



# Seminar: Towards Recycling of Building Glass in Europe

25 November 2016  
Thon Hotel Brussels City Centre  
Brussels, Belgium

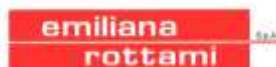
*Welcome in the heart of Europe!*

# Ulrich Ix – President FERVER

## Welcome word



S.A. minérale n.v.



Santos Jorge, S.ª.



glasrecycling leersieringen



everglass



**Nicolas Scherrier**  
Representative of  
*Minister Céline Frémault*

# Session 1: Why is it important?

**Gunther Wolff**  
Policy Officer  
*European Commission*  
*DG Environment*





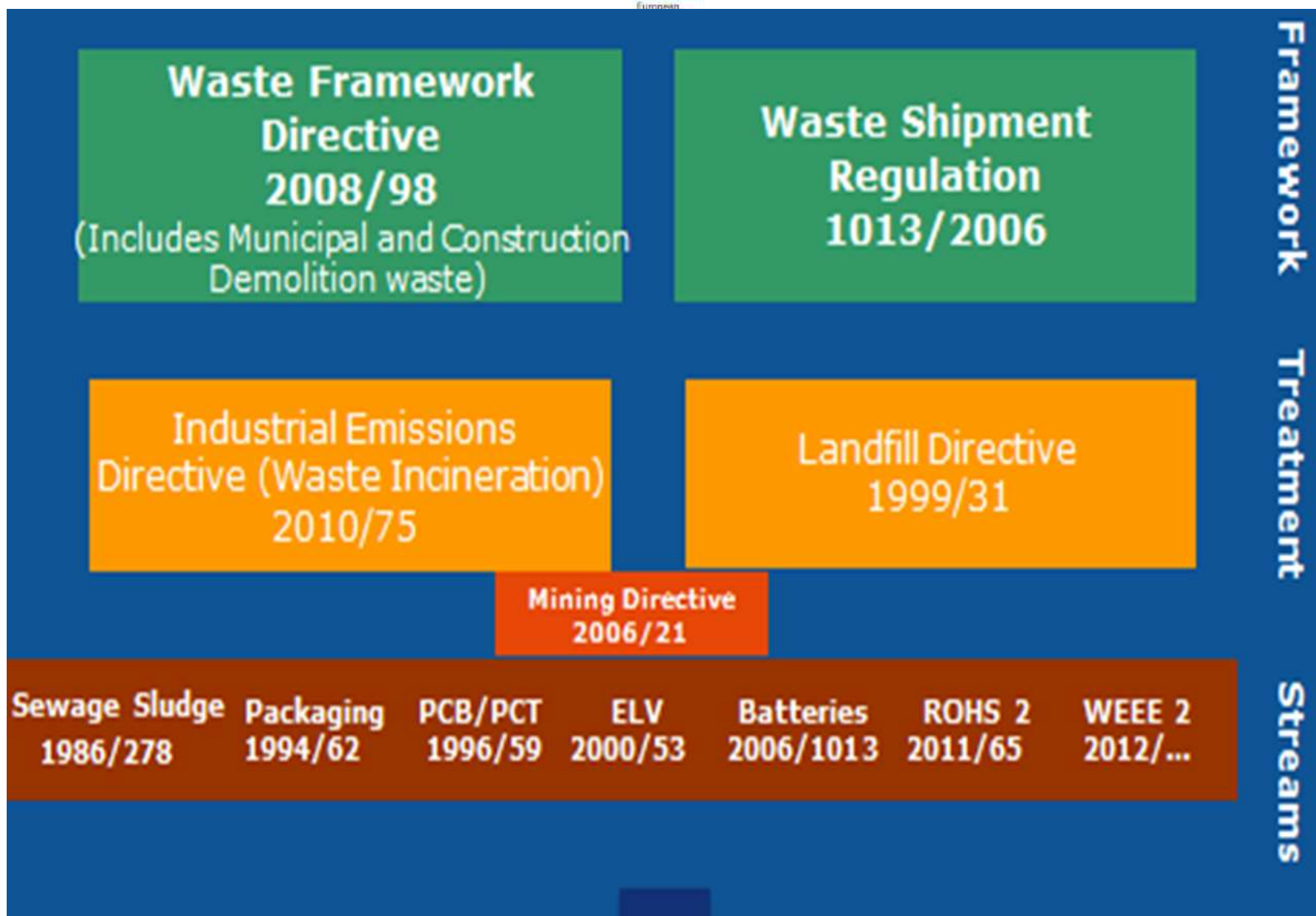
# A Circular Economy approach for the construction sector

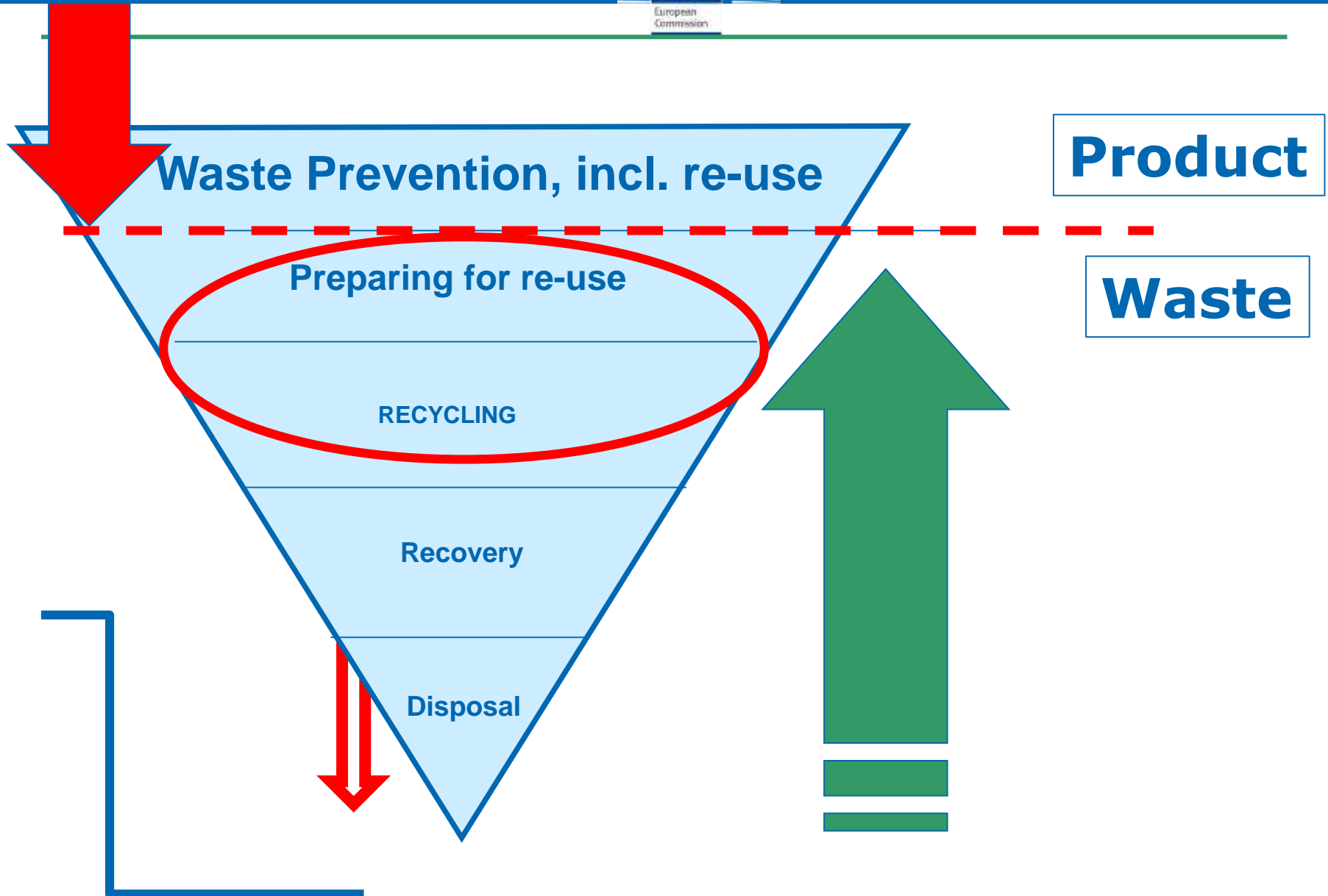
Gunther Wolff

European Commission  
DG Environment

Brussels, 25/11/2016

# EU waste legislation



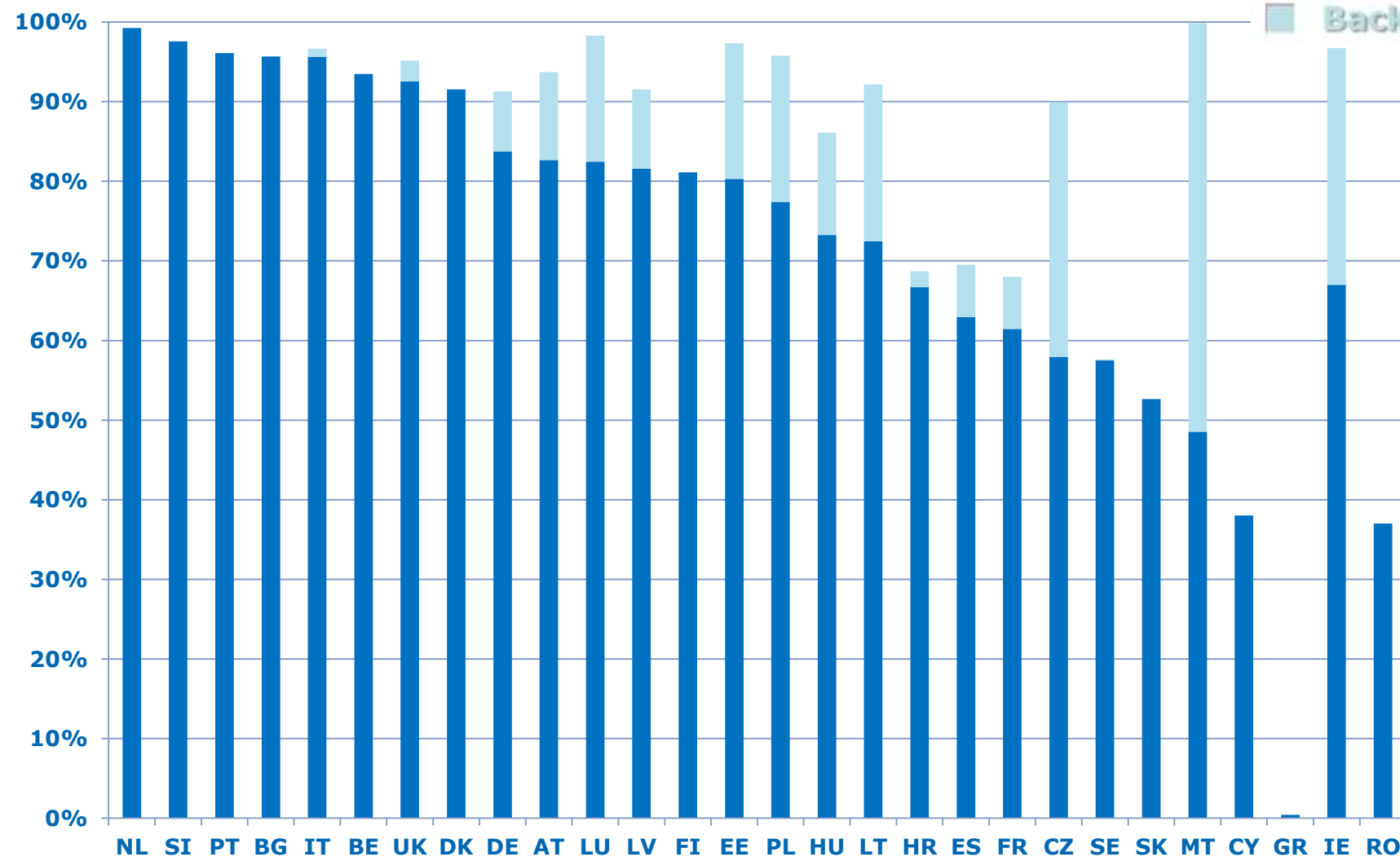




# Results: CDW 2014

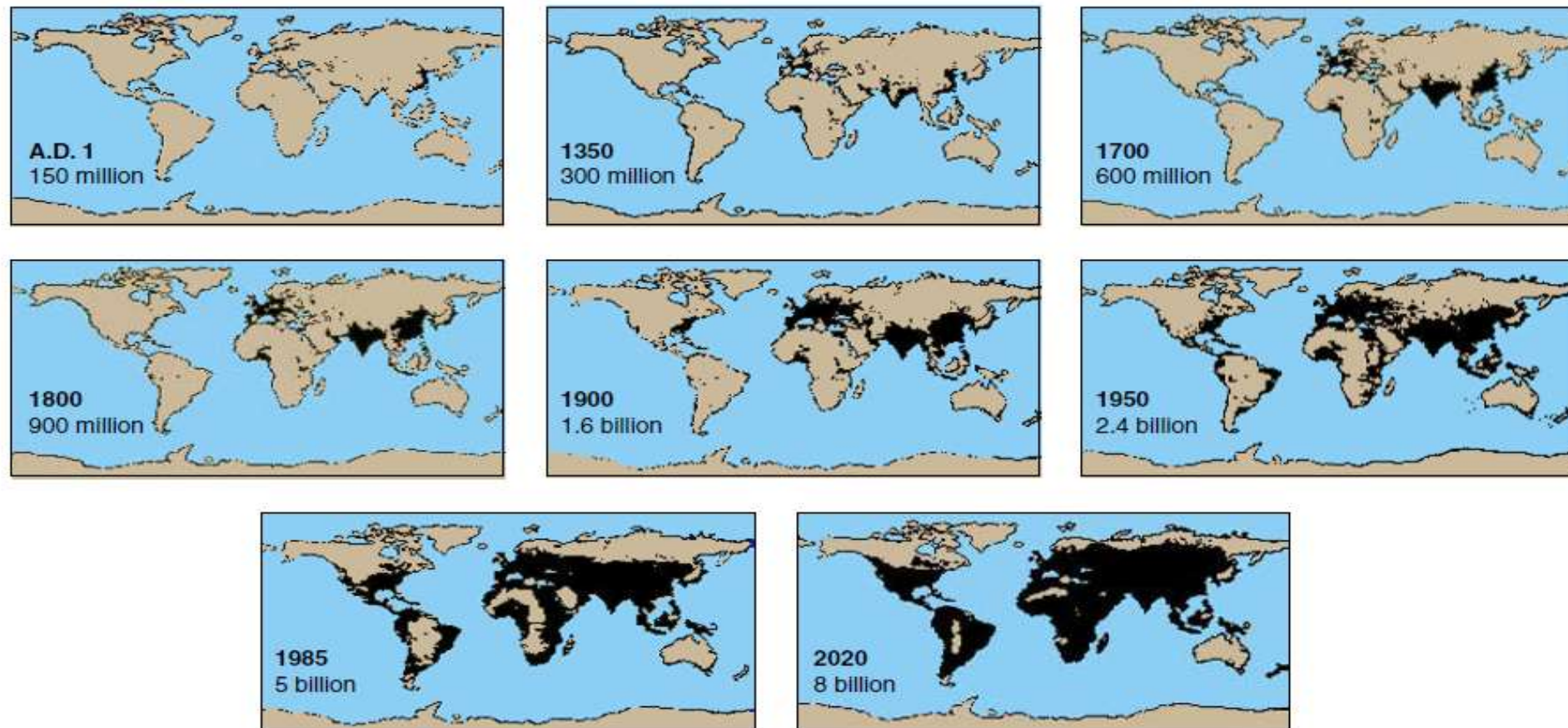
European  
Commission

 Recycling  
 Backfilling



# Demography

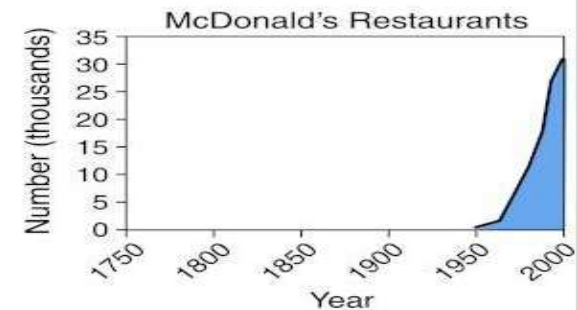
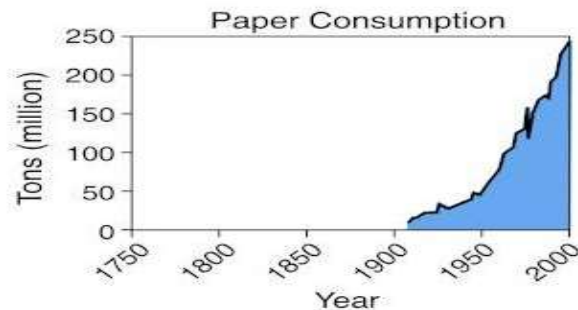
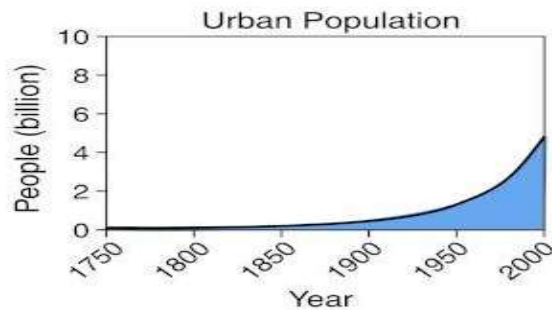
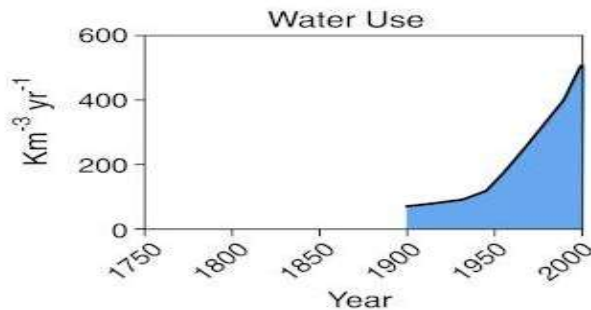
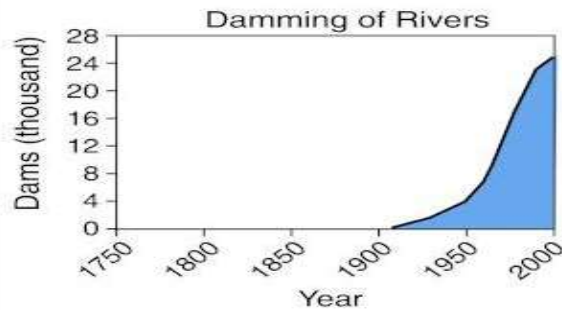
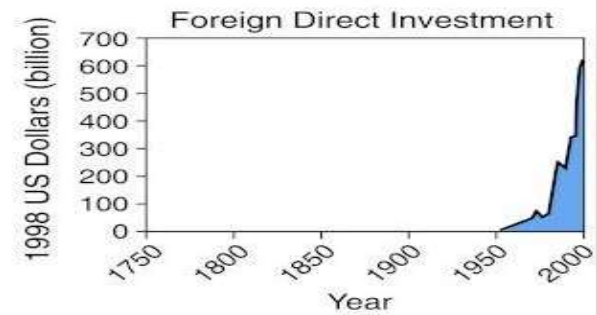
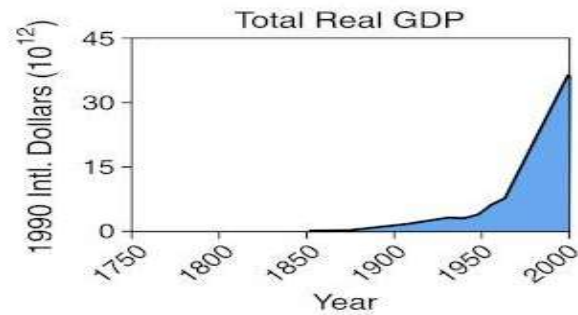
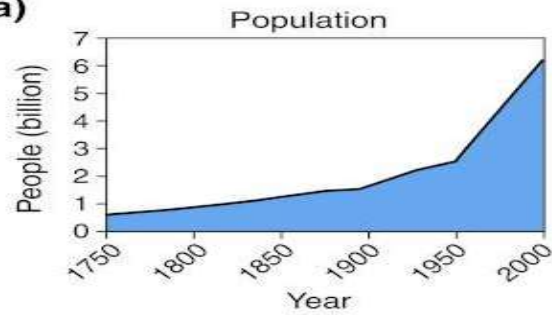
**Figure 1**  
**Human Population Throughout History, A.D. 1 to 2020**



Source: John H. Tanton, *End of the Migration Epoch*, reprinted by the *Social Contract*, Vol. IV, No. 3 and Vol. V, No. 1, 1995.

# Exponential growth

(a)





# Resources are scarce – and not in Europe

## WHERE THE MINERALS ARE



Figures refer to proportion of world reserves available for extraction given current technology, whether economic or not. Reserves below 5% not shown.

**It is not enough to recycle more:  
We need to use resources more  
efficiently!**





# Circular Economy Strategy: From a linear economy...

**NATURAL  
RESOURCES**

**EXTRACT**

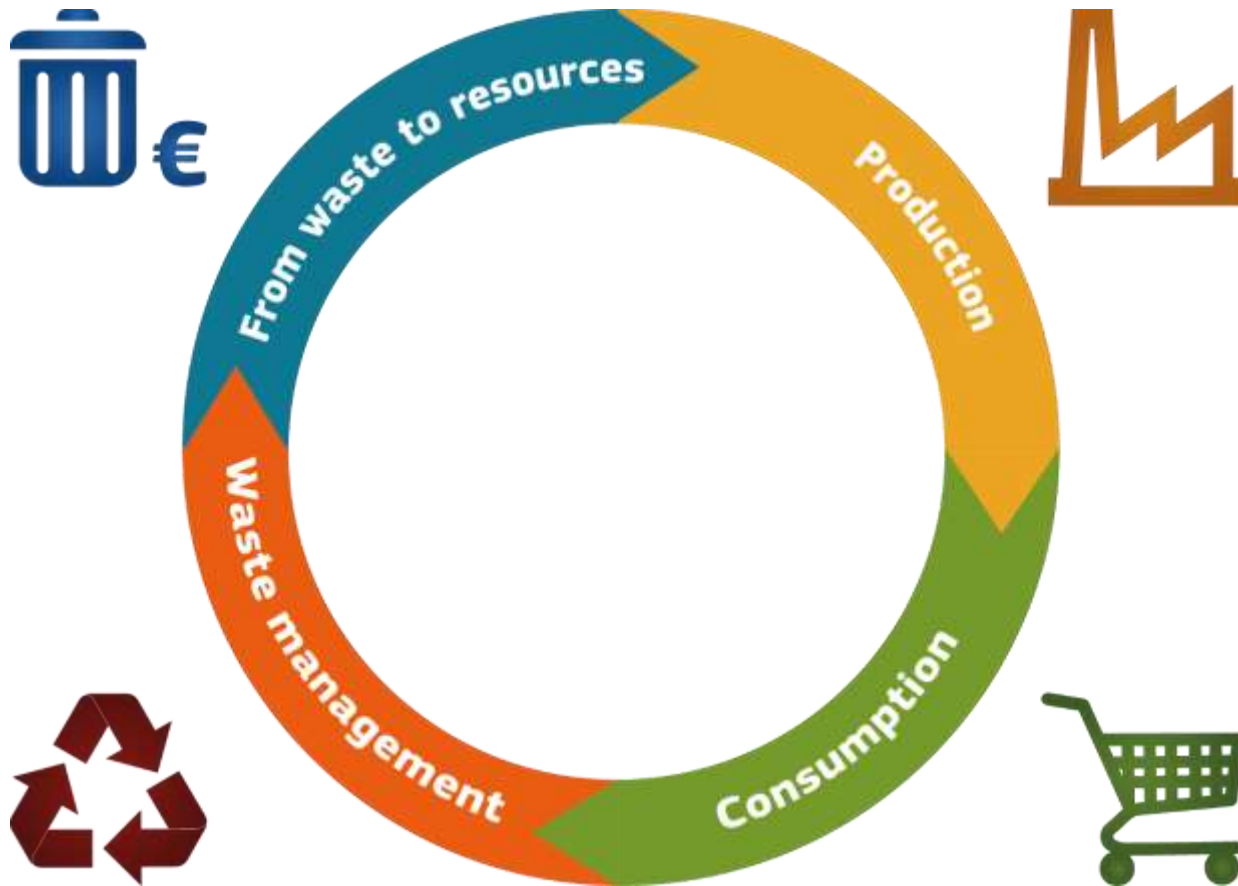
**PRODUCE**

**DISPOSE OF**

**WASTE  
WASTE  
WASTE**

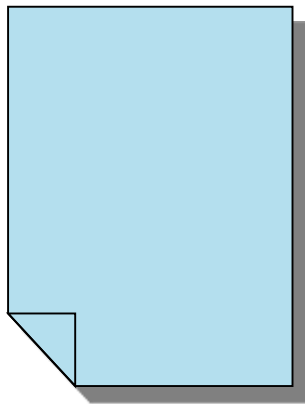


## ... to a circular economy

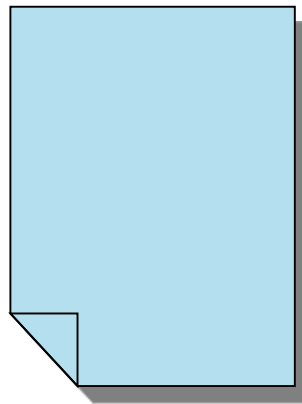


# The Circular Economy Package

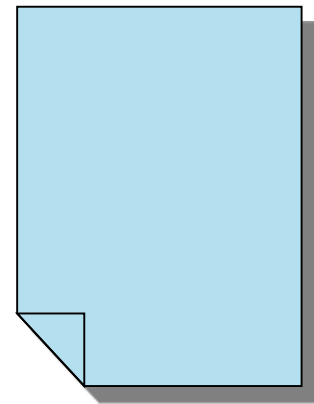
- **Adopted by the Commission on 2<sup>nd</sup> December 2015**



**Action Plan  
Communication**



**List of Follow-up  
Initiatives (Annex)**



**Legislative  
proposals on waste**

# Legislative proposal on waste

## Waste in general:

- **Recycling targets 2030:**
  - Municipal waste > 65 %
  - Packaging: > 75 %
  - reducing landfilling: <10 %
- **Measures to promote waste prevention**
- **Clearer rules (preparation for reuse, by-products and end-of-waste status)**
- **Separate collection of bio-waste**
- **Minimum requirements for EPR**



# Legislative proposal on waste

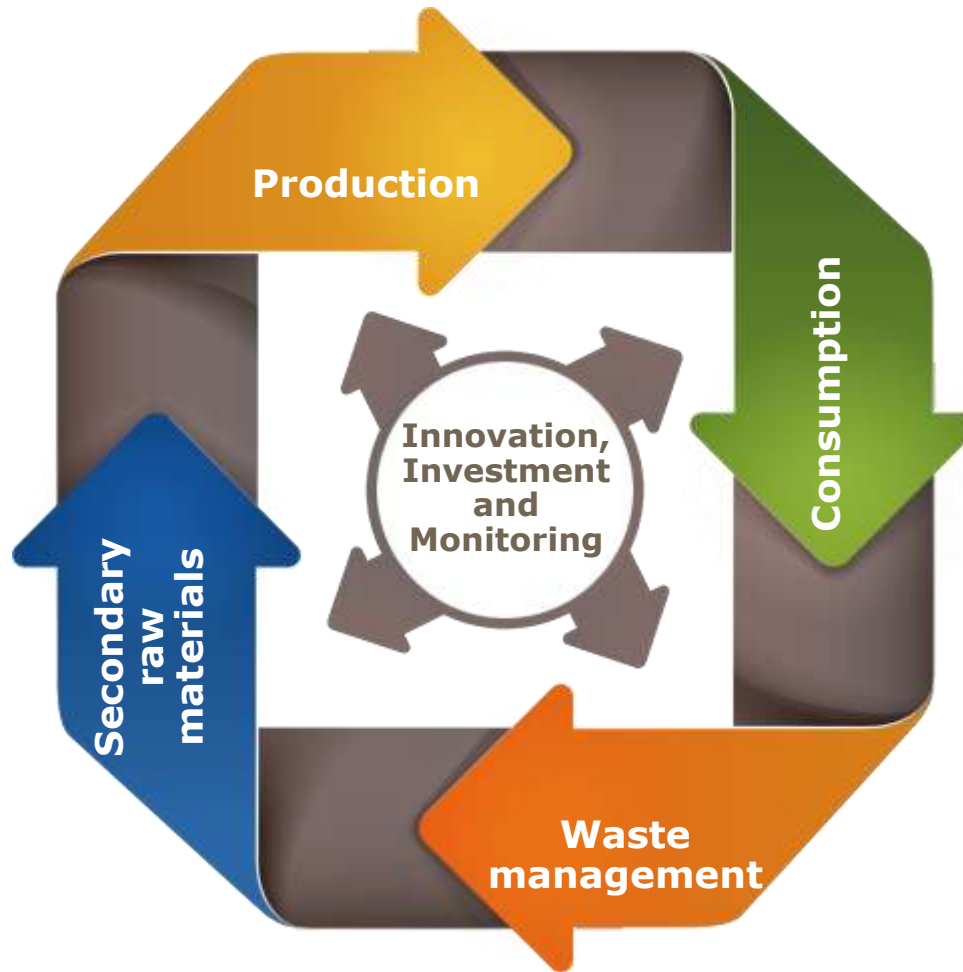
## CDW:

- Waste prevention in the construction sector
- Sorting systems for CDW: wood, plaster, glass, metal and aggregates
- New definition: backfilling





# Action plan: Main areas





# Circular economy: Outlook

- Growth and job creation up to + 7 % of GDP
  - ➔ **+600 M EUR annual turnover**
  - ➔ savings of 8 % for EU companies
  - ➔ **170,000 direct jobs in the sectors of waste management**
- Boosting competitiveness and ensure security of supply
- Economic and environmental resilience
- Promotion of innovation
- Reduce greenhouse gas emissions by 2-4 % annually

# CDW: Current situation

- Low level of regulation at EU level: Art. 11 WFD
  - material recovery: at least 70 % (by 2020)
  - Including backfilling
- Accuracy and reliability of statistics is an issue
- High potential for recycling activity of CDW in principle, but differently used by MS
- Introduction of the 70 % recovery target has led to an improvement
- Implementation problems:
  - Identification and treatment of hazardous waste
  - In some MS: Illegal landfills

# European Commission: Actions

## Basis:

- Legislative proposal
- Circular economy action plan

## Individual measures:

- Study on CDW at EU level (2016)
- CDW management protocol (2016)
- Pre-demolition audit (2017)
- Evaluation of environmental performance of buildings (2017)
- Business models and financing of recycling facilities (2017)
- Quality standards for secondary raw materials (?)
- Interface Chemicals/product/waste legislation



# Long-term: Possible measures

## Statistics

- Harmonisation and improvement

## Legislation/Transposition

- New recycling targets (material specific?)
- Backfilling (better definition/restriction)
- Improving implementation

## Design and prevention

- Eco-design and design for dismantling
- Prevention and reuse





# Long-term: Possible measures

## Infrastructure

- Network of recycling facilities (EU funds)

## Products/markets

- Labelling and information
- Quality standards
- GPP (minimum content of recycled materials)

## Long-term challenges

- High quality recycling
- Taking into account strategic aspects (raw materials)



## More information:

<http://ec.europa.eu/environment/waste/index.htm>

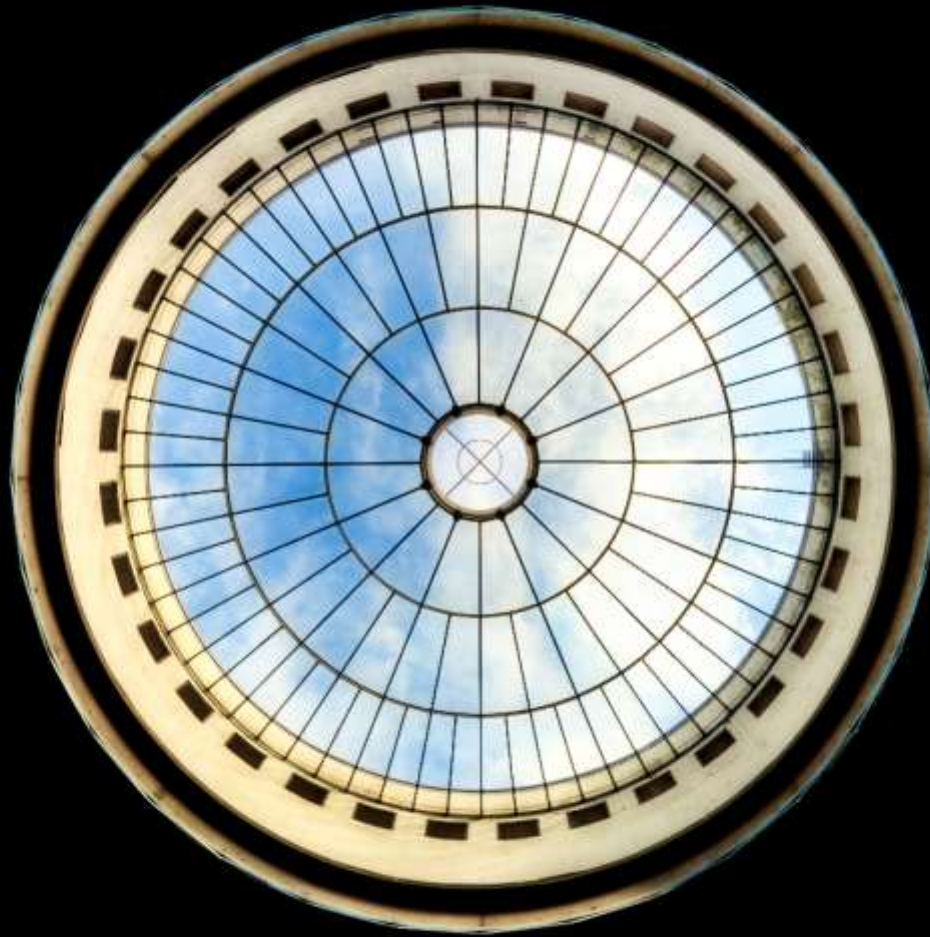
<http://ec.europa.eu/environment/circular-economy/>

Thanks for your attention/  
Gracias por su atención!

Gunther Wolff [at] ec.europa.eu

**Mathieu Hestin**

Director Sustainable Development  
*Deloitte*



## **Building glass recycling in the EU**

Study for Glass for Europe

Towards recycling of building glass in Europe – November 2016 - Brussels

# Contents

Quantification of building glass waste in the EU

Case studies

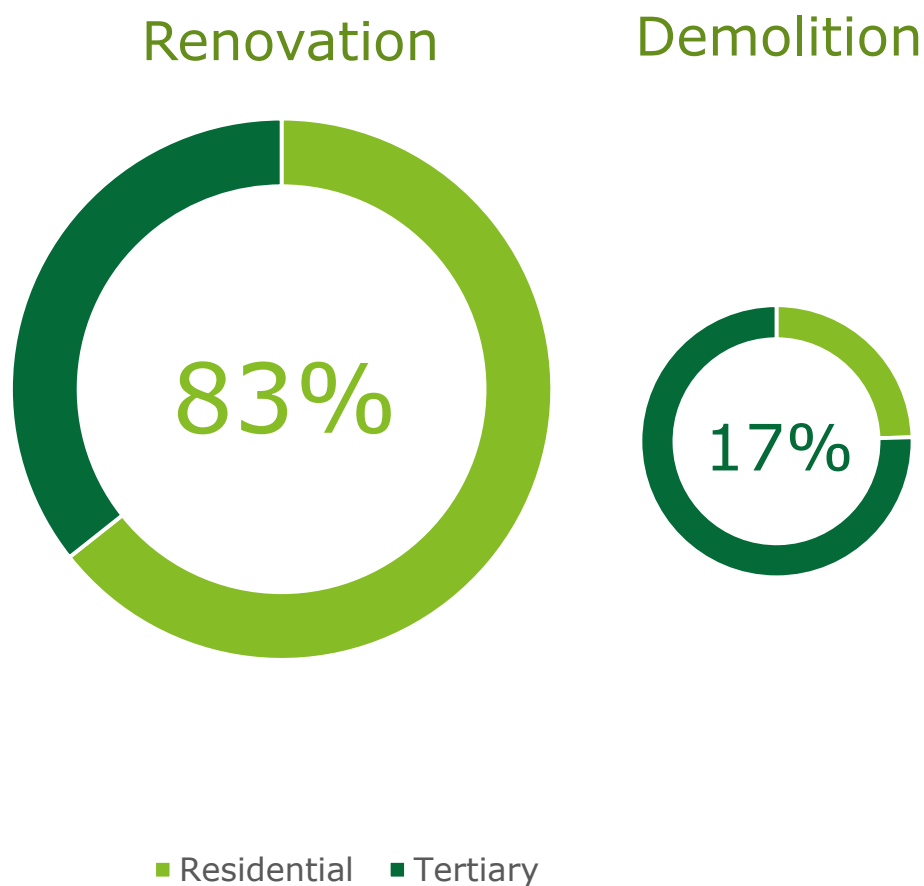
Evaluation of environmental benefits of building glass recycling

Cost-benefit analysis





# Quantification of building glass waste in the EU



An estimated 1,5 Mt of glass waste arising in the EU, from the renovation and demolition of buildings

# Case studies

## Building glass recycling in 6 EU countries



# Examples: France

## Partnership for building glass closed-loop recycling

**AGC, GTM Bâtiment, Veka  
Recycling, Veolia propreté,  
Isel:** « Revalo » window  
dismantling and recycling pilot



**Saint-Gobain, Lapeyre,  
Paprec:** experimentation of  
take-back at retail shops.

# Impacts of increased flat glass recycling

## Environmental impacts

**Recycling flat glass waste in the EU  
could lead to:**

**Reduction of 900,000 tons of  
waste landfilled**

**1.2 million tonnes of raw  
materials** (mainly sand) saved

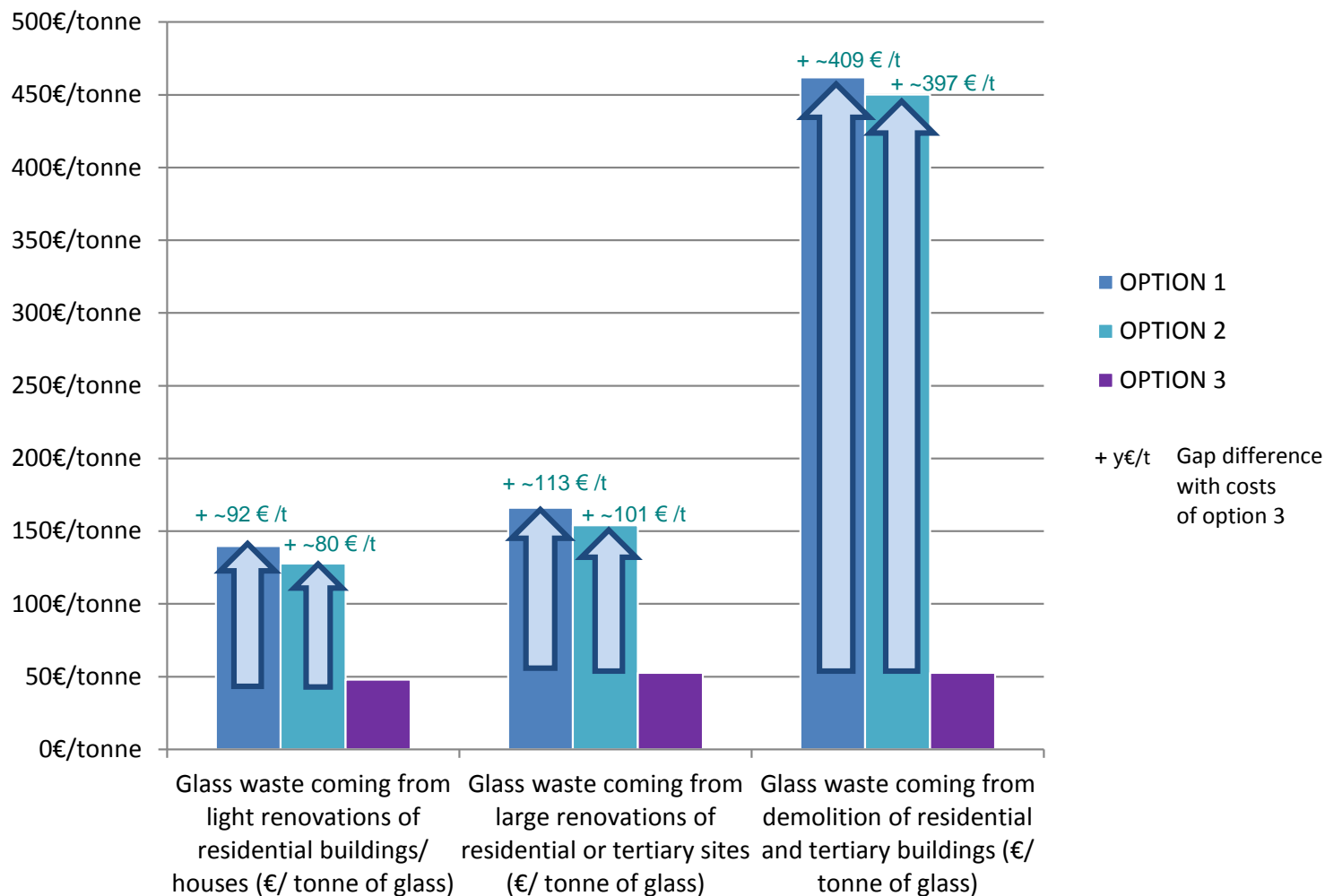
**~250kg CO<sub>2</sub> eq / tonne GHG  
emissions reduction**



# Impacts of increased flat glass recycling

## Economic impacts

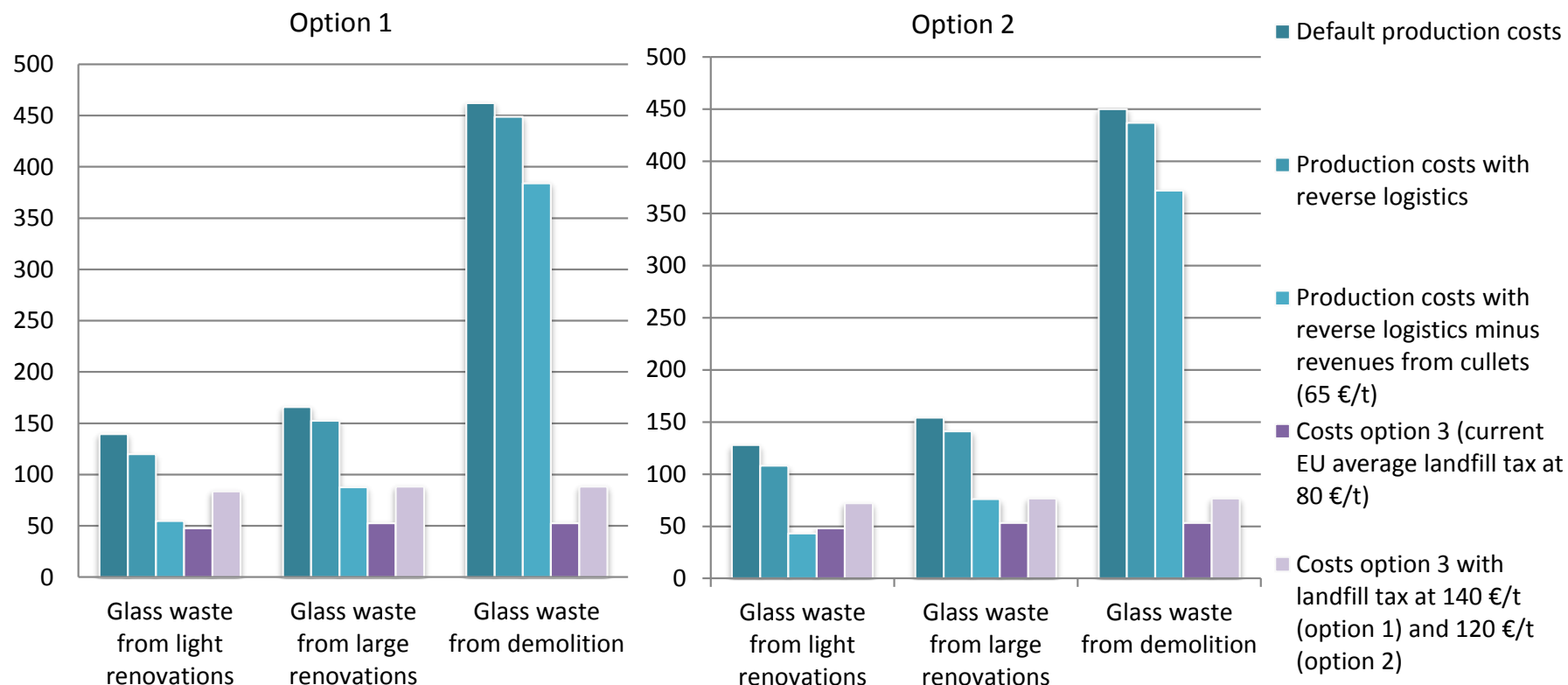
**An economic balance yet to be found (*Options 1&2: dismantling and recycling ; Option 3: BAU*)**



# Impacts of increased flat glass recycling

## Economic impacts

**Filling the gap: positive price for high quality glass cullets, optimising logistics and raising landfill taxes**



# Key take-aways



A clear environmental benefit from increasing flat glass recycling



An economic balance yet to find, but a potential net competitive advantage in the case of renovations (which account for 83% of the waste arising)

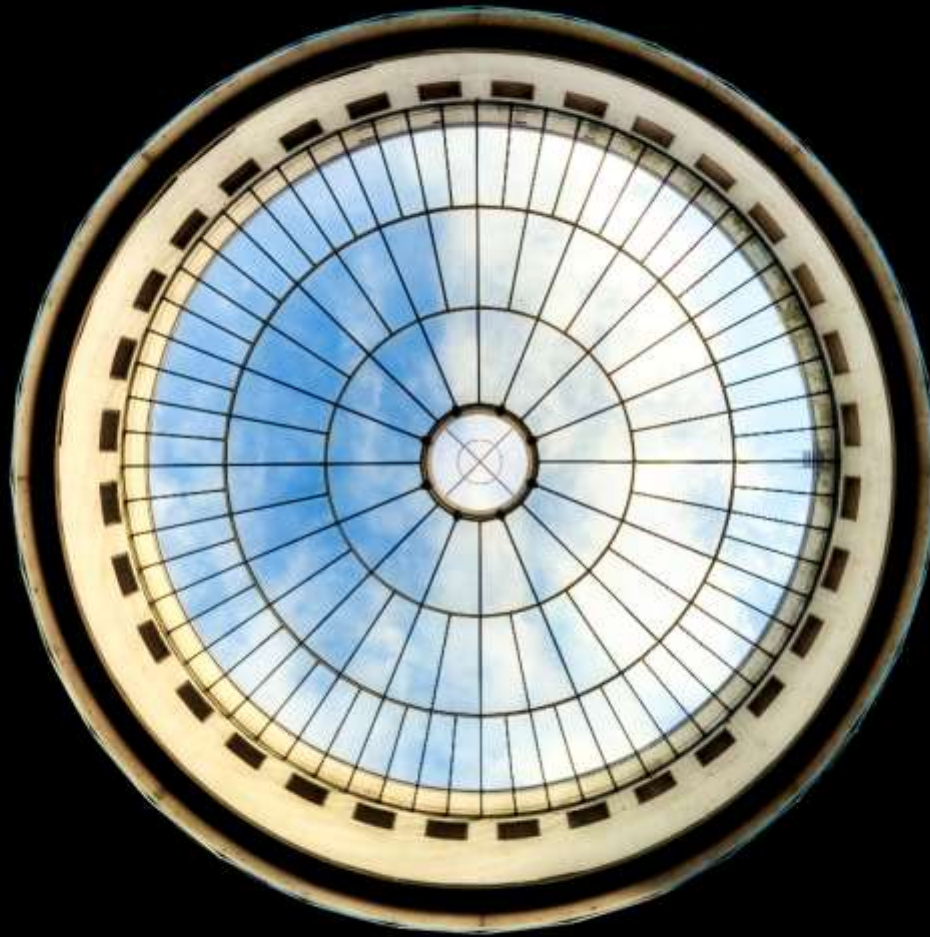


A large gap in the case of demolition activities, which need to be addressed taking into account the whole building, and incentivized through predemolition audits / selective demolition requirements



Local infrastructures are key to the development of building glass recycling (the economic balance is highly influenced by transportation costs).





**Thank you !**

Mathieu Hestin – [mhestin@deloitte.fr](mailto:mhestin@deloitte.fr)

Towards recycling of building glass in Europe – November 2016 - Brussels

# The Circular Economy Regional Program applied to Construction Waste

**Nicolas Scherrier**  
Project Manager  
*Bruxelles Environnement*

# The Circular Economy Regional Program applied to construction wastes



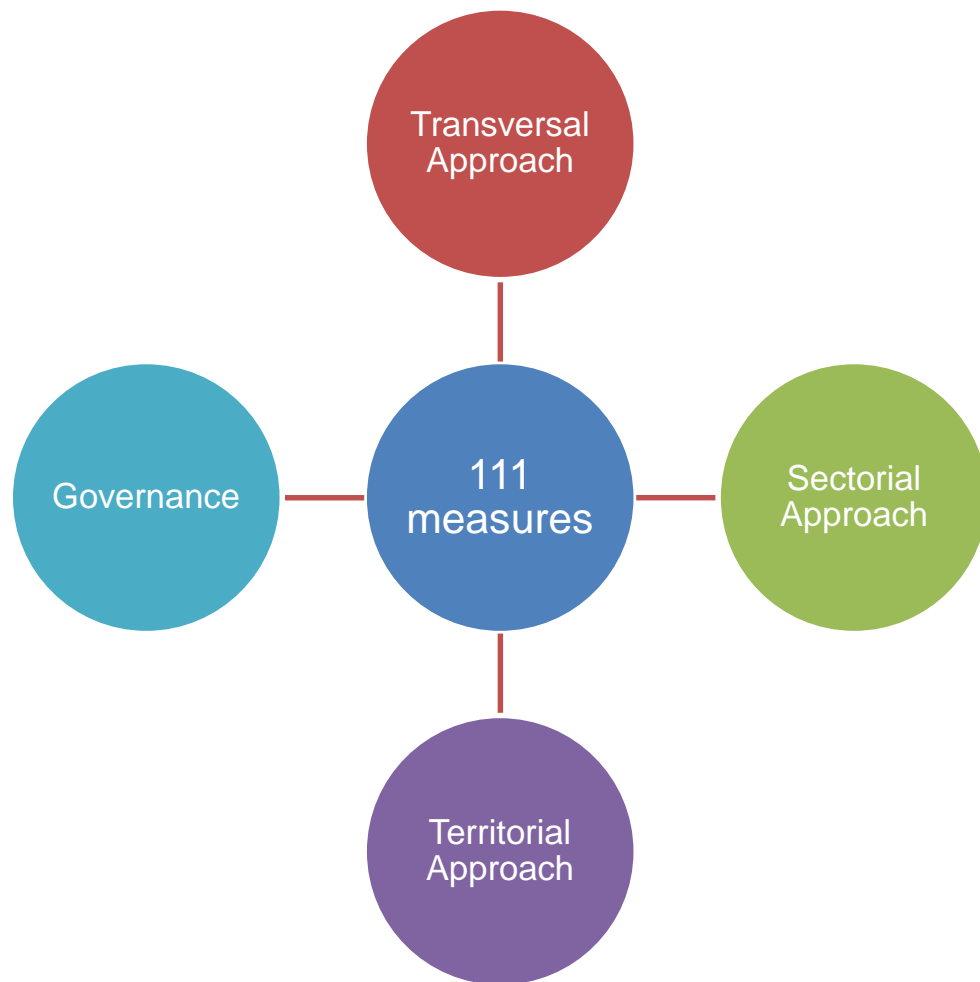
Nicolas Scherrier,  
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**Seminar: Towards recycling of  
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25 Nov. 2016 - Brussels, Belgium  
Info & Registration: [click here](#)



**BRUXELLES ENVIRONNEMENT**  
IBGE - INSTITUT BRUXELLOIS POUR LA GESTION DE L'ENVIRONNEMENT

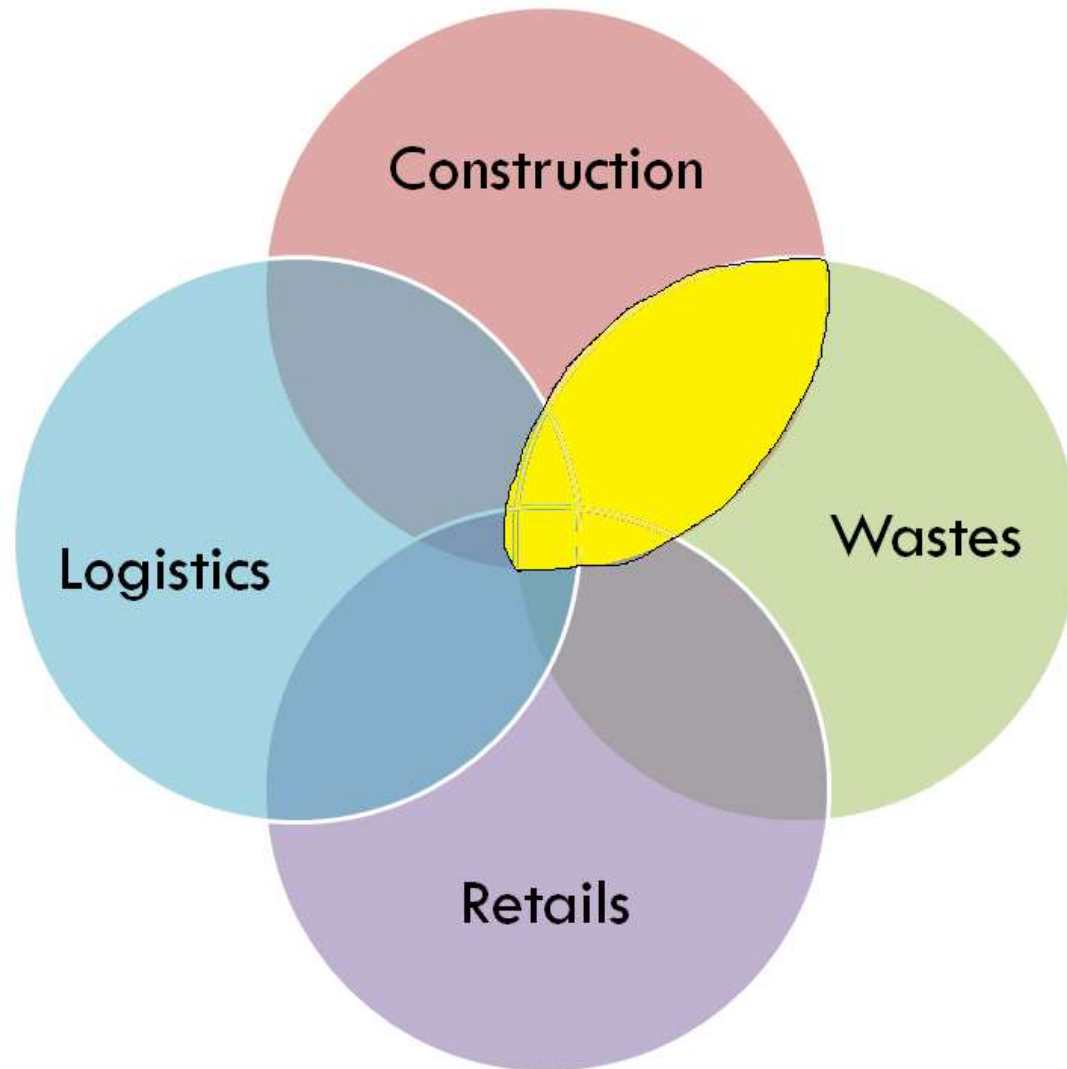
# PREC – Regional Programme of Circular Economy



## PREC

- A tool for economic stimulation
- Oriented towards economic activities and job creation
- Adopted on March 10th 2016 (3 ministers and 4 regional administrations involved)

# PREC – Sectorial Approach





# SEMI-LINEAR APPROACH OF C&D MATERIALS

Construction materials



650 000 T/an

Construction & Demolition waste

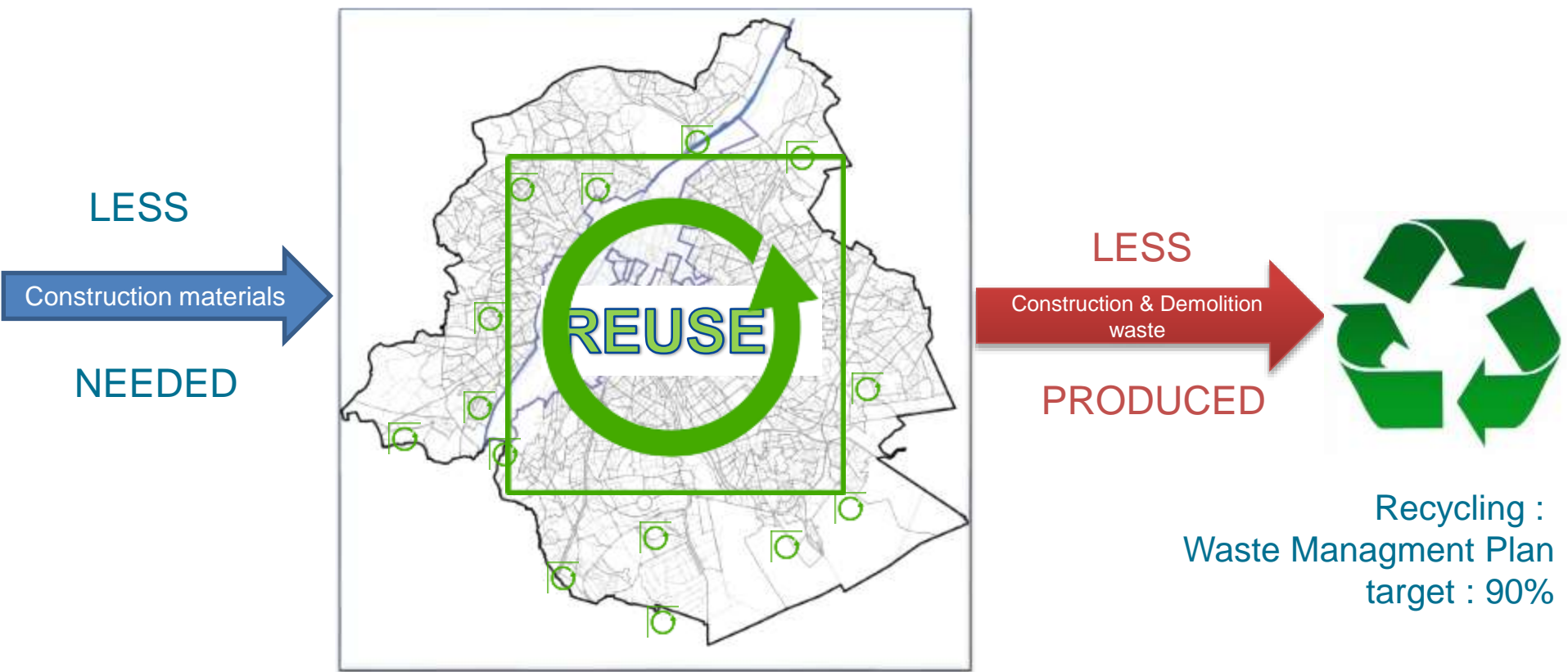


80-85% of D&CW are recycled

In Brussels : no C&D material production nor C&D waste recycling facilities  
Economy & jobs related to material production and waste management are outside Brussels



# CIRCULAR APPROACH OF C&D MATERIALS VIA REUSE



Recycling :  
Waste Management Plan  
target : 90%

Economy and jobs related to selective deconstruction , recycling and material reuse are in Brussels and can hardly be delocalized

Environmental impact on resources, waste management and transport are lower in a circular approach.



## 5 MEASURES ON CONSTRUCTION AND DEMOLITION WASTE / MATERIAL

**RW 13 : STIMULATION** of the construction sector via a **Call for Project** :

- Selective deconstruction and material reclaim
- Material reuse

**RW 14 : INNOVATION** on waste management and on site sorting via pilot projects.

**RW 15 : ACTIVATE** entrepreneurship on **REUSE** of construction material

**RW 16 : STIMULATION** of **RECYCLING** of construction wastes

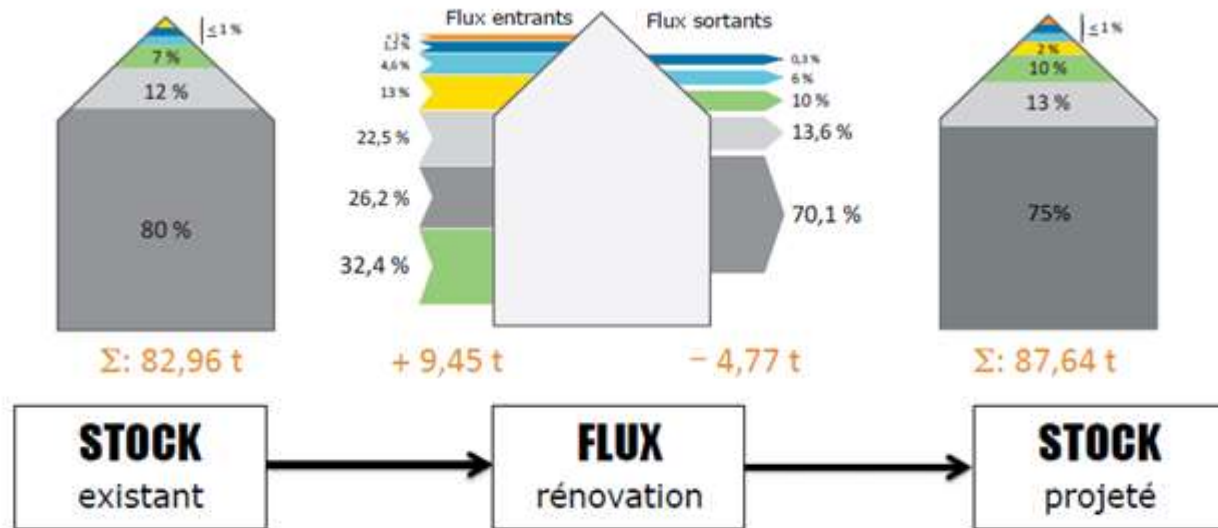
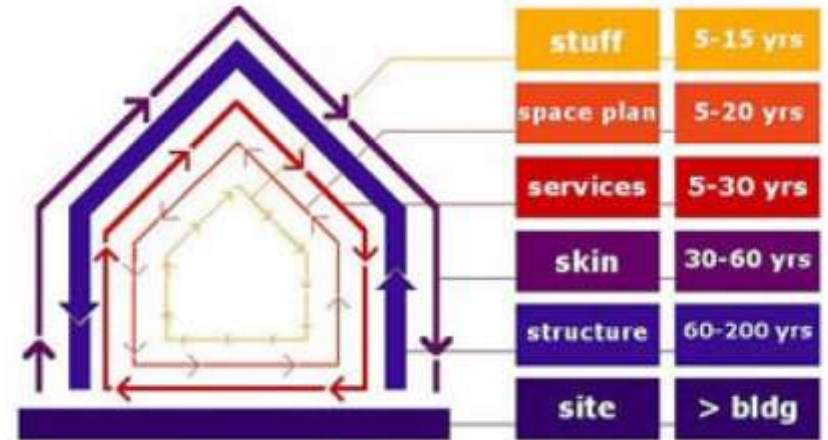
**RW 23 : SUPPORT** selective deconstruction in calls for tender



# STIMULATION via a Call for Project

9 retrofitting projects received, based on :

- Well thought constructive hierarchy
- Maintaining existing building blocks
- Maximisation of material reclaim
- Design for deconstruction
- Integrated management
- Rentability - Reproducibility



Source : E.Gobbo, *Déchets de construction, matières à conception*, UCL, 2015

# ACTIVATE entrepreneurship on REUSE

All actors active in Reuse of construction material (identified so far) plan to work together and with the construction sector in 2017 in order to :

1. Coordinate and animate the « **Reuse Network** »
2. **Communicate** around this network and its actions
3. Prepare **business models to further develop the network** and its actions
4. Identify and document **inspiring projects of Reuse** and the **professionals** who made it possible
5. Further develop [www.opalis.be](http://www.opalis.be) as a **numerical portal on Reuse**





# MATERIAL RECLAIM



All pictures from ROTOR ([www.Opalis.be](http://www.Opalis.be))



# MADE IN BELGIUM



All pictures from ROTOR ([www.Opalis.be](http://www.Opalis.be))





# BXL : OFFICES ELEMENTS



All pictures from ROTOR ([www.Opalis.be](http://www.Opalis.be))

# INNOVATION on waste management and on site sorting

- 11+ pilot projects
- Lead by the Belgian building research institute (CSTC/WTCB) and the construction confederation (CCCB/CBBH)



- Procedure is as follows :
  - Diagnosis of each project (including evaluation of the production of waste per waste stream)
  - Identification of major issues and possible solutions
  - Waste management plan

So far, projects are in the analysis phase, future steps include:

- Implementation of the waste management plan
- Data collection, analysis, recommendations



# STIMULATION of RECYCLING of CDW

- Ongoing study on **EoW criteria for concrete**, (and other inert CDW) to promote their recycling. The new law (BRUDALEX, work in progress) will allow the Region to edict such EoW criteria.
- A study has identified **active recyclers of Brussels' CDW** and a repository has been developed
- Actions on the **recycling of specific waste streams** (such as flat glass, gypsum, hazardous products) by Go4Circle will be supported

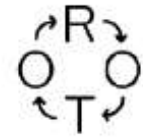
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# SUPPORT selective deconstruction in calls for tender

- Long term action
- So far : vademecum on how a public owner can direct specific material to reuse (ready to use technical and legal documents), made by ROTOR.



4 routes have been developed :

*SERVICE TENDERS*

*SALE*

*DONATION*

*OBLIGATION OF MEANS (for the general contractor)*

[http://assets.opalis.be/vademecum/Vademecum\\_extraire\\_les\\_materiaux\\_reutilisables\\_updated.pdf](http://assets.opalis.be/vademecum/Vademecum_extraire_les_materiaux_reutilisables_updated.pdf)

[http://rotordb.org/project/2015\\_Vademecum\\_Deconstruction](http://rotordb.org/project/2015_Vademecum_Deconstruction)



# Thank you for your time

More info :

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& <http://www.environnement.brussels>

&





**Chris Holcroft**  
Senior Technologist  
*Glass Technology Services*

**&**

**Valli Murthy**  
Environmental Advisor  
*British Glass*



FOSTERING INDUSTRIAL SYMBIOSIS FOR A  
SUSTAINABLE RESOURCE INTENSIVE INDUSTRY ACROSS  
THE EXTENDED CONSTRUCTION VALUE CHAIN

# Recycling of Building Glass in Europe

## Project overview

Chris Holcroft and Valli Murthy



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 642154.



- Horizon 2020 funded project ~€11M
- 27 European Partners from 9 countries
- Project aims to close loop recycle all types of construction waste.
  - Glass
  - Wood
  - Ceramic
  - Plastics
  - Rubber
- British Glass and GTS are leading on glass to increase recycling for both remelt and higher value alternative uses in particular Ecocement products.
- Sept 2015 – Feb 2020

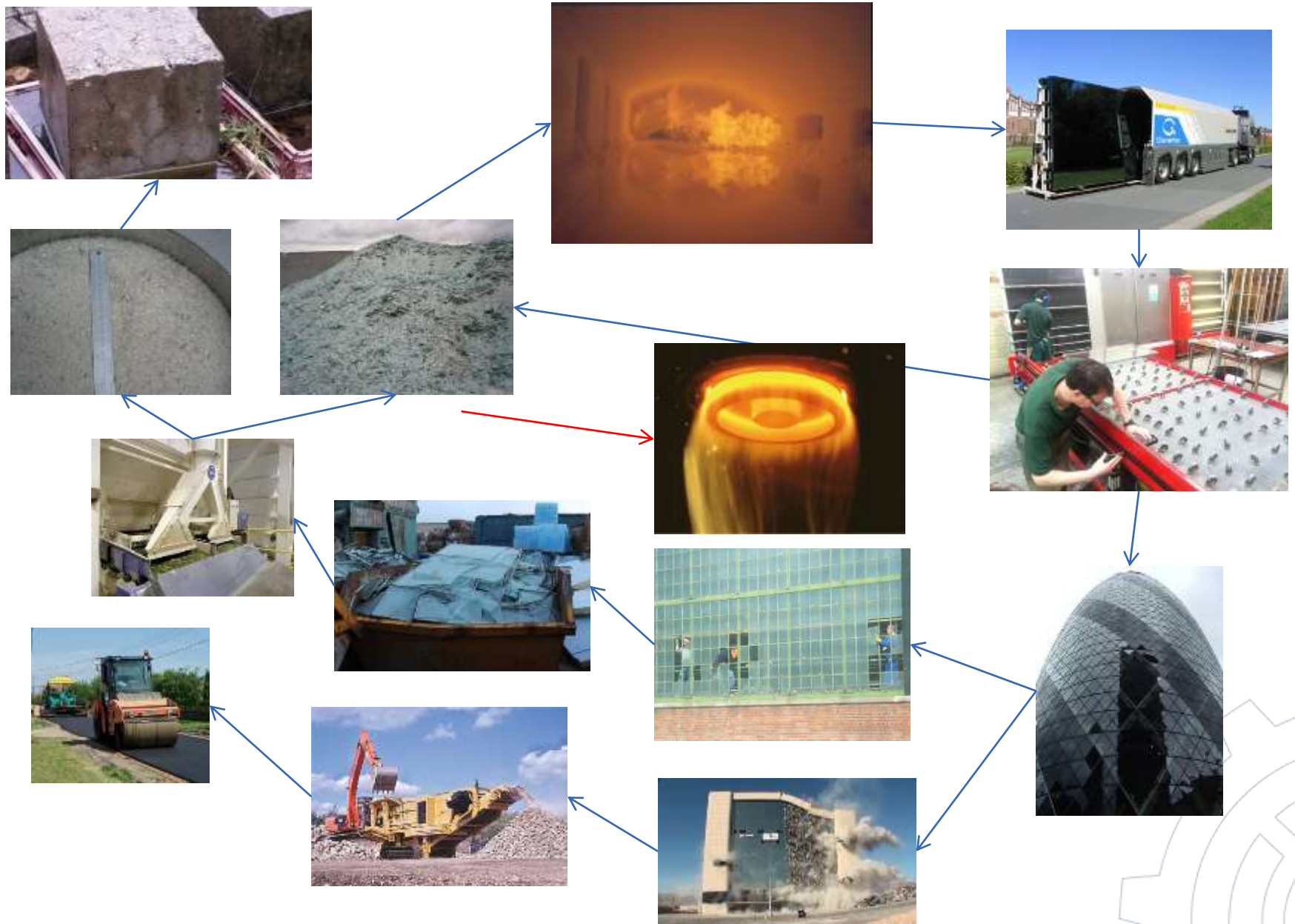




KERABEN GRUPO



# FISSAC Glass Supply Chain



2015

2020

Review of  
markets  
-availability  
-stakeholders  
-current levels

Collection and  
recycling  
processes  
-Case studies  
-Interviews  
-Barriers  
-Legislation and  
regulations

Environmental  
assessments

Design for  
deconstruction  
and recycling

Technology  
Previous work  
Lab trials  
Pilot trials

Dissemination  
and education

Software tool

Living Labs

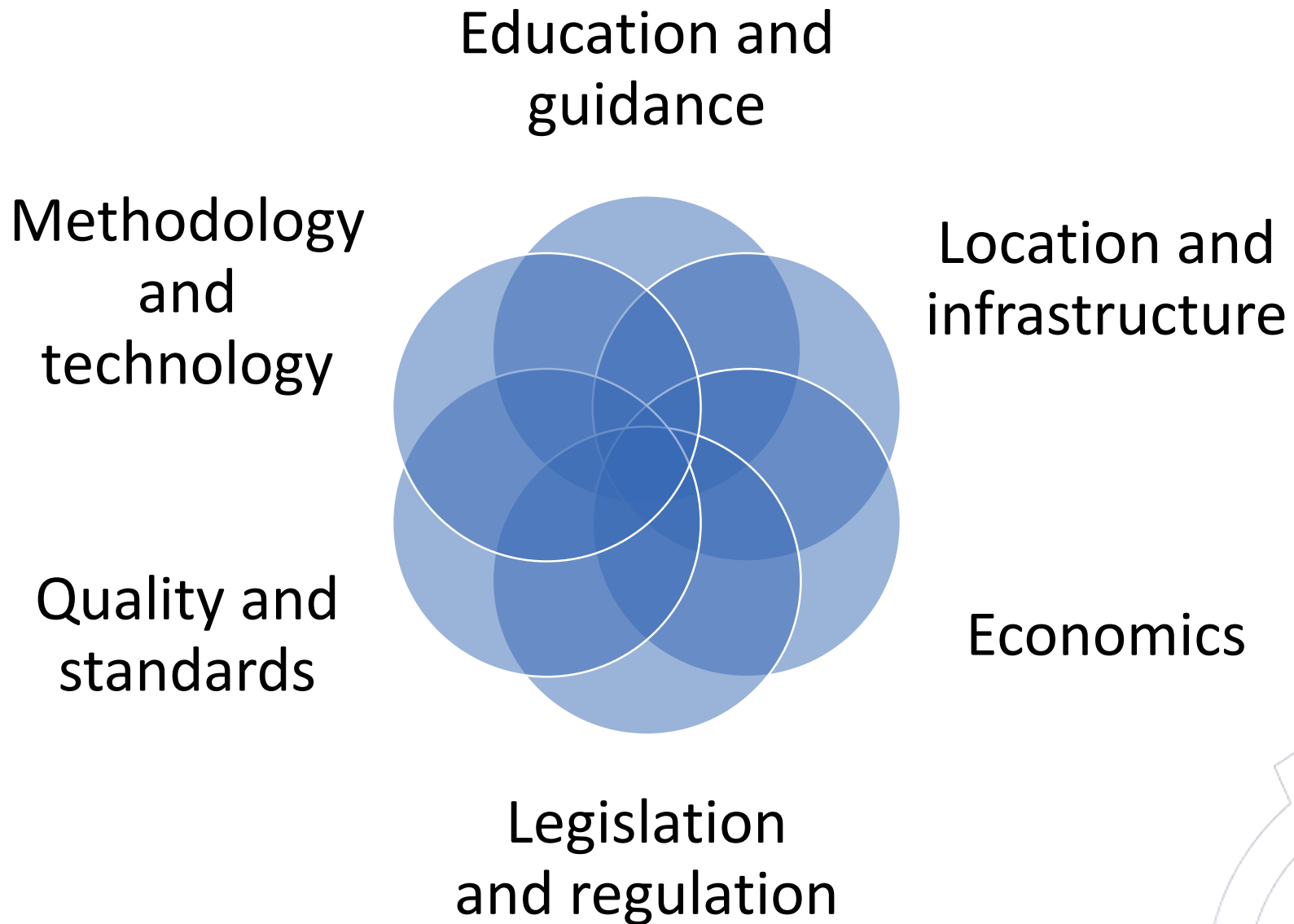




# Benefits of Recycling Glass

- 🌱 Saves 1.2 tonne raw materials
- 🌱 Energy                      Saves 322 kWh
- 🌱 CO2                         Saves 185 kg batch + 61kg fuel
- 🌱 Air emissions             Reduces dust and other pollutants





<p><u>Recyclers</u></p> <ul style="list-style-type: none"> <li>• A “blueprint” for recycling is needed</li> <li>• Explaining the importance of closed loop recycling</li> <li>• Individual companies and managers have strong personal preferences.</li> <li>• If they can’t be bothered, it is difficult to recover good glass.</li> <li>• Site managers are important to influence</li> <li>• Education is important</li> </ul>	<p><u>Glass manufacturers</u></p> <ul style="list-style-type: none"> <li>• Many different people and contractors on a construction site; co-ordination and communication are challenging</li> <li>• Motivation i.e. persuading people to act on knowledge, is also a challenge.</li> </ul>
<p><u>Other interested parties</u></p> <ul style="list-style-type: none"> <li>• Lack of information is a big barrier to recycling more flat glass.</li> <li>• There is a perception that glass is ‘difficult to recycle’. People are confused about contamination, and it is difficult to find places that accept glass.</li> <li>• More concrete information to help them with this.</li> <li>• We need to raise awareness.</li> <li>• Many people just do what they have always done; it is young people who change things.</li> </ul>	<p><u>Construction and demolition</u></p> <ul style="list-style-type: none"> <li>• Demolition contractors don’t know where to recycle the glass.</li> <li>• General assumption is that it is not cost effective, it is not normal practice.</li> <li>• ‘If you ask a demolition contractor if they recycle glass, they will say they don’t know where to do it or who will take it.’</li> <li>• The client has a big influence in how things are done because they specify the results. A client putting closed loop glass recycling as a condition in their contract would make things happen – especially in cases where it isn’t commercially viable to recycle glass which is believed to be the majority of instances.</li> </ul>

<p><u>Recyclers</u></p> <ul style="list-style-type: none"> <li>• Construction sites may not have the man power to separate windows</li> <li>• At the end of the day, it is down to the people on site – if they can't be bothered, it is difficult to recover good glass.</li> <li>• Storage - Space on site is a big barrier. A project may only have space for 3 skips for all waste materials.</li> <li>• Some glaziers don't have any space at all for skips and have to store old windows in their vans.</li> <li>• H&amp;S – Processing glass on their site may not make sense once you factor in H&amp;S and cost of PPE.</li> <li>• Construction sites may not have the man power to separate windows</li> <li>• 1 person would have to break glass units all day to get a tonne of glass.</li> </ul>	<p><u>Glass manufacturers</u></p> <ul style="list-style-type: none"> <li>• Operational obstacles and making it pay will be barriers. There are lots of different people and contractors on a construction site; co-ordination and communication are challenges.</li> </ul>
<ul style="list-style-type: none"> <li>• <u>Other interested parties</u></li> <li>• We try to make recommendations on material disposal in pre-demolition audits. Glass is more difficult to deal with than other materials.</li> <li>• Time and space constraints often cited as reasons for not separating glass</li> </ul>	<p><u>Construction and demolition</u></p> <ul style="list-style-type: none"> <li>• In their demolition projects, windows are removed manually with a crowbar.</li> <li>• If the project is on the ground floor, it may be possible to take it to a skip.</li> <li>• Even if it is 1 storey up, there will be a drop zone/shaft to drop heavy things, like windows, and this is where the glass gets smashed. The process is rough but it doesn't matter because they are not reused and their value doesn't change.</li> <li>• Have to designate a dedicated area, separate the glass, transport the glass etc. It doesn't have enough value.</li> </ul>

<u>Recyclers</u> <ul style="list-style-type: none"><li>• Got to treat it like a high value product, but it isn't worth that level of treatment'</li><li>• Very high quality standards from flat glass manufacturers</li><li>• Individual companies and managers have strong personal preferences on quality</li></ul>	<u>Glass manufacturers</u> <ul style="list-style-type: none"><li>• Quality is more important than volume is their experience.</li></ul>

Recyclers

- Need legislation banning from landfill
- Regulations need to be enforced to work
- Definitions: UK is the only country in EU which describes glass to aggregates as 'recycled'.
- If there was an incentive to recycle
- Landfill ban of glass
- Putting clauses that glass must be recycled into the contract would be good

Glass Manufacturers

- Motivation i.e. persuading people to act on knowledge, is also a challenge.



<p><u>Recyclers</u></p> <ul style="list-style-type: none"> <li>• Got to treat it like gold, but it doesn't have the value of gold'</li> <li>• Putting clauses in contracts that glass must be recycled to level the playing field for companies doing the right thing</li> <li>• Transport cost is key</li> <li>• H&amp;S – Processing glass on their site may not make sense for WT once you factor in H&amp;S and cost of PPE.</li> <li>• Low value of glass compared to time required for processing – 1 person would have to break glass units all day to get a tonne of glass.</li> <li>• Space and time constraints</li> </ul>	<p><u>Glass manufacturers</u></p> <ul style="list-style-type: none"> <li>• Motivation</li> </ul>
<p><u>Other interested parties</u></p> <ul style="list-style-type: none"> <li>• Solutions must be cost neutral, easy and quick. Construction companies need to be efficient with costs and time, and often hire one waste management contractor to do everything.</li> <li>• There needs to be a financial benefit,</li> <li>• Lack of value – If the demolition industry see a value for glass, they will take it out.</li> <li>• Lack of market a barrier</li> </ul>	<p><u>Construction and demolition</u></p> <ul style="list-style-type: none"> <li>• They want us to split it into 2 panes and it is not profitable to do this.</li> <li>• It all comes down to cost</li> <li>• We sell the metal. We want someone to take the glass off us for money.'</li> <li>• A client putting closed loop glass recycling as a condition in their contract would make things happen – especially in cases where it isn't commercially viable</li> <li>• Glass is a very small percentage of the crushed material and doesn't need to be there – there is just nothing better to do with it at the moment that is convenient and financially viable.</li> <li>• When he has spoken to recyclers, they say they will take it for nothing. But he has to designate a dedicated area, separate the glass, transport the glass etc. He won't recycle glass under these circumstances – it doesn't have enough value.</li> <li>• It is not economically viable to recycle glass unless there is a credit value for it or the client asks for it and bears the cost.</li> </ul>

Recyclers

- Construction sites may not have the man power to separate windows

Other interested parties

- It is difficult to find places that accept glass

Construction and demolition

- If you ask a demolition contractor if they recycle glass, they will say they don't know where to do it or who will take it.
- We don't recycle because we don't know where.

## Barriers

- Lack of knowledge
- Contamination levels
- Lack of data
- Low price of finished material
- Cost of processing
- Lack of regulation/enforcement of regulation

## Opportunities

- Education/guidance programs
  - Better/new regulation
  - Infrastructure development
  - New technology
- 

# Contact



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British Glass

Valli Murthy- British Glass- [v.murty@britglass.co.uk](mailto:v.murty@britglass.co.uk)

<http://fissacproject.eu/en/>



**Any questions?**  
*Now's the time to ask them!*

**Time for some coffee!**

- 30 minute break -

After the break:

*Session 2: What works and what doesn't?*



## Session 2: What works and what doesn't?

# Collecting and Recycling of Sheet Glass – a Step Forward to a Circular Economy

**Cor Wittekoek**

Director

*Vlakglas Recycling Nederland*



## **Collecting and recycling of sheet glass - a step forward to a Circular Economy**

[www.vlakglasrecycling.nl](http://www.vlakglasrecycling.nl)





## Structure of Vlakglas Recycling Nederland (VRN)

2002: funding of Vlakglas Recycling Nederland, voluntary initiative of the Dutch Glass Industry

Reason: to meet the producer Responsibility (EPR)

Foundation: Non-profit

Board

Office: Zoetermeer, the Netherlands



## Structure of VRN in 2015

- Network of 403 collection points
  - Located at/near: sheet-glass manufacturers, sheet-glass processing companies, sheet-glass wholesalers, container firms
  - Free disposal of sheet-glass waste
  - Collection points have no costs
- Rental locations at/near +/- 326 companies
  - For their own use - monthly fee is payable
- 531 temporary locations per year
  - At demolition or renovation sites - a monthly fee is payable
- 192 collection points at waste park
  - Located at municipal waste disposal points
  - Free disposal of sheet glass waste







## Financing

*Recycling levy is € 0,40 for every m<sup>2</sup> of insulated glass*

- Produced in or imported into the Netherlands
- Introduced by the Ministry of Housing, Spatial Planning and the Environment
- Around 277 participants
- A few foreign manufacturers (8) who pay the levy as a gesture to and on behalf of their customers



## Financing

- Levy collected by independent firm of accountants
- Confidentiality
- Random checks at ten companies conducted every year by our accountant
- Legal enforcement by VRN



# Recycling and re-use of sheet glass waste

## Results

2014: 69,415 ton sheet glass cullet collected

2015: 69.998 ton sheet glass cullet collected

*Destination of the waste sheet glass  
Average result 2013-2015, re-used in:*

- |                        |     |
|------------------------|-----|
| • Sheet glass industry | 11% |
| • Insulation products  | 19% |
| • Packaging industry   | 69% |
| • Others               | 1%  |





## Collection results(ton)

Glass type	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
Combination glass	58,890	57,670	60,277	66,809	70,179	60,860	75,065	67,506	69,263	63,113
Laminated glass	6,114	6,259	7,674	9,121	10,239	17,178				
Float glass	4,740	5,110	6,452	8,978	7,812	7,688	6,918	5,341	4,257	1,544
Green houses glass	170	32			423	369				
Mirror	32	231	339	301	159	47	40	121	252	800
Contaminated (dirty) glass	52	113	79	381	339	658	467	462	294	205
<b>Totaal</b>	<b>69,998</b>	<b>69,415</b>	<b>74,821</b>	<b>85,590</b>	<b>89,151</b>	<b>86,000</b>	<b>82,490</b>	<b>73,460</b>	<b>74,044</b>	<b>65,662</b>

## CO<sub>2</sub>- reduction through recycling and re-use of waste sheet glass

- VRN received the Lean and green Award and the Lean and Green Star award: 20% CO<sub>2</sub>-reduction through the transport of waste sheet glass.
- In 2015 VRN transported +/- 40,347 ton by vessel.  
Two locations in the Netherlands to where waste sheet glass is shipped by vessels.



## CO<sub>2</sub>- reduction through recycling and re-use of sheet glass

*Result recycling of sheet glass waste*

In 2015 VRN collected **69.998 ton** of sheet glass waste.  
This results in a CO<sub>2</sub> reduction of 8.120.000 kilogram.







## Collection and recycling of waste sheet glass from C&D projects





## Collection and recycling from waste sheet glass from C&D

- VRN participates together with other branch organisations in a project.
- Aim of the project : collect and recycle more window frames including sheet glass from demolition and renovation.
- Each year estimative 5.000 to 10.000 ton sheet glass waste is not collected from demolition projects (figures 2011).





## Collection and recycling from waste sheet glass from C&D

In 2014 : change of the Dutch Building Decree

- Article 4.1 : sheet glass with or without window frame is now also mentioned on the list of waste streams that have to be separately collected at demolition sites, to be recycled afterwards.
- No good law enforcement / control yet available.





## Collection facilities – also available at C&D sites



Dimensions: 6 x 2 x 1.10 m  
Height is appropriate for safe disposal  
of glass



Volume 0.5; 1; 2m<sup>3</sup>



Closed container: safe for the  
surrounding area and reduces  
the chance of contamination





## Other developments/projects

- Research into setting up collection structure in other countries
- Research into collecting and recycling glass grit



## Communication channels

- Newsletter
- Flyer
- Training
- Website
- Annual report
- Participation at trade fairs
- Twitter





# Insights on the Recycling of Flat Glass and Flat Glass Recycling Activities of FERVER members

**Marc Uphoff**  
General Manager  
*Reiling Glas Recycling*

Insights on the

# **RECYCLING OF FLAT GLASS**

and flat glass recycling activities of **FERVER** members

Marc Uphoff



**Reiling Glas Recycling GmbH & Co. KG**  
**GERMANY**



- Current activities of FERVER members
- Why (flat) glass recycling ?
  - Types of flat glass and flat glass collection
  - Challenges in flat glass processing
    - Main processing steps in flat glass recycling
    - Main applications for processed flat glass
    - Quality demands of glassworks
    - Outlook and conclusions



### Members have :

- NO activity in collection / processing
- Activities in collection
- Activities in collection and processing
- No FERVER members, not specified

**42 Members**

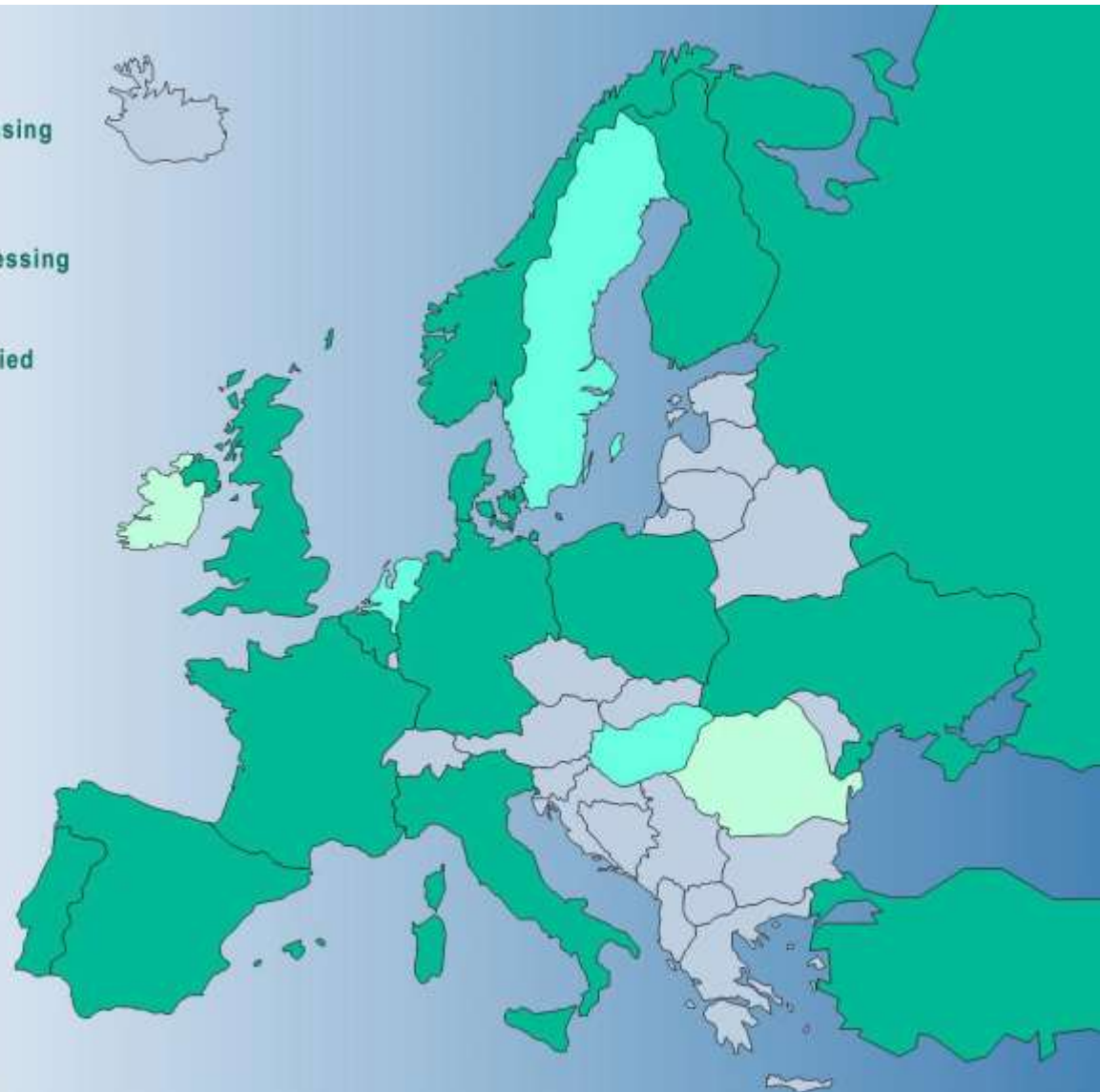
### 79 Recycling plants

Packaging glass	: 40
Flat glass	: 8
Both	: 31

**Recycling of  
70 % of European glass waste**

**= 8.6 Mio tons**

Packaging glass	: 6.8 Mio tons
Flat glass	: 1.8 Mio tons



## FLAT GLASS RECYCLING makes SENSE !

It protects the environment !



- Saving energy



- Conserving resources



- Reducing CO<sub>2</sub>-emissions



- Reducing further emissions



## FLAT GLASS RECYCLING makes SENSE !

It helps economy !



- **Saving energy ...costs !**



- **Reducing emission ...costs !**



- **Increasing productivity („pull“) !**



- **Extending the lifetime of furnaces !**





## CLEAN FLOAT GLASS

- Pre-consumer glass waste
- Glass producers
- Best cullet quality



## LAMINATED SAFETY GLASS

- Pre-consumer glass waste
- Glass producers
- A challenge: the removal of the PVB-foil !

## CAR WINDSCREEN GLASS

- Pre- and post-consumer glass waste
- „Greenish“ glass type (ferric oxide)
- A challenge: PVB-foil and rubber !



## MIXED FLAT GLASS (Isomix)

- Pre and post-consumer glass waste
- Biggest volume in flat glass recycling
- A challenge: a lot of different impurities !



And...

## IN TERMS OF QUALITY . . .

- Only specialised companies should collect the glass !
- Glass recyclers should do the inspection of the glass !
- Glass recyclers should decide further processing and use !



We don't want . . .

## LANDFILL FLAT GLASS !

- Quality can be destroyed by wrong handling !
- This glass is lost for the recycling loop !



„**TOP 4**“ of contaminants in collected flat glass waste :



c.s.p.



glass ceramics



metals (f, nf)



plastic, wood, ...



It's a hard job anyway . . .

from  
feedstock quality

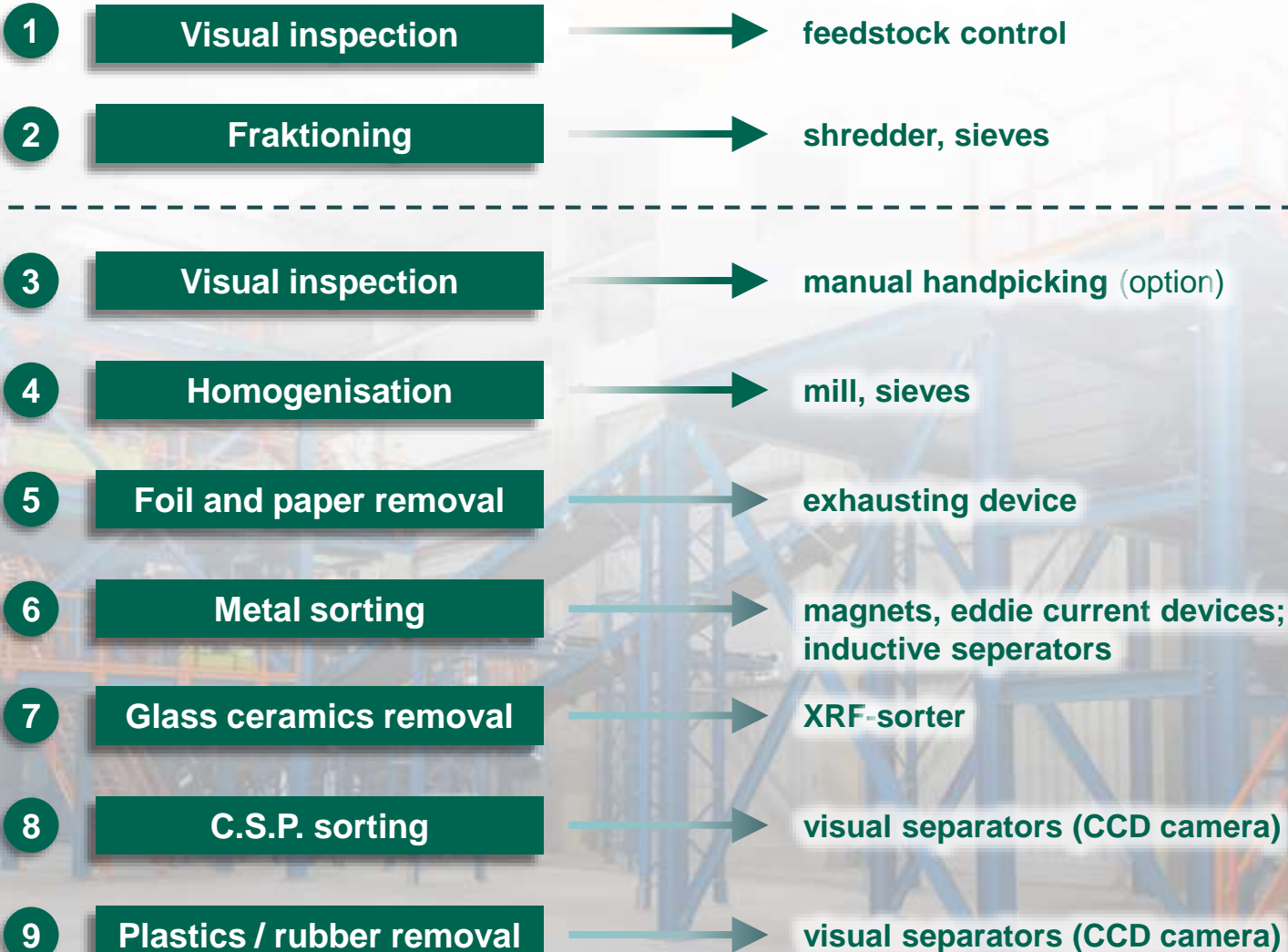


## FLAT GLASS PROCESSING LINE

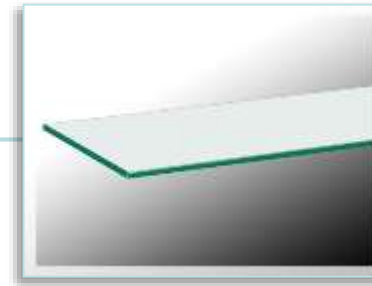
to  
cullet quality







- **FLAT GLASS**



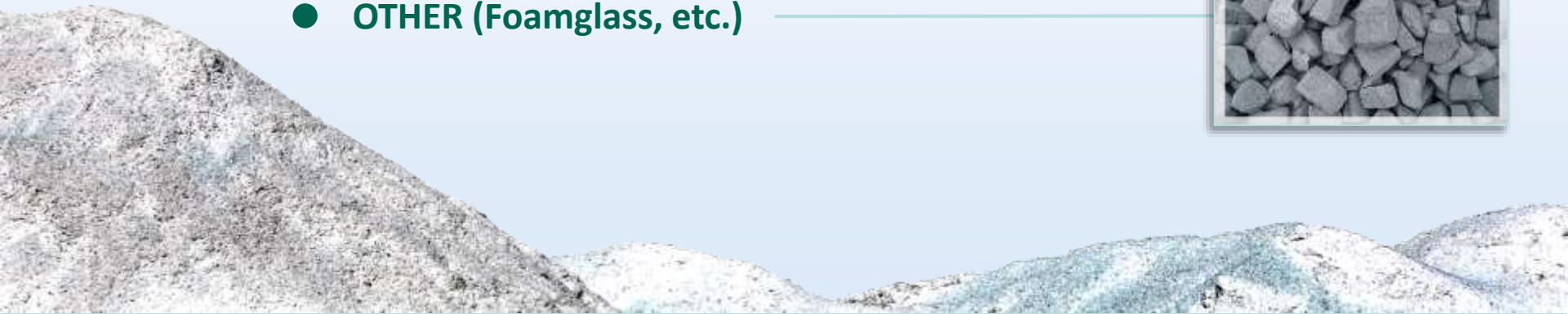
- **GLASS BEVERAGES (bottles)**



- **FIBERGLASS (e.g. insulation)**



- **OTHER (Foamglass, etc.)**





**FLAT GLASS**

**+ 20 %**

**PACKAGING GLASS**

**+ 30 %**

**FIBERGLASS**

**+ 50 %**

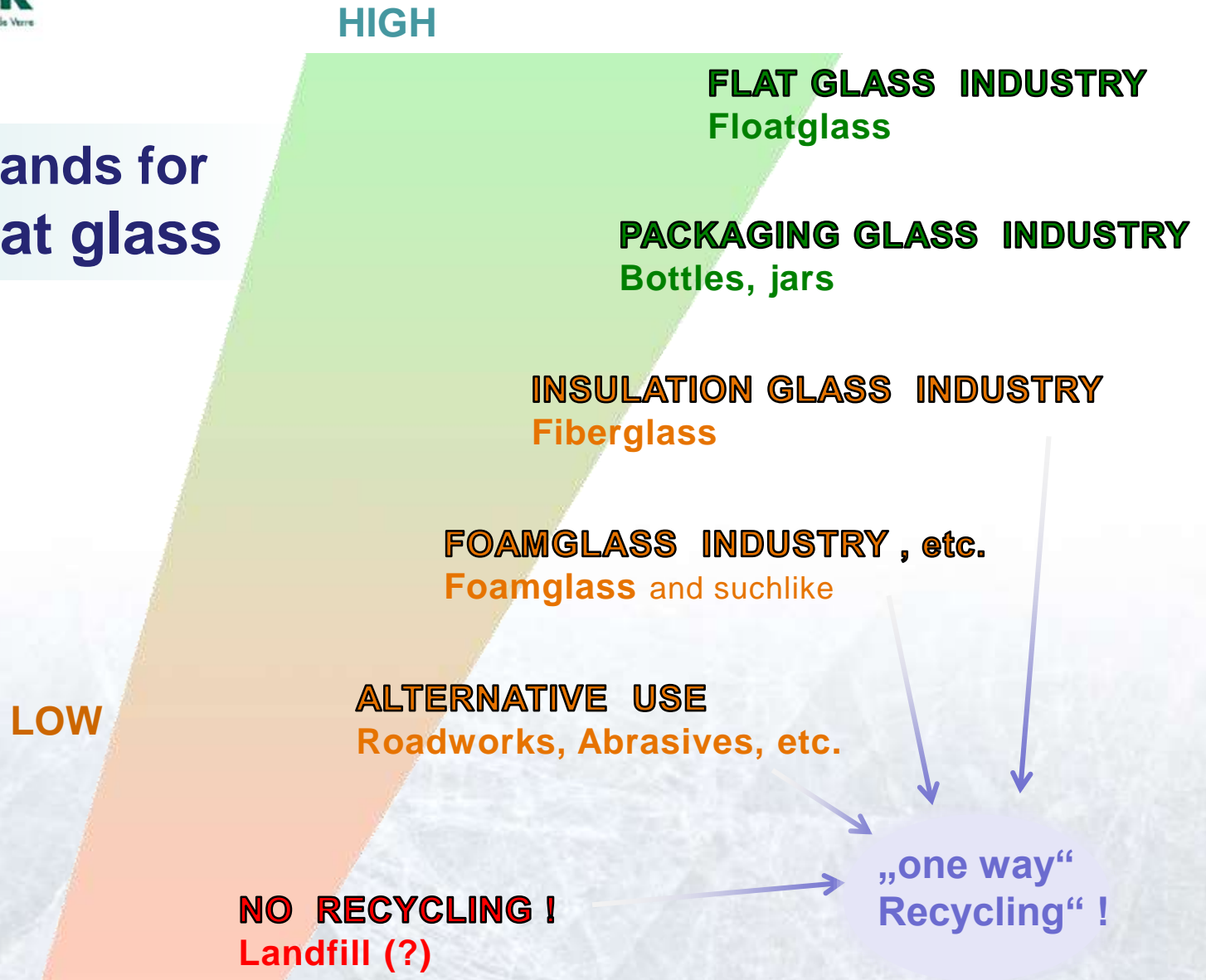
**FOAMGLASS** and suchlike

**+ 50 %**

**PROCESSED FLAT GLASS**

**Ca. Cullet share  
in production processes**

## quality demands for recycled flat glass





- Flat glass recycling makes sense !
- Experience and recycling capacities are sufficient !
- Better eco-design for windows !
- Collection has to be done by specialised companies !
- Recycling companies should decide the applicability of waste glass !
- **Rubbish In – Rubbish Out !**

# THANK YOU !

Marc Uphoff



**Reiling Glas Recycling GmbH & Co. KG**  
**GERMANY**

Two Brussels' Initiatives:  
*1. Windows Frame and Flat Glass  
Recycling in Brussels-Capital Region*

**Alexandre Halbrecq**  
Manager High 5 & Minerale  
*SUEZ*



# Windows frame and flat glass recycling in Brussels-Capital Region

25 november 2016



ready for the resource revolution





# 1. Project City Green Glass & Windows

**In November 2014, project "Collection and sorting of windows frames & flat glass" launched by Go4Circle with a view to setting up a selective deconstruction system or collection or sorting of the windows and flat glass wasteflow in Brussels.**

**Suez and Minerale get approved !!**

## **1 . Initial characteristics and achievements**

- **March 2015:       Market study has demonstrated the interest and the feasibility**
- **April 2015        Development of an operational zone at the SUEZ Laeken allowing the sorting and recycling of windows frames.**
- **From june 2015   Organize administratively, operationally and commercially the collection and direct deliveries from customer to recycling site.**
- **Data collection to feed outcome indicators**

# 1. Project City Green Glass & Windows

## 2. Objectives:

- The identification and centralization of data on the potential market
- The development of selective collection and thus actively participate in a new recycling activity in the Brussels-Capital Region
- To offer the various market players an integrated solution for the collection, sorting and maximization of recycling.
- To allow Minerale S.A. to develop its flat glass recycling business to meet the constant and increasing demand for flat glass for the glass industry.

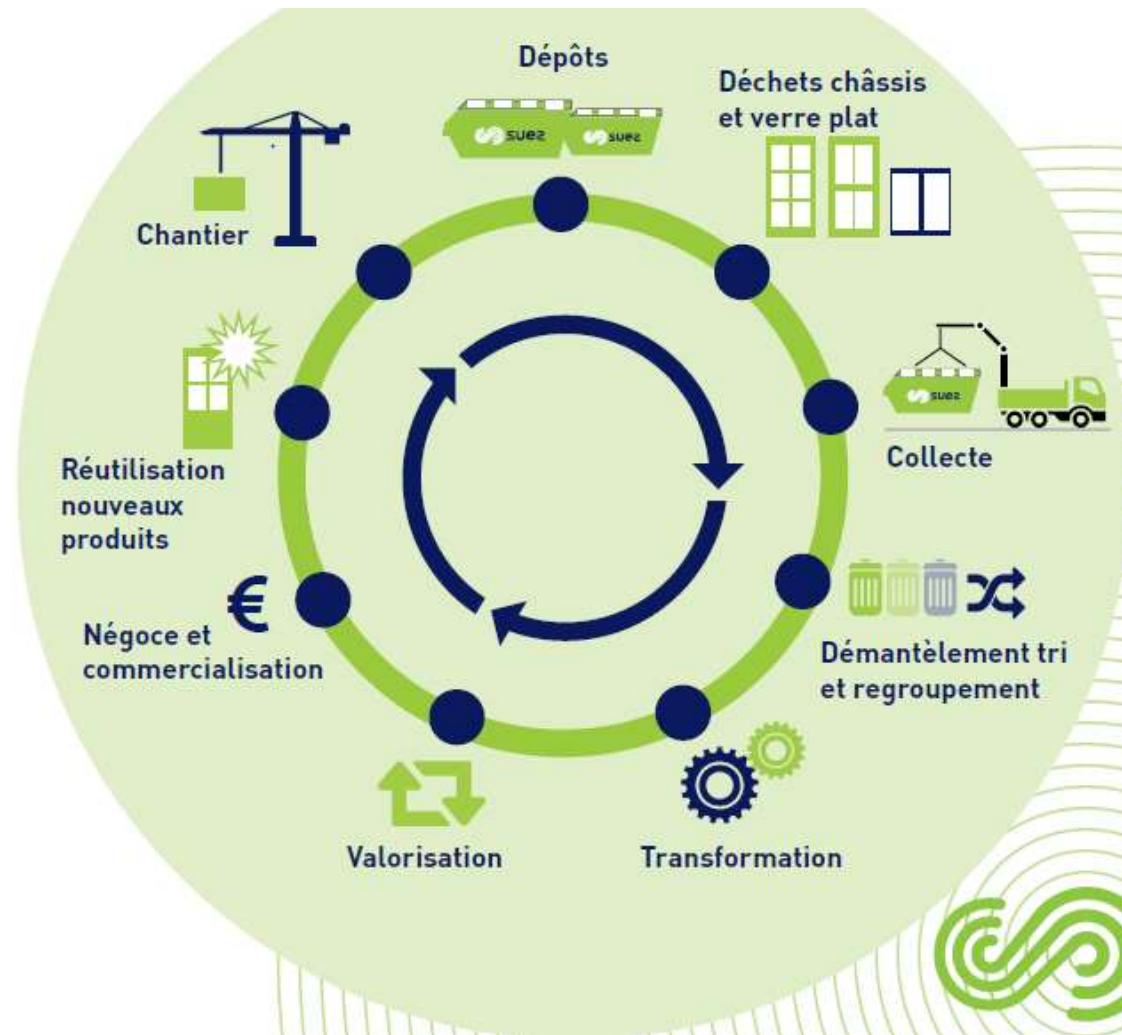


# 1. Project City Green Glass & Windows

## 3. Advantages for the market:

-> optimization of recycled waste quantities

-> financial saving (reduction of the processing costs generated).



## 2. Sorting and recycling of windows frames and flat glass

### 1. Dismantling of frames in 4 recyclable fractions

### 2. Recycled or recovered fractions

- Flat glass
- Wood
- PVC
- Metal
- + residual fraction

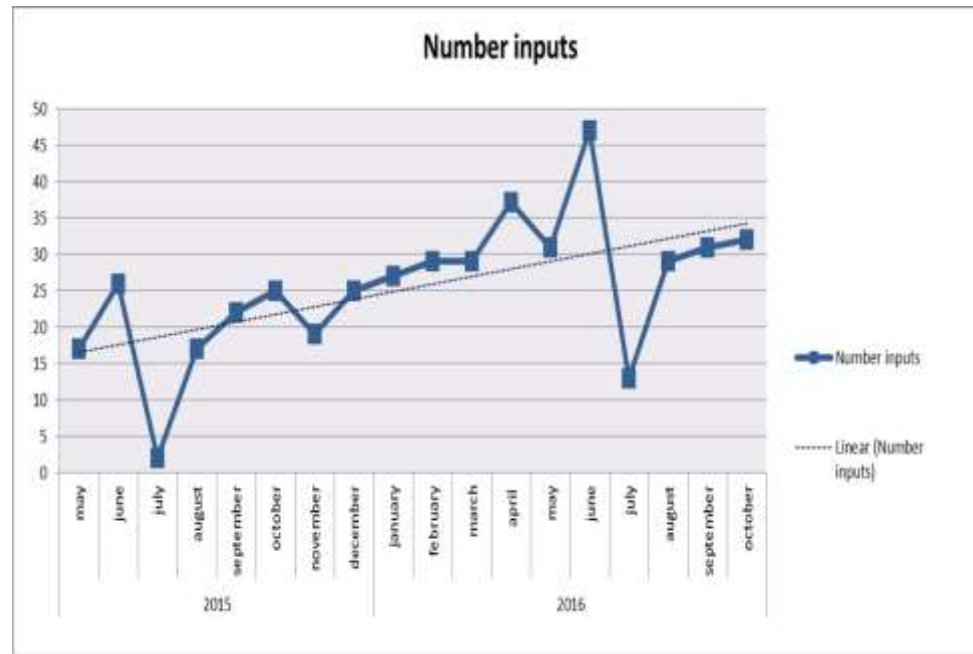
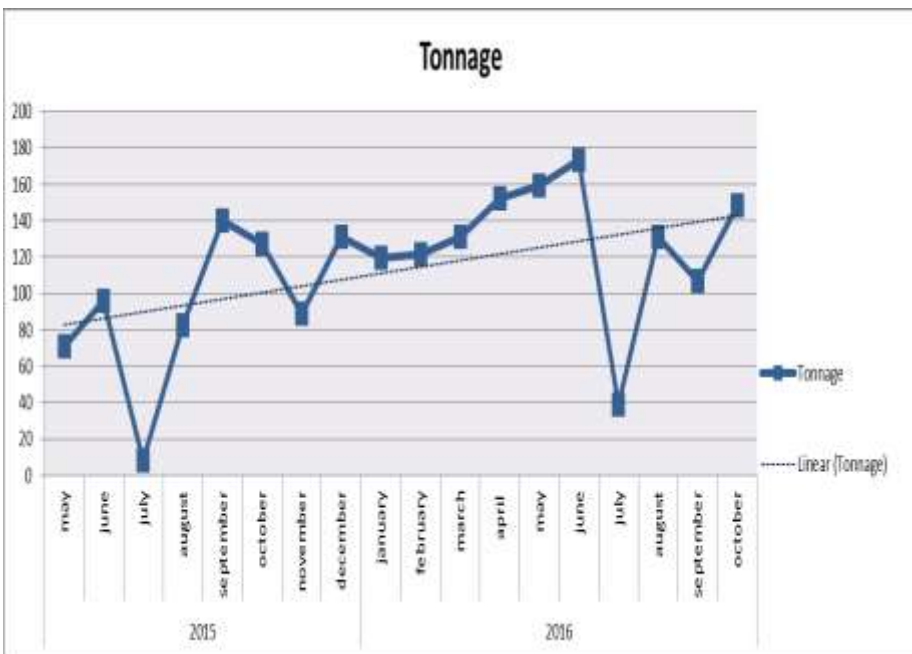
### 3. Sorting result in %

Waste streams	%
Glass	49,34%
Wood	39,30%
Metal	0,20%
PVC	2,43%
Residual	8,73%



### 3. Figures

- Chassis IN 2015 745T sorted
- Chassis IN 2016 YTD 1.281 T sorted
- Number input 2015 153
- Number input 2016 YTD 305





## 4. Flat glass treatment Minérale

The extracted glass is transported to Minérale located near Charleroi.

### 1. Pre-treatment site: 140.000 tons/year

- 80.000 T bottle glass
- 60.000 T flat glass

Partnership: 50% Sibelco Europe - 50% Suez

### 2. Sorting line for flat glass:

- Screening
- Ferrous separation - nonferrous
- Cyclonic aspiration of light fractions
- Optical sorting
- Sales to glass industry ( insulation, bottles,...)



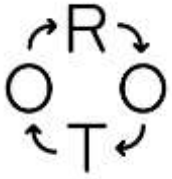
## 4. Conclusion

- It works in Laeken. Suez will start 2 other sites: Antwerp/Gent
- Obstacle:
  - The lack of space at customer location is a major obstacle for sorting.
  - Direct input to a sorting center can be a solution for the windows frames companies.
- Geographical area: Not only Brussels !
  - Companies located the most outside Brussels, “transfer/take back” their waste to their headquarters in Flanders or Wallonia.
  - With larger companies located in or near Brussels, our business approach has been more successful.
- The financial incentive for customer is essential (sorting vs mixing all wastes)
- But also the “ recycling/green” image of this activity for the big customers.

## 4. Conclusion

- The demolition companies active in Brussels do not carry out the selective dismantling of the windows frame/glass.
  - These are collected as a mixture in construction and demolition waste. According to several companies, it is not profitable for them to proceed otherwise.
  - BUT for big buildings/ towers, it should be possible!
- The feasibility and profitability of the collection and selective sorting of the windows frame is demonstrated.
- A sorting obligation, a strict recommendation or a targeted information campaign by the competent authorities would have a positive impact on increasing the volume of flat glass and chassis waste.

**Lionel Billiet**  
Project Manager  
*ROTOR*



# Non-destructive reuse of glass products and windows

Towards Recycling of building glass in Europe  
25 november 2016

Lionel Billiet  
Rotor, Brussels



## 1. Window frames









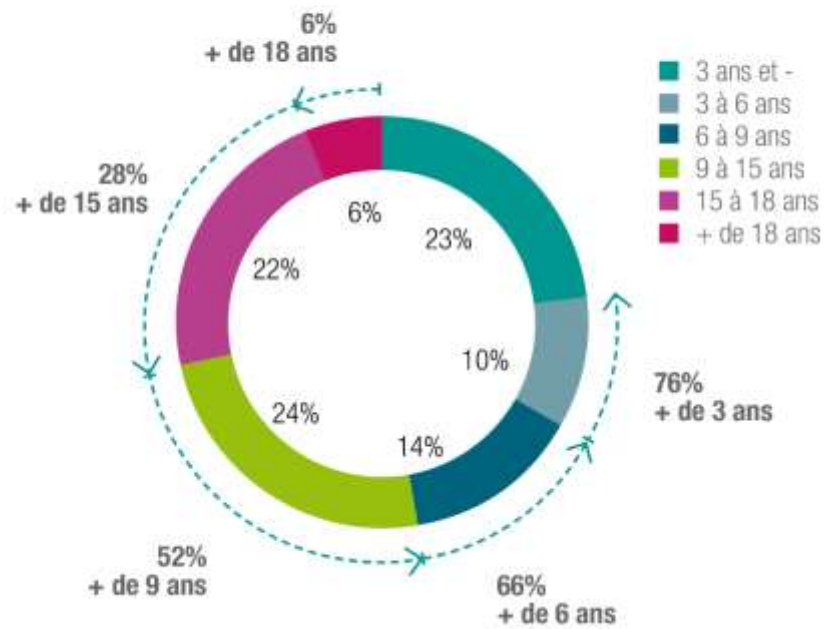




## 2. Glass partitions



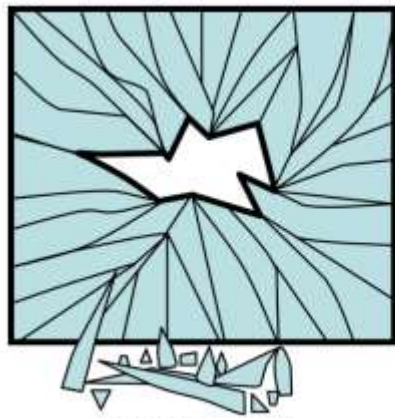
## DURÉE DES LOYERS <sup>(3)</sup>







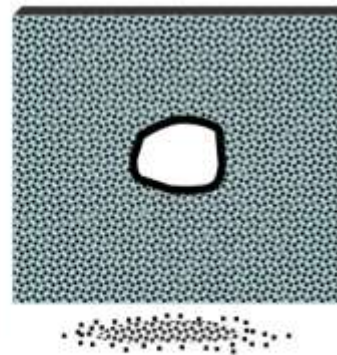




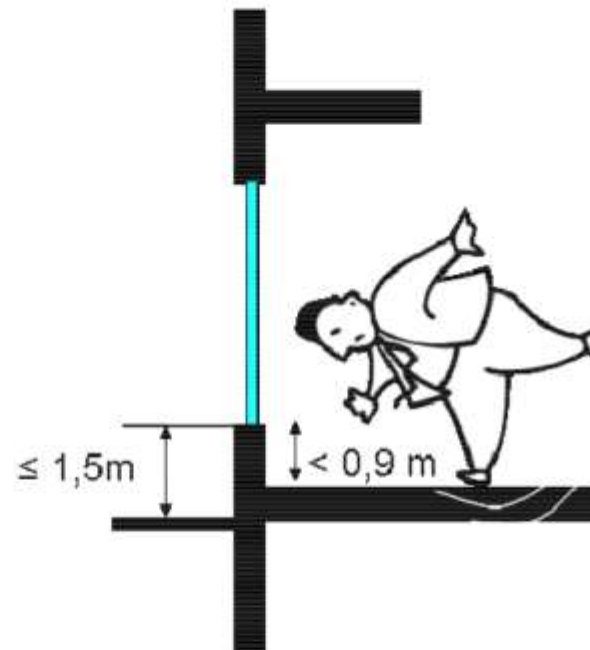
Type de casse A



Type de casse B



Type de casse C

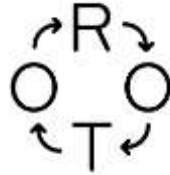


- $h_c \leq 1,50m$  et  $h < 0,90 m$ .
- verre de classe 1C- ou 2B2
- ou verre recuit avec garde-corps permanent placé côté risque de choc



### 3. Point-fixed glass façade





Thank you for your attention !

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[www.rotordc.com](http://www.rotordc.com)

[lionelbilliet@rotordb.org](mailto:lionelbilliet@rotordb.org)

+32 494 17 68 77

**Any questions?**  
*Now's the time to ask them!*

# Debate: How to Improve the Recycling of Building Glass?

- Moderator:
  - **Jan Maarten de Vet** – Director, *Ecorys*
- Panelists:
  - **Vincent Basuyau** – Policy Officer, *European Commission - DG Internal Market, Industry, Entrepreneurship and SME's*
  - **Nicolas Scherrier** – Project Manager, *Bruxelles Environnement*
  - **Ulrich Ix** – President, *FERVER*
  - **Bertrand Cazes** – Secretary General, *Glass for Europe*
  - **Jose Blanco** – Secretary General, *European Demolition Association*
  - **Cor Wittekoek** – Director, *Vlakglas Recycling Nederland*





**Jan Maarten de Vet**  
Director  
*Ecorys*

# Many thanks for your attention!

## Enjoy a well-deserved lunch in the restaurant



**FERVER aisbl**

*European Federation of Glass Recyclers*

*Fédération européenne des Recycleurs de Verre*

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