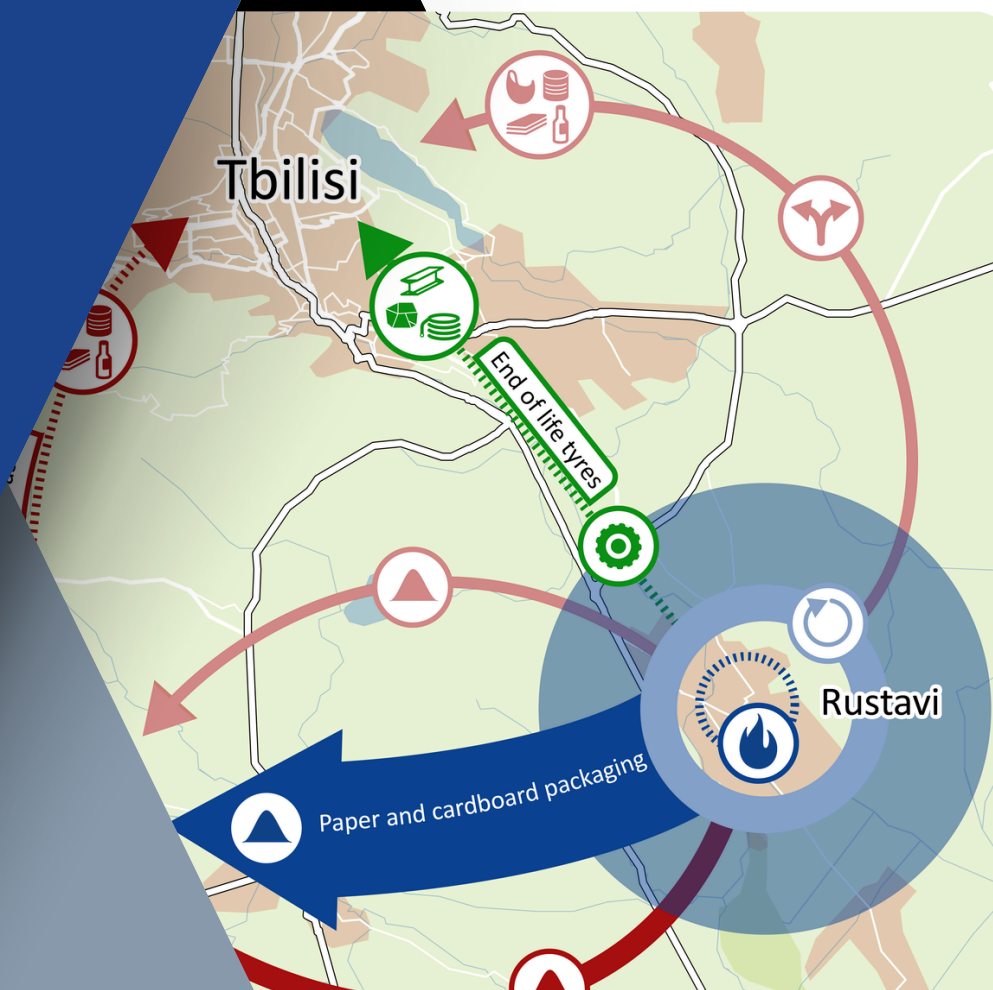




Funded by
the European Union

EU4Environment
Green Economy in Eastern Partner Countries



INDUSTRIAL WASTE MAPS

MOVING FROM LINEAR TO CIRCULAR PROCESSES

Action implemented by:



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



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What is industrial waste mapping?

Industrial Waste Mapping (IWM) is a common method used to quantify and demonstrate the distribution and management of waste within a geographic area. The overall objective of IWM is to identify, assess, and map the waste streams of manufacturing enterprises and help them develop options for improved resource efficiency. Within the European Union-funded, EU4Environment Action, between 2019-2024, IWM activities were carried out in three Eastern Partnership countries, namely Azerbaijan, Georgia, and Ukraine.

Purpose and direction

This flyer explores useful strategies for approaching particular industrial waste streams, prioritising opportunities for industrial synergies in four major waste types identified within the IWM exercises: wood, oil, plastic, paper and cardboard. In general, it is important to prioritise improvements within the top of the waste hierarchy. This is because the prevention of waste is the most efficient way to save financial and environmental resources. The waste that cannot be prevented should be reused, then recycled, and so on. The below illustration shows how resources are saved in a circular system as compared to a linear system (take-make-waste).

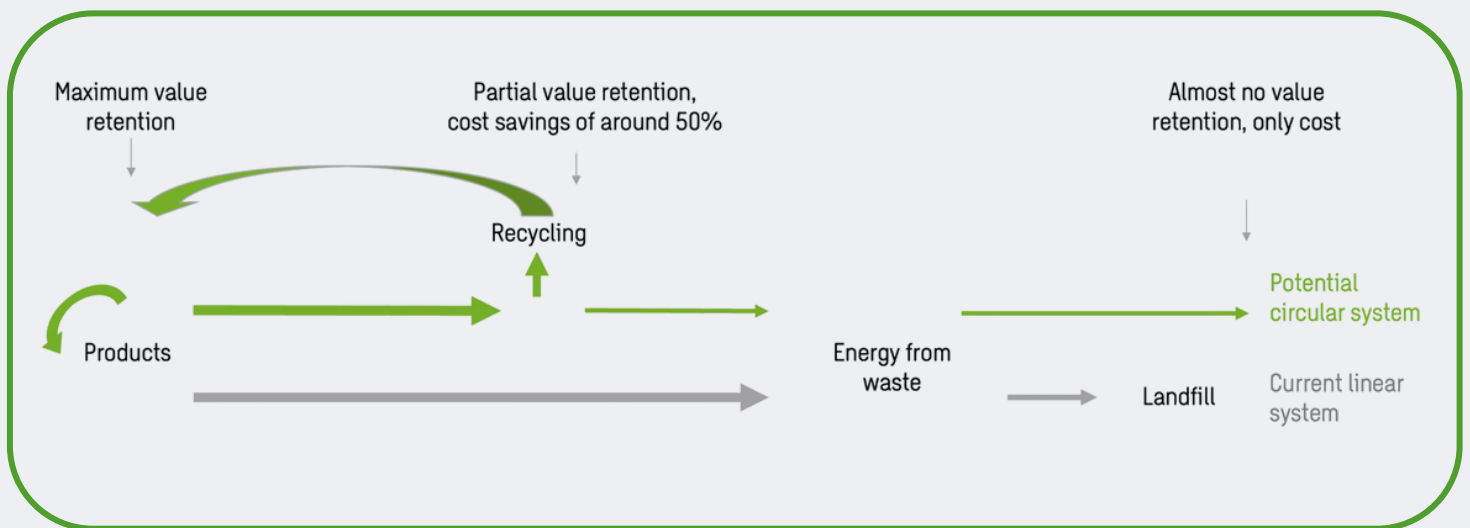


Figure 1. Improvement priorities for industrial waste

IWM STRATEGIES FOR WOOD

Wood waste can be reduced through various strategies. For instance, installing repair shops for broken pallets has demonstrated a potential 50% reduction in wasted pallets in Azerbaijan. Additionally, recycling wood waste into particle boards can yield a 50% higher income compared to pellet production (a lucrative opportunity observed in Ukraine). The return on investment (ROI) for pellet machines is notably quick, with a one-year ROI being documented in Ukraine. Moreover, wood waste can be incinerated for heat or recycled into bedding for horses, presenting further avenues for reuse. These strategies not only enhance material value but also support industrial symbiosis, promoting a more sustainable and economically beneficial approach to wood waste management.

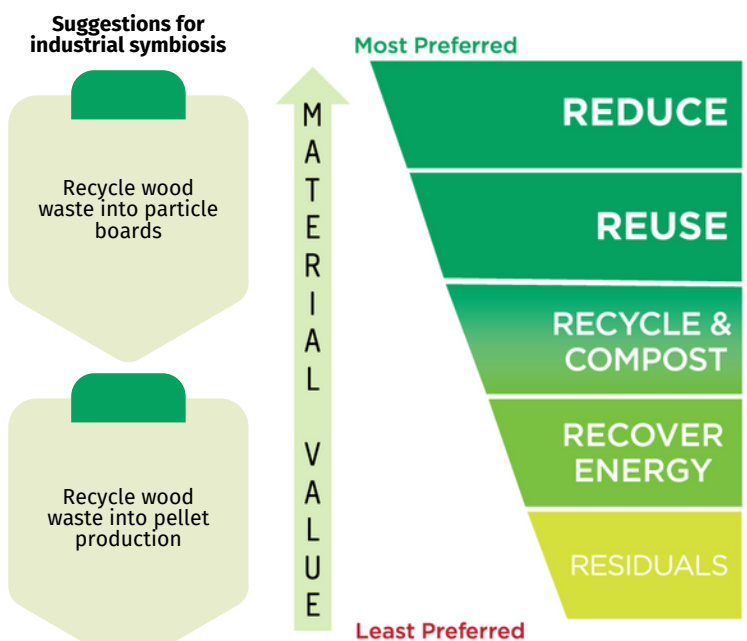


Figure 2. Wood waste hierarchy

IWM STRATEGIES FOR OILS

Some suggestions to optimise the management of oil waste include the use of minimal quantity lubricants or dosage equipment can significantly reduce oil consumption, marking the primary step in waste minimization. Following this, reusing hydraulic oil after cleaning with mechanical filters can further decrease waste and improve resource utilization. Transitioning to hydraulic bio-oil offers lower collection costs and greater reprocessing potential, which serves as the third priority. Ultimately, the elimination of hydraulic oil usage through electrification represents a forward-thinking approach to completely mitigate oil waste. These methods not only reduce environmental impact but also provide economic benefits by lowering operational costs and increasing the potential for oil reprocessing

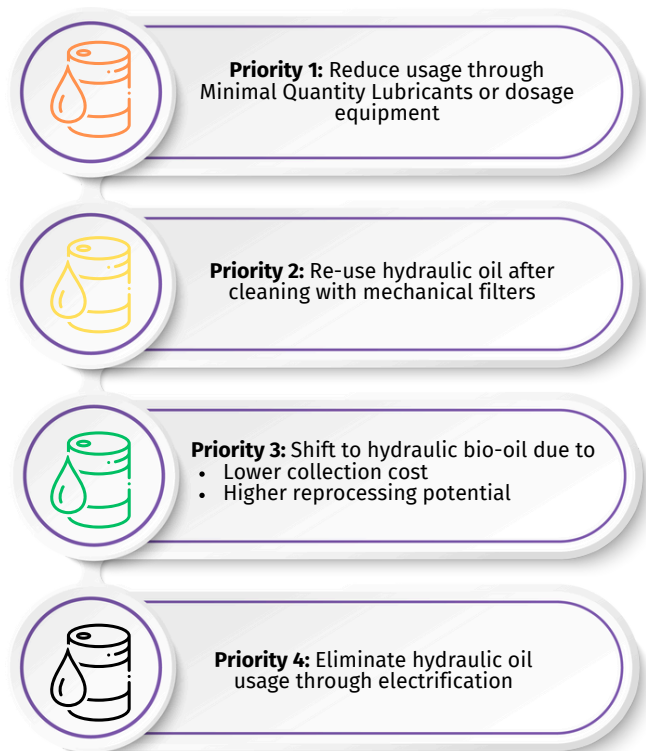


Figure 3. Oil waste hierarchy

IWM STRATEGIES FOR PLASTIC

An improved management of plastic waste should include prevention, reuse, and recycling. The primary goal is to prevent plastic waste by optimising the use of packaging materials, avoiding disposable packaging, and developing re-use schemes for packaging boxes and materials. Additionally, implementing a deposit system where deposits are returned upon the return of packaging can further incentivise reuse. Likewise, prioritising bulk deliveries could help reduce waste. Overall, it is important to avoid blended materials (such as duct tape), as these are difficult to recycle. Another suggestion is to investigate potential opportunities industrial symbiosis, where the plastic waste from one industry can be used as input material in another. Here, categorising plastic based on its recyclability (such as PET, HDPE, LDPE, PP, PVC, and PS) can help streamline the recycling processes and prioritise circular solutions.

Priority 2: Investigate possible industrial symbiosis

- Consider if plastic waste could be reused as input material in adjacent industries

Priority 3: Avoid un-recycleable materials

- Avoid blended materials, such as duct tape or composites, as these are difficult to recycle

Priority 1: Prevent plastic waste
Optimise the use of packaging materials:

- Avoid disposable packaging
- Develop schemes to re-use packaging boxes and/or materials
- Consider deposit system where deposit is returned when returning box (on system level)
- Optimise transportation by bulk deliveries instead of small sacks or bags

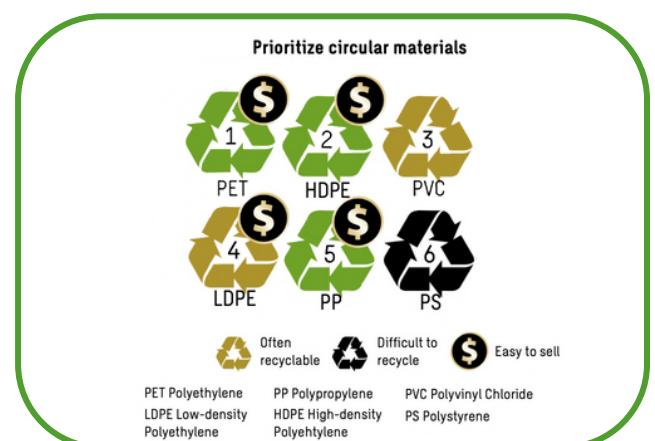


Figure 4. Priority areas for managing plastic waste

IWM STRATEGIES FOR PAPER AND CARDBOARD

The effective management of paper and cardboard waste starts with prevention and proper sorting at the source. For example, in Azerbaijan, 70% of the cardboard waste at landfills could be recycled if sorted correctly. Transitioning to reusable packaging and implementing bulk transport can significantly reduce waste. Additionally, recycling paper and cardboard is cost-effective, with recycling being cheaper than landfill disposal and cardboard material valued at approximately €35 per tonne. These practices not only minimise environmental impact but also provide economic benefits through reduced disposal costs and material reuse.

Priority 1: Prevent paper and cardboard waste

- An infinite flow of packaging materials going to waste can be prevented through using reusable packaging and/or bulk transport

Priority 2: Avoid landfill

- Sending material to recycling is cheaper than sending it to landfill. Cardboard material is worth approximately €35/tonne

About the EU4Environment

The European Union (EU) funded EU4Environment Action aims to help the EU's Eastern Partnership countries preserve their natural capital and increase people's environmental well-being. It does so by supporting environment-related action, demonstrating and unlocking opportunities for greener growth, and setting mechanisms for better management of environmental risks and impacts. EU4Environment is implemented by five partner organizations: OECD, UNECE, UNEP, UNIDO, and the World Bank between 2019-2024, with a budget of EUR 20 million. The leaflet gives an overview of activities the United Nations Industrial Development Organization (UNIDO), within EU4Environment Action, is working in Azerbaijan to implement activities related to Result 2 Circular Economy and New Growth Opportunities. The activities have been analyzed with the assistance of Sweco.

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