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SUSTAINABLE DEVELOPMENT GOALS

The role of industry and business in waste management and circular economy: Industrial waste mapping in the EU's Eastern Partnership countries - methodology and conclusions

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UNIDO is a specialized UN agency – CER Unit promotes circular and resource-efficient modes of production and consumption

United Nations Industrial Development Organization (UNIDO)

UNIDO is a specialized agency of the United Nations with a unique mandate to promote, dynamize and accelerate industrial development. UNIDO provides support to its 172 Member States through four mandated functions:

- Technical cooperation
- Action-oriented research and policy-advisory services
- Normative standards-related activities
- Fostering partnerships for knowledge and technology transfer

UNIDO Headquarters in Vienna

Circular Economy within UNIDO

UNIDO's Circular Economy and Resource Efficiency Unit promotes circular and resource-efficient modes of production and consumption through technical cooperation and other means. The Unit helps countries and actors along value chains realize social, environmental and economic benefits, with a focus on the upstream activities (design for circularity)

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Circular Economy and Resource Efficiency Unit has global, regional as well as multi-country and single-country programmes and projects

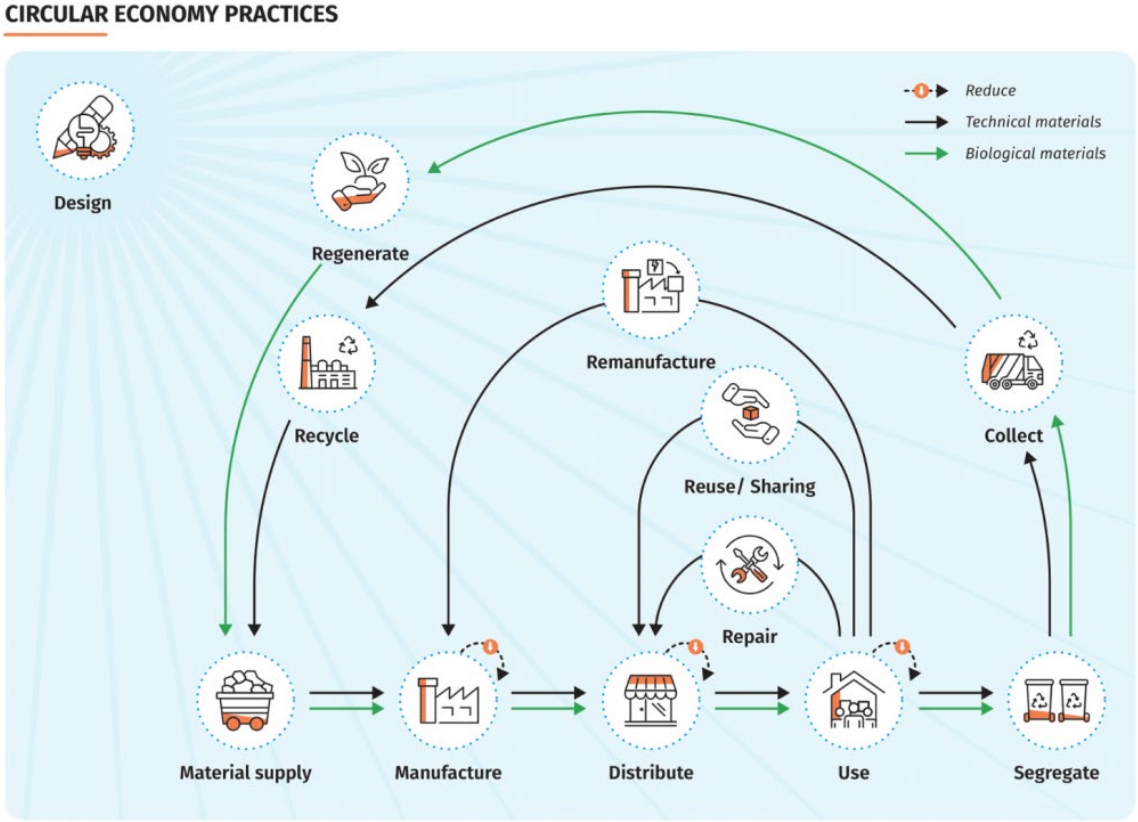
Approach	Example	Donors
Global	The Global Eco-Industrial Parks Programme (GEIPP)	GEIPP Global Eco-Industrial Parks Programme; Swiss Confederation – Federal Department of Economic Affairs, Education and Research EAER, State Secretariat for Economic Affairs SECO
	Switch to Circular Economy Value Chains	switch to Circular Economy Value Chains; Funded by the European Union; Ministry for Foreign Affairs of Finland
	Support to the Global Alliance on Circular Economy and Resource Efficiency (GACERE)	GACERE Global Alliance on Circular Economy and Resource Efficiency; Funded by the European Union; Norway
Regional	SwitchMed	switchmed; Funded by the European Union; Generalitat de Catalunya Departament d'Acció Climàtica, Alimentació i Agenda Rural; Agència de Residus de Catalunya; Italian Development Cooperation Ministry of Foreign Affairs and International Cooperation
	New project to start: Green Forward: Increasing Circular Competitiveness in the Mediterranean	
	EU4Environment	Funded by the European Union; german cooperation
Multi-country and single-country	Promoting sustainable plastic value chains through circular economy practices in Nigeria	
	Ghana Circular Economy Centre	in partnership with Canada
	Circular solutions to plastic pollution in Morocco, Philippines & South Africa	gef
	TEST-Niger	
	Establishing a circular economy framework for the plastics sector in Ghana	
	Technical support for the transformation of two industrial zones of Uzbekistan into eco-industrial parks	giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

20+ countries with active projects

30+ ongoing projects

10+ distinct donor organizations

We support circular economy across the value chain



CER unit portfolio includes 30+ ongoing projects across four continents

- A) Plastics
- B) Textiles
- C) Eco-industrial parks
- D) Blue economy
- E) ICT
- F) Agro-food
- G) Other

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Introduction

"Unutilised industrial materials"

Wastes

By-products

Broader view, actions, structured approach, clear benefits, a way ahead

Define baseline
Alternatives
Whole system

Quantities
Classifications
Waste journeys

Financial impacts
Environmental impacts
Key players

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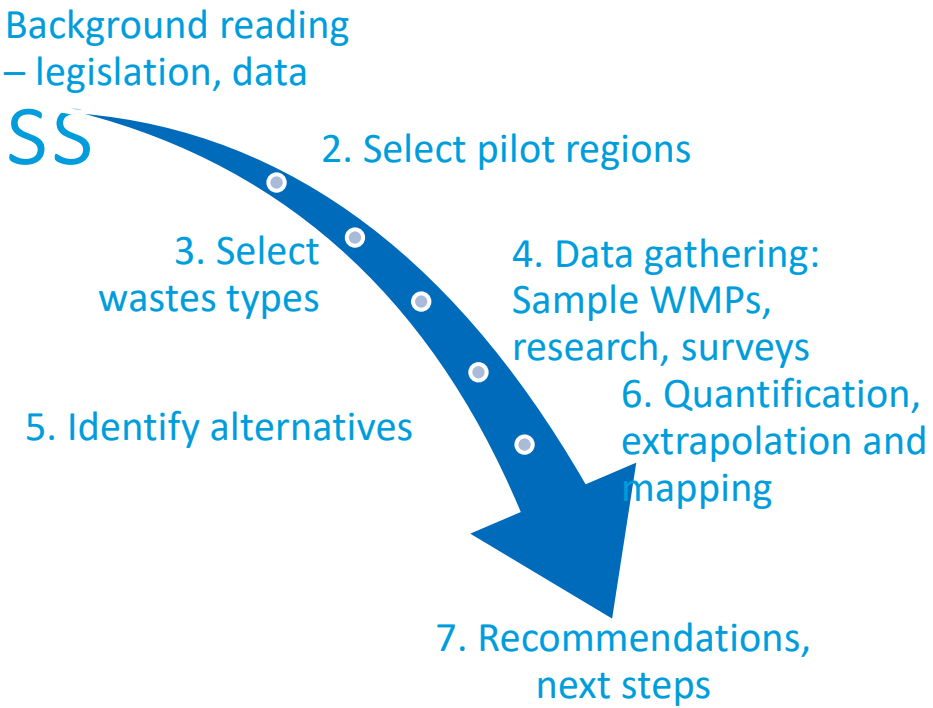
The process



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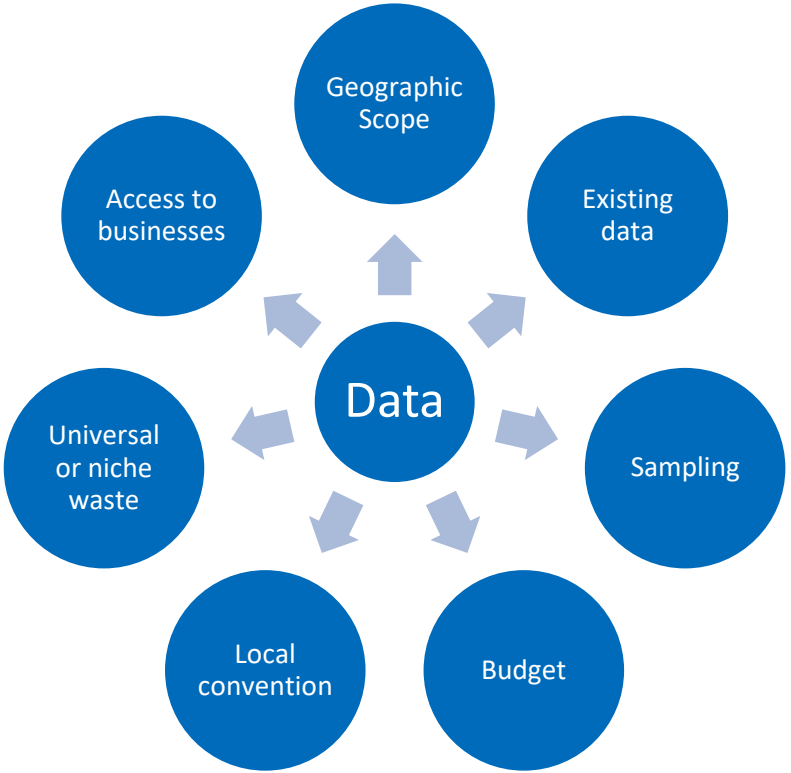
Data gathering



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Possible data sets and strategy

Characterizing the industrial base

- NACE lists of businesses
- Data on turnover
- Data on employment
- External sources for benchmarking.

Waste data

- European Waste Catalogue codes
- Sources of the waste
- Onward destinations of wastes, including sorted and segregated fractions
- By-products that are not listed as wastes
- Classification (non-hazardous, hazardous or inert)
- Treatment capacities
- Waste composition analyses
- Process diagrams and/or photos

Financial

- Collection costs for mixed household waste and sorted fractions
- Post-treatment market value
- Taxation rates levied
- Gate fees at facilities
- Storage fees

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Stakeholder input

Stakeholder	Input
Municipality	Waste data, overview of the local area, contacts
Regional/central Government	Waste data, policy direction
Data agencies	Official statistics (industrial, waste, demographic)
Business clubs	Networking, contacts, sectoral data, symbioses, opinion
Businesses	Primary data, opinion on challenges and opportunities
Waste contractors	Primary data on waste journeys
Regulators	Waste data, qualitative information
Academia/other	Industrial process mapping, research

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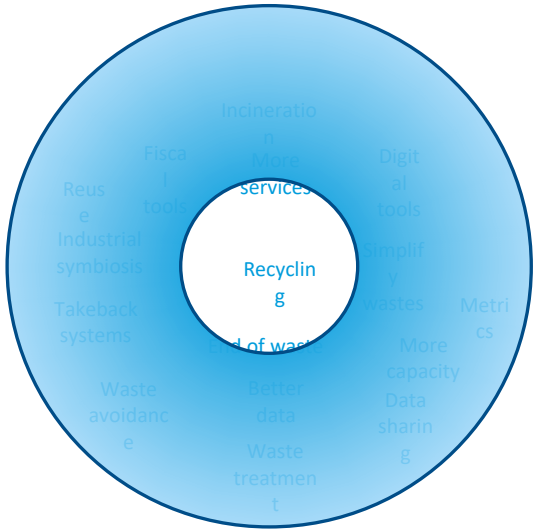
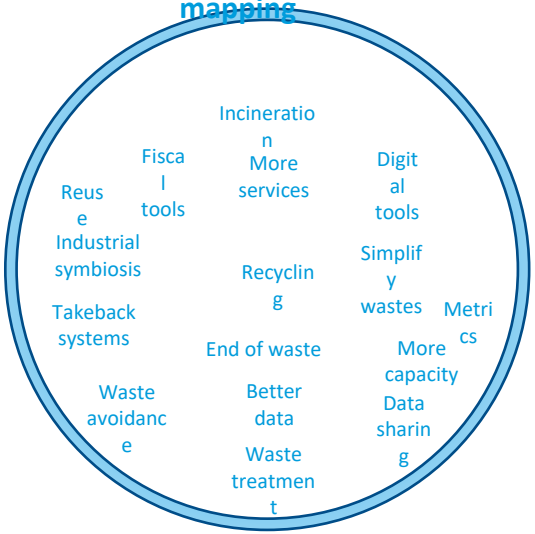
Seeing the whole picture

Narrow individual approach



OR

Broader regional waste mapping



Funded by the European Union

EU4Environment
Green Economy in Eastern Partner Countries

Georgia: Selection of pilot regions

- All 10 Georgian regions considered
- 4 taken forward
  - Shida Kartli
  - **Kvemo Kartli - Rustavi**
  - Adjara
  - **Imereti – Zestaponi**

Action implemented by:

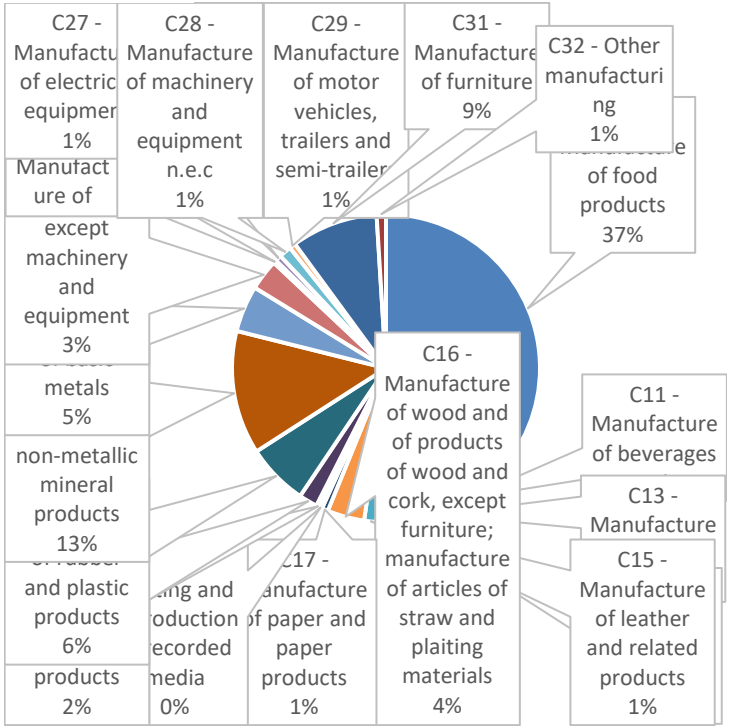
OECD BETTER POLICIES FOR BETTER LIVES | UNECE | UN environment programme | UNIDO UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION | THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

Industrial businesses - Zestaponi

- 14,242 tonnes MSW (all sectors)

NACE codes 10-32:

- 308 manufacturing businesses (10% of total)
- Estimated approx. 2000 employed
- No data on employment, turnover of sub-sectors

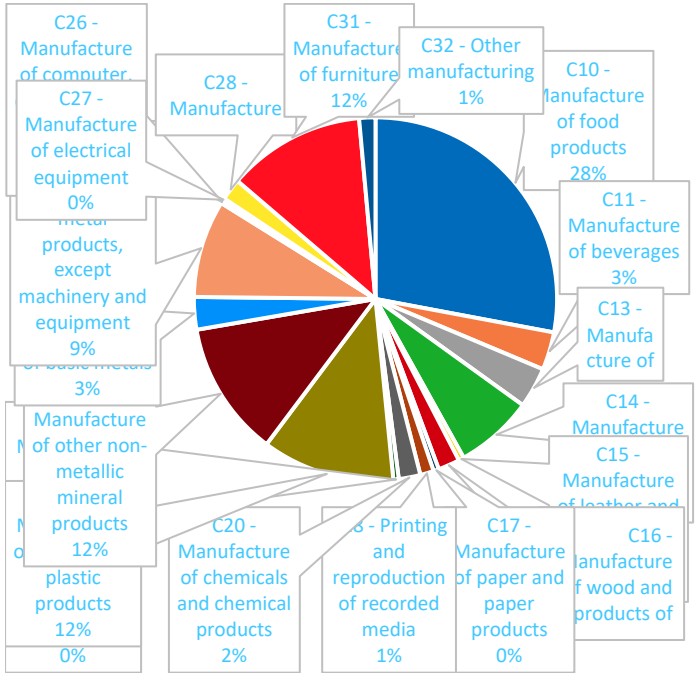


Industrial businesses - Rustavi

- 44,627 tonnes MSW (all sectors)

NACE codes 10-32

- 415 manufacturing businesses (8.4% of total)
- Estimated approx. 4000 employed in manufacturing
- No data on employment, turnover of sub-sectors



Industrial waste producers

Company Waste Management Plans formed centerpiece of data gathering
Focused on major businesses:

Rustavi

- Rustavi Steel
- Heidelberg Cement
- Vivacement
- Mneshibili

- **105,718 tonnes** per year according to their Waste Management Plans

Zestaponi

- Sakabelli
- Metalline
- GTM Group
- Ecometal
- Metalolami

- **21,801 tonnes** per year according to their Waste Management Plans

Industrial waste arisings - Zestaponi

- 21,500 tonnes (89%) is from 2 waste types:
  - Unprocessed slag
  - Wastes from the processing of slag
- 300 tonnes from 20 waste types
- **Extrapolated estimate of total industrial waste per year:** 23,700 tonnes - 36,000 tonnes. Very approximate.

Industrial waste arisings - Rustavi

- **94,000 tonnes** (89%) is from 6 waste types:
  - Unprocessed slag
  - Waste binders
  - Particulates and dust
  - Ferrous metal dust and particles
  - Other linings and refractories from metallurgy
  - Construction and demolition
- The remaining 11,000 tonnes from 55 waste types
- **Extrapolated estimate of total Rustavi industrial waste per year:** 108,000 tonnes - 125,000 tonnes. Very approximate.

Selected wastes for mapping

Rustavi

- Paper and card
- End of life tyres
- Mixed municipal waste (albeit from an “industrial” setting)

Zestaponi

- Waste from processing of slag and unprocessed slag
- Synthetic hydraulic oils
- End of life tyres
- Mixed municipal waste. (mixed waste from industrial facilities)

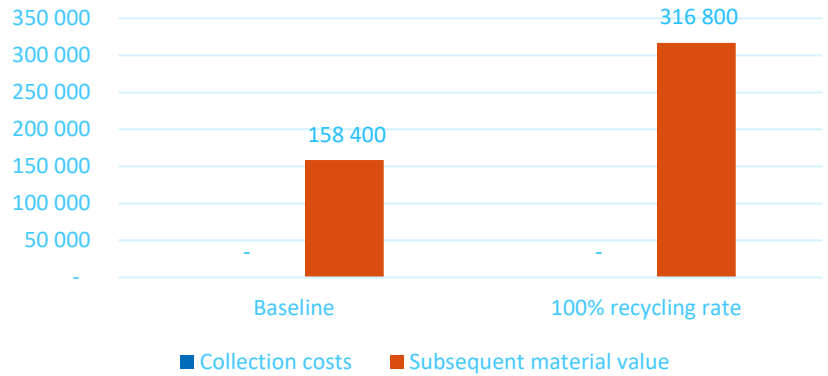
Zestaponi - Waste from processing of slag and unprocessed slag

Baseline:

- 21,500 tonnes per year
- Of which 16,500t are wastes from the processing of slag. 50% crushed and sold, the rest stored in situ…
- …and 5000 tonnes unprocessed slag fed back into the metallurgy process
- Unknown waste transporters
- Collection costs: No direct costs
- Market value of waste: €158,000 per year

Options:

- Clarify status as waste – end of waste protocol
- 100% recycling



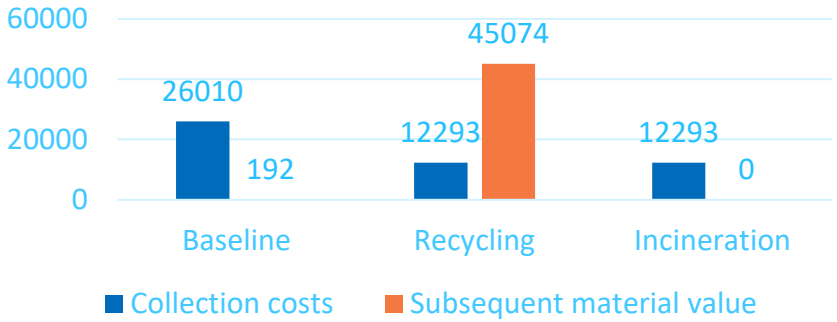
Rustavi - Paper and cardboard

Baseline:

- 1281 tonnes per year
- Of which 1250t are damaged disposal sacks for transport of cement
- Unknown waste transporters, assumed local municipal services
- Destination: landfill, very small amount of separation for recycling at landfill
- Collection costs: €26,000 per year
- Market value of waste: €192 per year

Options:

- Waste avoidance through reusable cement containers
- Recycling
- Incineration in kilns



Zestaponi - extrapolations

	Collection costs		Material value	
Waste	Upper range	Lower range	Upper range	Lower range
Unprocessed slag and wastes from processing of slag				
Baseline	-	-	254 400	254 400
100% recycling rate	-	-	412 800 (+50%)	412 800 (+50%)
Synthetic hydraulic oils				
Baseline	16 604	2 767	1 038	173
Adoption of eco oils	6 227 (-63%)	1 038 (-63%)	3 798 (+266%)	633 (+266%)
End of life tyres				
Baseline	8 694	1 449	-	-
Granulation and recycling	30 528 (+251%)	5 088 (+251%)	101 760	16 960
Incineration / pyrolysis	40 704 (+368%)	6 784 (+368%)	14 925	2 487
Mixed MSW				
Baseline	9 398	5 639	-	-
50% recycling rate	4 337 (-54%)	2 602 (-54%)	10 844	6 506
Incineration as RDF	8 675 (-8%)	5 205 (-8%)	15 904	9 542

Rustavi - extrapolations

	Collection costs € (+/-%)		Material value € (+/-%)	
Waste	Upper range	Lower range	Upper range	Lower range
Paper and cardboard				
Baseline	**65 026**	**37 158**	**480**	**274**
Recycling	30 732 (-53%)	17 561 (-53%)	112 684 (+23k%)	64 391 (+23k%)
Incineration	30 732 (-53%)	17 561 (-53%)	-	-
End of life tyres				
Baseline	**11 290**	**1 882**	**37 632**	**6 272**
Shredding for incineration	15 053 (+33%)	2 509 (+33%)	2 760 (-85%)	920 (-85%)
Mixed MSW				
Baseline	**29 831**	**17 899**	**4 957**	**2 974**
50% recycling rate	13 768 (-54%)	8 261 (-54%)	68 842 (+1300%)	41 305 (+1300%)
Processing into RDF	27 537 (-7%)	16 522 (-7%)	50 484 (+918%)	30 290 (+918%)

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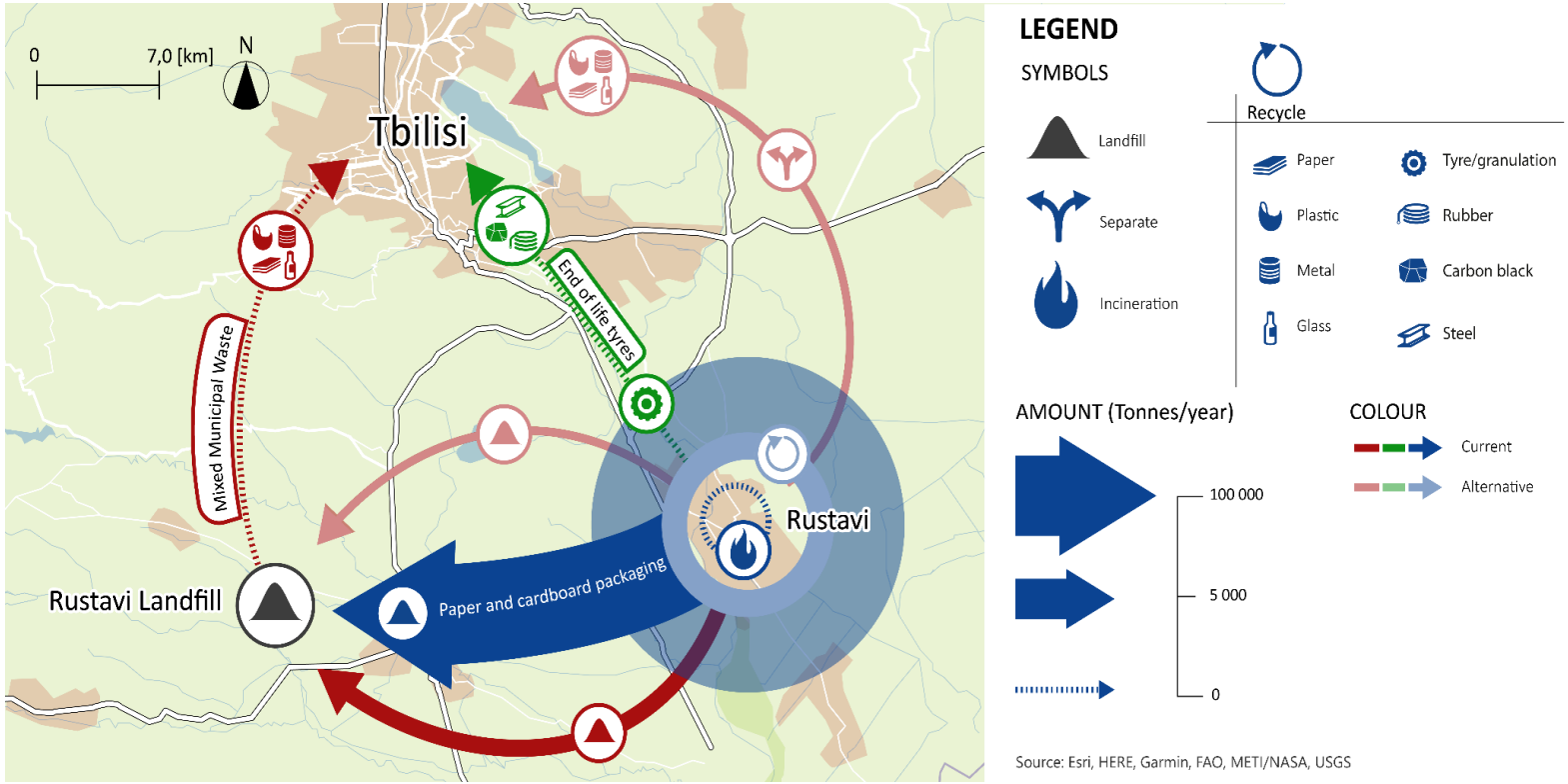
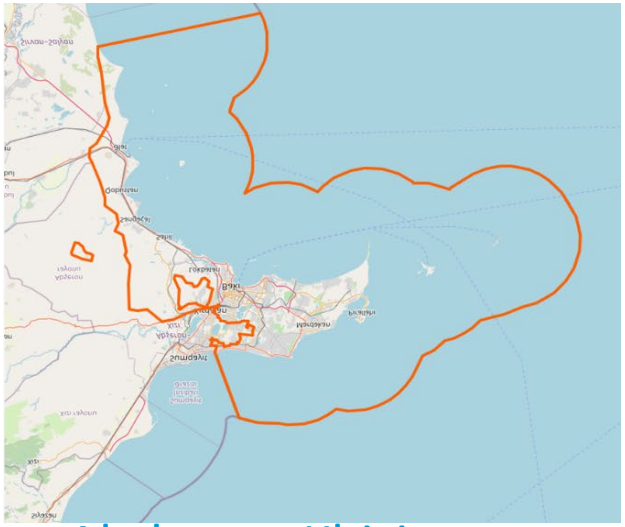


Conclusions

- Range of alternatives – incineration to new business models
- Collection costs reduced by 40-70%
- Material value created anew or multiplied in value
- Solutions mainly logistical/organisation, rather than technical
- Issues with data availability

Azerbaijan: Selected regions

Baku



Absheron-Khizi

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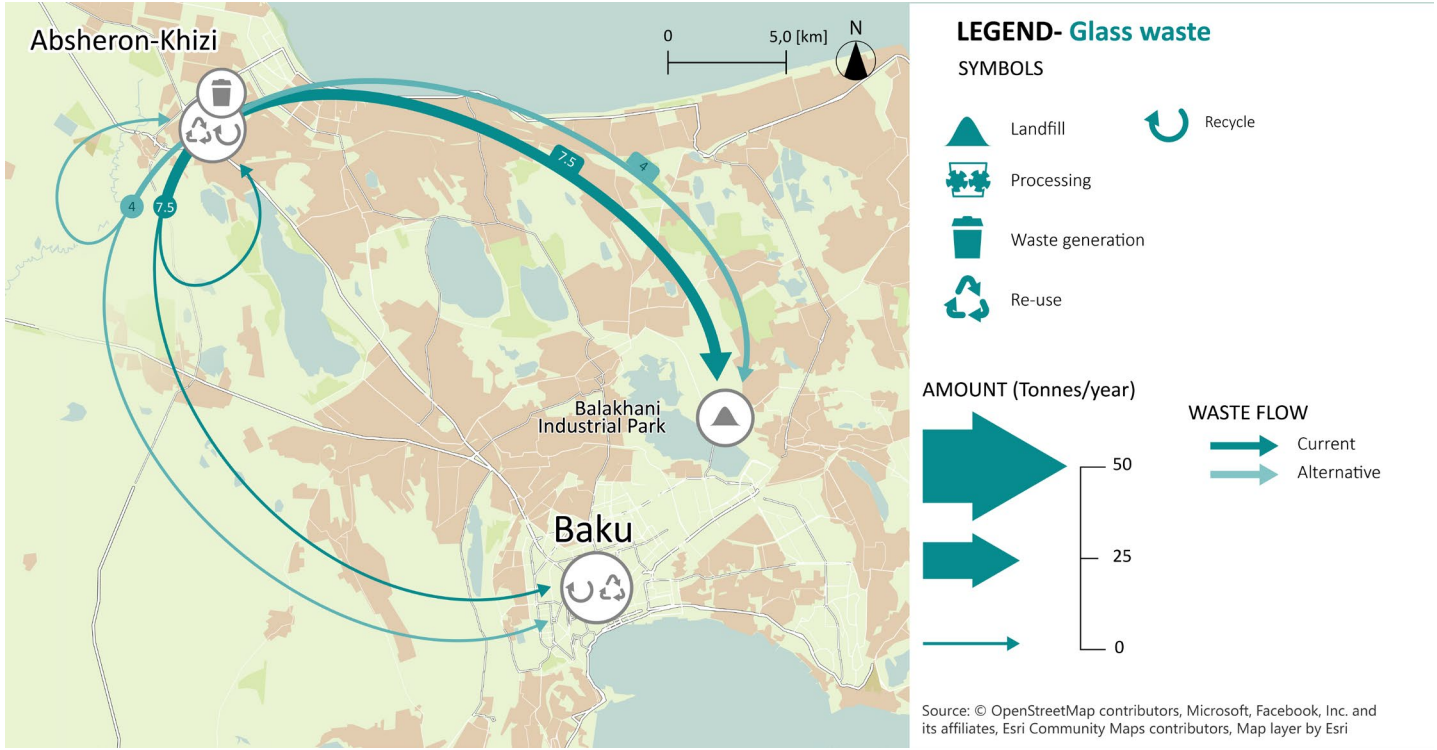
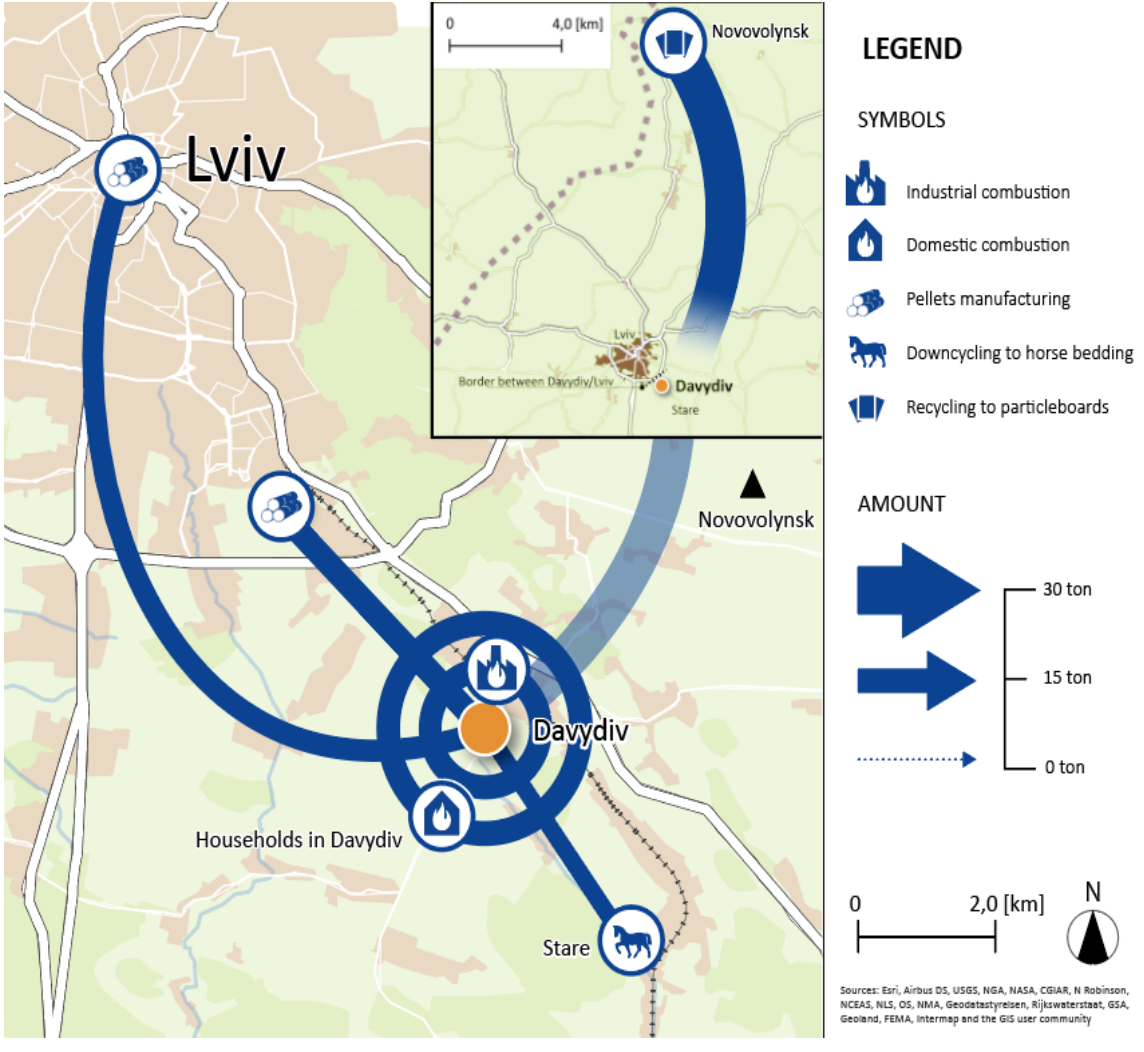
Glass waste



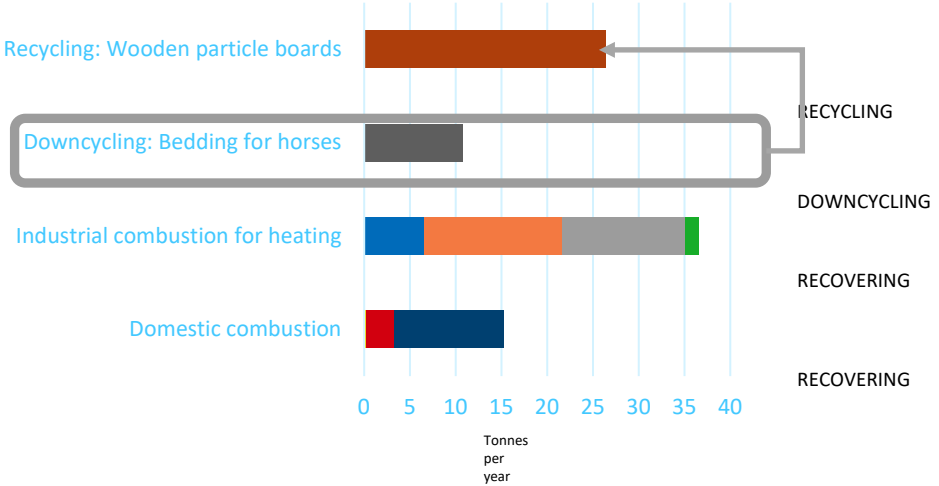
Conclusions

- ≈13% of mapped industrial industrial waste recycled or re-used
- Financial implications in sample industries – 1.1 million EUR /year
- Extrapolated to the four focus sectors in the pilot regions:
  - 29-35,000 EUR / year savings in collection costs
  - 5.6-6.8 million EUR in increased material value per year


Lviv
Novovolynsk
Davydiv
Households in Davydiv
Stare
0
4,0 [km]
Lviv
Border between Davydiv/Lviv
Davydiv
Stare
LEGEND
SYMBOLS
Industrial combustion
Domestic combustion
Pellets manufacturing
Downcycling to horse bedding
Recycling to particleboards
AMOUNT
30 ton
15 ton
0 ton
0
2,0 [km]
N
Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Opportunities: From downcycling to recycling

- Recycle into wooden particle boards
- Approximate increase in income per cbm:
  480 UAH
- Approximate total increase in income for company in waste mapping:
  20 000 UAH



Conclusions

- Clear financial benefits evident
- Waste policy could support the waste hierarchy more
- **Acute need for more robust and digitalised waste data system**
- Regional planning/mapping needed for economies of scale
- Practical support is needed for businesses

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Recap and summary

- **Large financial savings possible.** Waste prevention measures yield greatest results
- **Collaboration.** Numerous opportunities between industry. Opportunities to build on business networks
- **Mindset.** Avoid temptation to think of better waste management. Think of **“circular economy systems”.**
- **Incomplete data**. This was a challenge throughout. Data strategies should be prioritised
- **Procurement and market stimulation**. Green procurement can help develop markets
- **Fiscal tools.** Landfill is often cheaper than recycling
- **Regulation.** Needs to support reuse and recycling, e.g. end of waste protocols
- **Strategy**. Need greater alignment of policy and goals with waste hierarchy

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Thank you