

Recovery technologies for C&D Waste
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NEW INITIATIVES IN BELGIUM TO IMPROVE C&DW MANAGEMENT PRACTICE AND TO DEVELOP INNOVATIVE SOLUTIONS

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BELGIAN BUILDING RESEARCH INSTITUTE

BBRI — Belgian Building Research Institute

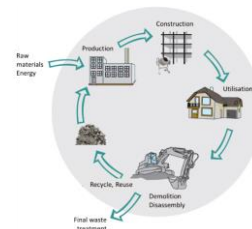
- PERFORM research
- SUPPLY information
- CONTRIBUTE to innovation

SDR — Div. Sustainable Development and Renovation

- SUSTAINABLE BUILDINGS
- RENOVATION
- MICROBIOLOGY AND HEALTH

SCO — Labo Sustainable Development

- BUILDING SUSTAINABILITY
- LIFE CYCLE ANALYSIS
- ACCESSIBILITY & ADAPTABILITY
- LIFE CYCLE COSTING
- DEMOLITION, RECYCLING & WASTE — Circular Economy



OVERVIEW

New initiatives in Belgium: improvement & innovation

Context

- High recycling rate
- Remaining & new challenges

Improve: Recycled aggregates

- Quality
- Pre-demolition assessment & Tracimat

Innovate: Other volumes

- Management methods
- Pilot projects

Conclusions/Questions

- Where do we go from here?

CONTEXT

95% recycling

Proactive, grown-up industry
From experiments (1980s)



to > 250 installations



Well-thought policy framework
Levies, ...

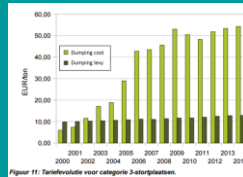


Figure 11: Tariefevolutie voor categorie 3-afvalstoffen.

Trust & quality
EOL 'avant la lettre'
+ standard techn. clauses



Densely built country
Lack of space
Short on resources

361 inhab/km²



C&D W RECYCLING SUCCESS RATE

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Challenges

- **Growing volume(s)**
 - Demolition instead of renovation?
 - Other fractions are upcoming
 - Cellular concrete & gypsum (1960s)
 - Insulation materials (1980s)
 - ...
- **Saturation of road-works industry?**
 - Main infrastructure exists
 - Reuse of existing materials
 - Application domain for 'hard to recycle' fractions



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architectuurbureau alexanderjanssens bvba

Rank	Country	Road length (km)	Area (km ²)	Ratio
1	United States	6586610	9525067	0.69
2	India	4865000	3287263	1.48
3	China	4500000	9572900	0.47
5	Russia	1396000	17098246	0.08
6	Japan	1215000	377835	3.22
8	France	1028446	675417	1.52
11	Spain	683175	504781	1.35
12	Germany	644480	357021	1.81
19	United Kingdom	394428	244820	1.61
33	Belgium	154012	32545	4.73
35	Malaysia	144403	329750	0.44
38	Netherlands	139295	41526	3.35

C&D W RECYCLING SUCCESS RATE

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6

Challenges

- Value creation in a highly competitive market

- Recycling + demolition/contracting/concrete
- Cost of primary materials



- Confidence & quality

- Study on contamination & purity (BBRI - 2012)
 - **12.8%** has (too much) physical impurities
 - Floatings – mixed aggregates
 - **6.6%** contains asbestos
 - Bound – mixed aggregates
 - **3.6%** contains hazardous materials
 - Chemical contamination



=> Bad image for recycling sector

- General applications (roadworks)
- High Value application?

C&D W RECYCLING SUCCESS RATE

IMPROVING QUALITY BY ACTING AT THE SOURCE

Regulations for recycling C&D W

OVAM – Flemish Waste Agency

- Regulation for all crushers, sorters, ... to ensure quality aggregates (& EOW) (VLAREMA)
- Pre-demolition audit obligatory for buildings >1000 m³, non-residential function (2009)
 - Hazardous wastes in detail
 - Non-hazardous: listing
 - Responsibility of the client
 - 'Fair competition' between demolition contractors

Recommendations Quality study 2012 (BBRI)

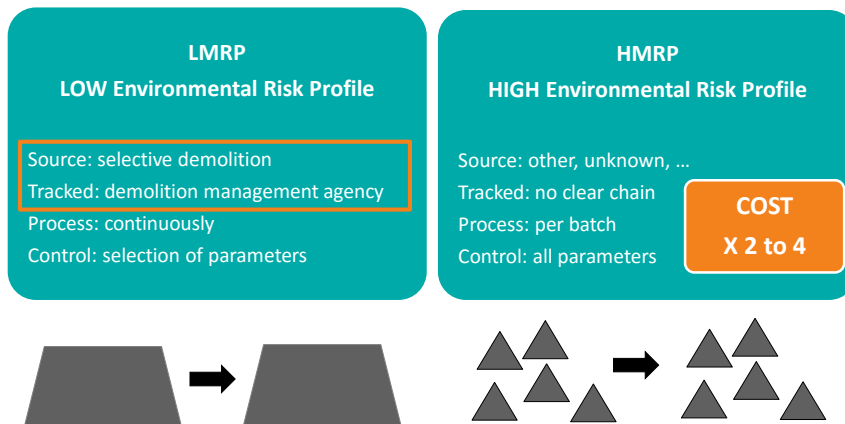
- ⇒ More control & inspections
- ⇒ More action needed at the source
 - ⇒ Who is responsible? Crusher or Demolisher ?

POLICY TO IMPROVE QUALITY

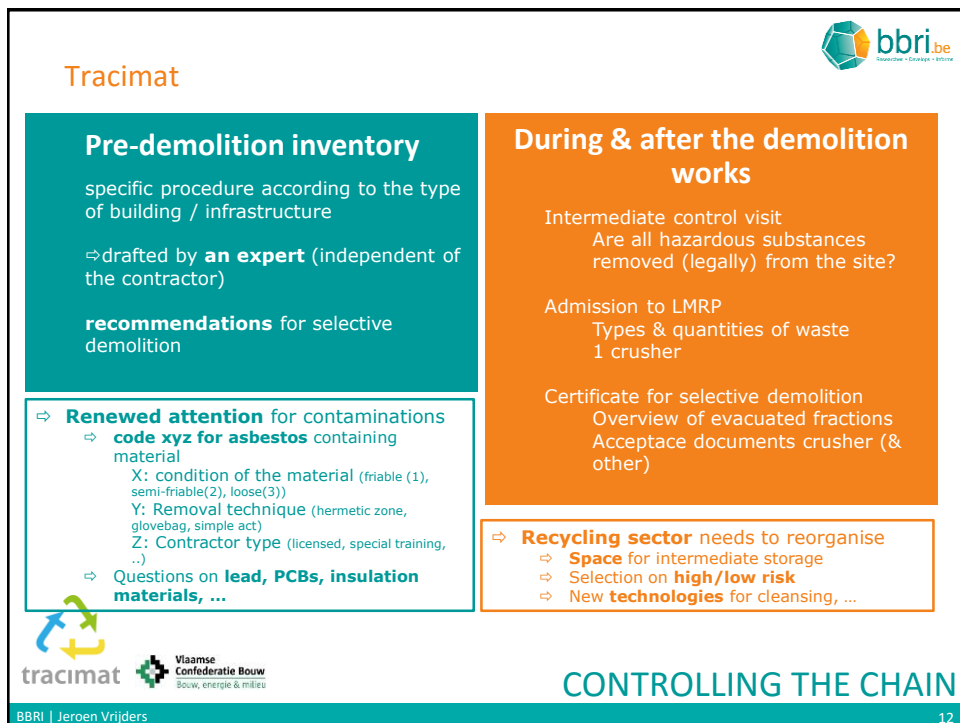
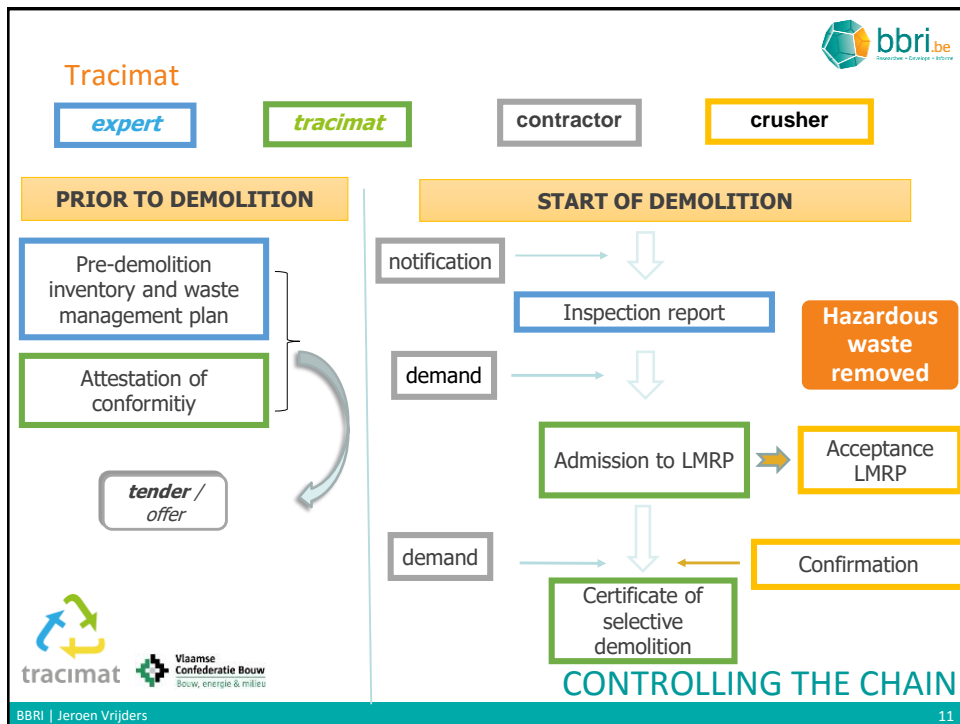
Regulations for recycling C&D W

OVAM – Flemish Waste Agency

- **NEW:** focus on 'problematic fractions' via ACCEPTANCE criteria :
RISK ASSESSMENT => 2 types of 'stony waste'



POLICY TO IMPROVE QUALITY



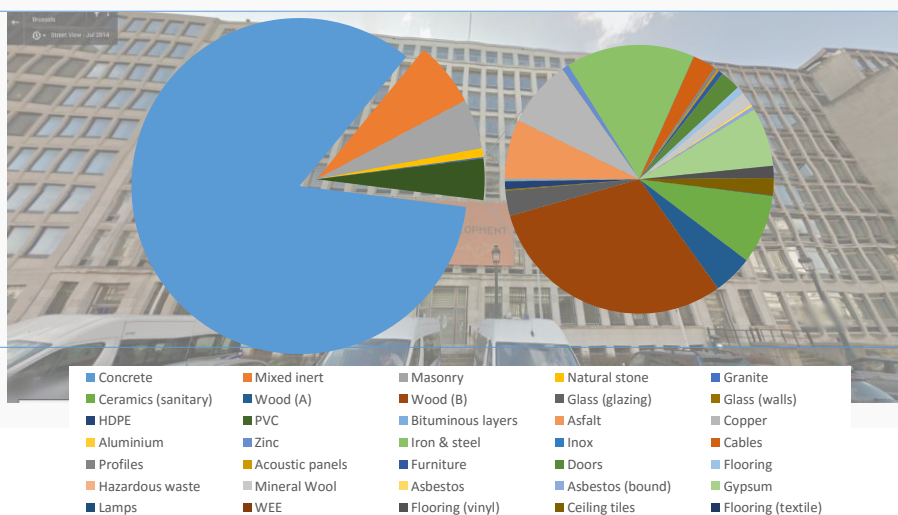
Outlook

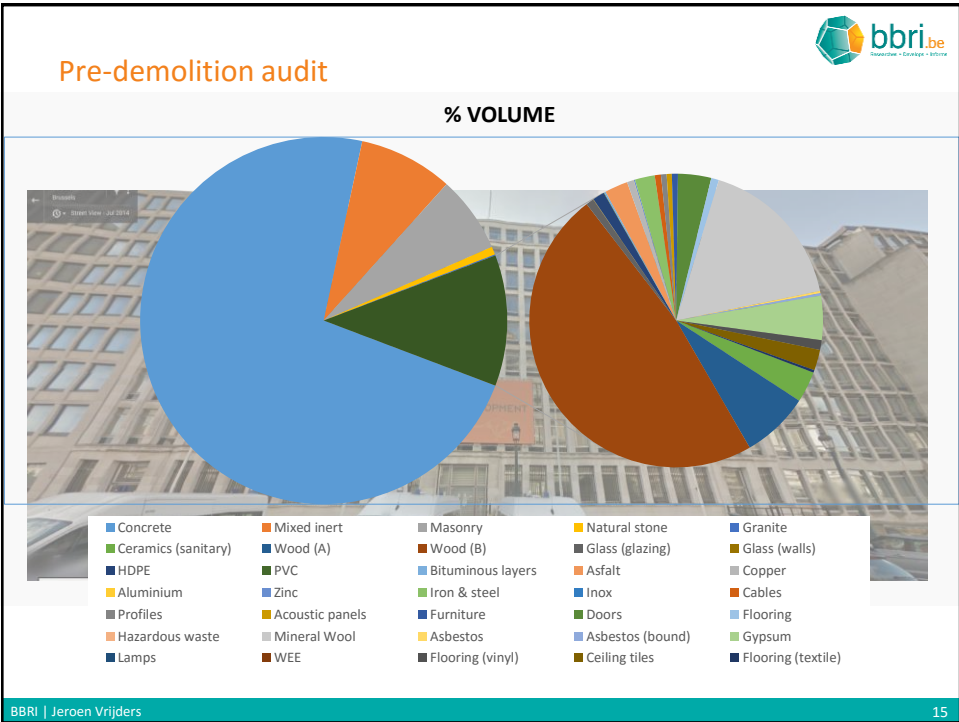
- **Better & more pre-demolition audits**
 - Qualities & quantities available for demolition contractor
- **Better & more data on demolished buildings**
 - Actual quantities (evacuated) + where did they go
 - Types of waste & degree of separation
- **Extrapolation possible?**
 - What is our current 'urban mining stock' ?

WHAT'S NEXT?

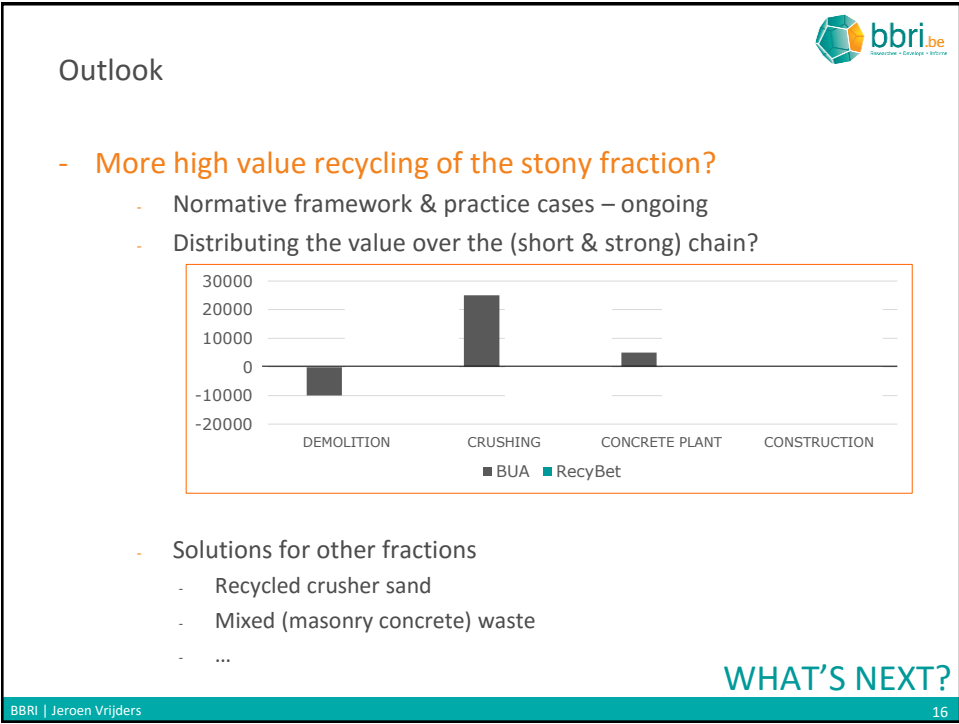
Pre-demolition audit

% MASS





15



16

RECYCLING THE NON-STONY FRACTIONS


Developing solutions for other fractions

Hard(er) to recycle

- ⇒ Technical solutions?
- ⇒ Practical problems?
- ⇒ Economic benefit?
- ⇒ Environmental benefit?



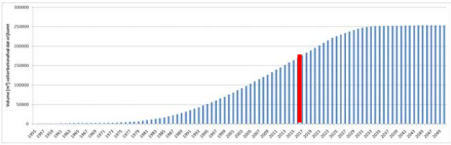
OTHER VOLUMES




Developing solutions for other fractions


Drivers:

- Environmental problem (no more 'inert landfills' due to sulfates)
- Technical challenge
- Emerging waste stream






Gyproc ∞ Recycling ⇌ Cijfers & Feiten



- NWGR Canadees bedrijf – 3 Mio Ton
- Grondstof leverancier # afvalverwerker
- 70.000 ton
- 15 nieuwe jobs
- Gipsconvenant 20% VI gipsafval 2010
- Gyproc C2C product > 10% recyglips



OTHER VOLUMES

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19



Developing solutions for other fractions

Challenges

- Niche market ?
- Cost of workforce vs. value of product
- Product regulations (CE) & quality
 - Evolutions & innovations
- Intermediate storage?



Challenges

- Technically sound solutions?
- Transporting 'air' = more environmental impact!
- Cost/Benefit?

OTHER VOLUMES

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Innovative solutions: ON- and OFF-site



Pilot Projects on Waste management on Construction sites in Brussels

5 'big' sites: space & volumes for innovative approaches

6 'smaller' sites: alternatives for the mixed container ?

OTHER VOLUMES

Innovative solutions

Quantification

- Estimation
- Monitoring

Third party services (social economy)

- Clean site
- Sorting on site
- Security & logistics

Alternative containers

- Higher/Lower volume containers
- Big bags
- ...

Specific solutions for specific fractions

- Clean Site System: packaging
- Rockwool Insulation
- Derbigum Roofing
- Kurio – PE&PP pipes
- Isover Insulation

Sorting out specific fractions


- Palets
- Formwork
- Plastic wrapping
- PIR
- Gypsum blocs & boards
- Aerated concrete
- Mineral wool
-





First insights...

- Separated streams cost MORE than mixed container
 - Business model of sorting companies
 - Uncertainty on purity (except through verification)
 - Extra logistics or less logistics?
 - Pay per m³ or pay per ton ?
- There is a certain benefit in better filling of containers
 - Voids > 50%
- No sense to sort out if incinerated afterwards
 - No solutions for all wastes
 - Always new types of waste...
- Estimation vs. Reality ?



OTHER VOLUMES

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Additional benefits?

Insight in 'waste streams of the future'

Types of waste

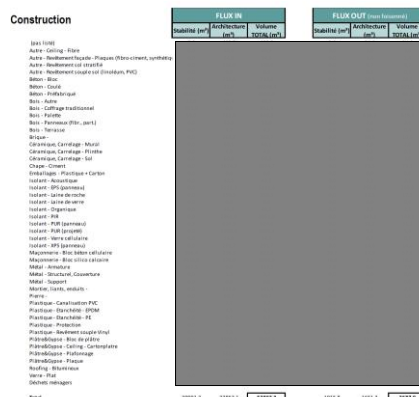
Key Waste Streams

- High volume
- No solution
- Contaminating other fluxes
- Composites
- Service life in the building

Attention

- ETICS
- Sandwich panels
- Fibre cement materials
- Insulation materials
-

Volumes of waste



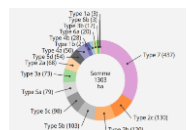
OTHER VOLUMES

BBSM - LE BÂTI BRUXELLOIS, SOURCE DE NOUVEAUX MATÉRIAUX

How to unlock the materials available in the Brussels Building Stock ?

QUANTIFY THE TYPES & VOLUMES

EXTRAPOLATION OF BUILDING PARK & CASE STUDY'S



DECISION TOOL (LCA, KM, ...)

DEVELOPPING SOLUTIONS

EXISTING VALUE CHAINS, NEW WAYS
TO BE CREATED, ...



STANDARDS FOR RECYCLING & REUSE

Conclusions

- Belgium a 'frontrunner'
 - From good to great
 - Acting at the source & controlling demolition
 - Policy & practice
 - Stony fraction is important
- New solutions needed for 'new' waste materials
 - Balance between technically, practically & economically feasible solutions
 - Innovations on the construction site: from estimation to concrete action
- Looking forward
 - Belgium as one big 'city' mine of materials

FINAL WORDS

Questions

- Demolition & pre-demolition
 - Insights in contamination & quality of aggregates?
 - Control on demolition vs control on recycling?
 - Lead, PCBs, insulation materials?
- Solutions for smaller fractions
 - How do we make things work?
 - Role of contractors on site: innovations needed?
- Extrapolation
 - Which are the key fluxes for the future?
- Paradigm shift?
 - Circular Economy
 - Technological breakthroughs are not incremental

HOW FAR
SHOULD
WE GO?

FINAL WORDS

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