



MINISTRY OF FOREIGN AFFAIRS
OF DENMARK



COWI

Assistance to the Development of the **Mykolaiv** **Masterplan**

Municipal Waste Management – **Vision 2050**

Report, Final

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List of Abbreviations

C&D waste	Construction & Demolition waste
EPR	Extended Producer Responsibility
EU	European Union
GPS	Global Positioning System
IoT	Internet of Things
MBT	Mechanical Biological Treatment
MCA	Mykolaiv City Administration
MFA	Ministry of Foreign Affairs
NGO	Non-Governmental Organisation
SWM	Solid Waste Management

1 Introduction

This report has been developed within the framework of the project “Mykolaiv - Denmark partnership – Technical support unit” financed by the Danish Ministry of Foreign Affairs (MFA). The project, which has been entrusted COWI, is a framework contract, which, among others, includes assistance to the Mykolaiv City Administration (MCA) in developing the Mykolaiv Masterplan in close cooperation with an Italian company, One Works.

COWI's contribution to Mykolaiv Masterplan in a nutshell

Mykolaiv Masterplan, which has been requested by the Mayor of Mykolaiv City, has a time horizon till 2050. It provides a compass for actions to be taken by the Mykolaiv City to ensure that it will develop into a thriving city attractive to its citizens and business community.

COWI and One Works assist Mykolaiv City Administration in developing the masterplan. In this work, COWI focuses on three sectors:

- Water and wastewater
- Energy, including power, district heating and renewable energy sources
- Solid waste management.

Mykolaiv City Administration meets every week with COWI and One Works to ensure proper coordination.

COWI has established a project organization consisting of a project management team and three sector teams of professionals, each headed by a Discipline Leader. Three sectoral Focal Points are responsible for monitoring cross-cutting activities, ensuring coordination between the parties and maintaining consistency in the deliverables.

To enhance transparency in the development of the Mykolaiv Masterplan, given its significant public interest and exposure, COWI has established three sector-specific Sounding Boards inviting all potentially interested parties to take part in these.

This report delineates the long-term strategic outlook for the solid waste generation and management in the city of Mykolaiv, projecting ahead to the year 2050.

A preliminary iteration of this vision was initially disseminated to colleagues within the MCA and One Works, prominent stakeholders in this endeavour. Additionally, a thorough deliberation of this vision took place during the inaugural session of the Sounding Board on Waste. Subsequently, all pertinent feedback and recommendations were meticulously integrated into the final rendition of this report.

The principal audience for this report comprises the MCA and One Works, given their central roles in the realization of this vision.

The two sections, the current "Introduction" and ensuing "Vision for Solid Waste Management" along with the sub-chapters serve to expound upon the Mykolaiv City's aspirations for the year 2050 in the domain of solid waste management, articulating the paramount initiatives that will be instrumental in attaining these objectives. These chapters endeavour to provide a comprehensive framework that supports the strategic direction and overarching principles underpinning Mykolaiv's envisioned progress in the solid waste management sector.

2 Vision for Solid Waste Management

A consensus has been reached to develop master plan for Mykolaiv, articulating a vision reaching up to the year 2050 and integrating both short- and mid-term objectives. As the city of Mykolaiv looks to the future, it is essential having a clear vision for SWM that aligns with “Global Best Practices”, environmental sustainability, and the needs of its residents.

This chapter presents the vision for SWM in Mykolaiv City as of 2050.

2.1 Circular Economy Approach

The vision is to establish an eco-friendly, sustainable city that sets an example in waste reduction, recycling, and resource recuperation. It includes the development of a waste segregation culture, encouraging community involvement, and advanced technologies to diminish waste generation and untreated waste disposal while maximizing resource utilization.

Mykolaiv's future solid waste management system will be based on a circular economy approach where waste will be viewed as a valuable resource.

2.2 Regulatory Approach

Circular economy practices align with regulatory requirements related to waste management, pollution reduction, and sustainable development. Institutions that embrace circular strategies are more likely to stay in compliance with existing regulations and contribute to meeting national and international sustainability targets. By adhering to this approach, Mykolaiv will align itself with European legislation, including the Waste Framework Directive (2008/98/EC) that embodies the principles and goals of a circular economy by establishing the hierarchy of waste management options (prevention, preparation for reuse, recycling, energy recovery, and disposal), and introducing concepts like Extended Producer Responsibility (EPR) and sets targets for waste reduction and recycling.

2.3 Integrated Waste Management Infrastructure

To achieve the future vision, Mykolaiv will develop an integrated waste management infrastructure that optimizes waste collection, transportation, treatment, and final disposal. This infrastructure will involve a network of modern waste sorting, recycling and treatment facilities (e.g. Mechanical Biological Treatment, or composting plants, or waste-to-energy facilities), ensuring that waste is processed in the most environmentally friendly manner possible.

The city will implement a comprehensive household-level initiative for the separate collection of solid waste. Recyclable materials will undergo specialized recycling processes, while hazardous waste from households, collected separately, will be appropriately transported to licensed facilities. Non-recyclable waste will undergo preliminary treatment and the remaining will be directed to a newly established sanitary landfill for non-hazardous waste.

This sanitary landfill will adhere to the regulations set by the EU standards outlined in the Landfill Directive (1999/31/EC). The closed cells and dumpsites within the city will undergo rehabilitation, accompanied by post-closure monitoring.

2.4 Advanced Waste Collection Systems

The future vision includes implementing smart waste collection systems equipped with IoT (Internet of Things) sensors and GPS technology. These systems will enable real-time monitoring of waste

bins' fill levels, identified best location for waste containers or transfer stations, optimizing waste collection routes, reducing fuel consumption, and improving overall operational efficiency.

2.5 Cost-effective Waste Management

Circular economy principles prioritize waste reduction, reuse, and recycling. As a result, the volume of waste being sent to landfills or incineration decreases significantly. This reduction in waste disposal leads to lower waste management costs for the municipality. With less waste to handle, fewer resources are required for collection, transportation, and disposal, thereby reducing the associated expenses.

2.6 Economic Opportunities and Local Job Creation

Implementing circular practices will stimulate Mykolaiv's local economies by generating new business opportunities. Rethinking production processes, product design, and service delivery fosters innovation and entrepreneurship. This, in turn, creates jobs in areas such as recycling, repair, remanufacturing, and eco-design, enhancing the municipality's economic resilience.

2.7 Community Engagement

Circular economy initiatives encourage active community involvement. Programs that promote waste reduction, recycling, and sharing not only strengthen community bonds – between local businesses, NGOs and waste management companies but also raise environmental awareness among residents. Public awareness and education will play a crucial role in Mykolaiv's solid waste management future vision. Thanks to the development of comprehensive educational campaigns, residents will be informed about waste segregation, recycling best practices, and the benefits of waste reduction.

2.8 Construction & Demolition Waste

Management of demolition waste from destroyed buildings will be an important issue for Mykolaiv in the short- and mid-term. The vision for 2050 is that the amount of this kind of waste is back to pre-war conditions and the facilities that have been established for processing of building waste in the short- and mid-term period are transferred to a commercial feasible facility for recycling of construction & demolition waste (C&D-waste). A municipality managed reporting and monitoring system for recording of C&D-waste production to EU standard shall be in place.

2.9 Cross-cutting: Waste-to-Energy and Renewable Energy Integration

Potential of waste-to-energy technologies and opportunities for integration of renewable energy sources (e.g. solar or wind) into the waste management infrastructure and promoting a sustainable energy mix will be considered.