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**DANIDA**  
**SUSTAINABLE INFRASTRUCTURE FINANCE**



















Lviv Wastewater Treatment Plant Emergency Rehabilitation Project

Ukraine

2021-2023

May 2021

# Lviv Wastewater Treatment Plant Emergency Rehabilitation Project

<p><b>Key results:</b></p> <ul style="list-style-type: none"> <li>• Reduced pollution of the Poltva River, which eventually discharges in the Baltic sea, by treating the wastewater from Lviv's 750,000 residents to EU standards.</li> <li>• Reduced greenhouse gas emissions due to new centrifuges and sludge input to the Biogas Plant, presently under construction with funding from EBRD.</li> <li>• Reduced adverse environmental and health impact through reduced quantities of sludge for final disposal</li> <li>• Enhanced long-term sustainability of the rehabilitation attained through capacity building and skill transfer from a Danish utility company.</li> </ul> <p><b>Justification for support:</b></p> <ul style="list-style-type: none"> <li>• The project promotes Danish development priorities of supporting inclusive and sustainable growth, cf. World 2030. Moreover, the project is aligned with the Danish Neighbourhood Programme (DANEP) 2017-2021, that focus on energy efficiency in Ukraine.</li> <li>• Ukraine is an important partner in the EU neighbourhood and Denmark has an interest in Ukraine's sustainable growth and development.</li> <li>• The project supports the priorities and strategies of the Government of Ukraine and addresses local concerns. The Lviv Municipality "Green City Action Plan" identifies the project as one of its top priorities.</li> <li>• The project has an emphasis on energy security and efficiency and commitment to meet EU environmental standards.</li> <li>• The project ensures effective use of the Danida Sustainable Infrastructure Finance instrument through cooperation with experienced partners, EBRD and NEFCO.</li> </ul> <p><b>Major risks and challenges:</b></p> <ul style="list-style-type: none"> <li>• Volatile political and economic situation of Ukraine.</li> <li>• LVK future financial situation, which requires continued subsidies from the City Government and possibly tariff increases.</li> <li>• Capacity of LVK in managing the implementation and the operation and maintenance. Main mitigation is to provide technical assistance through an Implementation Consultant and through twinning arrangement with Danish Water Utilities to address O&amp;M and long-term sustainability issues.</li> </ul>	<p><b>File No.</b></p> <p>2020 - 18432</p>												
	<p><b>Country</b></p> <p>Ukraine</p>												
	<p><b>Responsible Unit</b></p> <p>Danida Sustainable Infrastructure Finance</p>												
	<p><b>Sector</b></p> <p>Wastewater</p>												
	<p><b>DKK mill.</b></p> <table border="1"> <thead> <tr> <th>2021</th> <th>2022</th> <th>2023</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>78.8</td> <td></td> <td></td> <td>78.8</td> </tr> <tr> <td>10.0</td> <td>68.8</td> <td></td> <td>78.8</td> </tr> </tbody> </table>	2021	2022	2023	Total	78.8			78.8	10.0	68.8		78.8
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	<p><b>Duration</b></p> <p>2021-2023</p>												
	<p><b>Finance Act code.</b></p> <p>06.38.01.13</p>												
	<p><b>Head of unit</b></p> <p>Adam Sparre Spliid (acting interim) IFU: Tina Kollerup Hansen</p>												
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	<p><b>Financial officer</b></p> <p>Christina Hedegård Hyttel</p>												
<p><b>Relevant SDGs</b></p> <table border="1"> <tr> <td> <p><b>Primary impact:</b></p>  <p>Water and sanitation</p> </td> <td>  <p>Partnerships for Goals</p> </td> </tr> <tr> <td> <p><b>Secondary Impact:</b></p>  <p>Good health and well-being</p> </td> <td>  <p>Clean Energy</p> </td> </tr> <tr> <td>  <p>Sustainable cities and communities</p> </td> <td>  <p>Life below water</p> </td> </tr> </table>		<p><b>Primary impact:</b></p>  <p>Water and sanitation</p>	 <p>Partnerships for Goals</p>	<p><b>Secondary Impact:</b></p>  <p>Good health and well-being</p>	 <p>Clean Energy</p>	 <p>Sustainable cities and communities</p>	 <p>Life below water</p>						
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<p><b>Total construction project budget:</b> DKK 196.5 million</p> <p><b>Of which DSIF financing:</b> DKK 68.8 million</p> <p><b>DSIF TA grant:: (twinning &amp; PIU)</b> DKK 10.0 million</p> <p><b>DSIF total grant commitment (cash grant for construction budget + TA):</b> DKK 78.8 million</p> <p><b>Grant element according to OECD definitions and regulations (concessionality level):</b> 35 pct. of total project investment</p>													

## Strategic objective:

Improved functioning of Lviv Wastewater Treatment Plant resulting in increased removal of organic matter from the wastewater, which can be digested in the new biogas plant, thus increasing energy efficiency, reducing the amount of final sludge and achieving an effluent quality in accordance with EU standards.

## Justification for choice of partner:

Lviv Vodokanal (LVK) is a natural monopoly entity in the water sector, wholly owned by the Lviv City Government. Its key responsibility is to provide reliable and sustainable water supply and wastewater treatment to the population, industries and public institutions within the City of Lviv.

## Summary

The Wastewater Treatment Plant (WWTP) serving the residents of Lviv is in poor condition. The project will rehabilitate the existing infrastructure treating the wastewater and install new centrifuges for the sludge. The project is urgently needed and a precondition for successful operation of a new Biogas Plant, financed by the European Bank for Reconstruction and Development (EBRD), under construction. The project is one of three DSIF-NEFCO (Nordic Environment Finance Corporation) projects within energy, water and sanitation in Ukraine. Contrary to the other two projects, this one also receives financing from the EBRD. The project is a contribution to the Government of Ukraine's effort to clean up the environment and achieve compliance with EU standards. EBRD will provide Technical Assistance (TA) during tender and construction. DSIF will complement with additional TA as required. In addition, a twinning arrangement between LVK and a Danish Water Utilities will be grant-financed by DSIF. This twinning arrangement will provide support to operations, monitoring and data collection. The skills development will target younger staff.

## Budget for construction project (not including Technical Assistance)

Million DKK	Total	Share
<b>Output 1.</b> Rehabilitation of existing infrastructure treating the wastewater	171.4	87.2%
<b>Output 2.</b> Installation of new centrifuges for the sludge	5.4	2.8%
Contingencies	19.7	10.0%
Total budget (incl. VAT)	196.5	100.0%

## Sources of funds<sup>1</sup> (not including Technical Assistance)

Million EUR	Total	Share
City of Lviv	1.13	4%
EBRD loan	14.00	53%
NEFCO loan	2.00	8%
DSIF grant	9.22	35%

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<sup>1</sup> Funds from EBRD, NEFCO and the City of Lviv will be finalised and documented in the EBRD/NEFCO term sheet signed by all parties in the second half of 2021.

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## ACRONYMS

BOD	Biological Oxygen Demand
DANEP	Danish Neighbourhood Programme
Danida	Danish International Development Aid
DBF	Danida Business Finance (now DSIF)
DCFTA	Deep and Comprehensive Free Trade Agreement
DKK	Danish kroner (1 Euro = 7.46 DKK)
DSIF	Danida Sustainable Infrastructure Finance (earlier DBF)
EUR	Euro
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment.
EIB	European Investment Bank
ESIA	Environmental and Social Impact Assessment
FIDIC	Fédération Internationale Des Ingénieurs-Conseils (Int. Fed. of Cons. Eng.)
GoU	Government of Ukraine
IMF	International Monetary Fund
KfW	Kreditanstalt für Wiederaufbau
LVK	LvivVodokanal (Lviv Water and Wastewater Utility)
M&E	Mechanical and Electrical
m <sup>3</sup> /d	Cubic meter per day
mg/l	Milligram per litre
N	Nitrogen
NEFCO	Nordic Environment Finance Corporation
NEURC	National Energy and Utilities Regulatory Commission
P	Phosphorous
PIU	Project Implementation Unit
O&M	Operation and Maintenance
SDG	Sustainable Development Goals
ToR	Terms of Reference
UAH	Hryvna (1 Euro = 33.6 Hryvna)
WWTP	Wastewater Treatment Plant

# 1 Introduction

In terms of area, Ukraine is the second largest country on the European continent. Geographically, it is a close and important neighbour to the EU. As a lower middle-income country, it faces a range of development challenges, including pollution. The present Danish Country Programme with Ukraine is an integrated part of the Danish Neighbourhood Programme, through which Danish-Ukraine development cooperation has developed since 2004. The present Danida Sustainable Infrastructure Finance (DSIF) project is part of Denmark's support and commitment to Ukraine's continued sustainable growth and development. There is a vast need in Ukraine for upgrading of critical infrastructure, which has deteriorated since the dissolution of the Soviet Union. Low FDI and trade volumes associated with the country's low international credit rating have hampered access to modern green technology.

The present project is also in line with the Danish Government's long-term strategy on Global Climate Action (2020). This includes the objectives of promoting green transition and greenhouse gas reductions as well as increasing the focus on climate and environment in Denmark's development cooperation.

DSIF is a suitable instrument to support the sustainable and inclusive growth objective of the Danish-Ukraine cooperation through strengthening of the local governments' ability to deliver public water services, as well as ensuring energy efficiency. Last year, the Danish Ministry of Foreign Affairs and the Government of Ukraine entered into a Memorandum of Understanding, paving the way for traditional DSIF engagements in Ukraine. In parallel to the drafting of the agreement, DSIF and the Nordic Environment Finance Corporation (NEFCO) have established a financing model to offer loans to Ukrainian municipalities. NEFCO is an international financial institution founded by the Nordic countries with the purpose of providing loans for investments in green growth and climate mitigation and adaptation. The Lviv Wastewater and Sludge Treatment Project (WWTP) is the third of three joint DSIF-NEFCO projects. The model allows for the realization of projects that have important benefits to communities and the country, but which are not otherwise financially viable. At the same time, through collaborating with NEFCO and EBRD, DSIF obtains experience in Ukraine and in relevant sectors, informing future consideration of additional, and potentially larger, projects in this sector and geographic area.

The project has been derived from the construction of a biogas production capacity at the WWTP ("the Biogas Project") financed by the European Bank for Reconstruction and Development (EBRD). During project preparation and tendering of the Biogas Project, it became clear that there was an urgent need to rehabilitate the WWTP to ensure adequate amounts of sludge for the operation of the biogas plant. An independent consultant has carried out an appraisal of the project in April 2021, and the recommendations from this report have been included in the present Project Document.<sup>2</sup>

The objective of the project is to rehabilitate the Lviv WWTP, increasing the efficiency in removing organic matter from the wastewater thus ensuring an effluent quality in accordance with Ukrainian and EU standards. At the same time, the increased removal of organic matter will increase the amount of sludge that can be digested in the Biogas Plant, while the amount of residual sludge for final disposal is reduced significantly. Rehabilitation will prolong the lifetime of the plant.

Total project budget is DKK 196.5 million, where NEFCO and EBRD will each provide a loan totalling DKK 119.4 million, DSIF will provide a grant of DKK 68.8 million and the City of Lviv will finance

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<sup>2</sup> Due to the travel restrictions related to COVID-19 the appraisal was carried out as a desk-study, complemented with extensive communication with LVK, NEFCO and EBRD through emails and video-conferencing.

DKK 8.4 million. EBRD will tender the works contract and the implementation consultant. In addition to the project grant, DSIF will provide technical assistance (TA) totalling an estimated DKK 10 million, administered by DSIF and provided according to identified needs.

## 2 Project Context

### 2.1 Socio-economic context in Ukraine

Since the ‘Maidan’ uprising in February 2014, Ukraine has experienced acute political, economic and security challenges, including the outbreak of conflict in Eastern Ukraine and the Russian annexation of Crimea. President Volodymyr Zelenskyy won the election in April 2019 with 73 per cent of the votes. However, two years into his presidency, his government has let to deliver promised wide-ranging reforms to improve trust in public institutions and combat widespread corruption. One of President Zelenskyy’s main electoral promises was to end the conflict in Eastern Ukraine, where Russian-supported separatists are in power in parts of two provinces, but no substantial progress has been made so far.

With a per capita GNI (gross national income) of 3,370 (2019)<sup>3</sup>, Ukraine is classified as a lower middle-income country (LMIC). After an abrupt decline in GDP in 2014-2015, the Ukrainian economy showed some improvement, with the growth rate reaching 3.2 per cent in 2019. However, manufacturing and investment growth remains weak. Before the COVID-19 pandemic the expectations for 2020 was continued consolidation and an annual growth rate around 3 per cent. The restrictions due to the pandemic, lower remittances from workers, due to the decline in economic activity in Poland and other EU countries, and lower commodity prices contributed to a 4.2 pct. contraction in 2020. GDP growth for 2021 is expected to be close to 5 pct. and then just over 3.5 pct. in 2022.

The central bank’s strong actions and new anti-corruption measures may allow the stalled IMF programme to re-start in Q3 of 2021. But concerns over reform momentum and external debt sustainability will only be relieved by a new IMF deal, with conditions strong enough to keep reforms on track even if a less liberal (reform-oriented) government were to take office in 2024. Political risks remain high, despite the possible revival of public support for reform as output, employment and real wages continue to rise in 2022-23<sup>4</sup>.

### 2.2 The socio-economic situation in the area

Lviv is the largest city in Western Ukraine, located some 70 kilometres from the border to Poland. Lviv region is historically one of the more developed and industrialized regions in Ukraine. However, after the break-up of the Soviet Union in 1990, Lviv has gone through a process of deindustrialisation, which has particularly hit the electrical and engineering industry, and this process has accelerated with the conflict since 2014, as several enterprises were tightly integrated with Russian companies, among others within the defence industry.<sup>5</sup> The remaining industry in the area is mainly within agricultural processing.

In 2020, the income per capita in Lviv region was very close to the average for the country as a whole, but only 40 pct. of the income in the capital, Kyiv. Prosperity in the Lviv region is thus more or less average for Ukraine outside the capital city.

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<sup>3</sup> World Bank Databank. World Development Indicators

<sup>4</sup> Oxford Economic’s Country Economic Forecast Ukraine May 2021

<sup>5</sup> ‘Lviv Oblast: Urgent Socio-Economic Problems in the Context of European Integration’, Myroslav Biletskyi, Yaroslav Ivakh, Liubov Kotyk, Journal of Geography, Politics and Society, 2017,7



Lviv had a number of highly skilled professionals, who due to lay-offs have migrated in search of adequate employment. The population of the municipality of Lviv has declined slightly over recent years, to around 750,000 people. The biggest Danish community, as well as a major part of Danish businesses, in Ukraine reside in Lviv and Lviv region. Lviv is the top tourist destination in Ukraine. Pre-pandemic numbers show that 2.5 million tourists visited Lviv per year.

The water and wastewater tariffs were according to a 2019 report from NEURC<sup>6</sup> in the lower end of the regions, which that year corresponded to around 90 pct. of the tariff in Kyiv. The combined tariffs for water and wastewater increased by almost 70 pct. from 2019 to 2021 (despite a more or less constant exchange rate to the Euro). In the start of 2021, many parts of Ukraine experienced demonstrations against the utility tariff increases, particularly concerning the increase in the price of natural gas.<sup>7</sup> Freeing the markets for gas and electricity is one of the sticking points in the negotiations with IMF that are currently ongoing. The Government is also committed to full cost recovery for water and wastewater.

Regarding the financial sustainability of the project in Lviv, the appraisal concludes that the tariffs collected for wastewater treatment are only cover the operational costs, but not the capital costs. The WWTP is therefore dependent on a subsidy from the City Government to finance major reparations and reinvestments. Taking into account the present precarious economic and political conditions in Ukraine, it is not likely that the wastewater tariffs in the near future will be increased sufficiently to cover the capital costs, and the WWTP will therefore continue to be dependent on subsidies from the City Government. Nevertheless, there is no doubt that the City Government will continue to subsidize the plant as it provides an essential service to the City, and the new installations should not need major reinvestments in the short to medium term.

### **2.3 Water sector stakeholders, policy and sector plans**

Since the dissolution of the Soviet Union, access to water supply services in Ukraine has stagnated at 80 pct. of the population largely due to a lack of investment. There is a considerable need for investments into rehabilitation existing water and wastewater sector facilities and for the construction of new facilities. The World Bank estimated in 2014 that an investment of EUR 4-6 billion was needed to bring the water and sanitation systems to operational safety, and a total of EUR 2-26 billion to achieve international service standards.

In cities and towns, 90 pct. of the population is connected to water supply, while 85 pct. of Ukraine's urban residents have access to sewerage, and only 70 pct. have access to wastewater treatment.<sup>8</sup> Decades of underinvestment and poor maintenance has furthermore resulted in deterioration of many of the wastewater systems, with worn-out infrastructure and equipment that has passed its lifetime. As a result, poorly treated wastewater is discharged and much of it ends up in the Black Sea, or, as in the case of the present project, into the Baltic Sea.

During the years of post-Soviet independence, the national government has delegated water and sanitation services to local authorities. As of end 2013, 1,595 utilities in the water and wastewater sector serve 65 pct. of the population. The fragmentation of the water sector in Ukraine derives from a high number of medium and small residential settlements, giving rise to a high number of water supply operators.

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<sup>6</sup> [https://www.nerc.gov.ua/data/filearch/Catalog3/Richnyi\\_zvit\\_NKREKP\\_2019.pdf](https://www.nerc.gov.ua/data/filearch/Catalog3/Richnyi_zvit_NKREKP_2019.pdf)

<sup>7</sup> A poll carried out in March 2021 showed (unsurprisingly) that 86 pct. of Ukrainians were against utility tariff increases <https://en.interfax.com.ua/news/press-conference/728114.html>

<sup>8</sup> World Bank: 'Project Appraisal Document for a Second Urban Infrastructure Project'. Data for 2014.



There are various types of ownership for water supply and wastewater utilities, with the most typical and commonly used form being the communal unitary enterprise fully owned by the local government (of a city, village, or residential settlement), which is the case for Lviv Vodokanal (LVK).<sup>9</sup> LVK is a “regulated utility”, subject to state regulation by the National Energy and Utilities Regulatory Commission (NEURC). State policy for the sector, drinking water standards and environmental protection standards, are national responsibilities of the Ministry for Regional Development, Ministry of Health Protection and Ministry of Environment and Natural Resources, respectively.

#### *Sector Policies*

Centralised water supply and wastewater is regulated by several laws. The two most important laws regulating the sector are: the Law on Housing and Communal Services and the Law on Drinking Water, Drinking Water Supply and Wastewater. These focus on effective and efficient use of resources and equal access to services. The state guarantees that the rights of consumers to drinking water supply and wastewater services are protected.

A draft National Strategy on Development of Water Supply and Wastewater Systems has been developed. It states that public policy should aim at securing reliable provision of water and wastewater services to consumers, reducing the negative impact on the environment, improving the financial and economic condition for the utilities, introducing a transparent effective system of payments between the consumer and the service provider, and creating conditions for attracting investments to the sector.

## **2.4 The present wastewater and sludge treatment in Lviv**

Wastewater in Lviv is collected in two systems that feed into two Wastewater Treatment Plants, collectively the Lviv WWTP, located in on at each bank of the Poltva River in the northeast of the city. Both collection systems are generally “combined” systems, meaning they collect both rainwater/surface drainage as well as foul sewage from residences, industries and commercial premises. The WWTPs are traditional activated sludge plants that separate the liquid wastewater into solid sludge, which feeds into the biogas plant, and effluent (treated clean water). Layout and details of the processes involved are outlined Annex 1.

The WWTP 1-2 (constructed 1964-74) system serves a population of about 100,000 people and uses a normal piped collector. The WWTP 3-4 (constructed 1978-82) system serves a population of about 650,000 people and uses the Poltva River as the main sewer system. After treatment, the effluent plus any storm overflows are returned to the open river, which flows East for approximately 50km where it joins the Bug River that flows north to the Baltic Sea.

The WWTPs are in poor condition with much of the mechanical and electrical equipment broken down and with correspondingly poor treatment of the wastewater. The poor treatment regime means that much of the organic matter that should have been removed and settled out as sludge is not removed, resulting in a) effluent that has a high organic load (nitrogen and phosphorus) and b) low sludge volumes.

At present the final sludge from the two WWTPs, which has had limited treatment to thicken it, is stored in two sets of lagoons next to the WWTP site. The lagoons are reported to be full and there is no agreed system for disposing of the existing sludge in the lagoons nor for the disposal of future sludge. Works are constantly being carried out to strengthen, raise and expand the lagoons in order to prevent the

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<sup>9</sup> This section is based on: World Bank: ‘Water and Wastewater Services in the Danube Region, Ukraine Country Note’, 2015

negative impact of sediment on the environment. In the context of the Biogas Project, an analysis of the stored sludge has been made. There are around 12 hectares of sludge lagoons, and the amount of sludge stored is estimated at around 408,000 m<sup>3</sup>. The study of the composition of the sludge stored on the site shows that while there are pathogens in the upper layers (parasite eggs), these have apparently decomposed in the lower layers. A preliminary study of the present sludge from the WWTP indicates that it may be used for agricultural purposes.

The issue of the final disposal of the sludge is not addressed in the present project, but there are several options: incineration, composting and use in agriculture or landscaping, burying in landfills etc. The decision about how to dispose of the sludge has to be taken by the political authorities (the City Council) in accordance with the national legislation.

## **2.5 Relation to other relevant partners and actors**

Many wastewater projects are presently under planning or construction, mostly with external funding. The biggest ongoing project is the rehabilitation and extension of the Greater Kyiv WWTP (Bortnytska) with Japanese funding (around USD 900 million), but most larger cities in Ukraine are planning or in process of upgrading their wastewater facilities. The other main foreign agencies active in the sector are in addition to EBRD, the European Investment Bank, the World Bank, and KfW (Germany). NEFCO has several projects within the wastewater sector, one of which is the rehabilitation of the wastewater and sludge treatment plant in Zaporizhzhia City funded by the DSIF-NEFCO model (recommended to the Minister for Development Cooperation by UPR on October 28 2020).

## **3 Danish priorities, interests, and strengths**

### **3.1 Key Danish policies and priorities**

The project supports the Danish strategy for Development Cooperation and Humanitarian Action ‘*World 2030*’, namely the strategic priority area “*Inclusive, sustainable growth and development*”, where “*Denmark will invest in inclusive and sustainable growth in the developing countries with a special focus on energy, water, agriculture, food and other areas, where Denmark has particular knowledge, resources and interests*”.

The project is highly relevant in this context as the main aim of the project is to reduce adverse environmental, health and climate impact by improving the wastewater effluent quality. The project is necessary for operation of the EBRD financed Biogas Plant, as it will ensure the amount of sludge required for energy recovery.

Denmark is actively pursuing foreign and security policy goals in relation to the EU approximation process and the EU response to the security situation in Ukraine. The goal is to support peaceful and prosperous development in an important neighbouring country to the EU by supporting the governments’ reform programmes and sustainable and inclusive growth.

The EU is by far the largest development partner in Ukraine supporting democracy and human rights, rule of law, good governance and sustainable development. The Danish Neighbourhood Programme (DANEP) supports the EU programmes on decentralization and anti-corruption and aims at complementing the EU assistance through targeted and flexible interventions. Within the climate and energy sector, a new phase of support to the Ukrainian Ministry of Energy and the Ministry for Communities and Territories Development for the period 2021-2026 is planned to start mid-2021. The objective is to strengthen the enabling environment for investment in sustainable energy and district heating, thereby assisting Ukraine in achieving its energy efficiency, renewable energy, and energy independence targets as well as modernising district heating.

At the same time, the project opens opportunities for Danish contractors and suppliers with expertise within wastewater and sludge treatment, and for Danish Water and Wastewater Utilities for provision of technical assistance through a twinning arrangement with LVK.

The project aligns with DSIF's guiding principles:

- The project is economically beneficial, but **not viable under commercial conditions**.
- **IFC performance standards** and **UN guiding principles** for business and human rights are reflected in the guidelines of NEFCO, who will be DSIF's main partner.
- Contributing to **poverty reduction indirectly** by supporting sustainable public infrastructure in line with the SDGs. DSIF-funding is well-suited for single-project investments in urban/peri-urban areas with a mix of poor/non-poor populations.
- The project is identified as a top priority in the Lviv Municipality "Green City Action Plan"<sup>10</sup>, thus responding to local demand and a local development challenge.
- The project will be tendered in accordance with EBRD rules, which require an open international tender. This is compatible with existing DSIF regulations.

### 3.2 Main Danish strengths and lessons learned

Through DANEP, currently in its fourth phase (2017-2021) covering only Ukraine and Georgia, the Danish embassy has a long-term cooperation with Ukrainian government institutions and development partners, in particular the EU. A new phase of DANEP 2022-2026 is presently being prepared.

The DSIF framework agreement with Ukraine focuses on concrete investments within the energy, water and sanitation sectors. As part of DANEP the embassy holds regular meetings with national authorities responsible for service provisions at local level, such as the Ministry for Communities and Territories Development (water and district heating) and the Ministry of Energy and the State Agency for Energy Efficiency (energy).

Last year, the Danish Ministry of Foreign Affairs and the Government of Ukraine entered into a Memorandum of Understanding (MoU), paving the way for additional DSIF engagements in Ukraine. Despite the ratification of the MoU, it is not yet operational as the Ukrainian authorities are still working on implementation procedures.

In parallel to the drafting and ratification of the agreement, DSIF and NEFCO have established a blended finance model (the "DSIF-NEFCO model") that enables Ukrainian municipalities to undertake larger and less commercial projects, which provide important benefits to communities and the country, but which are not otherwise financially viable. In the DSIF-NEFCO model, NEFCO provides a loan for the projects, while DSIF provides a grant and the local beneficiary provides the remaining project funding. For the first three pilot projects, the grant component (DSIF contribution to construction budget) is set at 35 pct.. This percentage is further informed by the OECD guidelines on tied aid (as per traditional DSIF projects), which stipulate a minimum concessionality level of 50 pct. for Least Developed Countries, and 35 pct. otherwise (including LMIC's like Ukraine)<sup>11</sup>. Despite the projects being untied under the DSIF-NEFCO model, the partners deemed this level adequate due to the City Governments limited

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<sup>10</sup> <https://mobilitylviv.com/en/green-city-action-plan-for-lviv/>

<sup>11</sup> [https://www.oecd-ilibrary.org/development/the-grant-element-method-of-measuring-the-concessionality-of-loans-and-debt-relief\\_19e4b706-en](https://www.oecd-ilibrary.org/development/the-grant-element-method-of-measuring-the-concessionality-of-loans-and-debt-relief_19e4b706-en)

financial resources and Ukraine's overall income level. For future projects, the required grant level and terms of collaboration will be re-assessed based on project characteristics.

The present project is the third of the three pilot projects financed through the DSIF-NEFCO model, here with the additional participation of EBRD. The two former projects are managed by NEFCO, and this project is implemented by EBRD. Both NEFCO and EBRD have years of experience in Ukraine providing loans to municipalities for investments in different sectors, and the collaboration will provide valuable insight for future Danish engagements in Ukraine, especially regarding co-financing of DSIF projects. Furthermore, this model is simpler in that it does not involve a commercial bank and so no export credits or loan subsidies are involved.

The two other projects financed by the DSIF-NEFCO model are a wastewater and sludge treatment project in Zaporizhzhia and a district heating project in Kremenchuk. NEFCO identified the three projects, based on their knowledge of the sector and extensive experience working with municipalities in Ukraine, while DSIF ensured that the projects are aligned with Danish priorities (see next section). The DSIF-NEFCO model differs from the traditional DSIF model in that it involves an open international tender. Given the competitiveness and expertise of Danish water companies it is expected that even without a formal tie to Danish contractors, the project provides good opportunities for inclusion of Danish green solutions and know-how.

Danish companies in the water sector possess world-class expertise. This very solid Danish resource base holds significant potential in relation to implementation of the current project. The safeguards imbedded in the implementation procedures of EBRD backed by the support from DSIF and the Embassy are considered sufficient to persuade potential bidders to participate in the tendering process, even if Ukraine has a reputation for opaqueness in relations between business and government.

#### **4 Strategic considerations and justification**

This project is, in its core, fully aligned with Denmark's focus on environment and climate, as well as upskilling and technical skills development based on the transfer of Danish expertise. Based on the above, the main strategic considerations behind the proposed project are:

- The project will have a significant development impact by reducing pollution discharged into the river that leads to the Baltic Sea through treatment of the wastewater to EU standards (SDG 6 water and sanitation), ensuring safely managed wastewater for the entire population in Lviv city as well as reduced quantities of sludge for final disposal (SDG 3 healthy lives and SDG 11 Sustainable Cities and Communities). In this respect, Denmark also has a direct interest in the project given the importance of a healthy marine environment of the Baltic Sea.
- The project is fully aligned to Danish Government's long-term strategy on Global Climate Action (2020) and contributes directly to Danish development priorities, supporting inclusive and sustainable growth by ensuring safe wastewater treatment.
- The project will contribute to reduced Greenhouse Gas Emissions by providing the sludge needed for operation of the biogas plant that converts sludge to renewable energy (SDG 7 clean energy).
- The project is aligned with the policies and strategies of the Government of Ukraine and addresses local concerns. Lviv is one of the pilot cities in Ukraine for the "green city" development funded by the EBRD. The Lviv Municipality "Green City Action Plan" identifies the project as

one of its top priorities. The project will serve as a catalyst for addressing environmental challenges in the city of Lviv.

- By enabling operation of the biogas plant, the project will contribute to the success of the first project in Ukraine producing energy from wastewater sludge, which may have a broader demonstration effect in Ukraine.
- The rehabilitation will extend the lifetime of the Wastewater Treatment Plant, which is considered a cost-efficient solution compared to the construction of a completely new plant.
- The project ensures effective use of DSIF-investments in critical infrastructure with low profitability but significant benefits to citizens. The cooperation with partners with experience in Ukraine, EBRD and NEFCO, will reduce risk, increase probability of successful implementation and provide a learning opportunity for DSIF.

## 5 Theory of change and key assumptions

The Theory of Change builds on the following main pathways, all of which are subject to the main contextual risk of a deteriorating economic and political situation in the country, which could result in social conflicts and slowdown in implementation.

- By rehabilitating the WWTP (output), the wastewater effluent led into to the Poltva river, which eventually ends up on the Baltic Sea, will meet EU effluent standards (outcome) and thereby ensure access to safely managed wastewater for the approximately 750,000 residents of Lviv (impact, SDG targets 6.2, 6.3, 11.6 and 14.1)).
- By rehabilitating the WWTP and installing new centrifuges for sludge dewatering (outputs), the extraction of sludge will increase (outcome) and provide the sludge needed for operation of the biogas plant, thereby indirectly contributing to energy efficiency and reduction in the greenhouse gas (GHG) emissions (impact, SDG target 7.2)). Furthermore, by upgrading the treatment process and providing sludge for the biogas plant, the amount of sludge for final disposal will be reduced (outcome), which combined with a strategy for disposal of sludge (output) will improve the health and well-being of the population living in the vicinity of the plant (impact, SDG targets 3.9).
- A twinning arrangement between LVK and a Danish Water Utility will provide technical assistance and training (output), enhancing the operation and maintenance of the project, and providing an important input to long-term sustainability for the project (impact, SDG target 17.7).

The Theory of Change rests on two main assumptions (see also separate risk section);

- *Output to outcome*; that Lviv City Council will provide the required part of the funding for the project
- *Outcome to impact*; that Lviv Vodokanal (LVK) will be able to operate and maintain the rehabilitated facility adequately and that the Biogas Project is successfully implemented.

## 6 Project Objective, Results framework and Impact Assessment

### 6.1 Results framework

Summary of the Results framework presented below (see full version including outputs in Annex 3).

Thematic Programme title		Lviv Wastewater Treatment Plant Emergency Rehabilitation Project	
Thematic Programme Objective		Improved functioning of Lviv WWTP to remove more biological matter from the wastewater, which can be treated in the new biogas plant, thus increasing energy efficiency, reducing the amount of final sludge and achieving an effluent quality in accordance with Ukrainian and EU standards.	
Impact indicator 1		Effluent quality in compliance with EU standards	
Baseline	Year	2021	Not in compliance
Target	Year	2029	Compliant
Outcome 1		Reduction of biological pollution in the effluent from the WWTP	
Outcome indicator		Level of BOD <sup>12</sup> in the effluent	
Baseline	Year	2021	70 mg/l (2019). This number will be updated based on the ongoing monitoring programme supported by NEFCO
5 year target	Year 1	2024	To be determined, but at least down to 25 mg/l (EU standard)
End target	Year 5	2029	To be determined, but at least down to 25 mg/l (EU standard)
Outcome 2		Increased quantity of sludge delivered to the new biogas plant for energy production	
Outcome indicator		Average quantity of sludge delivered to the biogas plant (tons/day)	
Baseline	Year	2021	70 t/day
5 year target	Year 1	2024	90 t/day
End target	Year 5	2029	120 t/day
Outcome 3		Increased quantity of dry solids for final disposal	
Outcome indicator		Quantity of sludge for final disposal, tons dry solids (tDS) per day	
Baseline	Year	2021	Data from the ongoing monitoring programme supported by NEFCO
5 year target	Year 1	2024	63 tDS/day
End target	Year 5	2029	84 tDS/day

<sup>12</sup> Biochemical Oxygen Demand is used as a gauge of the effectiveness of wastewater treatment plants. BOD indicates the amount of organic waste present in the water supply (and hence the impact of the discharged treated water on the receiving environment).



## 6.2 Social and Environmental Impact

### Environmental impact

The main *positive* environmental impacts expected from the project are the following:

1. *Less pollution in the effluent from the WWTP*

The reduction of pollution to at least the EU standard will be a significant benefit given that the water in the Poltva River for several tens of kilometres is primarily consists of the effluent from the two WWTPs.

2. *Sludge disposal*

The current final sludge is a liquid with about 4 pct. solid content and this is stored on-site in sludge lagoons. Some of the stored sludge will evaporate in the summer months and some may soak into the ground, thereby reducing the volume somewhat but the net volumes to be stored/disposed of remain substantial. The Rehabilitation Project will with the new centrifuges and input to the the Biogas Project to produce a solid sludge of about 30 pct. solid content with a corresponding significant reduction in volume to be stored/disposed. The proposed project will also require LVK and the City authorities to implement a sustainable sludge disposal plan. This will reduce the current risk of a major accident and spillage of sludge from the storage lagoons and potential leakage of pollutants into the groundwater at the lagoons.

3. *Energy recovery*

Energy recovery is not part of the present project, but the project indirectly contributes to the energy recovery from the Biogas Project, as the present project is a condition for the biogas project to function optimally.

No *negative environmental effects* are expected, except for the transitory impacts during the construction period (noise, dust etc.). The WWTP is already in place and operating, and the project consists in interventions to *diminish the environmental* impact from the WWTP compared to the present situation.

### The social impact

The expected *positive social impact* is the result of a reduction of the pollution from the effluent from the WWTP being discharged into the Poltva River, and hence reduced health risks and nuisance for the population living downstream. The project secures the basic human rights of to clean water and sanitation for the citizens of Lviv and people residing downstream from the WTTP. Improved treatment of wastewater is a top priority of the Green City Action Plan, which was informed by consultations with a variety of stakeholders.<sup>13</sup> The project will make Lviv more attractive and thus help to attract enterprises and create jobs and incomes in the region.

Safely managed water and sanitation services are a prerequisite for gender equality, and thus involving women in the decision-making process is important. However, since this project concerns rehabilitation of existing infrastructure treating wastewater, where there is no direct contact with the users (in contrast to other aspects of water management, i.e. water and sanitation facilities), the project in considered gender-neutral in its approach. The provision of public services also recognizes and values unpaid care and

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<sup>13</sup> <https://ebrdgreencities.com/news-events-and-publications/lviv-green-actions-planning/>



domestic work, most often undertaken by women. There are not expected to be any *negative social impact* as the project does not involve an expansion of the area of the WWTP, and there hence are no plans to dislodge people from the area around the WWTP. A *Livelihood Restoration Framework* is therefore not necessary.

In conclusion, the present project does not carry any negative environmental and social impacts. This may change if the final disposal of the sludge (not part of the project) is located outside the WWTP area, in which case an Environmental and Social Impact Assessment for the sludge disposal will be necessary. The EBRD has assessed the potential impacts to be site specific and readily identifiable and that potential impacts can be addressed through mitigation measures. EBRD will prepare an Environmental and Social Action Plan (ESAP) for the project, as well as a Stakeholder Engagement Plan.

## 7 Budget

Budget	DKK million	Share
<b>Output 1.</b> Rehabilitation of existing infrastructure* for the Wastewater Treatment Plant	171.4	
<b>Output 2.</b> Installation of new centrifuges for the sludge	5.4	
<b>Contingencies (10%)</b>	19.7	
<b>Total budget (incl. VAT)</b>	196.5	
Funding provided by:		
City of Lviv	8.4	4%
EBRD loan	104.4	53%
NEFCO loan	14.9	8%
<b>DSIF grant</b>	68.8	35%
<b>DSIF-financed Technical Assistance</b>	10.0	
<b>DSIF total grant (appropriation)</b>	78.8	

\* Specification in Annex 1. Note that the budget is not sufficient to cover all works needed for full rehabilitation of the WWTP, but finances rehabilitation of the core components needed for operation.

In addition to the construction project budget, the budget includes a DKK 10 million grant for Technical Assistance (more details in section 8.2). In case the costs during tender turn out to be higher than the estimated construction budget, the City Government (Lviv City Council) will finance the difference.

## 8 Management arrangement

### 8.1 Project implementation set-up

Project implementation will be managed by a Project Implementation Unit (PIU) from LVK, supported by an Implementation Consultant financed by the EBRD and DSIF. This is similar to the arrangement under the Biogas Project, and there will potentially be some overlap in the members of the two PIU's (Rehabilitation and Biogas Projects).

The Implementation Consultant will support the project from tender preparation to commissioning, and advise the PIU regarding design review, procurement, contract administration, engineering supervision, disbursement, implementation, commissioning, testing and acceptance and monitoring. During implementation, the consultant will supervise the construction, clear invoices from the contractor and make recommendations to NEFCO regarding payments to be made according to the loan agreement. The Implementation Consultant is particularly important for this project, as the PIU will need to coordinate the rehabilitation with the works on the Biogas Projects.

For the Biogas Project, the project investors (NEFCO, EBRD and the local authorities) regularly hold meetings of a Steering Group during which LVK and the Engineer/PIU report on progress of project implementation. A similar setup is expected for the Rehabilitation Project.

## **8.2 Operation and maintenance**

The Rehabilitation Project will, by its nature, not introduce any new operational challenges for the LVK operators, while the Biogas Project will introduce new operational requirements. The new Biogas plant is designed to be highly automated and it is expected that the current staffing levels at the WWTP will be adequate to operate both the rehabilitated WWTP and the new Biogas plant. The Biogas contract includes practical training for the operators on the day-to-day operation of the new facilities.

An analysis of LVK shows that:

- Technical education and training in Ukraine is strong so there is a wide pool of potential recruits available. However, employment terms and conditions in LVK are not very attractive and it is therefore difficult to recruit and retain strong staff.
- LVK is generally a strong organisation compared to other Vodokanals.
- There is still a legacy of “soviet” thinking where compliance with norms and regulations is more important than evidence-based management. This, together with the strong influence from the City authorities leads to confused reporting and short-term priorities on “firefighting” rather than long term planning.
- Day to day operation is difficult and minimal advice and support from the existing consultants achieved significant improvement in performance.
- There is little or no preventative maintenance and no budget for regular replacement of worn out mechanical and electrical equipment. When equipment breaks down the first option is to find a way of “working round” the breakdown and if that fails, to secure emergency funding from the City for minimal repairs.
- An institutional development plan was prepared by the consultant Dreberis but most of their recommendations were not implemented by LVK as the proposals were not in line with the LVK or City prioritisation of resources. The main outcome from this work has been the establishment of an “Operator’s Partnership” with three German water companies. This will run from April 2021 to June 2023 and focuses on optimization of plants and processes, especially regarding the water intake.

DSIF will finance Twinning Arrangement between a Danish Water Utility and LVK. The existing institutional development plan contains a very detailed and comprehensive list of recommendations for modernizing management and technical aspects of water treatment in Lviv. This plan should provide guidance for the new Danish twinning arrangement and also ensure that overlaps with existing arrangements are avoided. The twinning will be based on the following principles;

- A focus on practical advice that is appropriate to LVK's organisational environment. It is not the intention to design and implement a fundamental business transformation plan.
- The main inputs will be short-term technical missions from the Danish Water Utility, complemented by visits or study tours from Lviv to Denmark. If considered appropriate, it may include longer-term staff secondments in both directions.
- A key focus will be on developing the skills of younger staff and on improving the quality of data collection and reporting to assist with better evidence based management.

In practical terms, the twinning arrangement will initially be set up with very broad objectives and a ceiling amount for the cost, but with an agreement to narrow it down after an inception period to an action plan with concrete outputs and targets, which will have to be approved by DSIF. The Implementation Consultant will play a role in this more precise definition of the support by advising and supporting the Danish Water Utility to ensure that the twinning is driven by LVK's needs and constraints.

## 9 Procurement

The Project will be tendered using EBRD's tendering process in an open EU tender, in accordance with normal EBRD procedures, which comply with DSIF requirements. EBRD and DSIF have agreed to provide grants to cover costs for the Project Implementation Unit Consultant (covering assistance to the PIU in the tender preparation and construction supervision). The DSIF grant size will be determined in the project term sheet, with expected signature in Q32021. In addition, DSIF will be responsible for procurement and implementation of the twinning arrangement, which will be an agreement between DSIF and a Danish utility company. The budget for both grants are included in the TA budget of DKK 10 million.

Presently, the tender for the construction project is planned in two packages; rehabilitation of grit chambers, for which the tender documents have already been prepared as they need to be ready for the Biogas plant, and the remaining rehabilitation works. For the second construction project tender, preparation of tender documents and procurement is estimated to take 12 months. The physical construction works are expected to last 24 months, followed by a 12 months Defects Liability Period, for a total of 4 years.

## 10 Lending arrangements and financial management

According to the DSIF-NEFCO Framework Agreement DSIF provides a grant to soften the conditions of the EBRD and NEFCO loans. The City Government of Lviv provides the rest of the funding for the project. DSIF will disburse the grant directly to NEFCO, who will be responsible for management of the DSIF funds. This includes setting up a grant agreement with Lviv Vodokanal, and managing disbursements throughout the project. NEFCO will report periodically to DSIF. EBRD will be responsible for procurement support and monitoring of the project. DSIF will finance, procure and manage the twinning arrangement.

NEFCO takes the credit risk without requirement for a guarantee from the Danish export credit agency, EKF. Hence, the NEFCO loan will not be guaranteed by Danish development budget, as is the usual DSIF procedure where loans are extended by a private commercial bank. Furthermore, since NEFCO and EBRD take the credit risk with a guarantee from Lviv City, the normal DSIF requirement for a sovereign guarantee is not relevant.

## 11 Risk Management, preconditions and monitoring

### 11.1 Risks

This section presents the main risks, while Annex 4 outlines the full set of risks.

The main *contextual risk* are;

A deterioration of the political situation in Ukraine and increased conflict in the Eastern part of the country, as it affects the environment in which LVK will be operating. Even if Lviv is located in Western Ukraine and hence far away from the conflict zone, the tense situation related to the conflict may imply that foreign companies are less interested in bidding for the project, and hence the cost may turn out to be higher than estimated. The impact on the project is considered moderate.

- The impact of COVID-19 on the Ukrainian economy, and in particular on the City Government finances and hence its capacity to provide its part of the funding. Despite the loans provided by IMF and EU to Ukraine to handle the impact of the COVID-19 crisis, this risk is considerable. However, as the project is high priority for the City Government, the impact will likely only be a delay, and not project termination.

Among the *programmatic risks*, are:

- Insufficient technical capacity of LVK to manage the rehabilitated system properly. This risk is considered unlikely, as the rehabilitated system does not introduce any new challenges for LVK. Among the mitigating actions is the training included in the construction contract and the planned twinning arrangement with a Danish Water Utility. The residual risk is considered to be low.
- Insufficient financial capacity of LVK to ensure proper maintenance of the new system. However, raising the tariffs is a sensitive political issue and it is not possible to guarantee that they will be raised sufficiently to make the facility financially sustainable, so the risk is likely to occur. A shortfall in the revenues is likely to be compensated by a continuation of the present subsidy from the City Government, but LVK will in that case probably be financially stressed and there is a risk that maintenance may be inadequate. The impact will probably not be felt very much the first couple of years, where there should not be much need for replacement of equipment, if it is operated properly, but in the medium term this may become more of a problem. Apart from subsidies, the main mitigation should come from the overall international support that Ukraine is receiving, mainly from EU, to improve governance and the economy. The residual risk is considered to be medium.
- There is a risk that poor enforcement of pollutant levels in the discharge of industrial wastewater flowing into the WWTP may affect the functioning of the WWTP, even if according to LVK, most of the industries presently operating are related to agro-processing, while most other industries have been closed. However, the future of the industrial development of the Lviv area is difficult to predict. The mitigation is improved monitoring of the wastewater by LVK, so actions can be taken swiftly if excess pollution with e.g. heavy metals occurs. The residual risk is considered small.

- Projecting the future wastewater load is always difficult, and there is a risk that the system may be under-designed or over-designed. The impact is considered to be small as the system is presently over-designed, but the operating capacity can be adjusted to the actual load. Should it turn out that there is substantial growth in the Lviv area in the future and hence a large increase in the quantity of wastewater, the plant area has sufficient space to increase the capacity in the future.

The main *institutional risk* is

- lack of transparency during tender and construction. It is considered to be low, as EBRD and NEFCO will be managing the process and have substantial experience in operating in the complicated environment in Ukraine, where corruption is widespread.

## 11.2 Preconditions

DSIF's main development partner in the project is NEFCO, who will be responsible for implementing the grant for the subsidy linked to the NEFCO and EBRD loans to the City of Lviv.

In the agreement between EBRD and the City, it will be a pre-condition that the City confirms available local funding on an annual basis before disbursements under the loan can be made.

Before the DSIF Grant for the project is transferred from DSIF to NEFCO, the following conditions shall be met:

- Approval of the project by Denmark's Minister for Development Cooperation
- Final Investment Approval of the project by the EBRD Investment Committee.
- Term Sheet on the investment project, acceptable to DSIF, signed by EBRD/NEFCO and the Ukrainian project owner.
- A grant agreement negotiated between the City of Lviv/LVK, EBRD, NEFCO and DSIF where a satisfactory solution to the final disposal of the sludge is stipulated.
- Form of Contribution Letter (Annex 1 of the Agreement) signed by NEFCO and DSIF

## 11.3 Monitoring mechanisms

During the preparation of the tender documents, the implementation consultant will verify the proposed indicators and ensure availability of baseline data. The PIU at LVK will gather the data for monitoring the indicators in the results framework, and if required, suggest revisions to the indicators. LVK will receive Technical Assistance for the monitoring of the indicators from the Implementation Consultant and through the twinning arrangement. This will be stipulated in the ToR for the twinning arrangement.

During tender and construction, the implementation consultant will report to EBRD and NEFCO on implementation progress, with copy to DSIF. NEFCO will report to DSIF on the results framework after final implementation of the project. Reporting format and requirements are defined in the DSIF-NEFCO framework agreement.

DSIF shall have the right to carry out any technical or financial mission that is considered necessary to monitor the implementation of the project. DSIF also reserves the right to carry out an evaluation of the project. Five years after commissioning, an evaluation financed by the TA grant will report on target indicators and assess whether the expected impact has been achieved. This may be supplemented by additional consultancy input as required.

#### **11.4 Communication on results**

The Terms of Reference (ToR) for the implementation consultant will include elaboration of a communication strategy. The implementation consultant will have an important role in assisting EBRD, NEFCO, DSIF and the City Government in the communication of the results.

## Annex 1. Lviv WWTP

The two wastewater collection systems serving the SW and NE sections of the city feed to two wastewater treatment plants (WWTPs) located in the NE of the city – these are named WWTP 1-2 and WWTP 3-4 and are located close to each other on the same site. Both collection systems are generally “combined” systems, meaning they collect both rainwater/surface drainage and foul sewage from residences, industries and commercial premises.

The two WWTPs are similar in design and layout; traditional activated sludge plants that separate the liquid wastewater into solid sludge and clean water through three main processes;

(1) primary sedimentation tanks that remove the mainly inorganic sand and silt, (2) activated sludge aeration tanks that provide biological treatment and remove the organic carbon by converting this to sludge and water, (3) secondary sedimentation tanks, where the sludge is settled, thereby separating the sludge from the final effluent (treated clear water). In a follow-up process, the sludge is dewatered using a centrifuge. The graphic on the next page shows the layout of the works.

**WWTP 1-2 system.** This serves a population of about 100,000 people and has an average flow of 105,000 m<sup>3</sup>/day (of which 75,000 m<sup>3</sup>/d is from industries). The average flow has been estimated to 87,500 m<sup>3</sup>/d. There are overflows at the various pumping stations along the system that allow excess flows during storm events (or other high flows) to spill into the natural drainage system.

**WWTP 3-4 system.** This serves a population of about 650,000 people and has an average flow of 332,000 m<sup>3</sup>/d (of which 137,000 m<sup>3</sup>/d is from industries). In 2019 the average flow was estimated to 230,000 m<sup>3</sup>/d. Unlike the WWTP 1-2 collection system, which uses a normal piped collector, the main sewer for this system is the Poltva River. The Poltva River rises (commences) just to the south of the city and during the 19<sup>th</sup> Century the river was “culverted” (encased and covered) and used as a combined sewer, receiving both foul sewage and surface water drainage as well as some natural flows from the catchment north of the city. The culverted river discharges at WWTP 3-4 where the full flow is treated, except during storm (or other high flow) events when the flow exceeds the capacity of the WWTP (see below for more details). The treated wastewater effluent plus any storm overflows are then returned to the open river, The river then flows east for approximately 50km where it joins the Bug River which flows north to the Baltic Sea.

The wastewater to WWTP 1-2 (constructed 1964-74) flows to the works and overflows during storms and other high flow events.

The wastewater to WWTP 3-4 (constructed 1978-82) arrives in the culverted river and large pumps lift the flows into the WWTP. During storm events/high river flows, the excess wastewater overflows into the now open river. The pumps were automated but the system no longer works so they are operated manually which results in non-optimal control and possibly excess overflows to the river and/or inappropriate flows to the WWTP. The inlet has three levels of operation:

- Up to 5.32 m<sup>3</sup>/s (460,000 m<sup>3</sup>/d) the flow is pumped to the WWTP.
- Flow between 5.32 m<sup>3</sup>/s and 19.2 m<sup>3</sup>/s are directed to rainwater storage tanks of about 19,000 m<sup>3</sup> which store the first 10-20 minutes of the most polluted overflow. The stored wastewater is then pumped to the WWTP once the high flows subside.
- Over 19.2 m<sup>3</sup>/s the wastewater overflows into the river.



Figure 1 – Layout of the two WWTPs



LEGEND

WWTP 1-2

- 1. Screening building;
- 2. Grit chambers;
- 3. Primary clarifiers;
- 4. Aeration tanks;
- 5. Secondary clarifiers;
- 6. Blower (compressor) station;
- 7. Drainage channel to the river Poltva;
- 8. Grit beds;
- 9. Sludge dewatering;
- 10. Circulation sludge pumping station;
- 11. Sludge beds;
- 12. Storage building;
- 13. Boiler room;
- 19. Asphalt plant;
- 21. Sludge mixing tank before dewatering;
- 22. Drainage pumping station;
- 23. Old non-working metantanks;
- 24. Primary sludge pumping station

WWTP 3-4

- 1. Screening building;
- 2. Grit chambers;
- 3. Primary clarifiers;
- 4. Aeration tanks;
- 5. Secondary clarifiers;
- 6. Blower (compressor) station;
- 7. Drainage channel to the river Poltva;
- 8. Grit beds;
- 14. Main sewerage pump station;
- 15. Administrative buildings;
- 16. Sediment rainwater;
- 17. Pumping transfer station;
- 18. Gravity thickeners (not in use);
- 20. Power substation 35 kV.

Note that the Sludge Beds (11) are the old sludge drying beds – the sludge storage lagoons are not shown and are outside the WWTP site. The old drying beds will be used to store sludge under the new project

## Components of rehabilitation works in output 1

<u>Rehabilitation Components</u>	<u>EUR Million</u>
Rehabilitation of Grit Chambers at WWTP 1-2	3.87
Rehabilitation of Grit Chambers at WWTP 3-4	6.83
Automatic Overflow Control Establishment	0.44
Intermediate Rehabilitations Work by LVK	2.85
<i>Including catenary screens, rehabilitation of sedimentation tanks, aeration systems, new sluice gate valves, new sludge pumps and transformer unit, construction of new sludge pipelines and rehabilitation of sludge thickening tank</i>	
Rehabilitation of the Existing Structures	8.98
1 Replacement blowers and aeration system for WWTP 1-2	
2 New (replacement) high voltage power line	
3 Rehabilitation of Primary Sed. Tanks	
4 Rehabilitation of Secondary Sed. Tanks	
5 Rehabilitation of sludge thickener at WWTP 3-4	

## Annex 2. Partner

**The European Bank for Reconstruction and Development (EBRD)** was established in 1991 to help build a new, post-Cold War era in Central and Eastern Europe. EBRD shareholders at present count 69 countries from five continents plus the European Union and the European Investment Bank. The EBRD supplements domestic capital by bringing in external capital from both private and public sources. With their “Green Economy Transition” approach, the EBRD has made climate finance a key measure of their performance. Ukraine joined the EBRD in 1992. Currently the EBRD has approximately 500 projects in Ukraine, focusing, amongst others, on strengthening energy efficiency and providing quality infrastructure.

**Nordic Environmental Finance Corporation (NEFCO)** was established in 1990 by the five Nordic countries with an aim to finance environmental and climate projects of interest to the Nordic countries. NEFCO has a particular focus on Eastern Europe, as well as the Baltic Sea, Arctic and Barents regions. NEFCO is working closely with various partnerships and global organisations) and is a trusted partner to IFU and the Danish Ministry of Foreign Affairs, e.g. via a Trust Fund Agreement implementing Energy Efficiency Demonstration Projects in Georgia. NEFCO has extensive experience working in Ukraine in cooperation with other IFIs and DFIs, such as Sida and the EBRD.

**Lviv Vodokanal (LVK)** is a natural monopoly in the water and wastewater sector in Lviv. Its primary business is to provide reliable and sustainable water supply and wastewater collection and treatment for domestic, public, commercial consumers and industrial clients within the City of Lviv. In addition to the WWTP, the company operates 1100 km of water networks, water treatment facilities and 17 water intakes located at distances of 10 to 105 km from the city.

LVK informs to have 130 employees at the WWTP, which is substantially higher than for similar Danish WWTPs, but this is partly due to the fact that the Danish utilities to a very large degree carry out operation and maintenance through out-sourcing to service providers, rather than with in-house staff.

Tariffs have increased substantially from 2019 to 2021 (up 70 pct. in Hryvna) and are in 2021:

2021 tariffs	Hryvna	Euro
Water tariff	15.25	0.45
Wastewater tariff	7.42	0.22
Total tariff	22.67	0.68

1 Euro = 33.6 Hryvna

LVK is owned by the City Government (Lviv City Council). According to the financial statements for 2019 and 2020, provided by LVK, the Company is able to cover the operational expenses, but not the capital costs. It is thus dependent on subsidies from the City Council.

LVK informs that it has received the following subsidy from the City in 2019 and 2020:

	2019	2020	2019	2020
	Million UAH		Million Euro	
City guarantees per credit obligations	61.9	67.4	1.8	2.0

Funds for improving financial and economic activities	112.6	60.5	3.4	1.8
Financial leasing purchases	0.0	36.7	0.0	1.1
Capital investments	124.0	60.1	3.7	1.8
Total	298.5	224.7	8.9	6.7

1 Euro = 33.6 Hryvna

It is expected to be difficult to increase the tariffs substantially in the near future due to the present difficult political and economic situation in the country. LVK is therefore likely to depend crucially on continued subsidies from the City Government.

The City Government will be the Borrower and the Contracting Authority for this project. The City of Lviv is financially stressed in 2020-21 due to the Covid pandemic, among others because tourism is a quite important source of revenue for the City, and tourism has practically been brought to a stop. EBRD has informed that it is about to put into place a loan agreement with the city for around Euro 20 million to provide it with liquidity to overcome the present crisis.

Summary of key partner features

Partner name	Core business	Importance	Influence	Contribution	Capacity	Exit strategy
What is the name of the partner?	What are the main business, interest and goals of the partner?	How important is the programme for the partner's activity-level (Low, medium high)?	How much influence does the partner have over the programme (low, medium, high)?	What will be the partner's main contribution?	What are the main issues emerging from the assessment of the partner's capacity?	What is the strategy for exiting the partnership?
Lviv Wastewater and Sludge Treatment Plant Project						
Lviv Vodokanal	The Company's primary business is to provide reliable and sustainable water supply and wastewater collection and treatment services for domestic, public, commercial and industrial clients in the Lviv City area.	High. The project emerged from concerns expressed by both LVK and the City Government regarding degraded situation of the Plant. What has given a urgent character to the project is that the Biogas project under construction is dependent on the rehabilitation of the WWTP.	High. Both LVK and the City Government have participated actively in the formulation of the project and the prioritisation of the investments under the budget ceiling.	The City Government will contribute to the funding for the project.  LVK will provide skilled workforce for the PIU for managing project implementation.	LVK is assessed to be a relative strong company compared to other Vodokanals in Ukraine. Availability of skilled staff is not a problem in Lviv, as the closure of many industries has made the lay-off of many skilled workers and engineers. However, it is difficult to maintain good staff as the salary conditions are not very competitive, and many qualified people are searching opportunities outside the country.  It is NEFCO's assessment that the existing staff has proved to have a good capacity to take advantage of the advice provided to the Company from consultants during the preparation of the Biogas project. It therefore assessed that LVK will be able to profit from a Twinning Arrangement.	This support is a one-off support to Lviv City Government to rehabilitate the WWTP. There are no further commitments from DSIF/Danida.  The twinning arrangement with Danish Water Utilities, will furthermore provide technical assistance and training to LVK. These services will be funded by DSIF with an additional grant.

## Annex 3. Results Matrix

Project title		Lviv Wastewater Treatment Plant Emergency Rehabilitation Project	
Project Objective		Improved functioning of Lviv WWTP to remove more biological matter from the wastewater, which can be treated in the new biogas plant, thus increasing energy efficiency, reducing the amount of final sludge and achieving an effluent quality in accordance with Ukrainian and EU standards.	
Impact indicator 1		Effluent quality in compliance with EU standards	
Baseline	Year	2021	Not in compliance
Target	Year	2029	Compliant
Outcome 1		Reduction of biological pollution in the effluent from the WWTP	
Outcome indicator		Level of BOD in the effluent	
Baseline	Year	2021	70 mg/l (2019). This number will be updated based on the ongoing monitoring programme supported by NEFCO
5 year target	Year 1	2024	To be determined, but at least down to 25 mg/l (EU standard)
End target	Year 5	2029	To be determined, but at least down to 25 mg/l (EU standard)
Outcome 2		Increased quantity of sludge delivered to the new biogas plant for energy production	
Outcome indicator		Average quantity of sludge delivered to the biogas plant (t/day)	
Baseline	Year	2021	70 t/day
5 year target	Year 1	2024	90 t/day
End target	Year 5	2029	120 t/day
Outcome 3		Increased quantity of dry solids for final disposal	
Outcome indicator		Quantity of sludge for final disposal, tons dry solids (tDS) per day	
Baseline	Year	2021	Data from the ongoing monitoring programme supported by NEFCO
5 year target	Year 1	2024	63 tDS/day
End target	Year 5	2029	84 tDS/day
Output 1		Rehabilitation of grit chambers at WWTP1-2 and WWTP3-4, replacement of blowers and aeration system for WWTP 1-2, installation of new medium voltage power line, rehabilitation of primary and secondary sedimentation tanks, rehabilitation of sludge thickener at WWTP 3-4 and installation of Automatic Overflow Control.	
Output indicator		Indicator for the functionality of the rehabilitated plant (to be identified)	
Baseline	Year	2021	To be determined during tender preparation
Annual target	Year 1	2024	To be determined during tender preparation
Output 2		Installation of new centrifuges for the sludge	
Output indicator		Dry matter in the sludge for final disposal (percentage)	
Baseline	Year	2021	To be determined
Annual target	Year 1	2024	To be determined
Output 3		Strategy for final disposal of sludge has been approved and at least partly implemented	
Output indicator		Status of strategy	

Baseline	Year	2021	No sludge strategy
Annual target	Year 1	2024	Sludge strategy approved by City Government. Implementation initiated.
Output 4		LVK has implemented a plan for capacity development, developed and implemented with support from a Danish utility company under a twinning arrangement.	
Output indicator		To be determined in contract regarding twinning support	
Baseline	Year	2021	To be determined
Annual target	Year 1	2024	To be determined



## Annex 4. Risk management matrix

### Contextual risks

Risk Factor	Likelihood	Impact	Risk response	Residual risk	Background to assessment
Flaring up of the conflict in Eastern Ukraine, which may imply that foreign companies are less interested in bidding for the project, and hence that the cost may turn out to be higher than estimated.	Likely	Medium	The tendering of the project in one or two packages should make it more attractive for foreign companies to bid for it.	Medium	There has been problems in getting attractive bid for the rehabilitation of the grid chambers, leading to the tender being declared void.
The disruption caused by the COVID-19 pandemic and the economic problems that has created, may affect the capacity of Lviv City Government to contribute with the agreed part of the project budget.	Likely	Low	None	Low	The project has high priority in LVK and the Lviv City Government, so the main impact is probably that the project may be delayed, not abandoned. However, a deterioration of the economic situation presents a risk to the maintenance of the system (see below).

### Programmatic risks

Risk Factor	Likelihood	Impact	Risk response	Residual risk	Background to assessment
The technical capacity of LVK to manage the rehabilitated system properly may be insufficient.	Likely	High	Among the mitigating actions is the training included in the construction contract and the planned twinning arrangement with a Danish Water and Wastewater Company.	Minor	The project does not introduce any new challenges for LVK, but LVK has had problems in the past in reaching operational efficiency.
The financial capacity of LVK may be insufficient to ensure a proper maintenance of the new system. LVK already now depends on a subsidy from the City Government.	Likely	Medium	The planned twinning arrangement with a Danish Water and Wastewater Company is expected to increase the capacity of the company within the area of asset management, leading to an improved maintenance even within the limited financial resources.  Apart from that, the main mitigation should come from the overall international support that Ukraine is receiving,	Medium	Due to the economic and political situation in Ukraine it is not likely that wastewater tariffs will be raised sufficiently to make LVK financially sustainable. However, it is likely that the shortfall in the revenues will continue to be compensated by subsidies from the City Government. However, if LVK is financially stressed, maintenance may be inadequate. The impact will probably not be felt very much the first couple of years, where there should not be much need for replacement of equipment, if it is operated

Risk Factor	Likelihood	Impact	Risk response	Residual risk	Background to assessment
			mainly from EU, to improve governance and the economy.		properly, but in the medium term this may become more a problem.
There is a risk that poor enforcement related to the discharge of industrial wastewater, which may affect the biological processes.	Likely	Medium	The mitigation is improved monitoring of the wastewater by LVK, so actions can be taken swiftly, in case excess pollution with e.g. heavy metals occurs.	Minor	Even if according to LVK most of the industries presently operating are related to agro-processing, while most other industries have been closed, it is difficult to predict the future of the industrial development in the Lviv area.
There is no projection of the future wastewater load and there is a risk that the system may be under-designed or over-designed.	Possible	Medium	None	Minor	The impact is considered to be small as the system is presently over-designed, but the operating capacity can be adjusted to the actual load. Should it turn out that there is substantial growth in the Lviv area in the future and hence a large increase in the quantity of wastewater, the plant area has sufficient space to increase the capacity in the future.
As the problems with the Electrical Substation at the WWTP are not well documented yet, and as the new line to the Municipal Substation included in the project is only for emergency use, there is a risk that longer breakdowns will put the operation at risk for longer periods.	Possible	Significant	The construction of the Biogas Plant will in the future provide most of the electricity needed for the WWTP and the Biogas Plant itself. A study is ongoing to evaluate the extension of the upgrading needed for the Substation. Part of the technical contingencies could if judged necessary be assigned to this upgrading.	Minor	
Insufficient capacity of LVK to manage implementation of the project (contract management) including required reporting to NEFCO and DSIF	Unlikely	Significant	NEFCO provides an implementation consultant to the PIU, financed by DSIF	Minor	
There is a risk that LVK runs out of space to store final sludge on the site, and the sludge storage also implies a risk of pollution in the area (e.g. spilling over of the ponds).	Likely	Medium	It is made a condition for the signing of the Grant Agreement that the City Government approves a concrete plan for final sludge disposal. If needed, DSIF will finance a consultant to support the elaboration of the plan and facilitate agreement between the stakeholders. DSIF may also co-finance the implementation of the plan.	Minor	The risk is not directly related to the project as sludge has for decades been stored at then WWTP site, and the project will together with the Biogas project drastically reduce the amount of sludge for final disposal.

## Institutional risks

Risk Factor	Likelihood	Impact	Risk response	Residual risk	Background to assessment
Irregularities during tender and construction constitute a reputational risk for DSIF and NEFCO.	Unlikely	High	EBRD and NEFCO will be responsible supervising during tender construction. An EBRD 'implementation consultant' will be placed in the Project Implementation Unit within LVK.	Minor	EBRD and NEFCO have much experience from project implementation in Ukraine.

## Annex 5. List of main material consulted

The main documents used, apart from the partner documentation, are the following:

### Danida documents

- 1 'Guiding Principles for Danida Business Finance', April 2016
- 2 'Aid Management Guidelines', Danida;
- 3 'Danida Business Finance', Danida, January 2012;
- 4 'Danida Business Finance, Rules for Procurement', March 2017;
- 5 'General Conditions for Loan Agreements and for the Provision and Administration of Interest Subsidy under the Mixed Credit Programme', Danida, October 2010;
- 6 Strategic Framework for the Danish Neighbourhood Programme 2017-2021, Danida, October 2017;
- 7 DANEP 2017-2021. Ukraine Country Programme Document, Danida, October 2017;
- 8 Guiding Principles for Danida Sustainable Infrastructure Financing 2020, Investment Fund for Developing Countries, 2020
- 9 The World 2030 Denmark's strategy for development cooperation and humanitarian action, Danida 2017;

### Project documents:

- 10 'Due Diligence Report. Lviv Wastewater Biogas Project Implementation Support and Engineering Supervision', Egis, August 2019;
- 11 'Lviv WWTP Emergency rehabilitation project', Egis, Short Synopsis, October 2019;
- 12 'Lviv WWTP Emergency rehabilitation project', Egis, Presentation;
- 13 'Lviv WWTP Emergency rehabilitation project. Environmental And Social Action Plan', October 2019;
- 14 'Construction of Biogas Production and Cogeneration Facilities Review of Technical Proposal', AFRY 22 April 2020
- 15 'Prioritisation Report, Policy Dialogue for Green Cities Action Plan', City of Lviv, June 2019;
- 16 'Lviv Biogas Project Corporate Development Support Programme : Final Report. Lviv City Communal Enterprise Lvivvodokanal', DEBRERIS 2 August 2019 (For NEFCO and EBRD);
- 17 'Environmental and Social Action Plan', 2019, EBRD;
- 18 'Optimal Treatment for the Lviv Sludge Digester Reject', POYRI 21 April 2016 (for NEFCO);
- 19 'Lviv Wastewater Biogas – Feasibility Study Update', ABANOR August 2015 (for EBRD);
- 20 Package with extra documentation provided by NEFCO and LVK (previous studies);
- 21 '*Description of Sludge Management Practices after setting into operation the biogas unit at LVK*', Note elaborated by LVK to answer the questions from the appraisal team regarding the sludge disposal.

### Other documents

- 22 '*Water Protection in Ukraine*', Ministry of Environmental Protection and Natural Resources, Presentation made Bratislava, 2012
- 23 '*IMF Executive Board Approves 18-month US\$5 Billion Stand-By Arrangement for Ukraine*', June 2020, <https://www.imf.org/en/News/Articles/2020/06/09/pr20239-ukraine-imf-executive-board-approves-18-month-us-5-billion-stand-by-arrangeme>
- 24 'Ukraine Country Strategy 2018-2023', EBRD, 2018;

- 25 'The Covid-19 Crisis in Ukraine', OECD, 10 August 2020;
- 26 '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 Million to Ukraine for a Second Urban Infrastructure Project', World Bank, January 2014;
- 27 'Water and Wastewater Services in the Danube Region, Ukraine Country Note', World Bank 2015
- 28 'Ukraine. Recent Developments.' World Bank, March 2020;
- 29 '*Benefits and Costs of DCFTA: Evaluation of the Impact on Georgia, Moldova and Ukraine*', Amat Adarov and Peter Havlik, The Vienna Institute for International Economic Studies, December 2016;
- 30 'Water supply, sewerage tariffs in Ukraine will grow by an average of 20%', <https://en.interfax.com.ua/news/economic/639873.html>
- 31 '*Water and Wastewater Projects in Ukraine*' <https://www.globalmarketsinternational.com/latestmarketpost/ukraine-wastewater-sewage-treatment-plant-projects/>;
- 32 '*Ukraine. Economic Update*'. World Bank, November 19, 2019;
- 33 '*Rethinking of Water Security for Ukraine*', T. I. Adamenko, A. O. Demydenko, M. I. Romashchenko, A. M. Tsvietkova, A. M. Shevchenko, M. V. Yatsyuk, Global Water Partnership, 2016
- 34 '*Lviv Oblast: Urgent Socio-Economic Problems in the Context of European Integration*', Myroslav Biletskyi, Yaroslav Ivakh, Liubov Kotyk, Journal of Geography, Politics and Society, 2017,7
- 35 '*Drivers of change in urban water and wastewater tariffs*'. Simon Damkjaer. H2Open Journal (2020) 3 (1): 355–372. <https://doi.org/10.2166/h2oj.2020.031>

## **Annex 6. Plan for Communication of results**

The EBRD implementation consultant will be tasked with supporting the elaboration of a communication strategy, as well as contributing to the implementation of the strategy by providing information on the project. The implementation consultant will thus have an important role in assisting EBRD, NEFCO and DSIF in the communication of the results.

What? (the message)	When? (the timing)	How? (the platforms)	Who? (Target groups)	Responsible and resources
Denmark is bringing affordable and sustainable wastewater and sludge treatment to people in Ukraine	<ul style="list-style-type: none"> <li>● When the Works contract is signed</li> <li>● When rehabilitated WWTP is taken into operation</li> </ul>	<ul style="list-style-type: none"> <li>● The EBRD, DSIF/IFU and NEFCO web pages</li> <li>● Ukrainian media (TV, newspapers)</li> <li>● Selected Danish media</li> </ul>	<ul style="list-style-type: none"> <li>● The Ukrainian and Danish public to ensure transparency and accountability of the use of Danish development funds</li> </ul>	DSIF in cooperation with RD and NEFCO, with support from the implementation consultant.
Danish Water Utilities are providing technical assistance and training to a Ukrainian water and wastewater company through a twinning arrangement.	<ul style="list-style-type: none"> <li>● When the separate grant funded contract with Danish Water Utilities is entered.</li> </ul>	<ul style="list-style-type: none"> <li>● The EBRD, DSIF/IFU and NEFCO web pages</li> <li>● Ukrainian media (TV, newspapers)</li> <li>● Selected Danish media</li> </ul>	<ul style="list-style-type: none"> <li>● Private sector in Denmark and the Danish Public in general</li> </ul>	DSIF in cooperation with EBRD and NEFCO, with support from the implementation consultant.



## Annex 7. Process Action Plan

Activity/Output	Date	Responsibility
Draft appraisal report to DSIF	15 May 2021	Appraisal Consultant
Draft Project Document	22 May 2021	Appraisal Consultant
Approval of Project by UPR	June 2021	DSIF/Danida
Appropriation by Minister	August 2021	DSIF/Danida
Signing of NEFCO / DSIF Agreement, transfer of PIU consultant funds to NEFCO	August 2021	DSIF/NEFCO
Recruitment of Tender Consultant	September 2021	LVK / EBRD
Elaboration of Tender Documents and tender	October 2021	Tender consultant/LVK / EBRD/NEFCO
Recruitment of Implementation Consultant (if different from tender consultant)	August-September 2021	EBRD/LVK
Contract awarded	November 2021	LVK / EBRD/ NEFCO
DSIF no-objection to contract	December 2021	DSIF
Construction starts	February 2022	Contractor
Transfer of main grant to NEFCO, after DSIF preconditions honored	2022	DSIF
Commissioning	February 2024	Contractor/LVK

## Annex 8. Appraisal recommendations and follow-up

Rec. #	Recommendation	Responsible	Action
1	<p>The Appraisal Team recommends the Lviv Emergency Rehabilitation Project for approval by DSIF. However, a solution to the final disposal of the sludge has to be found to make the WWTP environmentally sustainable. It is recommended to make it a precondition for the DSIF support that steps are taken to address the issue of the sludge:</p> <ul style="list-style-type: none"> <li>• DSIF should together with NEFCO and EBRD agree on realistic and credible preconditions to include in the DSIF grant agreement with Lviv City, which will ensure that the issue of final disposal of the sludge is addressed adequately.</li> <li>• The Implementation Consultant should be tasked with facilitating the preparation of a Sludge Disposal Plan with LVK and the City Government. If needed, this assignment should be financed by DSIF. The Sludge Disposal Plan will agree on the final disposal route and the practical action plan needed to implement the plan, including any funding and procurements.</li> </ul>	DSIF with NEFCO and EBRD	This has been agreed with NEFCO and EBRD and is included in the present project document.
2	<p>It is recommended to include an evaluation of the condition of the wastewater collection systems in the scope of work for the Implementation Consultant for the project, with the aim to identify any major risks to the flows to the WWTP. The objective should be to carry out a rapid assessment to identify major risks and to propose any critical interventions that may be needed, not to conduct a comprehensive wastewater collection feasibility study.</p>	DSIF	DSIF will follow up on this in the tender preparation process.
3	<p>The tender documents for the work should contain: a detailed specification; an evaluation and an allowance for any supplementary work for the LVK rehabilitation; and the requirement for a plan for keeping the WWTPs operational during the contract.</p>	DSIF	DSIF will follow up on this in the tender preparation process.
4	<p>It is recommended to DSIF to consider including an additional financing of EUR 3.72 million as a technical contingency to cover necessary priority investments not included in the present proposal. These priority investments should be identified and agreed with DSIF during tender preparation, and should in particular contribute to a sustainable solution for the sludge disposal, but could e.g. also co-finance a rehabilitation of the electrical substation at the WWTP, if this is deemed justified. DSIF will have to provide a non-objection to the final project description and budget.</p>	DSIF	DSIF has decided not to include a technical contingency. If more funds are needed to solve e.g. the final sludge disposal, NEFCO, EBRD and the City will have to increase their funding.
5	<p>The AT supports the proposal to set up a Twinning arrangement between a Danish Water Utility and LVK to complement the German Twinning Partnership. The twinning should be based on the following principles.</p>	DSIF	This has been included in the present project document.

Rec. #	Recommendation	Responsible	Action
	<ul style="list-style-type: none"> <li>• A focus on practical advice that is appropriate to LVK’s organisational environment. It is <u>not</u> the intention to design and implement a fundamental business transformation plan.</li> <li>• The main inputs should be by experts from the Danish Water Utility visiting Lviv. There should limited visits or study tours from Lviv to Denmark. Secondments in both directions could be an option</li> <li>• A key focus should be on developing the skills of younger staff and on improving the quality of data collection and reporting to assist with better evidence based management.</li> </ul> <p>In practical terms the twinning arrangement could be set up initially with very broad objectives and a ceiling amount for the cost, but with an agreement to narrow it down after an inception period to an action plan with concrete outputs and targets, which should be approved by DSIF. The Implementation Consultant should play a role in this more precise definition of the support by advising and supporting the Danish Water Company to ensure that the twinning is driven by LVK’s needs and constraints. It should not be the assumed that Danish “best practice” is the ideal solution.</p>		

## Annex 9. Quality Assurance checklist for Appraisal<sup>14</sup>

<b>File number/F2 reference:</b>	2020 - 18432
<b>Programme/Project name:</b>	Lviv Wastewater Treatment Plant Emergency Rehabilitation Project
<b>Programme/Project period:</b>	2020-2023
<b>Budget:</b>	DKK 78.8 million

### Presentation of quality assurance process:

The project has undergone an independent appraisal in May 2021. The project was appraised according to Danida guidelines. Due to COVID-19 travel restrictions, the appraisal was desk-based, completed with communication with the partners (LVK, NEFCO and EBRD) through emails and video-conferencing. It is the overall impression that the appraisal has been thorough and that recommendations are appropriately reflected in the final project document.

**X The design of the programme/project has been appraised by someone independent who has not been involved in the development of the programme/project.**

Comments: The appraisal was undertaken by PEM-consult, who was not part of the preparation of the project.

**X The recommendations of the appraisal has been reflected upon in the final design of the programme/project.**

Comments: All recommendations have been accorded appropriate consideration during the finalization of the project document. Annex 7 outlines appraisal recommendations and follow-up

**X The programme/project complies with Danida policies and Aid Management Guidelines.**

Comments: The project supports the overall Danish engagement in Ukraine and contributes directly to Danish development priorities of promoting inclusive and sustainable growth with a special focus on energy, water, agriculture, food and other areas, where Denmark has particular knowledge, resources and interests. The project complies with the DSIF guiding principles.

**X The programme/project addresses relevant challenges and provides adequate responses.**

Comments: The appraisal concludes that that the project is relevant as a response to the challenges faced in Lviv. The project is aligned with policies and plans of the Government of Ukraine and addresses local concerns. Rehabilitation is a top priority in the “green city” plan. The project is based on an analysis of

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<sup>14</sup> This Quality Assurance Checklist should be used by the responsible MFA unit to document the quality assurance process of appropriations where TQS is not involved. The checklist does not replace an appraisal, but aims to help the responsible MFA unit ensure that key questions regarding the quality of the programme/project are asked and that the answers to these questions are properly documented and communicated to the approving authority.

the conditions of the existing system. While the project budget is not sufficient to finance all rehabilitation works, it prioritises the most direly needed for proper functioning of the WTP and biogas plant.

**□ X Issues related to HRBA/Gender, Green Growth and Environment have been addressed sufficiently.**

Comments: The issues are addressed in the Environmental and Social Impact assessment. In addition, an agreement between the City of Lviv/LVK, EBRD, NEFCO and DSIF with a satisfactory solution to the final disposal of sludge is included as a precondition.

**□ X Comments from the Danida Programme Committee have been addressed (if applicable).**

Comments: Comments from the programme Committee have been reflected in the project document and in its preparation. The project document includes a justification for the size of the grant element as well as a concise description the DSIF-NEFCO model. Regarding the recommendation of a plan for adaptive and flexible approaches in DSIF, there is currently an ongoing evaluation of DSIF, which will inform the future strategic framework. The proposed results framework appears appropriate for this type of project.

**□ X The programme/project outcome(s) are found to be sustainable and is in line with the partner's development policies and strategies. Implementation modalities are well described and justified.**

Comments: The project is in line with Ukraine's development policies and Lviv city priorities by providing an overdue rehabilitation of critical infrastructure and associated input for production of biogas, which will in turn reduce demand for other energy sources. However, as remarked in the appraisal, the overall sustainability of the intervention is influenced by many factors, including tariffs and subsidies - also affecting public financial headroom for further rehabilitation works.

**□ X The results framework, indicators and monitoring framework of the programme/project provide an adequate basis for monitoring results and outcome.**

Comments: A few baselines will have to be established/verified during the final design/elaboration of tender documents. The implementation consultant will assist with this process. The technical assistance (twinning agreement) will also ensure support for monitoring. Finally, DSIF is committed to evaluation of impacts five years after commissioning.

**□ X The programme/project is found sound budget-wise.**

Comments: The project finances the components of the WTP most critically needed for operation and input to the biogas plant. Some of these works are already commenced due to time considerations (and in the hopes of external financing), hence the budget line "intermediate rehabilitations work by LVK". Based on LVK financial statements for 2019 and 2020, the appraisal team assessed that LVK is able to cover the operational expenses, but not the capital costs. As the project is not a full rehabilitation, LVK will remain dependent on subsidies from the City Council.

**□ X The programme/project is found realistic in its time-schedule.**

Comments: The partners are keen to initiate the project as it is a crucial component for the functioning of the biogas plant, where construction has begun.

- Other donors involved in the same programme/project have been consulted, and possible harmonised common procedures for funding and monitoring have been explored.**

Comments: The project is a joint project with NEFCO and EBRD, involving extensive planning and consultation.

- Key programme/project stakeholders have been identified, the choice of partner has been justified and criteria for selection have been documented.**

Comments: Stakeholders have been identified and the partner is by default the utilities company.

- The executing partner(s) is/are found to have the capacity to properly manage, implement and report on the funds for the programme/project and lines of management responsibility are clear.**

Comments: The partnership between NEFCO, EBRD and DSIF is clearly defined and relations appear good. These partners are professional development organisations with extensive experience from Ukraine. The Project Implementation Unit (PIU), consisting of employees from LVK, will be assisted by a consultant throughout the tender process and during construction.

- Risks involved have been considered and risk management integrated in the programme/project document.**

Comments: The main risks and mitigation measures are included in the project document, while Annex 4 presents the full risk management matrix. The concerns regarding sludge disposal are addressed.

- In conclusion, the programme/project can be recommended for approval:**

Yes

Date and signature of desk officer: 09/06-2021 Theo Ib Larsen



Date and signature of management: 14/06-2021 Adam Sparre Spliid