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A6: PILOT NEW OFFICE BUILDING

PRESENTATIONS & VISITS pilot projects BAMB - 13/10/2017



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DESCRIPTION OF THE PILOT PROJECT

LOCATION	World heritage site „Zeche Zollverein“ Essen, Ruhr-area, Germany
FUNCTION OF BUILDING	Office building of private, commercial company, approx. 200 workplaces, cantina, conference and meeting rooms and rooftop garden. No major underground facilities.
SPACIAL DIMENSION	Total gross area: 10,000 m ² ; Total gross volume: 39,000 m ³
OWNER/ USER	RAG AG/ RAG Stiftung
PROJECT DEVELOPER	Kölbl Kruse 13 GmbH & Co.KG
ENGINEERING	Drees & Sommer
CONSTRUCTION PERIOD	Spring 2016 – End of 2017



Fig. 1: Visualisation of building „Neubau Zollverein“, kadawittfeld architecture, Aachen 2016



Fig. 2: Construction site on „Zeche Zollverein“ Essen, Germany



Fig. 3: Construction site as Brownfield

DESCRIPTION OF THE PILOT PROJECT

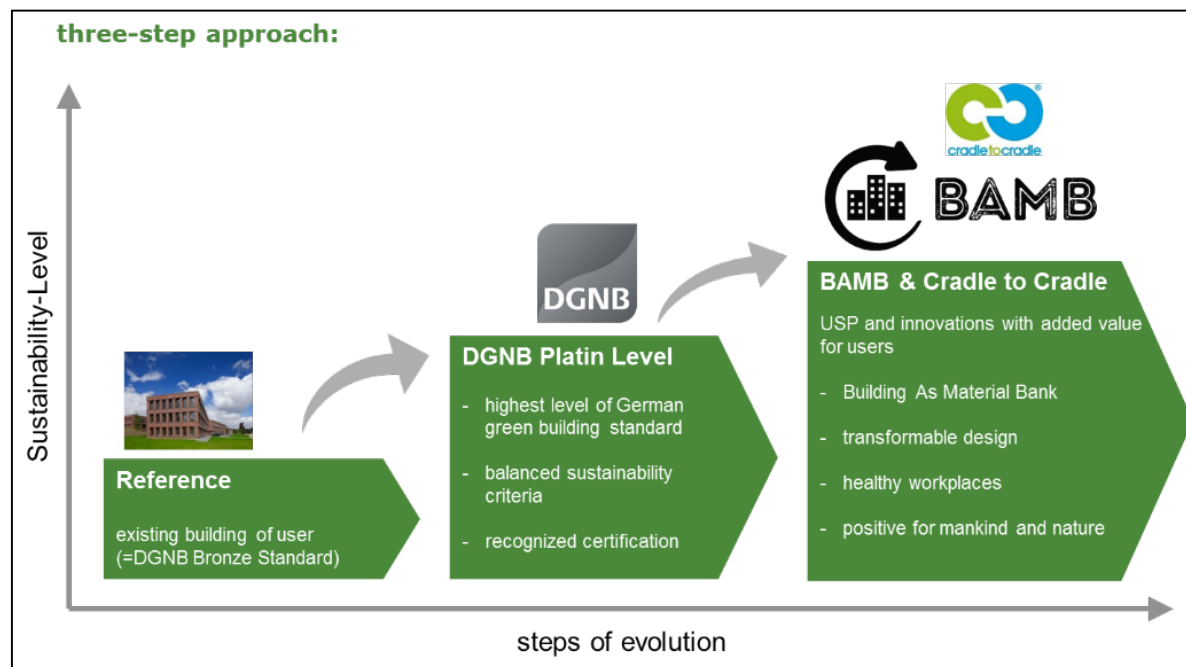


Fig. 4: C2C/ BAMB Aspects of the Building

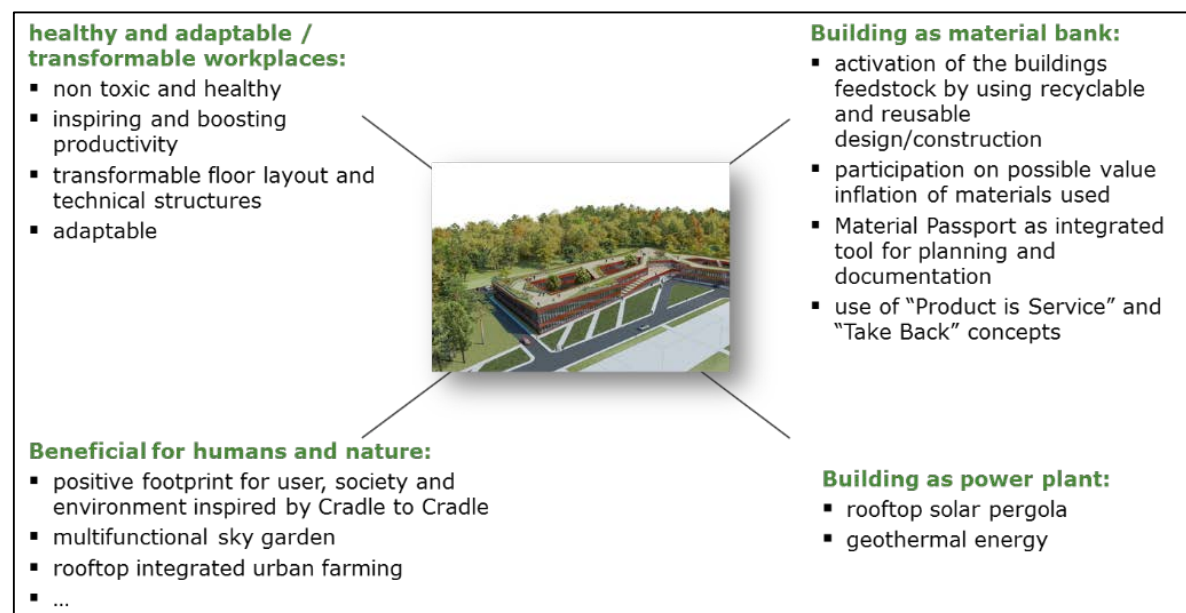


Fig. 5: Three Step Sustainability Approach

Pilot project for sustainable design, focusing on:

- Cradle to Cradle (C2C) design principles
- BAMB-targets

Three-Step-Implementation of Sustainability: (see Fig. 4)

1. Starting point: **existing RAG building**
2. Implementing **DGNB Platinum Certificate**
3. Objectives of **BAMB** and **C2C** are integrated (see Fig. 5)

SCENARIOS

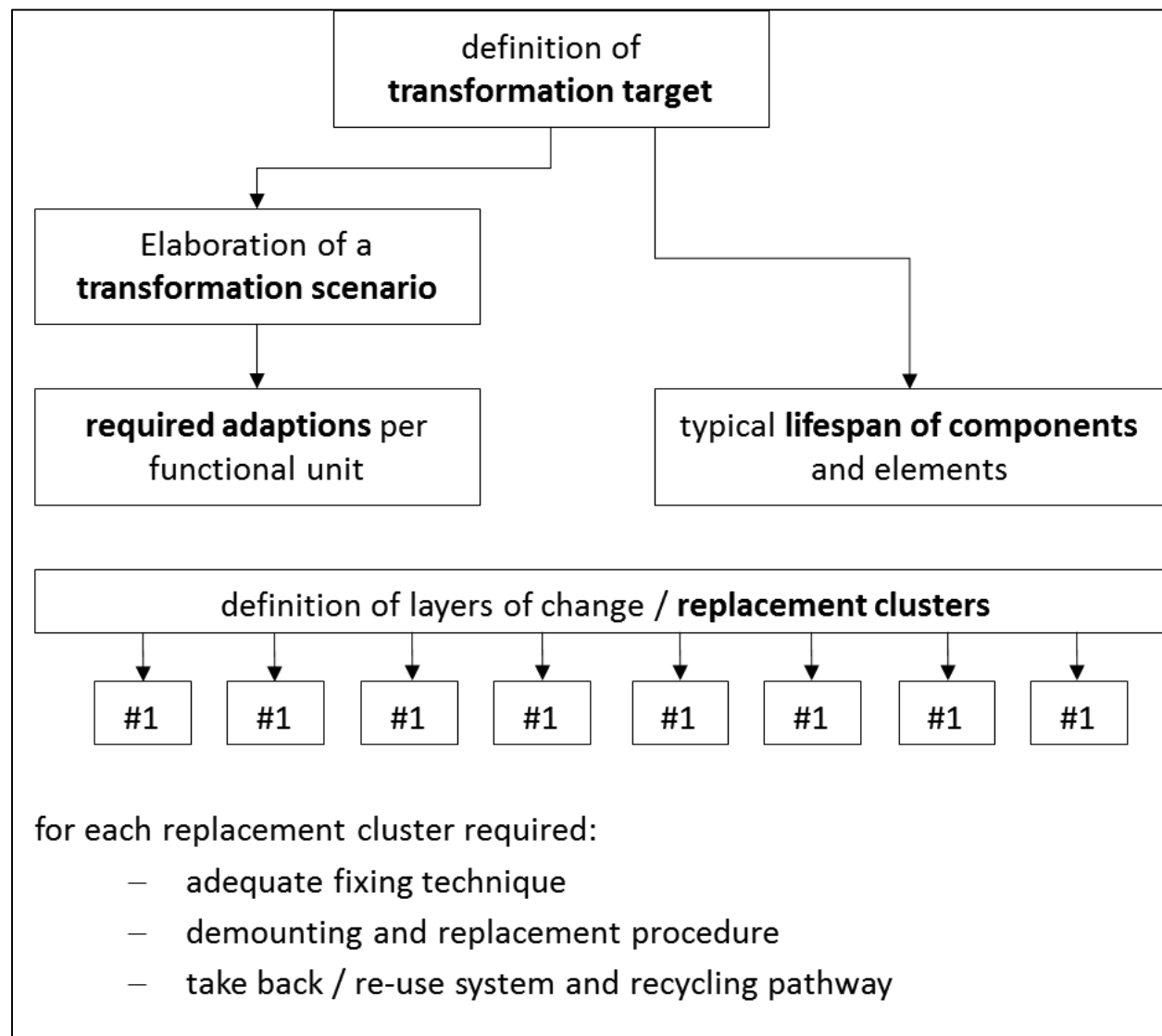


Fig. 21: Methodical Approach for the Development of Transformation Scenarios

Ultimate BAMB-goal was also interpreted as possibility of **building transformation**

→ Design of two transformation scenarios

- 1. Office:** only room layout, zoning and operator models are changed
- 2. Hotel:** building's type of use is changed

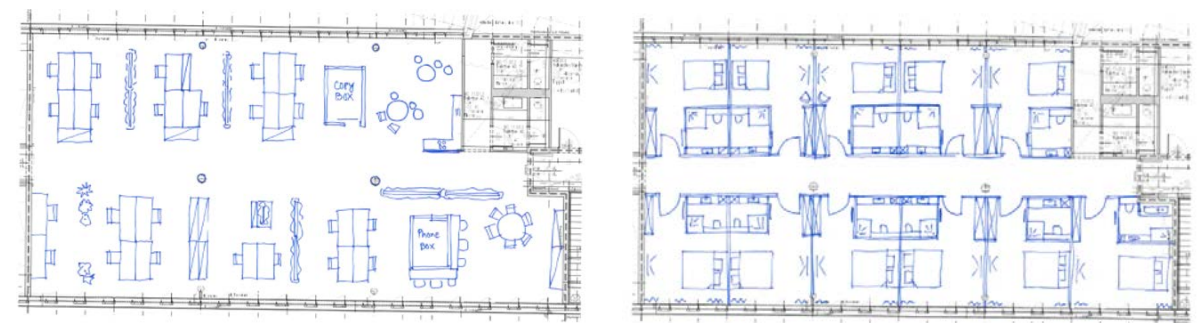


Fig. 22: Office Scenario (left) and Hotel Scenario (right)

SCENARIOS

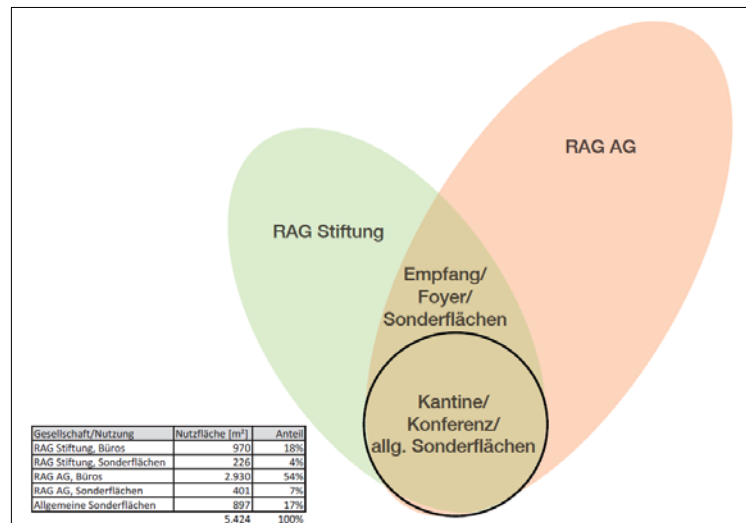


Fig. 25: Design Concept

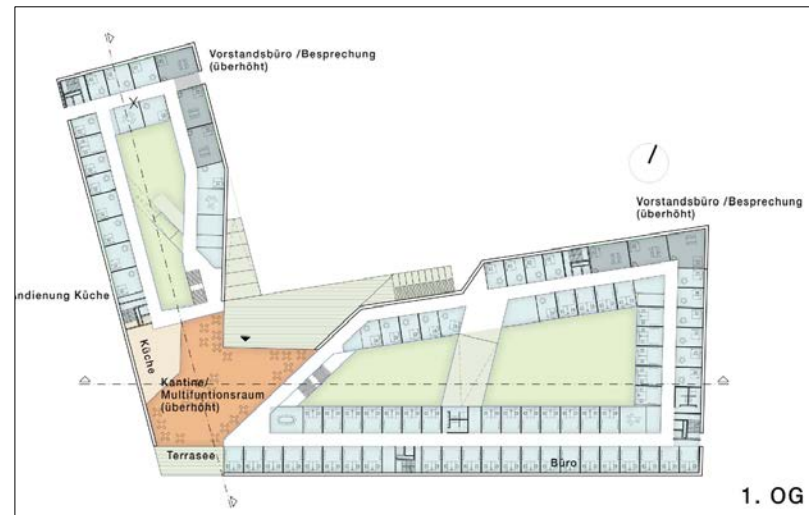


Fig. 26: Floor Plan, First Floor



Fig. 27: Reference Building



Fig. 28: Evolution of the Building Design, kadawittfeld architecture

- the **basic design idea** came from the **task**: a joint building for the offices of RAG Foudation and RAG AG with shared reception, foyer space, canteen and conference facilities
- all construction details match those of the **reference building**, except for a few adjustments due to the current legal standards and DGNB certification requirements

SCENARIOS

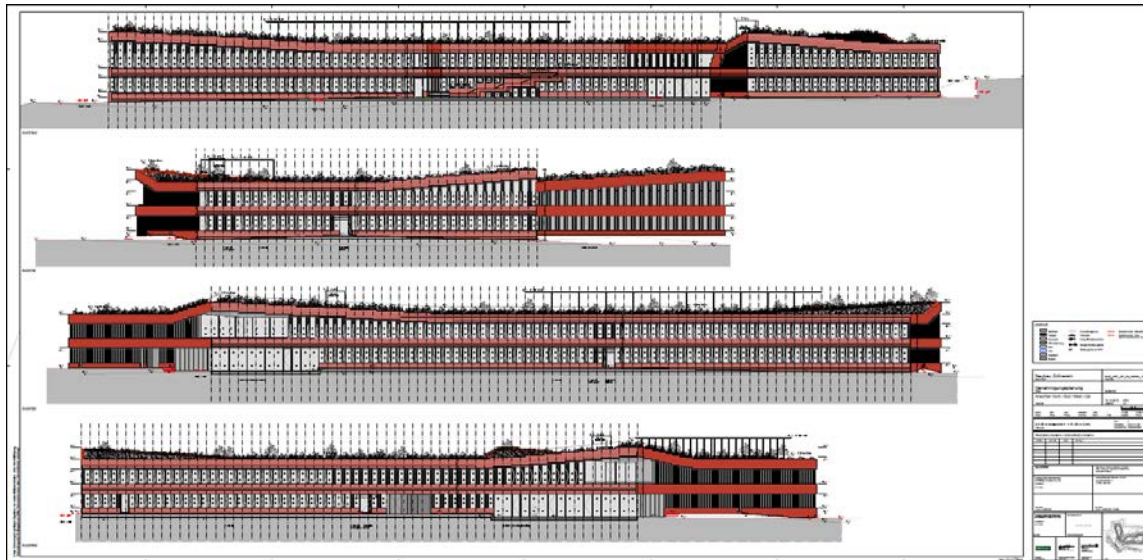


Fig. 29: Elevations



Fig. 30: Situation plan, also showing rooftop garden



Fig. 31: Laying of the Foundation Stone



Fig. 32: Façade Mock
up



Fig. 33: Construction Site, August 2016

TECHNICAL ASPECTS & MATERIALS

A building does not become recyclable merely by using recyclable products.

*It is also important to join the different products **separable**.*

Measures must be approached by
manufacturers (Product Design) and
planners (Circular Engineering)

Circular Engineering describes the **three planning tasks**:

- Design for Disassembly (DfD)
- Design for Recycling (DfR)
- Transformable Design
- Material Health

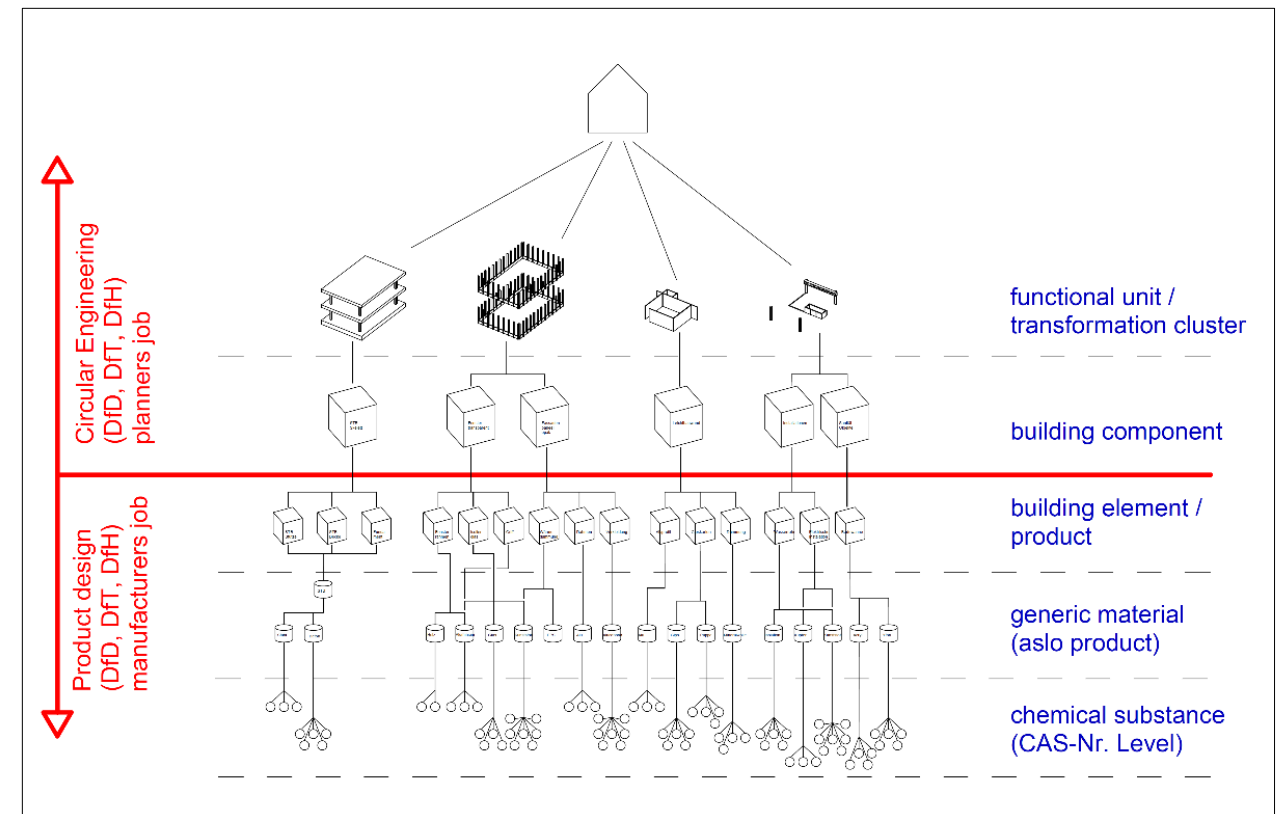


Fig. 6: Circular Engineering Approach in Comparism to Product Design

TECHNICAL ASPECTS & MATERIALS

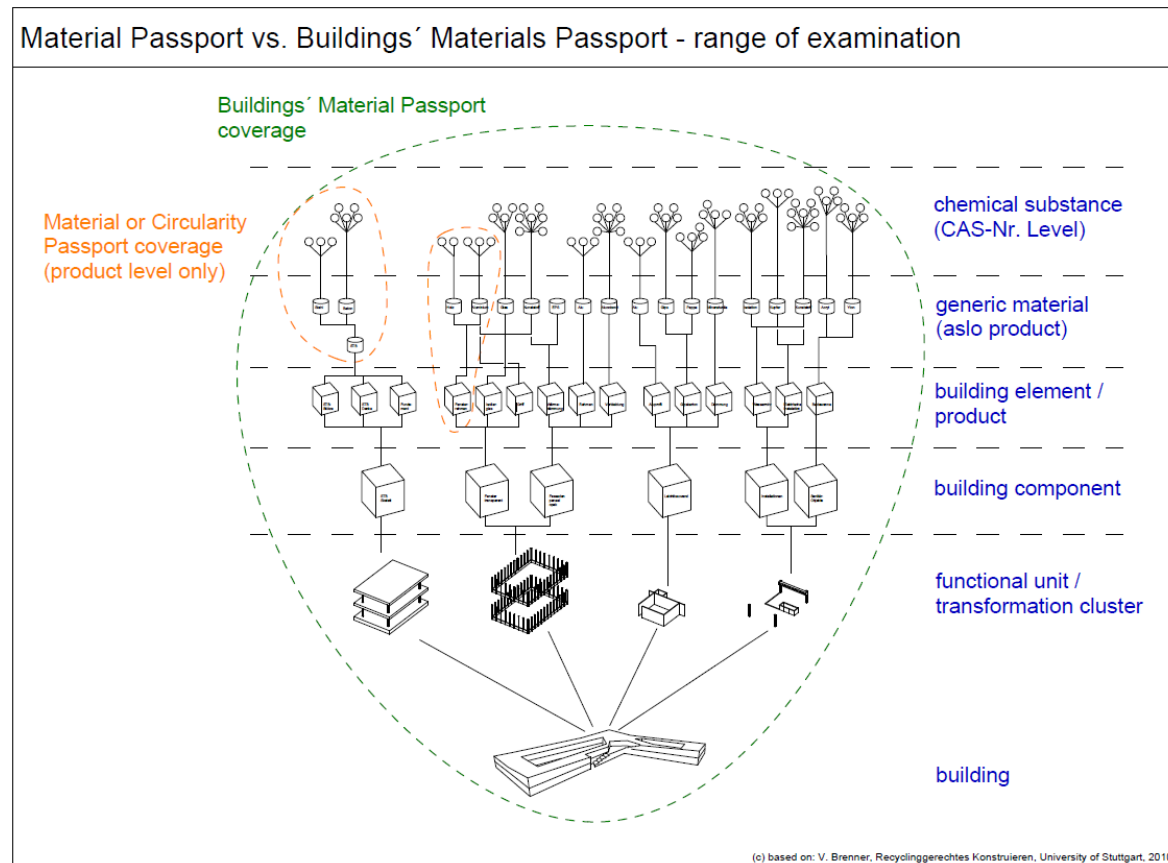


Fig. 15: Buildings' Material Passport – Range of Examination

Levels of Examination

1. **Chemical Substance:** water, iron, aluminium, ...
2. **Generic Material:** insulation, concrete, float glass, ...
3. **Component:** window frames, façade panelling, ...
4. **Building Component:** windows incl. glass + frame + handle, ...
5. **Functional Unit/ Exchange Cluster:** facade covering + insulation, ...

The **scope** of the Material Passport as defined in WP 2 was **expanded** to the Buildings' Material Passport for the project:

Material Passport

- operates exclusively at the level of **construction products or building materials**

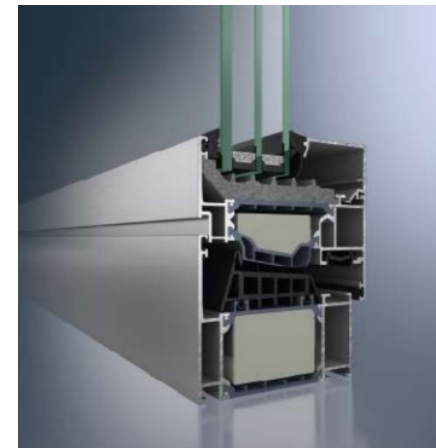
Buildings' Material Passport

- considers building as one **entity**,
- covers more than the maximum data depth for individual products,
- includes integrated **Life Cycle Assessment (LCA)**
- examines the building at **five levels** (see Fig. 18)

TECHNICAL ASPECTS & MATERIALS

It was the first project using C2C certified **Aluminium Façade System by Schüco**, for its use in the pilot building:

- existing **Certificate** extended to **Silver**.
- **95% of used materials** were assessed down to 100ppm.
- **no chemicals** of the **C2C-banned list** were used.
- for **Material Reutilisation** the level **Gold** was reached.
- a **take back system partner** was found.



	Tier	Basic	Bronze	Silver	Gold	Platinum
Criterion						
Material				✓		
Material Reutilization / Design for Environment					✓	
Energy					✓	
Water					✓	
Social Responsibility				✓		
Overall				✓		

Fig. 12: Cradle to Cradle Rating Chart for the Schüco Façade System



Fig. 13: Façade Concept Design

OPPORTUNITIES & BARRIERS

Material Passport Balance Limit:

Buildings' Material Passport may be considered as a **recommended solution**, because of its **reduced depth of detail** compared to Material Passports makes sense from the user's perspective.

Building Component Data:

Aquisition of data by manufacturers continues to represent the **greatest challenge**, **more transparency** should be required regarding **legal standards** (e.g. grade of disclosure of composition).

New Business Models:

A couple of **manufacturers integrated** in the project started **thinking about new models** and agreed to offer them for any new project (e.g. Schüco, Adolf Würth).

Policies and Standards:

German policies **prevent a broad implementation** of **BIM** as well as new "**product as service**" business models e.g. through missing Standards.

Building Industry and Project Organisation:

The use of BAMB-like products requires **new procurement models**. It is necessary to **involve potential suppliers early** in the project. **Manufacturer Take back** is seen as the most effective and promising way to generate **high grade recycling rates**.

OPPORTUNITIES & BARRIERS

Waste Generation and Material Flows

- Increasing volume of waste from construction and demolition
- Annual **input** of materials into buildings exceeds **output** by a **factor of 3**
 - Potential for urban mining grows

Waste Treatment

- **Recycling rate** of construction and demolition waste is quite high, **BUT**
- Most building materials are **downcycled**

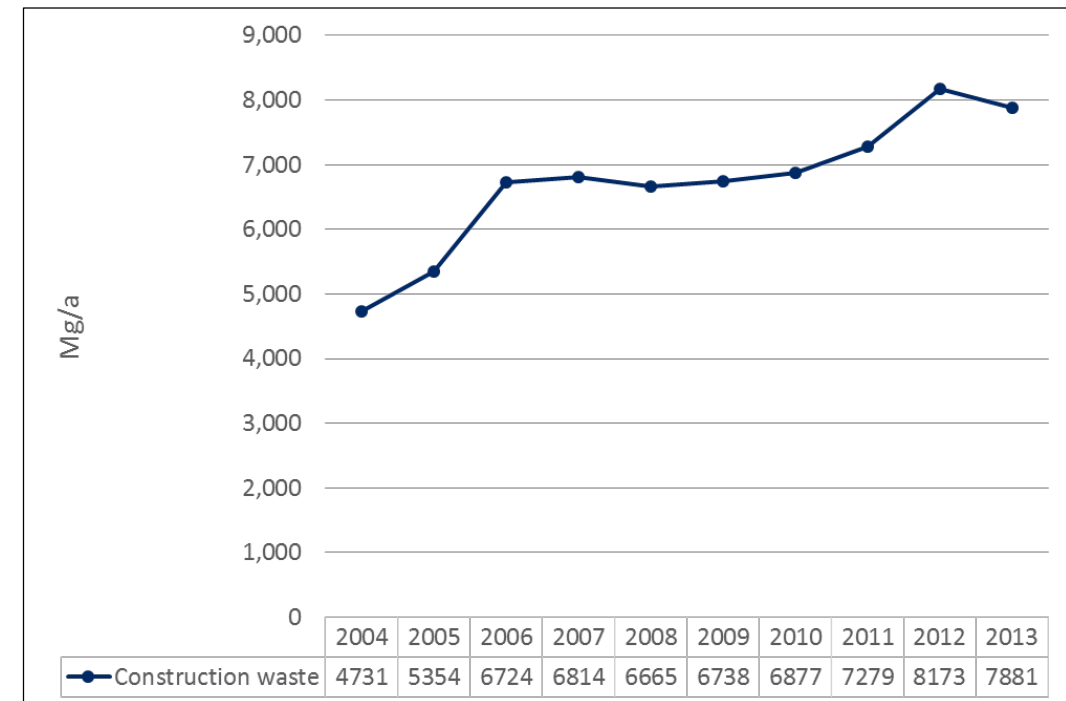


Fig. 7: Construction Waste in the City of Essen, 2004 - 2013

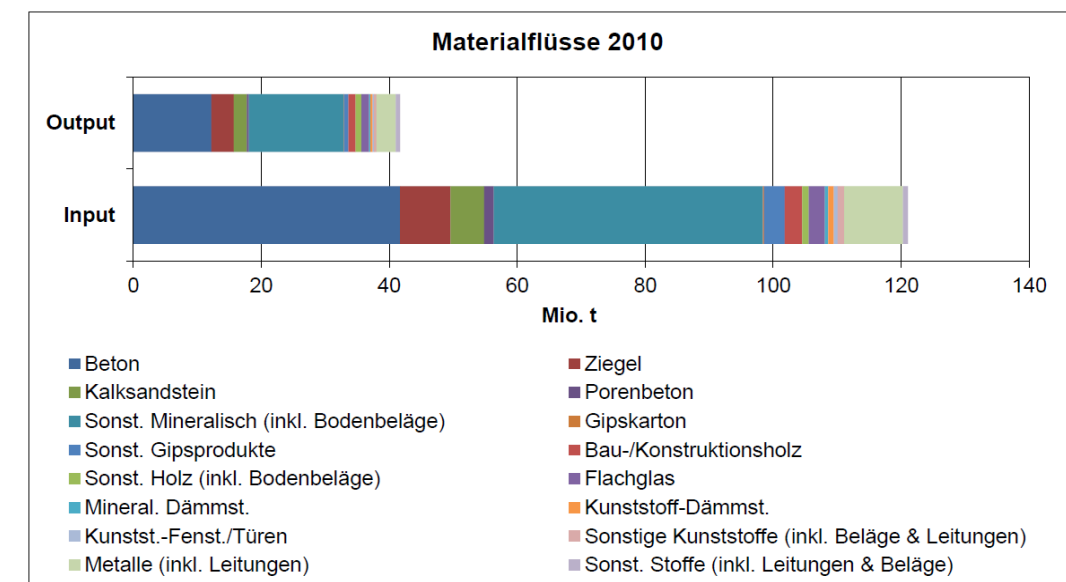


Fig. 8: Material flows "total" of construction process, year 2010

OPPORTUNITIES & BARRIERS

Barriers & Opportunities

- Greatest obstacle to high-quality recycling is **economic viability**

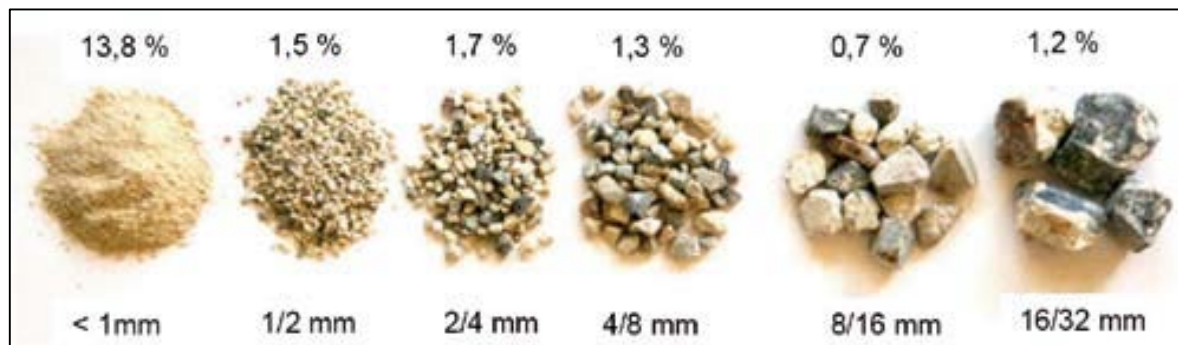


Fig. 9: recycled concrete size distribution



Fig. 10: Uncoated concrete walls facilitate their future potential recycling

Use of Recycled Concrete

- Concrete is currently **not collected separately**
 - Only used for **low-grade applications** when recycling it

Goals for the pilot building:

- Using recycled concrete to the highest extent possible (was deferred later)
- Making all components **suitable for recycling** after dismantling

STAKEHOLDERS



Fig. 23: Introducing BAMB at the Trade Fair BAU 2017 in Munich

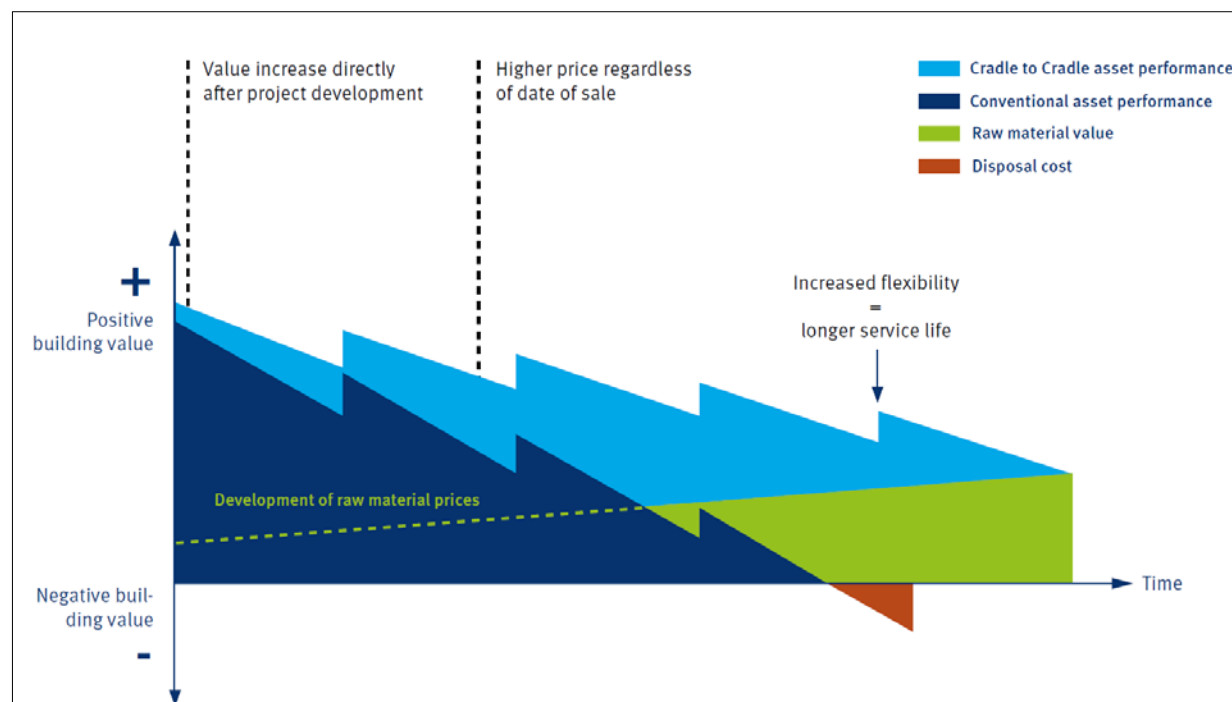


Fig. 24: Development of the buildings asset (without site)

Main Target of the Project:

to involve relevant stakeholders, esp. product manufactureres

→ Series of “round table” talks

Main Results of the Discussion:

- Difference in the asset performance between conventional and BAMB-building (see Fig. 11)
- The financial influence of material health should not be underestimated

CONCLUSION

- Pilot was **successful** in **implementing and testing** key aspects of **BAMB** within a **realistic market environment**
- Many **insights** can be **transferred** directly to thousands of **comparable real estate projects**
- **Developed tools** (esp. "Material Passport tool") can be used as **reference** for development of appropriate tools in the **research project** and for a multitude of **comparable construction projects**.
- Project created a possibility to present "**powerful evidence**" for a warehouse of raw materials that is able to **withstand strict economic requirements**
- Added **value for the overall BAMB project**: practical and real market feedback generated within the pilot, esp. for the material passport and its balance limit



Fig. 35: UNESCO World Heritage "Zeche Zollverein"



Fig. 36: Visualisation of the New Office Building

NEXT

- Project is **nearing completion**
- Buildings' Material Passport (BMP) is **integrated**
- **Following steps** would be
 - **further development** of the BMP
 - further development of the **implementation process** by integration into **further projects**
 - draw the **market's attention** to the BMP
 - spread information about the **importance** and **added value** of the BMP



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THANK YOU

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