

ევროკავშირი საქართველოსთვის The European Union for Georgia





EU ENI East Twinning project Supporting inter-sectoral collaboration possibilities between Research and Industry GE 18 ENI OT 02 19

Mobilising industry for a clean and circular economy

Public lecture

"WASTE MANAGEMENT – WASTE RECYCLING, focus on C&DW recovery"



Why the focus is on C&D waste?



Why C&DW is a priority?

- Mineral fraction of non-hazardous C&DW predominates
- 70% should have been recovered as materials by 2020 (Directive 2008/98 EC)
- Up to 100% of the mineral non- hazardous
 C&DW can be recovered...



Will be C&DW in the future?

The largest waste stream in EU: 35,9% of total waste generated (2018) ca. 450 – 620 kg/per capita/year (i.e. for Georgia it would be 1,7-2,3 mln. tones)

Numerous sources of C&D waste:

- Demolition of obsolete buildings
- Removal of abandoned and illegal buildings
- Transformation of industrial areas
- Transformation of urban environment
- Reconstruction and rehabilitation of roads and railways
- New construction
- Unused pre-fabricated panels and elements...





What to do with C&DW?



Chart — Mineral waste from construction and demolition, waste treatment

How to deal with the mineral C&D waste?

Stationary plant



Semi-stationary plant



better sorting

- recycling of many types of C&DW
- more complex technology
- bigger variety of recycled materials
- better quality of recycled materials
- larger market opportunities
- more expensive equipment
- bigger operational costs
- bigger transport distances

Mobile plant



- only preliminary separated C&DW
- simpler technology
- no transportation of C&DW
- use of recycled materials in situ
- smaller range of recycled materials
- more difficult control on the quality of recycled materials

What to do with C&D waste?

Mineral fraction



Preparation for reuse

- Masonry units
- Pavement blocks, tiles, curbs
- Plasterboards
- Thermal panels
- Steel structural elements...

Recycling

What to do with recycled materials?

Pavements with pavement blocks Road basecourse 8 см. покрытие 3 см. рециклирани материали 0-2 мм. 3 см. вофалтобетон 15 см. рециклирани материали 0-60 мм. 12 см. стабилизиран с битум пласт 15 см решиклирани материали 0-30 мм. 20 см. рециклирани материали 0-60 мм 20 см рециклирани материали 0-30 мм. Parking areas Temporary roads 30 см. рециклирани материали 0-60 мм. 2 см. рециклиран асфалтобетон 20 см. рециклирани материали 0-60 мм. 20 см. рециклирани материали 0-30 мм. Backfilling Cable ducts рециклирани материали 0-2 мм. рециклирани материали 0-30 мм.

Road construction and rehabilitation

- improvement of soils
- subbase
- base courses (incl. stabilized),
- backfilling,
- embankments,
- cold and warm recycling of asphaltic pavements
- drainage works

Backfilling of cable ducts and pipelines

Aggregates in concrete:

- reinforced concrete (incl. HPC and SCC),
- lean concrete,
- Lightweight concrete
- small size concrete elements



What to do with recycled materials?





Sport and park facilities

In gabions

Green roofs (ceramic aggregates)

Green cements



1cm brick powder 5cm brick powder and clay 5cm grained aggregate 15cm brick rubble Ground with drain pipe



10mm sandy loam

100mm recycled aggregate

25mm IKO Plasfeed 5+1 drainage board Polyester reinforced PVC

18mm plywood deck



	Product	Reduction of impacts compared to CEM I, %	
	CEM I	0%	
	CEM II/A	5-10%	
	CEM II/B	15-20%	
	WCP-5	5-15%	
	WCP-15	15-20%	
	WCP-30	30-35%	



What to do with C&D waste?

Asphaltic concrete



Recycled asphalt aggregate

Source: https://cherrycompanies.com/recycling-services/asphalt/



- Bitumen supplementi n recycled asphalt paving
- Granular base or subbase
- Stabilized base aggregate or fill material



Hot-in-place recycling

Source:

https://informedinfrastructure.com/36026/hot-inplace-asphalt-recycling-yields-benefits-for-roadrehabilitation/



Cold-in-place recycling Source: https://www.clrp.cornell.edu/q-a/077-cir.html

Is the use of recycled materials covered by standards and recommendations?

EN 13242:2002+A1:2007 Aggregates for **unbound and hydraulically bound materials** for use in **civil engineering work and road construction**

EN 13043:2005+AC:2005 Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas

EN 12620:2002+A1:2008 Aggregates for concrete

EN 13108-8:2016 Bituminous mixtures - Material specifications - Part 8: Reclaimed asphalt

EN 13055:2016 Lightweight aggregates

EN 206:2013+A2:2021 **Concrete** - Specification, performance, production and conformity



Are recycled crushed stone/aggregate more expensive than natural crushed stone?



Concession tax

- Extraction raw material
- Crushing costs
- Screening costs
- Internal transport costs
- Staff costs
- Machinery related costs
- Industrial waste treatment costs
- Conformity assessment costs



- Control C&DW entrance related costs
- **Sorting related costs** *might be avoided if separate C&DW*
- Crushing costs
- Screening costs
- Purification costs might be avoided if separate C&DW, depends on uses of recycled products
- Internal transport costs
- Staff costs
- Machinery related costs
- Industrial waste treatment costs
- Conformity assessment costs (one more testing only acc. to EN 933-11)
- + Income from recycled components (metals) and RDF
- + Income from C&DW entrance fees

Transport impact: If the quarry is 20-30 km from the building site, the recycled materials are less expensive, considered the treatment plant is closer!

Are there business opportunities?

Recycling plants number for the predominant part of C&DW in Bulgaria (2013-2020)



Are there still challenges?

YES, a lot!

Challenges

C&D W management to be optimised

Selective demolition v/s complicated sorting /recycling systems at the treatment plants

Confidence in quality of recycled materials

Lower price than primary materials

Hazardous substances

Are there solutions?

YES, A LOT! Even more than one...

Solutions

Country specific studies on the C&DW quantity, sources and morphology Business models

Pre-demolition audit Appropriate equipment New technologies (3D scanning, image recognition, BIM...) Guidelines

Systems for traceability Testing and characterization Standardization Performances evaluation Technical know-how Most appropriate uses Country-based studies and guidance

Selective demolition – cheaper recycling Minimized transport distances Competition Demand –Supply schemes

Country specific identification of hazardous C&DW Pre-demolition audit Fast identification in situ Decontamination techniques Selective demolition

What to do with metal C&D waste?



What to do with other C&D waste?



Are there best practices?





EU Construction & Demolition Waste Management Protocol

September 2016

waste identification, source separation and collection

- waste logistics
- waste processing and treatment
- quality management and assurance
- policy and framework conditions



Guidelines for the waste audits before demolition and renovation works of buildings

U Construction and Demolition Waste Managemen







RECYBETON

COMMENT RECYCLER LE **BETON DANS LE BETON RECOMMANDATIONS DU PROJET** NATIONAL RECYBETON



Research on C&DW management and recovery



Supporting Environmentally Sound Decisions for Construction and Demolition (C&D) Waste Management

A practical guide to Life Cycle Thinking (LCT) and Life Cycle Assessment (LCA)



JRC jes

https://ec.europa.eu/environ ment/system/files/2021-02/waste-Guide-to-LCTLCAfor-C-D-waste-management-Final-ONLINE.pdf





Promotion of the Recycling of Industrial Waste and Building Rubble for the Construction Industry

Reference: LIFE10 INF/SI/000138 | Acronym: REBIRTH

 $https://webgate.ec.europa.eu/life/publicWebsite/index.cfm?fuseaction=search.dspPage&n_proj_id=4021&docType=pdf$



GtoG: From Production to Recycling, a Circular Economy for the European Gypsum Industry with the Demolition and Recycling Industry

Reference: LIFE11 ENV/BE/001039 | Acronym: GtoG

 $https://webgate.ec.europa.eu/life/publicWebsite/index.cfm?fuseaction=search.dspPage&n_proj_id=4191$



http://www.veepproject.eu/Page.aspx?CAT=STANDARD&IdPag e=6aca0a41-ca8b-49fd-b678-08ae93c96a13 Horizon 2020

WOOL2LOOP

http://www.hiserproject.eu/

https://www.wool2loop.eu/en/

Examples of circular actions that improve the management of C&DW



Source: https://www.eea.europa.eu/publications/construction-and-demolition-waste-challenges/construction-and-demolition-waste-challenges/download.pdf.static



Thank you for your attention!

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