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Executive Summary

Industrial Waste Mapping in Pilot Areas

Zestaponi and Rustavi Municipalities

Georgia

Action implemented by:

OECD BETTER POLICIES FOR BETTER LIVES | UNECE | UN environment programme | UNIDO | THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

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Foreword

Waste mapping is a common method used to quantify and demonstrate the distribution and management of waste within a geographic area. The overall objective of industrial waste mapping is to identify, assess, and map the waste streams of manufacturing enterprises in order to develop options for improved resource efficiency. This includes the analysis of the collection, transport, treatment and disposal of waste, together with the monitoring and regulation of the waste management process and waste-related laws, technologies, and economic mechanisms. An efficient waste management system creates increased business value for any manufacturing enterprise. This contributes to the sustainability of industries and the promotion of economic opportunities.

The initiative on Industrial Waste Mapping in Pilot Areas was developed under the regional programme funded by the European Union, the EU4 Environment Action. It is the result of a collaboration between team members from the United Nations Industrial Development Organization (UNIDO), an international expert team from SWECO AB consultancy, and the Regional Environmental Centre for the Caucasus (RECC), together with the Energy Efficiency Centre (EEC) in Georgia in its role as a National Implementing Partner of UNIDO for EU4Environment. The full report on industrial waste mapping in Georgia consists of nine chapters, which provide an in-depth analysis of the handling of industrial waste in the selected municipalities.

About the study

In Georgia, industrial waste mapping (IWM) was carried out in two pilot municipalities: Rustavi and Zestaponi. These were chosen following an initial evaluation of all 10 Georgian regions, which took into account the presence of manufacturing industries or industrial parks, potential industrial wastes and waste recycling enterprises, high urban territory ratio, availability of waste sorting/treatment or disposal facilities, and the existence of waste management plans. In discussion with the Ministry of Environmental Protection and Agriculture (MEPA), out of the four shortlisted regions (Shida Kartli, Kvemo Kartli, Adjara A/R and Imereti), Imereti and Kvemo Kartli regions were taken forward for the study.

It was then decided that individual municipalities should be selected as their pre-existing municipal waste management plans would provide an important source of information for the waste mapping study. Finally, after taking into account the existing industries, the quantity, and types of industrial waste and waste treatment, the Rustavi and Zestaponi municipalities were selected for the waste mapping exercise as industrial centres hosting significant metallurgy and cement production facilities.

The report outlines the legislative and strategic background to waste management in the country, provides information on the characteristics of the pilot areas, and identifies key stakeholders in the management of waste. Additionally, it describes waste type selection, extrapolation and mapping activities, and identifies dedicated datasets and data collection methods. Lastly, it provides recommendations for more circular waste management and highlights lessons learned for future waste mapping exercises.

IWM methodology

In order to define the scope of the mapping exercise and develop concrete results, the study was delimited to geographical pilot regions, focus sectors with an industrial presence, and waste types with a high potential for circularity. Waste data were first obtained through a desk-based review, and then by reviewing the waste management plans of the largest businesses in each area. Municipal waste management plans were also consulted. Details and clarifications (such as information on waste transporters, destinations, and costs) were obtained by direct engagement with the businesses in question.

The mapping of wastes focused on their waste journey (including quantities, transport, destination, key stakeholders, collection costs, and post-treatment market value). Based on the results, solutions were then proposed, along with estimated material and financial benefits. The data primarily focused on the samples from the selected businesses, although several extrapolations suggest trends that would allow the exercise to be replicated in other pilot regions.

Legislative, regulatory, and strategic context

Enacted in 2015, the Waste Management Code of Georgia creates a legal and regulatory framework for waste management. The purpose of the Code is to provide legal conditions for the implementation of measures aimed at the prevention of waste, its increased reuse, and the environmentally sound treatment of waste. Of particular relevance to this project, the Code mandates the submission of waste management plans to MEPA. This applies to entities that produce more than 200 tonnes of non-hazardous waste or 1,000 tonnes of inert waste, or any amount of hazardous waste, annually. Other key provisions in the Code include the introduction of an Extended Producer Responsibility (EPR) scheme, municipal waste management plans, environmental impact assessments, and the requirement to establish a National Waste Management Strategy, which sets out recycling and recovery targets. National recycling targets are also stated in the Code for paper, glass, metal and plastic wastes, rising gradually from 20 per cent to 90 per cent by 2030.

The Code enables an alignment of Georgian waste management legislation with key European Union (EU) directives, such as the Waste Framework Directive and the Landfill Directive, thus setting out the direction of travel for Georgian waste management as it works towards harmonization with EU standards.

MEPA is also responsible for the development and implementation of a unified national policy on overall waste management, including the management of industrial waste. On 1 April 2016, in line with the Code provisions, the Government of Georgia approved the 2016-2030 National Waste Management Strategy and 2016-2020 Waste Management Action Plan for Georgia, the implementation of which is funded through waste management tariffs. The National Waste Management Strategy lays the foundations for the development of the waste management system in Georgia, taking into account international practices and the socio-economic situation in the country.

Pilot areas: industrial base, main sectors, and waste management system

Rustavi

415
manufacturing enterprises

3,970
employees

Zestaponi

308
manufacturing enterprises

>2,000
employees

There are 415 active manufacturing businesses in Rustavi, employing an estimated total of 3,970 staff (representing 0.23 per cent of the employable population).[1] Despite the fact that the sector makes up less than 10 per cent of total businesses in the area, the large size of individual enterprises means that manufacturing accounts for a significant portion of the local economy. Metallurgy and associated processes are the most important industries in the municipality. Other significant industry sub-sectors with registered businesses in the locality include rubber, plastic products, and furniture.

Similarly, in Zestaponi, manufacturing makes up around 10 per cent of all businesses but because of the large scale of industrial concerns, it once again accounts for a greater proportion of economic activity. In total, there are 308 active manufacturing businesses, estimated to employ just over 2,000 people (representing 0.11 per cent of the employable population). A large number of people are employed in cement production, metallurgical plants, and associated processes. The food and beverage sectors are also well represented on the business register but there is limited information regarding the industrial nature of the operations.

[1] All citations to statistics are provided as footnotes in the main body of the report.

In both municipalities, landfill is the dominant form of waste disposal. There are data on waste arising from municipal solid wastes (MSW) but no information on non-MSW waste or on recycling or reuse, while industrial waste data are very limited. As a result, inferences have been made from the waste management plans of a number of companies in the metallurgy and cement production sectors in order to estimate the generation of industrial waste.

In Zestaponi, the collection of residual waste is carried out by the Zestaponi Amenity Service, a non-entrepreneurial (non-commercial) legal entity, set up by the Zestaponi municipality. There are five existing landfills in the Imereti region (Tskaltubo, Khoni, Chiatura, Kharagauli, Zestaponi/Terjola). It is assumed that all waste destined for landfill in the region is taken to Zestaponi Landfill, which currently has no provision for pre-sorting of mixed waste. No separate collections of recyclable municipal waste are in place, so no data on segregated waste types are available. A number of private contractors collect non-MSW recyclable and hazardous wastes treated elsewhere, however, there are no data on the quantities of this waste. The waste management plans of businesses provide information on waste streams that are collected from private businesses only.

In Rustavi, mixed waste is collected by the municipal waste management service company. A variety of contractors collect non-MSW recyclable wastes, although this is quite limited in scope and capacity. Mostly, the "Medical Technology Ltd" performs treatment of hazardous waste in the pilot municipalities. Currently, all waste produced in the Rustavi area is sent to Rustavi Landfill, one of three landfill sites operating in the Kvemo Kartli region. The facility has a sorting line for paper, glass, and plastic from municipal waste, with the rest being disposed of in the landfill. However, all landfilling activities are expected to move to Tbilisi in the short term as Rustavi landfill nears full capacity.

Datasets

Based on the information from five of the largest businesses in Zestaponi, the total waste per year amounts to 21,800 tonnes, of which all but 300 tonnes are unprocessed slag or wastes from the processing of slag. The remaining 300 tonnes per year are accounted for by 20 different kinds of waste. Extrapolating the data from all manufacturing businesses in Zestaponi results in an estimate of up to 36,000 tonnes per year of industrial waste.

In Rustavi, the waste management plans from four of the biggest companies showed 106,000 tonnes of waste produced per year. Unprocessed slag (40,000 tonnes), waste binders (6,500 tonnes), particulates and dust (5,000 tonnes), ferrous metal dust and particles (13,000 tonnes), other linings and refractories from metallurgy (14,000 tonnes) and construction and demolition wastes (15,500 tonnes) comprise 94,000 tonnes or 89 per cent of the reported wastes. The remaining 12,000 tonnes per year are spread across 55 different waste types. Once again, based on data extrapolation, it is estimated that up to 125,000 tonnes of industrial waste per year are produced in Rustavi.

The estimates provided above underline the need for empirical waste data reporting or the use of regular business waste surveys.

Waste selection

Three to four waste streams per pilot region were selected to ensure that lessons could be drawn from a variety of situations. Particular streams were chosen based on the quantity and industrial nature of the wastes, the kind of waste journeys best suited to the pilot, the potential for greater circularity, and whether the wastes could be characterized as “niche” or more universal.

In Zestaponi, the following types of wastes were taken forward:

- Waste from the processing of slag and unprocessed slag
- Synthetic hydraulic oils
- End-of-life tyres
- Mixed municipal wastes

In Rustavi, the following types of waste were taken forward:

- Paper and cardboard (predominantly heavy-duty packaging for the transportation of cement)
- End-of-life tyres
- Mixed municipal wastes

The wastes in Rustavi are characteristically more universal, even if produced in industrial settings. The wastes selected in Zestaponi are more industrial in nature.

Results

The results for the sample of selected companies are presented to prioritize each selected waste type illustrated by the waste maps. The potential financial savings are derived from the specific amounts presented by the enterprises in the sample, which provide the basis for later extrapolation.

Zestaponi

Waste from the processing of slag and unprocessed slag

A total of 21,500 tonnes of slag waste is produced per year. Around 5,000 tonnes are unprocessed and reinserted into the metallurgy process. It is assumed that half of the remaining 16,500 tonnes of waste produced from the processing of slag is crushed and sold, while the remainder is assumed to be stored. Market stimulus is needed to sell or reuse the stored waste, for example, by encouraging greater procurement for use in construction, although the categorization as waste is said to be a barrier. If all of the waste produced from the processing of slag was sent to the market, the estimated market value would rise to €316,000. Capacity already exists to make this possible, with crushing and aggregate logistics being well developed. However, measures to prevent the generation of waste in the first place require more analysis of specific metallurgic processes.

End-of- life tyres

The enterprise sample also showed 21 tonnes of waste being generated each year from end-of-life tyres. There is no local granulation capacity and the tyres are not landfilled, so it is assumed that they are stored indefinitely. Until capacity is developed, this material has no current market value and is a problem waste. Circular practices could be introduced by increasing the capacity of granulation processes to convert tyres into rubber crumbs for sale to the market. In addition, shredding for incineration/pyrolysis by cement plants has been discussed in Georgia and there is a willingness to use tyres as fuel by these plants, provided a regular supply could be guaranteed, for which capacity is needed.

Mixed municipal wastes

Mixed municipal solid waste is disposed of in Zestaponi/Terjola landfill with no pre-sorting. Current collection costs are just under €1,500 a year with no retrieved material market value. A 50 per cent recycling rate – in line with EU performance - could result in reduced collection costs of €600 and a market value for the material of over €1,500 (applying to the enterprise sample). Processing into refuse-derived fuel (RDF) could yield a similar market value but collection would cost more.

Synthetic hydraulic oils

According to the samples taken from businesses, around 3.2 tonnes of synthetic hydraulic oil waste is produced per year. The oil is classified as non-recyclable, with 99 per cent of it being incinerated in Tbilisi. Electrification of the plant's machinery and equipment could reduce the overall demand for oil, along with the promotion of eco oils. Overall, the shift from fuel-based to electrical machinery has the potential to reduce the use of all types of oil. However, the prevention and minimization of waste are the optimal solutions.

Rustavi

Paper and cardboard

According to the estimates, a total of 1,281 tonnes of paper and card waste is produced each year, of which 1,250 tonnes come from waste paper sacks from the cement production facility. All paper is currently disposed of in the landfill, amounting to €26,000 in annual collection costs, with very little recycling or recovery, and almost no material value. Concrete steps that could address this problem include: the use of reusable sacks as part of a take-back scheme (which would largely eradicate this waste); investigation into recyclability options, which could yield a material value of around €45,000 a year for recycled paper and reduced collection costs of about €12,000; or incineration of the waste in a cement kiln.

End-of- life tyres

Small quantities of end-of-life tyres (8 tonnes per year) are collected and sent directly for granulation at a pilot-scale facility in Tbilisi, where they are converted into rubber crumbs. Collection costs and material value have been estimated at around €500 and €1,800 per year, respectively. The facility is small scale so no further tonnage can be recycled without expansion. Heidelberg Cement has signalled that it could accept tyres as fuel in its kiln. This is technically viable but it would require supply guarantees

Mixed municipal wastes

Approximately 215 tonnes of mixed municipal waste are disposed of each year directly into landfills (with a small degree of pre-sorting of paper, plastic, metals, and glass). Collection costs for the recovered recyclables have been estimated at around €4,400 a year while material value costs are thought to be about €800. If half of the waste generated was recycled, collection costs would be reduced to around €2,000 a year, with the recycled material subsequently valued at around €10,000. Alternatively, processing into RDF would cost around €4,000 annually for collection, and yield a value of around €8,000 on the RDF market.

Conclusions

In both pilot regions, the large majority of all industrial waste surveyed is made up of a small number of material types, such as unprocessed slag, wastes from the processing of slag, and various metals and minerals. There is still a large reliance on landfill and incineration and relatively little sorting or intermediate processing – the chains of custody for wastes are generally very simple, with wastes transported from point of origin to point of disposal with no known intermediate handling.

Certain industrial waste types (such as unprocessed slag) are already recirculated back into the production process. There is scope for symbioses, such as the use of tyres (as fuel feedstock in a cement kiln). How viable this is, however, will depend on ensuring a dependable supply of tyres rather than on any other technical considerations.

The financial benefits from the proposed alternatives to the baseline are considerable, both in terms of avoided waste collection costs and increased material value. In some cases, such as the waste slag in Zestaponi, financial benefits are linked to expanding existing markets for reuse. In other cases, such as end-of-life tyres in Zestaponi, the solutions would create markets and values that do not currently exist. In both pilot areas, extracting recyclables from mixed wastes would reduce waste collection costs by half and increase material value by 10 to 15 times. Overall, there is potential to cut collection costs on the surveyed wastes in both regions from the current baseline by up to an estimated €65,795 per year and to increase material value by €348,093 a year. These estimates exclude end-of-life tyres for which investment and new operational costs are needed to create an economic value as secondary material (this practice is not implemented in Zestaponi).

There are opportunities to introduce measures that are aligned with the circular economy. These involve a change in the business model to prevent waste in the first instance. The introduction of reusable containers via take-back schemes could be explored to replace paper sacks. Increased electrification of plants and machinery could reduce reliance on oils. These are not “easy wins” as they would require reorganization and investment, but they would provide a powerful narrative in the region on the benefits of circular approaches. Solutions to several waste streams are more strategic in nature, such as the need for waste sorting and treatment plants to treat mixed waste from industrial facilities.

There is variation in how wastes are managed in the different pilot regions. Rustavi benefits from a pilot-scale granulation plant which reprocesses end-of-life tyres into rubber crumbs, whereas in Zestaponi no solution for tyres currently exists. The landfill in Rustavi (although soon closing) has some limited pre-sorting facilities to extract recyclables, whereas, in Zestaponi, the landfill currently lacks such a capability. This is indicative of the universal provision of waste facilities. Where such facilities exist, they are usually localized or limited in capacity.
There is a shortage of reliable empirical data on industrial waste. Until such data exist on quantities, types, composition and prices, there will be a lack of confidence on which to base decisions pertaining to the development and improvement of waste management systems.

Recommendations for more circular waste management

There is an acute need for better waste data. Improvements in Georgia are ongoing; however, the current waste mapping exercise underlines the need for faster change. One clear way to help achieve this is through the digitalization of data and the use of digital tools to drive a greater understanding of current practices and identify tangible benefits for the proposed solutions.

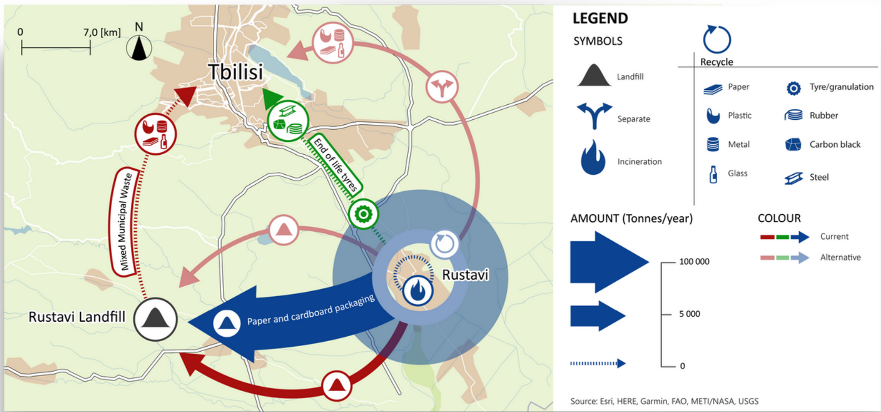
In addition, the underdeveloped nature of Georgia’s waste and resource management systems presents the country with an opportunity to embrace circular economy policies and thinking that were not available to the EU at the same stage of development. These include the use of more nuanced reporting indicators such as CO_2 weightings for waste management, the creation of national databases for recovered materials to encourage reuse, the promotion of green procurement (such as the specification of recovered materials, electrification and other waste-avoiding measures in tenders), and taking a broader, collaborative, whole-system view where industrial symbioses are enabled. Targeted investment similar to the EU Taxonomy Regulations (designed to support the transformation of the EU economy to meet the European Green Deal objectives) could also be pursued.

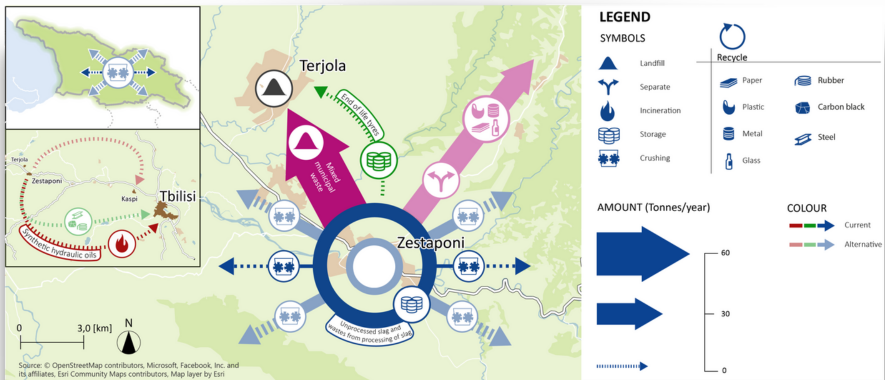
There is also a number of strategic actions that could be taken to stimulate more circular flows of industrial waste, such as fiscal tools and collection pricing that encourage recycling, market stimulation, and procurement strategies to prioritize recovered materials. Moreover, regulation can support circular solutions, for example, through the greater use of end-of-waste protocols that clarify how wastes can become products again.

Lessons learned for waste mapping

Key lessons learned include:

- The importance of keeping tasks as simple as possible in order to maximise input from external stakeholders
- The need to align waste mapping with regions that report data
- The importance of undertaking research on the industrial base and waste management sector before proceeding with tasks
- Allowing sufficient time to gather data
- Acknowledging the vital role financial savings have in making the case for change
- The use of process diagrams to verify the understanding of industrial processes and wastes
- The need to build impact when dealing with a lack of data on quantities and value of wastes (as it would necessitate certain assumptions)
- The desirability of a streamlined and simplified selection process in any future mapping
- The importance of putting in place structured data gathering and documenting processes that are also sensitive to local conventions and customs





Improvement options

The following steps would help improve the Georgian waste management system:

- Strengthened waste hierarchy perspective in waste strategy and laws
- Opportunities for embracing the circular economy
- Better data and a sound waste data strategy
- Acceleration of the reviews of fiscal tools
- Market stimulation and support
- End-of-waste initiatives
- Measures to counter waste crime
- More expansive business information
- Public registers of waste businesses

Read more

Industrial Waste Mapping in Pilot Areas of Azerbaijan

Industrial Waste Mapping in Pilot Areas of Ukraine

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