European Benchmarking Cooperation.
- Energy Efficiency: The Program is also coming close to launching a regional capacity-building program for utilities to develop their own energy audits, program would complement and enhance the significant energy efficiency activities carried out under Component 1 of the UIP2 Project,
- Further utility capacity-building programs on commercial practices, on asset management and on other utility performance improvement topics.

42. The Project's institutional strengthening activities at national / sector level are closely complemented by additional support from the regional Danube Water Program. The Program will in particular support the Project's overall institutional support by providing an analytical review of the sector's situation in regional comparison and allowing further exposure of key stakeholders to international sector good practices.

43. The program will also support the Regulator's efforts to improve its utility indicators platform. As part of the Program, the national Regulator has received a USD100 thousand grant which it will use to further develop and improve its utility performance indicators platform. Among other things, the Regulator plans to improve data collection and processing, define a set of meaningful performance indicators and make them available publicly. The Regulator has also indicated its interest in participating in a regional effort to make utility performance information available on a regionally comparable level, based on IB-Net standards.

Component 2 Implementation Schedule

No.	Activity	Year 1				Year 2				Year 3				Year 4				Year 5			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Utilities Performance Improvement (UPI) Study																				
2	Implementation of UPI Study Recommendations																				
3	Utility Benchmarking																				
4	Energy Efficiency Study																				
5	Support to Regulator																				
6	Review and update design standards for water supply and wastewater																				
7	Sector Policy Review and Developments																				
8	Review and Update of National Water Supply and Wastewater Management Strategy																				
9	Policy review and development for Solid Waste																				
10	Prepare National Solid Waste Strategy																				
11	Support to Utilities for Financial Reporting (workshops and training)																				
12	Support to Improve Billing and Collection Systems																				
13	Training for Financial Management and Procurement																				
14	Implementation of Social Accountability Activities																				
15	Others (Monitoring and evaluation, reporting, coordination and technical support etc.)																				

Component 3: Project Management and Supervision (estimated US$5 Million)

44. This component finances project implementation support to carry out activities under components 1 and 2 of the project. This includes financing the CPMU and consultant services associated with project implementation. This component will fund operating costs related to: (i) financial and technical audits; (ii) guidance and training for utilities and local governments on project implementation; (iii) preparation of feasibility studies and bidding documents; (iv) supervision of project implementation; (v) incremental operating costs of Minregion related to all eligible expenses; and (vi) other activities needed for project implementation support.

45. The suggested budget for component 3 is shown in Table below:

Table A2.3: Suggested Budget for Project Management and Supervision

Expenses	US $ mln	%
Staff costs	2.0	40.0
Operating/ supervision costs	0.4	7.6
PR/Capacity building costs	1.6	32.4
Project specific costs (customized software for data collection; project audit)	1.0	20.0
TOTAL	**5.0**	**100.0**

Annex 3: Implementation Arrangements

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)

Project Institutional and Implementation Arrangements

1. The project will be implemented by ten participating entities across the nine identified project cities in Ukraine. Namely, these entities comprise nine water and wastewater utilities and one municipality for the solid waste subcomponent, including: (i) Kyiv Vodokanal, (ii) Donetsk Vodokanal, (iii) Zhytomyr Vodokanal, (iv) Kirovograd Vodokanal, (v) Ternopil Vodokanal, (vi) Kolomiya Vodokanal, (vii) Kramatorsk Vodokanal, (viii) Kharkiv Vodokanal, and (ix) Kharkiv Municipality (x) Ivano-Frankivsk Vodokanal. The project will be implemented over a five year period, under the responsibility of the Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine (Minregion) with close cooperation with the Ministry of Finance and the National Commission for Regulation of Communal Services.

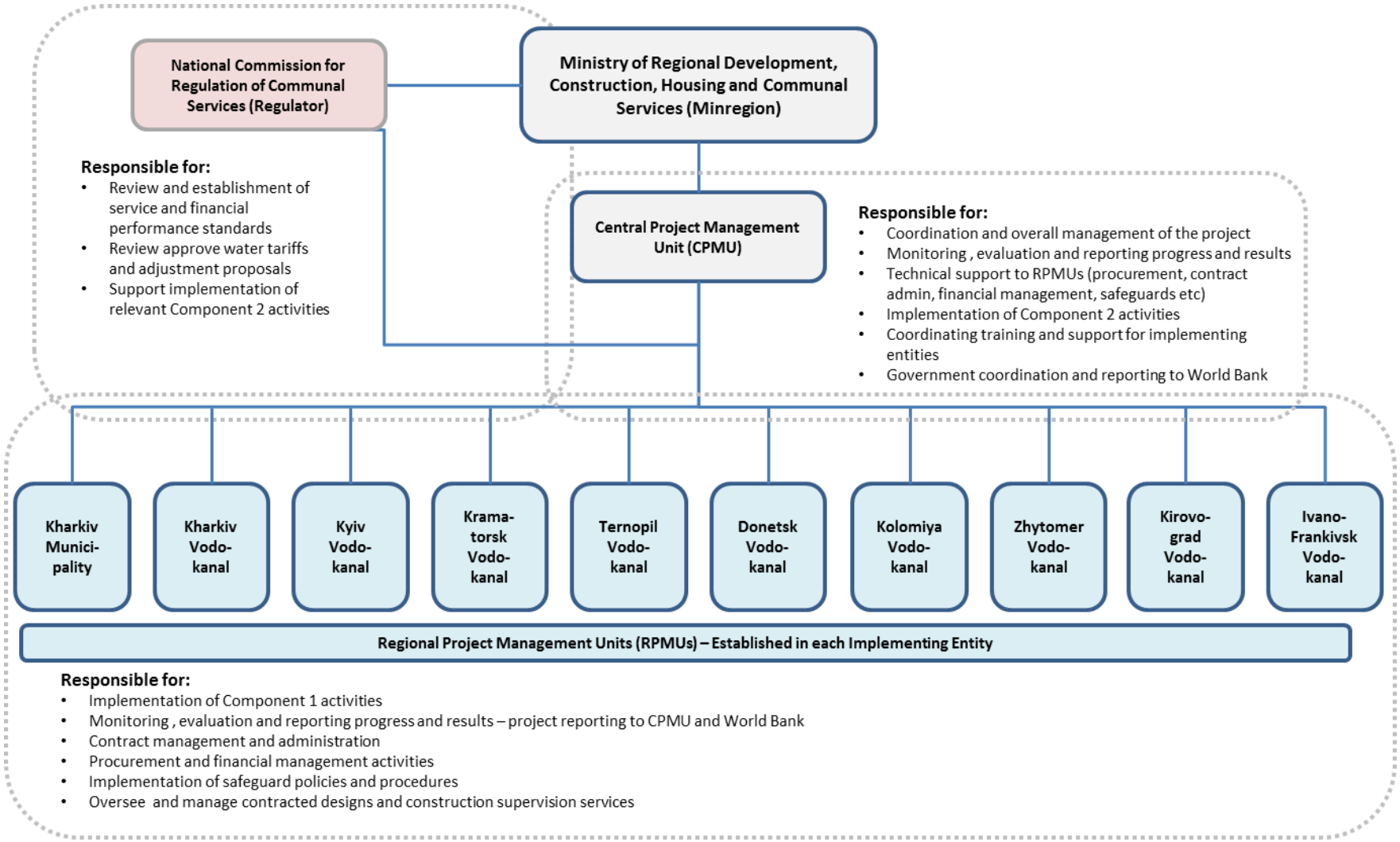
2. The diagram below illustrates implementation arrangements that will be utilized under the project and the entities involved in the project. Key responsibilities are described in more detail below.

3. **The Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine (Minregion)**, is the line ministry responsible for implementation of projects in the municipal sector, including project preparation, supervision, and monitoring and evaluation as well as for review of projects' evaluation results. Accordingly, Minregion will carry out such functions for this project.

4. Each participating company will present its annual investment programs, financed by the project, to **the National Commission for Regulation of Communal Services (the Regulator)** for its review, approval, and inclusion in the investment component of its water tariffs.

5. **Central Project Management Unit (CPMU).** Overall project implementation will be supervised and monitored by the existing CPMU that sits within the Minregion, which has been implementing the first UIP. The CPMU will be responsible for monitoring and reporting project progress to the World Bank, providing financial management and procurement support to the RPMU, as well as liaising with the World Bank on financial management and disbursement issues, intermittent inspections of physical works of the project, and assurance that subprojects are implemented in compliance with relevant safeguard policies and procedures.

6. The CMPU is staffed by qualified personnel, consisting of a CPMU Head, procurement manager, financial manager, safeguards specialist, and an assistant. If necessary, the CMPU will also hire a specialist consultant on procurement as well as water supply and sanitation. The consultant should have significant experience and be sufficiently trained in World Bank procurement procedures.


National Commission for Regulation of Communal Services (Regulator)
Ministry of Regional Development, Construction, Housing and Communal Services (Minregion)
Responsible for:
• Review and establishment of service and financial performance standards
• Review approve water tariffs and adjustment proposals
• Support implementation of relevant Component 2 activities
Central Project Management Unit (CPMU)
Responsible for:
• Coordination and overall management of the project
• Monitoring , evaluation and reporting progress and results
• Technical support to RPMUs (procurement, contract admin, financial management, safeguards etc)
• Implementation of Component 2 activities
• Coordinating training and support for implementing entities
• Government coordination and reporting to World Bank
Kharkiv Munici-pality
Kharkiv Vodo-kanal
Kyiv Vodo-kanal
Krama-torsk Vodo-kanal
Ternopil Vodo-kanal
Donetsk Vodo-kanal
Kolomiya Vodo-kanal
Zhytomer Vodo-kanal
Kirovo-grad Vodo-kanal
Ivano-Frankivsk Vodo-kanal
Regional Project Management Units (RPMUs) – Established in each Implementing Entity
Responsible for:
• Implementation of Component 1 activities
• Monitoring , evaluation and reporting progress and results – project reporting to CPMU and World Bank
• Contract management and administration
• Procurement and financial management activities
• Implementation of safeguard policies and procedures
• Oversee and manage contracted designs and construction supervision services

7. **Regional Project Management Unit (RPMU).** All participating entities will have a RPMU using their existing staff that will be responsible for the day-to-day implementation and supervision of their specific subproject(s) – including technical aspects, procurement, financial management and safeguard management. Each RPMU will comprise a team that includes: (i) a head of the RPMU; (ii) procurement specialist; (iii) financial management specialist; (iv) engineering, design, and supervision specialist; and (v) safeguards implementation specialist.

8. The responsibilities of the RPMUs will include: preparation of tender documents for bidding; preparation of technical inputs for project readiness and supervision; management of procurement processing, management of project disbursements and funds according to World Bank guidelines on financial management; and supervision of physical works, environmental and social safeguards, and monitoring and evaluation aspects. The RPMUs will report to the CPMU through a clearly established protocol.

9. This structure follows the implementation arrangement that has been utilized for some cities under the first UIP. It has proved to work well and through several consultations with the CPMU staff during project preparation, it was decided that this arrangement should continue forward for the UIP2 project as well.

10. Because only three of the nine project cities have prior experience with implementing World Bank funded projects (Kolomiya, Ivano-Frankivsk and Kharkiv), members of the RPMUs were invited to guidelines training sessions throughout project preparation to ensure capacity and skills-readiness prior to project effectiveness. The World Bank will continue to provide regular training throughout project implementation to build capacity and skills at the municipal and utility levels as a part of the project's institutional and strengthening component. Training plan is included as part of **Annex 6 "Implementation Support Plan"**

Financial Management, Disbursements and Procurement

Financial Management

11. A financial management (FM) assessment of the project was completed, and the FM arrangements for implementation of the project have been confirmed as satisfactory. The FM assessment covered the capacity assessment of Minregion and its CPMU as well as participating utilities in all key areas of financial management and disbursement. The FM arrangements for the project build on the ongoing Urban Infrastructure Project (UIP), with currently satisfactory FM arrangements, taking into account the lessons learned during implementation of UIP. The overall FM risk rating for this project is Moderate, and specific risk factors and measures to address them are provided in the table below:

Table A3.1: Financial Management Risk Matrix

FM Area	Risk	Risk Mitigation Measures	FM Risk Rating
Staffing	Lack of experience of CPMU staff in World Bank-financed	Periodic training will be provided to RPMUs on a need basis. Training will be provided by the World Bank as well as by CPMU during preparation and implementation of the	High

	operations	project. Segregation of duties within CPMU and between CPMU and RPMUs	
Budgeting	Insufficient budget allocation in the State Budget	Regular budgeting procedure will allow monitoring of the remaining available funds, and ensure timely initiation of additional budget allocation as needed	Moderate
Disbursement	Delays in disbursements	For more efficient disbursement process, Designated accounts will be opened in UkrExim Bank, which has confirmed capacity for fast processing of records. Each utility will have access to own Designated account and will be able to manage the flow of funds to meet its own needs. Disbursement letter will be designed specifically for each participating utility to meet its disbursement needs. The quality of disbursement documentation will be subject to multiple reviews, including by CPMU, Minregion, as well as MOF.	High
Accounting	Errors in accounting records	Accounting records of CPMUs will be maintained in automated accounting systems, which will be further modified to meet project accounting needs (except Kharkiv, where the accounting software will be installed). Accounting records of CPMUs and RPMUs will be periodically reconciled, and will be subject to annual audit.	Moderate
Reporting	Delays in submission of consolidated reports by CPMU due to need to receive inputs from each RPMU	RPMU will be required to submit reports 30 days after the end of each quarter, allowing further 15 days for their consolidation. CPMU will be able to use own accounting data to fill in the gap in case of delayed individual report from RPMU.	Moderate
Auditing	Late appointment of auditor leading to delay in submission of audit reports	CPMU will contract an auditor for audit of consolidated financial statements of the Project. CPMU has experience with such audits, and will be required to appoint auditor on time.	Moderate
OVERALL FM RISK			Moderate

12. **Strengths and Weaknesses:** One of the strengths of this project is the experience of Minregion and its CPMU in implementation of World Bank-financed infrastructure projects, including availability of key systems such as a comprehensive accounting and reporting system and experienced staff. The key weaknesses are: (i) large number of participating utilities (ten utilities) and therefore complex project implementation and disbursement architecture, and (ii) the need to further build capacity of utilities in financial management and disbursement in the World Bank-financed projects.

The following table presents the FM action plan.

Table A3.2: Financial Management Action Plan

Action	Timing	Condition
Adopt Project Operational Manual, which includes the section on FM and disbursements	Prior to implementation	Condition of effectiveness
Provide training to the financial staff of utilities in relevant areas of financial management and disbursements	Preparation and implementation	N/A
Further development of the automated accounting software available at utilities, except Kharkiv. Installation of accounting software in Kharkiv utility.	Implementation	N/A

13. **FM Roles and Responsibilities:** All of the participating utilities, except Kolomiya, are new to implementation of World Bank-financed projects. Each of the participating utilities established an RPMU, which includes a financial specialist. Financial specialists at RPMUs will take responsibility for a substantial portion of financial management and disbursement tasks. The role of the financial specialist of the participating utilities will include management of the flow of funds, including preparation of the withdrawal applications and payment orders, keeping records of all project transactions, preparation of reports, and facilitation of annual audits.

14. The CPMU will be responsible for financial management and disbursement of the Minregion component, as well as for review of the documents submitted by participating utilities, consolidation of reports, and coordination with MOF. The CPMU has two experienced financial specialists and one financial assistant, all externally hired consultants, who are expected to coordinate and assist the financial staff of the utilities. One of the financial specialists at the CPMU will be responsible specifically for the components implemented by participating utilities, and will coordinate closely with financial staff of utilities on all aspects of financial management and disbursement. The functions of the two financial staff and one financial assistant at the CPMU are distributed in a way to ensure segregation of duties and quality control. Specific roles of RPMUs and the CPMU financial staff will be detailed in the project operations manual (POM).

15. Given that the financial staff of utilities (except Kolomiya) has limited knowledge and experience of World Bank requirements, technical training will periodically be provided by the World Bank and CPMU staff during preparation and implementation of the project. The training program will address the continuous learning needs of the financial staff, and will be tailored to each specific stage of project implementation and aim to address any cross-cutting issues.

16. **Budgeting:** The utilities will be responsible for planning and budgeting of their respective components. Monthly planning process will be used in the management of flow of funds, and also serve as inputs to quarterly reports and as a basis for preparation of the annual

budget of the project. The CPMU will be responsible for collection and review of disbursement plans and budgets from utilities and preparation of consolidated budgets as needed. The CPMU, in coordination with Minregion and MOF, will also ensure sufficiency of allocation of funds in the state budget for each fiscal year of project implementation. Should the budget allocation in a fiscal year become insufficient, the CPMU will initiate the procedure of additional budget allocation in coordination with Minregion and MoF.

17. **Project Accounting:** Project accounting records will be maintained by the financial specialist of each participating utility for its respective component. The accounting records for the project will be maintained on a set of accounts, segregate from other activities of the utility, in an automated accounting system available at the utility. All participating utilities, except Kharkiv, keep their accounting records in automated accounting systems. Project accounting records will be maintained in accordance with the requirements of National Accounting Standards in national currency (UAH). Additional functionality will be added to meet the Bank's reporting requirements, including keeping records in the currency of payment and in USD equivalents. Project capacity building activities will include installation of accounting software at Kharkiv utility, and further modification of the accounting software systems which are in use by other utilities.

18. At the same time, the CPMU will keep records for the entire project, separately for its own component, and also for each of the participating utilities, separately for IBRD and CTF sources of funding. Accounting records will be kept on a cash basis, with additional disclosure of commitments. The CPMU has a developed customized accounting system 1-C which has wide functionality and allows keeping detailed records of all project transactions by component, by contract, in multiple currencies, etc. Segregated set of accounts will be opened by the CPMU in the existing 1-C for UIP2. A separate set of accounts will be used to record components of each of the participating utilities. Accounting records of utilities will be reconciled with CPMU at the time of preparation of quarterly reports, at the time of preparation of withdrawal applications, and on a need basis.

19. All relevant project accounting documents (acts, invoices, bank statements, etc.) will be retained and orderly filed by both the implementing utility as well as by the CPMU. Further, to facilitate the flow and exchange of documents and reports between the CPMU and participating utilities, the CPMU is in process of purchasing and installing an "Automated Statistics System". It is expected that the system will be functional prior to effectiveness of this project.

20. **Reporting:** Consolidated Interim Financial Reports (IFRs) will be prepared quarterly during the implementation of the project. Separate consolidated reports will be prepared for IBRD and for CTF funds. RPMUs will be required to submit their inputs 30 days after the end of each quarter, and CMPU will have additional 15 days for their review and consolidation. The template of IFRs will be agreed at project negotiations, and will include forms on the sources and use of funds, designated account statements, as well as information on detailed use of funds.

21. **Internal Controls:** Key internal controls for project financial management and disbursement will be described in the POM. The periodic controls will include, but not be limited to the following: segregation of duties between the CPMU fiduciary staff and also

between CPMU and RPMUs, review and authorizations of withdrawal applications and bank payment orders, reconciliation of financial data, and reports between CPMU and RPMUs as well as to the World Bank Client Connection data, review and authorization of reports, and technical acceptance of goods and services. Technical supervision will be obligatory in all contracts where specific technical expertise is required, and each utility will contract an independent technical supervisor who will be reviewing and certifying acts of acceptance prior to their payment. The internal controls structure for project implementation will also be reviewed by independent auditors during their annual audits. Key weaknesses, if identified, will be brought forward in the management letter, which would accompany every audit report. Further management actions to address those recommendations will be monitored as part of regular FM monitoring of the project.

22. **Audit Arrangements:** Annual audits of consolidated project financial statements will be required. Such audits will need to be carried out by an eligible audit firm in accordance with the TOR agreed with the Bank following requirements of International Standards on Auditing (ISA). The project audit report will be due six months from end of each fiscal year. Separate audit reports will be issued for IBRD and for CTF project financial statements, although both audits can be covered by one audit contract, which will be the responsibility of the CPMU. An audit of project financial statements will be financed from loan proceeds. Project audit reports will need to be publically disclosed by Minregion as well as the World Bank on their respective websites, as required by the Information Disclosure Policy of the Bank. Management letters issued by auditors are excluded from this requirement.

23. Annual audit of entity financial statements of each participating utility will be required. Such audits will be carried out in accordance with ISA by locally licensed audit firms, and also submitted to the Bank within six months from the end of each fiscal year. Auditors of utility financial statements will be appointed by each respective utility. These audits will be required by the project team to enable availability of reliable financial data for the ongoing monitoring of financial performance of the utilities, and also as part of capacity building activities aimed at strengthening the accounting and reporting framework of each utility. Audits of entity financial statements may be financed from either own funds of utility or the loan funds [to be determined and included in procurement plan if needed]. The utilities audit reports (excluding management letters) will also need to be publically disclosed by each respective utility as well as by the World Bank.

24. **Supervision Plan:** The frequency of the FM monitoring visits will be determined based on the current FM risk rating of the project. Based on the initial risk rating, it is expected that the FM monitoring visits would be carried out annually, and would cover all areas of FM and disbursement such as staffing, budgeting, accounting, reporting, auditing, and disbursement arrangements. The FM monitoring would normally consist of review of the FM arrangements at the CPMU level and at several selected utilities. The scope and frequency of the visits may be modified based on the findings of such visits and the revised risk assessment. All supervision findings will also serve as a basis for updating the ongoing training program during project implementation.

Disbursements

25. Proceeds of IBRD loan and CTF funds will be disbursed in accordance with the traditional disbursement procedures of the Bank, including Advances, Direct Payments, and Special Commitments. Each application will be accompanied by appropriate documentation in accordance with the procedures described in the disbursement guidelines and further detailed in the disbursement letters.

26. MoF will open designated accounts for Minregion (for its component) as well as for each of the participating utilities. Separate designated accounts will be opened for IBRD funds and for CTF funds (only for those utilities that will receive CTF funding). Designated accounts in USD will be opened in Ukreximbank, and additional transit accounts in Ukreximbank may be opened as needed for payments in other currencies. MoF will delegate management of all designated accounts to Minregion and to the participating utilities, but will retain the oversight function. Such disbursement arrangements will enable efficient control over the flow of funds, reconciliation of accounts balances, and preparation of periodic reports. Each of the participating utilities will receive access to Client Connection, and will be able to manage their own flow of funds, including preparation of withdrawal applications with assistance from the CPMU as needed. Withdrawal applications will require approval of MOF, following authorizations of the utility and Minregion, while payments from designated accounts will be managed by utilities and Minregion. Replenishment of the designated account will be done on the basis of payment projections prepared by the respective utility.

Procurement

Mitigation measures:

27. The agreed mitigation measures to be completed during project preparation are as follows: (a) the Bank will assist Utilities in preparing a Procurement Plan for the whole period of the project implementation; and (ii) Bank staff will conduct training on fiduciary requirements and specific procurement procedures.

28. The agreed mitigation measures to be completed by the loan effectiveness are: (a) Project Operational Manual will be elaborated by CPMU, approved by the Bank and endorsed by each participating Utility. It will provide, in particular, for delegation of approval authorities: internal guidelines for recordkeeping of procurement documents; anticorruption guidelines and provisions related to disclosure of conflict of interests; and a code of ethics for the evaluation committee members. It will also outline the arrangements for close collaboration between procurement and FM specialists in planning expenditures, the responsibilities of the beneficiary technical experts in elaboration of the technical requirements of the bidding documents, evaluation of bids, and acceptance of the goods and works. The bidding documents, for at least the first 12 months of the project implementation, will be elaborated by each beneficiary.

29. The agreed mitigation measures to be carried out throughout project implementation are: (a) The CPMU will provide continuous assistance to utilities in conducting procurement and facilitate communication with the World Bank; and (b) the Bank procurement team will provide continuous support and guidance to the CPMU and beneficiaries.

Applicable Guidelines

30. Procurement for the proposed project will be carried out in accordance with the World Bank's:

(a) Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, published in January 2011;
(b) Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, published in January 2011; and
(c) Guidelines: Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits, dated October 15, 2006 and revised in January, 2011.

Summarized Procurement Plan

31. A draft Procurement Plan for the entire project and each beneficiary will be developed and will provide information on procurement packages, methods, and the World Bank review method. This plan will be agreed between the beneficiaries and the project team and will be finalized at project negotiations. The finalized Procurement Plan will be disclosed on the World Bank's external website.

32. During project implementation, the Procurement Plan will be updated, as needed, in agreement with the World Bank project team to reflect the actual project implementation needs.

I. General

33. Period covered by this procurement plan:
Project implementation period

34. Reference to Project Operational Manual (POM):
Procurement manual will be elaborated as a part of the POM.

II. Procurement of Goods

35. Prior Review Threshold:

	Procurement Method	Procurement Method Threshold	Prior Review Threshold	Comment
1.	ICB	$1 mln for goods $ 5 mln for Works	All	
2.	NCB	<$1 mln for goods <$ 5 mln for Works	First by each Utility First by each Utility	
3.	Shopping	<100K	First by each Utility	
	Direct Contracting	n/a	n/a	All contracts will be subject to prior review

1	2	3	4	5	6	7
Ref. No.	**Beneficiary**	**Description of Assignment**	**Estimated Cost US$**	**Procurement Method**	**Review by Bank (Prior / Post)**	**Comments**
1	**Kyiv**	Rehabilitation of pumping station for Dnipro Water Utility; level 3 pumping station of Desna, pumping station of Krutohirna ; Installation of energy efficient water pumping stations	11 mln	ICB	prior	S&I
2	**Kharkiv WWTP**	Wastewater and Sludge treatment facilities	66 mln	ICB	Prior	D,S&I without PQ
3	**Kharkiv Solid Waste**	Reconstruction and upgrade of the solid waste facilities	40 mln	ICB	Prior	Large Works with Pre-Qualification
4	**Kirovograd**	1. Water treatment facilities in Dneieper – Kirovohrad Rayon 2. Rehabilitation of 22 Sewage pumping stations + SCADA 3. Rehabilitation of pipelines 23 km.	29 mln $17 mln $4 mln	ICB ICB ICB/NCB	Prior Prior Prior	S&I or D,S&I without PQ S&I or D,S&I without PQ Small Works
6	**Ternopil**	Construction of iron-removal facility at the water pumping station; Optimization of water distribution systems, intake and replacement of pumping stations (VSN No.1 and 5)				D,S&I without PQ
7		Replacement of sewer pipes; upgrade of sewerage pumping station (KNS No.9) and Reconstruction of wastewater treatment plant including sludge dewatering.				Works contracts
8	**Zhytomyr**	1. Rehabilitation of water pumping stations 2-nd and 3-rd level 2. Rehabilitation of waste water treatment 3. Rehabilitation of water pipes	$16,7 mln $12 mln $1 mln	ICB ICB NCB	Prior Prior Prior	D,S&I without PQ D,S&I without PQ Small Works
10	**Kramatorsk**	Reconstruction of water treatment plant (liquid Cl2 to Sodium Hypochlorite); Reconstruction sewage treatment facilities; and Replace water supply and wastewater pipes	5.25mln	NCB	Prior	Works
11	**Kolomiya**	Upgrade of water intake; Replace 16 km of water pipes and construct a new clear water storage tank of 6,000m3 capacity	3.009 mln	NCB	Prior	Works

12	**Donetsk**	Rehabilitation of water supply facilities in Kuibyshevskyi district	37.5 mln			Large works
13	**Ivano-Frankivsk**	Construction of wastewater treatment plant part 2.	15.0 mln	ICB	Prior	Large works
	Total					

III. Selection of Consultants

36. **Prior Review Threshold.** Selection decisions subject to Prior Review by the World Bank as stated in Appendix 1 to the Guidelines Selection and Employment of Consultants.

	Selection Method	Prior Review Threshold	Comment
1.	Competitive Methods (Firms)	>100,000	and first selection by any method irrespective of the size of the contract
2.	Individual Consultants	> 50,000	and all individual consultants selected for the project management
3.	Single Source (firms and Individuals)	n/a	All contracts will be subject to prior review

37. **Short list comprising entirely of national consultants.** Short list of consultants for services, estimated to cost less than $300,000 equivalent per contract, may comprise entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

38. **CQ application threshold:** < $300,000 equivalent per contract

Consultancy Assignments with Selection Methods

Ref. No.	Beneficiary	Description of Assignment	Est. Cost (US$)	Selection Method	Review by Bank (Prior / Post)	Comments
1	Kharkiv WWP	Construction supervision	$6 mln	QCBS	prior	
2	Kharkiv Solid Waste	Construction supervision	$4 mln	QCBS	prior	
3.	Kirovograd	Pre-contract services and construction supervision	$3.5 mln	QCBS	prior	
4.	Zhytomyr	Construction Supervision	$0.3 mln	CQ	prior	

39. All technical specifications and TORs will be subject to prior review by the World Bank.

40. Detailed procurement documentation will be maintained by each utility company in the project files.

41. The detailed Procurement Plan, once agreed with the Borrower, will be published on the World Bank website in accordance with World Bank Guidelines.

42. **Post-review percentages and frequency.** In addition to the prior review to be carried out by the World Bank, the project team recommends to post-review at least 20% of the total number of contracts signed which were not subject to prior review. Procurement documents will

be kept readily available for the World Bank's ex-post review during supervision missions or at any other points in time. It is expected that the World Bank will conduct post reviews every 12 months. A post review report will be prepared and filed in the procurement post review system.

Environmental and Social (including safeguards)

43. The project is assigned an environmental screening category "B", as there will be only minor negative environmental impacts. These negative impacts will be mitigated by proper planning and adherence to measures described in the Project Operational Manual (POM).

44. An Environmental and Social Management Plan (ESMP) for Kharkiv SWM and Environmental and Social Management Framework (ESMF) and RPF for WSS have been prepared and publicly disclosed locally and in the Bank's Infoshop on March, 2014.

45. Public consultations on Kharkiv's ESMP as well as ESMF and RPF for WSS took place in participating municipalities in 2014. Prior to the meeting, notifications were posted on Minregion's website, as well as on the participating municipalities' websites and in the Government newspaper, "Uriadovyi Courier" (The Governmental Courier), and in municipal newspapers on January 20, 2014, inviting interested stakeholders to participate. The English language version of the Kharkiv ESMP and ESMF and RPF and minutes of the public consultation meetings were disclosed at the Infoshop on March, 2014. Site specific environmental management plans (EMPs) for Kirovograd, Kramatorsk, Donetsk, Kharkiv, Kolomiya, Zhytomyr, and Ternopil will be finalized and disclosed locally and in the Bank's Infoshop at a later stage. Upon finalization of site specific technical designs the RAPs will be prepared by the borrower where relevant, duly disclosed and mitigation measures implemented prior to start of project works. The regional project management units (RPMU) were trained in Bank Safeguards Policies and also provided guidance on monitoring for compliance with them. The RPMU will alert CPMU and the Bank in case of any displacement caused by project works The Safeguards specialist in CPMU will monitor the implementation of the RPF as part of regular monitoring activities. The Bank will monitor compliance with OP 4.12 in the framework of its supervision missions.

46. The project –specific grievances mechanism will be set at the level of every RPMU and the CPMU. The information grievances submission channels will be placed on the project page on the website of Minregion and on the web-pages of respective utilities. The grievances will be filed and analyzed to draw lessons for the project implementation. The forms and the procedure of registering and addressing grievances will be described in the Project Operations Manual.

47. The Minregion and participating utilities have qualified technical staff for assuring compliance with Ukrainian environmental requirements (each has an Environmental Department that belongs to the Chief Engineer) and Sanitary Laboratories.

48. The World Bank conducted safeguards training for representatives of Minregion staff (the CPMU) and environmental experts at each of the participating utilities during project preparation. Designated training on disclosure and public consultations on Kharkiv's ESMP and ESMF was organized on November 13, 2013. Additional training may be required to develop the client's skills on EMP implementation. Depending on training needs, the project team's

environmental specialist will organize additional workshops providing hands-on experience to build capacity at the local level.

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[X]
Pest Management (OP 4.09)	[ ]	[X]
Physical Cultural Resources (OP/BP 4.11)	[X]	[ ]
Involuntary Resettlement (OP/BP 4.12)	[X]	[ ]
Indigenous Peoples (OP/BP 4.10)	[ ]	[X]
Forests (OP/BP 4.36)	[ ]	[X]
Safety of Dams (OP/BP 4.37)	[ ]	[X]
Projects in Disputed Areas (OP/BP 7.60)[11]	[ ]	[X]
Projects on International Waterways (OP/BP 7.50)*	[X]	[ ]

Monitoring & Evaluation

49. Project monitoring and implementation progress, as well as reporting of progress towards achieving the PDO and results indicators will be the responsibility of the CPMU as well as the RPMUs. The Results Framework (Annex 1) presents the intermediate and final outcomes of the project. The utilities will work towards the timely achievement of these outcomes and will submit to the World Bank annual Project Progress Reports. The Project Progress Report will provide the status of project implementation and recommend any measures necessary to meet project objectives. Results from all nine project entities will be provided to the CPMU. The CPMU will collect data on key and intermediate indicators from the RPMUs and present the data through the Project Progress Report to be sent to the World Bank on a bi-annual basis. This will be followed-up with World Bank supervision missions of the project.

Previous Cases

50. In 2012, the Ministry of Regional Development, Construction, Housing and Communal Services reported a number of concerns to the World Bank in relation to the predecessor project: the Urban Infrastructure Project (P095337). The Bank's Integrity Vice Presidency (INT) was able to confirm lapses in the actions of the CPMU and a number of firms. As a result of related cases, the Bank and the Government pursued sanctions against the firms. The preparation of this new project has taken into account the risks that were revealed in the investigations and relevant mitigation measures are included as a part of the design. A set of mitigations measures were discussed with the government, these include but are not limited to training on fiduciary requirement and specific procurement procedures; close and frequent supervision; quality control of procurement decisions, continuous support and guidance to the project management units by the Bank team. It should be emphasized that the government identified risks, raised concerns with the Bank and local enforcement agencies, and took timely and appropriate measures to safeguard the funds of the previous project.

[11] By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas

Role of Partners

51. The project is using grant funding from regional development partners including: the Swedish International Development Agency (SIDA), and Kreditanstalt für Wiederaufbau (KfW) of Germany. SIDA funded the "Comprehensive Water and Wastewater Feasibility Study" for five of the nine identified project cities (Ternopil, Zhytomyr, Kramatorsk, Kirovograd, and Kharkiv) and intends to contribute an additional US$5 million for the institutional strengthening and training component of the project. KfW provided grant for the preparation of the Comprehensive Water and Wastewater Feasibility Study being carried out for the Donetsk subproject, which will also include preparation of the city's environmental impact assessment (EIA).

Annex 4: Financial and Economic Analysis

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)

I. Economic Analysis

Rationale for Public Sector Investment

1. In Ukraine, water, wastewater and solid waste disposal services are traditionally supplied through public sector companies under municipal management and ownership. The benefits of water supply and especially wastewater services and solid waste services do not only accrue to individuals, but also to the society in terms of improvements in public health, and environmental benefits (through the protection of water and soil resources, natural ecosystems and biodiversity). Although the benefits of improved water supply, wastewater and solid waste management will accrue to the society as a whole, the benefits of such investments are usually not sufficient to induce private sector investments. This is especially true for Ukraine, where the municipal sector has suffered from decades of underinvestment and poor maintenance in combination with low tariffs which has resulted in utilities which depend heavily on the government for funding their daily operations. Hence, public financing is still needed to ensure that investments can be made.

Rationale for Bank Involvement

2. The Bank has been involved in the municipal service sector since 2007. For utilities to improve their operating efficiency, investments are needed. These investments will be large due to the decades of underinvestment in the sector. The Bank, with its global experience, will be able to combine a focus on funding the most cost-effective investments that will assist the utilities in improving their efficiency in service delivery and hence assist in increasing the levels of cost recovery in the participating utilities. This is an area that has not garnered that much attention yet, but that is an important element in the Bank's Country Partnership Strategy, as it is critical tool to put the sector on a more sustainable footing while providing essential services to the population. The Bank value added is most notably in (i) the use of technologies and approaches that are not yet introduced in the Ukrainian municipal sector; and (ii) the lack of local expertise in helping utilities and the recently established regulator with the transition to a more financially viable sector, while ensuring that the service remains affordable to the poor. The involvement of the Bank also allows for the inclusion of a significant amount of funds from the CTF and other bilateral donors to be employed for necessary investment and capacity building activities under the project that will facilitate the transition to a more financially viable sector.

3. The financial and economic analysis will put particular emphasis on the viability of subprojects to be supported by UIP-2, and their importance in reducing the cost of service provision by utilities through generating significant efficiency improvements. These efficiency improvements will help to reduce the gap between the revenues that the utilities generate and the cost of their services, which will reduce the burden on government and consumers.

Cost Benefit Analysis

4. At appraisal, 4 subprojects that will be funded under UIP-2 had sufficient information to prepare a financial and economic analysis (including financial statements of the utilities including the project impact). These projects make up 37 percent of the total investment program of USD 335 million. Once sufficient information on the remaining subprojects becomes available, a financial and economic analysis of these subprojects will be prepared to ensure that they are economically viable and to assess their impact on the financial performance of the utilities.

5. ***Objective of the Project***. The project development objective (PDO) is to improve the quality and efficiency of water, wastewater, and solid waste services in selected cities in Ukraine. This will be achieved through rehabilitation and reconstruction of WSS infrastructure in nine cities. The project will also support improvements in sustainable service delivery through the utilities performance improvement program.

6. By improving the quality and efficiency of selected municipal services in targeted cities, the project will contribute directly to reducing the burden that the water supply and sewerage sector currently puts on government budgets. The project will result in a decline of the real costs of the utilities, and hence improve the efficiency with which the services are provided. The precise combination of benefits per utility depends on the investments selected. Yet, the benefits of the project will include (i) increases in energy efficiency; (ii) reduction in maintenance costs associated with the poor state of the water and wastewater assets; (iii) reduction in waste and losses, especially non-revenue water. In addition, by making these investments, the water and wastewater provided will be of higher quality, while in some utilities access to water and wastewater services will increase. The project will also produce public health and environmental benefits in those utilities where existing wastewater and solid waste (including sludge treatment) facilities are being rehabilitated and upgraded. These environmental benefits will be reflected in the reduction of environmental pollution loads, reduction in greenhouse gas emissions, and recycling of solid waste.

7. The capacity building activities are important as they will help to improve the governance of the utilities and the water, wastewater and solid waste sector, but these will also help improve the efficiency and quality of services, because they essentially create and/or strengthen the enabling environment in which utilities operate. Yet, in the analysis of the first four projects, the analysis focuses on the investment projects.

8. The project costs are the investments required for the various project activities, and the corresponding operation and maintenance costs associated with ensuring that the investments can generate the water, wastewater and solid waste services in the short-, medium- and long-term.

9. ***Methodology for Selection of Investments***. In the cost-benefit analysis, costs and benefits were assessed at financial prices. In a second stage, the financial cash flows were translated into economic cash flows by using standard conversion factors to translate financial prices into economic prices. In addition, the economic analysis also values the reduction in greenhouse gas emissions that the projects will achieve. Greenhouse gas emissions reductions

have not been valued in the base case scenario, but the risk analysis will include these benefits assuming a positive price of carbon[12].

10. In case the project will not be implemented (the "without" project scenario), the quality of service provision will continue to decline, and so will the efficiency with which the service can be provided. Decades of underinvestment and poor maintenance have resulted in an asset base that is in dire need of replacement and upgrading. Without this replacement and upgrading, the services that are provided to customers will continue to deteriorate, where non-revenue water losses escalate and emergency maintenance will increase as a result of system and equipment failures. Even more important, as is currently also happening in Zhytomyr, the utility is not able anymore to provide continuous water supply to some of its customers.

11. This further enforces the vicious circle in which utilities find themselves; the low service quality results in lower collection efficiencies as customers are increasingly unwilling to pay for such services, which makes it very difficult to increase the tariffs as a critical tool to improve the financial sustainability of the utilities.

12. More specifically, the "without project" scenario is defined as follows:

- In Kyiv, the without project scenario foresees an increase in energy intensity and an increase in emergency and regular maintenance and repair to ensure that the current plants keep on operating. In Kharkiv, the existing landfills are close to saturation and a new landfill is needed to deal with the solid waste produced in the city. In both with and without scenarios, a new landfill is required. In the case of the "without project" scenario, a more traditional technology will be used that is less costly but does not produce the benefits of the proposed technology. .
- Sludge from the wastewater treatment plant in Kharkiv is currently partially treated and afterwards deposited on lands near the airport. As the lands are getting saturated, a solution is also needed as continuing the current practice is not possible. It is assumed that the current practice is likely to continue in the "without project" scenario but will require investments in land.. In a conservative estimate we assume that these investments will be needed and will take place by 2017[13].
- In Zhytomyr under the "with project" scenario the utility will benefit from energy savings, savings in maintenance costs and associated personnel costs, reduction in non-revenue water. In the "without project" scenario, the decline in capacity to service will continue and a greater portion of the population will no longer be able to receive services around the clock.

13. Under UIP-2 (the "with" project scenario) the participating utilities have suggested that each utility includes a set of investments that were selected on their commitment, the development impact of their proposed investments, and a minimum available level of project readiness. As discussed above, the economic and financial analysis has been prepared for these four investment programs at project preparation. For the remaining investment projects, an

[12] This price level originates from www.carbonpoint.com

[13] The European Environment Agency has published data on wastewater sludge treatment in 1997 ranging from Deutsch Mark (DM) 250-600 for composting, DM 300-800 for drying, DM 450-800 for incineration, and DM200-600 for landfills. .

economic and financial analysis will be prepared once more details of the investment programs are available and the design will be – if necessary – adjusted to ensure that the subprojects are economically feasible.

14. The net benefit is the difference between the incremental benefits and the incremental costs of two scenarios: "with" and "without" the project. The "with" project scenario considers the proposed project and its associated targets. The "without" project scenario considers that utility consumers will face continuous deteriorating services. .

15. The activities were appraised measuring their flow of costs and benefits for the lifetime of the project, estimated as 25 years. Costs and benefits were expressed in constant prices as of 2013[14]. The discount rate corresponded to the opportunity cost of capital, estimated to be 10 percent, as used in other projects in Ukraine.

16. ***Benefits.*** The combination of benefits depends on the investments selected. The benefits under UIP-2 will include (i) increases in energy efficiency; (ii) reduction in maintenance costs (and related staff costs) associated with the poor state of the water and wastewater assets; (iii) reduction in non-revenue water losses; (iv) revenues from consumers in those towns; (v) benefits linked to electricity generation and recycling of waste. In addition, by making these investments, the water and wastewater provided will be of higher quality, while in some utilities access to water, wastewater and solid waste services will increase. The project will also produce environmental benefits in those utilities where existing wastewater and solid waste (including sludge treatment) facilities are being rehabilitated and/or, upgraded. These environmental benefits will be reflected in the reduction of environmental pollution loads into rivers and other water bodies and associated public health benefits, reduction in greenhouse gas emissions, and recycling of solid waste, which have not been included due to lack of data at the time of appraisal

17. ***Costs.*** For most of the projects, which are rehabilitation projects, the utilities will actually save on operation and maintenance costs due to the savings made in energy consumption and maintenance costs and by reducing network losses. In projects that are linked to upgrading of services, the costs that are taking into consideration will include investment costs and incremental operation and maintenance costs.

18. *Investment costs.* The investment costs for each subproject were estimated based on feasibility level designs. The only costs not included in the analysis are technical assistance costs that are not directly related to the implementation of the works. These activities are focused on capacity building and project management. Financial investment costs include (i) the costs of the investment program linked to the participating cities, including physical contingencies and supervision; (ii) replacement costs of equipment such as electromechanical parts and (iii) incremental operation and maintenance costs.

19. *Operation and Maintenance Costs (O&M).* The incremental operation and maintenance costs include incremental costs of staff, chemicals, electricity and maintenance. Labor costs were calculated as the number of incremental employees and the average financial cost per

[14] The exchange rate used was USD 1 is equivalent to UAH 8

employee. It is assumed that both the "with" and "without" project scenarios would over time benefit from significant efficiency improvements. Energy cost savings were calculated as the savings in the volume of energy used multiplied by the electricity rate paid by the utility. In cases, where changes are made to drinking water and/or wastewater treatment processes, the project may also generate chemical cost savings. Finally, improvements in the systems will often reduce the maintenance cost for utilities, even though the new investment will require that the new investments will be properly maintained. In Kyiv, for instance, the emergency and routine maintenance to deal with the fully depreciated pumps and ancillary equipment is increasing and significant savings are foreseen when the energy efficiency program is implemented.

20. Financial costs were transformed into economic costs using conversion factors (SCF), which eliminate market distortions created by taxes, tariffs and subsidies. T axes include value added taxes, trade tariffs and tax legislation for labor. The economic cost for each input is estimated as the financial cost multiplied by its conversion factor. The most important SCF is for electricity. According to a recent study, the economic price of electricity should at least be increased by two times the current level for non-residential users[15]. The project uses a labor SCF of 0.67, an overall SCF of 0.95 and an electricity SCF of 2.0.

21 ***Results***. Table A4.1 shows that the cost benefit analysis for all subprojects analyzed generate healthy rates of returns for the base case. This base case does not assume, any real tariff increases and does not account for the benefits of reduced GHG emissions. In case the benefits of a reduction in greenhouse emissions are included the EIRRs the benefits increase significantly. In Zhytomyr, the project does not include the benefits of improved wastewater treatment and the corresponding impact on a reduction of pollution loads due to lack of data.

Table A4.1: Results of the Cost Benefit Analysis without any real tariff increases

Subproject	Economic CBA with economic prices but without GHG emissions	
	NPV (UAH mill.)	EIRR %
Kyiv	256	41
Kharkiv solid waste management	78	15
Kharkiv sludge management	120	17
Zhytomyr	5	10

22. ***Sensitivity and Risk Analysis.*** The results obtained so far assume that the values of all variables are certain. The sensitivity and risk analyses measure the impact on the results when some of the assumed values for the key variables change. The sensitivity analysis measures the outcome if one of the variables changes while all others remain fixed. The risk analysis measures the outcome when all selected variables change at the same time, each one based on a probability distribution.

[15] Ogarenko, Iuliia and Klaus Hubacek, 2013. Eliminating Indirect Energy Subsidies in Ukraine: Estimation of the Environmental and SocioEconomic Effects Using Input-Output Modeling. Journal of Economic Structures, volume 2: 7.

23. *Sensitivity Analysis.* The variables tested for the sensitivity analysis were: (i) investment cost overrun; (ii) change in standard conversion factor for electricity price; (iii) price of greenhouse gas emissions. Results of the analysis show that except for the project in Zhytomyr:

- investment costs and associated maintenance costs convey a low risk to the project. Investment costs can increase as much as 40-60% and the projects in Kharkiv will still generate positive net present values. In Kyiv, the effect of any increases in investment costs is even more negligible
- benefits related to the distortions in energy prices and its effect on energy efficiency investments convey very little risk. Even a much lower standard conversion factor will not affect the net present value significantly
- the exclusion of greenhouse gas emissions does not result in negatives economic net benefits as the base case scenario already excluded such benefits.

24. *Risk Analysis.* To enhance the accuracy of the financial and economic analysis, the uncertainties of the real world are approximated using Monte Carlo simulation with the Crystal Ball software. This software measures the extent of various risks and their impact on the results of the project by modeling a likely probability distribution that best describes the behavior of each of the selected variables. Based on a simulation of 10,000 trials the model recalculates the results of the economic analyses by simultaneously changing each of the selected risk variables according to their probability distributions.

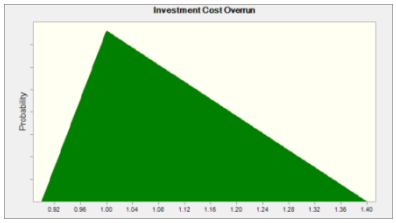
25. The assumed probability distributions of the three key variables and their respective parameters are found hereunder. For the different projects other key variables were included such as the change in energy intensity, reduction in non-revenue water and the volume of recycling.

General Assumptions

Assumption: Investment Cost Overrun

Triangular distribution with parameters:

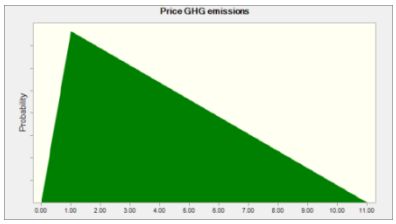
Minimum	0.90
Likeliest	1.00
Maximum	1.40



Assumption: Price GHG emissions

Triangular distribution with parameters:

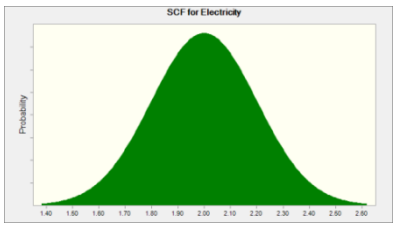
Minimum	0.00
Likeliest	1.00
Maximum	11.00



Assumption: SCF for Electricity

Normal distribution with parameters:

Mean	2.00
Std. Dev.	0.20



26. In sum, as seen in Table A4.3, the result of the risk analysis confirms the robustness of the project. The probability of having positive economic rates of return is 100 percent. The risk evaluation shows that the likelihood of a negative economic outcome – once market distortions are eliminated and the benefits captured – is non-existent in all activities, except for the Zhytomyr component; the probability of having positive returns in this component is 64 percent, mainly due to the absence of any environmental benefits that could not be quantified at the time of appraisal.

Table A4.3: Risk Variables and their impact on Economic Net Present Value

Subproject	Probability of a Positive NPV	Mean Expected NPV UAH mill)
Kyiv	100%	317
Kharkiv Solid Waste	100%	417
Kharkiv Sludge Management	100%	465
Zhytomyr	64%	11
Subtotal 4 projects	100%	1,211

II. Financial Analysis

Financial situation of the water supply and sanitation (WSS) utilities

27. The analysis is conducted at the utility level, which means that it is taking into account not only the debt financed investments but also all the business as usual decisions.

28. The financial analysis covers four of the prospective utilities. The financial and economic (F&E) team did not receive all the necessary information to complete the F&E analysis for the rest of the utilities for which the feasibility studies are under preparation and are expected to be completed by June 2014. The F&E analysis for these utilities will follow the same approach once the information is available. Once the information is available, a F&E analysis will be undertaken and the subprojects will be adjusted in design in case they are not economically viable.

29. The most important objective of the financial analysis is to explore the effects of the proposed investments on the financial situation of the companies and ensure that the utilities can demonstrate an annual debt service coverage ratio (ADSCR) of 1.3 or better during the repayment period. Because the existing tariffs are significantly below cost recovery levels (in some cases utilities cover not more than 55% of the actual operation and maintenance costs), the analysis assumes that government subsidies for these utilities will continue to allow for an acceptable and steady real increase of the tariffs until the subsidies are phased out (global experience shows that this process will take time, and is assumed to take about ten years in this analysis). The analysis is done at utility level, which means that it is taking into account not only the debt financed investments but also all the business as usual decisions (besides the Bank investment, the utilities will have to keep on operating and maintaining existing infrastructure to provide consumers with water, wastewater and solid waste services).

30. The financial analysis is using the historical performance data from financial statements of the companies for the past three years and making certain assumptions to forecast the future performance. The financial situation of Kyiv, Kharkiv and Zhytomyr vodokanals are extremely difficult. This is mainly as a result of tariffs that do not cover the costs of services. These utilities rely heavily on central government transfers (to cover the gap between a tariff needed to achieve cost recovery and the existing tariff, or **"cost recovery gap"** this is usually by off-setting electricity costs), which are not regular and make them financially dependent on central government.

31. The financial analysis of these three WSS utilities as well as the Kharkiv's solid waste utility to be responsible for both the EPC and the operations and maintenance (O&M) of the new solid waste landfill has focused on ensuring sufficient cash flow to enable adequate O&M of the assets and service the debt. It has been assumed that the financial conditions of the IBRD loan will be transferred to the participating utilities on the same terms as the lending to the sovereign.

32. The financial analysis will project the cash flows of the utilities with the key criterion being that the cash flow generated will be sufficient to enable ADSCR of at least 1.3. To ensure that this minimum debt service coverage will be met a combination of real tariff increases and government subsidies are needed. It is assumed that the real tariff increases will not exceed 25% in the next five years. Because the existing tariffs are significantly below cost recovery levels, the analysis assumes that government subsidies for these utilities will continue so as to allow for acceptable and steady real tariff increases until the subsidies are phased out around ten years from now. After closing the cost recovery gap the tariffs are set to increase only with the inflation rate but due to the accumulated under-investment in the WSS system additional real tariff might be needed in some utilities. These tariff increases will allow the WSS utilities to invest adequate amounts for proper maintenance of the existing systems in order to stop the process of deterioration of assets. Of course along with the necessary tariff increases utilities should take active steps in optimizing their costs and increasing efficiency.

WSS Tariffs

33. The WSS tariffs are regulated by the National Commission for Regulation of Communal Services, since 2011. Unfortunately, the team could not agree more with earlier observations[16] that currently the regulator seems too focused on inputs (like energy consumption) and outputs (like water losses) but not on outcomes such as reliable service and/or water quality. This results in constant pressure from the regulator for tariff reductions contrary to the required increases needed to ensure cost recovery and sustainability of services, and as a result tariff increases in the past years have been insufficient. Based on our analysis and feedback from utilities, the team can clearly identify that for the past three years the cost recovery gap has increased.

34. As mentioned above the government is subsidizing the utilities by covering the gap between cost recovery and existing tariff. Addressing the tariff imbalances and reducing the dependence on government transfers will require time. The financial analyses show that the existing tariffs need to increase significantly, which will require time to ensure that these tariff increases are acceptable for customers. The financial analysis assumes that in the next 10 years

[16] Zetland, David: Draft comment on Commission methodology, July 2013

the state will continue to subsidize water utilities to ensure the acceptability of tariff increases but during this time subsidies will gradually be phased out while the tariffs increase up to cost recovery level.

35. The Bank will assist the government and the water regulator to develop a clear plan for an increase of the tariffs and a decrease of government transfers until cost recovery level is achieved for the financed utilities. The team will monitor financial progress of the prospective utilities to maintain a certain annual ratio between the cash operating costs (excluding depreciation) and cash operating revenue – operating cost coverage ratio (OCCR) during the project cycle to ensure steady real increase of the tariffs until the utilities reach cost recovery level.

Financial Results

36. As explained above the most important objective of the financial analysis was to explore the effect of the proposed investments on the financial situation of the companies and ensure that the utilities can demonstrate an ADSCR of 1.3 or better during the repayment period.

37. With the exception of Kyiv all the proposed interventions are quite significant for the prospective utilities when comparing them to their past investment experience. Investments will have a significant effect on their O&M costs and financial costs. Timely adjustments of their tariffs to be able to cover the new financial costs and ensure proper operation and maintenance of the new WSS assets is required for the successful completion of the project and ensuring the financial sustainability of the utilities and provided services.

38. **Kyiv vodokanal**: The proposed intervention is very small for a company serving almost 3 million people. Nevertheless, the financial analysis is showing that the cost recovery gap is probably the biggest among the financed utilities. The company received almost a third of the government subsidies for the WSS utilities in 2012. Steady increase of the WSS tariffs up to cost recovery level is vital for the financial sustainability of the company. The financial model is showing that in the next 5 years (2014-2018) the tariffs should increase in real terms of around 23%. The government should continue to provide subsidies until the tariffs cover the costs of providing WSS services. The project generates significant savings in electricity costs due to increased energy efficiency. Sensitivity was done and even if the projected electricity consumption savings are reduced by 10% the project is still worth investing in.

Table A4.2: Results of the Financial Analysis Kyiv

Year	2014	2015	2016	2017	2018	2019
ADSCR	n/a	n/a	164.5	40.4	6.0	5.2
OCCR	0.61	0.66	0.70	0.72	0.73	0.75
Real tariff increase	0%	10%	5%	5%	3%	5%
Project tariff	3.26	3.68	4.00	4.34	4.61	5.00
Affordability ratio	1.7%	1.8%	1.8%	1.9%	1.9%	1.9%

Note
** Affordability ratio presents the percentage of the average WSS bills (at 2012 consumption) from the average household monthly income.*

39. **Kharkiv vodokanal**: This utility already has some long term debt obligations ($ 11.6 million as at the end of 2012) but its gearing is small with debt/equity ratio of 17%/83% (as at the end of 2012). With the new debt financed investments the ratio will go up to 70%/30% (at the end of 2016) but remains within manageable levels due to the projected steady EBITDA increase. Similarly, as in Kyiv, the financial model for Kharkiv is showing that in the next 5 years the tariffs should increase in real terms by around 24%. The government should continue to provide subsidies until the tariffs cover the costs of providing WSS services. Sensitivity was done due to the significant expectations for revenue generation because of the production of electricity by the sludge treatment plant:

- 20% reduction of the expected electricity production will reduce the FIRR by 1% and NPV by USD 4.2 million.
- More significant is the effect of land sales at the end of the project (the plant will help the utility to clear 126 hectares currently occupied by sludge, which they intend to sell). A failure to sell the land at market prices will reduce the FIRR with 2% and turn the NPV negative.

Table A4.3: Results of the Financial Analysis Kharkiv vodokanal

Year	2014	2015	2016	2017	2018	2019
ADSCR	4.2	4.0	4.3	4.0	3.4	3.4
OCCR	0.94	0.97	1.01	1.02	1.05	1.05
Real tariff increase	0%	10%	5%	5%	4%	5%
Project tariff	3.65	4.13	4.48	4.86	5.20	5.64
Affordability ratio	1.7%	1.8%	1.9%	1.9%	1.9%	2.0%

40. **Zhytomyr vodokanal**: This utility does not have any debt obligations as at the end of 2012. Nevertheless the projected investment is quite significant for such a small utility (covering around 271,000 people) and with the intervention the debt will amount to almost three times the equity of the company as at the end of 2016. Although it is extreme leverage the utility could manage the debt if there are steady tariff increases reaching 25% (in real terms) in the next 5 years. The government should continue to provide subsidies until the tariffs cover the costs of providing WSS services.

Table A4.4: Results of the Financial Analysis Zhytomyr

Year	2014	2015	2016	2017	2018	2019
ADSCR	n/a	16	20.1	17.2	3.4	2.8
OCCR	1.03	1.09	1.11	1.13	1.14	1.17
Real tariff increase	0%	10%	5%	5%	5%	5%
Project tariff	6.19	6.71	7.28	7.90	8.57	9.30
Affordability ratio	1.4%	1.5%	1.5%	1.5%	1.6%	1.6%

41. **Kharkiv's solid waste utility**: This project differs from the ones analyzed above, as it is a greenfield investment in a new landfill with two stages. There is a municipality owned utility that is responsible for the existing landfill. The company will be in charge of the O&M of the new landfill. The intervention is financing the first stage of the proposed project and the second stage will be financed with own resources. The project is benefitting from electricity to be generated both from the existing landfills and the new one. Sensitivity analysis was done to

determine the effect of changes in the revenues related to the production of electricity and the utilization of separated waste:

- 20% reduction of the expected electricity production will reduce the FIRR by 2.6% and NPV by $ 8 million.
- Less significant is the effect of reduction in utilization of separated waste by 20%. FIRR will be reduced by 1.5% and NPV by $ 4.4 million.
- More significant is the effect of the utility not being able to sell the produced energy at green energy prices (in some countries one can only sell excess electricity once one own needs have been covered). In this case the FIRR with be reduced by 5.1% and NPV will become negative.

Table A4.5: Results of the Financial Analysis Kharkiv solid waste

Year	2014	2015	2016	2017	2018	2019
ADSCR	n/a	n/a	n/a	12.2	4.0	4.1
OCCR	n/a	n/a	n/a	2.46	2.98	2.96
Real tariff increase	n/a	n/a	n/a	15%	10%	0%
Project tariff (per person/year)	n/a	n/a	n/a	20.28	23.01	23.82
Affordability ratio	n/a	n/a	n/a	0.05%	0.05%	0.05%

Notes:
* real tariff increase from the current landfill charge
** project tariff covers just the landfill charge
*** affordability ratio presents the percentage of the landfill charge from the average annual household income.

Table A4.6: Results of the Financial Analysis Summarized

Subproject	**Financial CBA**	
	NPV ($ 000)	**FIRR %**
Kyiv**	**35,990**	**21**
Kharkiv solid waste management	**14,928**	**14**
Kharkiv sludge management	**9,372**	**12**
Zhytomyr	**374**	**10**

Notes:
* Financial and Economic Analysis cover a period of 25 years.
** The NPV and FIRR for Kyiv are quite distorted due to the small investment and significant subsidies provided by the state to the utility.

Annex 5: Operational Risk Assessment Framework (ORAF)

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)
Stage: Appraisal

<table>
<tr><th colspan="7">1. Project Stakeholder Risks</th></tr>
<tr><td>1.1. Stakeholder Risk</td><td colspan="6">Rating Substantial</td></tr>
<tr><td>Description:
Utilities understand the necessity of modernizing their assets and improving the efficiency of their operations. However, not all utilities and municipalities may be convinced that the proposed reforms and cost recovery tariffs are the best way to go.

Consumers of the selected utilities may not support tariff increases. They may not believe that the improvement in the quality of services justifies the tariff increases. Implementation of the tariff increases, without adequate consultation may lead to resistance.</td><td colspan="6">Risk Management:
Project efforts will build on local knowledge of state organizations and NGOs with extensive on-the-ground experience in the selected areas, and will be developed in a participatory way with substantial consultations with local residents and community representatives. The team will continue regular meetings and consultations with the stakeholders to monitor implementation progress and identify any issues, or delays.

The project will invest in institutional strengthening and awareness-raising to ensure that consumers, utilities and the regulators are fully aware of all issues involved. Customer surveys will be carried out during the design phase of each sub-project, and mechanisms put in place to address any concerns or potentially adverse impact on local communities. Customer response will also be sought upon project completion, and be used to feed back into the design of the next round of projects.</td></tr>
<tr><td></td><td>Resp:
Client</td><td>Stage:
Implementation</td><td>Recurrent:
☐ Yes</td><td>Due Date:
Ongoing</td><td>Frequency:
Ongoing</td><td>Status:
In progress</td></tr>
<tr><th colspan="7">2. Implementing Agency Risks (including fiduciary)</th></tr>
<tr><td>2.1. Capacity</td><td colspan="6">Rating Substantial</td></tr>
<tr><td>Description:
The capacity of the Central Project Management Unit (CPMU) of the Ministry of Regional Development, Construction, Housing and Communal Services is considered adequate for implementation as the systems already in place and institutional capacity developed through the first project will continue to be utilized. However, at each of the nine cities Regional Project Management Units (RPMU's) will be established comprised of staff from the municipalities / utilities with limited exposure to and experience with World Bank financed projects. This lack experience in Bank procedures and lower capacity more generally may lead to implementation delays.</td><td colspan="6">Risk Management:
The project will establish and detail implementation arrangements, systems and procedures to be followed through the project's implementation manual. Training will be provided by the Bank related to financial management, procurement, M&E and environmental and social safeguards as per the recommendations and findings from the assessments carried out during preparation. The CPMU will also carry out training and monitor and coordinate the work of the RPMU's. It is envisaged that more intensive support from the CPMU and Bank will be required during the initial stages of project implementation. Furthermore, Implementation Agency capacity assessments will be carried out for all utilities, and where necessary, additional technical support deemed would be provided by training and/or hiring experienced staff in the interim, while building local capacity.
Support will be provided to the Regulatory Commission through component 2 of the project.</td></tr>
</table>

As highlighted above, the capacity of the National Regulatory Commission is still developing and their effectiveness and credibility is yet to be established – which may lead to difficulties and conflicts with the utilities in the process of the implementing the necessary sector reforms.						
	Resp: Bank/ Client	**Stage:** Preparation & Implementation	**Recurrent:** Yes☐	**Due Date:** Ongoing	**Frequency:** Ongoing	**Status:** In progress
2.2. Governance	**Rating**	Substantial				
Description: Given the number of agencies and utilities involved in the project's implementation, it could be difficult to exercise sufficient oversight and control of project implementation.	**Risk Management:** The overall management, coordination and monitoring and reporting requirements for the project are the responsibility of the CPMU who are experienced and have managed similar activities through the first urban development project. Governance structures and project controls will be developed and set out in the project implementation manual and training will be provided to the RPMUs and other project participants as required. Furthermore a Project Steering Committee will be established to provide guidance to the project and improved Governance. The PSC will be comprised of representatives from each of the utilities and relevant sector agencies and will have a consultative nature and decision-making abilities. The project budget allocations will reflect the necessary requirements for Governance and management of the project including training and institutional strengthening.					
	Resp: Bank/ Client	**Stage:** Preparation & Implementation	**Recurrent:** Yes☐	**Due Date:** Ongoing	**Frequency:** Ongoing	**Status:** In progress
Fraud and Corruption (sub-category of Governance risk) (Note for information: this section is not disclosed at Negotiation and Board presentation stages, except the risk Management measures which will be merged with those on 2.2 Governance)	**Rating**	**Substantial**				
Description: There are risks to the project associated with fraud and corruption due to the general prevalence of such issues in the operating environment as outlined in the current country risk assessment. However, the implementing agencies proved to be diligent during	**Risk Management:** Mechanisms to mitigate risks associated with Fraud and Corruption are developed and incorporated in the project design during preparation. Financial Management and Procurement procedures and controls will be well established responding to specific needs identified during the capacity assessments. These will be documents in the project implementation manual and training provided prior and during implementation. The Bank will also					

the previous project, finding and reporting irregularities to the Bank and local authorities. No new risks have been identified during preparation. Experience from the first urban development project indicates that the CPMU and Ministry more generally are committed to minimize the risks associated with fraud and corruption.	closely monitor such activities and compliance.					
	Resp: Bank/ Client	**Stage:** Preparation & Implementation	**Recurrent:** Yes☐	**Due Date:** Ongoing	**Frequency:** Ongoing	**Status:** In progress

3. Project Risks						
3.1. Design	**Rating**	Substantial				
Description: Inaccurate project costing based on feasibility studies or substandard bid documents may cause actual costs to vary substantially from initial estimates. This will be the first sludge and solid waste treatment plants to be constructed and as such the PIU might have less experience in the design and preparation – which could affect cost estimates and technical aspects associated which would delay implementation. Project activities include three municipal services addressing and range of priority investments to be implemented across 8 cities. A large number of contract packages for execution of the works may lead to management and control issues.	**Risk Management:** The task team will work closely with the CPMU and utilities to ensure adequate attention is given to the development of investment plans and that feasibility level designs are accurate and can be used to determine cost estimates upon which the project will be appraised. This will include a careful review of the TORs, investment needs, design inputs and standards and estimates along with market value comparisons – as appropriate. The designs will be developed to a more advanced stage where possible in order to further improve the reliability and accuracy and contingencies will be put in place in line with industry standards where applicable. The Bank will also engage specialist review of the designs for major contracts such as the sludge management and solid waste facilities. The CPMU and Bank will careful review the procurement packaging to optimize the implementation arrangements and enhance the efficiency and economy of the project. The management and control structures will be reviewed to ensure effective quality cost and time control measures are in place.					
	Resp: Bank/ Client	**Stage:** Preparation & Implementation	**Recurrent:** Yes☐	**Due Date:** Ongoing	**Frequency:** Ongoing	**Status:** In progress
3.2. Social and Environmental	**Rating**	Moderate				
Description: The activities and works proposed under the project are not expected to generate negative environmental or social impacts. Nonetheless, some activities should be closely monitored to ensure that they do not lead to future safeguard risks Although all contracts will follow Bank Guidelines and standards, private contractors may deviate from the ESIA and	**Risk Management:** Detailed feasibility studies are to be carried out during preparation will define the project activities from which the environmental and social impacts can be identified. Environmental and social impact assessments will be carried out for each sub-project and mitigation measures will be appropriate design and incorporated into the EMP. An Environmental and Social Management framework will be developed for the project along with a Resettlement Framework which will used to Govern the relevant project activities. Project specific EMPs and RAPs will be developed as required and inserted in the works contract documents to ensure implementation is a contractual / legal obligation. The bidding documents for works and services (as relevant) will also emphasis the					

RAP during project implementation. The EMPs will be inserted in the works contracts obligations. There is a risk that potential environmental and social impacts are not well identified and mitigation measures are less effective due to lack of detail in the feasibility assessment design carried out during preparation.	importance of the safeguards compliance / management and ensure adequate staff are assigned to manage these issues. Adequate staffing capacity and procedures exist within CPMU, including specialists dedicated to oversight on similar Category B projects. There is a strong record of experience with Safeguard aspects of projects with the World Bank and other international and bilateral donors. A capacity assessment will be carried out for the RPMU's and training will be provided.					
	Resp: Bank/ Client	**Stage:** Preparation & Implementation	**Recurrent:** Yes☐	**Due Date:** Ongoing	**Frequency:** Ongoing	**Status:** In progress
3.3. Program and Donor	**Rating**	Low				
Description: There are a number of donors who are financing studies related to UIP2, including the EC, the US, and SIDA. This will require extensive consultation/coordination with each, some of whom have specific reporting requirements.	**Risk Management:** The Task Team will ensure close coordination with the donors in Kiev. The Country Office has a special liaison with donors and will be sure to coordinate closely.					
	Resp:	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**	**Status:**
	Bank/ Client	Preparation & Implementation	Yes☐	Ongoing	Ongoing	In progress
3.4. Delivery Monitoring and Sustainability	**Rating**	Moderate				
Description: The project, and specifically the sludge treatment and solid waste, are two new areas aimed at building a sustainable treatment model which might not achieve results that can be replicated as planned. An inadequate monitoring and evaluation system might make it difficult for project managers to assess project implementation and the success of the Project in achieving its PDOs. Inadequate funding and managerial/technical capacity for Operation and Maintenance (O&M).	**Risk Management:** During project preparation, the methodology and design of the impact evaluation will be developed and the work for the establishment of the baseline will be contracted. After the proposed interventions have been carried, out the impact evaluation will analyze whether the results achieved can be replicated/scaled-up. An impact evaluation will be undertaken to evaluate the potential of scaling-up the pilot demonstration project. The proposed implementation arrangements will build on a previously successfully implemented M&E system and will include indicators with real world relevance and meaning for the concerned institutions' day-to-day management and strategic planning. During project design, the team will ensure the right-sizing of investments to optimize investment and O&M costs. The project will support a training program on financial aspects for mangers. It will also engage in an on-going dialogue with GoU on issues of financial sustainability of services through, *inter alia*, revenues from tariffs and the feasibility of periodic tariff increases.					
	Resp: Client	**Stage: Implementation**	**Recurrent: Yes**	**Due Date: Ongoing**	**Frequency: Ongoing**	**Status: In progress**

	Bank/ Client	Preparation	Yes☐	Ongoing	Ongoing	In progress
3.5. Other (Optional)	**Rating**					
Description:	**Risk Management:**					
	Resp:	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**	**Status:**
3.6. Other (Optional)	**Rating**					
Description:	**Risk Management:**					
	Resp:	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**	**Status:**

4. Project Team Proposed Rating Before Review	
Preparation Risk Rating: Substantial	**Implementation Risk Rating:** Substantial
Comments: The key issue is to ensure that cost estimates at feasibility stages do not vary widely from contract amount. Adequate project preparation and design is critical, especially to ensure that utilities move faster towards covering their O&M costs to ensure long-term sustainability and financial viability of the utilities.	Comments: While the CPMU will remain the same as in UIP1, there are a number of new sectors (solid waste and sludge treatment) and clients that are not familiar with Bank policies and procedures. The key issue with regard to reforms is the possibility of resistance to tariff increases, especially if they are not adequately explained/ consulted or if consumers do not perceive that the cost increases match the improvement in services. Furthermore, the new regulatory commission has yet to establish its credibility in an increasingly decentralized system. While utilities understand the need for reforms, they might resist change and the particular approach taken.

5. Overall Risk	
Preparation Risk Rating:	**Implementation Risk Rating:**
Comments:	Comments:
Nondisclosable Information for Management Attention (Optional) (Note for information: this section is not disclosed at Negotiation and Board presentation stages)	
Comments:	

Annex 6: Implementation Support Plan

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)

Strategy and Approach for Implementation Support

1. The strategy for implementation support has been developed based on the design of the project and its risk profile. It aims at providing sufficient technical support to the identified city utilities as well as to the central and regional project management units. The plan will ensure fiduciary compliance with World Bank guidelines and look to adequately carry out all risk mitigation measures defined in the ORAF. Specifically, the strategic approach for implementation support includes having taken into account the following:

(a) Participating utilities have technical skills but are limited in their experience of working with international financial institutions, which could cause implementation delays;
(b) The CMPU has experience in implementing World Bank projects;
(c) Most of the project's interventions are well proven and widely used internationally;
(d) All of the participating utilities and the National Commission for Regulation of Communal Services understand and agree on the necessity of cost recovery to ensure financial sustainability of the utilities;
(e) A high-level political decision needs to be taken to increase water sector tariffs to allow for cost recovery and social impacts need to be considered.

2. Based on these abovementioned factors, the Implementation Support Plan will focus on:

(a) Continuing regular training of RPMU staff and new members of the CPMU on World Bank Guidelines related to: procurement, financial management, and safeguards, which started during project preparation;
(b) Maximizing use of the institutional strengthening and training component to build capacity at the central and local levels to make utilities more efficient and embark on a path to greater sustainability;
(c) Intensifying supervision during the first 18 months of project implementation to provide adequate World Bank support to ensure a smooth start of project implementation; and
(d) Continuing the high-level dialogue and having intensive consultations with relevant stakeholders at the national and municipality levels to effect changes toward greater cost-recovery in the sector.

Implementation Support Plan

3. The Implementation Support Plan in presented in Table below

Table A6.1: Implementation Support Plan

Time	Focus	Skills Needed/ Functional Specialist	Estimated Staff Weeks/ Year	Partner Role
First 18 months	**Support to timely implementation**. The Bank team will start providing support before effectiveness. A training and workshop program was developed during project preparation that includes: training on Bank's Guidelines in Procurement, Financial Management, Environmental and Safeguards; "Contractors Outreach" workshop, and training on Contract Management and Administration. In addition the Bank supported the utilities in preparation of pre-qualification and bidding documents for the first 18 months packages. In the first 12 months and following effectiveness, the immediate priority is to support the participating utilities with finalization of bidding process and contract award of the major contracts for total value of at least 30% of the loan amount. Bank will continue review of bidding documents, procurement plans, bid evaluation reports and provide training to RPMU	Project Management and Procurement	8	Specialized consultants in DSI contracts will be mobilized to Minregion / RPMU to provide technical support to RPMU in preparation of the BD under SIDA funds. RPMU will lead the Project implementation, including procurement.
	Training for RPMU: As part of supervision missions, the Bank will focus, through training workshops, on improving the capacity of participating utilities and PMUs to ensure quality of project implementation, monitoring and evaluation; compliance with the Bank's procurement, financial management guidelines and safeguard policies and	Project Management, Bank Safeguard, procurement and financial Specialists, M&E specialist	n/a	Minregion will organize regular trainings for the regional PMUs and new members of CPMU.
	Coordination. The Bank will work with Minregion and participating utilities to ensure that effective coordination is established between Central and regional PMUs as well as participating utilities and the Regulator. This is important to help strengthen supervision and good governance practices.	Project Management	5	

Time	Focus	Skills Needed/ Functional Specialist	Estimated Staff Weeks/ Year	Partner Role
	Monitoring and Evaluation. The Bank will work with RPMU, utilities and CPMU to develop and agree on the "Quarterly Progress Report" format and monitoring and evaluation systems. Quarterly reports will include information update on technical, financial progress as well as an update of the monitoring indicators. In addition to environmental due diligence to ensure that the EMP is adhered to during construction phases.	Project Management	5	
	The Bank will work with utilities to assist them with improving their transparency and information-sharing, including development of websites.	Social Safeguards, and EXT Specialists	4	Participating utilities to strengthen their interaction with users.
	Provide training and support to WSS utilities in coordination with the DWP, including Utility benchmarking, exposure to international sector good practice, and other targeted TAs.	DWP and Project Management		
	Preparation of "Utilities Performance Improvement" study (UPI) that includes operational and financial analysis of each of the participating utilities, proposal on reform, cost estimates and phased implementation schedule.	Project Management		
	National Water Sector Strategy: The Bank will continue high-level sector reform dialogue, including update of national policies and strategies, improving tariffs setting in coordination with other donors, to move forward water tariff and sector reforms.	Project Management	5	Minregion to support Water sector reform in Ukraine. The Regulator to estimate and approve financial cost-recovery tariffs
18-60 months	The focus in this phase will be on (1) timely and quality implementation of works within budget (which includes contract management, technical and safeguards supervision), and (2) institutional strengthening and implementation of sector reforms. Preparation of bidding documents and contracts for subsequent years of implementation. The Bank will continue its focus on implementation quality, improving the capacity of participating utilities and compliance with implementations schedules and safeguards policies.	Project Management	n/a	RPMUs, CPMU to strengthen their supervision capacity.
	Project supervision. The Bank will focus on implementation quality, compliance with EMPs (including site safety and material	Project Management, Technical	n/a	

Time	Focus	Skills Needed/ Functional Specialist	Estimated Staff Weeks/ Year	Partner Role
	handling), and quality of works.	Specialist		
Other	Implementation of the UPI first priority recommendations as possible.	Project Management, Technical Specialist		

Table A6.2: World Bank Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Task Team Leader	8/year	4	HQ
Water & Sanitation Specialist	8/year	2	HQ/Regional Staff
Water Economist	6/year	1	HQ Staff
Communication specialist	6/year	2	Consultant/ Local Staff
Utility Financial Analyst	6/year	2	Regional Staff
Intuitional Building Specialist	4/year	2	Consultant
Procurement Specialist	3/year	Local Trips	Local / Regional Staff
FM Specialist	3/year	Local Trips	Local Staff
Environmental Specialist	3/year	Local Trips	Local Staff
Social Development Specialist	3/year	Local Trips	Local Staff
Senior Operations Officer	2/year	1	HQ Staff
Operations Officer	8/year	1	HQ Staff

Annex 7: Clean Technology Fund

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)

Indicator	CTF/IBRD-funded Project	Scaled-up Phase[17]
Energy savings [GWh/yr]	434*	8,680
Tons of GHG emissions reduced or avoided -Tons per year [tCO_{2eq}/yr] -Tons over lifetime of the project [tCO_{2eq}]	294,891* 5,897,820*	na
Financing leveraged through CTF funding [$ million]	CTF: US$50 million IBRD: US$300 million	na
CTF leverage ratio [1:X]	1:6	na
CTF Investment cost effectiveness [$\$_{CTF}/tCO_{2eq}$ avoided]*	US8.48_{CTF}$/tCO2eq	na
Other co-benefits	• Demonstrate potential for future replication and accelerate the uptake of more efficient technologies to bring gradual overall sector improvement through significant energy cost savings; • Increase overall system reliability, minimizing downtime and emergency responses; • Environmental benefits through reduction in pollution levels through decreased energy consumption; • Decreased pollution load on rivers and other surrounding waterways through improved sludge management; • Health co-benefits due to reduced emissions;	

**The numbers will be adjusted after feasibility studies are completed.*

Introduction

1. Ukraine, a lower middle income country, with a population of 46 million is the second largest among the successor states of the former Soviet Union. The recent global financial/economic crisis hit Ukraine's industrial sector particularly hard. To recover its economic growth and improve competitiveness, Ukraine will need to address a combination of challenges. Improving the energy efficiency of the economy and thereby reducing its vulnerability to further import price shocks, as well as modernizing its utility sectors to make them more efficient, are among those challenges. The Energy Strategy of Ukraine for the Period until 2030 (Energy Strategy), adopted in 2006, provides a platform for addressing these issues

[17] The scaled-up phase expects that similar investments in energy efficient technologies will be extended to cover other utilities in the water and sanitation sector in Ukraine beyond the six utilities being supported through the Project. The scaled-up phase intends to portray the contribution of the Project to the transformation of the water sector in Ukraine 20 years from now.

over the three distinct phases of development envisaged for the country: Phase I (2006-2010) – focusing on innovation and reconstruction; Phase II (2011-2020) – on accelerated development of the Ukrainian service sector; and Phase III (2021-2030) – on the start of changes in economic structure, moving to a post-industrial society.

2. Ukraine has enormous potential for increasing energy efficiency, and good progress has already been made in addressing some sectors of the economy. Drawing on lessons learned in other countries in Eastern Europe and the Former Soviet Union, progress would require access to concessional financing to address the many barriers to energy efficiency investments. GEF's energy efficiency program has demonstrated that EE investments require relatively modest support to succeed. The proposed CTF EE program would build on these lessons learned and enable the scaling-up to become transformational.

3. The investment needs in energy efficiency in Ukraine are estimated to exceed $1 billion per year. The Government has agreed to establish a broad-based EE Action Plan, under which the International Financial Institutions (IFI) support would fall. The Action Plan is expected to show scalability of the EE program. The IFI program would be instrumental in deepening EE interventions in the industrial sector, district heating, power, and water utilities.

4. Ukraine is in the group of the twenty largest primary energy consuming nations and is one of the top ten most energy intensive economies in the world. The Government, in its Energy Strategy, set a target of reducing its energy intensity by 50% by 2030. The Government has agreed to complement this target with medium-term targets, so that a targeted Action Plan could be developed to ground-truth these targets. The energy efficiency program is expected to decrease GHG emissions by about 3.2 million tons of CO2 per year. To achieve this, it is estimated that about US$20 billion needs to be invested in energy efficiency.

5. The primary problem is Ukraine's aging asset base – many assets are operating beyond their design life. Ukraine has the most developed water and wastewater infrastructure among the countries of the former Soviet Union. Nonetheless, the municipal services sector in Ukraine suffers from decades of underinvestment and poor maintenance, which requires significant investment. Investment needs for upgrading the network are higher than what can be mobilized by utilities, consumers and local government. An estimated US$5.5-8 billion are needed to bring the water and sanitation system to operational safety and total of US$30-35 billion will be required to achieve international services standards. This translates into a minimum need to replace 35% of water mains and repair 31% of the sewer network. These direct investment needs are exacerbated by the overall high-energy consumption in water production and wastewater treatment.

6. The GoU demonstrated interest in the sector through UIP[18] and request for financing for UIP2. The municipal services sector was recognized as an important area for scaling up

[18] The World Bank's investment in Ukraine's Urban Infrastructure Project (UIP) in 2007 looked to support two main priorities: (i) energy efficiency; and (ii) improve quality of urban water supply and wastewater services. In particular, energy efficiency investments in thirteen utilities under the UIP were expected to reduce total energy consumption of participating utilities by 15% translating to significant reductions in greenhouse gas reduction, and lead to other environmental benefits such as improvement of wastewater discharges. Eight utilities have completed

investment. The successful implementation of UIP and request for a follow up project is clear indication of GoU priorities and readiness.

7. The Government of Ukraine (GoU) recently highlighted the considerable potential to improve energy efficiency through the municipal services sector, including water, wastewater and solid waste. The Ukraine Infrastructure Project 2 (UIP2) would focus on targeted investments to increase energy efficiency in the municipal services sector. The project will enable better investment planning by utilities that will replace the current ad hoc nature of investments that respond only to emergency needs rather than long term operations.

8. The establishment of the National Regulatory Commission for Communal Services (Regulator) in 2011 made substantial changes to the governance structure of municipal services and is expected to improve financial operations. Cost recovery is expected to increase through centralized tariff setting, thus limiting the influence of local political actors. The Regulator will also establish national service standards and reporting requirements. This coordination is expected to include energy audits and long term financial planning.

9. The initial CTF investment coupled with the IBRD project will enable several project utilities to achieve improved fiscal capacity and operations. Expected transformations include: (i) improved operating standards; (ii) implementation of national regulatory reform; (ii) demonstrated financial benefit of improving the energy efficiency to local utilities; and (iii) avoided future emissions.

Ukraine's Investment Plan for CTF

The CTF Plan for Ukraine was endorsed by the CTF Trust Fund Committee (TFC) in March 2010. Under this plan, the Government of Ukraine (GoU) would use US$350 million from the CTF to finance and catalyze greater investments in renewable energy, energy efficiency, smart-grids, and waste heat recovery projects. As of February 2013, US$50 million of CTF funding has been committed by the TFC. The GoU's intention is to commit all US$350 million of CTF funding by Q2-2014. An update of the CTF Plan for Ukraine was approved in May 2013 to reflect the reallocation of funds within priority sectors. The areas of intervention include:

- Ukraine Renewable Energy Financing Facility (EBRD, IFC): to address policy, finance, business, and information barriers to renewable energy market development, while also providing direct financing to private sector of 100 MW of large-scale wind power capacity and 80 MW of medium-sized renewable sources;

- Improving Energy Efficiency (EBRD, IBRD, IFC): an energy efficiency program targeting reconstruction and refurbishment of municipal and mixed ownership housing stock, upgrade of Government-owned buildings, decrease losses in district heating supply, and industrial energy efficiency;

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such subproject investments under UIP and have achieved greater than 15% reduction in energy consumption. The project was also expected to contribute to sector reform by increasing institutional capacity and strengthening the accountability and efficiency of water utilities.

- Smart-grids (IBRD): strengthening of the management and control systems that would allow loss reduction through demand management and large-scale integration of intermittent renewable sources; and

- Zero Emissions Power from the Gas Network (EBRD, IBRD): commercial-scale demonstration of zero-emissions power generation from waste heat recovered from compressors in Ukraine's gas network.

10. The indicative financing of these interventions is summarized in the table below:

Table A7.1: Indicative financing allocation for Ukraine CTF plan

Program	CTF	Co-financing				Total	PPG
		MDB	Ukraine Counterpart	Other Donors	Private Sector		
Ukraine Renewable Energy Financing Facility	135-150[1]	259		8	366	**768-783**	6
Improving Energy Efficiency	120-165[1]	760-910	105	100	25	**1,110-1,305**	7
Smart Grids	50-80	250-350	50		200 [2]	**550-680**	0.5
Zero Emissions Power from the Gas Network [3]	TBD	TBD	TBD			**TBD**	TBD
Total	**350** [4]	**1,269-1,519**	**155**	**108**	**591**	**2,473-2,723**	**13.5**

[1] Depending on market demand and speed of project development IFC may reallocate the remaining US$15 million of CTF funds to the Renewable Energy Financing Facility
[2] Around US$200 million is expected to be invested by the private sector into RE by 2018 and at least US$1000 million by 2030
[3] Project amounts, including CTF funding and co-financing, will be determined at a later stage
[4] Smart Grids and Energy Efficiency funds are mutually exclusive; hence total CTF allocation remains US$350 million (instead of US$320-380 million). This also constitutes the reason why the horizontal and vertical totals do not add up by the amount in question.

Project Description: Second Urban Infrastructure Project (UIP2)

11. The proposed Second Urban Infrastructure Project is part of Ukraine's CTF Improving Energy Efficiency program. The proposed project development objective is to improve the quality, and efficiency of water, wastewater, and solid waste services in selected cities in Ukraine.[19] This objective will be achieved through a combination of investments in energy efficient infrastructure, rehabilitation of existing assets, and capacity building initiatives.

[19] Targeted cities include: Kyiv, Kharkiv, Zhytomyr, Ternopil, Donetsk, and Kirovograd.

12. This initial investment will enable several utilities to achieve improved fiscal capacity and operations. Expected transformations include: (i) investments in physical works and improved operating standards; (ii) implementation of institutional strengthening and capacity building activities; (iii) demonstrated financial benefit associated with improving energy efficiency in local utilities; (iv) avoiding future emissions; and (v) reduction of the fiscal impact of the delivery of water, wastewater and solid waste service provision. Please see the section Annex 1 for details.

13. *Project Justification.* Financing these interventions is necessary because water utilities do not have the funding to invest in these projects on their own nor is there sufficient commercial financing available. Unless interventions are taken to rehabilitate much of the existing aged infrastructure, the amount of required investments will swell progressively in the coming years with environmental and energy-related risks increasing dramatically. UIP2 will address some of the urgent needs alleviating the pressure on municipalities to respond to growing maintenance and investment needs. Investments will improve the efficiency of the sector as well aim for more long term financial viability. The future implication is that municipalities will have fiscal capacity and social capital to make additional investments in energy efficiency without having to source it from international financial institutions.

14. CTF funds would finance investment that otherwise would not have been immediately undertaken. Moreover, CTF funds will allow utilities to make investments in technologies that are more energy efficient and responsive to environmental concerns. CTF funding will facilitate utilities to invest in more advanced technologies that require higher upfront capital costs, but address the need for more energy efficient assets that reduce long-term degradation to the environment. CTF funding that will invest in assets that help utilities lower their energy costs is a significant aspect of this project.

15. Demand of utilities for reducing energy costs by increasing energy efficiency is high, because energy tariffs have been increasing in recent years, further placing pressure on water utilities' financial situations. Energy costs comprise approximately 30% of utilities' total operations and maintenance costs. Because the utilities face significant shortfalls in cash flow to pay the state-owned energy company, the government is subsidizing water utilities in order to fill the gap, which exerts a significant fiscal burden on the government. If utilities were more energy efficient, they could save costs which will allow for more investments in rehabilitation and upkeep, which would translate into lower likelihood of damage and pollution to the environment.

16. The following table highlights all the CTF investments and the portion of CTF funds allocated to each of the respective subprojects. The CTF allocation was based on a higher weightage provided to those subprojects with a larger potential for energy savings. For example, the sludge treatment and solid waste subprojects in Kharkiv are expected to yield significant energy savings and reductions in GHG emissions. As a result, half of the CTF funds are being allocated to those subprojects, while the other fifty percent of the CTF funds for the pump replacement subprojects will be more evenly distributed among the remaining five cities.

Table A7.2: Sub-project investments and CTF - IBRD allocations

(All Figures given in US$, Millions)		Total Amount	IBRD	CTF
Kyiv: Rehabilitate and Upgrade Water Supply Pumping Stations				
Kyiv	Rehabilitation of pumping station for Dnipro Water Utility; Level 3 pumping station for Desna; Pumping station of Krutohirna; Installation of energy efficient pumping stations across 20+ locations in Kyiv.	11.24	8.99	**2.25**
Kharkiv: Wastewater and Sludge Treatment Plant and Solid Waste Treatment Facility				
Kharkiv	Rehabilitation / construction of a wastewater and sludge treatment facility.	75.80	60.20	**15.60**
	Construction of a solid waste treatment facility.	44.00	34.32	**9.67**
Kirovograd: Rehabilitate and Upgrade Water and Wastewater Facilities				
Kirovograd	Reconstruction of water treatment facilities in Dneiper - Kirovograd Rayon. Rehabilitation of sewage pumping stations including installation of mechanical, electrical, and automation and control system.	34.30	27.42	**6.88**
Ternopil: Rehabilitate and Upgrade Water and Wastewater Facilities				
Ternopil	Construction of iron-removal facility at the water pumping station; Optimization of water distribution systems; Upgrade of intake and replacement of pumping stations (VSN No.1 and 5). Replacement of sewer pipes; Upgrade of sewerage pumping station (KNS No.9), and reconstruction of a wastewater treatment plant including sludge dewatering.	36.69	32.09	**4.60**
Zhytomyr: Rehabilitate and Upgrade Water Supply System Facilities				
Zhytomyr	Rehabilitation and upgrade of water pumping stations and treatment plant (filters). Rehabilitation and replacement of mechanical and electrical equipment at the wastewater treatment plant.	30.00	24.60	**5.40**
Donetsk: Rehabilitate and Upgrade Water Supply System Facilities				
Donetsk	Rehabilitation of water supply facilities in Kuibyshevskyi district.	37.26	31.88	**5.375**
Total		269.29	219.5	**49.775**

Note: 6 of the 9 cities have been selected for CTF financing. Front end fee of US$0.225m is to be paid from the CTF loan.

Assessment of the Proposed Project with CTF Investment Criteria

Potential for GHG Emissions Savings

17. Total GHG emission savings for the project result in 294,891 tCO2eq/yr and about 5.9 million over the lifetime of the project (assumed 20 years). GHG emission savings were estimated from investments categorized into the following areas:

i) Energy efficient pumping equipment and related mechanical equipment;
ii) Sludge treatment facility and electricity generation equipment; and
iii) Biogas collection and electricity generation equipment for a solid waste management site.

18. The feasibility study reports for the subprojects are still under preparation, but CO2eq savings from at least two project cities, Kharkiv and Kyiv, can already be estimated based on initial feasibility study data. In Kharkiv, the landfill gas subproject will range from landfill gas captured of 53,000 tons CO2eq/year in 2016 to 294,000 tons of CO2eq/year captured in 2036. During the 20 years life of the landfill, total CO2eq captured should reach 3,665,000 tons reduced. The Kharkiv sludge treatment subproject should save 99,000 tons CO2eq/year. Kyiv also completed feasibility studies for its priority investment subprojects showing CO2eq savings of 200,000-220,000 tons per year. These studies indicate that the overall program savings could range from 400,000 to 700,000 tons per year.

19. Several municipalities have already submitted plans for implementing utility investments and energy efficiency improvements. Thirteen subprojects across six of the nine UIP2 project cities have noticeable potential for CO2 equivalent (CO2eq) emissions reduction and will improve energy efficiency by at least 15% (while these investments have a relatively short payback period).

20. ***Replacement of pumping equipment.*** Four project cities will be replacing existing pumping equipment: Kyiv, Ternopil, Kirovograd, Zhytomyr and Donetsk. The current energy consumption of the pumps at these subproject sites is 120,619 MwH per year. Due to aging, these pumps are no longer operating at an efficient capacity. Replacement of the existing pumps should lower utilities' energy consumption to 94,245 MWh per year; thereby generating savings of 26,374 MWh per year. These figures were based on data provided by Ministry of Regional Development. See table below for city-level calculations.

Table A7.3: Energy consumption and GHG reductions from Energy Efficiency Programs

	A	B	A-B	(A-B) x 0.419	
City/Description	**Current MWh/Year Used**	**Expected MWh/Year Used after Replacement**	**Expected Savings in MWh/Year after Replacement**	**tCO2eq Saved/Year[20] (tons)**	**tCO2eq Saved Over Lifetime of Project (20 Years)**
Kyiv					
Pumping Station for Dnipro Water Utility	14,578	11,007	3,571	1,496	29,920
Reconstruction of water pumping station of Krutohirna	12,848	12,011	837	351	7,020
Replacement of level 3 pumping station of Desna	7,170	5,401	1,769	741	14,820
Installation of energy efficient water pumping stations across the city	1,690	1,163	527	221	4,420
Ternopil					
Upgrade of intake and replacement of pumping stations	1,172	1,052	120	50	1,000
Upgrade of sewerage pumping station and reconstruction of wastewater treatment plant and sludge dewatering	15,830	8,629	7,202	3,017	60,340
Kirovograd					
Reconstruction of water treatment facilities	167	151	16	7	140
Rehabilitation of automation and control system at pumping station	41,700	33,400	8,300	3,478	69,560
Zhytomyr					
Rehabilitation of water pumping station and treatment plant	13,778	11,615	2,163	906	18,120
Rehabilitation and replacement of mechanical and electrical equipment at wastewater treatment plant	11,686	9,816	1870	784	15680
Donetsk[21]					
Rehabilitation of water supply facilities	3,196	TBD	TBD	TBD	TBD
Totals	**120,619**	**94,245**	**26,374**	**11,051**	**221,014**

[20] The electricity mix emission factor for Ukraine is 419 grams CO2/KwH. Due to calculations, expected energy savings is being multiplied by 0.419 as a result of converting kilowatts to megawatts and then representing data as tons/CO2eq per year rather than grams. Factor was sourced from: "CO2 Emissions From Fuel Combustion, IEA Statistics, International Energy Agency Highlights", 2012 Edition. International Energy Agency, Page 112.

[21] A feasibility study report for the investments to be made in Donetsk is still ongoing. It is likely that the water utility will invest in new energy efficient pumping equipment, but the plans have not been finalized as of the project preparation date.

21. ***Sludge treatment and electricity generation.*** Kharkiv vodokanal will invest in a sludge treatment facility with subsequent plans to build a thermal sludge disposal facility. The city receives 3,000 M^3 of fresh sludge from wastewater treatment every day. This project will involve the closure of the old land sludge lagoons (polygons), which currently contain 9 million M^3 of sludge that has accumulated over the years. These lagoons are close to the city airport and occasionally catch fire creating a significant hazard to the city and the environment. Recognizing the current situation is unsustainable the city is investing in sludge treatment that will include: (i) sand traps for the removal of sand from sludge, (ii) brewing chambers, and an (iii) incinerator plant. Rather than an ad hoc investment in sludge treatment, the project will be implemented using a Design-Build (DB) contract. CTF funding is enabling Kharkiv to use a DB method, which will facilitate the selection of the newest technology available taking into consideration energy efficiency factors and environmental benefits.

22. The project aims to use the sludge treatment process to generate electrical and thermal energy. The process will produce approximately 23.0 MWh of electrical energy and 84.44 MWh of thermal energy, of which 8 MWh of electrical and 53.96 MWh of thermal energy will be used internally in the sludge treatment process. Annual energy savings of around 398 GWh will be sold to the national grid at the green tariff prices. In addition to these energy savings, the project will contribute to environmental benefits. The energy produced will save approximately 2 million tCO2eq in GHG emissions over the lifetime of the project. Additionally, the introduction of this new process will accelerate sludge treatment production to reduce river pollution in the surrounding area in Kharkiv, Luhansk, and Donetsk oblasts.

23. ***Biogas collection and electricity generation at the Kharkiv solid waste site.*** This is the first project of its type in Ukraine. Kharkiv Municipality will construct a solid waste disposal site with a recycling and sorting facility as well as a biogas collection system that allows for landfill gas recovery and electricity generation. The project will install biogas collectors at an existing 13 ha site as well as at a new 17 ha site to collect gas from waste for production of electricity, which will ultimately be sold to the national grid at an agreed green tariff price. Based on the feasibility study calculations, this should produce 750 M^3 of biogas per hour. This gas would be collected and then used for energy production yielding approximately 1.5 MWh of electricity, or the equivalent of 10.26 GWh on an annual basis.

24. The project has three major environmental benefits: (i) biogas collectors will limit the amount of GHG emitted from the landfill to 3.6 million over the lifetime of the project; (ii) the installation of a recycling and sorting facility will decrease the amount of waste that reaches the landfill; and (iii) the gas collection to energy generation process will provide an alternative and cleaner source of energy that gets added to Ukraine's national grid. .

25. *Technology Development Status.* Pumping equipment is a tried and tested technology in the water sector. Pump replacement, as financed by this project, is aiming to implement a mature technology by replacing outdated and aged infrastructure with newer, more efficient equipment. The result of this rehabilitation will reduce energy consumption, allow utilities to save on electricity costs, and ultimately reduce GHG emissions that would have otherwise been generated from business-as-usual energy use. In the case of Kirovograd, the project will be

introducing more advanced technology for automation and control of the pump system rather than replacement of pumps. This should lead to similar savings in terms of reduction in energy consumption and costs.

26. The technology selection for the sludge treatment project is still under preparation, but will use tried and tested methods that have yielded favorable results in other parts of the world. The project is using a DB approach in order to select the best technology available. The solid waste project will use commercially sourced gas collectors and gas piston generators for electricity generation. Although the concept has not been widely used in the solid waste sector within the region, it has been successfully implemented in other parts of the world.

Cost-Effectiveness

27. The CTF cost effectiveness ratio for the project is 8.48 [US$50 million/5,9 million tons CO2 eq reduced over the lifetime of the project]. This ratio was calculated by dividing the $50 million CTF loan by the summation of the GHG emissions saved from investments in the three aforementioned areas.

$$\text{CTF Cost Effectiveness Ratio} = \text{US\$50 million} / (\text{GHG Reduced}_{\text{Pumps}} + \text{GHG Reduced}_{\text{Sludge Treatment}} + \text{GHG Reduced}_{\text{Solid Waste}})$$

Demonstration Potential at Scale

28. The targeted cities include two of the biggest in Ukraine (Kyiv and Kharkiv), and have the potential to inspire investments in other parts of the country and region as well. Recognizing the significant financial constraints that exist at the utility level, finding ways to save costs and generate additional streams of revenue while limiting environmental degradation is an important challenge for the municipal services sector in Ukraine.

29. This project demonstrates how investments in energy efficiency technology can lead to GHG reductions and cost savings for utilities. Because much of the sector's infrastructure is aged and inefficient, funding replacement of the equipment will have a transformational effect on the energy consumption of the sector. Although utilities are often constrained to make capital investments due to cash flow shortages, this project intends to show that incremental costs savings from the investment in more energy efficient assets will be financially paid back through energy cost reductions.

30. Meanwhile, other aspects such as GHG reductions from less energy usage, greater uptime and productivity, as well as lower incidence for emergencies, all demonstrate additional benefits that make the investment economically justifiable. The solid waste investment project will demonstrate that GHG reductions can be significantly reduced and additional streams of revenue can be generated by an otherwise polluting byproduct through its collection, conversion to energy, and the subsequent sale of electricity.

31. *Transformational Impact.* The large scale deployment of the interventions proposed are easily replicable, but funding constraints due to the lack of utilities' financial viability prevent more cities from implementing such projects, which makes its replication more challenging. Therefore, getting utilities onto a path of greater financial viability is key to overall sector

improvement. Through UIP2's institutional and capacity building component, the project will introduce measures for utilities to become more financially sustainable. This will include technical assistance to the Regulator to move the sector toward greater cost recovery through identifying options such as tariff increases. As the sector reforms and more utilities can generate cash flow to invest in their rehabilitation, this project can serve as a demonstration for other cities to invest in more energy efficient equipment. Ultimately, replication of this project through greater investments in interventions such as the ones proposed here, will lead to the transformation of the sector.

Development Impact

32. The project is expected to have substantial development impact from increased energy efficiency, reduction in GHG emissions, and environmental benefits. The expected efficiency gains will reduce demand for power generation, which translates into environmental benefits from lower GHG emissions polluted. Other environmental impacts from the project include mitigation of pollutants from entering rivers due to accelerating the process of sludge treatment, and offset of waste entering a landfill from the investment in a recycling/sorting station as part of the solid waste management subproject in Kharkiv. Related secondary impacts can also be realized through health co-benefits from these improved environmental conditions. Additionally, further scale-up within the sector through energy efficiency gains will also reduce the country's demand on fuel imports. Poverty and gender impacts will also be monitored through the project's results framework through the implementation of satisfaction surveys that will measure the impact of the project on different income groups and gender. .

33. The project's implementation of newer pumps also increases reliability, minimizing downtime and emergency response. A reduction in technical losses and other costs associated with system downtime is minimized due to the replacing of aged assets that are no longer functioning optimally. Ultimately, consumers would benefit from the increased system uptime and be more willing to pay for services that are reliable.

34. These savings have a direct impact on the utilities' financial situation. Energy efficiency gains will lower utilities' energy costs while greater reliability will avoid expensive downtime impacts and costs of ad-hoc maintenance and repair. Meanwhile improved reliability can improve consumer satisfaction and willingness to pay for services. As a result, this will facilitate more readiness on behalf of consumers to accept tariff increases, which will bolster utilities' ability to generate revenue. Together, increases in revenue and reduction in costs should allow utilities to move toward greater financial sustainability of their operations. As utilities become more financially self-sufficient, they can invest in additional rehabilitation and enhance service provision thereby impacting the overall development of the sector.

Implementation Potential and Readiness

35. *Government Support for Deployment.* A number of feasibility study assessments were conducted during project preparation to ensure that investments would be made in a more strategic rather than ad-hoc manner. The Ministry of Regional Development (Minregion), the Regulator, all municipalities, and utilities were brought onboard and share a similar understanding that the project aims not only to provide funding for infrastructure development,

but will also look to strengthen the provision of services and improve the financial sustainability of the overall sector. This involves rehabilitation that looks beyond just standard replacement, and takes a more long-term view through sustainable development and investments such as those being funded by the CTF.

36. *Leveraging Additional Resources.* Because of CTF funding being used for energy efficient investments, the project will be able to leverage additional grant financing from other multilateral development agencies. At this stage of preparation, the project is looking to attract additional grant funding from the Swedish International Development Agency (SIDA) and Kreditanstalt für Wiederaufbau (KfW).[22] These development agencies are looking to place their funding towards initiatives that emphasize improvements in energy efficiency and the environment; both of which are covered by the UIP2 project.

Readiness of Subprojects. The pump replacement subprojects in Kyiv and the solid waste subprojects in Kharkiv are ready for implementation as soon as the loan becomes effective. For other subprojects, the design supply and install bidding documents will be used, these will be prepared even prior to loan approval. Other utilities have submitted plans and designs for subprojects will be prepared during the first year of project implementation.

CTF Additionality

37. The CTF financing is a significant addition to this project. The CTF is influencing the use of the IBRD loan to make investments in technologies that are more energy efficient and responsive to environmental concerns. CTF funding will facilitate utilities to invest in more advanced technologies that require higher upfront capital costs, but address the need for more energy efficient assets that reduce long-term degradation to the environment.

38. Because the sector is in need of significant investments, using CTF funding will accelerate the development and enhance the overall sustainability of the water sector while demonstrate how investments in more efficient and GHG reducing technologies can have a significant long-term development impact. Along these lines, the solid waste project is one of the first in Ukraine to install biogas collectors and invest in an adjacent recycling/sorting facility rather than simply construct a standard landfill site that simply expands capacity. Interventions such as these will have a demonstration effect toward making similar investments in the future in Ukraine.

39. Perhaps one of the more important considerations of using CTF funds is to boost further investments in clean technology in the country. Given that investor confidence and private sector participation in the clean technology sector is low in Ukraine, CTF could have a demonstrative impact that shows these technologies can be introduced, scaled-up, and provide financial and operational benefits to utilities and municipalities, respectively. This demonstration effect could boost more investments in cleaner technology investments throughout the country.

[22] As of project preparation, only soft commitments from other donor agencies have been provided. Actual dollar amounts and activities are yet to be determined.

Annex 8: Team Composition

UKRAINE: SECOND URBAN INFRASTRUCTURE PROJECT (UIP 2)

World Bank staff and consultants who worked on the project:

Name	Title	Unit
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