The value chain, systemic solutions and resource flow in Circular Construction

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introduction

The presented value chain is developed by CityLoops for the implementation of the CityLoops demonstration projects. The aim of the value chain is to act as back bone of systematic solutions for implementation of circular economy in the building and construction sector.
Circular Economy

Circular economy is a strategy for

- reduction of resources consumption
- keeping the resources in a closed loop
- minimizing waste
- saving money
In principle the ressource-cycle is linked to the building-cycle:

- Buildings have **one specific time linear life cycle**, which is not repeated. It can be extended or changed.
- Building materials, such as steel, timber, masonry and concrete, have **life cycles, which can be repeated** by transformation of waste from the end of one building life cycle to resources for the start of a future life cycle.
Time linear life cycle of buildings

DS/EN 15978 Life Cycle Assessment
Transformation of materials from waste produced by the end of one building cycle to materials for a new building cycle.

Circular thinking
Linear acting!
The CityLoops Value Chain

EXISTING BUILDING

PLANNING → DEMOLITION → CDW → TRANSFORMATION

PRE-DEM. -AUDIT ASSESSMENT, DESIGN FOR DEMOLITION, TENDERING
PREP. WORKS, SELECTIVE DEMOLITION HEALTH & SAFETY
HANDLING TREATMENT LOGISTIC MANAGEMENT DOCUMENTATION
PREPARATION FOR REUSE, RECYCLING, RECOVERY END-OF-WASTE

FUTURE BUILDING

PLANNING → RESOURCES → CONSTRUCTION
SECONDARY RESOURCES TESTING & QUALIFICATION LOGISTIC MANAGEMENT PROCUREMENT DELIVERY
APPLICATION OF SECONDARY RESOURCES MONITORING DOCUMENTATION

DESIGN SECONDARY RESOURCES TENDERING & CONTRACT
Transformation – Key issues

- Waste-to-resource dilemma
- End-of-waste criteria
- Bridging the gap between the waste sector and the building sector
- Integrated, sustainable and comprehensive approach
Waste-to-ressource dilemma

- Waste is an object the holder discards, intends to discard or is required to discard (EU Waste Framework Directive 2008)
- Wastes are unwanted materials
- Resources are wanted materials
- Waste is not resources unless a certain transformation process has taken place depending on the type of waste and resources.
End-of-waste criteria

End-of-waste criteria specify when certain waste ceases to be waste and becomes a product, or a secondary raw material.

According to Article 6 (1) and (2) of the Waste Framework Directive, certain specified waste ceases to be waste when it has undergone a recovery operation (including recycling) and complies with specific criteria, in particular when

- the substance or object is **commonly used** for specific purposes
- there is an **existing market** or demand for the substance or object
- the use is lawful (substance or object **fulfils the technical requirements** for the specific purposes and meets the existing legislation and standards applicable to products)
- the use will not lead to overall adverse environmental or human health impacts
Bridging the gap

WASTE SECTOR
- WASTE LEGISLATION
- WASTE INDUSTRY
- COLLECTING CDW
- TREATMENT CDW

CONSTRUCTION SECTOR
- BUILDING LEGISLATION
- BUILDING INDUSTRY
- PRODUCTION CDW
- BUILDING MATERIALS

WASTE
TRANFORMATION
RESOURCES
Crushed concrete from old power plant chimney transformed to recycled aggregate concrete (100%) in new recycling/resource center, Copenhagen 2018-2019
Value Chain, Example 2

Crushed concrete from demolition of 8 housing blocks transformed to recycled aggregate concrete (100%) in concrete foundation of new city hall, Høje Taastrup, 2021. CityLoops HTK demo-project 2.
Conclusion

The basic premise for the systemic solution of circular economy and successful transformation of CDW to resources is:
- a general overview of all elements of the value chain,
- understanding of the elements and their relations, and
- knowledge of the materials, their quality and suitability for substituting natural materials.

Reference:
THANK YOU!

Website: www.circularcities.eu
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