

DATA FOR CIRCULARITY

INTERNATIONAL CONFERENCE

A collaboration of Rijkswaterstaat and Delft University of Technology



Ministerie van Infrastructuur
en Waterstaat



*This project has received funding from the European
Union's Horizon 2020 research and innovation
programme under grant agreement No. 776751*

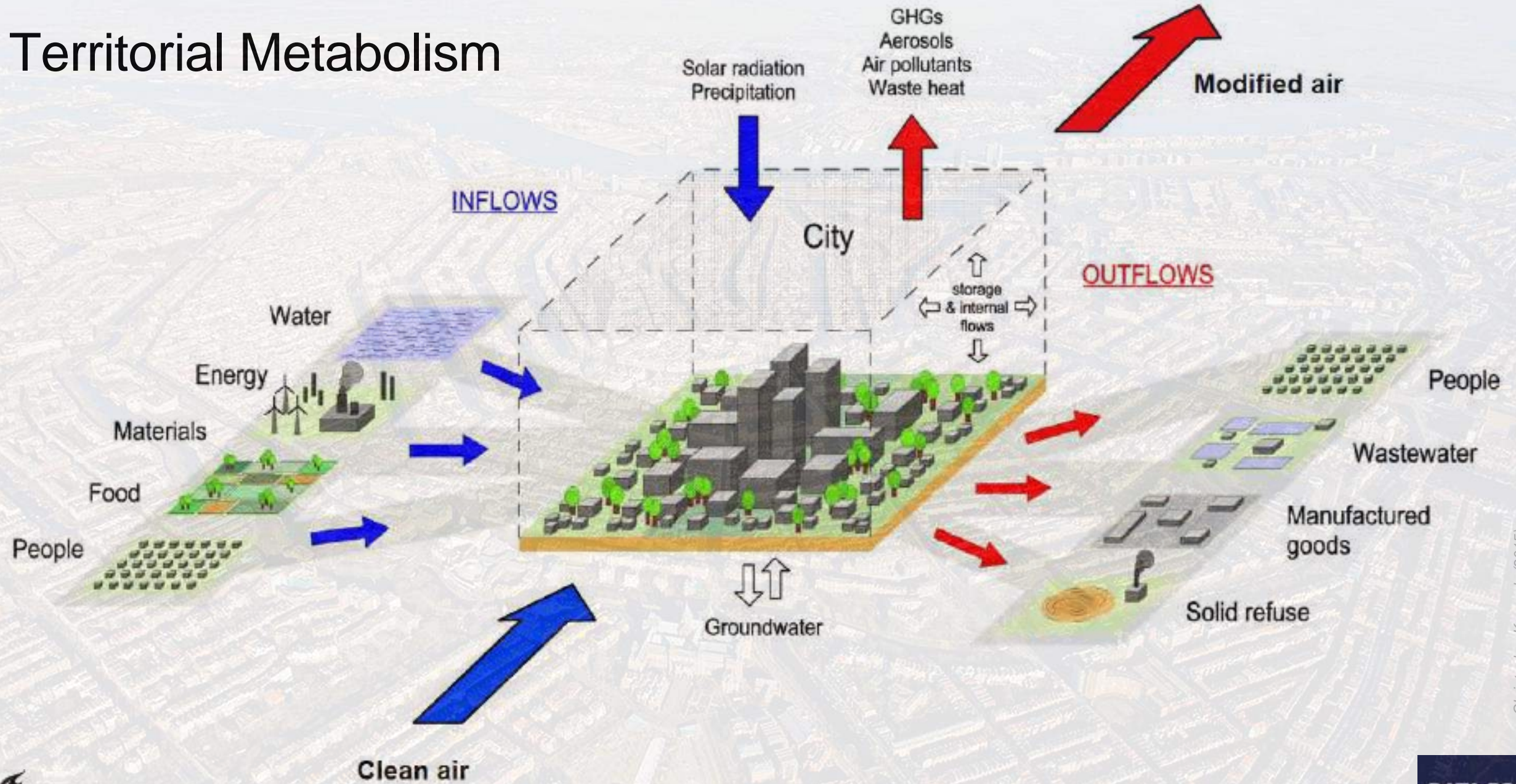
Introduction

Professor Arjan van Timmeren - Delft University of Technology

10:00 - 10:20 | 24th May 2022



Territorial Metabolism



Christopher Kennedy (2015)

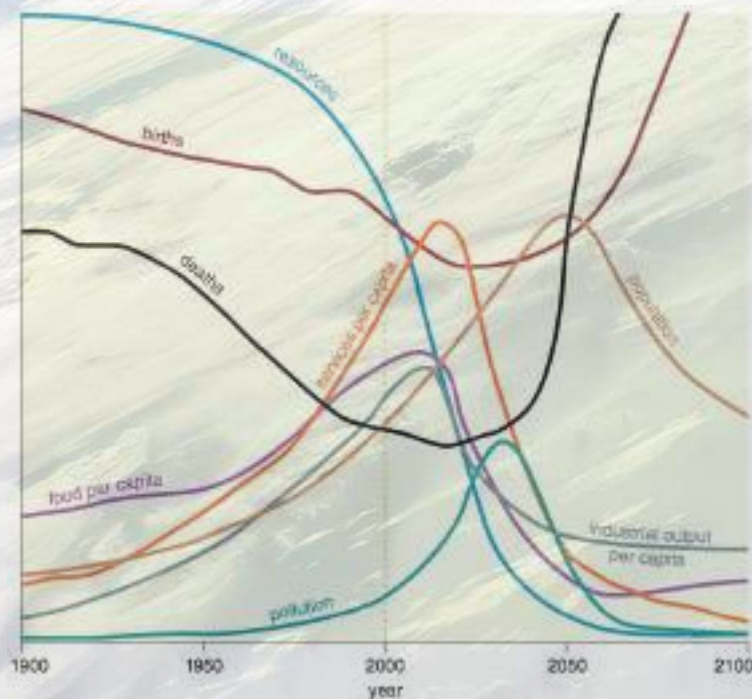
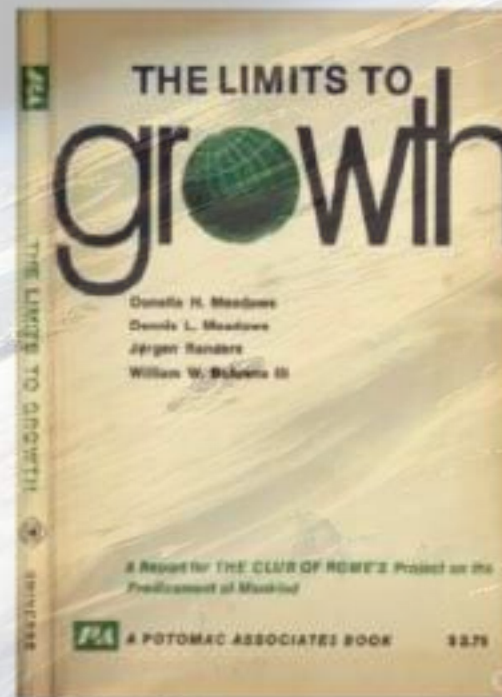


courtesy Mackay cartoons



1972

The Club of Rome Report of 1972, written by Dennis and Donella Meadows (and further Jorgen Randers and William Behrens) on behalf of the Club of Rome, entitled *The Limits to Growth*, is probably the most important philosophical book of the 20th century. The message is simple: Planet Earth is finite and as a result, continued growth in material production and consumption will lead to its collapse within a few decades. There are limits to growth that can only be temporarily exceeded.



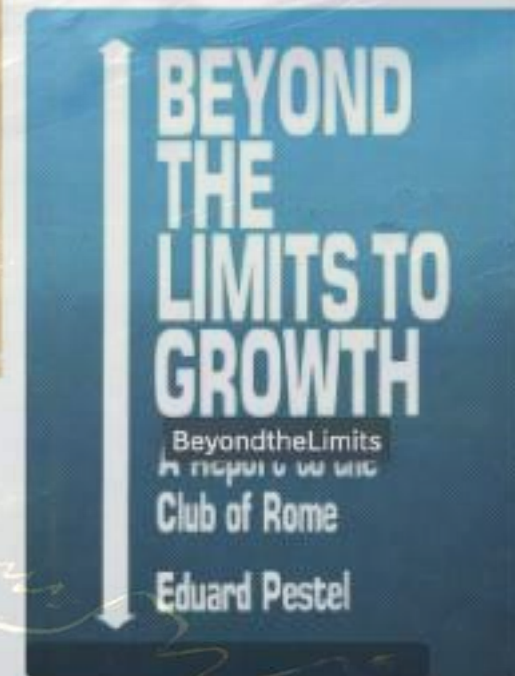
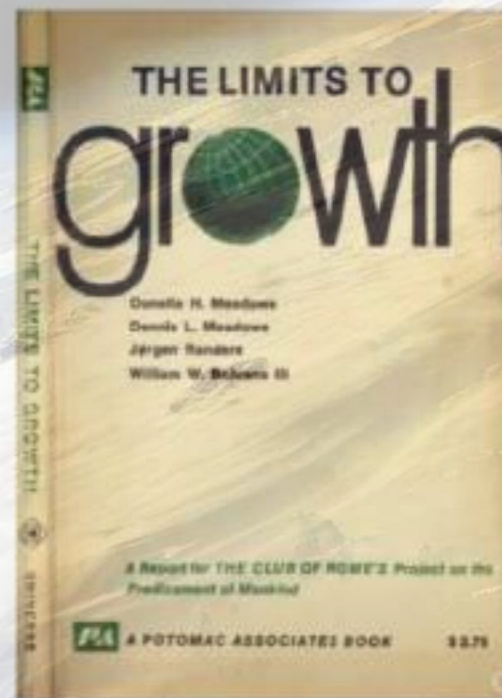


1972

The Club of Rome Report of 1972, written by Dennis and Donella Meadows (and further Jorgen Randers and William Behrens) on behalf of the Club of Rome, entitled *The Limits to Growth*, is probably the most important philosophical book of the 20th century. The message is simple: Planet Earth is finite and as a result, continued growth in material production and consumption will lead to its collapse within a few decades. There are limits to growth that can only be temporarily exceeded.

1991

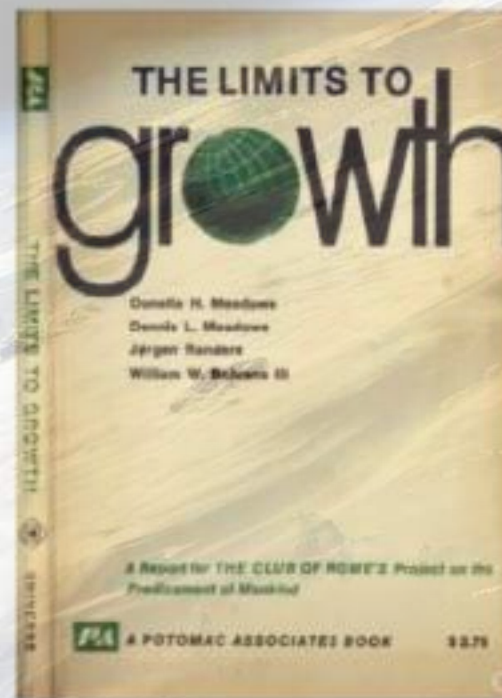
Twenty years later, in 1991, Meadows and Randers presented an update, *Beyond the Borders*. The world has crossed its borders. The current way of doing things cannot be sustained. To be livable at all, the future must be one of stepping back, taking it easy, recovering.





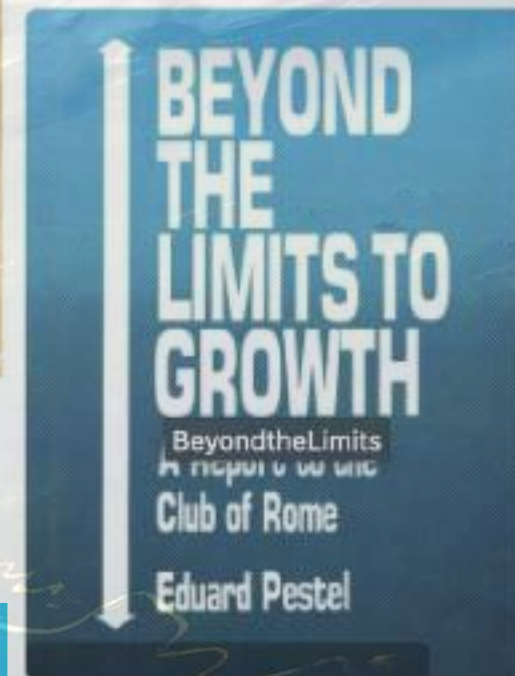
1972

The Club of Rome Report of 1972, written by Dennis and Donella Meadows (and further Jorgen Randers and William Behrens) on behalf of the Club of Rome, entitled *The Limits to Growth*, is probably the most important philosophical book of the 20th century. The message is simple: Planet Earth is finite and as a result, continued growth in material production and consumption will lead to its collapse within a few decades. There are limits to growth that can only be temporarily exceeded.



1991

Twenty years later, in 1991, Meadows and Randers presented an update, *Beyond the Borders*. The world has crossed its borders. The current way of doing things cannot be sustained. To be livable at all, the future must be one of stepping back, taking it easy, recovering.



2015

Paris Agreement / SDGs ...





1972

The Club of Rome Report of 1972, written by Dennis and Donella Meadows (and further Jorgen Randers and William Behrens) on behalf of the Club of Rome, entitled *The Limits to Growth*, is probably the most important philosophical book of the 20th century. The message is simple: Planet Earth is finite and as a result, continued growth in material production and consumption will lead to its collapse within a few decades. There are limits to growth that can only be temporarily exceeded.

1991

Twenty years later, in 1991, Meadows and Randers presented an update, *Beyond the Borders*. The world has crossed its borders. The current way of doing things cannot be sustained. To be livable at all, the future must be one of stepping back, taking it easy, recovering.

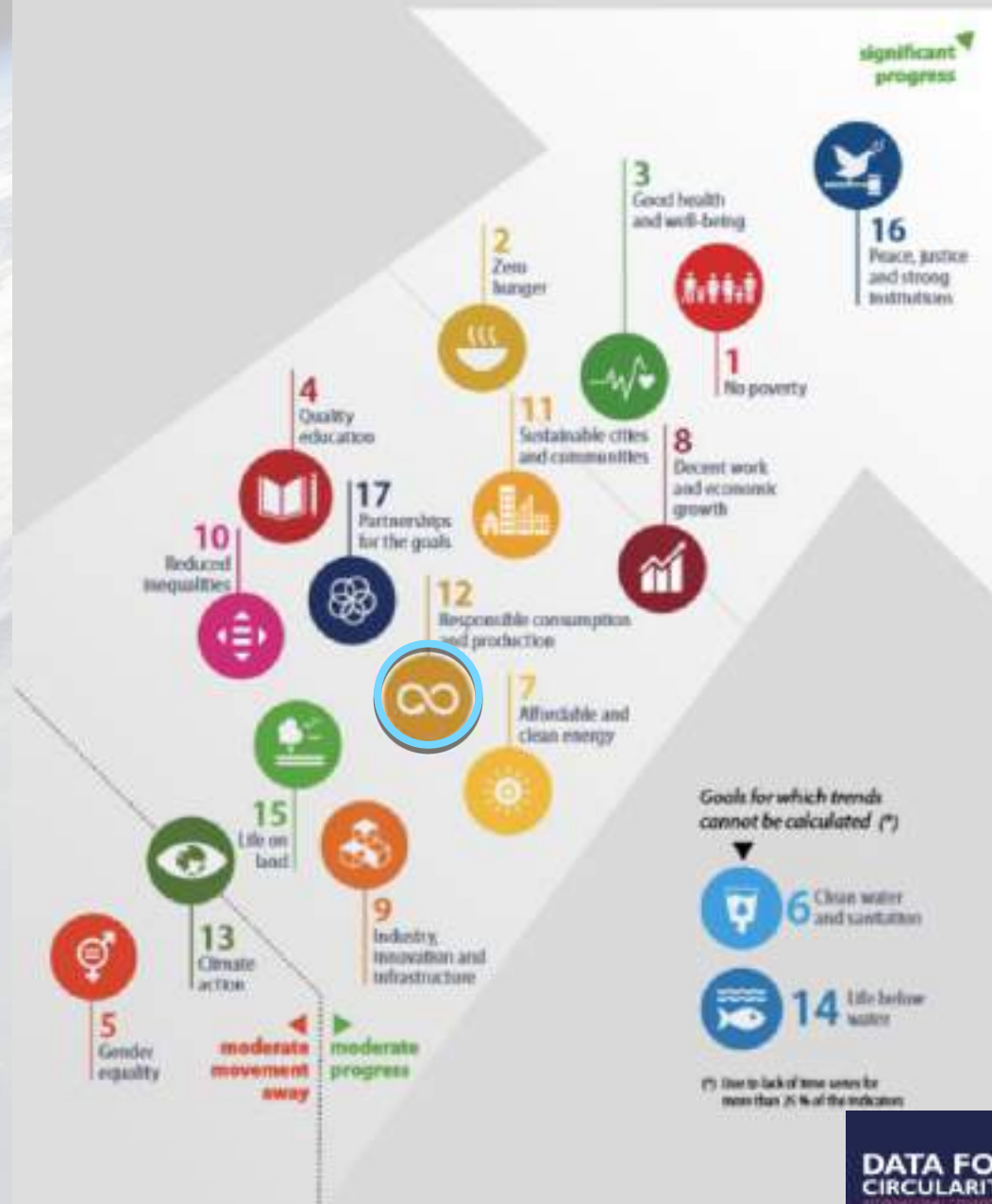
2015

Paris Agreement / SDGs ...

2022

Fifty years later. What are we currently seeing, where are we going...?

Overview of EU-27 progress towards the SDGs over the past 5 years, 2020
(Data mainly refer to 2013-2018 or 2014-2019)





Ministerie van Infrastructuur
en Waterstaat



1972

The Club of Rome Report of 1972, written by Dennis and Donella Meadows (and further Jorgen Randers and William Behrens) on behalf of the Club of Rome, entitled *The Limits to Growth*, is probably the most important philosophical book of the 20th century. The message is simple: Planet Earth is finite and as a result, continued growth in material production and consumption will lead to its collapse within a few decades. There are limits to growth that can only be temporarily exceeded.

1991

Twenty years later, in 1991, Meadows and Randers presented an update, *Beyond the Borders*. The world has crossed its borders. The current way of doing things cannot be sustained. To be livable at all, the future must be one of stepping back, taking it easy, recovering.

2015

Paris Agreement / SDGs ...

2022

Fifty years later. What are we currently seeing, where are we going...?

Overview of EU-27 progress towards the SDGs over the past 5 years, 2020
(Data mainly refer to 2013-2018 or 2014-2019)





Ministerie van Infrastructuur en Waterstaat



Overview of EU-27 progress towards the SDGs over the past 5 years, 2020
(Data mainly refer to 2013-2018 or 2014-2019)

1972

The Club of Rome Report of 1972, written by Dennis and Donella Meadows (and further Jorgen Randers and William Behrens) on behalf of the Club of Rome, entitled The Limits to Growth, is probably the most important philosophical book of the 20th century. The message is simple: Planet Earth is finite and as a result, continued growth in material production and consumption will lead to its collapse within a few decades. There are limits to growth that can only be temporarily exceeded.

1991

Twenty years later, in 1991, Meadows and Randers presented an update, Beyond the Borders. The world has crossed its borders. The current way of doing things cannot be sustained. To be livable at all, the future must be one of stepping back, taking it easy, recovering.

2015

Paris Agreement / SDGs ...

EU Green Deal

The Circular Economy Action Plan (CEAP)

2022

Fifty years later. What are we currently seeing, where are we going...?



Circular Economy



[Source: AFP]

Circular Economy

Refuse

Rethink

Reduce

Reuse

Repair

Refurbish

Re-manufacture

Re-purpose

Re-cycle

Recover

Narrowing loops



Decrease use of materials and energy

Slowing loops



Extend the utilization period

Closing loops



Increase recirculation of materials

Circularity strategies

(Potting et al., 2017)

R0 - Refuse

R1 - Rethink

R2 - Reduce

R3 - Reuse

R4 - Repair

R5 - Refurbish

R6 - Remanufacture

R7 - Repurpose

R8 - Recycle

R9 - Recover

Design strategies

(van Stijn and Gruis, 2019)

Design for material reduction

Design for energy reduction

Design for attachment and trust

Design for reliability and durability

Design for standardisation and compatibility

Design for ease of maintenance and repair

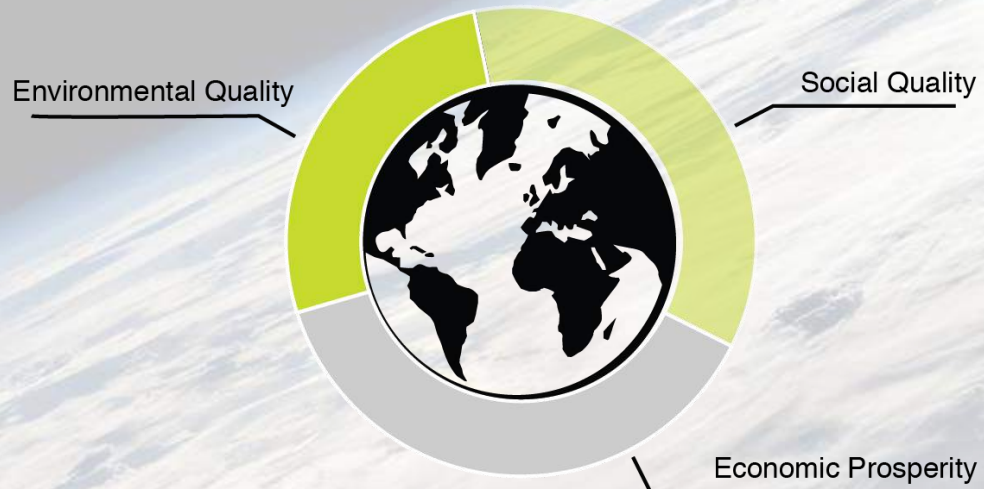
Design for upgrades and adjustments

Design for dis- and re-assembly

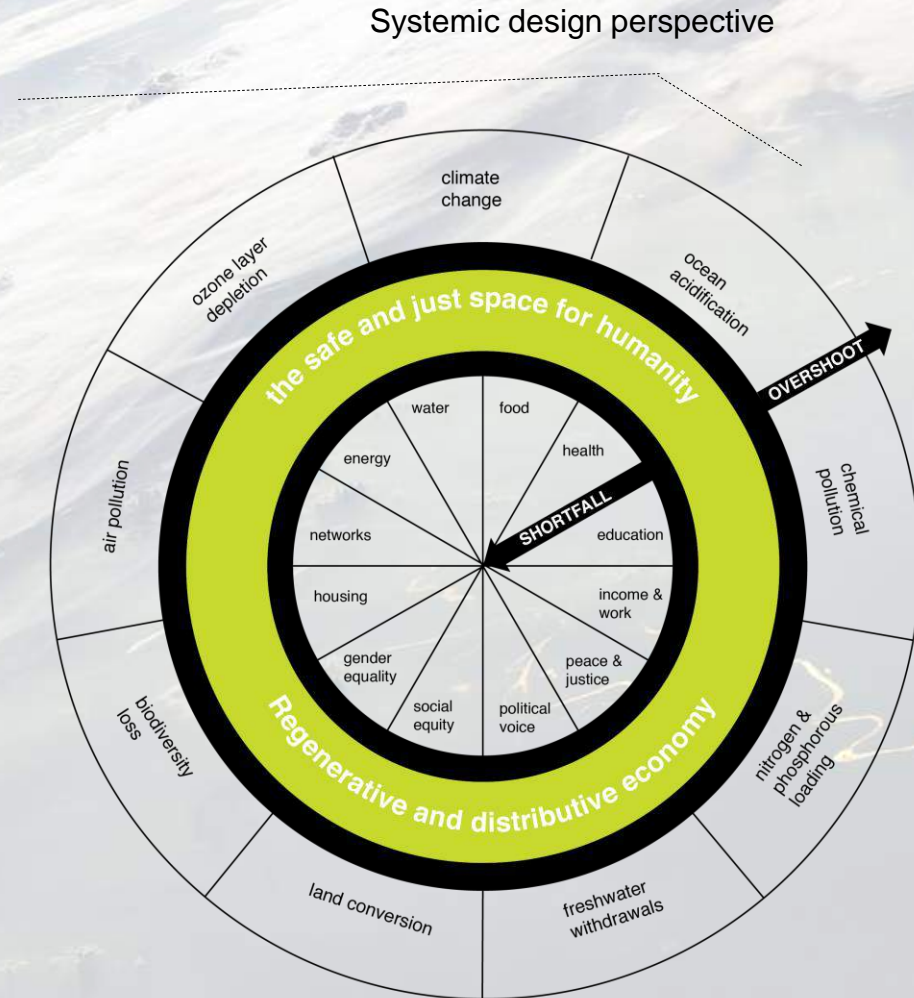
Design for biodegrading and recycling

Design for disassembly

CE includes the Social Perspective



Including the social perspectives : **“Doughnut Economics”**



“ Civilization advances by extending the number of important operations which we can perform without thinking about them. ”

Alfred Whitehead

NETWORKED ENVIRONMENTS



Congregation Market square, Pittsburg (Michael Henninger, 2014)



Urban big data is a goldmine of knowledge about cities that we cannot afford ignoring.

It is imperative that we update the methodological toolbox of urban analytics and policy making.

REPAIR –
REsource Management in
Peri-urban Areas

<http://h2020repair.eu/>

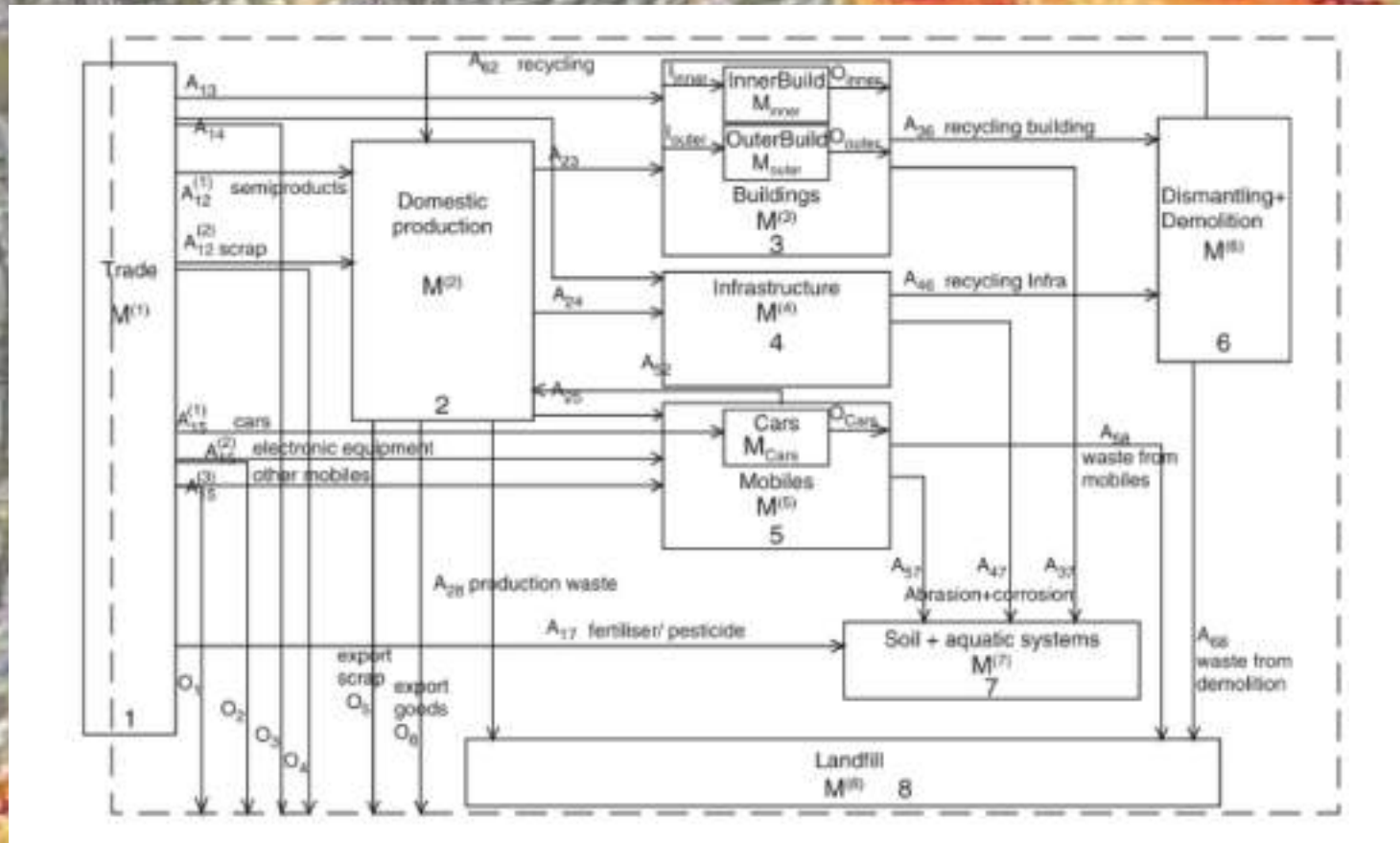


2 Start ups: the New Raw / geoFluxus

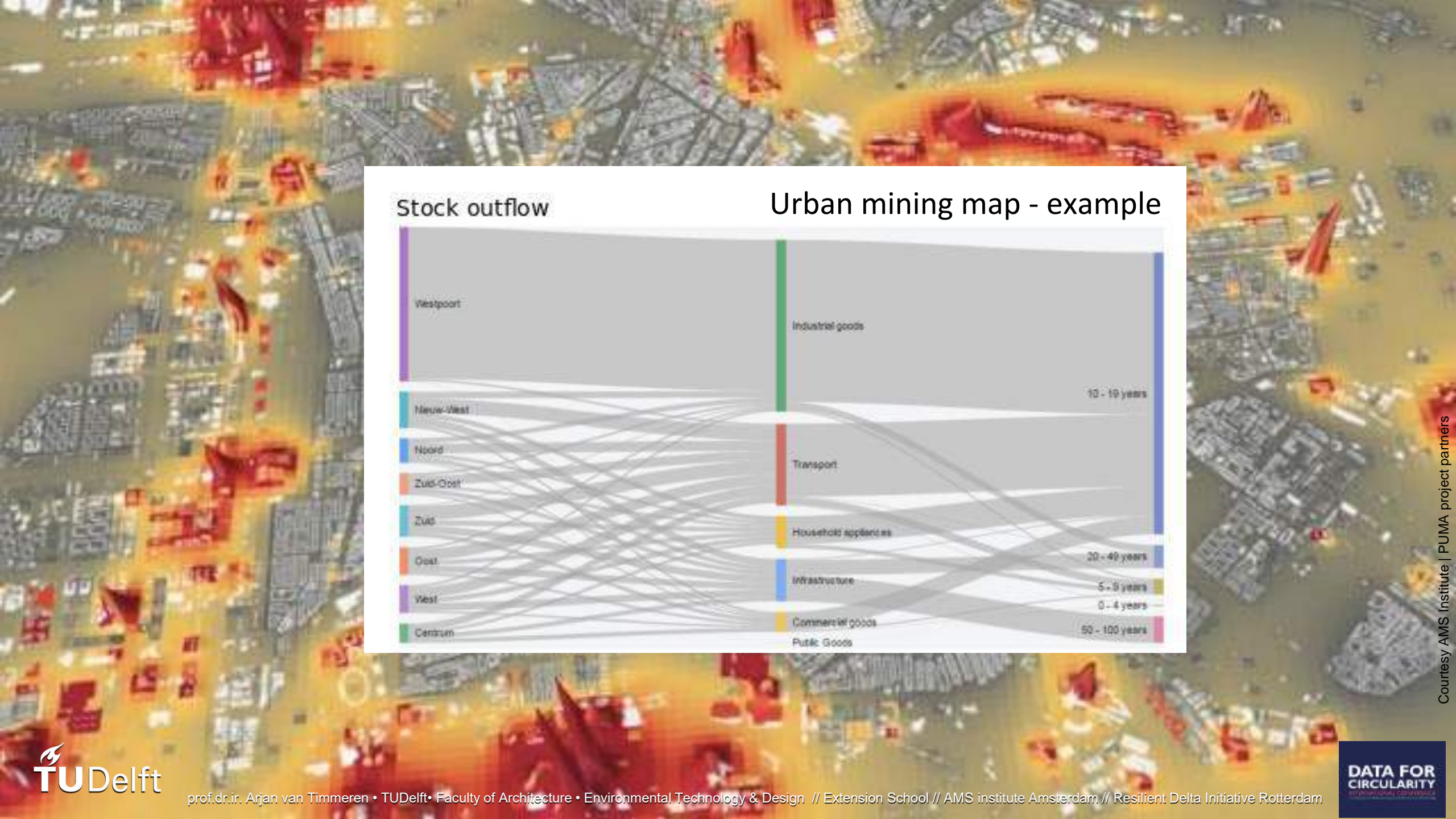
Opening up the Black-Box of Territorial Metabolism to facilitate the Transition towards more Circularity

Network analysis
SPACE SYNTAX



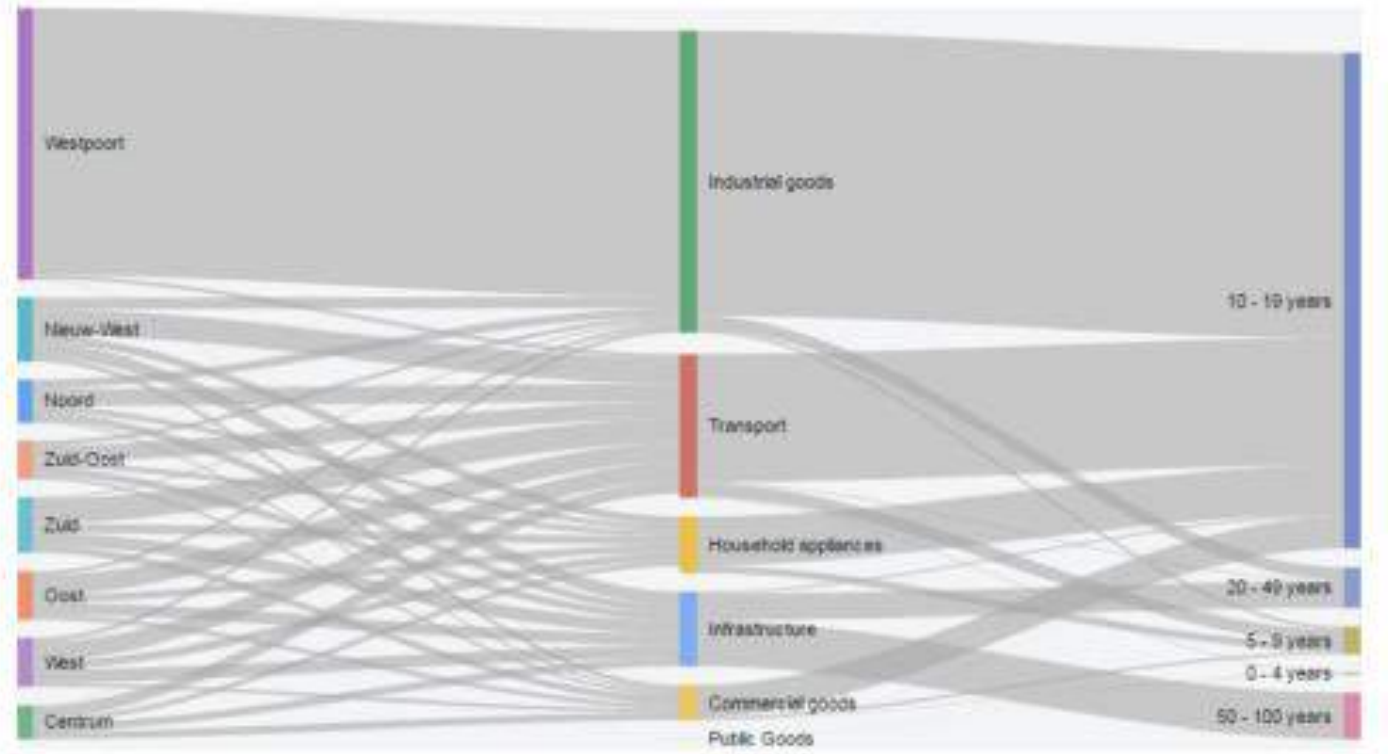


Courtesy AMS Institute | PUMA project partners



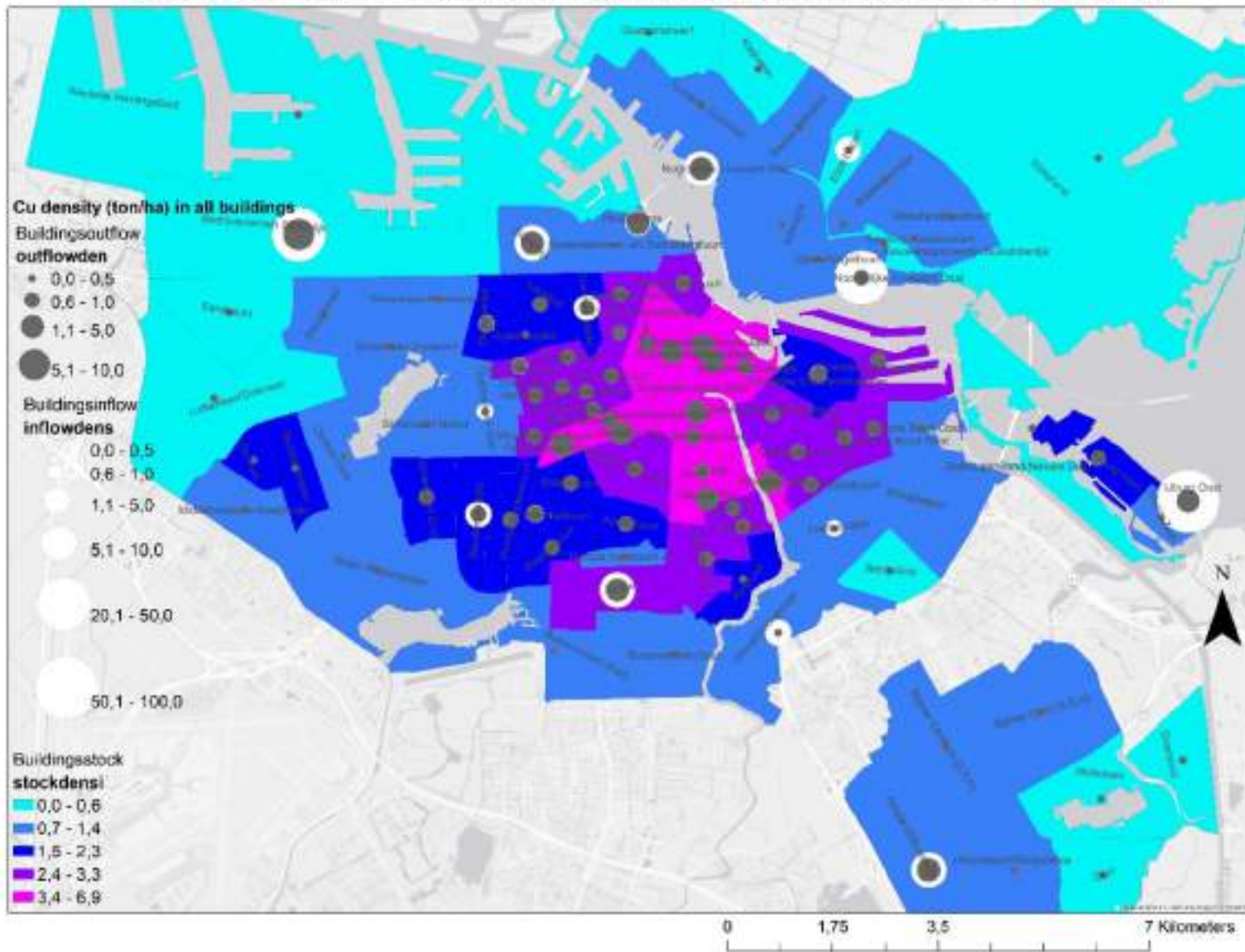
Stock outflow

Urban mining map - example



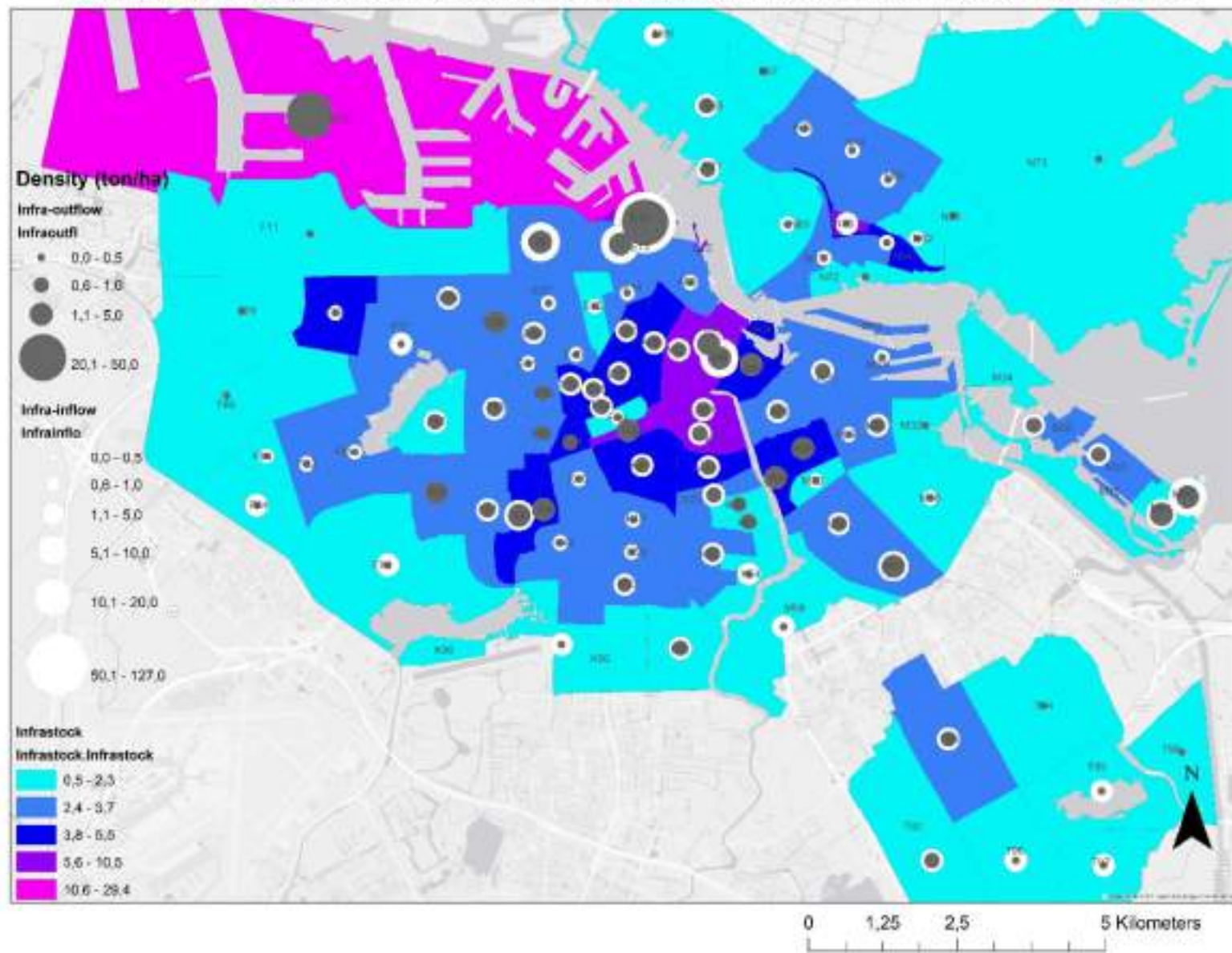


Current stock + accumulated inflow & outflow (2018-2050) of copper (ton/ha) in buildings



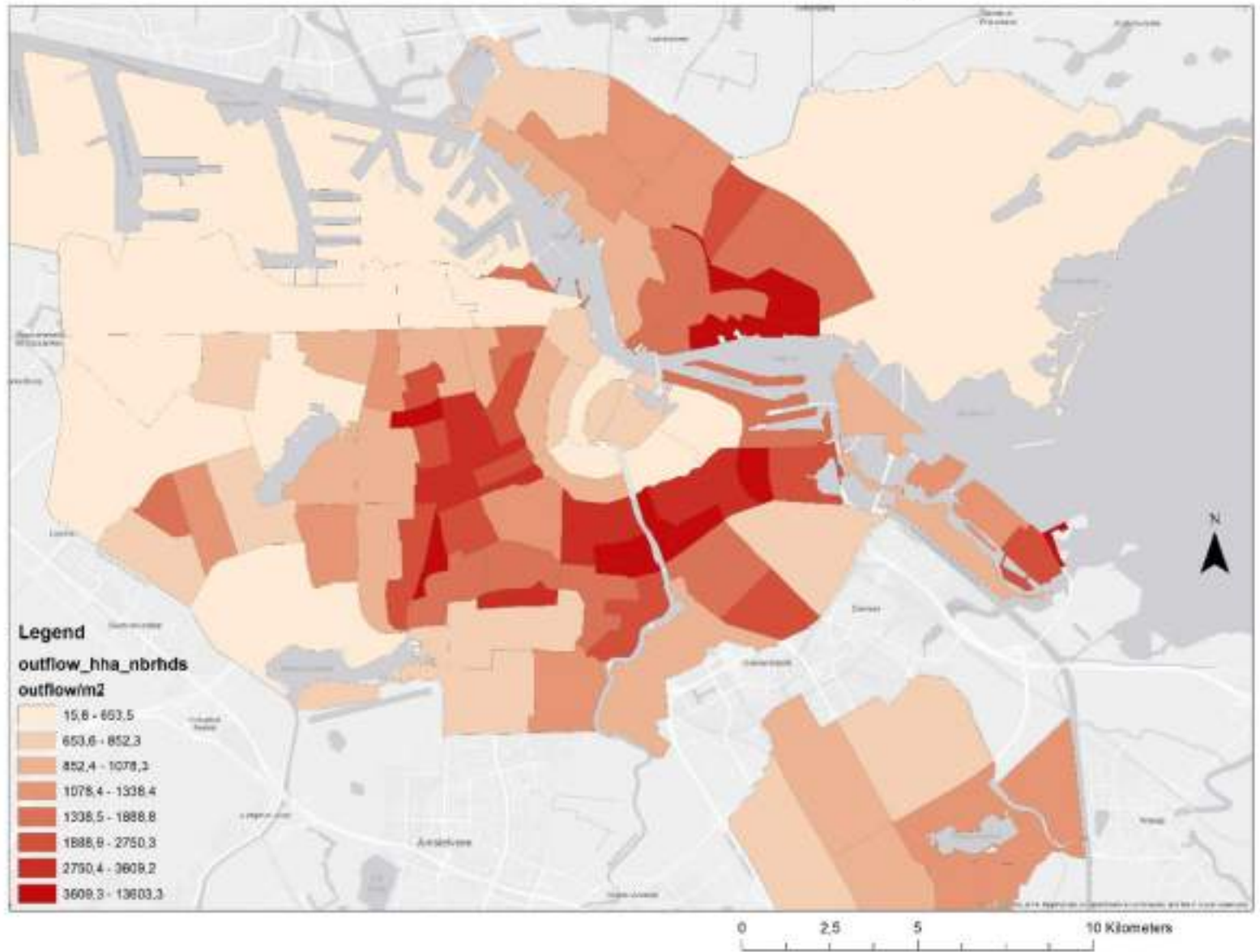


Current stock + accumulated inflow & outflow (2018-2050) of copper (ton/hectare) in infrastructure





Accumulated outflow in HHA 2018-50 (gr/m2)





REsource Management in Peri-urban Areas: Going Beyond Urban Metabolism

Grant Agreement No.: 688920

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688920



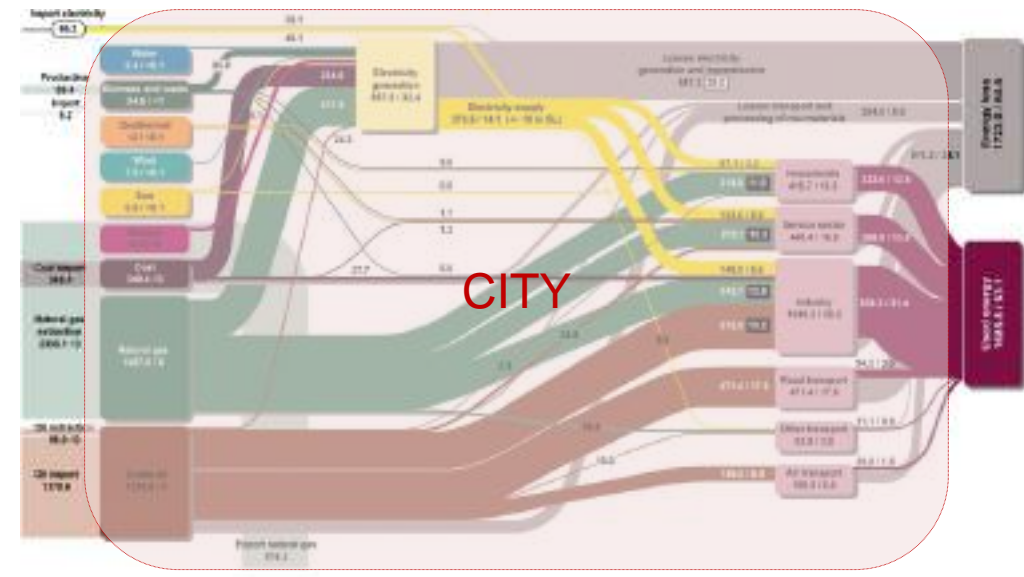
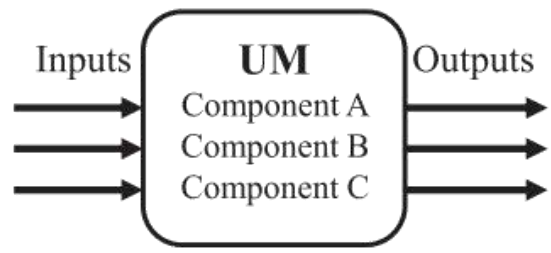
Three models of Urban Metabolism Analysis

Black-box model

2
Grey-box model

Network model

Source: Stremke, S., & Koh, J. (2011). Integration of Ecological and Thermodynamic Concepts in the Design of Sustainable Energy Landscapes. Landscape Journal, 30, 2-11.



An example of Grey-box model: Sankey diagram of the energy flows in the Netherlands and South Limburg (Stremke & Koh, 2011)



REsource Management in Peri-urban Areas: Going Beyond Urban Metabolism

Grant Agreement No.: 688920

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688920



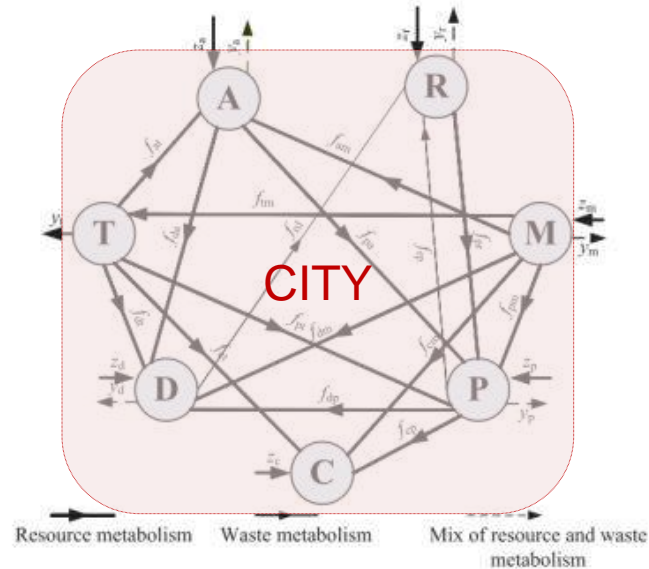
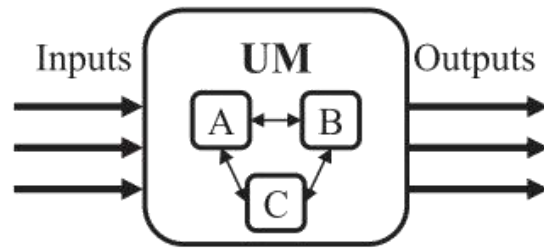
Three models of Urban Metabolism Analysis

Black-box model

Grey-box model

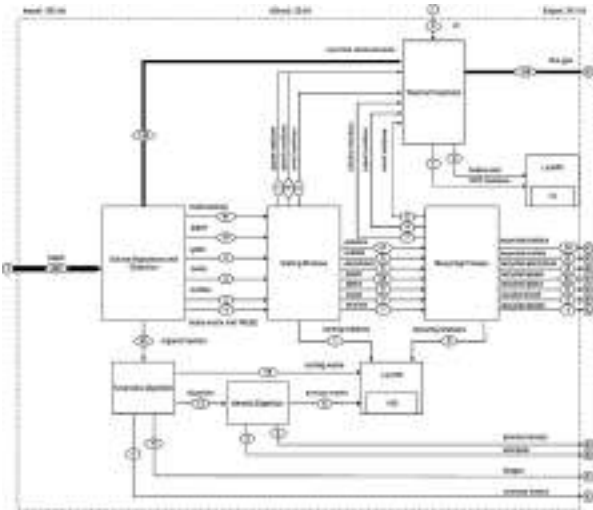
3
Network model

Source: Zhang, Y., Liu, H., & Chen, B. (2013). Comprehensive evaluation of the structural characteristics of an urban metabolic system: Model development and a case study of Beijing. Ecological Modelling, 252, 106–113.



An example of Network model: Model of Beijing's urban metabolism with two metabolic mainlines (Zhang et al., 2013)

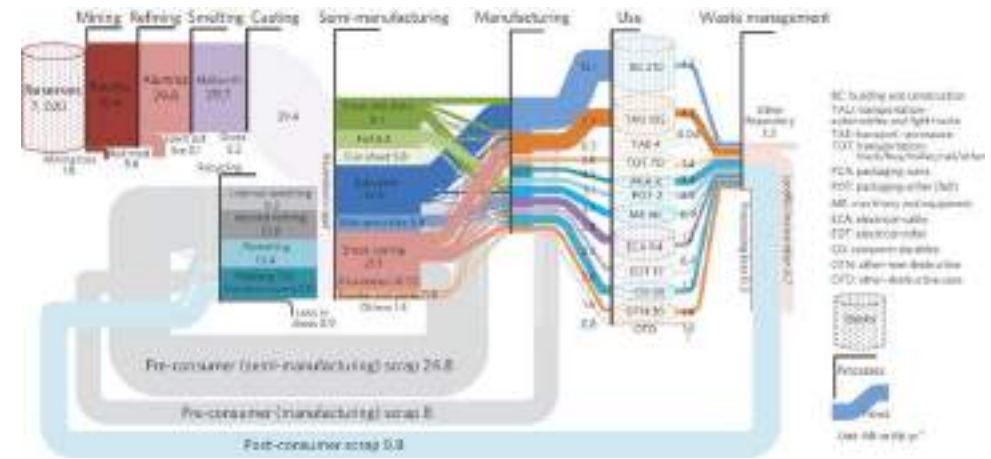
From:



Non spatial



Non actor-specific



Insufficiently accurate



AS-MFA for 10 EU regions



Uptake ->

CINDERELA



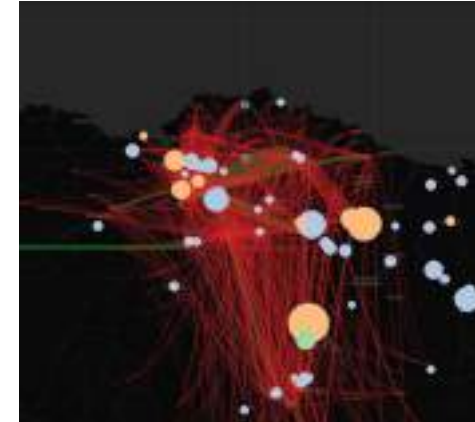
Pecs, Hungary



Lodz, Poland



Naples, Italy



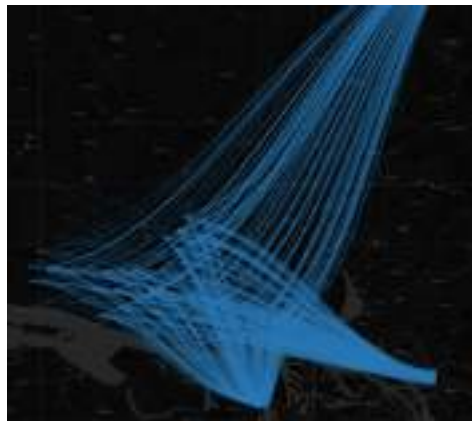
Bask country, Spain



Maribor, Slovenia



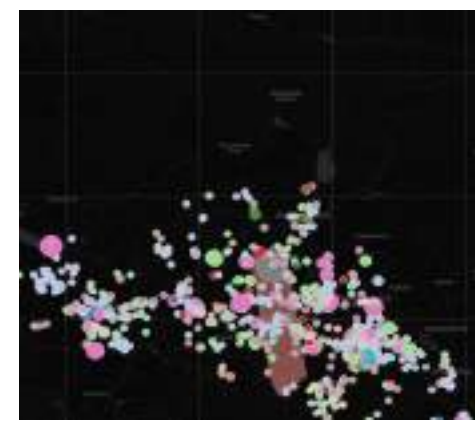
Ghent, Belgium



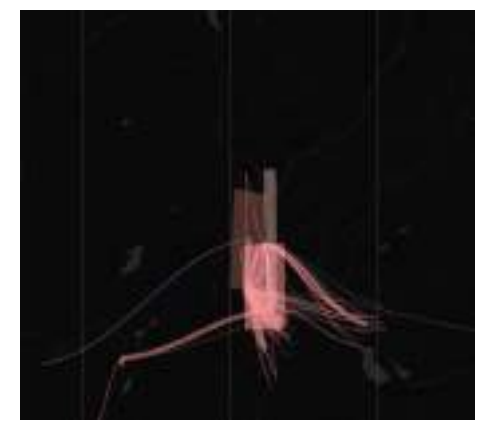
Hamburg, Germany



Amsterdam, NL



Katowice, Poland



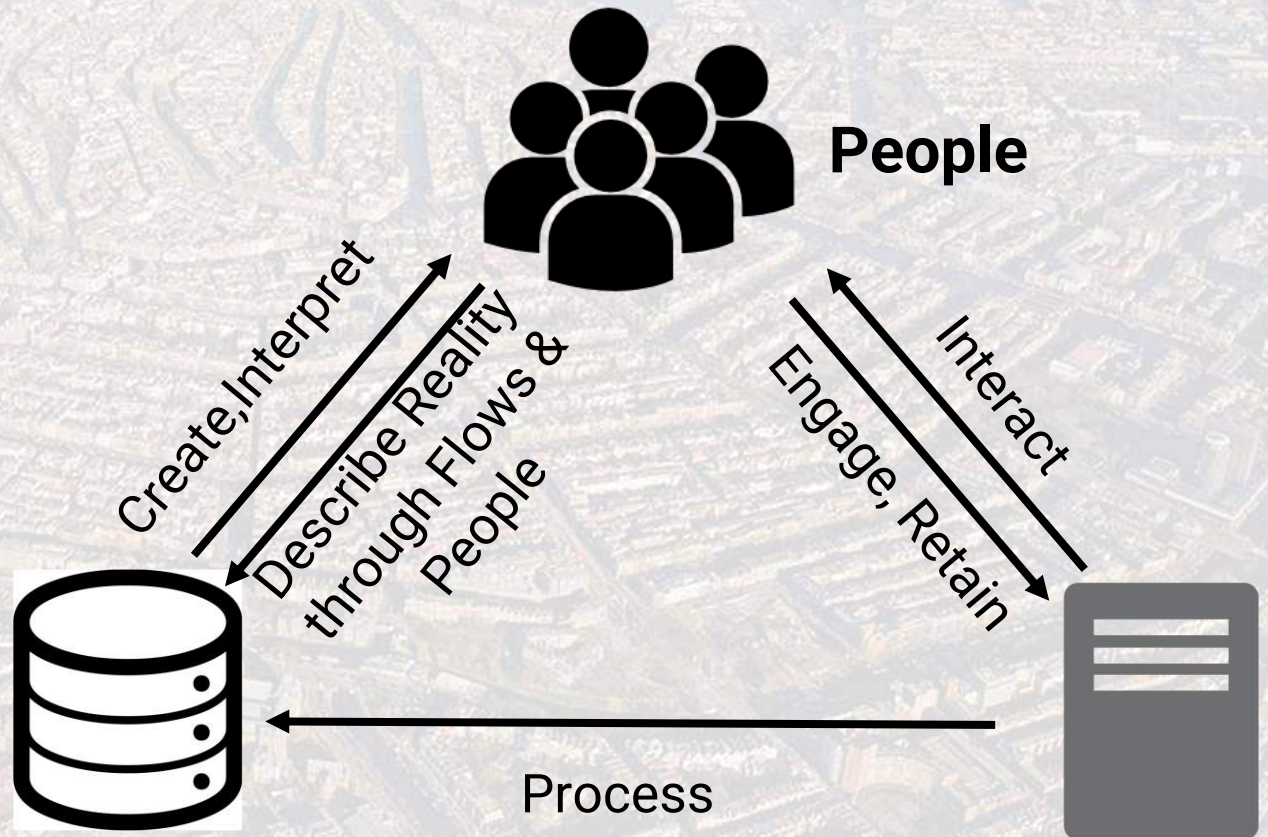
Trento, Italy



How can human-generated Web Data be transformed into a source that **informs fair and inclusive** MI system design in addition to (geo ref.) sensing ?

How to **enhance** MI Systems with automated, large-scale, and **efficient** human collaboration? And how to connect space to flows (activities / people)?

A Socio-technical System



our buildings / neighbourhoods / cities

courtesy AMS Institute | Alessandro Bozzon



REsource Management in Peri-urban Areas: Going Beyond Urban Metabolism

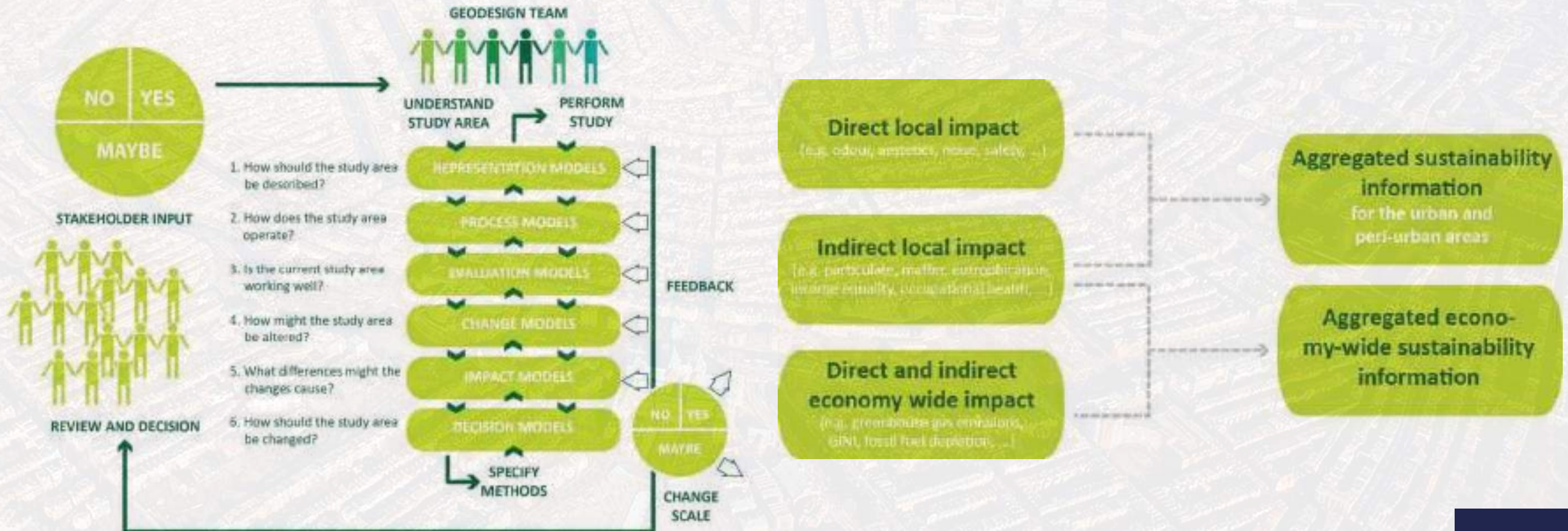
Grant Agreement No.: 688920

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688920



Approach:

- **REPAiR** integrates **life cycle thinking** and **geodesign** connected to **activities** and thus **locations**, to operationalise urban metabolism!



Framework of Geodesign (Steinitz 2012)



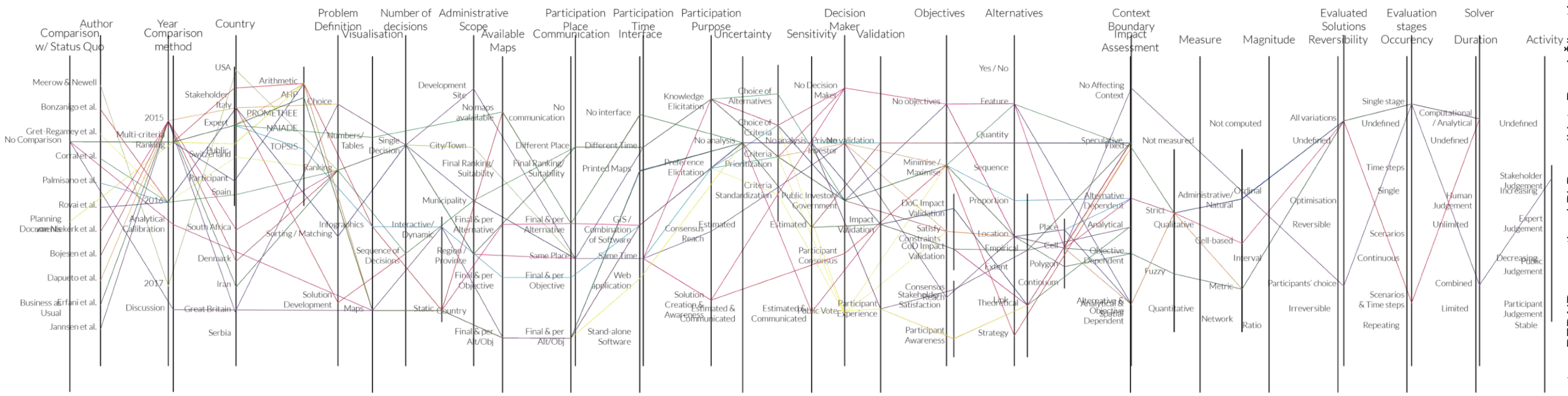
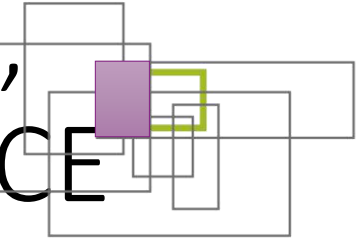
REsource Management in Peri-urban Areas: Going Beyond Urban Metabolism

PhD candidate
Rusné Šileryté
Grant Agreement No.: 688920

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688920



Geographies of Waste: Significance, Semantics & Statistics in pursuit of CE



Courtesy REPAIR consortium | PhD candidate Rusné Šileryté



Schedule – 24th May

10:00 - 10:20	Introduction
10:20 - 13:00	Morning Session (including Coffee Break)
13:00 - 14:00	Lunch
14:00 - 16:00	Afternoon Session (including Coffee Break)
16:00 - 17:00	Recap and Panel Discussion
17:00 - 18:00	Drinks and Snacks

Schedule – Morning Session

Chair: Alexander Wandl

- | | |
|---------------|--|
| 10:20 - 10:45 | Pedro Meda, University of Porto (PT) |
| 10:45 - 11:10 | Martijn van der Schaaf, RIVM (NL) |
| 11:10 - 11:35 | Jessica Tuscano, Fabio Tatti & Chiara Bonomi, ISPRA (IT) |
| 11:35 - 12:10 | Coffee Break |
| 12:10 - 12:35 | Tjerk ter Veen & Kiki Kerstens, RWS & CBS (NL) |
| 12:35 - 13:00 | Ton van Dril, TNO (NL) |

Schedule – Afternoon Session

Chair: Arnout Sabbe

14:00 - 14:20	Koen Smeets, OVAM (BE)
14:20 - 14:40	Elham Maghsoudi Nia, TU Delft (NL)
14:40 - 15:00	Boriana Rukanova, TU Delft (NL)
15:00 - 15:20	Juliane Kupfernagel & Bas van Huet, RWS (NL)
15:20 - 15:40	Jessica Tuscano, Fabio Tatti & Chiara Bonomi, ISPRA (IT)
15:40 - 16:00	Coffee Break

Morning Session

Chair: Alexander Wandl

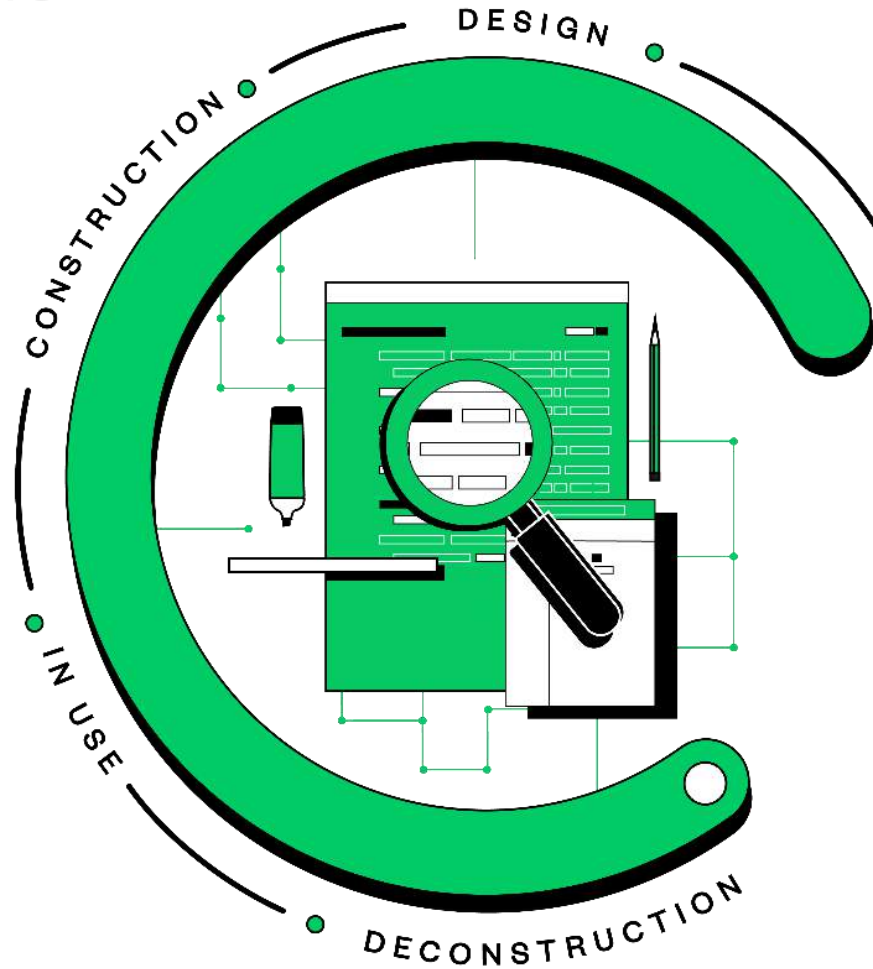
10:20 - 13:00 | 24th May 2022

Theme A – Data Collection

GrowingCircle Project – Rail Infrastructure

Pedro Meda – Institute of Construction, University of Porto

Iceland
Liechtenstein
Norway grants



Digital Data enabling Circularity

GrowingCircle project – Rail infrastructure case study to trigger discussion

DATA FOR
CIRCULARITY
INTERNATIONAL CONFERENCE

2022-05-24

<https://growingcircle.netlify.app/project/>

Program Operator



REPÚBLICA
PORTUGUESA

AMBIENTE E AÇÃO CLIMÁTICA

Promotor



Partner

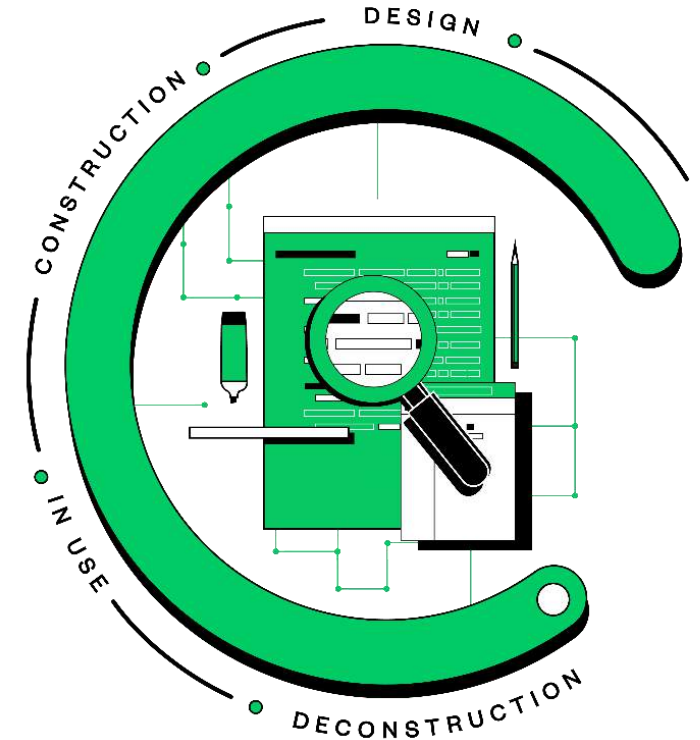


Norwegian University of
Science and Technology



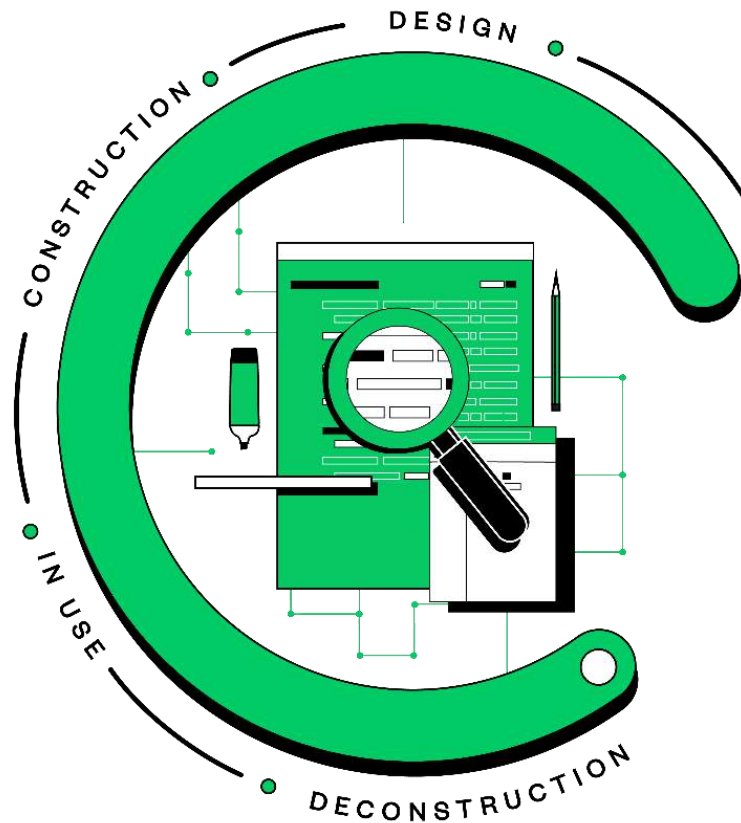
Agenda

- The GrowingCircle project
- Background
- Case Studies
- Detailing Railway infrastructure case study
- Triggers for discussion
- Conclusions





The GrowingCircle Project



Integrated Data for Efficient and Sustainable Construction

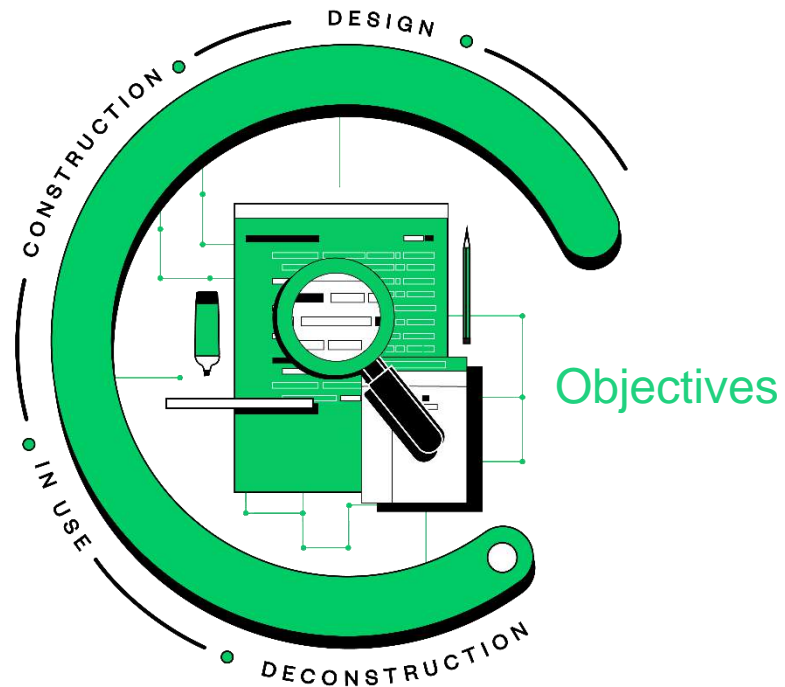
Circular Economy in Construction powered by Information Circularity

(based on Data Templates)

<https://growingcircle.netlify.app/project/>



GrowingCircle Project – objectives



Awareness → Knowledge

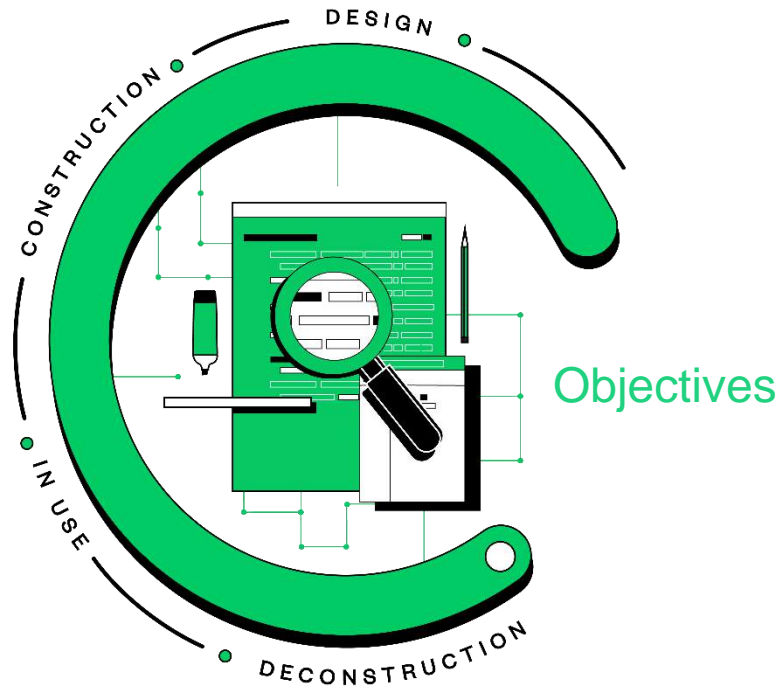
Raise awareness among agents, through training/dissemination actions for the (fundamental ... core ... essential ...) role of Data Templates – and related concepts like: Material Passport, Digital Products Passport, Digital Building Logbook, Digital Twin and likewise

Evidence → Research

Exploring concepts for reliable information exchange by use of concepts like; Data Templates – and related concepts like: Material Passport, Digital Products Passport, Digital Building Logbook, Digital Twin and likewise ..



GrowingCircle Project – objectives



Knowledge → Courses

Developing courses – with certification – to achieve competency to identify / use / adapt **Data Templates** concepts to **Integrate Data for an Efficient and Sustainable Construction**.

Research → Digital solutions / Templates

Evidence through practical implementation **Data Templates** in specific **case studies** by aligning with outcomes towards sustainability and circularity.

Explore solutions for increased use of information in **BIM**-based solutions



GrowingCircle Project – background

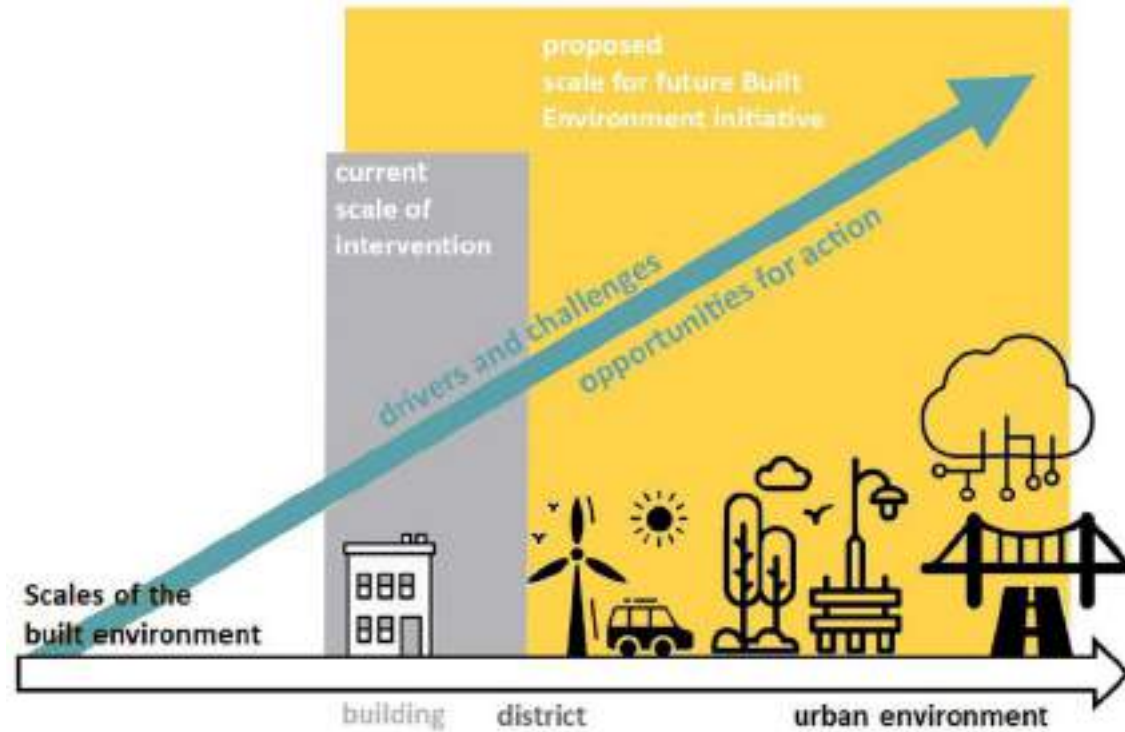
Focus on:



Resource efficiency



Innovation



From product information to digital logbooks

From Smart Buildings to Smart cities

From BIM to Digital Twins

GrowingCircle Project – background

Focus on:





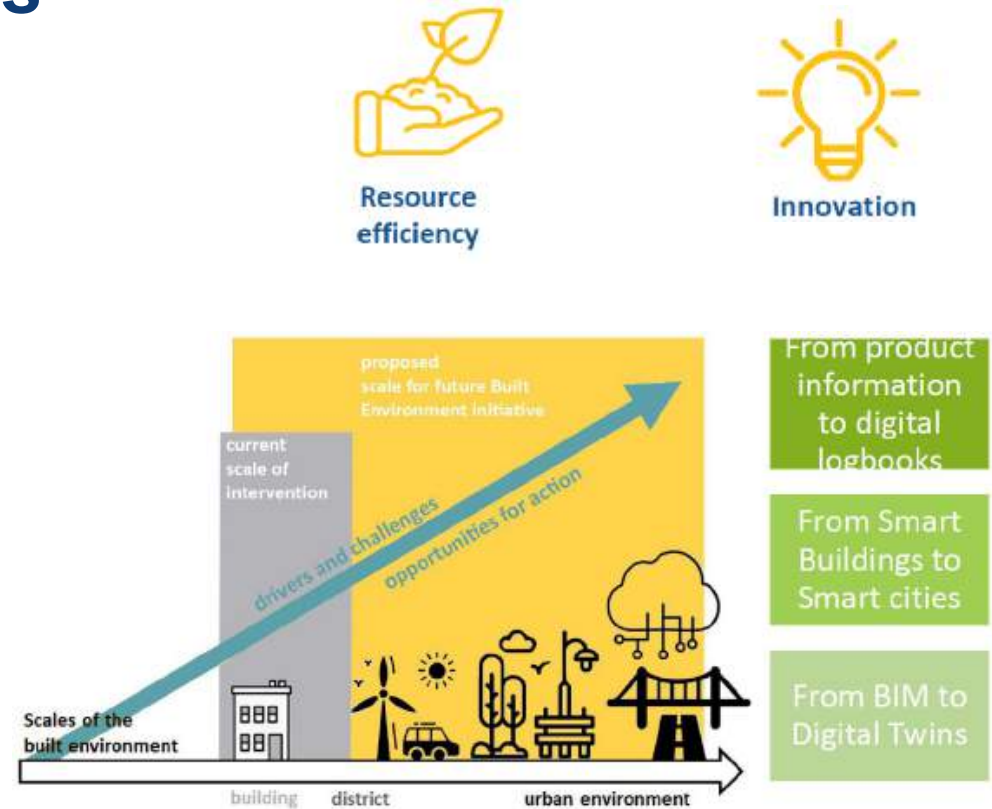
GrowingCircle Project – breaking “silos”



Focus on
integration

Data Templates
with
relevant and
trustworthy
information

Digital Building
Logbook
Material Passport
Product
documentation
Digital Twin





GrowingCircle Case Studies

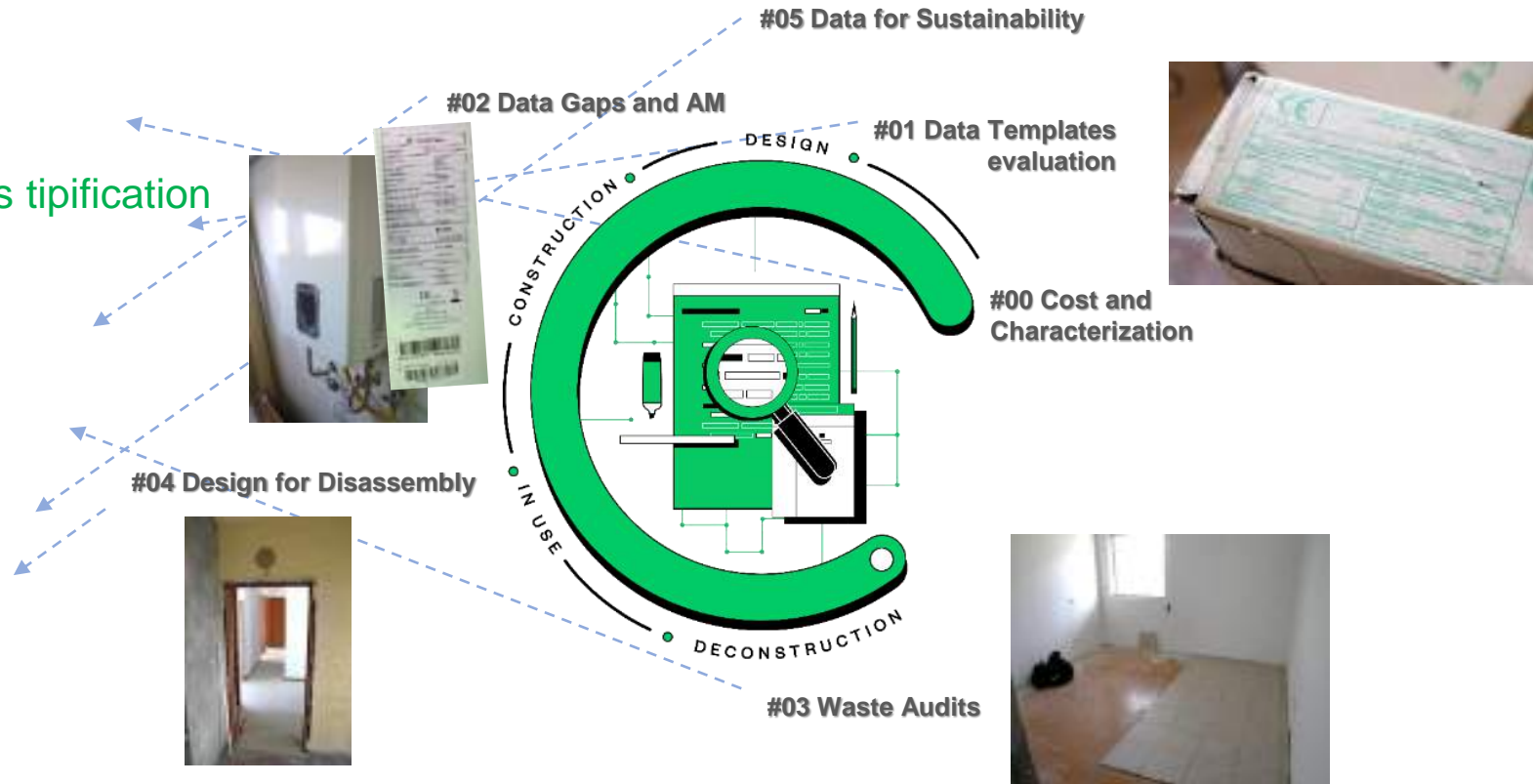




GrowingCircle Case Studies

Aligned with Renovation Wave

- Cost related Data
- Construction Products tipification
- Regulatory Data
- Performance Data
- FM Data
- Waste related Data
- Sustainability Data
- Logistics Data
- Demountability Data





GrowingCircle Case Studies

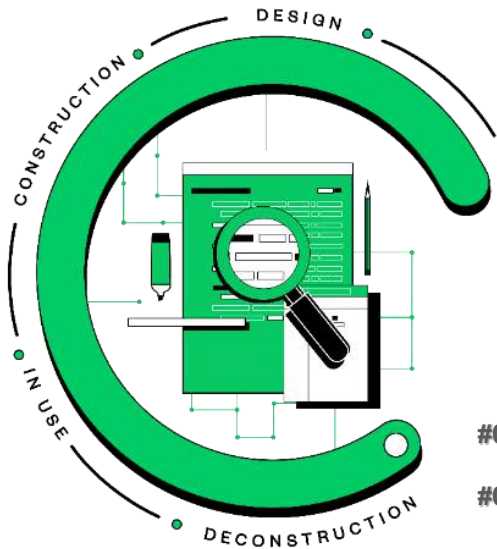
Aligned with Renovation Wave





GrowingCircle Case Studies

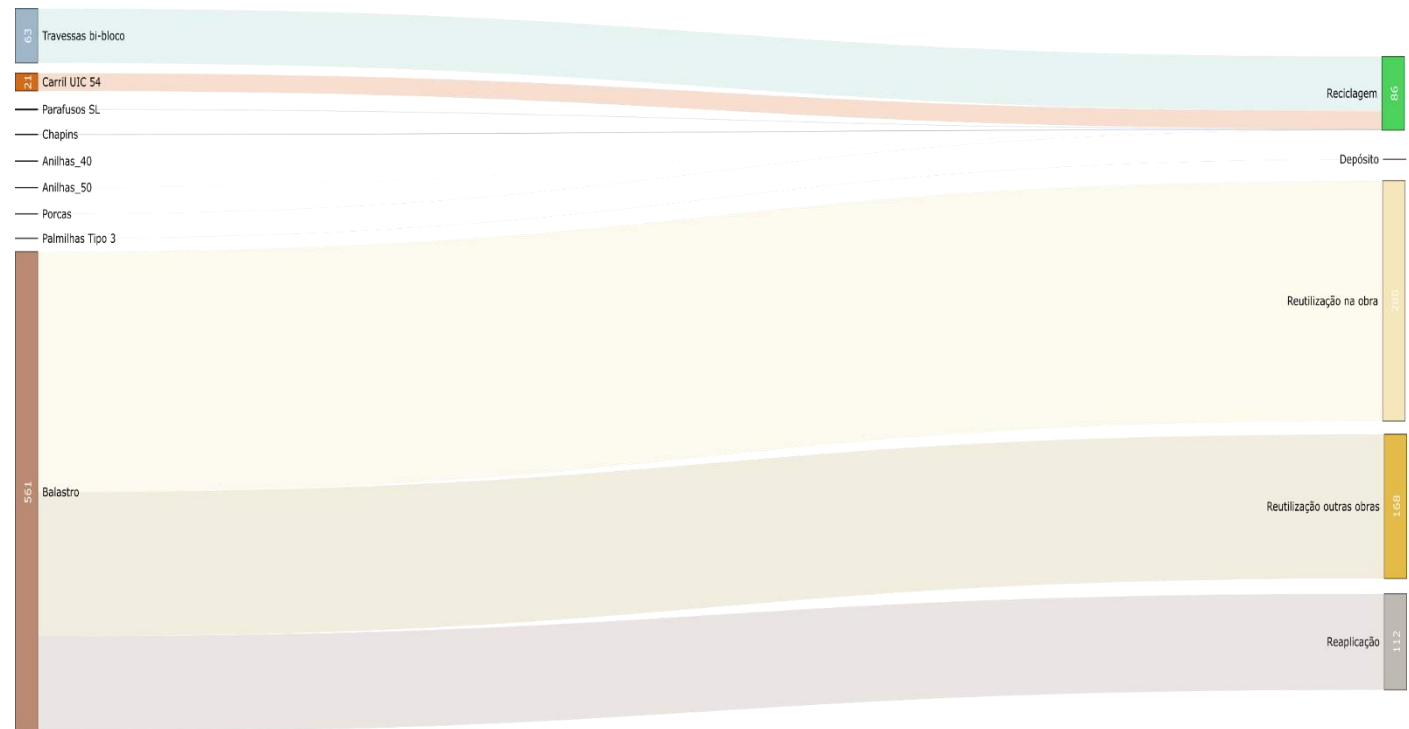
Aligned with Re-use/Recycling improvements



#00 Cost and Characterization
#06 Re-use/Recycling potential Rates

Construction Elements

Possible Outlets





CS – Re-use/Recycling improvements

Renovation of Railway tracks – What we did

Object/Element	Type 3 tie plate
Nomenclature	61080028
Manufacturer	Flexocol
Man. Year	n/id
Standard	n/a
Raw Materials	Rubber
EWC	17 06 04 insulation materials other than those mentioned in 17 06 01 and 17 06 03
Weight	194 g

Quantity	668 units
----------	-----------





CS – Re-use/Recycling improvements

Renovation of Railway tracks – What we did

Products	Material identification	EWC codes	Quantity	Unit	Quantity (kg)	Quantity (t)	Possible outlet	Recommended outlet	Additional Notes
UIC 54 rail	steel	17 04 05 iron and steel	400	m	20813	20,81			3,22%
Bi-block sleepers	concrete + steel		334	un					9,81%
sleepers (steel)	steel	17 04 05 iron and steel	2,05	m	6624	6,62			
sleepers (concrete)	concrete	17 01 01 concrete	170,17	kg	56836	56,84			
SL bolt	steel	17 04 05 iron and steel	1336	un	695	0,69			0,11%
Type 3 tie plate	rubber	17 06 04 insulation materials other than those mentioned in 17 06 01 and 17 06 03	668	un	130	0,13			0,02%
Rail clips	steel	17 04 05 iron and steel	1336	un	721	0,72			0,11%
Shims_40	steel	17 04 05 iron and steel	1336	un	34	0,03			0,01%
Shims_50	steel	17 04 05 iron and steel	1336	un	63	0,06			0,01%
Nuts	steel	17 04 05 iron and steel	1336	un	117	0,12			0,02%
Balast	stone	17 05 08 track ballast other than those mentioned in 17 05 07	308	m3	560560	560,56			86,69%
					646592				100,00%



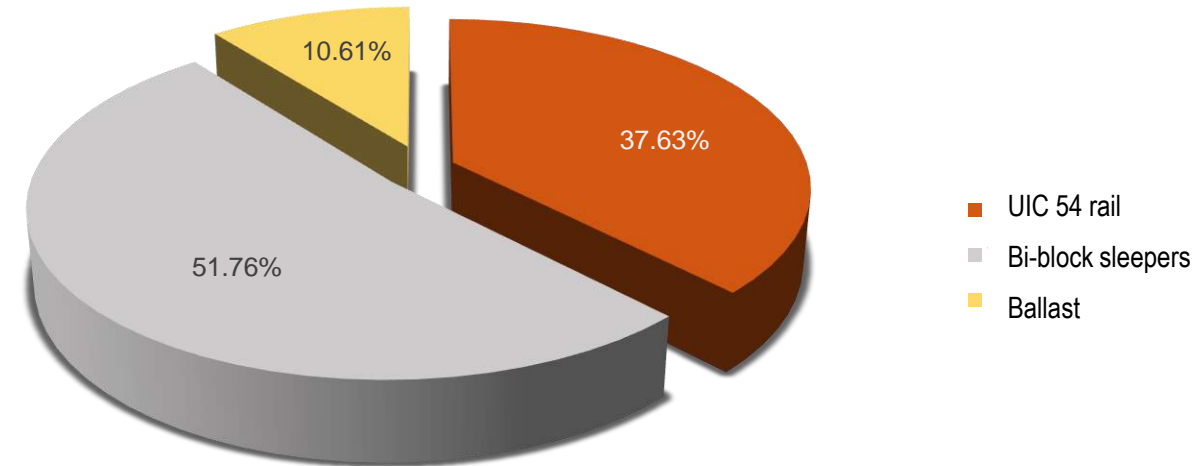
CS – Re-use/Recycling improvements

Renovation of Railway tracks – Analysis

Multi-dimension analysis on the relevance of railway elements.

Firstly, taking into account the current market prices, the economic relevance:

Elements relevance (cost €)





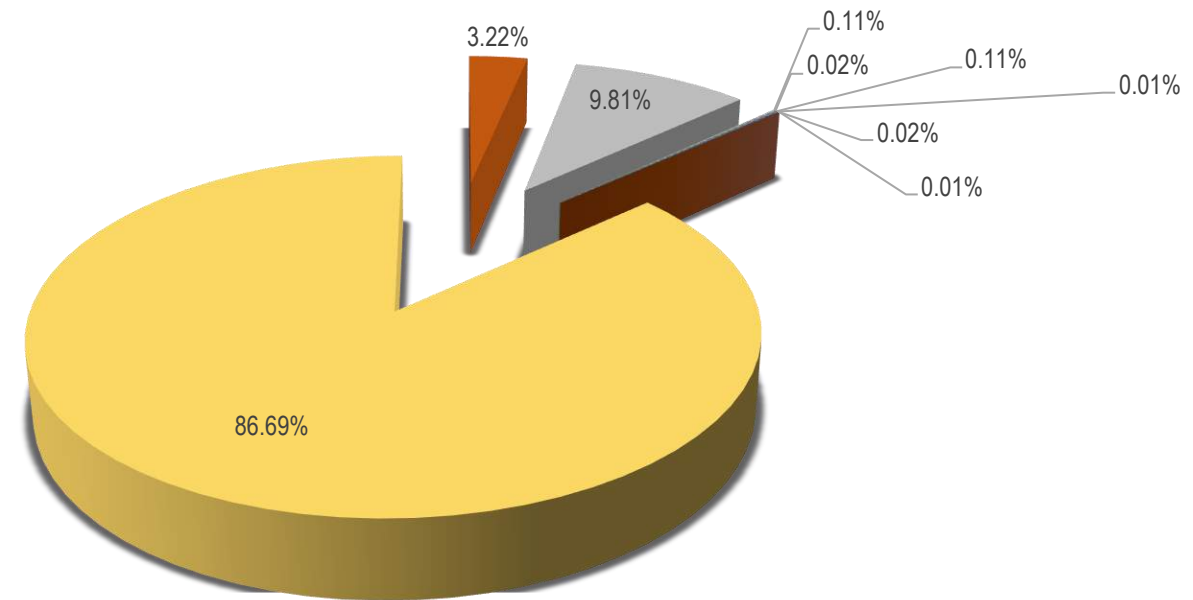
CS – Re-use/Recycling improvements

Renovation of Railway tracks – Analysis

Multi-dimension analysis on the relevance of railway elements.

Same elements evaluation considering their weight:

Elements relevance (weight)



■ UIC 54 rail ■ Bi-block sleepers ■ Parafusos SL ■ Palmilhas Tipo 3 ■ Chapins ■ Anilhas_40 ■ Anilhas_50 ■ Porcas ■ Ballast



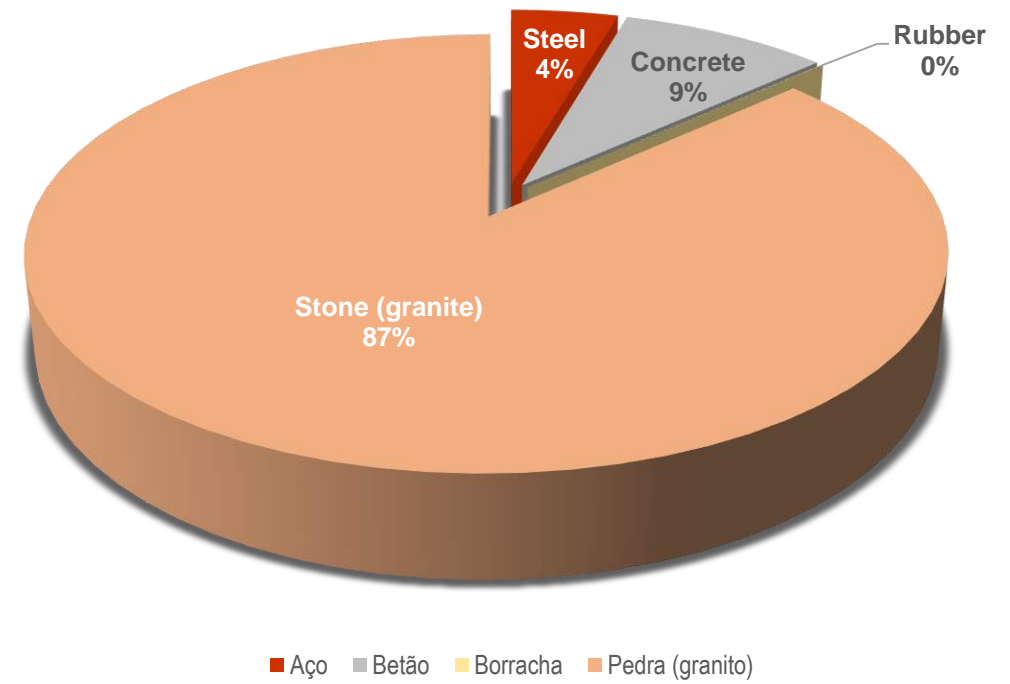
CS – Re-use/Recycling improvements

Renovation of Railway tracks – Analysis

Multi-dimension analysis on the relevance of railway elements.

Keeping the look on waste we replace the elements lenses by the material lenses. This provides a different insight for the decisions to be taken:

Materials relevance (weight)





CS – Re-use/Recycling improvements

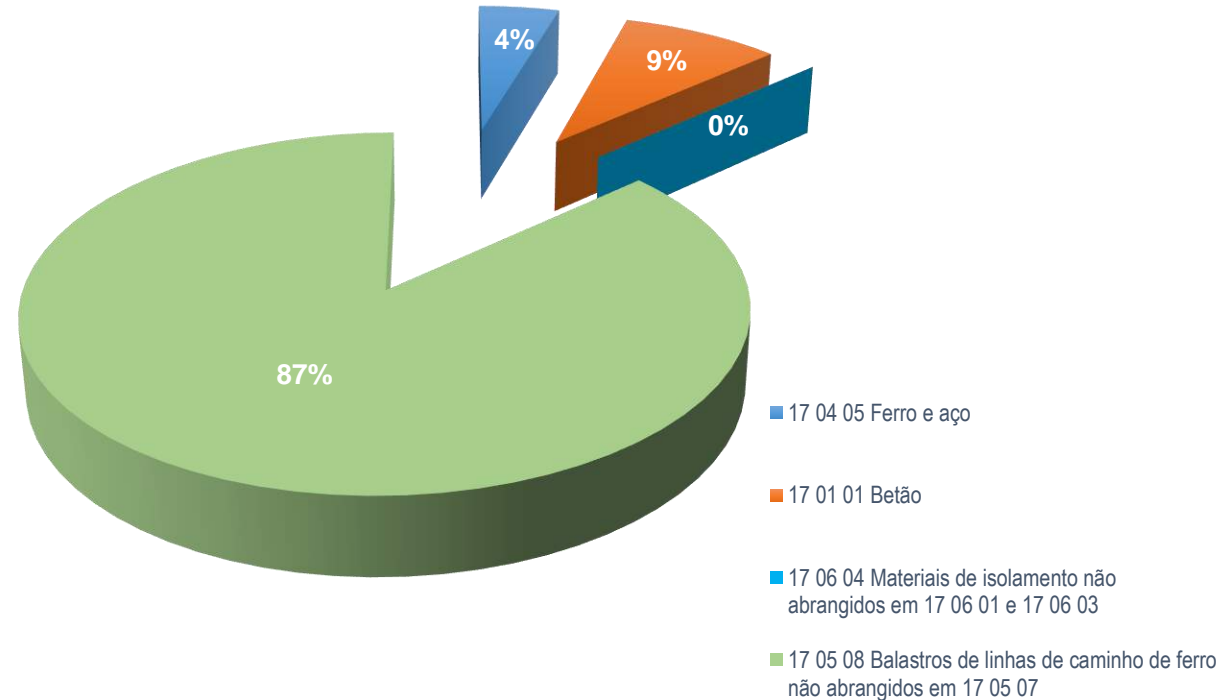
Renovation of Railway tracks – Analysis

Multi-dimension analysis on the relevance of railway elements.

Related to materials but in a transition to a circular economy mindset, it is of interest a vision following the EW codes:

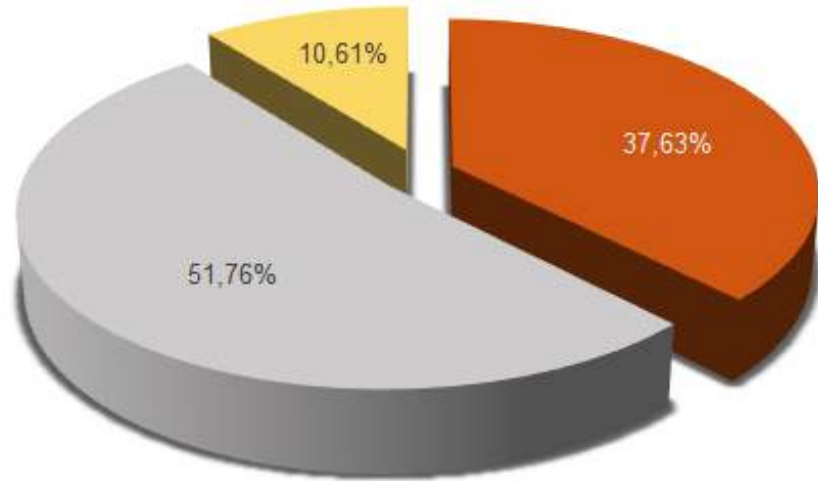
NOTE: In this specific case there is a coincidence in the results when analyzing the materials and the EWC.

EWC relevance

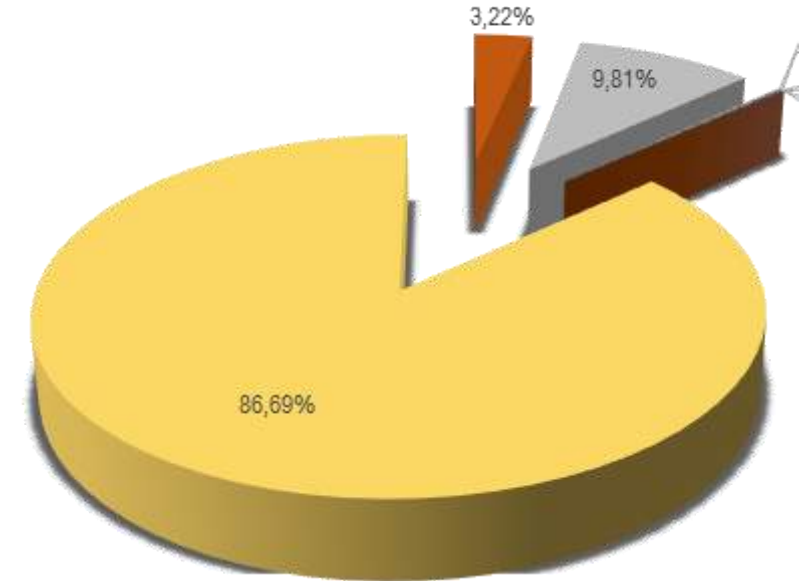




Triggering Discussion - Part I



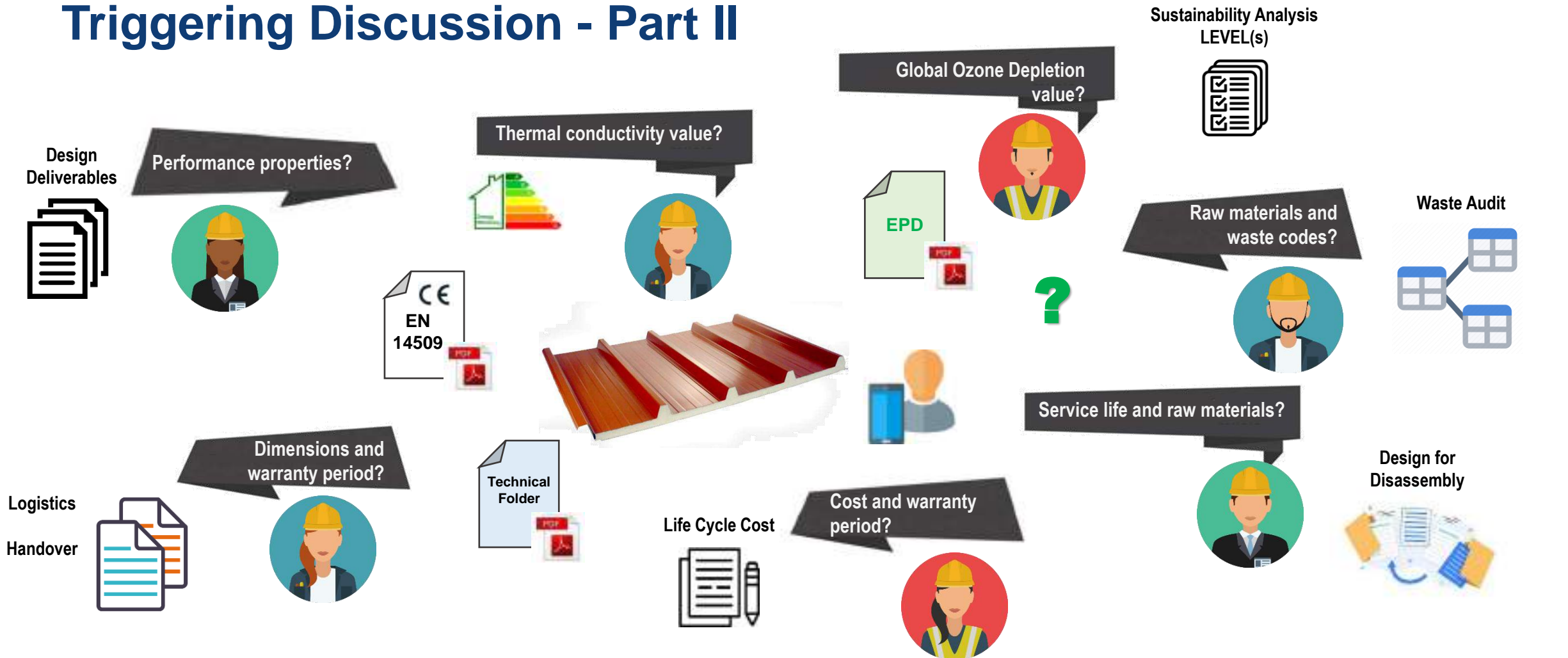
Relevance (€)



Relevance (ton)

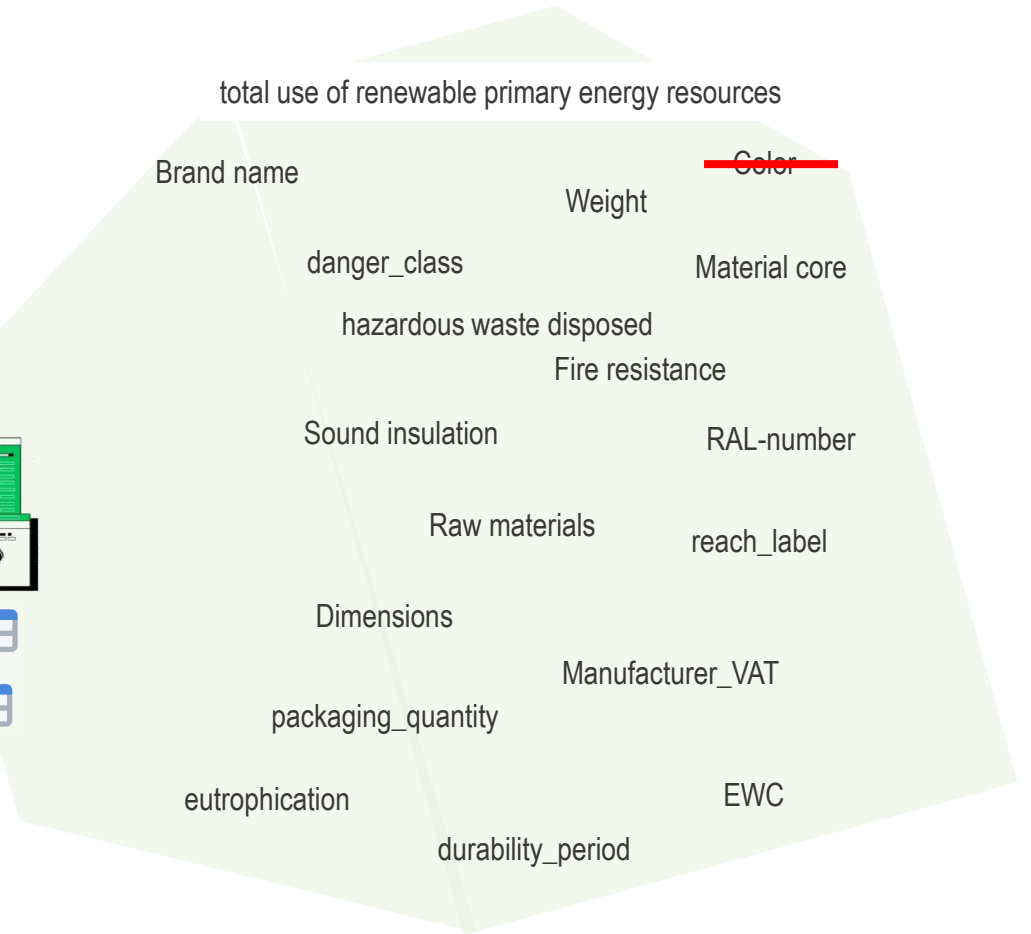
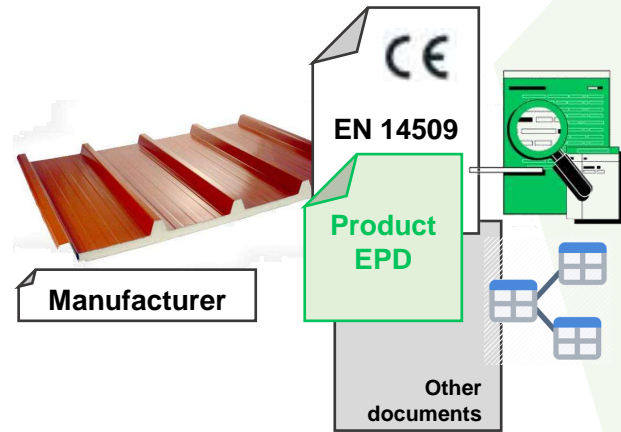
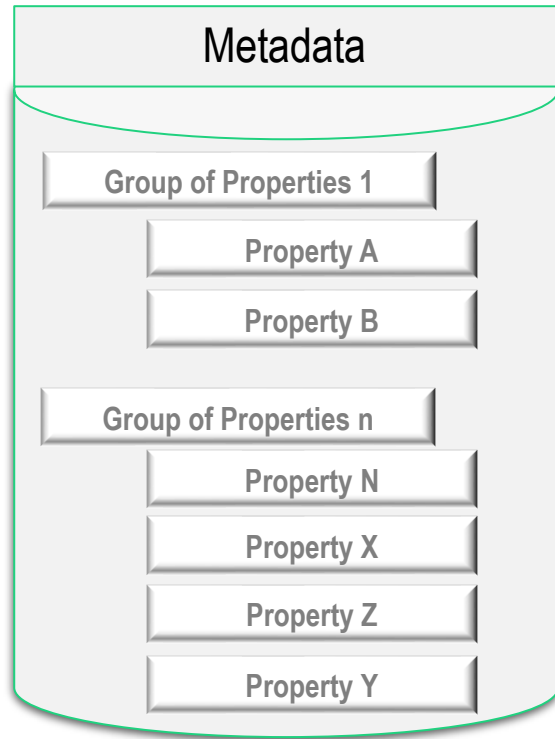


Triggering Discussion - Part II

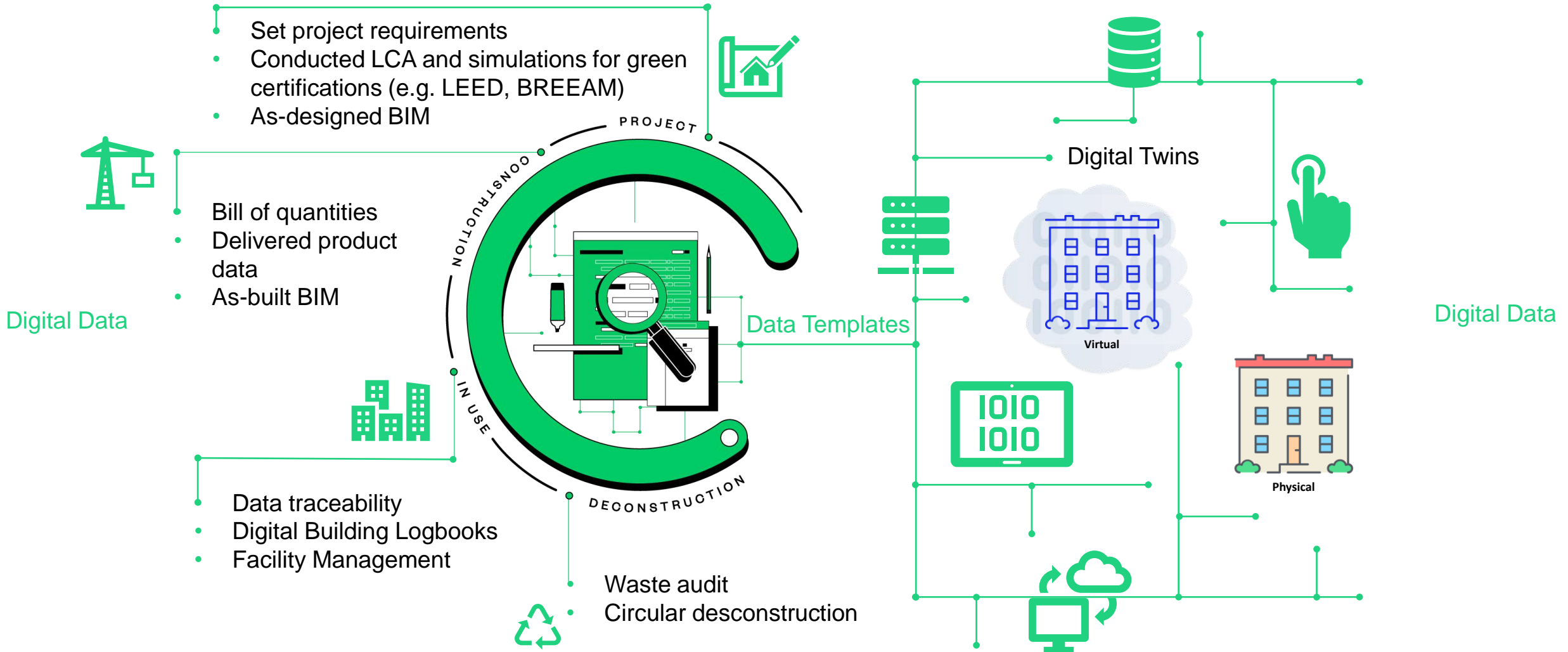




Triggering Discussion - Part II



Data-driven for a Circular Building's life cycle



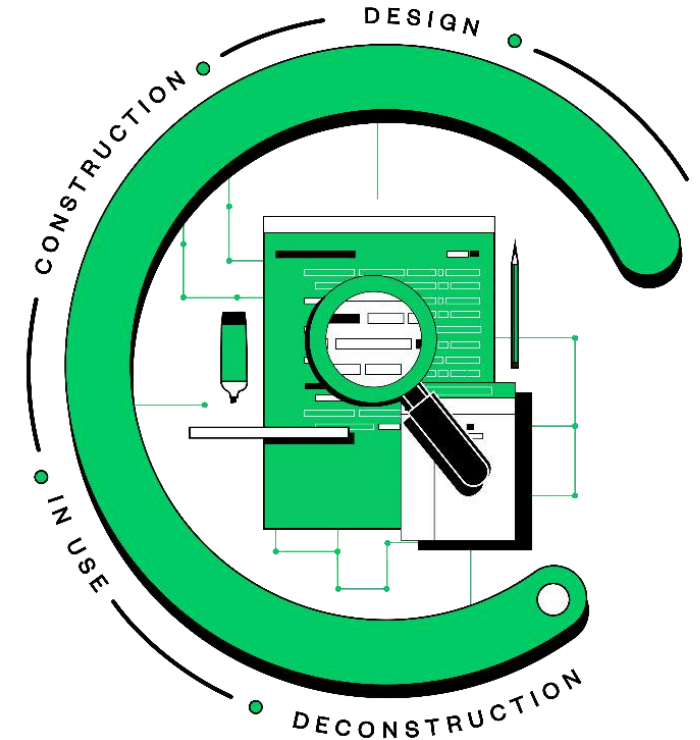


Thank you for your attention!

<https://growingcircle.netlify.app/project/>

Pedro Mêda
Msc. Eng.

CONSTRUCT - GEQUALTEC – Instituto da Construção, Porto,
PORTUGAL



GrowingCircle - “Integrated Data for Efficient and Sustainable Construction” project was approved under the EEA Grants 2014-2021 “Environment, Climate Change and Low Carbon Economy Programme”.
The project is promoted by IC – Instituto da Construção, Portugal with NTNU – Trondheim University , Norway as partner.

Radioactive waste streams in the Netherlands

Martijn van der Schaaf – National Institute for Public Health and the Environment (NL)

Radioactive waste streams in the Netherlands

Data for circularity

Delft, 24 May 2022

Martijn van der Schaaf (RIVM)

Leontine Boudewijns (RIVM)

Patricia Bekhuis (RIVM)

Jeroen Welbergen (COVRA)

Elise Burggraaff (COVRA)



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



Contents



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

- **Objectives**
- **Radioactive waste management in NL**
- **Approach**
- **Results**
- **Conclusions**



Objectives

Input new National Programme radioactive waste management

- Radioactive waste streams analysis
- Future developments, including decommissioning waste
- Options for (further) minimisation of radioactive waste.



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



Ministry of Infrastructure and the
Environment

The national programme for the management of radioactive waste and spent fuel

The Netherlands, June 2016

Www: the official document is in Dutch (Tribunary paper: www.west-2016-wafr-20-2016-101-142)

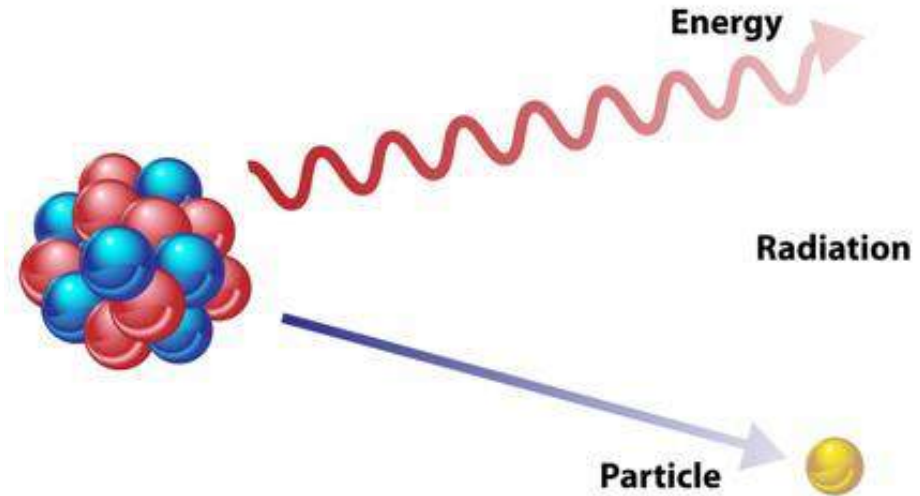


Radioactive waste management in NL

- Radioactivity and radiation
- Radioactive substances and radioactive waste: license
- Natural and artificial radioactivity
- Radioactive decay and 'half-life'
- Release



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

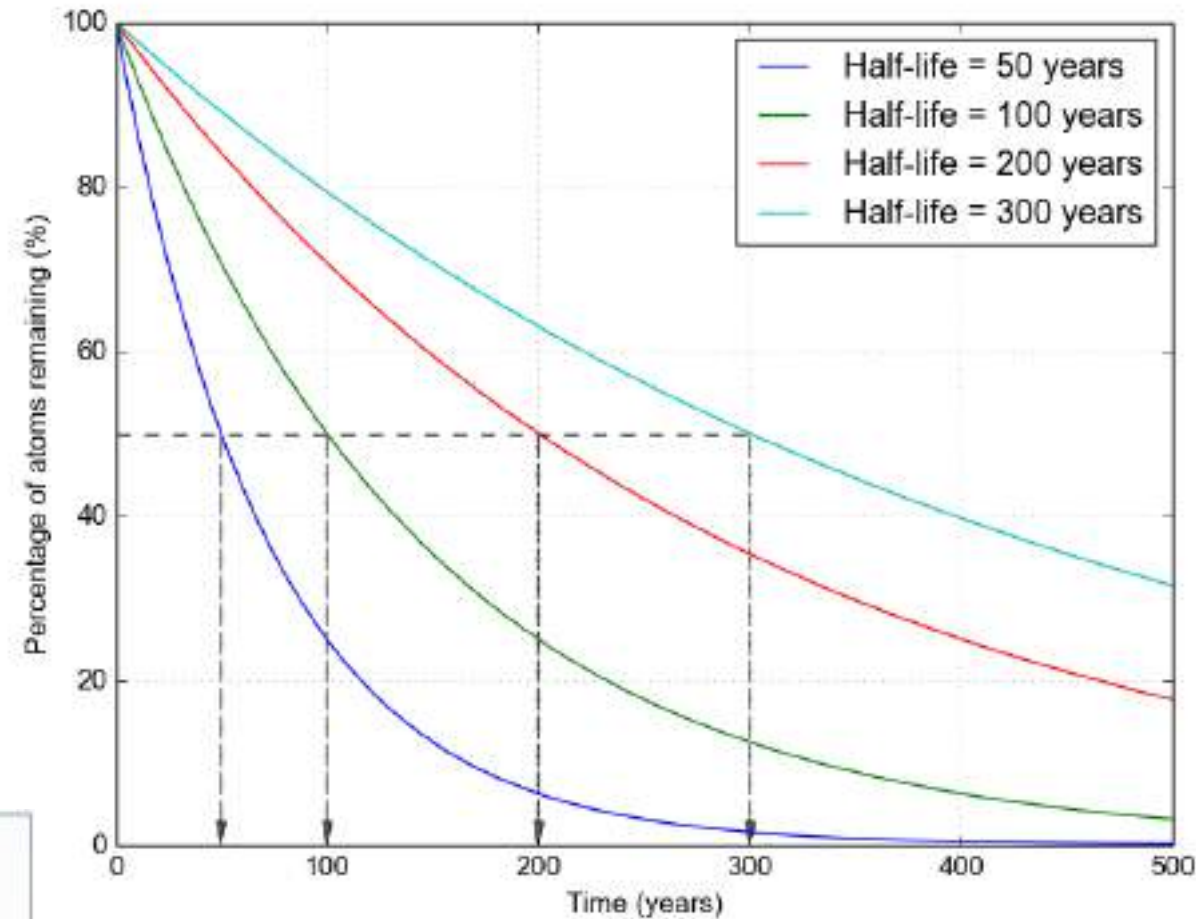


Radioactive waste management in NL

- Radioactivity and radiation
- Radioactive substances and radioactive waste: license
- Natural and artificial radioactivity
- Radioactive decay and 'half-life'
- Release



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

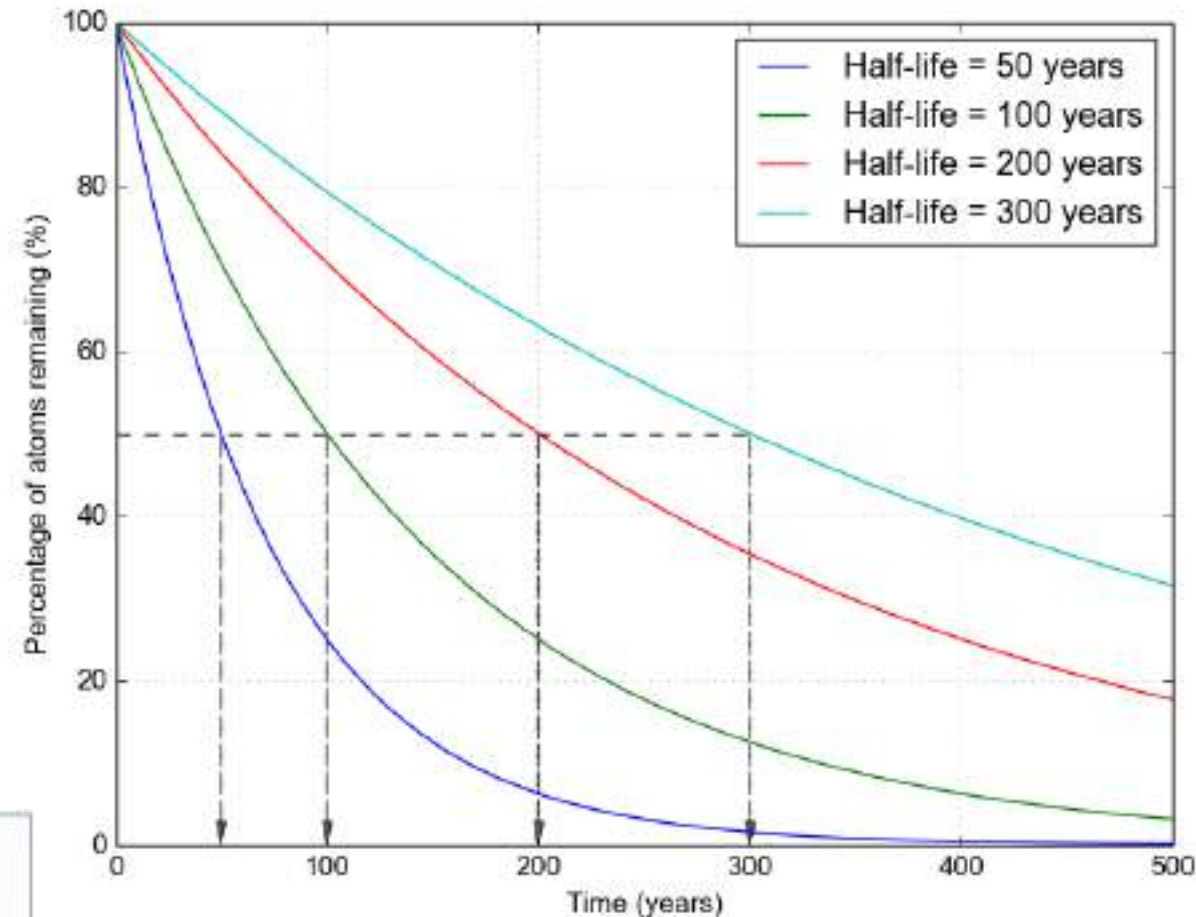


Radioactive waste management in NL

- Radioactivity and radiation
- Radioactive substances and radioactive waste: license
- Natural and artificial radioactivity
- Radioactive decay and 'half-life'
- **Release -> conventional waste legislation**



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



Radioactive waste management in NL



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

- Radioactive waste:
Requirements conventional waste do not apply
- Generation of radioactive waste shall be minimised
- Minimal storage on site (only fast decaying waste)



Radioactive waste management in NL

Radioactive waste of artificial origin: COVRA



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



Radioactive waste management in NL

Radioactivity of natural origin:

Destination depends on activity concentration

- Low: 'NORM waste': Landfill
- Higher: COVRA



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

1 - 10 Bq/g 'natural' nuclides *



> 10 Bq/g 'natural' nuclides *



* K-40 ten times higher

Radioactive waste management in NL



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Radioactive residues:

- Decontamination
- Other processing
- Recycling (under 'nuclear' license)



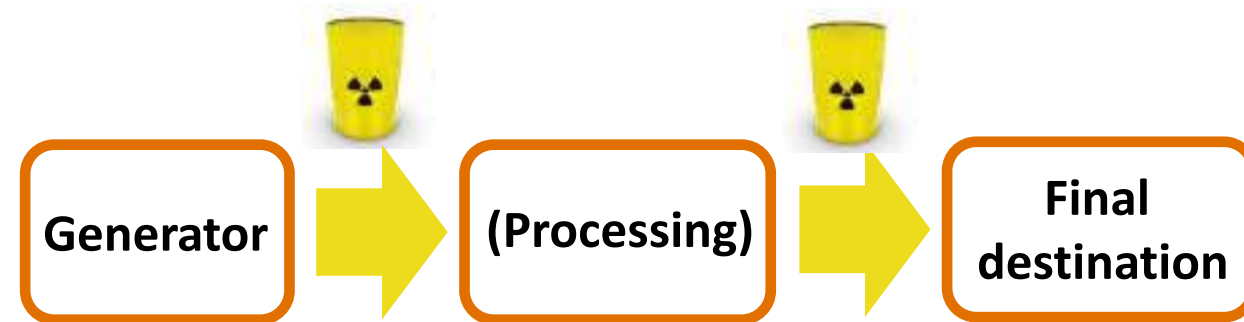
Approach



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Management routes:

1. Residue/waste generation (+ on site management)
2. (Processing by external companies)
3. Final destination



Approach



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



Generator



'Forward'

1. **Who** are generators?
2. **What** do they generate?
 1. Regular
 2. Decommissioning inventory
3. What is the **destination**?

- List of companies holding license or registration
- Assigned to 'sectors'

- Licenses
- Registrations
- Application documents
- Annual reports
- Interviews



Approach

'Forward'

1. Who are generators?
2. What do they generate?
 1. Regular
 2. Decommissioning inventory
3. What is the **destination**?



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



Generator

Sector	# enterprises	Most important radioactive waste streams
Nuclear	4	Reprocessing residues, resins, sources, activated material, contaminated clothes
Medical isotope production	8	- Reactor: spent fuel, resins, filters - Cyclotron: activated material
Medical	93	Medical waste, sources, iodine-seeds, generators, contaminated materials
Research and education	64	Spent fuel, resins, sources
Pigment production	1	Filtercake, filtermaterial and scrap
Steel production	1	Various types of filtercake and sludges
Zircon	≈ 200	Various zircon-holding wastes
Oil- and gas production	11	- (parts of) platforms, scrap, tools, etc. - Sludge and filters - Scale, m Miscellaneous waste
Geothermal energy production	27	- Filtermaterial, sludge, scrap, tools, etc. - Miscellaneous waste
Scrapyards	3	Scrap
Phosphorus production	1	Various decommissioning wastes
Miscellaneous	≈ 400	Filtercake, scales, sludge, scrap, slagwool, sources
Decommissioning, decontamination and processing	17	Various processing residues, decommissioned sources.
Abroad	-	(parts of) platforms, contaminated clothes



Approach

'Backwards'

1. What are **final destinations**?
2. **What** is received?
3. **Who** was the generator?



National Institute for Public Health
and the Environment
Mini

- COVRA
- 4 landfills for hazardous waste

- Annual reports
- Interviews
- National conventional waste registry ('LMA')



Final destination



Approach

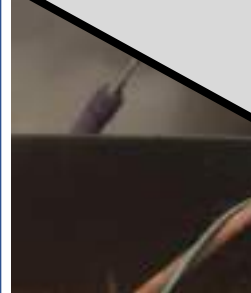
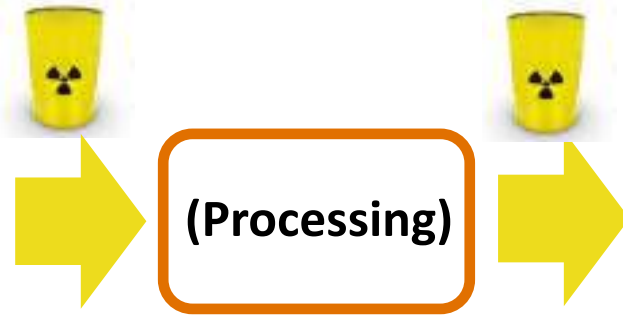
'External processing':

Processing of radioactive residues

- Released materials: management as conventional waste
- Radioactive waste: to landfill or COVRA



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



- Annual reports
- Interviews



Results

For each sector

1. Number of generators
2. Most important types
3. Characteristics
4. Total average annual quantities (Mg and GBq) in 2018-2020
5. Management routes
6. (Decommissioning inventory)
7. (options for minimisation)



National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport



Practice	# enterprises	Radioactive residue/waste	Management route	Average annual quantity (2015-2020)	
				(Mg)	(GBq)
Nuclear power generation	2	Reprocessing residues	COVRA	9,8	4,5 x 10 ⁷
		Resins	COVRA	54	7,7 x 10 ²
		Other operational waste from power generation	COVRA	6,6	12
Uranium enrichment	1	Depleted uranium	COVRA	2,1 x 10 ³	2,9 x 10 ⁴
		Other operational waste from enrichment	COVRA	9,1	8,1
		Radioactive contaminated clothing	Processing	4,5	0,1
Past research	1	Historical radioactive waste	COVRA	8,0	1,1 x 10 ⁶



Results

For each sector

1. Number of generators
2. Most important types
3. Characteristics
4. Total average annual quantities (Mg and GBq) in 2018-2020
5. Management routes
6. (Decommissioning inventory)
7. (options for minimisation)



National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport



Practice	# enterprises	Radioactive residue/ waste	Management route	Average annual quantity (2018-2020)	
				(Mg)	(GBq)
Raw materials trade and processing	3	Residuals	Landfill	81	< 0,4
Refractories production	1	None	-	-	-
Coating production for foundries	1	Used coatings	Landfill	636	0,6
ZAC materials in high temp industry	9	ZAC-stones and rubble	Landfill	410	1
Zircon sands in foundries	6	Used sands	Landfill	200 - 500	0,4 - 2
Coatings in foundries		None	-	-	-
Ceramic tiles	1	None	-	-	-
Zircon-wool in industry	5	None	-	-	-
Zirconsilicate blasting	Ca. 170	Residuals	Landfill	Unknown	Unknown
Zirconoxide grindstone	1	Grindstone	Landfill	47	0,05 - 0,1
'zirox' catalyst	1	'zirox' catalyst	Landfill	18	0,04
Zircon concrete	unknown	Vaults, safes, etc.	Landfill	32	0,04



Results

For each sector

1. Number of generators
2. Most important types
3. Characteristics
4. Total average annual quantities (Mg and GBq) in 2018-2020
5. Management routes
6. (Decommissioning inventory)
7. (options for minimisation)



National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport



Practice	# enterprises	Radioactive residue/ waste	Management route	Average annual quantity (2018-2020)	
				(Mg)	(GBq)
Steel production	1	Filter dust	Landfill (specific clearance)	≈ 8.000	80
		Sludge A	Processing	≈ 150	1,3
		Sludge B	Landfill (specific clearance)	≈ 1.000	1
		Filtercake A	Landfill (specific clearance)	≈ 18.000	250
		Filtercake B	Landfill (specific clearance)	≈ 5.000	35
		Disused sources	COVRA	<1 source	0,9



Results

For each sector

1. Number of generators
2. Most important types
3. Characteristics
4. Total average annual quantities (Mg and GBq) in 2018-2020
5. Management routes
6. (Decommissioning inventory)
7. (options for minimisation)



National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport



Practice	# enterprises	Radioactive residue/ waste	Management route	Average annual quantity (2018-2020)	
				(Mg)	(GBq)
Oil and gas exploration and production	11	Waste water	Processing	46	0,2
		Sludge	Processing	≈ 400	Ca. 11
		Filter waste	Processing	4 - 5	0,2 - 0,3
		Scrap	Processing	400	0,5
		Platforms	Processing	≈ 5.000	unknown
		Scale	Landfill	1,2	0,4
			COVRA	0,6	
		Other solid wastes		Processing	5,8
Landfill	2				
COVRA	0,3				



Results

For each sector

1. Number of generators
2. Most important types
3. Characteristics
4. Total average annual quantities (Mg and GBq) in 2018-2020
5. Management routes
6. (Decommissioning inventory)
7. (options for minimisation)



National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport



Practice	# enterprises	Radioactive residue/ waste	Management route	Average annual quantity (2018-2020)	
				(Mg)	(GBq)
Decommissioning and decontamination	12	Decommissioning waste	Landfill	15	0,12
			COVRA	0,2	0,04
		Blasting grit	Landfill	27	0,1
			COVRA	0	0
Oil/gas sludge and waste water processing	3	Processing residues	Landfill	45	1,5
			Landfill (recycling)	10	1,5
			Landfill (specific clearance)	40	6
			COVRA	6,2	3
		Other solid NORM waste	Landfill	≈ 10	≈ 0,05
Conditioning for disposal landfill	1	Steel production sludge processing	Landfill (specific clearance)	Unknown	0,05
Cleaning contaminated clothing	1	Residues	COVRA	2	0,6
Source decommissioning	1	Disused source cores	COVRA	≈ 1	Unknown



Results

For each sector

1. Number of generators
2. Most important types
3. Characteristics
4. Total average annual quantities (Mg and GBq) in 2018-2020
5. Management routes
6. (Decommissioning inventory)
7. (options for minimisation)



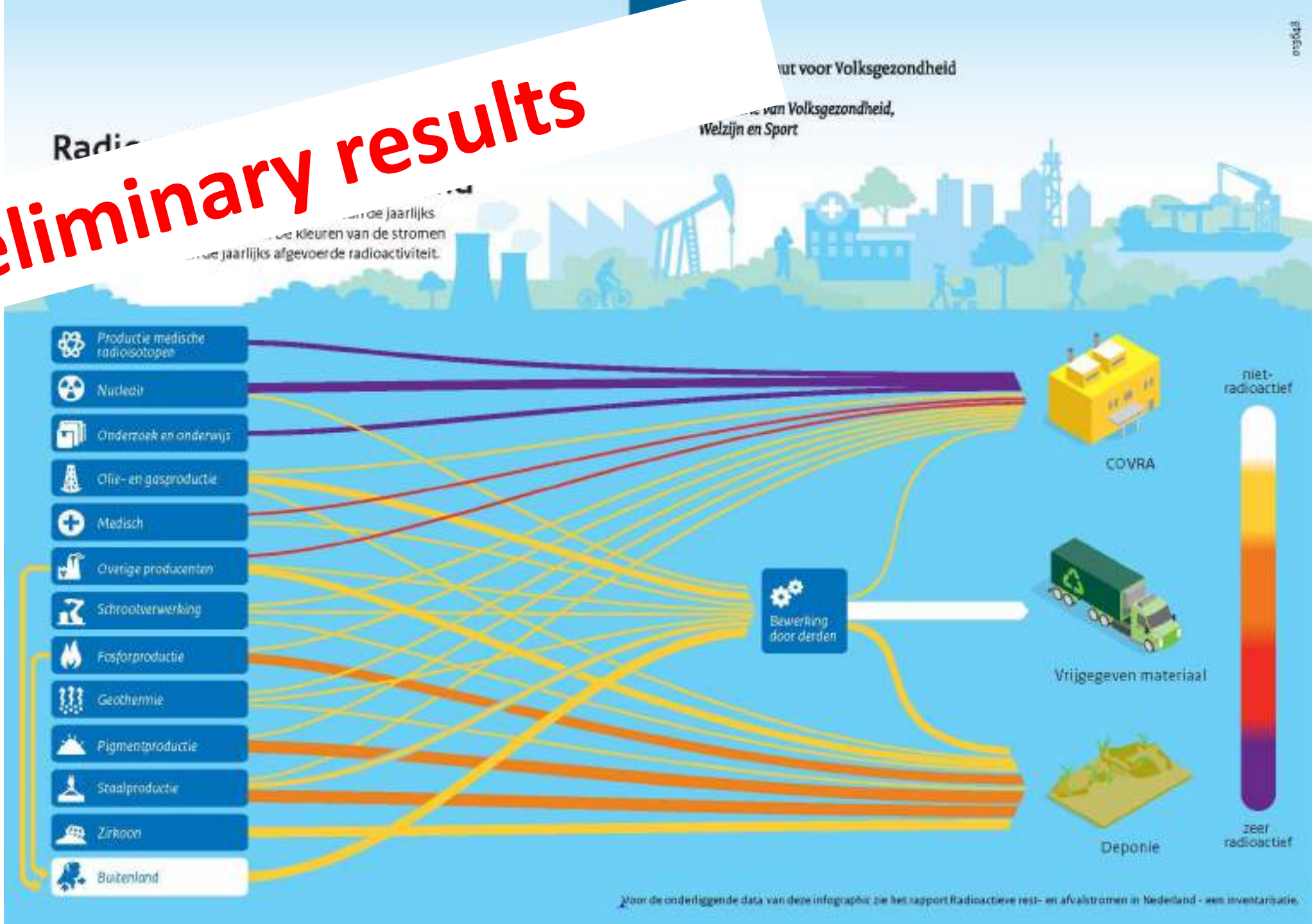
National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport



Practice	# enterprises	Radioactive residue/ waste	Management route	Average annual quantity (2018-2020)	
				(Mg)	(GBq)
Decommissioning phosphorus-plant	1	Rubble	Landfill (specific clearance)	1.720	30
		Sludges	Landfill	1.659	6
		Calciate	Landfill (specific clearance)	631	100
		Isolative material	Landfill (specific clearance)	10	0,5
		Ferrophosphor (Co-60)	Landfill (specific clearance)	9	0,01
		Sludge/ scale met Pb-210+	Landfill (specific clearance)	133	8,3
		Other solid waste with Pb-210+ en Po-210	Landfill (specific clearance)	162	9
			COVRA	< 1	0,8
		Contaminated soil	Landfill	21	0,03
		Phosphate-filtercake	Reuse in France	480	Ca. 5
Disused sources	COVRA	< 1	5,3		



Preliminary results



Conclusions

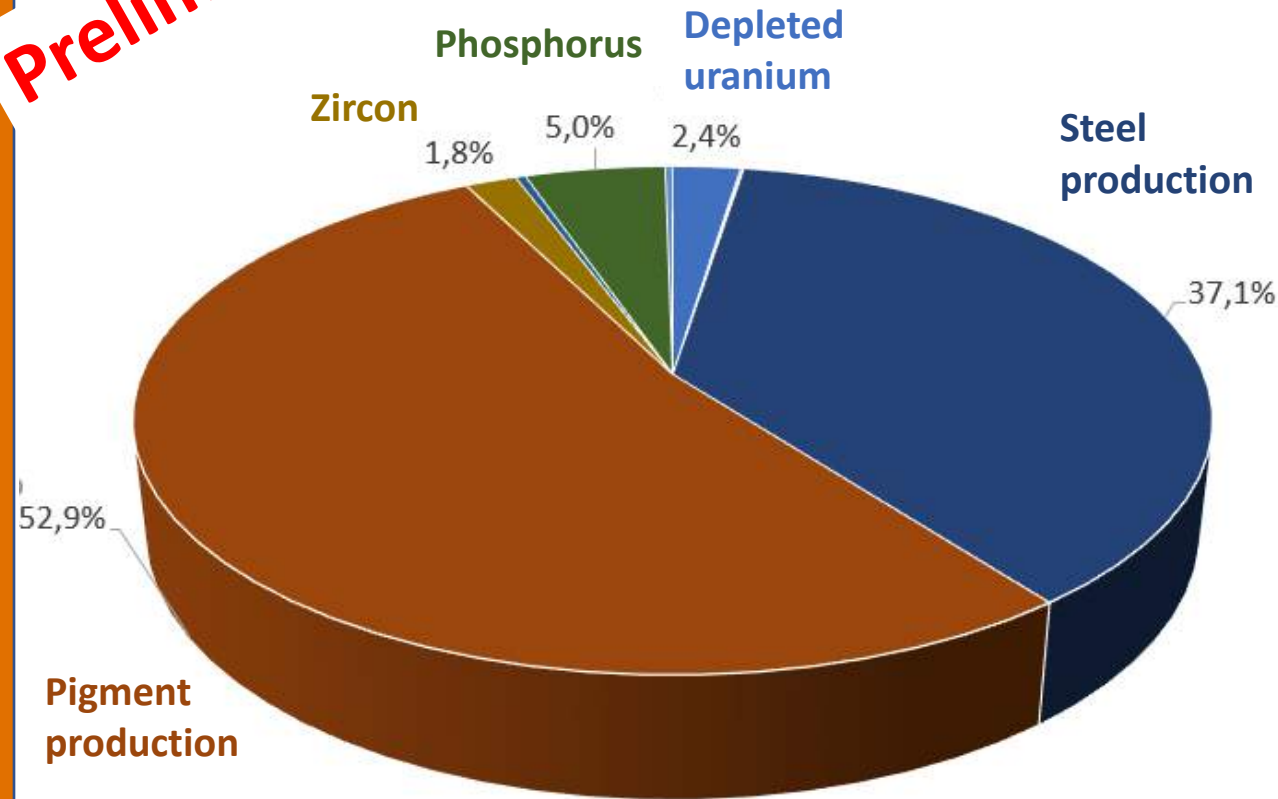
Annual generation in 2018-2020

- 97,5% of total radioactive mass is of natural origin
 - (Depleted uranium considered 'nuclear')
 - <0,001% of activity
- 15% of total radioactive mass is processed, 85% disposal
- Radioactive waste \approx 0,1% of total Dutch waste



National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

Preliminary results



Annual radioactive waste generation 2018-2020



Conclusions

Sector view

- Specific waste and residue streams require specific management route
- On site management and external processing

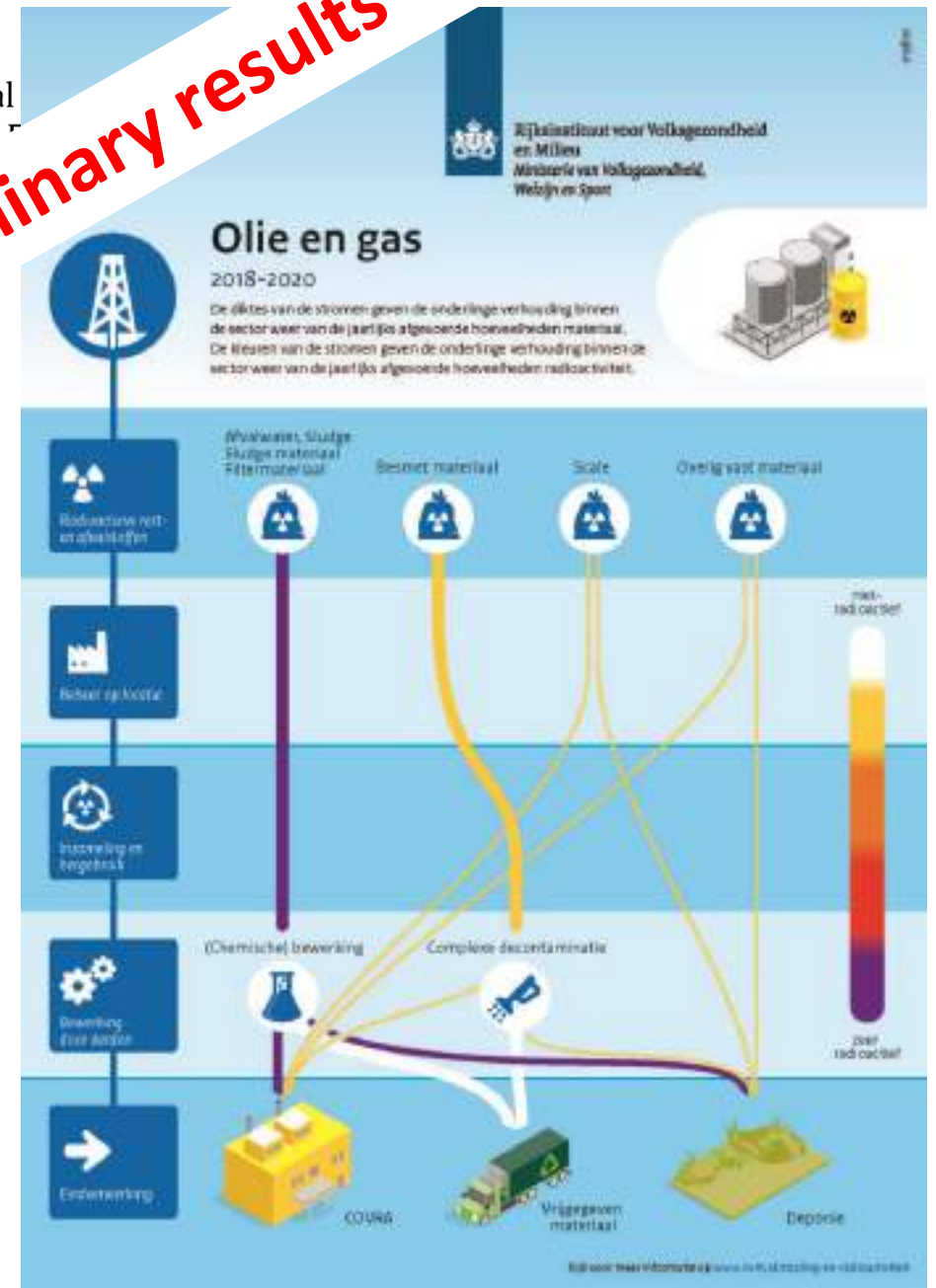


National
and the
Min

Preliminary results



Rijksinstituut voor Volksgezondheid
en Milieu
Ministerie van Volksgezondheid,
Welzijn en Sport



Radioactive waste and residues management

Conclusions

Decommissioning inventory

- Estimates of expected decommissioning waste
- 'Legacy site': Former catalyst production site, with uranium inventory



National Institute for
and the Environment
Ministry of Health, Welfare
and Social Security



Sector	Inventory (Mg)
Nuclear	6×10^3
Isotope production	$1,4 - 1,8 \times 10^3$
Medical	Unknown
Research and education	$4 - 7 \times 10^2$
Pigment production	$\approx 1 \times 10^2$
Steel production	Unknown
Zircon	None
Oil and gas production	100 - 400
Geothermal energy production	Unknown
Scrap	None
Phosphorus production	None
Miscellaneous	$1,3 \times 10^3$
Decommissioning, decontamination and processing	Unknown



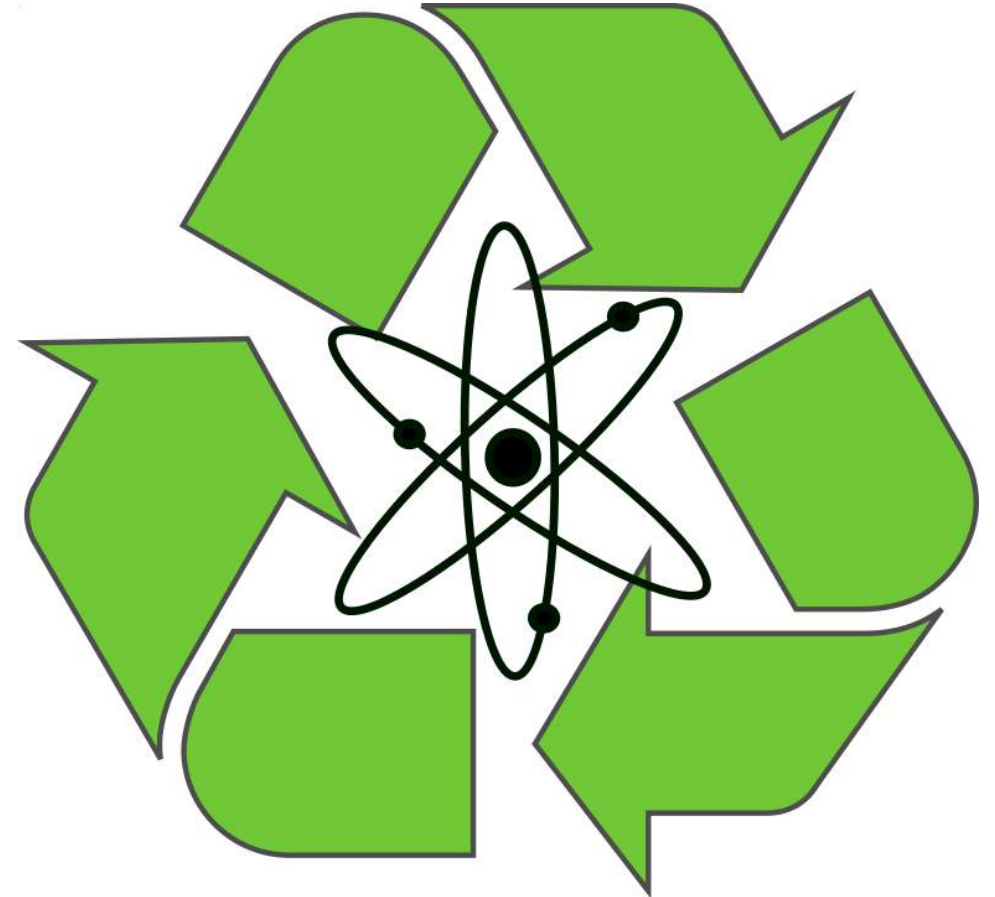
Conclusions



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Recycling?

- For some streams (to be) disposed of as radioactive waste recycling may be technically feasible
- Challenges:
 - Business case
 - Public acceptance
 - Legal aspects



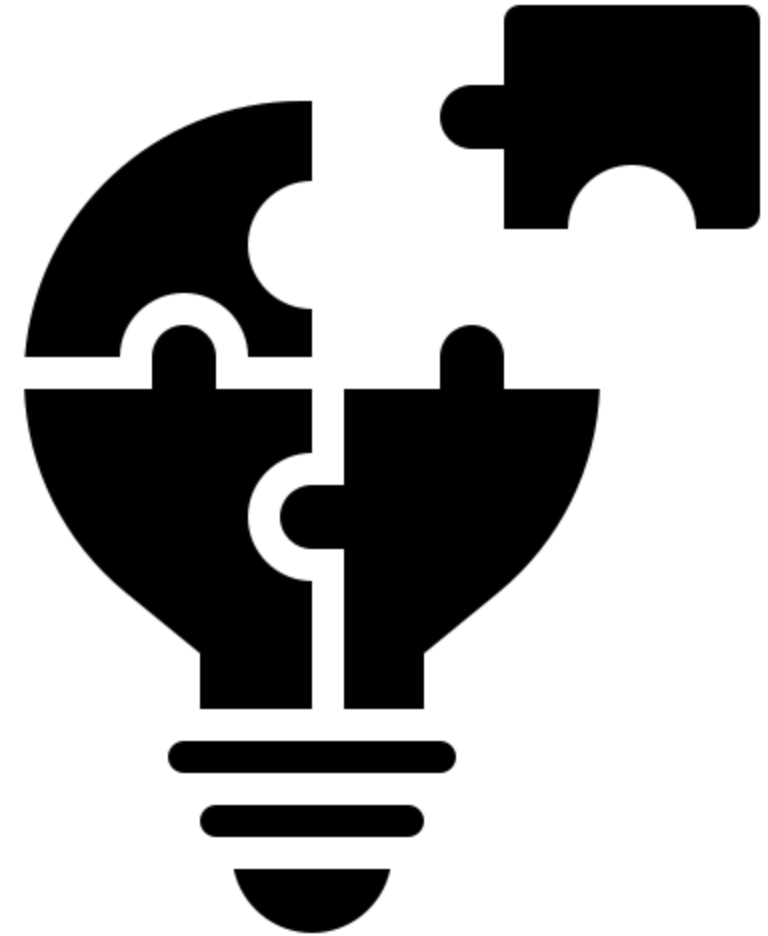
Conclusions



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Some issues...

- Data (availability, formats, units, confidentiality, etc.)
- More structural monitoring of waste streams?
- Complex legislation
- Non-radiological hazards may be of much more importance



Take home messages

- Volume Dutch radioactive waste generation determined by NORM waste. Activity share negligible
- No monitoring radioactive waste and residues, data acquisition manually
- Structural waste stream monitoring to be developed
- Minimisation technically feasible, but challenging



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



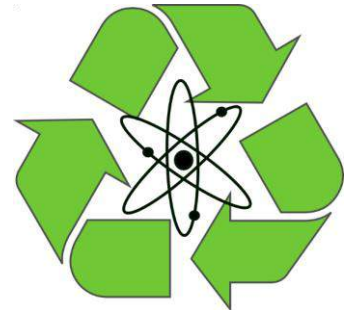


National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Thank you!

martijn.van.der.schaaf@rivm.nl

- Ministry of Infrastructure and Water management (funding)
- Authority Nuclear Safety and Radiation protection
- Rijkswaterstaat
- Stralingsupport B.V.
- Radiatco
- N.V. Afvalzorg Holding
- Mineralz B.V.
- BMT Europe
- Cleanstream B.V.
- Geothermie Nederland
- Tata Steel Nederland
- Tronox B.V.
- And many others...



Waste data collection in Italy

Jessica Tuscano, Fabio Tatti & Chiara Bonomi – Italian Institute for Environmental Protection & Research

Waste data collection in Italy

Jessica Tuscano, Chiara Bonomi, Fabio Tatti
National Center for Waste and Circular Economy
ISPRA - Italian Institute for Environmental Protection and Research

- Waste traceability in Italy
- Waste Data collection in Italy
- Structure of the Environmental Compulsory Declaration for waste data collection
- Obligated subjects to fill in the Environmental Compulsory Declaration
- Compulsory Declaration Data flow
- ISPRA telematic catalog

Waste traceability in Italy

In Italy, waste traceability and data collection system are **mandatory** by law since 1998. In 2006 Legislative Decree no. 152/2006 has updated the system, and in September 2020 a new Legislative Decree (n. 116), implementing the EU directive 2018/851 "Circular economy", reformed the complex discipline of the traceability of waste, established a new **National Electronic Register for the traceability of waste single register encompassing all those which until now have been separate declarations.**

The electronic system is at experimental stage and will be at full capability by next year.



The waste traceability system relies on 3 documents that trace the entire path of waste, from initial generation to final recovery or disposal: the **Loading and Unloading Register**, the **Waste Identification Form** and the **Environmental Compulsory Declaration (ECD)**.

Waste traceability in Italy

The Loading and Unloading Register reporting information on qualitative and quantitative characteristics of generated/managed waste, **is mandatory for: any person who collects and transports waste on a professional basis, dealers or brokers, establishments and enterprises that carry out waste recovery or disposal operations, Consortia (EPRs), enterprises and original producers of hazardous and non-hazardous waste.**

The register must be filled in with the following information:

- Name and address
- Number and date of loading and unloading of the waste
- Origin of the waste, quantity and characteristics of waste (European Waste Code, physical state, hazard characteristics..)
- Specific destination of the waste and method of treatment used
- Reference to waste identification document (recovery or disposal operation)
- Other specific information

Loading and unloading registers must be kept for a specific period.

Register data are used for the annual communication to the competent Chambers of Commerce, Industry, Craft and Agriculture.

There are **penalties** for missing or incorrect compilation.

Waste Identification Form must be filled in by an **authorized carrier** and contains all the information relating to:

- **The producer and the waste holder**
- **The carrier itself**
- **The waste receiver**
- **The waste source, type and quantity**
- **The planned destination**
- **Date and location of the route**
- **The intended method of treatment (recovery or disposal operation)**

Waste identification document must be endorsed and drawn up in 4 copies, completed, dated and signed by the waste producer or holder, the carrier and the recipient. Copies of the document **must be kept for 5 years**.

Waste data collection in Italy

In **1994**, Italian Law No. 70 established that all declaration obligations provided for by laws and their implementing regulations on **environmental, health and public safety matters**, are fulfilled through the presentation of a single declaration form, the **Environmental Compulsory Declaration (ECD)** (“Modello Unico di Dichiarazione ambientale, so-called MUD) to the Chamber of Commerce, Industry and Crafts and Agriculture (C.C.I.A.A.) competent for the territory.

The Chamber of Commerce then has the task of collecting all declarations and transmitting them to the competent environmental bodies in electronic format.

The submission to the Chamber of Commerce must be made exclusively electronically via website and cannot be submitted on paper. There are **penalties** for missing or incorrect compilation.

For non-hazardous waste generation, total exemption is provided only for some specific producers and sectors (e.g., agro-industry, construction & demolition activities) and for all producers with less than 10 employees.

Structure of the ECD for waste data collection

The **Environmental Compulsory Declaration** consists of a series of forms, eventually updated by the authorities, where environmental data, relative to the year preceding the declaration, must be mandatorily reported. The following information for **waste are mandatorily reported**:

- waste produced by economic activities
- waste collected by the municipality
- waste transported or intermediated
- waste sent for disposal or recovery

The ECD is divided into **six sections**, identifying the types of waste for which the form must be submitted:

- ❖ **Waste (from industrial and economic activities)**
- ❖ **End-of-life vehicles**
- ❖ **Packaging and packaging waste (one section dedicated to EPRs and one to waste managers)**
- ❖ **Waste Electrical and Electronic Equipment (WEEE)**
- ❖ **Municipal Waste**
- ❖ **Manufacturers of Electrical and Electronic Equipment**

Obligated subjects to filled in the ECD

1. Waste section (from industrial and economic activities) must be filled in by:

- Anyone who carries out **waste collection and transport** activities on a personal basis;
- **Dealers and brokers** of waste without custody;
- Firms and entities carrying out **waste recovery and disposal operations**;
- Companies and entities that are **initial producers** of hazardous waste;
- Enterprises and entities that have **more than ten employees and are initial producers** of: non-hazardous waste deriving from industrial processing, handicraft processing, waste recovery and disposal activities, sludges produced by the purification and other water treatment and by the purification of wastewater; consortia and recognized systems established for the recovery and recycling of particular types of waste (*with the exception of Consortia and systems established for the recovery and recycling of packaging waste, which are required to fill in the Packaging Communication*);
- The managers of the **public collection service** of the organized collection circuit with reference to waste delivered to them by producers of special waste.

2. End-of-Life Vehicles section must be filled in by:

Subjects carrying out treatment activities of end-of-life vehicles and their components and materials.

3. Packaging section must be filled in by:

- **Consortia Section:** CONAI (National Packaging EPR Consortium) or other EPRs;
- **Packaging Waste Managers Section:** Facilities authorized to carry out packaging waste management operations.

4. Waste Electrical and Electronic Equipment section must be filled in by:

Subjects involved in the WEEE management cycle.

5. Municipal Waste section, assimilated and conventionally collected waste:

Subjects responsible for the integrated management service of municipal and assimilated waste (Municipality or subjects delegated).

6. Producers of Electrical and Electronic Equipment section:

Manufacturers of EEE and obliged to register in the EEE.

ECD for waste data collection

Until next year, when the **National Electronic Register for waste traceability will be in fully force**, data are communicated through the following websites:

MUD Telematico (www.mudtelematico.it) for sending communications relating to:

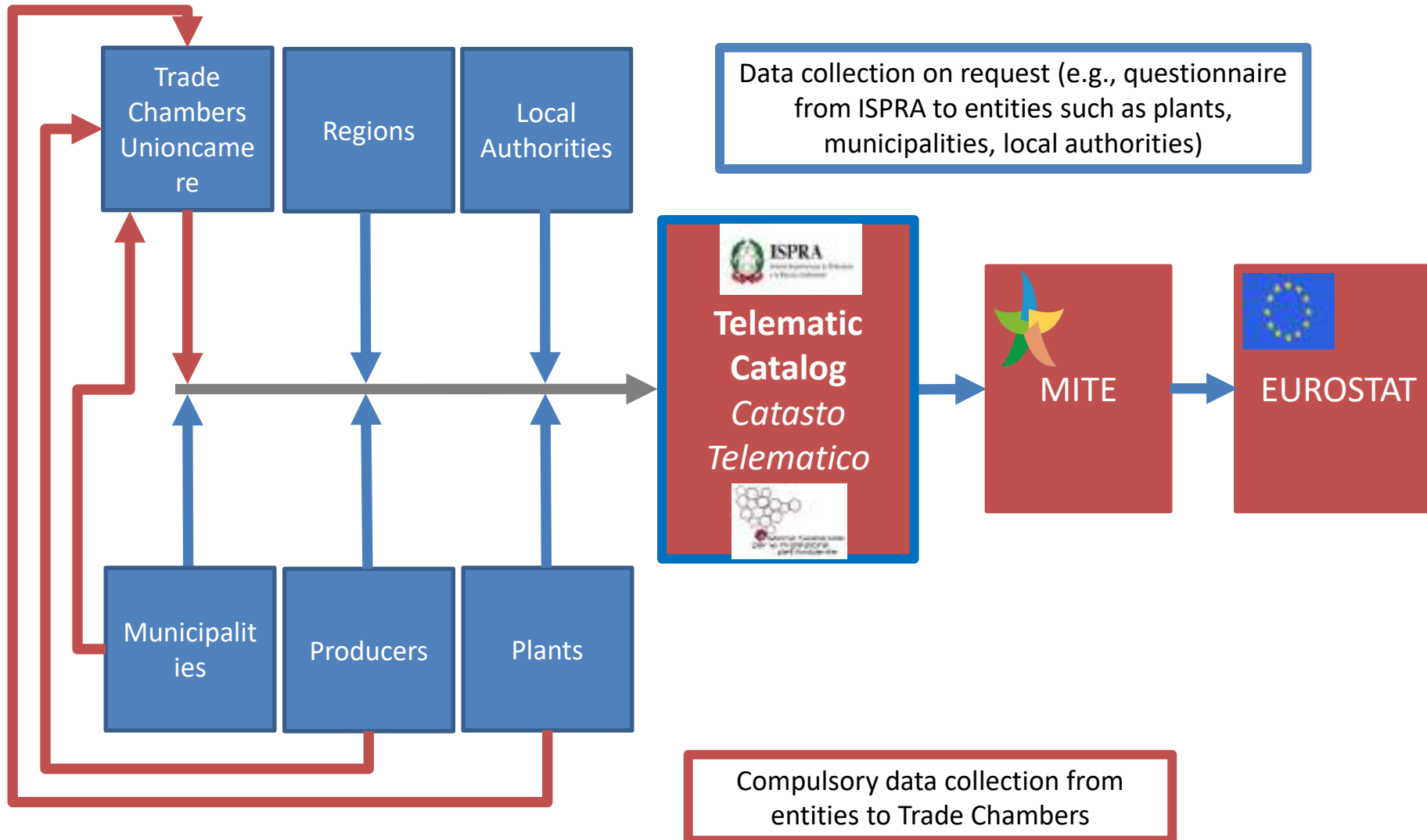
- Waste (from industrial and economic activities);
- End-of-Life Vehicles;
- Packaging, both EPR Section and Packaging Waste Managers Section;
- Waste from Electrical and Electronic Equipment.

MUD Comuni (www.mudcomuni.it) for Municipal Waste.

Simplified MUD (<https://mudsemplificato.ecocerved.it>) for sending the **Simplified Communication**.

EEE Register (www.registroaee.it) for sending data on Electrical and Electronic Equipment place on the market.

Compulsory Declaration Data flow



ISPRA telematic catalog

ISPRA

ISPRA downloads in ASCII format from the Chambers of Commerce, Industry, Crafts and Agriculture all the **Environmental Compulsory Declarations** annually sent and creates **regional Db's** in MS.Access format, performing as a telematic registry for all the declarations and makes it available to the regional and provincial sections (ARPA).

ARPAs

The ARPAs (Regional Environmental Protection Agencies) **clean up the data** (from redundancy and errors) according to a shared methodology, and then transmit the cleaned databases to ISPRA. ARPAs also perform partial analysis of the regional database and send results back to ISPRA.

ISPRA

ISPRA **processes all the data**, highlighting the types and quantities of waste generated, collected, transported, recovered and disposed of, as well as the active disposal and recovery plants, and ensures the publication of two annual reports with official national waste data. All data published are also available online at the **ISPRA National Waste Data Repository**.

**THANK YOU FOR YOUR KIND
ATTENTION**

Coffee Break

11:35 - 12:10 | 24th May 2022

Data Collection in The Netherlands

Tjerk ter Veen – Ministry of Infrastructure and Water Management (NL)

Kiki Kerstens – Statistics Netherlands (NL)



Centraal Bureau
voor de Statistiek



Rijkswaterstaat

Ministerie van Infrastructuur en Waterstaat *ieu*

Data-Collection in the Netherlands

24 May 2022

Kiki Kersten

Tjerk ter Veen



Introduction

National Registration-Office of Waste

- Registration Waste-data from 2.000 companies
- Obligation, from European legislation.
- Data has to be reported every month
- Almost completely Digital





What companies have to report?

- What companies are obligated to report?
 - Large waste processors
Exceptions: glass, metals, clean plastics
 - Companies that receive dangerous waste





What type of information is registered?

- Type of waste (EWC list of waste)
- Amount (kg), per month
- Amount of shipments, per month
- Location of origin (for most streams)
- Producer
- Method of recovery/ disposal
- Month of shipment

- If applicable: collector, broker or mediator



What for information is registered?

Location of production and producer information:

2.000 companies register
information about
100.000's

locations and producers





What is done with this data?

- Enforcement:
Local and National



- Transition to a
Circular Economy





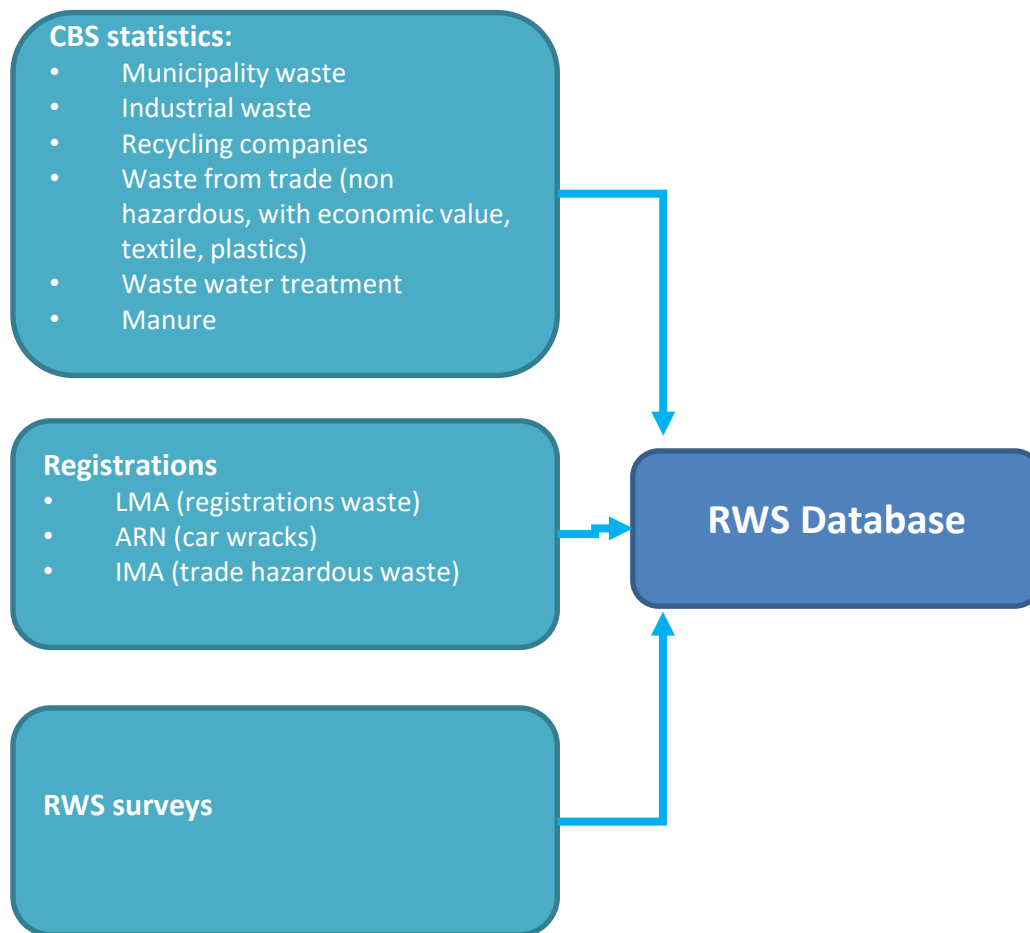
What is done with this data?

- Cooperation with Science Institutions



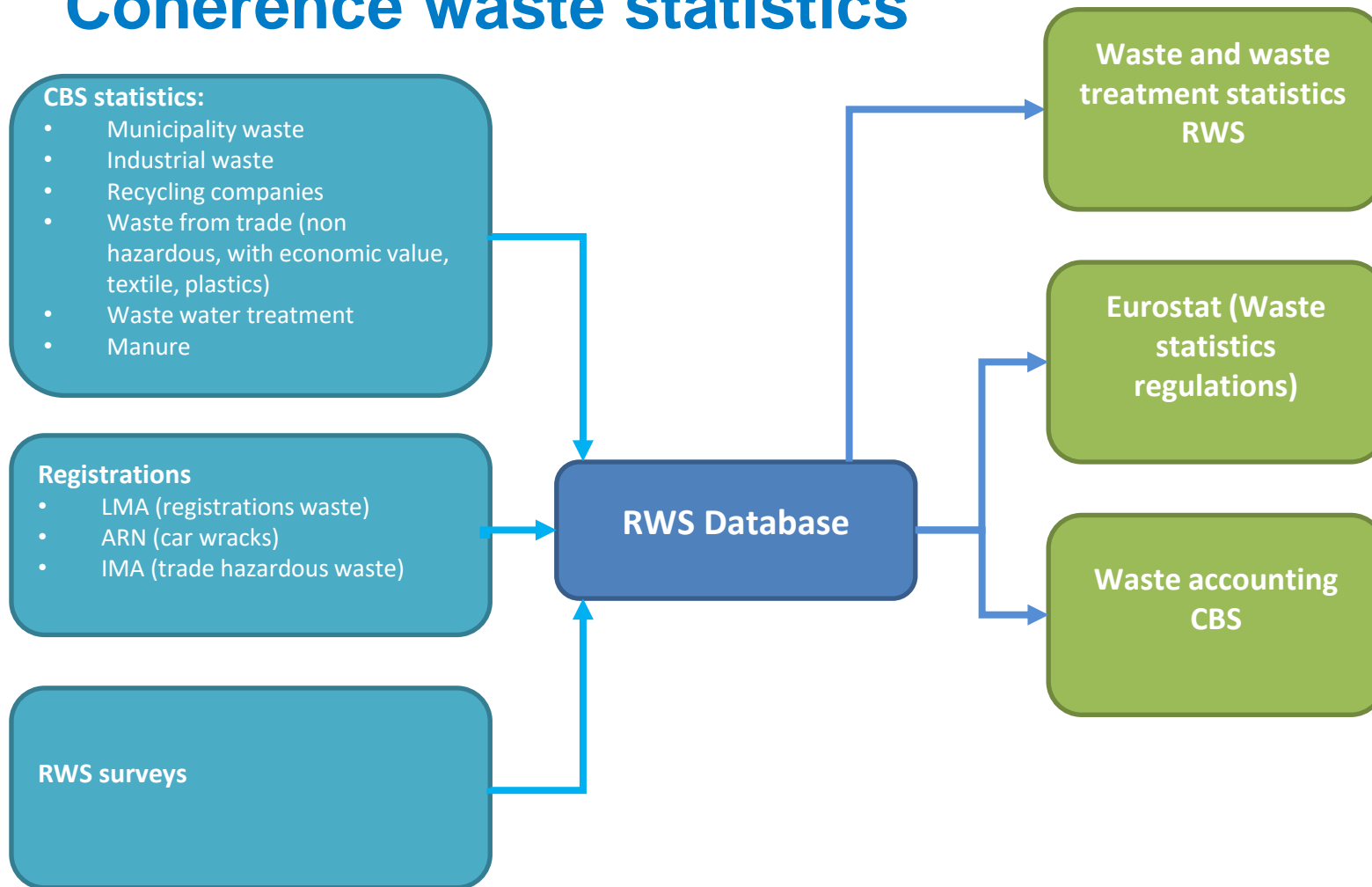


Coherence waste statistics



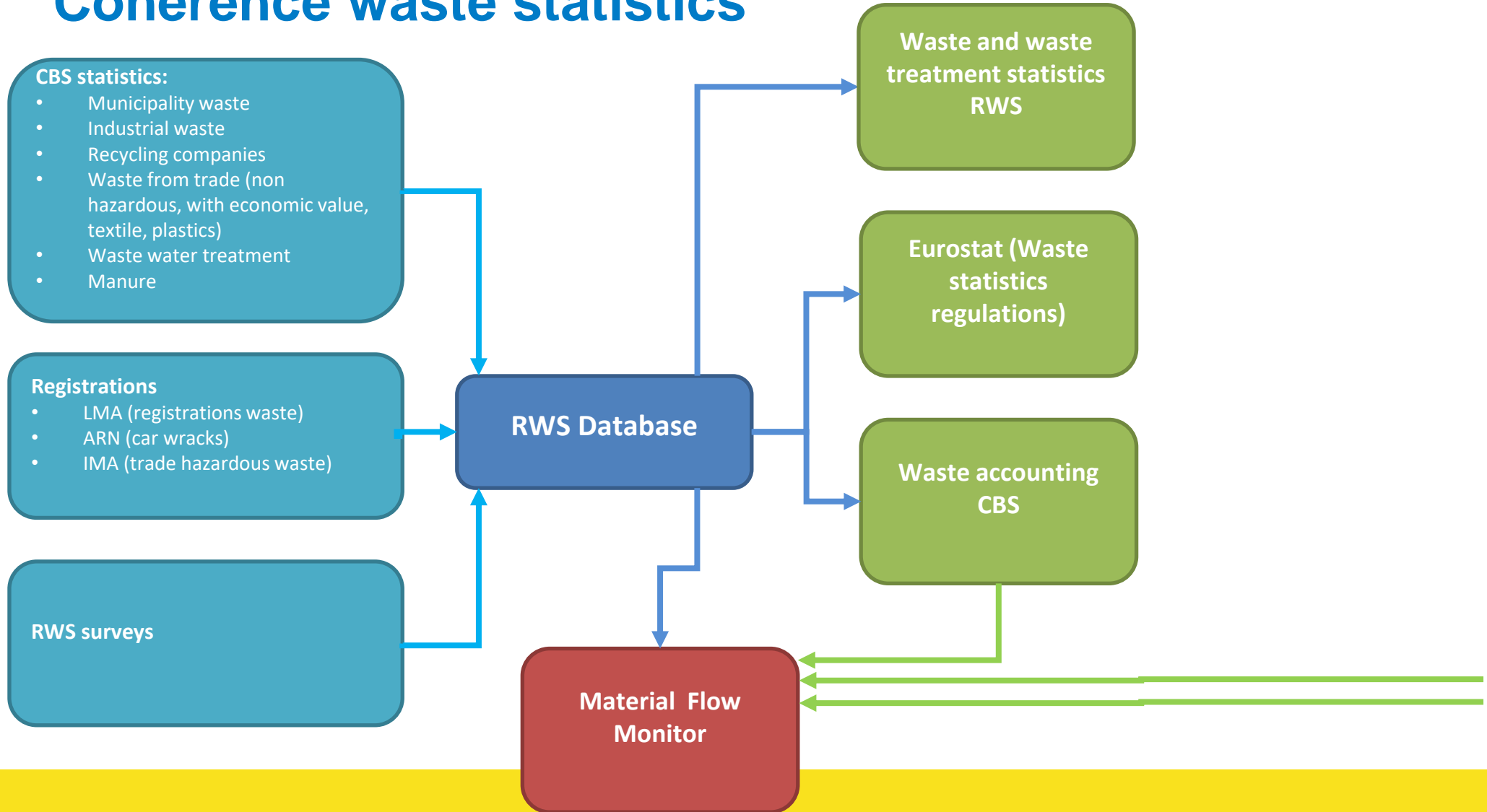


Coherence waste statistics



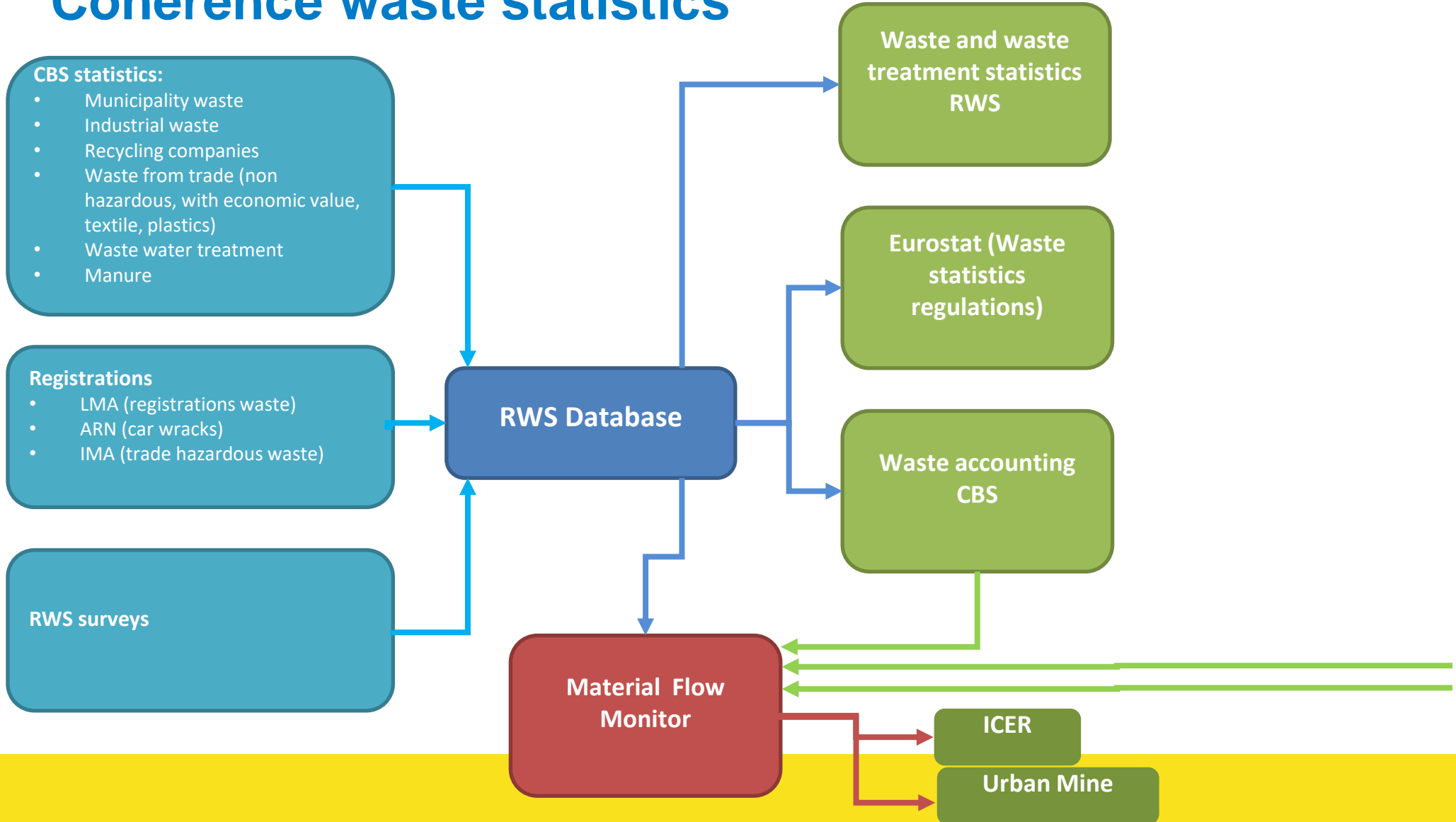


Coherence waste statistics





Coherence waste statistics



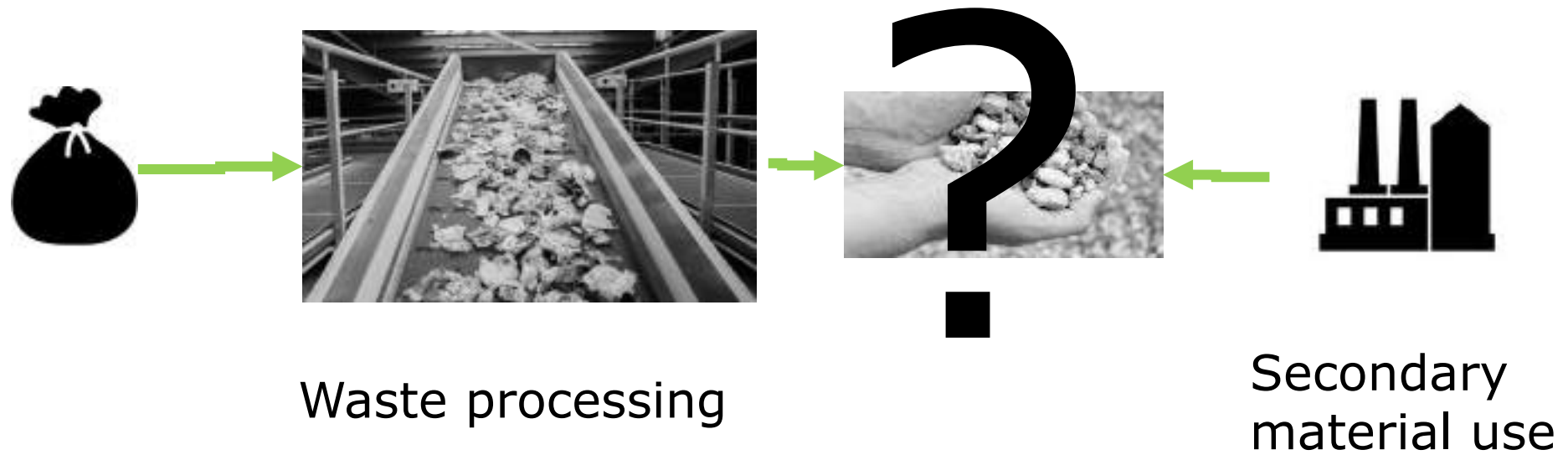


Coherence waste statistics

Aspect	RWS database	Eurostat	Waste accounting	Material Flow Monitor
Goal	Monitor waste policy Netherlands	Monitor waste streams in EU-countries	Monitor waste streams through time – connection economy & economic activities	Monitor material flow
Definition	Follows Dutch policy definition	European regulation Nr. 849/2010	All waste and by-product streams (SEEA)	All waste and by-product streams combined with non-waste streams (SEEA)
Concept	Primary Dutch waste	Primary and secondary waste	Primary waste in NL and import-export of waste	Primary and secondary waste in NL and import-export of waste
Method	Source data	Source data	Balance supply and use	Balance supply and use + balance of in- and output within economic sectors

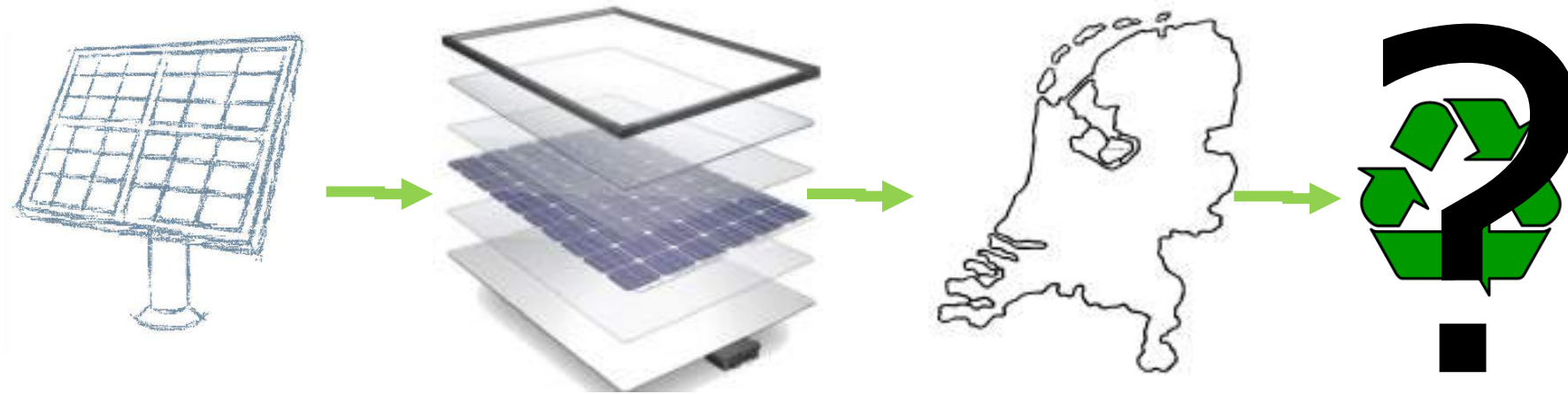


CE Future proof statistics: Secondary material use





CE Future proof statistics: Urban mine





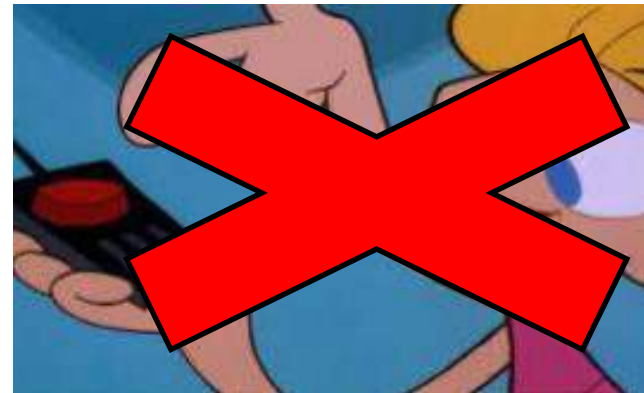
CE Future proof statistics: High quality recycling





Challenges

- Not all the waste is registered
- Not all locations of origin are registered
- What is still waste in the future?
- How do we measure it?



COIN – A Circular Options Inventory

Ton van Dril – Netherlands Environmental Assessment Agency & Netherlands
Organisation for Applied Scientific Research



PBL Netherlands Environmental
Assessment Agency

COIN, a Circular Options Inventory

Ton van Dril, 24 May 2022

Why circularity?

(EU Green deal and EU CE action plan)

“half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing”.

“The EU’s industry has started the shift but still accounts for 20% of the EU’s greenhouse gas emissions. It remains too ‘linear’, and dependent on a throughput of new materials extracted, traded and processed into goods, and finally disposed of as waste or emissions.”

Underlying considerations (CE action plan)

- The transition to the circular economy will be systemic, deep and transformative, in the EU and beyond.
 - Waste policies (incl. prevention)
 - Address toxic substances
 - Improve markets for secondary materials
 - Regulate international waste trading
 - Uptake of carbon removal and increased circularity of carbon
 - Getting the economics right (?)

> A sustainable, clean, secure, affordable supply of materials (??)

Nice goals, but how can politicians set concrete targets, implement action and monitor progress?

So we want “more circularity”:
How will this happen?

Better communication?

Market design?

Regulation?

Financial incentives?

Data and monitoring?

Innovations?

Probably a policy package is required,
but what will it achieve???



For target setting and instrumentation you need to know: **how much** can “more circularity” contribute to:

- Reducing depletion of natural sources
- Greenhouse gas reduction
- Reduce dependencies on imports
- Pollution and waste prevention
- Biodiversity

For target setting and instrumentation you need to know: how much can “more circularity” contribute to:

- Reducing depletion of natural sources
- Greenhouse gas reduction
- Reduce dependencies on imports
- Pollution and waste prevention
- Biodiversity

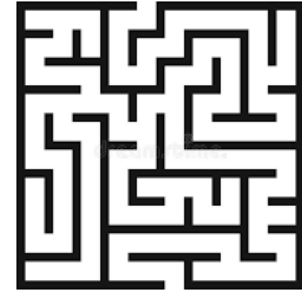
For effective and efficient policies, complete, consistent and robust data on potentials are needed!

How do we specify “more circularity” ?

1. Specify the current material flows
2. Specify the possible “more circular” alternative: **the Circular Option**
 - what, where, who, when + impact in tonne, euro, etc.
3. Calculate the impact difference



How do we prevent conceptual mazes and headaches?



1. Define statistically documented product categories
2. Underpin with statistically documented defined material categories
3. Map the nodes in the current extraction-to-end-of-life chain
4. Quantify the inputs, outputs and impacts per node
5. Collect impactful options from literature and market
6. Follow consistent R-categories (rethink, redesign, recycle, etc.)
7. Define concrete node impacts per option: tons of resource; land use types; CO₂eq; investment; actor actions
8. Further dimensions: current/2030; NL/EU/world; kilo/euro/m²

Discussion

- Is it possible or reasonably achievable?
- Can it be conceptually robust enough?
- Is this complete consistent overview already available?

We are recruiting:

- 40-50 master students for 6 month internships
- Preferred backgrounds in process technology, environment, economy, design, behavior
- intensified supervision, leading to a quality report and dataset



PBL Netherlands Environmental
Assessment Agency

COIN, a Circular Options Inventory

Join the initiative!

Contact:

Kees.Schotten@pbl.nl

Ton.vandril@tno.nl

Underlying considerations (EU CE action plan)

- Electronics and ICT: fast growing
- Batteries and vehicles: recovery of valuable materials
- Packaging: large and growing
- Plastics: recovery of valuable materials, addressing microplastics, plastic littering, marine plastic pollution
- Textiles: fourth highest-pressure category for the use of primary raw materials and water
- Construction and buildings: about 50% of all extracted material
- Food, water and nutrients: reduce the negative impacts of resource extraction and use on the environment and contribute to restoring biodiversity and natural capital in Europe

Lunch

13:00 - 14:00 | 24th May 2022

Afternoon Session

Chair: Arnout Sabbe

14:00 – 15:40 | 24th May 2022

The general framework and challenges for reuse in the construction sector for North-West Europe through the Interreg NWE FCRBE project

Elham Maghsoudi Nia – Delft University of Technology

Interreg



EUROPEAN UNION

North-West Europe

FCRBE

European Regional Development Fund

THEMATIC PRIORITY:



RESOURCE AND MATERIALS EFFICIENCY

The FCRBE Project



The general framework and challenges for reuse in the construction sector for North West Europe through the Interreg NWE FCRBE project

Elham Maghsoudi Nia
(TU Delft Partner)

Project objective: Increase by 50% the amount of reclaimed building elements being circulated in North Western Europe by 2032.

PROJECT EXTENDED!

EU FUNDING: €3.7 million
TOTAL BUDGET: €4.14 million
TIMELINE: 2018 - 2023
COUNTRIES: BE | UK | FR | NL | IE

ADDED PARTNER ORGANISATIONS:




Delft University of Technology

DATA FOR CIRCULARITY

INTERNATIONAL CONFERENCE

A collaboration of Rijkswaterstaat and Delft University of Technology



Total project budget: €4.33 million

www.nweurope.eu/fcrbe

24th-25th May 2022

1

WHAT DOES THIS ABBREVIATION STAND FOR?



“F” voor Facilitating
 “C” voor Circulation

FCRBE Facilitating the Circulation of Reclaimed Building Elements



“R” voor Reclaimed
 “B” voor Building
 “E” voor Elements

1

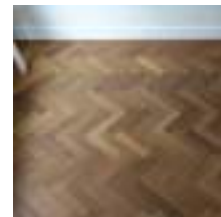
OBJECTIVES



The aim of the project is to increase the share of reuse materials and elements by reintroducing reuse practices in the sector.

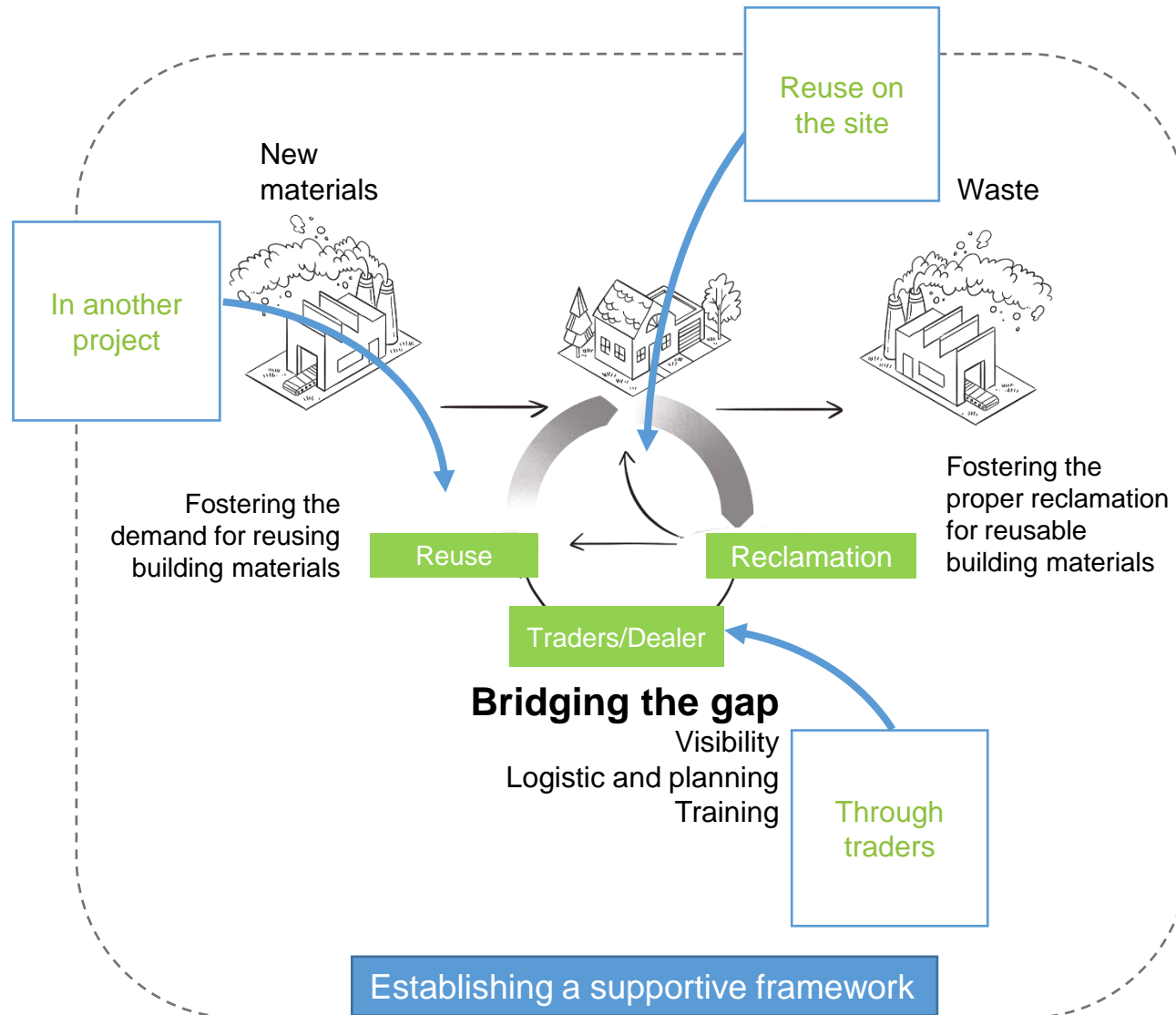


Today, less than 1% of building materials (in North-West Europe) are reused after an initial application.



1

HOW?



2

OVERVIEW OF RESULTS



Source: Leefmilieu Brussel - Project Loodtoren © F. Alardot



- How to identify reusable materials and their **reuse potential** in a building intended for **demolition**.



How to structure the information?

Inventory templates

2. Collect, structure and share the right information

Detail

General information

Identification of elements

Sheet per element

RECLAMATION INVENTORY	
GENERAL INFORMATION	
REVISION:	
REVISION FOR:	
DATE OF THE LAST REVISION:	
REVISION DOCUMENTS:	
CONTRACT NUMBER:	
NAME:	
ADDRESS:	
ADDITIONAL INFORMATION (optional):	
CLIENT INFORMATION:	
NAME:	
ADDRESS:	
ADDITIONAL INFORMATION (optional):	
USER ID (ADMINISTRATOR INFORMATION):	
NAME:	
ADDRESS:	

RECLAMATION INVENTORY															
PRIMARY INFORMATION															
Identification			Picture	Quantity		Dimensions			Mass		Total			Loca	
ID number	Element group	Element name		ans.	unit	width	length	height	unit	ans.	unit	total surface	total volume	total mass	
A	Interior doors			168	pcr										
A1		door THEUMA (left opening)		51	pcr	92	54	211	cm	-20	kg	/	/	2350	Buildin
A2		door THEUMA (right opening)		52	pcr	92	34	211	cm	-50	kg	/	/	2600	Buildin

Element identification	
ID number:	
Element name:	
Element description	
	
Element data	
Brand:	
Model:	
Material:	
Color:	
Finish:	
Weight:	
Volume:	
Surface:	
Environmental benefits	
Additional information	
Required applications	
Comments	
Download data (optional) / printout (optional)	



❖ Collecting sheets on materials

36 chips that cover a wide range of materials:

- How can they be recovered and reused:
- Guideline for reclamation / reuse
- what are their known characteristics,
- what is their availability on the market,
- what are their environmental benefits, ...

Version: December 2021.

Available in FR, NL and EN.

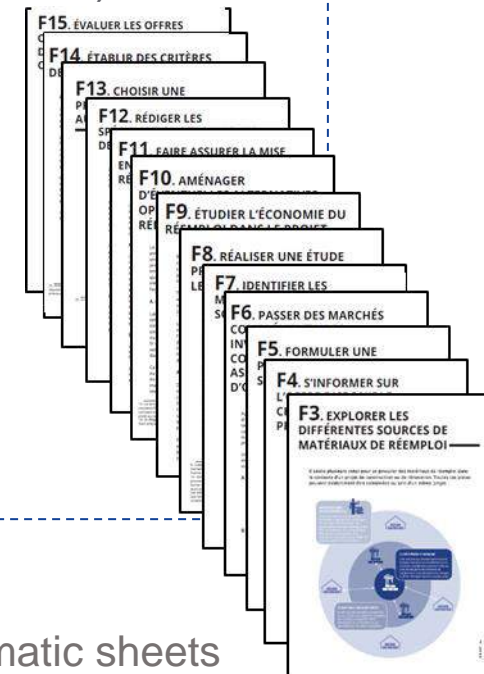


Stimulate the reuse sector Public tenders are one of the key leverages to stimulate innovative practices

How to integrate reuse ambitions into procurement procedures for construction and renovation projects (including public procurement).

Version: November 2021.

Available in FR, NL and EN.



Thematic sheets

Find Traders

The FCRBE project identified more than 1,000 companies, mainly SMEs, active in the field of recovered building materials. The results are available in two online business directories for the Benelux and England.

Source: Leefmilieu Brussel - Project Loodtoren © F. Alardot

Dealers in reuse materials Originally, 2 websites:

Salvo and Opalis

- In the Uk and Ireland (**Salvoweb.com**)



- In Belgium, France and the Netherlands



(**Opalis.eu**)

TOTAL in **Be Ne Lux**:

→ 287 registered traders

France

→ 242 included traders

→ 185 visited traders

Resources for reuse

The reuse of building materials can raise a number of questions and challenges. To provide answers, the FCRBE project has developed a range of information sources



The **FutuREuse** library comprises 7 publications dealing with questions related to the reuse of building materials.

➔ <https://futureuse.co.uk/>



Truly Reclaimed - the new label for effectively recovered products



<https://trulyreclaimed.org/>

A roadmap to promote re-use in the construction sector



Project website: <https://nweurope.eu/FCRBE>

Version: November 2021.

Available in EN.

Target audience: government agencies, administrations, policy makers, ...

➤ **The road ahead for the next two years: FCRBE capitalisation**

➤ **Developing an innovative method to:**

- Define and evaluate targets for re-use
- Communicate about realized "reuse performance"



Develop a method to:

Agree on what is measured (stock vs. flows, supply vs. disposal of reuse materials) and the appropriate units of measurement linked to the environmental benefits.



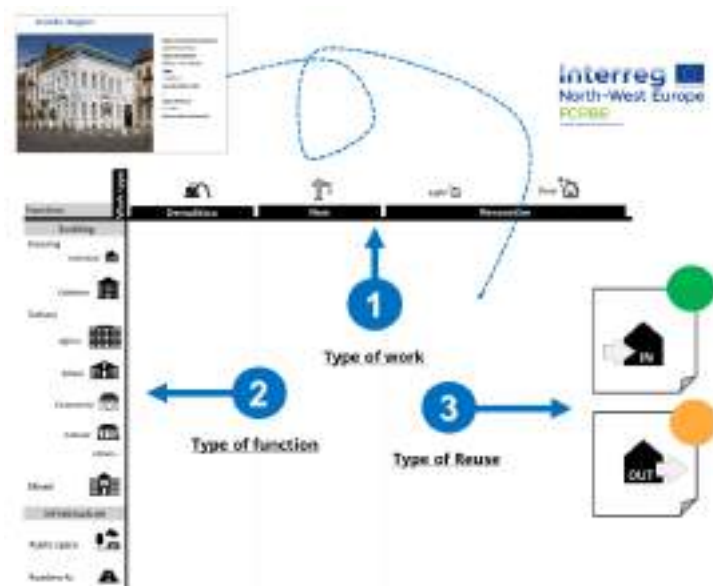
Analysis ~30 projects carried out > Setting indicative targets for different building typologies



➤ **Testing in real projects**

SETTING A TARGET FOR REUSE - METHOD

➤ Identify typologies for analysis



- 1 method
- 1 table of indicative objectives
- 4 tests in the context of ongoing real projects
- 3 interregional study trips for public authorities



- 2 Parallel groups
- Possible discussion



List of Projects

➤ Classification by **function**:

- 10 Collective housing
- 9 Individual housing
- 8 infrastructure
- 18 offices
- 14 Public facilities
- 2 Shops
- 5 Warehouses

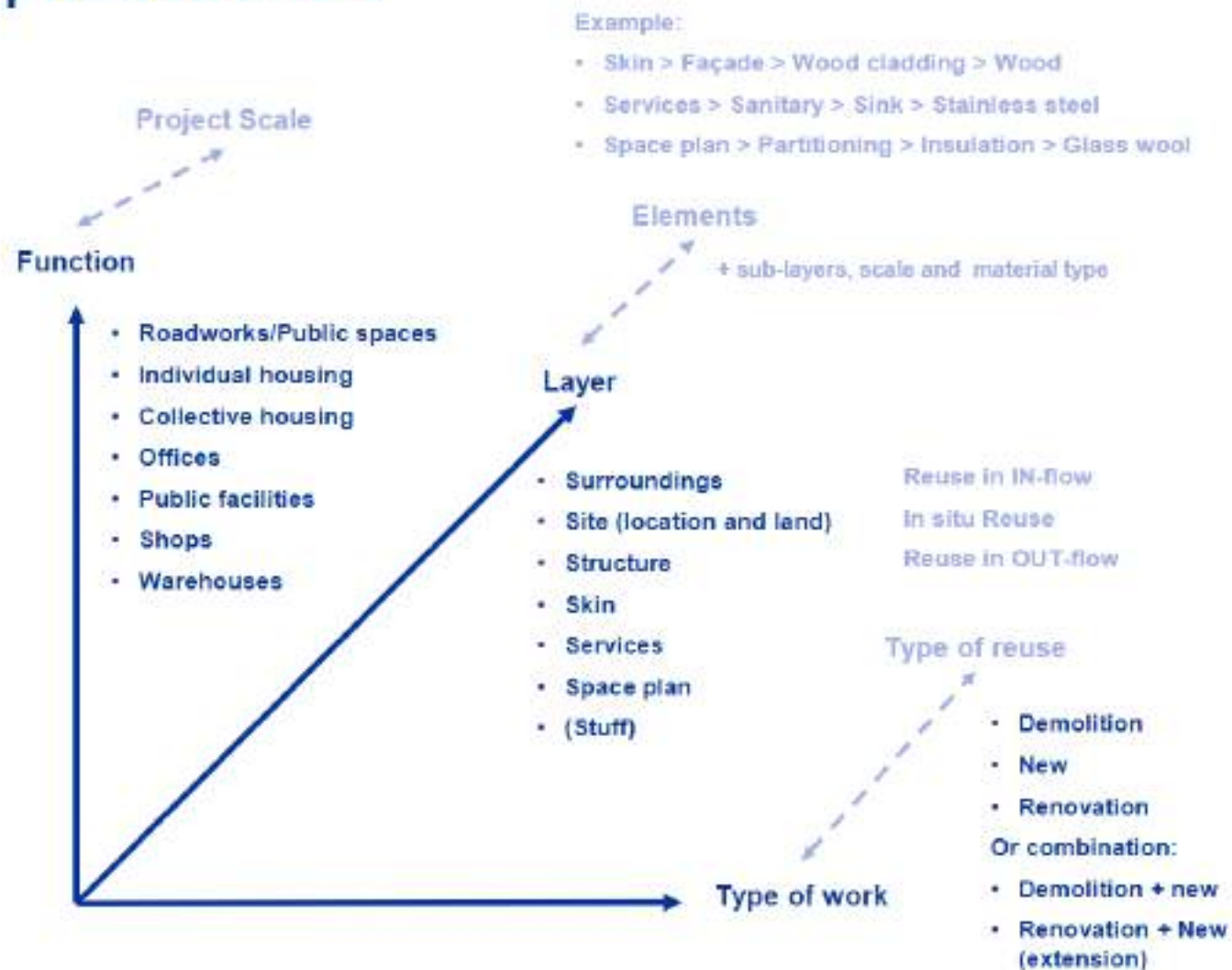
➤ Classification by **layer**:

- 9 SITE
- 13 STRUCTURE
- 25 SKIN
- 10 SERVICES
- 30 SPACE
- STUFF?Furniture?

➤ Classification by type of **building works**:

- 2 Demolition
- 8 Demolition + New
- 22 New
- 30 Renovation
- 6 Renovation + New (Extension)







Proposed structure



Proposed definition

Layer/Batches

TABLE 1
Éléments

	(0-) <i>Terrains, etc.</i>
	(1-) <i>Sol, infrastructure</i>
	(2-) à (3-) <i>Éléments primaires & secondaires de la superstructure</i>
	(4-) <i>Finitions</i>
	(5-) à (6-) <i>Installations techniques</i>
	(7-) à (8-) <i>Équipements (fixes et mobiles)</i>
	(9-) <i>Éléments extérieurs au bâtiment</i>

- Site
- Structure
- Skin
- Services
- Space plan
- (furniture ?)

Comparison with BB/SIB classification (used in Tolem and MPG). Is it compatible or not?!



BB/SFB classification

SETTING A TARGET FOR REUSE - METHOD

Example of deliverable: table of indicative target

REUSE IN						
	Site	Structure	Skin	Service	Space plan	Furniture
Individual housing						
Collective housing						
Offices						
infrastructure						
...						

REUSE IN SITU							
	Site	Structure	Skin	Service	Space plan	Furniture	
Individual housing							
Collective housing							
Offices							
infrastructure							
...							

REUSE OUT						
	Site	Structure	Skin	Service	Space plan	Furniture
Individual housing	-	-	15%	10%	2%	-
Collective housing	-	0,5%	20%	5%	8%	-
Offices	-	1%	-	5%	15%	30%
infrastructure	10%	-	-	-	-	-
...						


Example of deliverable: project descriptive sheet

Project Name

A 3rd page could be considered if additional information/ indicators are available

Table with reuse analysis information (layer, elements, quantities, destination/provenance, etc.)

Maison Vignette Reuse - IN



Characteristics

Situation: Brussels, Belgium

Function: Individual Housing

Scale: 355 m³

Type of intervention: Construction (New Building)

Date: 2015-2020

Types of reuse:

In In situ Out

Layers/batches concerned by reuse:

Infrastructure

Structure Skin

Services Space Plan


Furniture

Type of Reuse

Maybe interesting to add the type of work?

Summary of project characteristics


Maison Vignette Reuse - IN



Context and Reuse approach

This is the construction of a new single-family house. One of the main focuses of the project is the choice of materials selected to limit the impact of the construction on the environment (locally produced, bio-based or recycled materials).

The decorative facade is made of large floor-to-ceiling bricks supplied by a local user of reused bricks. Some of the interior finishes are also made from reused materials: the tiles on the ground floor and in the bathroom, and the tiles in the bedrooms. This also came according to the expertise and advice found at the time of finishing, via contact with specialists in the field of recovery or the reuse of materials from other construction projects.



Brief description of the context and approach to reuse (initial ambitions, motivation, framework, etc.)

Layer/Batch	Elements	Type	Provenance/destination	Quantities (kg)	Proportion to Layer/batch
Skin	Facade Bricks	In floor	Local reuse brick maker	3000 bricks	7
Structure	Landing	In floor	Local		
Space plan	Blue-green decorative tiles	In floor			

VISIT US AT



Elham Maghsoudi Nia

TU Delft partnership

FCRBE

 + 31 613 370 064

 e.maghsoudinia@tudelft.nl

...Any suggestion or comment



The Flemish MATerials Information System

Koen Smeets – OVAM



MATIS

The Flemish MATerials Information System



Flanders
State of
the Art



Flanders
State of
the Art

Koen Smeets
OVAM Team research and monitoring

Data for Circularity
24/05/2022

WE MAKE
TOMORROW
BEAUTIFUL
OVAM

Content

- ▶ Background
- ▶ Objectives of MATIS
- ▶ MATIS and the material cycle
- ▶ Who reports in MATIS
- ▶ How to report in MATIS
- ▶ Preconditions to roll out MATIS reporting
- ▶ Results and challenges

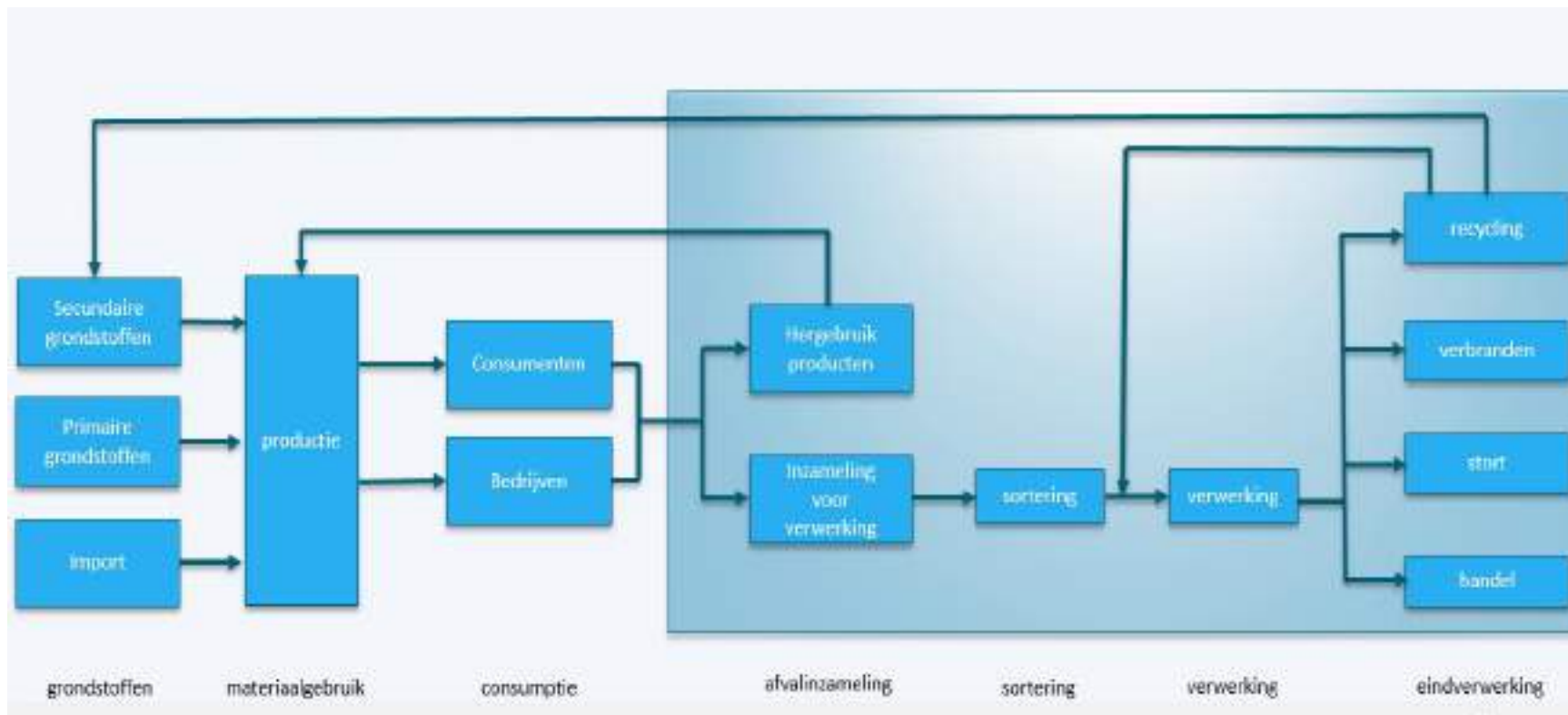
Background

- ▶ Current collection of waste data
 - Household waste
 - × All municipalities
 - × Production of municipal waste statistics
 - Industrial waste
 - × Sample of waste producers
 - × Statistical analysis of data
 - × Production of industrial waste statistics
- ▶ Current calculation of municipal waste recycling
 - ‘Separate collection in order to recycle’ is calculated as ‘recycled’

Objectives of MATIS

- ▶ EU framework directive on waste
Decision 2019/1004
New calculation method for recycling of municipal waste
- ▶ Flemish government asks to increase traceability of waste transports
- ▶ Waste management policy changes into circular economy policy : need to calculate the closure of material cycles

MATIS and the materials cycle



MATIS and the materials cycle

- ▶ One centralized system that is suitable to respond to the different European reporting obligations
 - WSTATR, FRAMEWORK DIRECTIVE, PRTR, Municipal waste indicators,...
- ▶ Digitally fed by professional waste collectors and treatment facilities
- ▶ Automated data validation based on mapping of incoming and outgoing waste and material streams
- ▶ Transparency and traceability
- ▶ Start with municipal waste (2022) and expand to all wastes by 2025 and soil materials (2027)

Who reports in MATIS

- ▶ Waste collectors
 - Origin of the waste
 - × Identification of each collection point for industrial waste
 - × Identification of municipality of origin for household waste
 - Waste type
 - Destination of the collected waste
- ▶ Licensed waste treatment facilities
 - Incoming waste/mat streams (origin, waste type, treatment activity)
 - Outgoing waste/mat streams (destination, waste type)
 - Internal waste/mat streams going to final treatment (recycling, composting/fermentation, landfilling, incineration)

How to report in MATIS

Secure login with eID

- ▶ Report manually each row of data
- ▶ Load CSV-files
- ▶ API for machine-machine-interactions

Preconditions to roll out MATIS

- ▶ Return on investment for reporting companies
 - (Market) reports for companies
- ▶ Added value for waste producers
 - Provide access to their own data supplemented with tailor-made tips
- ▶ Lower administrative burden private sector
 - Less companies involved, digitalisation pays off
- ▶ Compatibility with different ERP-systems and systems for digital transport documents
 - Data format based on legal waste registers
- ▶ Data confidentiality and secure data management
 - Data management system with external audit, non disclosure declaration
- ▶ Legal basis for data collection, management and reporting
 - Waste decree in Flanders and decision of the Flemish government

Results and challenges

- ▶ First data collection on 2021 completed on March 30 2022
- ▶ Data is transferred to a data platform for analysis
- ▶ Analysis has to start shortly

- ▶ Important challenges
 - Unique identification of companies and their local sites
 - Despite a legal obligation to keep digital waste registers since 2012, digitalisation is problematic for small waste management companies
 - Units (volume/weight, kg/tonnes,...)



Thanks for your attention

Questions?

OVAM

Department : waste and materials
management

Team : Research and Monitoring

e-mail : onderzoek-monitoring@ovam.be

Stationsstraat 110

B-2800 Mechelen

WE MAKE
TOMORROW
BEAUTIFUL

OVAM

Theme B – Harmonising Data Reporting

Digital Infrastructures for Circular economy Monitoring: Cross -border perspective

Boriana Rukanova – Delft University of Technology



DIGITAL INFRASTRUCTURES FOR CIRCULAR ECONOMY MONITORING

CROSS-BORDER PERSPECTIVE

Dr. Boriana Rukanova

ICT Section, Department Engineering Systems and Services,
Faculty of Technology, Policy and Management
Delft University of Technology

*Data for Circularity International Conference, 24-25 May, 2022
Delft, The Netherlands*

Circular Economy (CE)

- **Sustainability and Circular Economy high on the political agenda**
 - Paris Agreement, European Green Deal
- **From**
 - A linear model with focus on take-make-dispose (waste)
- **To**
 - A circular model with focus on aspects such as *reuse* and *recycle*, use of *secondary raw materials*, limiting the environmental impact and *reducing* (eliminating) *waste*
- **Example of Targets***
 - By 2030- use **50% fewer primary resources** (minerals, metals and fossil fuels)
 - By 2050- a **waste-free economy** that runs entirely on reusable raw materials.

In the media...



JOURNALISTIEK , OSINT , PLASTIC , PODCAST

NRC Handelsblad: Nederlands plastic afval gedumpt in Turkije

Need for better visibility and transparency for circular economy monitoring in cross-border trade flows

Monitoring CE

- **Instruments to stimulate sustainability and Circular Economy**
 - E.g. Subsidies, taxes, penalties
- **However**
 - **Measures and instruments** are **prone for misuse** unless proper **monitoring** is put in place
 - Difficult to follow what happens with the goods when they are out of the EU
 - CE flows **lack visibility** needed for governments and other actors (e.g. auditing firms, banks offering green loans) to be able to properly monitor and control these

The need for transparency

- **It is likely that more differentiation will take in the future, for:**
 - *Stimulating* trade in sustainable and circular products and
 - *Discouraging* flows of products that are less circular and sustainable
 - E.g. Carbon Border Adjustment Measure (CBAM)
 - HS codes/ nomenclatures can be used for the differentiation
- **CE monitoring requires finer level of transparency and visibility**
 - Visibility on **material composition** and the **raw materials** used
 - And assurances/ visibility thereof
 - Visibility on the **production, recycling** and **reuse processes**

IT innovations and data sharing

IT innovation on the government side



Data Analytics



Innovation network for Customs professionals



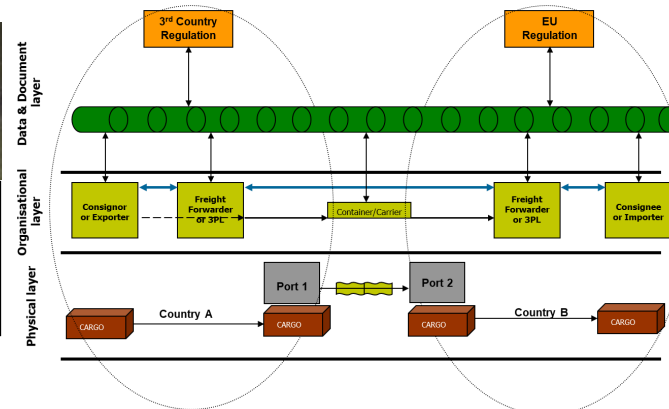
Data Analytics and AI– Detection Technology– Laboratory Equipment

IT innovation on the business side (ITAIDE, CASSANDRA, CORE)

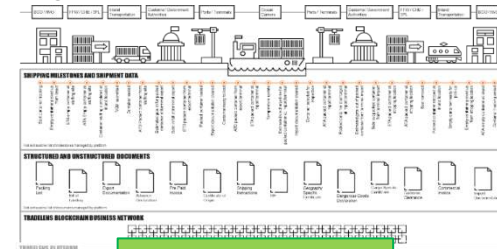
Digital trade infrastructures and platforms for **VOLUNTARY** business-government information sharing

(Data pipeline concept from ITAIDE, CASSANDRA, CORE)

IoT devices
Physical integrity (e.g. smart container seals)

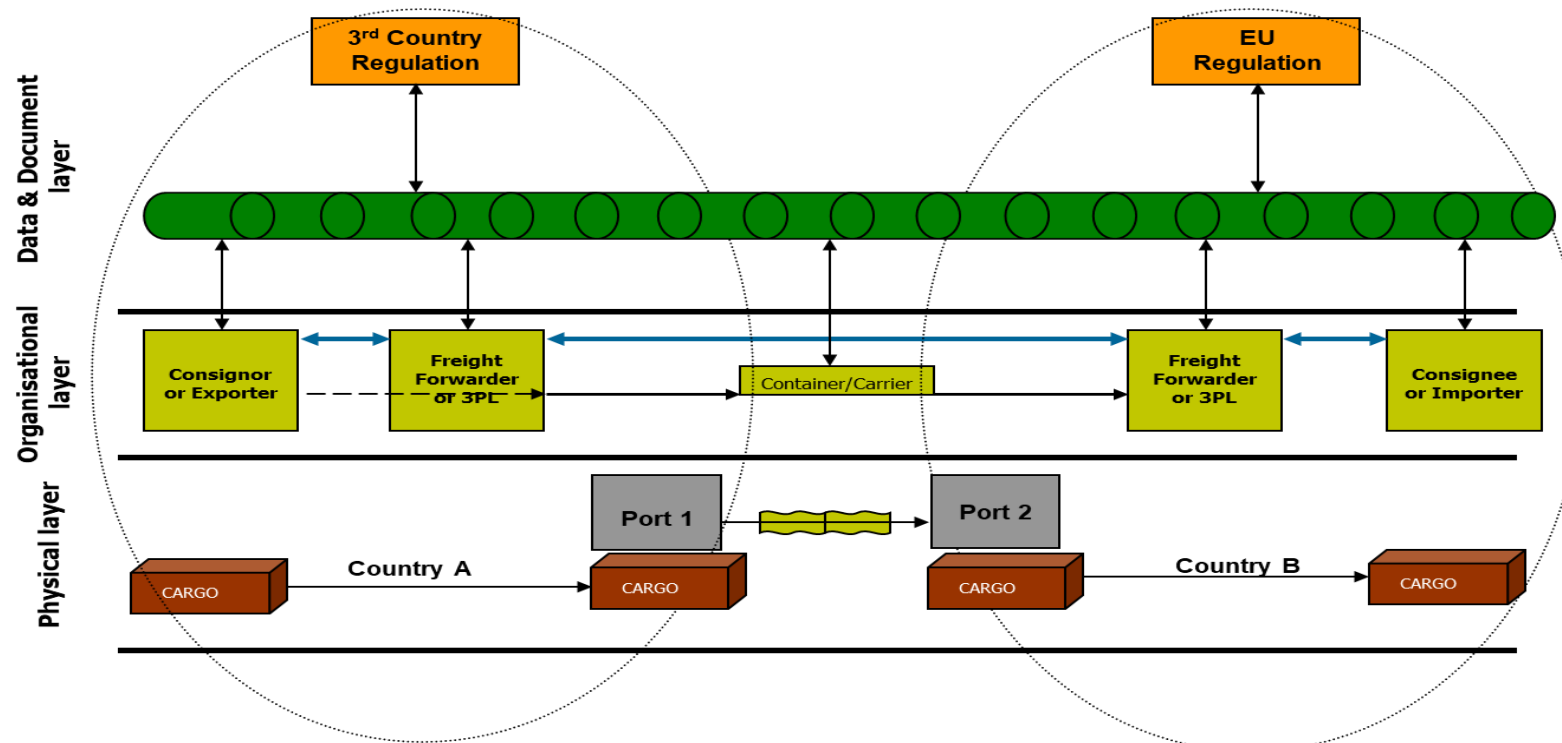


e.g. The blockchain-enabled TradeLens platform of IBM and MAERSK
© IBM and MAERSK



Blockchain

Data Pipeline (“Internet of logistics”)

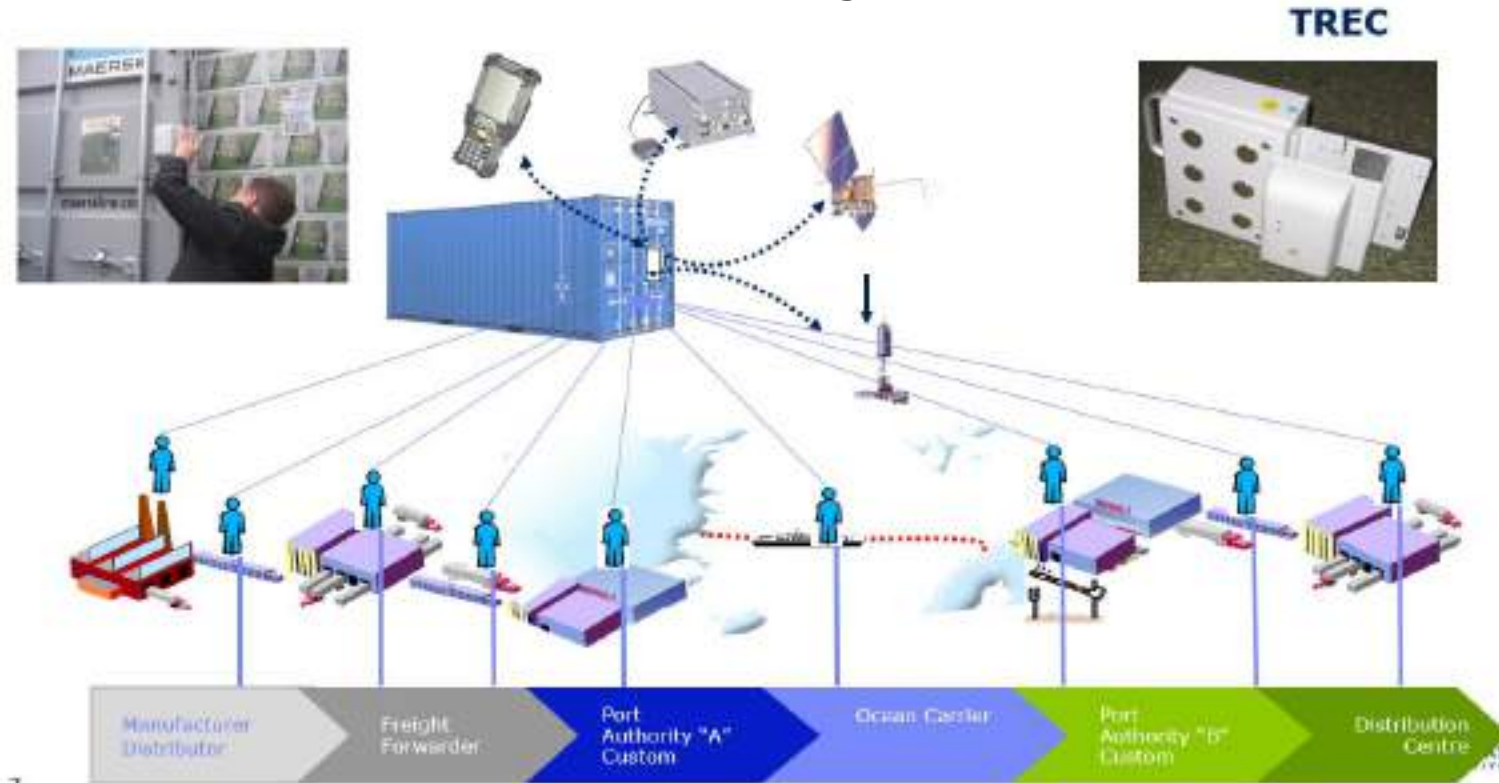


Conceptualization of the data pipeline (by David Hesketh and Frank Heijmann) (see e.g. Hesketh, 2010; van Stijn et al., 2012)

- Customs declaration notoriously inaccurate/fraud
- Cross-validate with extra business data
 - e.g. invoice, packing list, origin/food/product safety certificates etc.
 - Customs use data pipeline to collect 'data from the source'
 - Improve supply chain visibility

Pilots with Heineken (ITAIDE projects)

- **Export of Beer to US and UK**
- **Dutch Customs, UK Customs and US customs**
- **IBM smart container seals and data sharing infrastructure**



FloraHolland Demo (CORE project)

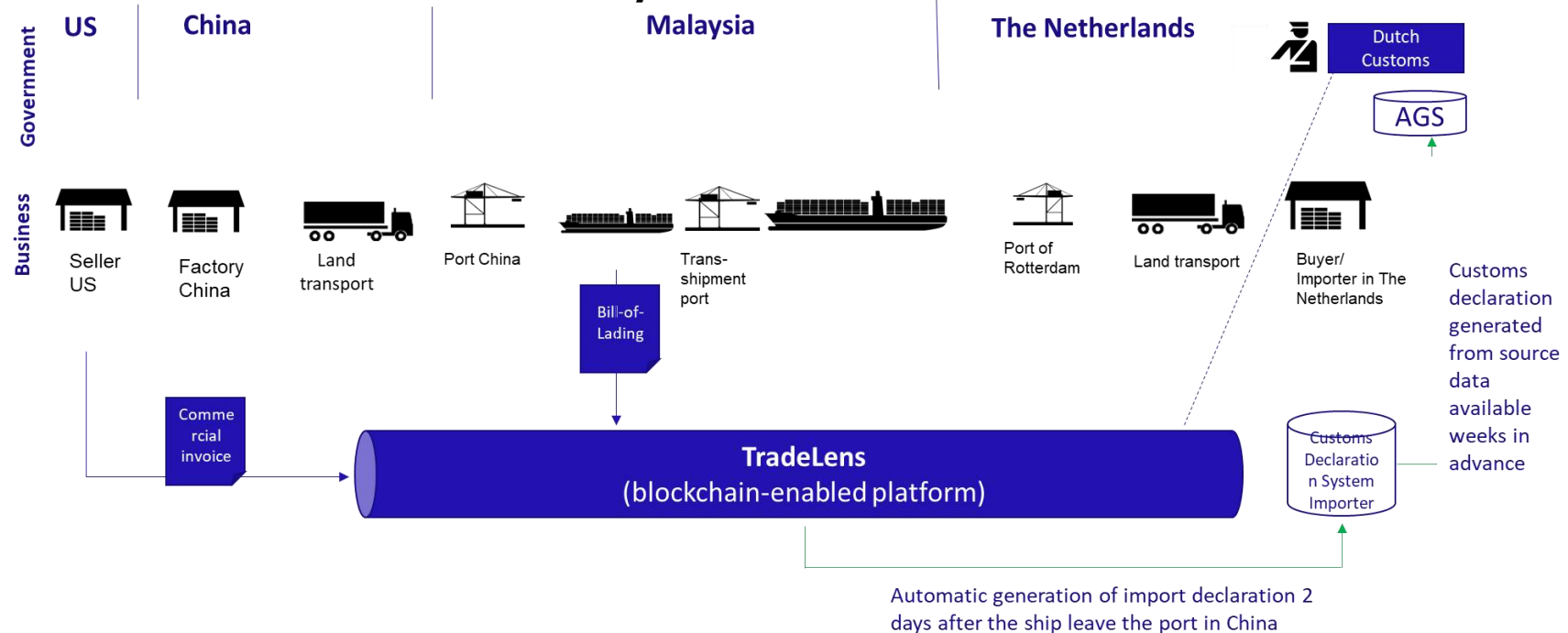
Import of Flowers into the Netherlands from Kenya

- Most of the roses on the EU market are grown in Kenya and Ethiopia
 - Shipped by FloraHolland from Kenya to the Netherlands (90 tons/year, 2 flight/day)
 - Distributed from Netherlands to all over Europe
 - Now 100% shipped as air cargo
 - Pilots also with reefer containers via sea
- Studied in EU research project CORE (with **Dutch Customs** and **Phytosanitary Inspection** (NVWA))
- Sharing on **phyto-sanitary certificates** and **pro-forma-invoice** with Dutch Customs
- Collaboration and data sharing authorities and businesses in Kenya and sharing data with NVWA and Customs in the Netherlands



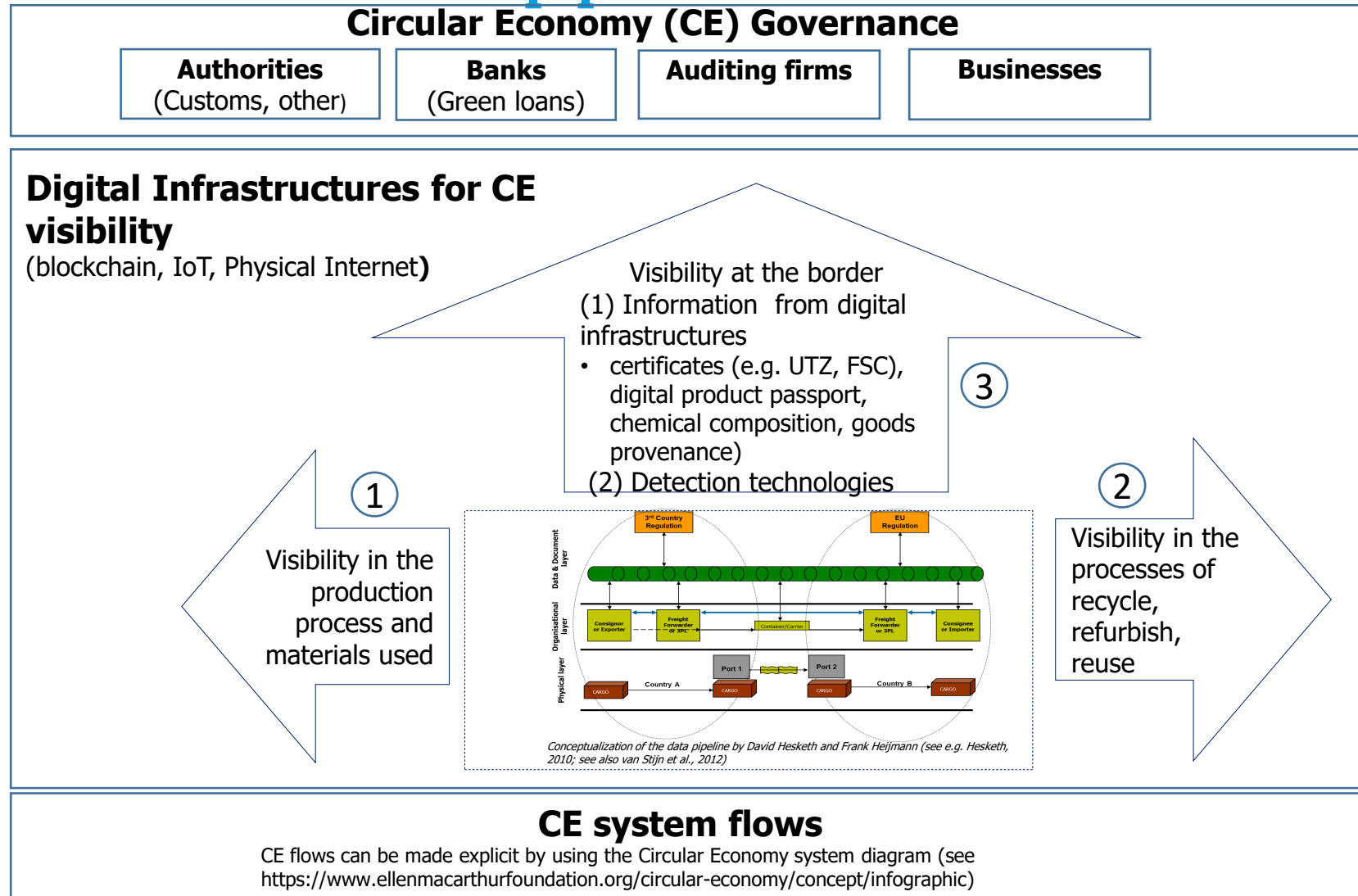
Importing Tires from China to the Netherlands using TradeLens: PROFILE Project

- **Automated generation of import declaration earlier in advance using data available via TradeLens**
- **Customs can benefit from early access to commercial data via TradeLens**



Digital Infrastructures for CE Governance**

Extended data pipeline for CE



International trade and CE

- **International trade and sustainability and CE**
 - **International trade** will be affected by measures to achieve sustainability and CE goals
 - When **borders are crossed**, customs will continue to play an important role
 - E.g. CBAM, other measures will be introduced in the future
- **Innovations that customs has developed with trade**
 - **Are relevant** for CE monitoring
 - E.g. business **digital trade infrastructures** and voluntary sharing of information; **Scanning and detection technologies**; **Linked data** and **data analytics** to link **image and declaration data**
 - **But**
 - Will need to be expanded to meet the needs for sustainability and CE
- **Next steps**
 - Conduct **further research** and **piloting** with the concept of extended data pipeline for CE monitoring
 - Multiple (blockchain) data sharing solutions (federation)
 - Governance issues related to data access across multiple data sharing infrastructures

Collaborations

- **Key collaborators at TPM and TUD**
 - TPM at TUD (Prof.dr. Yao-hua Tan; Dr. Jolien Ubacht; Dr. Sélinde van Engelenburg; Prof.dr.ir. Marijn Janssen)
 - CE Lab at TPM
 - Architecture (TUD)- Sultan Çetin
- **Examples of existing collaborations on CE monitoring with government and business**
 - Government side
 - Dutch Customs;
 - Ministry of Infrastructure and Water Management
 - TNO
 - PEN-CP- EU-network of customs innovation professionals
 - PEN-CP Innovation Network for Customs Practitioners
 - Annual study 2022 on Green Customs
 - Dublin workshop on Green Customs (April 2022)
 - Green Customs Global conference of the World Customs Organization 27-28 June, 2022, Brussels <https://na.eventscloud.com/website/35881/>
 - Technology providers
 - IBM platforms (TradeLens, FoodTrust); Vinturas
 - Companies in international supply chains
- **We are interested in new collaborations for expanding our research in the context of circular economy monitoring**

References

- Rukanova, B. D., Tan, Y., Hamerlinck, R., Heijmann, F., & Ubacht, J. (2021). **Extended Data Pipeline for Circular Economy Monitoring**. In J. Lee, G. V. Pereira, & S. Hwang (Eds.), Proceedings of the 22nd Annual International Conference on Digital Government Research: Digital Innovations for Public Values: Inclusive Collaboration and Community, DGO 2021 (pp. 551-553). [3463752] (ACM International Conference Proceeding Series). Association for Computing Machinery (ACM). <https://doi.org/10.1145/3463677.3463752>
- Rukanova, B. D., Tan, Y., Hamerlinck, R., Heijmann, F., & Ubacht, J. (2021). **Digital Infrastructures for Governance of Circular Economy: A Research Agenda**. In EGOV2021 – IFIP EGOV-CeDEM-EPART 2021 Digital Government Society.
- Kofos, A., Ubacht, J., Rukanova, B. D., Korevaar, G., Kouwenhoven, N., & Tan, Y. (2022). **Circular economy visibility evaluation framework**. Journal of Responsible Technology, 10, [100026]. <https://doi.org/10.1016/j.jrt.2022.100026>
- Cetin, S., Rukanova, B. D., De Wolf, C., Gruis, V. H., & Tan, Y. (2022). **A Conceptual Framework for a Digital Circular Built Environment: The Data Pipeline, Passport Generator and Passport Pool**. In: S. Shahnoori, & M. Mohammadi (Eds.), The state of circularity: The content of "the 2nd International Conference on Circular Systems for the Built Environment" (pp. 97-106). Technische Universiteit Eindhoven.
- Rukanova, B. Medaglia, R., Tan, Y.H. (2022, forthcoming). **Digital Government and the Circular Economy: Towards an Analytical Framework**. Paper accepted for DGo'2022
- Van Engelenburg, S., Rukanova, B., Ubacht, J., Tan, S.L., Tan, Y.H., Janssen, M. (2022, forthcoming). **From requirements to a research agenda for governments governing reuse of critical raw materials in the circular economy**. Paper accepted for DGo'2022
- Rukanova, B., Mannisto, T., Hintsä, J., Tan, Y.H., Slegt, M., Heijmann, F. (2022 DGo short paper). **A High-Level Framework for Green Customs and Research Agenda**, (accepted for Dgo'2022).
- Kräussl, Z., Baida, Z., Post, S., Rukanova, B., Tan, Y.H. (2022). **Digital Infrastructures for Monitoring Circular Economy Investments by Financial Institutions and Government: A Research Agenda** (accepted for IFIP EGOV-CeDEM-ePart2022 (EGOV2022))

Thank you!

Dr. Boriana Rukanova,

PEN-CP Project, <https://www.pen-cp.net/>

Department Engineering Systems and Services

Informatie- en Communicatie Technologie (ICT)

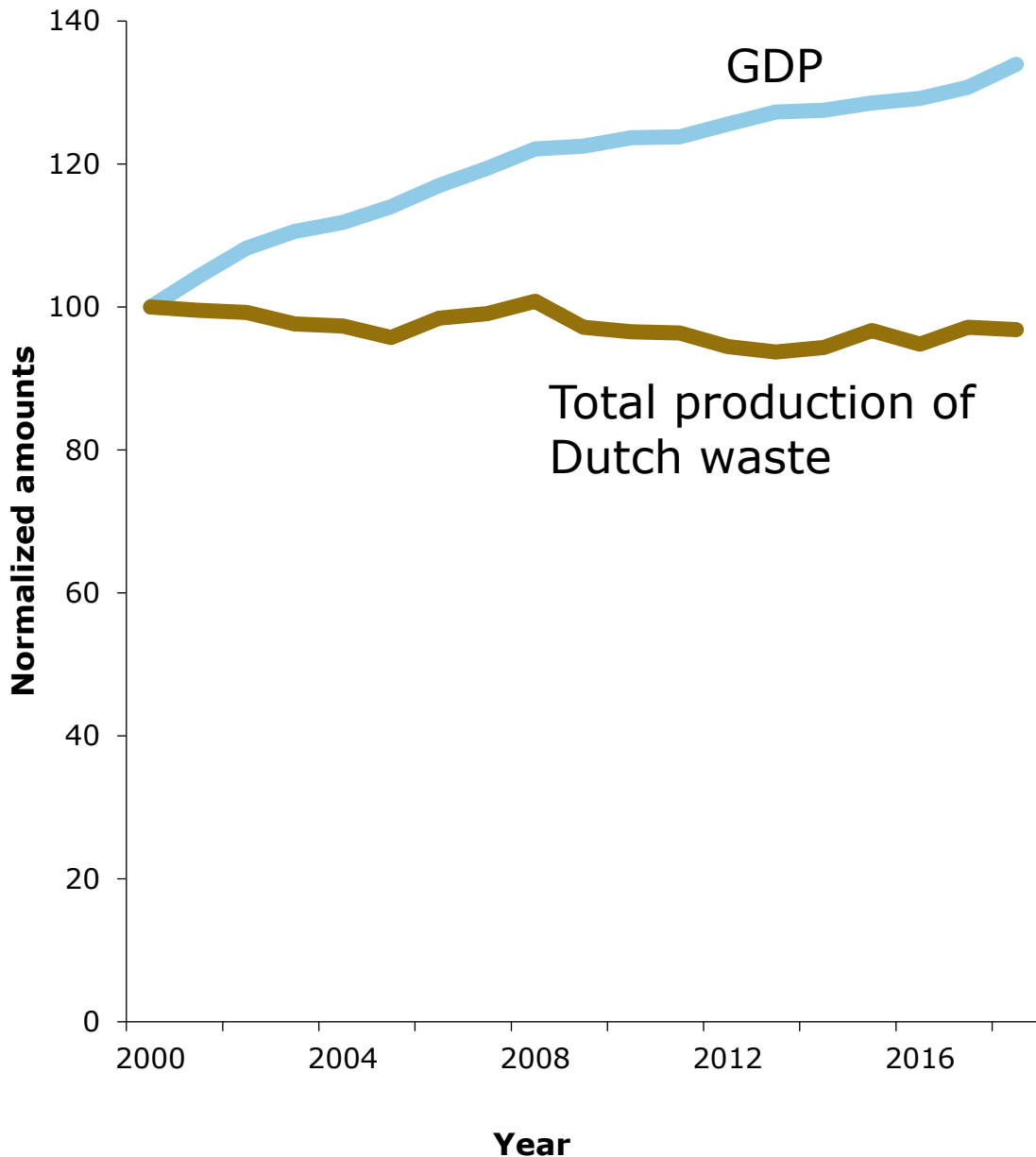
Faculty of Technology, Policy and Management (TBM)

TU Delft

E-Mail: b.d.rukanova@tudelft.nl

Waste Reporting in the Netherlands

Juliane Kupfernagel & Bas van Huet



Rijkswaterstaat
 Ministry of Infrastructure
 and Water Management

Waste reporting in the Netherlands

What do we (not) know? And what are the challenges?

Juliane Kupfernagel and Bas van Huet
 24-05-2022



Why and for who?

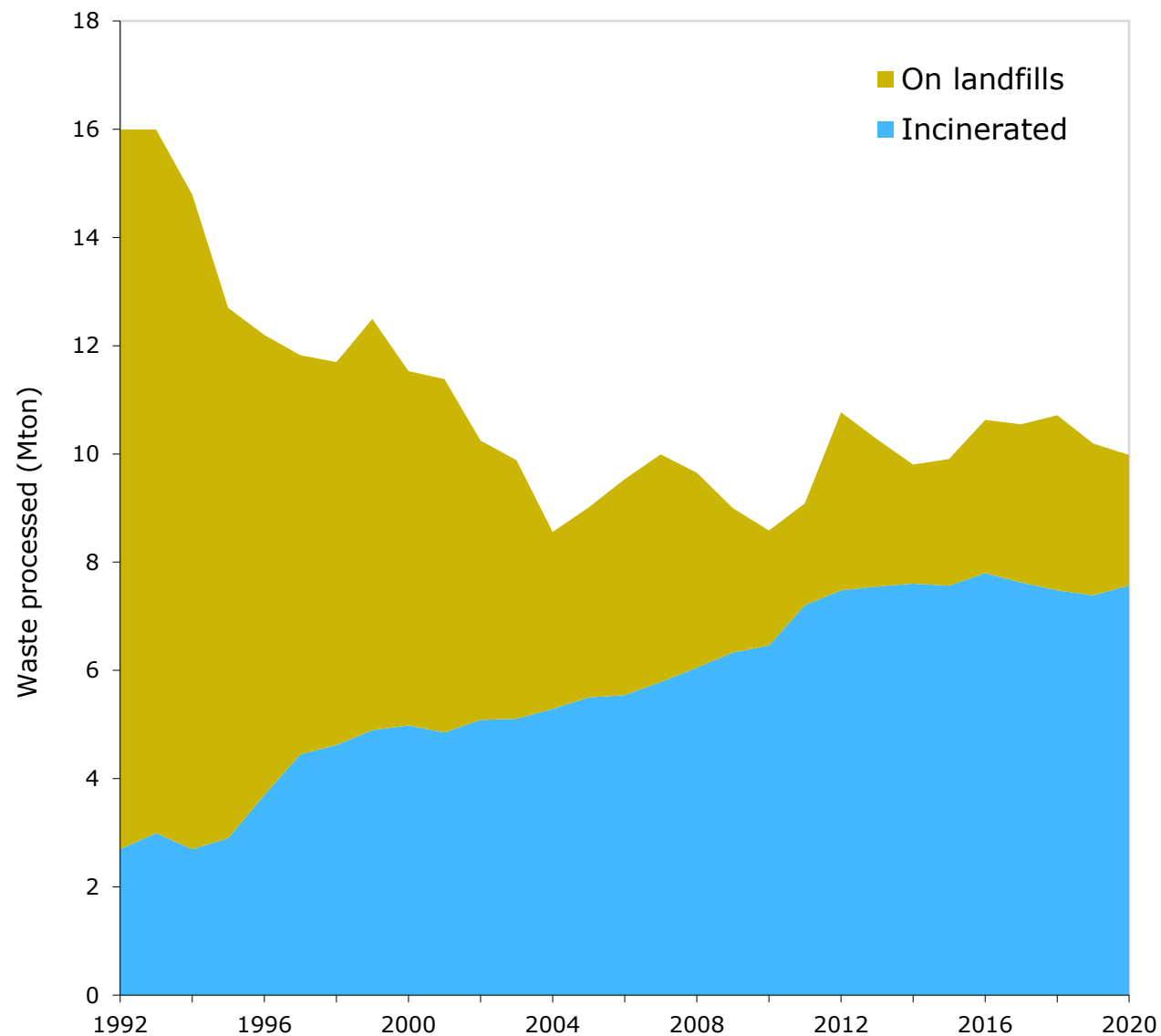
- Reporting responsibility
 - EC/ Eurostat
 - Basel convention
- Policy advice within the Netherlands
 - Evaluating measures
 - Signaling trends and new waste streams



What is not circular?

How much waste (in Mt) is incinerated and landfilled in the Netherlands?

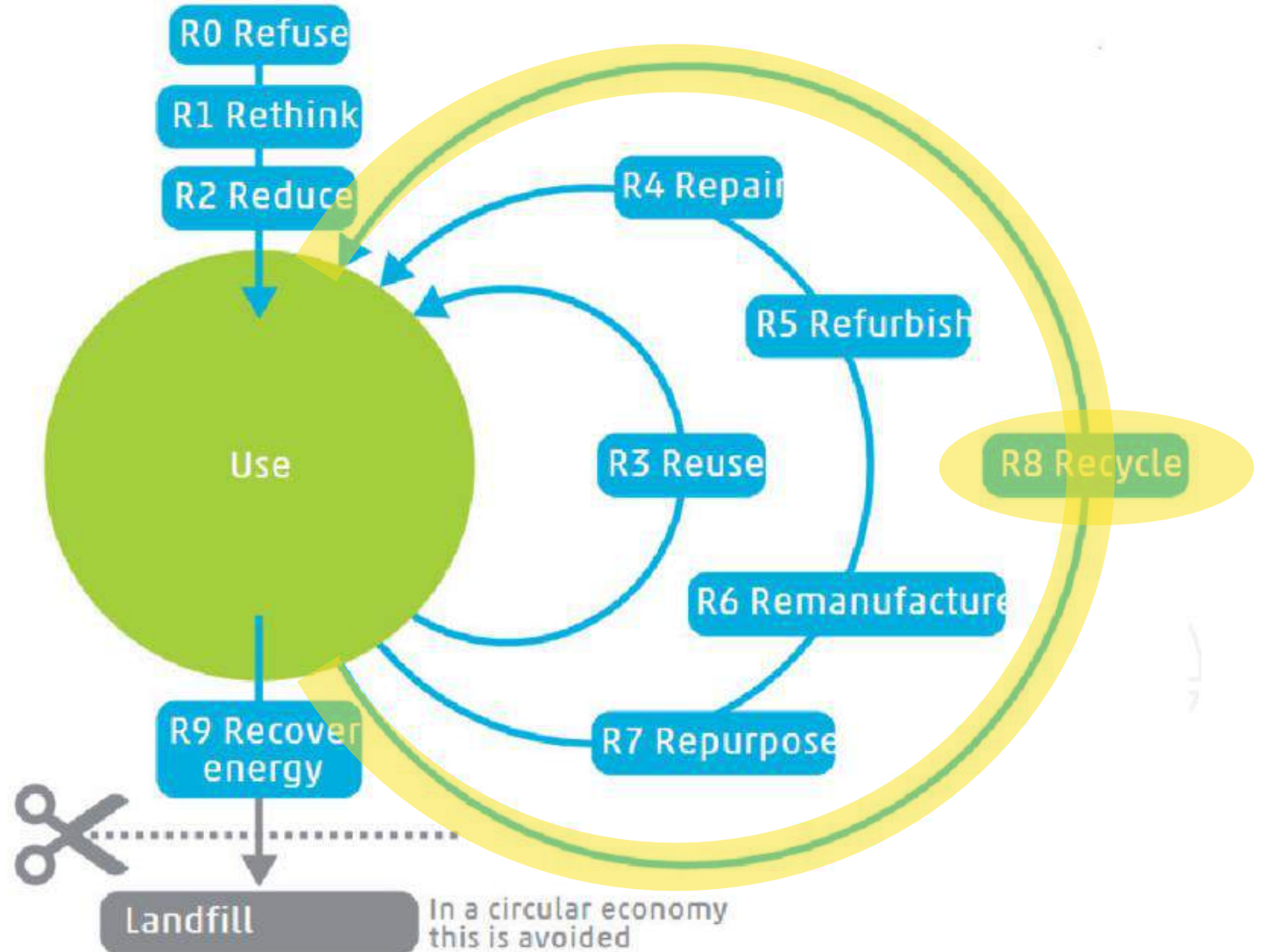
Client: Dutch government





Circular economy / R-ladder

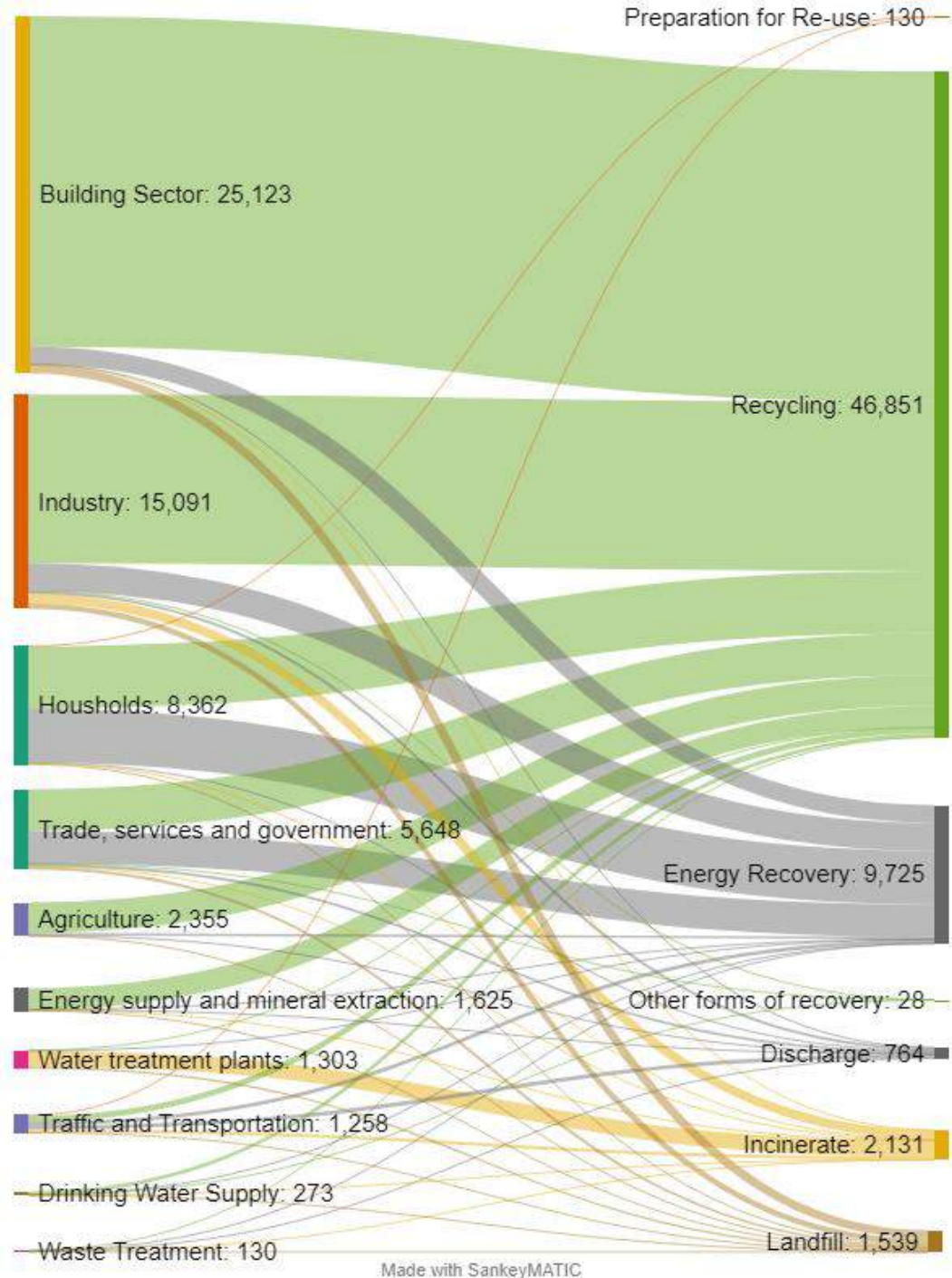
What is circular?





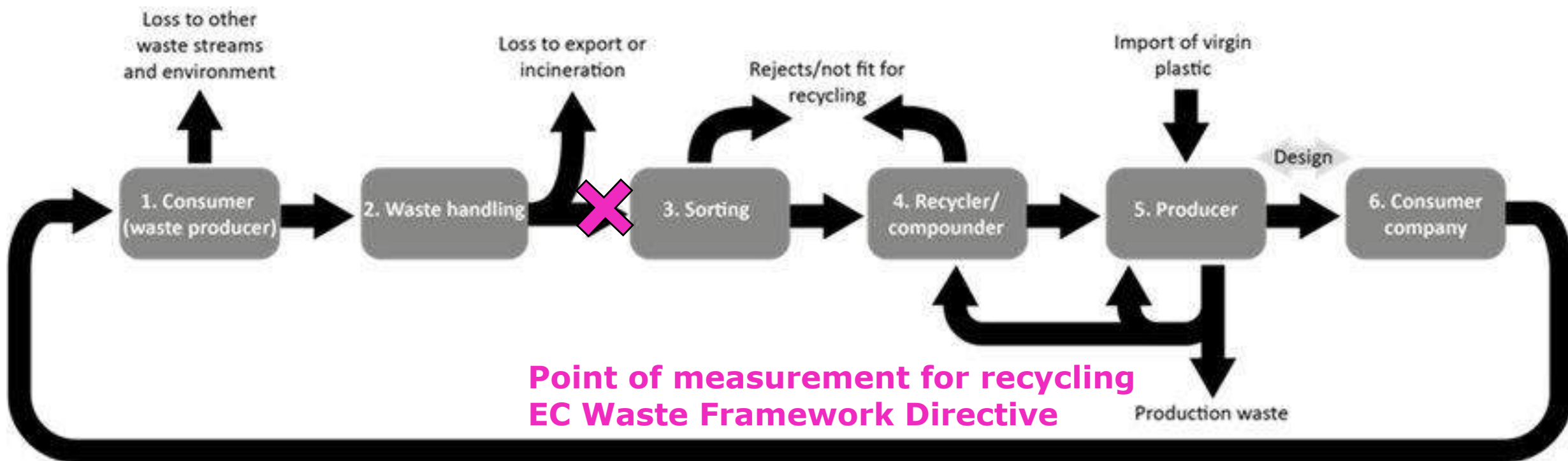
How much waste (in kt) is produced in different sectors in the Netherlands and how is this waste treated in 2018?

Client: Dutch government



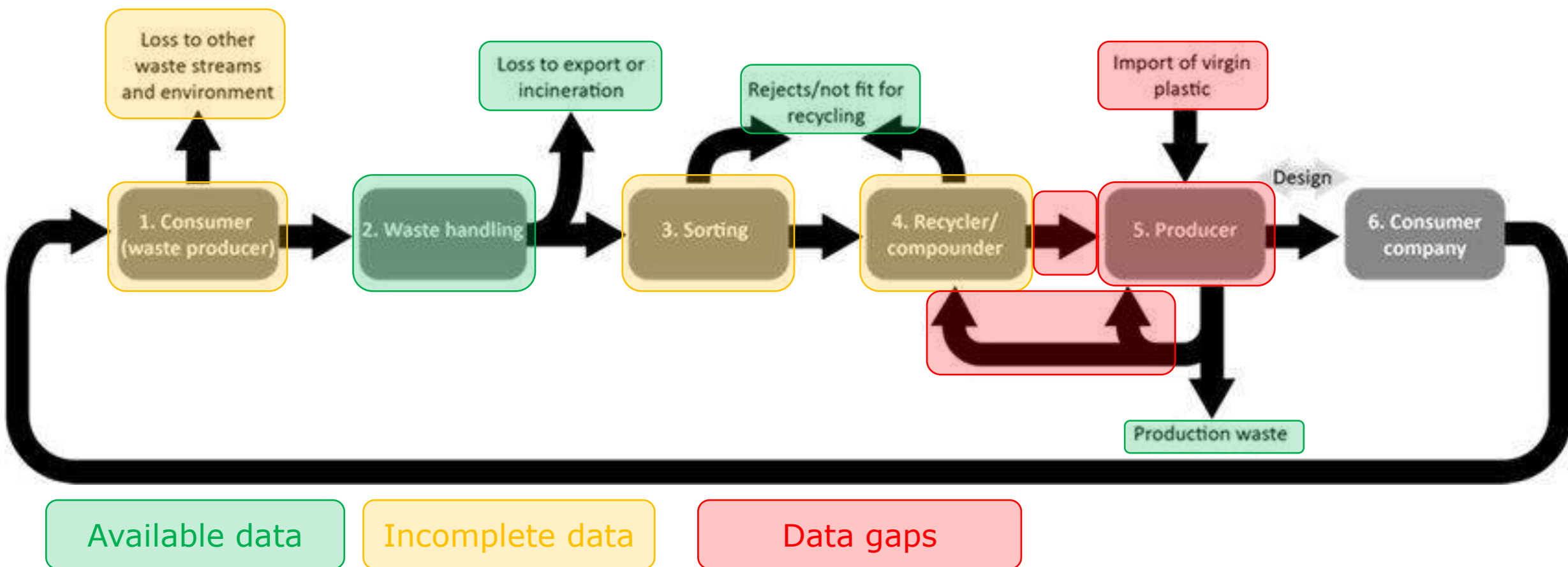


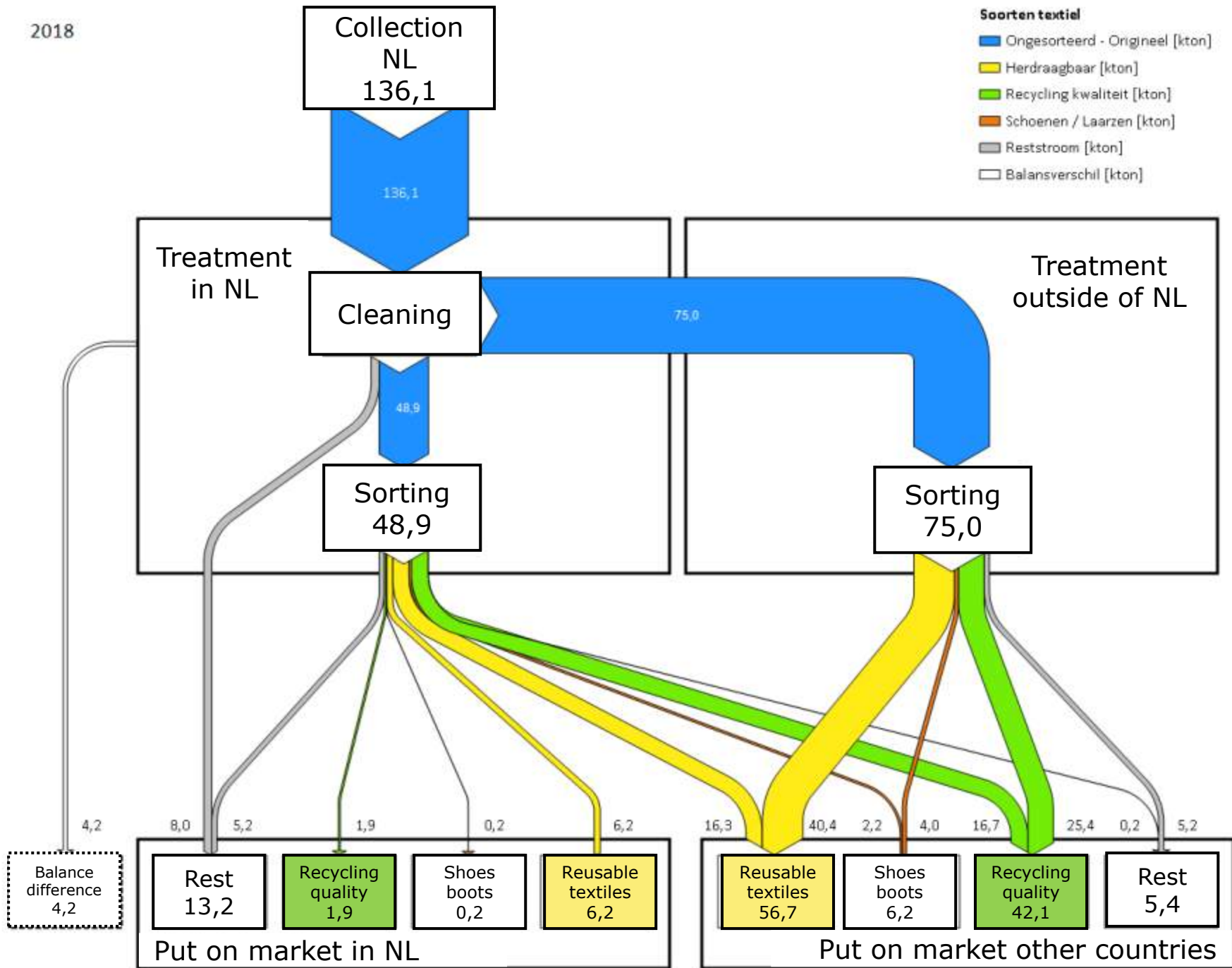
Mapping the waste chain for different materials





Mapping the waste chain for different materials



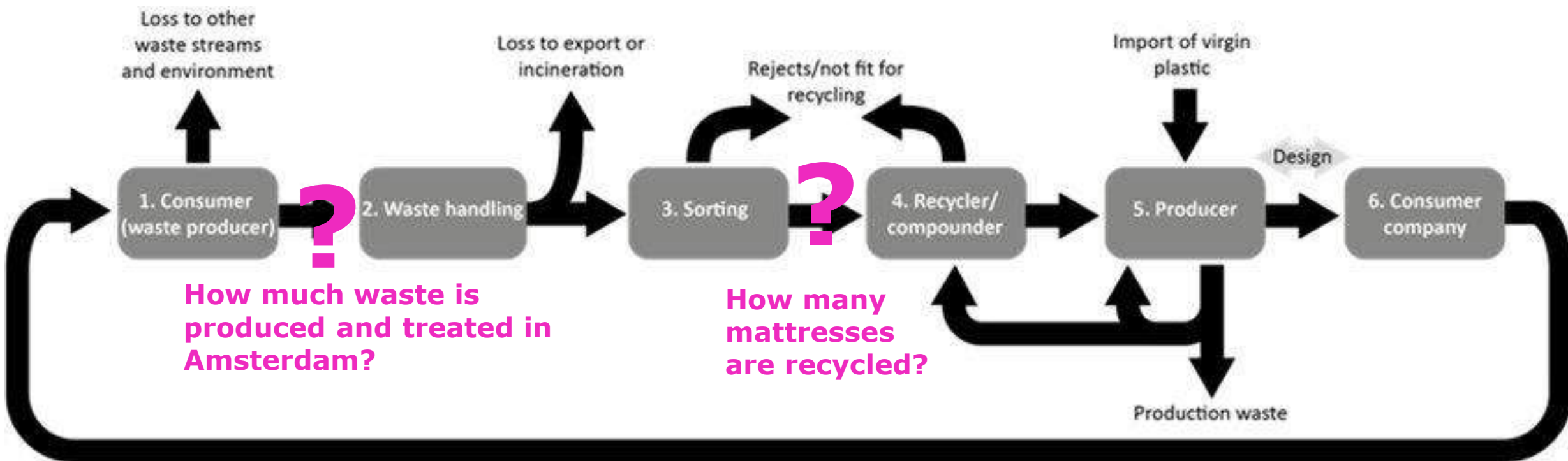


Mass balance textiles from households

research by FFacts
 commissioned by RWS



Increasing need for detail from external stakeholders





Challenges (I) in monitoring waste and CE

- Need for more detail
 - Mapping the waste chain/ material flow
 - Regions
 - Specific waste streams
- How to monitor secondary materials?



How to make our work easier

- Suggestions

EU

- Introduce new Eural codes for specific waste streams
 - Mattresses
 - Vessels
 - Artificial turf (football, hockey)
 - Rubber

NL

- (Re)introduce the duty to report excluded waste streams like
 - Plastics, textiles, metals, rubber



Challenges (2)

- Small-scale treatment plants without notification
- S(VH)C
- Are we collecting the correct data for monitoring the circular economy?



Rijkswaterstaat
*Ministry of Infrastructure
and Water Management*

Thank you!



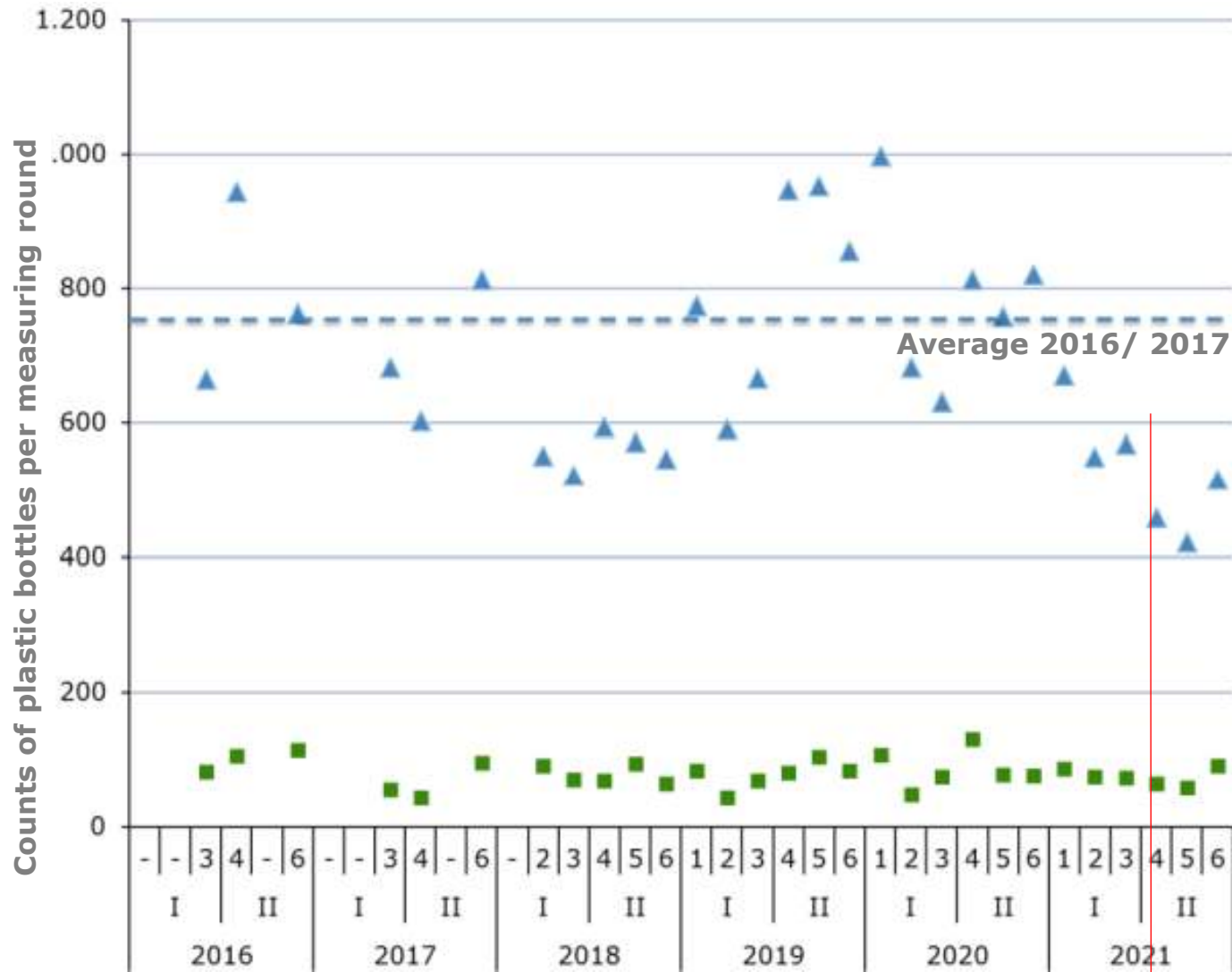
Reports and data

www.afvalcirculair.nl



afvalbeheer@rws.nl





Litter monitoring

Basis for introducing deposit on small bottles

▲ Small bottles
■ Big bottles

1st July 2021 introduction of deposit for small bottles

Waste Data Analysis for National and European Reporting: Italian Best Practices

Jessica Tuscano, Fabio Tatti & Chiara Bonomi – Italian Institute for Environmental Protection & Research

Waste data analysis for National and European reporting

Italian Best practices

Jessica Tuscano, Chiara Bonomi, Fabio Tatti
National Center for Waste and Circular Economy
ISPRA - Italian Institute for Environmental Protection and Research

Summary

- Role of ISPRA
- Key activities of ISPRA National Center for Waste and Circular Economy
- Waste reports
- The National Waste Data Repository
- Waste data collection and processing
- Municipal waste report: indicators
- Waste from economic activities report: indicators
- Reporting to Eurostat

The role of ISPRA

- ✓ The **Italian Institute for Environmental Protection and Research (ISPRA)** is a public research institute.
- ✓ The Institute supports the Italian Ministry for the Ecological Transition (MiTE) by performing scientific and technological research applied to environmental protection as well as assessment, monitoring, control, communication, training and education activities.
- ✓ ISPRA coordinates 21 environmental protection agencies of Italian regions and autonomous provinces within the **National System of Environment Protection Agencies (SNPA)**. The system ensures the exchange of information and expertise on environmental monitoring, control and inspections. Moreover, it connects scientific knowledge communities to environmental administrators and policy makers at national and local level.
- ✓ ISPRA is the **National Focal Point of EEA/EIONET for Italy**.
- ✓ The ISPRA **National Centre of Waste and Circular Economy** carries out activities for realizing a comprehensive accounting system for waste. It also supports the national government and local authorities in the regulatory activities for planning actions to improve circular economy actions.

Key activities of ISPRA National Center for Waste and Circular Economy

- Technical support to the Ministry of Ecological Transition (MiTE) for harmonizing and implementing **legislation on waste** (i.e., **End-of-Waste status**);
- **data analysis on waste** from economic activities **generation**;
- mapping of existing management plants;
- **analysis of economic instruments** (tax and incentives) to promote the use of secondary raw materials;
- assessment of the **waste management plants needs** to improve circular economy;
- identification of **by-products** generated by industrial processes;
- assessment of **indicators on waste generation and management** to evaluate the recovery and recycling targets achievement set at EU and national level;
- evaluation and transmission of **waste data statistics** to **EUROSTAT** (every two years);
- technical support to the MiTE on the preliminary investigations for the **legal recognition of Extended Producer Responsibility**;
- technical support on **waste classification**;
- assessment of innovative **technologies for waste management**;
- annual monitoring **of the municipal management service costs and tax systems**;
- Head office and management of the online **National Waste Data Repository** that stores data and indicators on **municipal waste and waste from economic activities**.

Waste Reports

Every year, the **National Center of Waste and Circular Economy** publishes a report on municipal waste and a report on waste from economic activities, providing a detailed and up-to-date framework on generation and management of municipal waste and waste from industry and economic activities in Italy.



The Municipal Waste report provides data on:

- municipal waste generation
- separate collection and management at national, regional and provincial level
- import/export
- packaging waste management
- municipal waste management service costs and tax system.

<https://www.isprambiente.gov.it/it/pubblicazioni/rapporti/rapporto-rifiuti-urbani-edizione-2021>

The Waste from Economic Activities report provides data on:

- generation and management of non-hazardous and hazardous waste, at national and regional level;
- import/export;
- monitoring of specific waste flows (end-of-life vehicles, WEEE, end-of-life tyres, construction and demolition waste, waste treatment sludge, wastes from human or animal health care, asbestos waste)

<https://www.isprambiente.gov.it/it/pubblicazioni/rapporti/rapporto-rifiuti-speciali-edizione-2021>

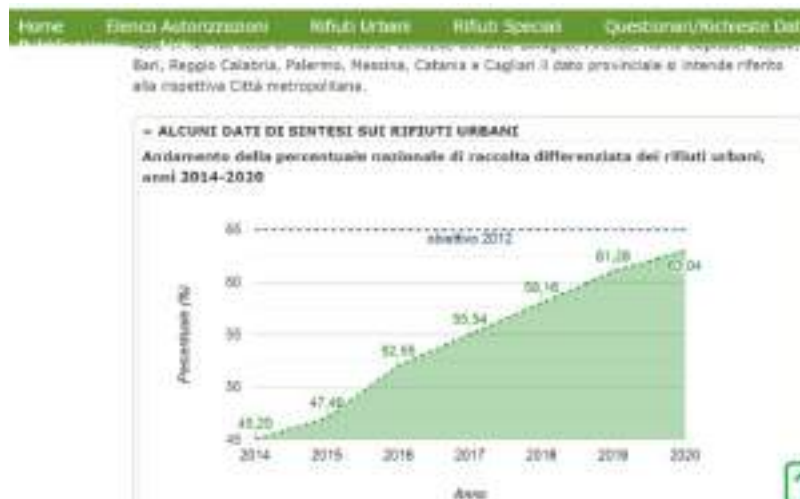


The National Waste Data Repository

ISPRA has organised the National Section electronically, through the establishment of the Telematic Register, which aims to provide a complete, constantly updated and easily accessible knowledge framework on waste.

The **National Waste Data Repository “Catasto Rifiuti”** was established by law in 1988. **It is organised in a National Section**, at ISPRA, **and in Regional Sections** at the Regional and Autonomous Provincial Environmental Protection Agencies. **ISPRA provided the National Section with a responsive website.** This National Waste Data Repository aims to provide a complete, constantly updated and easily accessible knowledge framework on waste. It contains comprehensive, freely searchable and downloadable databases and indicators on municipal waste, waste from economic activities and the national list of companies authorized to manage waste. All ISPRA Waste reports can also be found in the repository.

The **National Waste Data Repository** can be consulted online at the free website: www.catasto-rifiuti.isprambiente.it



ISPRA
Lunedì 16/01/2023
10:00

Home | Elenco Autorizzazioni | Rifiuti Urbani | Rifiuti Speciali | Questionari/Richieste Dati | Pubblicazioni | Link

PRODUZIONE E RACCOLTA RU

GESTIONE RU

COSTI GESTIONE RU

Guida alla navigazione
Fonti e metodologie

Home >> Rifiuti Urbani

Guida alla navigazione dei dati sui rifiuti urbani (produzione, raccolta differenziata, gestione e costi dei servizi di igiene urbana)

Dati di produzione e raccolta differenziata

The National Waste Data Repository

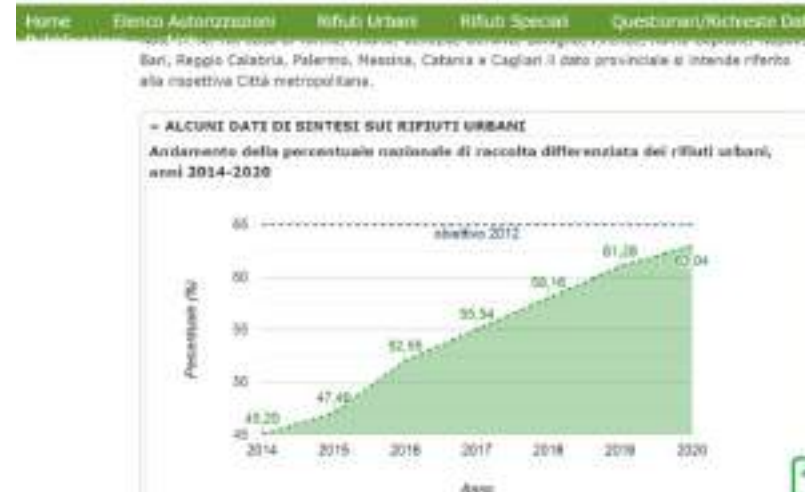
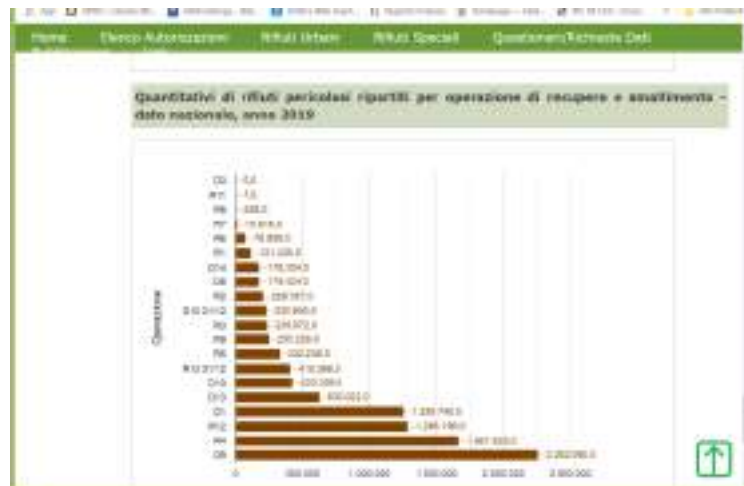
The Municipal Waste database contains information on:

- ✓ municipal waste generation and separate collection (up to municipal level)
- ✓ management costs of municipal management services (up to regional level)
- ✓ management plants (up to individual plant level)

The Waste from Economic Activities database contains information on:

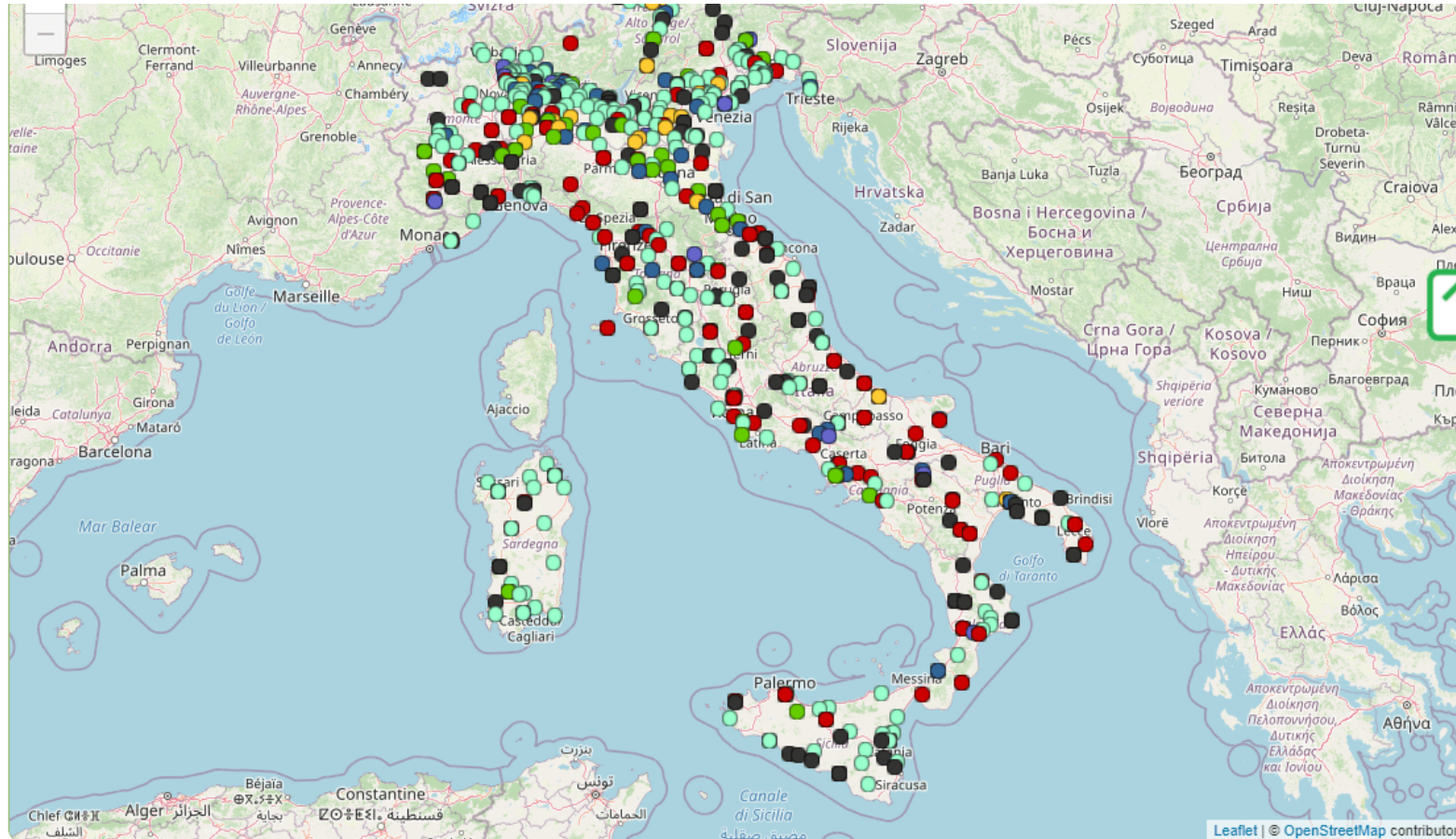
- ✓ hazardous and not-hazardous waste generation (regional level), with details on the chapter of the European Waste List and by Classification of Economic Activity
- ✓ hazardous and not-hazardous waste management (regional level), with details on the recovery (R) and disposal (D) operations.

All data are available from 2010 and updated every year



The National Waste Data Repository

One of the many maps available on the waste database showing the locations of treatment plants for municipal waste



● Compostaggio ● Trattamento integrato aerobico/anaerobico ● Digestione anaerobica ● TMB ● Incenerimento ●
Coincenerimento ● Discarica.

Nota: i marker sono posizionati in corrispondenza del comune di riferimento e non individuano, pertanto, le effettive coordinate degli impianti.

Waste data collection and processing

Pursuant to article 189 of Legislative Decree 152/2006, ISPRA collects and processes data on waste generation and management. **Indicators and data** from ISPRA and National System of Environment Protection Agencies (SNPA) constitutes an **official technical reference at national level**.

Municipal waste

- ✓ Data are collected through the Environmental Compulsory Declaration (municipal waste section) and/or the regional environmental agencies; data are also requested directly to municipalities and doublechecked with ECD.
- ✓ If data from municipalities are not available, previous year data should be used, as waste generation and separate collection data cannot be estimated.

Waste from Economic Activities

- ✓ Waste generation and management data are collected through the ECD; specific data and information are requested directly to local authorities and treatment plants to be doublechecked with ECD.
- ✓ Since some economic activities are exempt from compiling the ECD, waste generation data are supplemented by estimates using specific methodologies.

- ✓ Data are processed, validated, compared to data collected through specific surveys that have been previously sent to regional/provincial environmental agencies, regions, provinces and waste management plant managers;
- ✓ If inconsistencies are found in the processing of data, **specific investigations** shall be carried out on each plant/entity of the Environmental Compulsory Declaration.

Municipal waste report: indicators

<p>Municipal waste generation</p>	<p>Municipal waste generation per unit of GDP</p>	<p>Municipal waste re-use and recycling percentage</p>	<p>Separate collection</p>
<p>Total and per capita municipal waste generation amount at national and regional level.</p>	<p>Total municipal waste generation correlated to GDP.</p>	<p>Ratio between municipal waste prepared for re-use or recycled, and municipal waste generated in a given year (according to the methodologies established by Decision 2011/753/EU).</p>	<p>Ratio between separate collection and total municipal waste generation.</p>
<p>Composting anaerobic digestion</p>	<p>Mechanical biological treatment</p>	<p>Incineration</p>	<p>Landfilling</p>
<p>Waste amount treated by biological processes (composting, anaerobic/aerobic integrated treatment anaerobic digestion).</p>	<p>Waste amount processed by mechanical biological treatment.</p>	<ul style="list-style-type: none"> ▪ Number of incineration plants; ▪ Amount of incinerated municipal waste. 	<ul style="list-style-type: none"> ▪ Number of landfills; ▪ Amount of landfilled municipal waste

Municipal waste report: indicators

Methodology for calculating **municipal waste generation and the percentage of separate collection** applied from 2016 data, based on the criteria laid down in the Ministerial Decree-Law of 26 May 2016.

RU_{ind}	municipal mixed waste (code: 200301, 200303, 200309) (tonnes)
I	bulky waste sent for disposal (200307) (tonnes)
RD_i	Fractions of the separate collection (tonnes)
Municipal waste generation	$RU [t] = (\sum_i RD_i) + RU_{ind} + I$
Percentage of separate collection	$RD [\%] = \frac{\sum_i RD_i [t]}{RU [t]} \times 100$

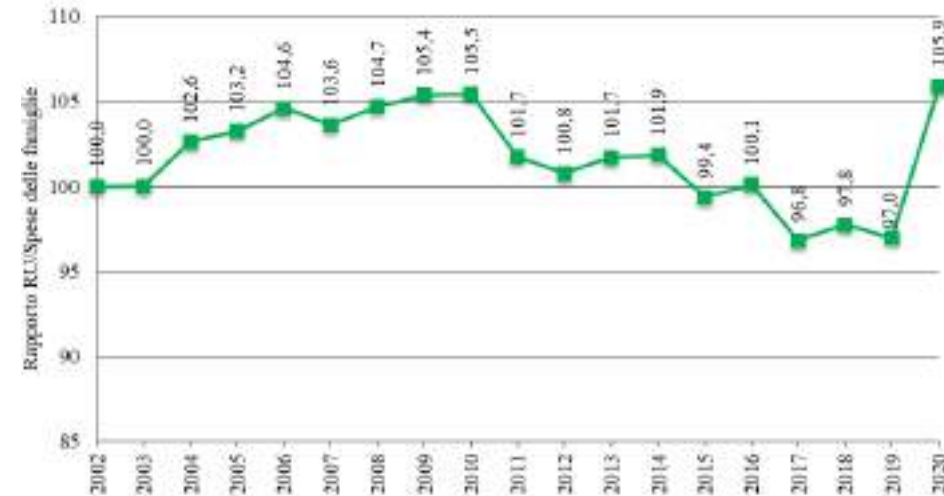
Separate collection percentage is calculated as the ratio of the quantity of waste collected to the total quantity of waste produced . No demographic corrections are needed.

Municipal waste report: indicators

Trend in municipal waste generation per capita, years 2007 - 2020



Trend in municipal waste generation per unit of household expenses, years 2002 - 2020

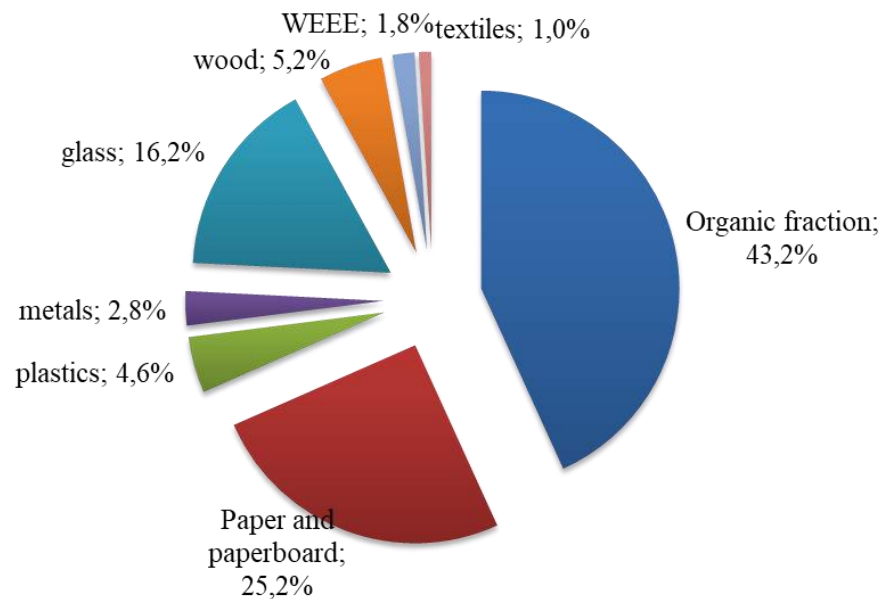


Municipal waste report: indicators

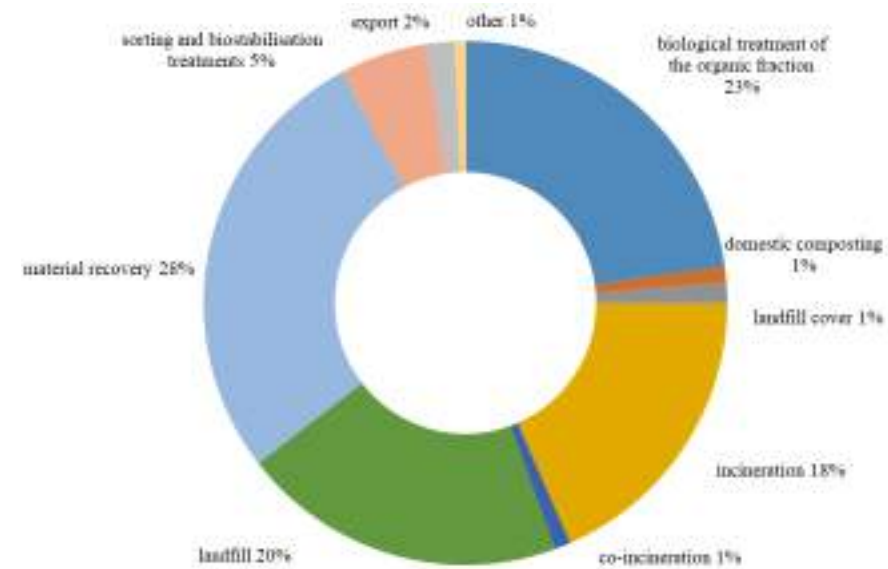
In accordance with the provisions of the **Waste Framework Directive**, the calculation of the recycling percentage is obtained by using information on the quantities of secondary raw materials obtained (Environmental Compulsory Declaration data) from the quantities of collected waste.

In the case of the organic fraction, the calculations is made directly using the input values to the composting and anaerobic digestion plants minus the residue from the treatment processes.

Percentage distribution of municipal waste sent for recycling, year 2020



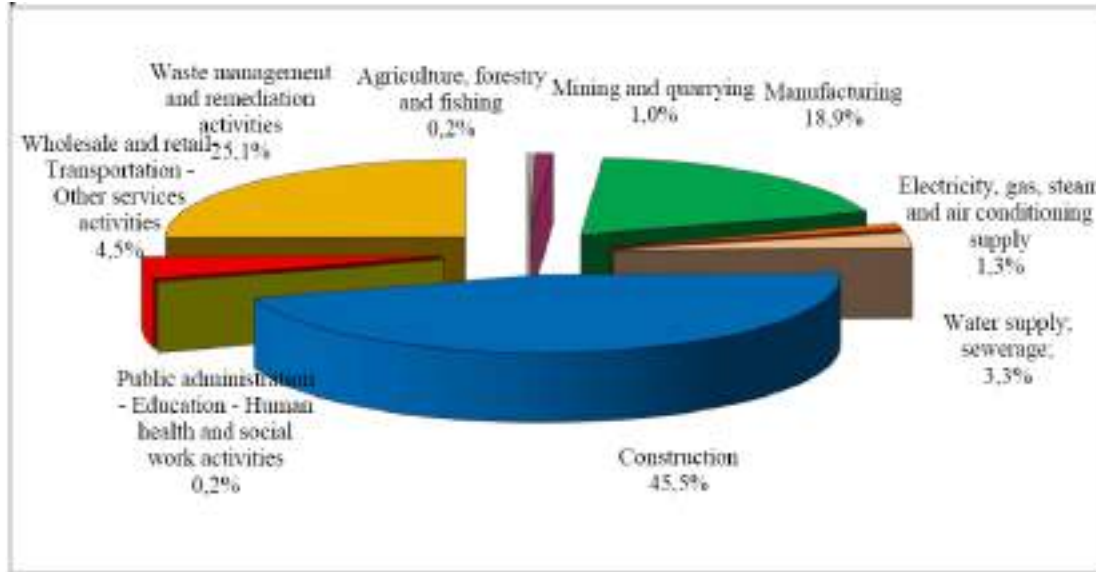
Percentage distribution of municipal waste management, year 2020



Waste from economic activities report: indicators

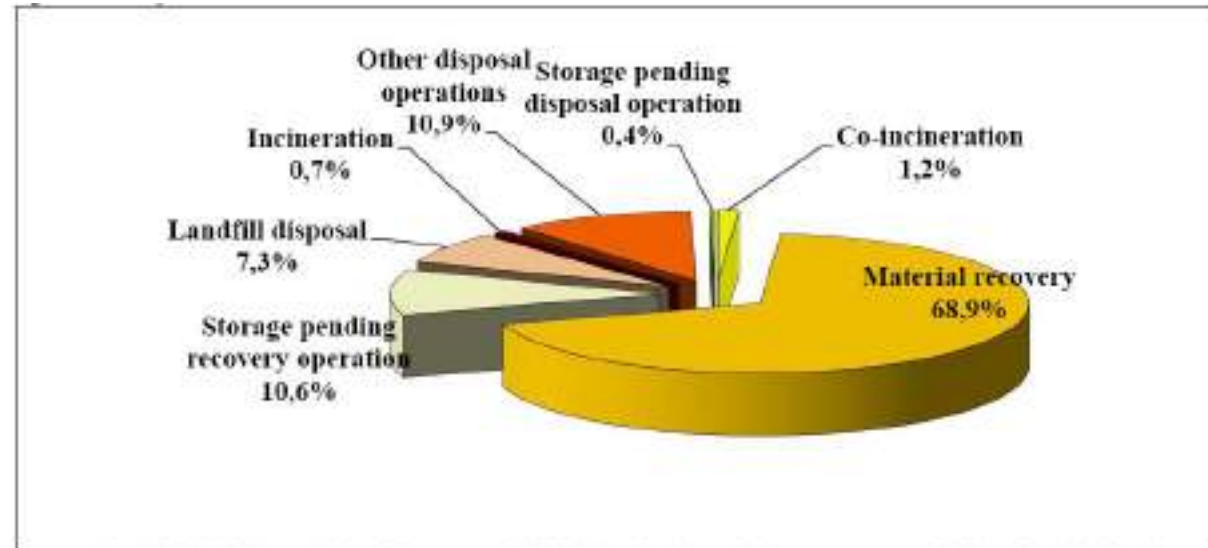
<p>Waste from economic activities generation</p>	<p>Import/export</p>	<p>Construction and demolition (C&D) waste recycling/recovery</p>	<p>Recycling</p>
<p>Waste from economic activities generation amount at national level. Details on non-hazardous, hazardous and construction and demolition waste are given.</p>	<p>Waste from economic activities that are imported or exported to be recovered or disposed of.</p>	<p>Non-hazardous C&D waste amount (except for soil from contaminated sites) prepared for re-use, recycling or recovering. It monitors the European target for C&D waste set at 70% within 2020.</p>	<p>Total amount of waste from economic activities that are recovered (subjected to R2-R12 operations).</p>
<p>Co-incineration</p>	<p>Incineration</p>	<p>Landfilling</p>	
<p>Amount of waste from economic activities used in total or partial replacement of traditional fuels in production plants.</p>	<ul style="list-style-type: none"> ▪ Number of incineration plants; ▪ Amount of incinerated waste from economic activities. 	<ul style="list-style-type: none"> ▪ Number of landfills; ▪ Amount of landfilled waste from economic activities. 	

Report on waste from economic activities: indicators



Percentage distribution of total waste generation by sector of economic activity, year 2019

Percentage distribution of waste of economic activities, by type of treatment operation, year 2019

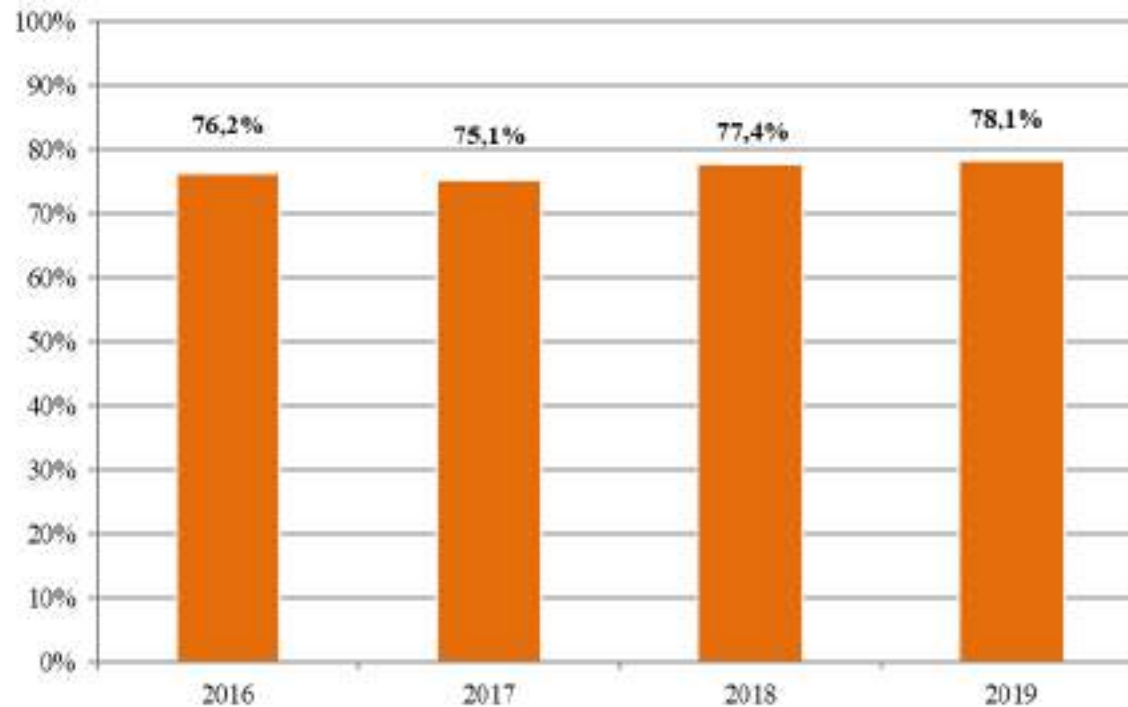


Report on waste from economic activities: indicators

Construction and demolition (**C&D**) is a specific waste stream monitored by the European Commission. In Article 11 of Directive 2008/98/EC, the Commission set a target of 70% preparation for reuse, recycling and other material recovery by 2020, including backfilling operations using waste as a substitute for other materials.

The calculation methods to be adopted by Member States in order to certify compliance with the targets have been identified in Decision 2011/753/EC, which defines in Annex III the recovery rate for C&D waste as the **ratio between the "recovered amount of construction and demolition waste" and the "total amount of construction and demolition waste"**.

The percentage of recovery of demolition and construction waste is **78,1% in 2019**, therefore above the 70% target set by Directive 2008/98/EC for 2020.



Trends in the rate of preparation for re-use, recycling and other material recovery, excluding backfilling, of C&D waste, years 2016-2019

Reporting to EUROSTAT



EU regulations and directives on waste require the submission of data from Member States to the European Commission. ISPRA provides the data requested, accordingly to Eurostat methodologies, using data collected and processed annually, and monitor the recovery and recycling targets for the different waste streams.

- ✓ **Waste statistics** in compliance to Regulation 2002/2150/CE (every two years)
- ✓ Report on **European targets monitoring** (every three years):
 - Municipal waste recycling
 - Construction and demolition waste recycling
- ✓ **Annual reports** on:
 - ✓ Packaging and waste packaging (Directive 1994/62/CE)
 - ✓ End-of-life vehicles (Directive 2000/53/CE)
 - ✓ Waste from Electric and Electronic Equipment (WEE) (Directive 2012/19/UE)
 - ✓ Waste batteries and accumulators (Directive 2006/66/CE)
 - ✓ Municipal Waste Reporting OECD/EUROSTAT

Thank you for your
kind attention

Coffee Break

15:40 - 16:00 | 24th May 2022

Recap & Panel Discussion

16:00 - 17:00 | 24th May 2022

Drinks & Snacks

17:00 - 18:00 | 24th May 2022