



WES CIRCULAR ECONOMY

Michael Moradiellos/23.03.2022

CLIMATE CHANGE

CONNECTING ECONOMICS WITH SUSTAINABILITY...



- **globale warming** under 2°C, ideally **≈1,5°C** compared to pre-industrial level
- **Decarbonization until 2050..2100**, elimination of all green house gas emissions until 2070
- **CO₂-budget** of **≈ 150 to 1050 Gigatons CO₂-Emissions**

*“The OECD estimates that, globally, EUR **6.35 trillion** a year will be required to meet **Paris Agreement** goals by **2030**. Public sector resources will not be adequate to meet this challenge, and mobilisation of institutional and private capital will be necessary.”*

European Taxonomy, 2020



ENGINEERING

Key Service Portfolio



CIRCULAR ECONOMY WITH EPEA

History of EPEA

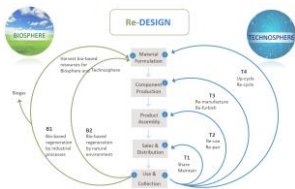
1987

Founding date of EPEA by Prof. Dr. Michael Braungart in Hamburg



2009

Cradle to Cradle Workshop with Ellen Mac Arthur about Circular Economy.



2008-2012

Global growth of the EPEA network



2019

Prof. Dr. Michael Braungart und Drees & Sommer drive Cradle to Cradle® together

FUTURE



2001

Book: "Cradle to Cradle® – Remaking the Way We Make Things "

2010

The Cradle to Cradle Products Innovation Institute receives the license for certification.



2013

EPEA und Drees & Sommer start cooperation for Cradle to Cradle

DREES & SOMMER

MICHAEL MORADIELLOS DEL MOLINO

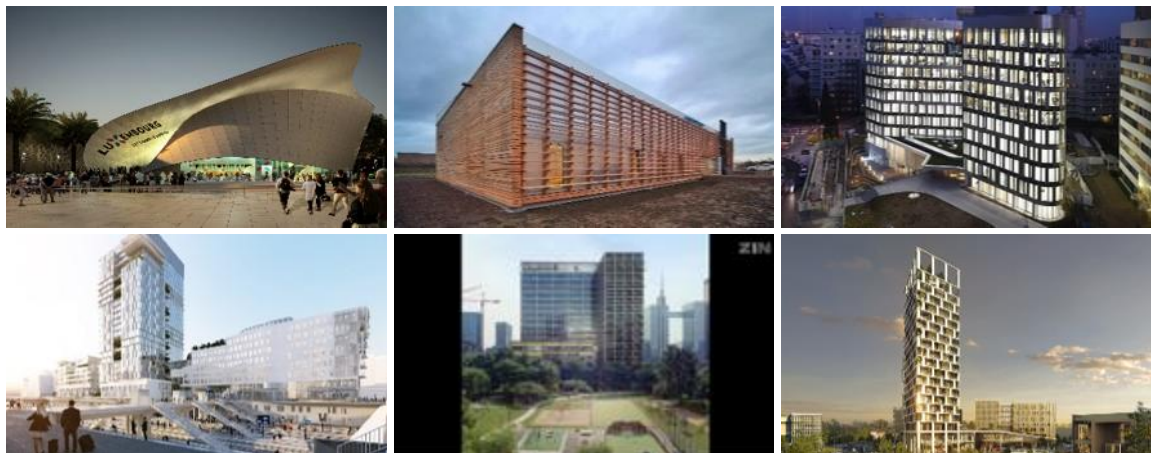
Head of C2C in Real Estate – BeNeLux&Fr



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Architect
Masters in Sustainable Urbanism



Professional education and career

Since 2019	EPEA – Part of Drees & Sommer, Head of Real Estate Benelux & Fr
Since 2017:	Drees & Sommer Belgium, Project Partner
2015 - 2019	Building Integrated Greenhouses – Founder / Associate Partner
2014 – 2018	Implementation Center for Circular Economy – Director
2011 – 2018	Lateral Thinking Factory – Founder / Associate Partner
2007 – 2009	Urbanaccion – Associate Partner
2006 – 2011	Ecosistema urbano, Madrid –Business Development Director
2004 – 2007	DEA Urbanism ETSAM Madrid
2003 – 2006	Nodo17 – Project Manager
1997 – 2002	Architect by ISAVH Bruxelles

Expertise

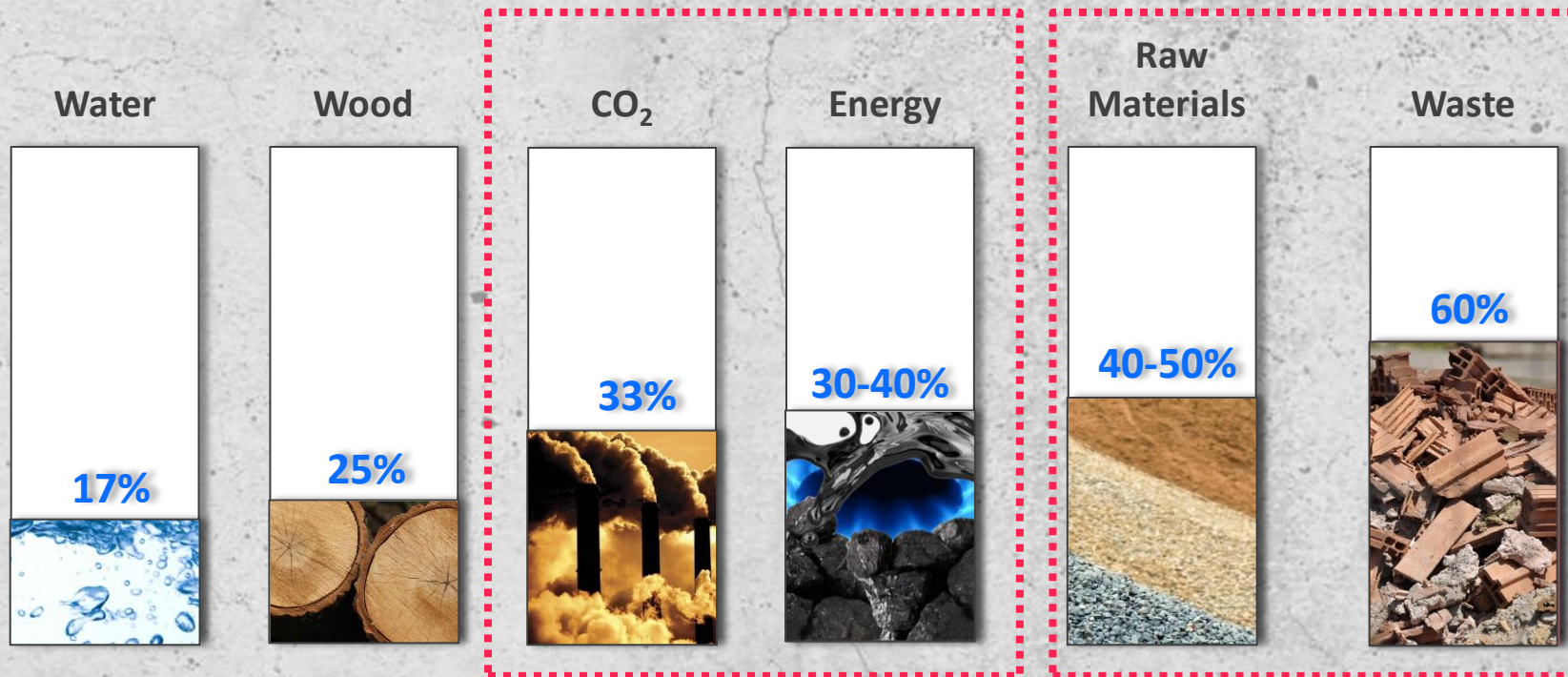
- Cradle to Cradle / Circular Economy / Urban Agriculture
- Embodied Carbon / Urban Mining
- Building Material Passeport / Madaster / TOTEM
- Innovation / New Business Model

Projects (Excerpt)

- Luxembourg 's Pavillon at Expo 2020 Dubaï (2.500m²), Dubaï (UAE).
- C2C Bizz Pilot Project « La maison des projets », Lille (FR) (LTF reference).
- Vinci new national HeadQuarter, (64000 m²), Nanterre (FR).
- Sogeprom new national Headquarter (15.000 m²), Paris (FR).
- ZIN, Flemish Government new offices, mixused project (110.000 m²), Brussels (BE).
- Entrée de Ville, apartments and mix use offices (35.000 m²), Differdange (LUX).

THE CONSTRUCTION SECTORS CONTRIBUTION

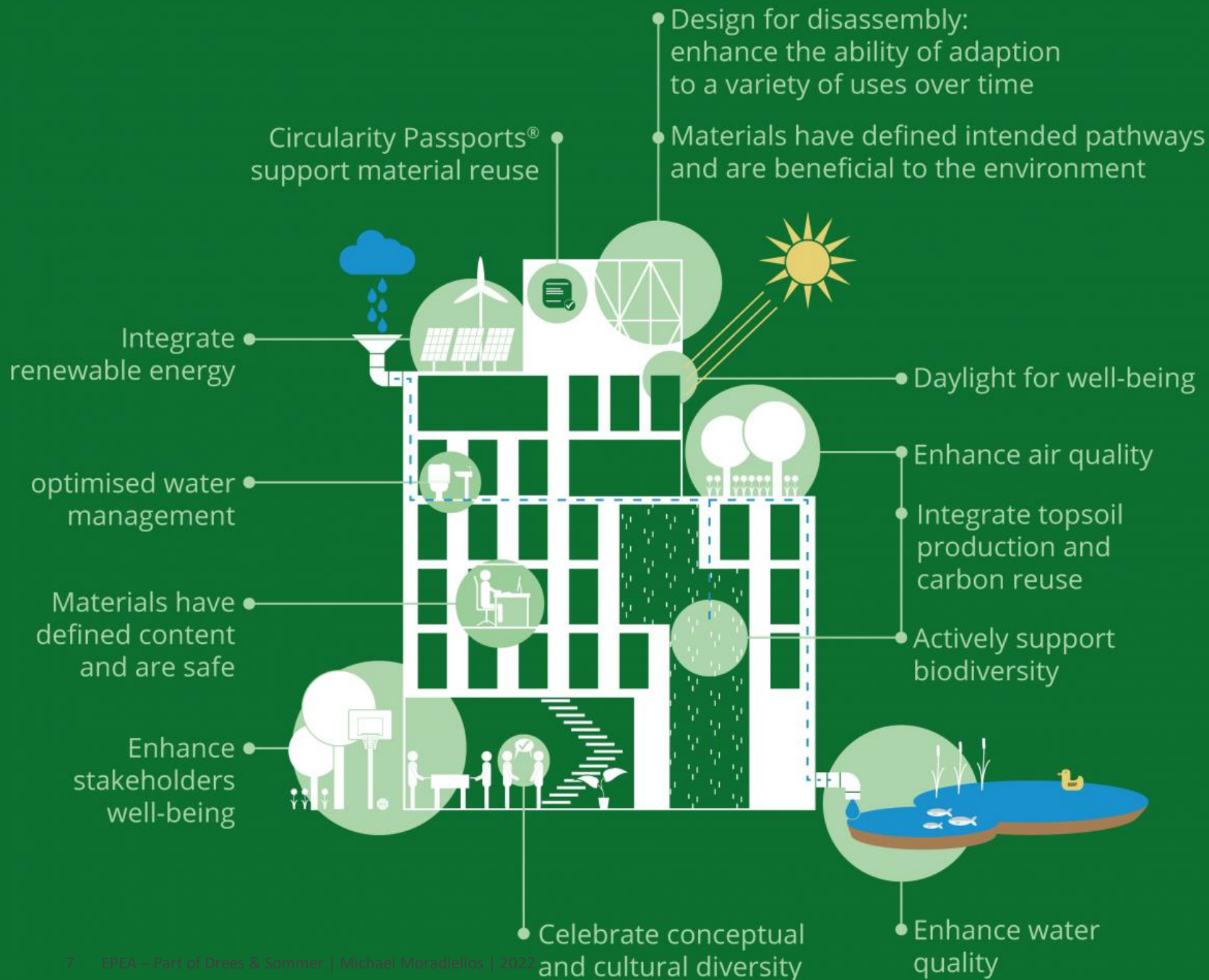
Climate Change Problem!
Resource and Material Problem!



Source: UNEP, Statistisches Bundesamt
Defra and Government, Statistical Service (2019)

CRADLE TO CRADLE IN THE BUILDING ENVIRONMENT

Design a Positive Footprint.



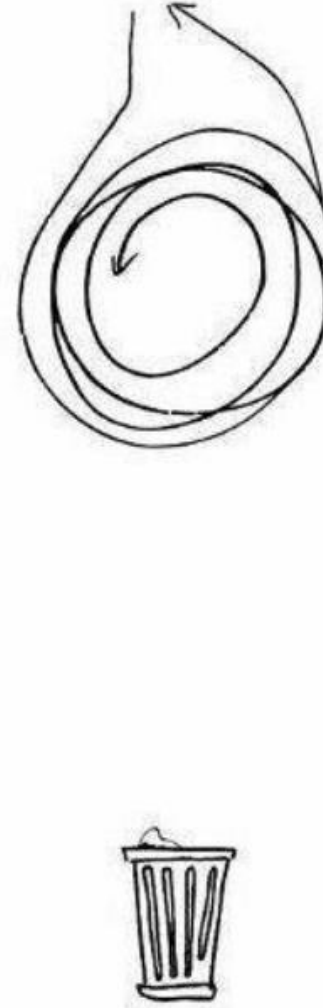
LINEAR ECONOMY



RECYCLING
ECONOMY



CIRCULAR
ECONOMY





City

Building

Product

Component

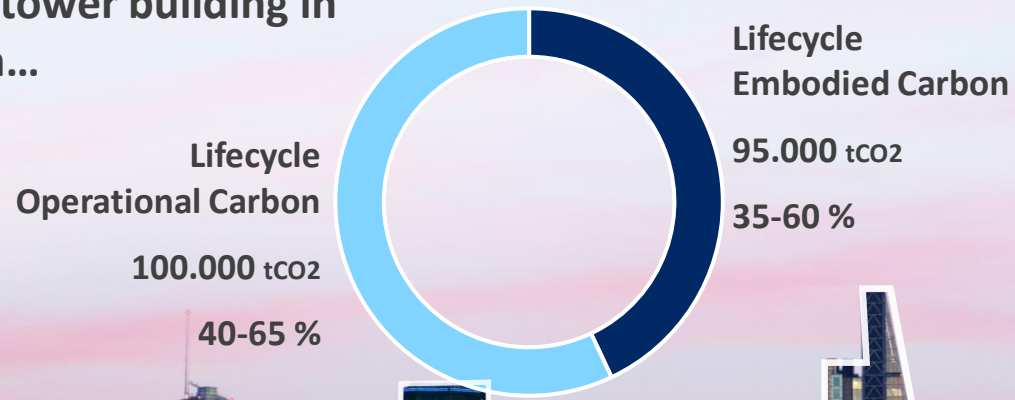
Molecule

The greater common good cannot exist without the small - all things are interconnected. To realise sustainable and liveable cities, we need circular buildings and products, made from materials and chemicals that are healthy for both humans and the environment. We think outside the box to develop innovative concepts together with our partners - from the molecular scale up to urban development dimensions.

_RE//IMAGINE

**DREES &
SOMMER**

The Carbon Footprint of a typical tower building in London...



**Embodied Carbon
Initial Construction**
60.000 tCO₂



Compensation by running a windpark with 17 wind turbines for one year.

**Operational Carbon
Annual**
5.000 tCO₂ per year



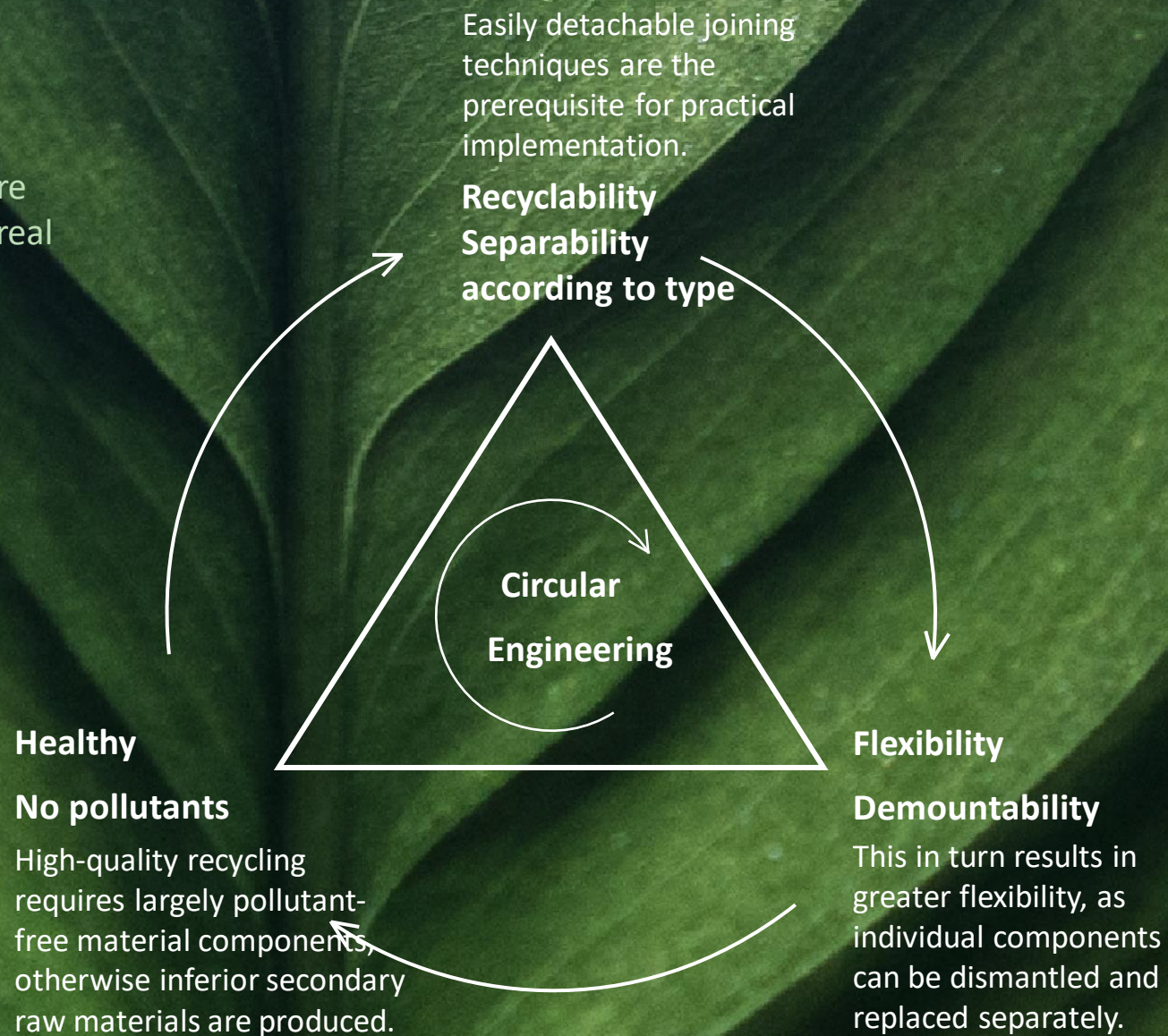
Compensation by 2 wind turbines continuously operating for the lifetime of the building

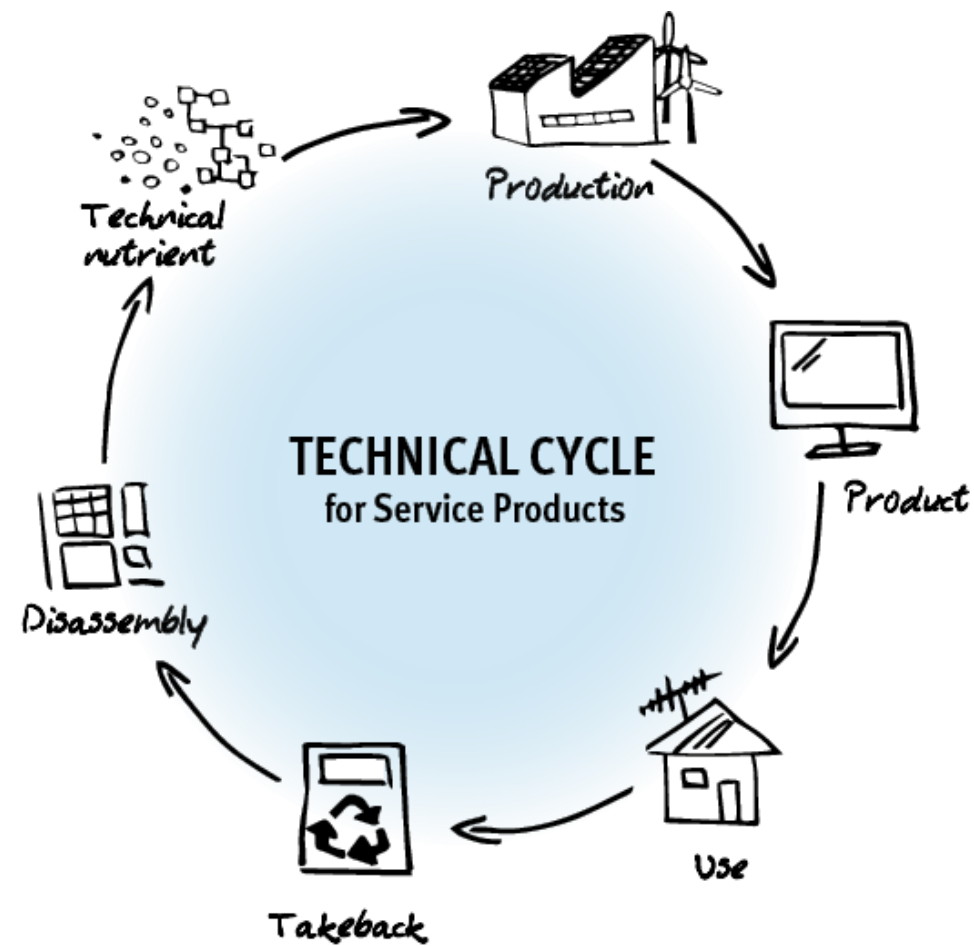
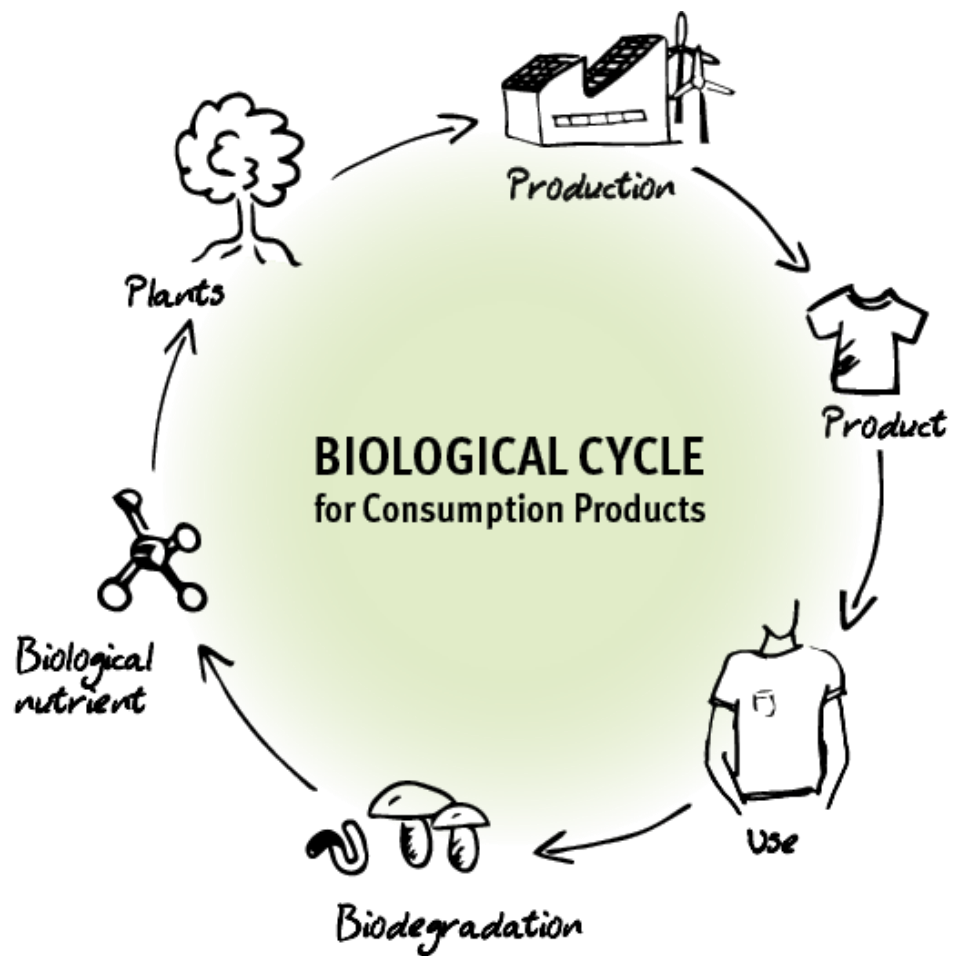
CIRCULAR ECONOMY TACKLES CLIMATE CHANGE

**DREES &
SOMMER**

NEW ROLE & NEW DISCIPLINE: CIRCULAR ENGINEERING

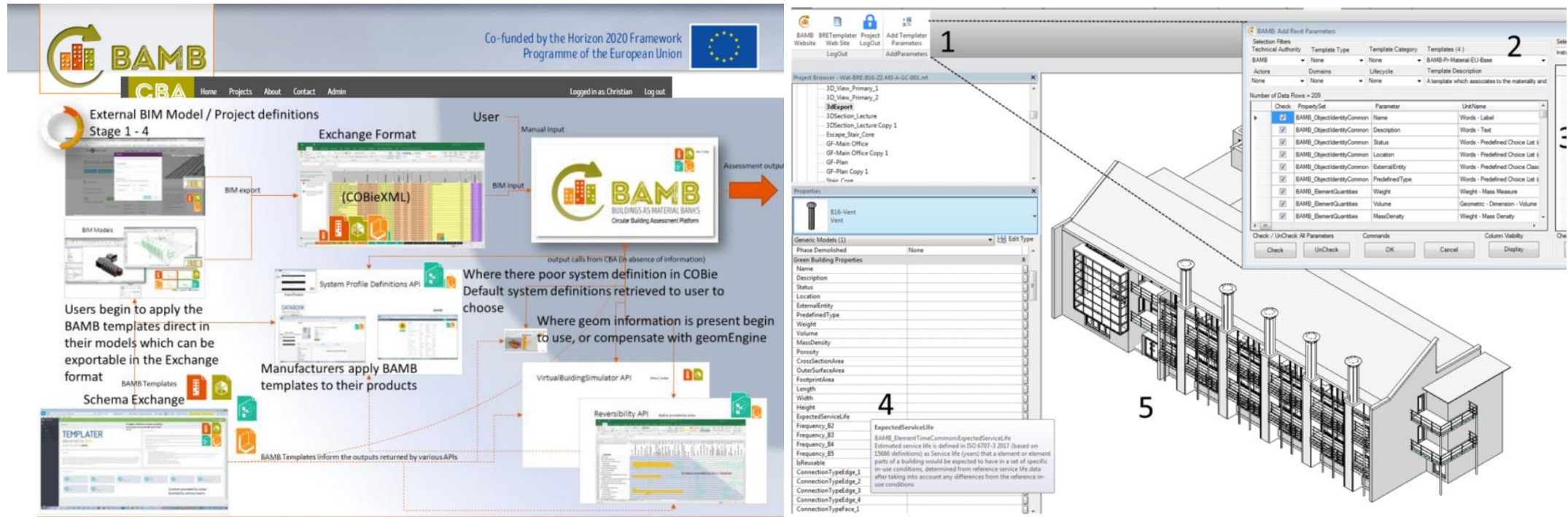
Cradle to Cradle® combines three essential future topics in one engineering task and thus creates real estate with long-term value.








BUILDING AS MATERIAL BANKS (BAMB H2020)

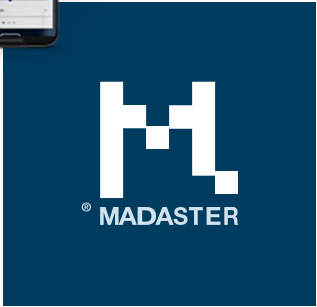
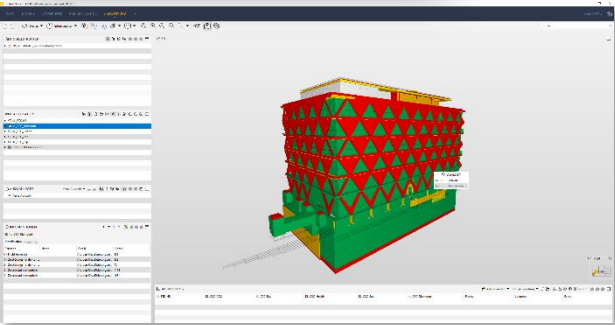
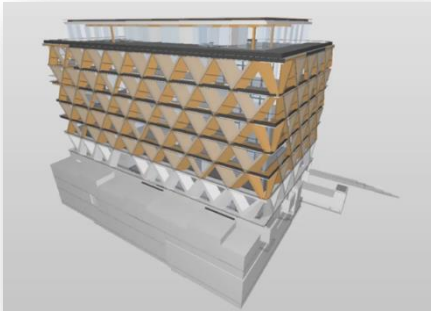
The EU project for circular buildings



BUILDING CIRCULARITY PASSPORT

A comprehensive tool to measure circularity

-  Health according to Cradle to Cradle®
-  CO2-Footprint
-  Demountability
-  Separability of materials
-  Recyclability of products
-  Available raw material assets



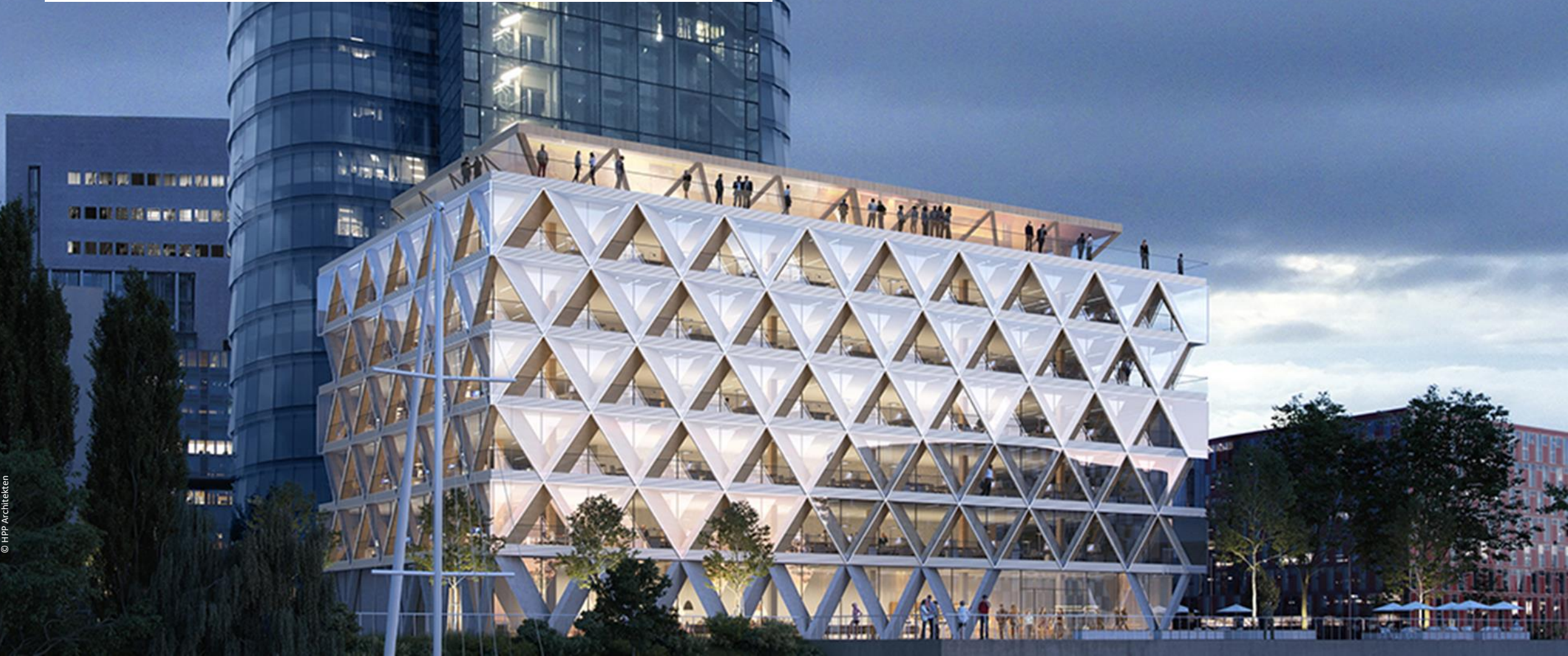
Or other...



CIRCULAR ENGINEERING FOR NEW CONSTRUCTION



MIPIM/The Architectural Review
**Future Project
Awards 2018
Winner**



URBAN MINING FOR RENOVATION PROJECTS

CIRCULAR FITOUT FOR INTERIOR

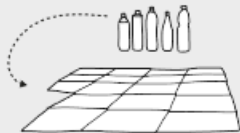
Air Purification



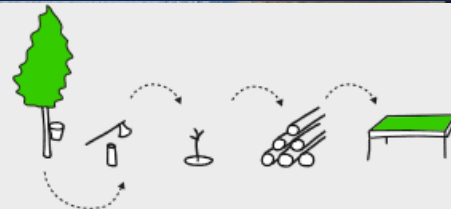
Design for disassembly



Upcycling & Ocean Mining



Biodegradable "Rubberwood"



WTC -> ZIN

SUSTAINABLE BUILDINGS– TODAY AND IN THE FUTURE

Valuable Investment



EU TECHNICAL EXPERT GROUP ON
SUSTAINABLE FINANCE



Healthy raw
material Bank

Cradle to Cradle - Quality standard for health and circularity issues :

- ✔ Healthy working place for more productivity / well-being
- ✔ A building as a raw material Bank - responsibility for society and the environment
- ✔ Risk prevention - EU taxonomy already fulfill

BREEAM®
In Use

Compliant with
green building standard

Ensuring a high sustainability standard for the entire building :

- ✔ Balanced quality assurance across the board (energy, mobility, ...)
- ✔ Market Expectation = conforms to the green building standard
- ✔ BREEAM In Use certification

Legislation

Compliance with building standards as a prerequisite :

- ✔ Belgian Building regulations
- ✔ Guidelines

BELGIAN MARKET

GRO sustainable framework by 2020 (used in public buildings)

By 2040/2050 all buildings will have a passport and will be reversible

No more demolition waste !



GRO

Op weg naar toekomstgerichte bouwprojecten

Gebruikershandleiding - versie 2020



REFURBISHMENT OF WTC 1&2, BRUSSELS, BELGIUM

Befimmo is launching the renovation of the 110,000 m² of WTC 1 & 2 towers in order to introduce diversity in the North district of Brussels. Selective demolition is underway in the first phase of construction to promote the reuse of finishing materials, while a C2C project is expected to be created by 2023.

110.000 m² / 2019 – 2023 / Befimmo

Drees & Sommer services

- Integration of circular economy specifications for the design team's tendering phases
- Identification of available materials and solutions and collaboration with companies to provide innovative solutions
- Demolition support according to C2C
- Implementation of the Material Passport
- Proposal for efficient ecosystems



CIRCULARITY AS AN ENGINE FOR INNOVATION

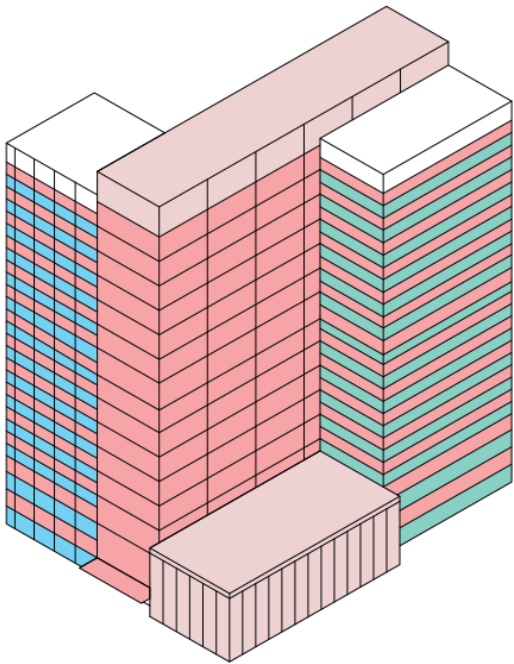
Circularity is a very important aspect of the ZIN project. The existing building will be kept to a maximum. The underground floors and traffic cores will be preserved. The elements that will be demolished will be given a new life. Overall, more than 95% of all existing materials and equipment will be recovered or recycled.

Circular thinking is not only based on recovery and certification, it is also based on a very long-term perspective for the building. ZIN is therefore not only focused on today's needs, but can also be adapted in the future to meet tomorrow's needs.

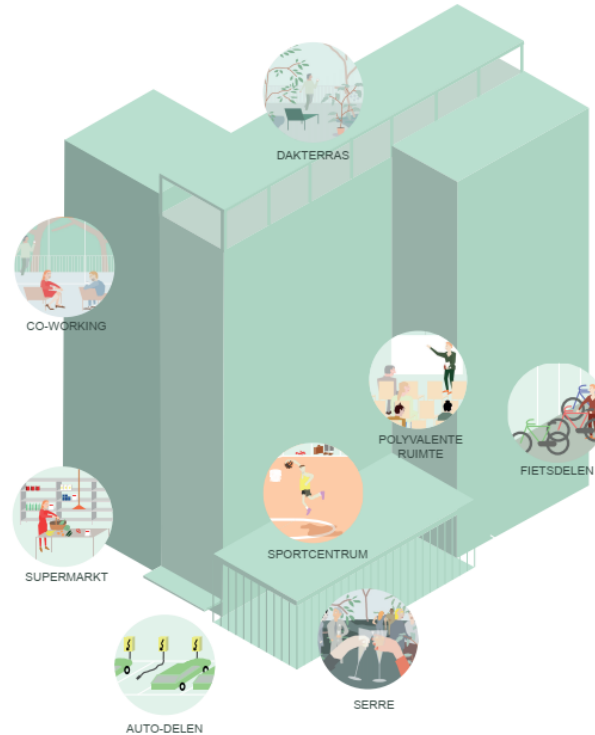
Main topics

- Urban Mining with C2C Mindset
- Upcycling
- Material Passport
- Build for Disassembly Design

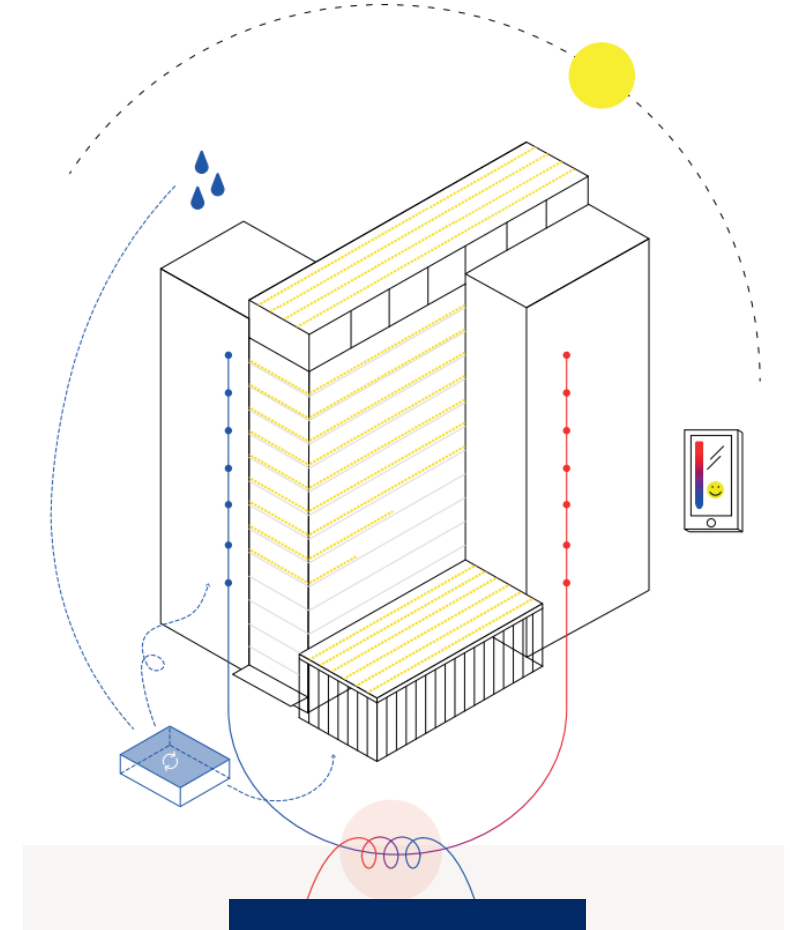
ZIN – FLEXIBILITY & ADAPTABILITY



Physical Flexibility :
building elements
can be adapted.



Functionnal
Flexibility : space can
be adapted.

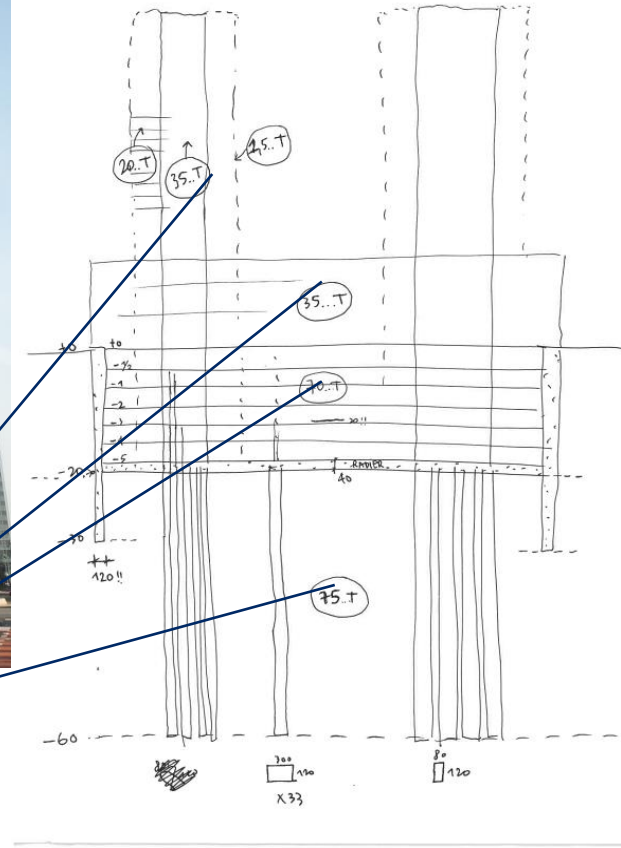


Technical Flexibility :
technics can be
adapted.

25 EPEA – Part of Drees & Sommer | Michael Moradiellos | 2022



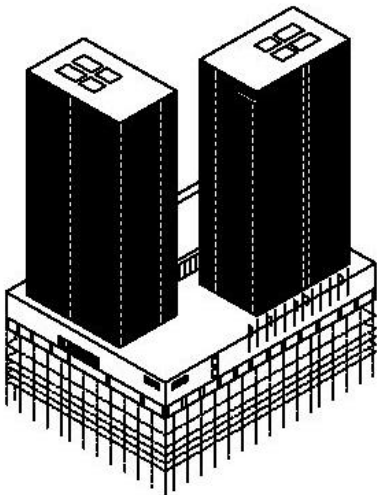
DIRECTED BY NURBERTO LOPEZ AMADO & CARLOS CARCAS PRODUCER ELENA OCHOA
EXECUTIVE PRODUCER ANTONIO SANZ WRITTEN AND NARRATED BY DEYAN SUDJIC MUSIC BY JOAN VALENT
DIRECTOR OF PHOTOGRAPHY VALENTIN ALVAREZ FILM EDITOR PACO COZAR LEU PRODUCTION PALOMA LOPEZ VAZQUEZ
ASSOCIATE PRODUCERS IMANOL URIE & ANDRES SANTANA
AN ART COMMISSIONERS PRODUCTION IN ASSOCIATION WITH AÏETE ARIANE FILMS
MORE INFORMATION AND PRESS MATERIALS AT WWW.ARTCOMMISSIONERS.COM



**DREES &
SOMMER**

ZIN - URBAN MINING STRATEGY

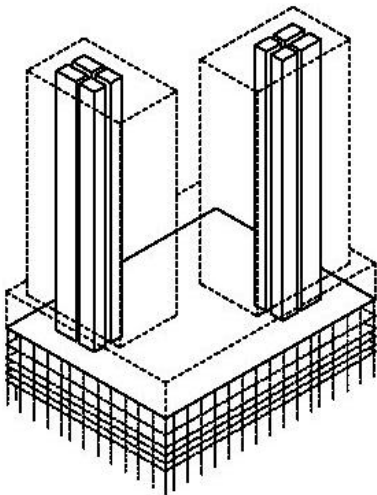
1972



Vloeroppervlak: 170 000 m²
Gewicht : 275 000 T

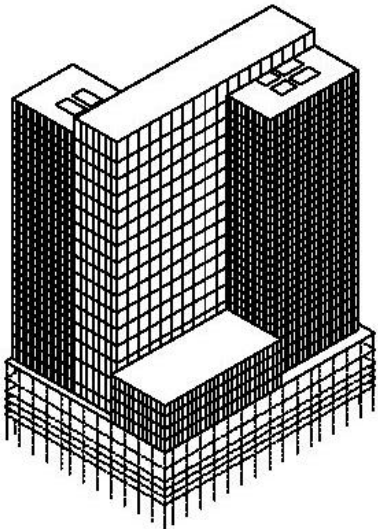
Nieuw: 275 000 T
Grond: 400 000 T
Afval: 41 000 T

2020



Behouden: 193 000 T
Gerecycleerd ter plaatse: 15 000 T
Gerecycleerd elders: 52 000 T
Afval: 15 000 T

Geen vernietiging van groene ruimte



Vloeroppervlak: 170 000 m²
Gewicht : 315 000 T

Nieuw: 107 000 T
Behouden delen: 193 000 T
Gerecycleerd ter plaatse: 15 000 T
Afval: 7 512 T
Grond : 0T



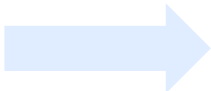
500.000,00 €
Savings in Demolition cost (2,5 %)

ZIN – MATERIAL FLOWS



INDUSTRIAL TAKE BACK LOOPS : CONCRETE

Sorting properly demolition waste on site, in order to be able and ensure high-quality recycling



Concrete Upcycling to be reused as structural material in future buildings



Concrete is typically crushed and reused as gravel for streets and other purposes of low-quality requirements

Recycled concrete aggregates are typically used for low-quality applications (road constructions). Using it for structural purpose is not common and need several audits and test to have bank insurance today.

High-Quality concrete with high recycled content is locally produced and reused on site, controlled and safe for the next use.



Material recovery



Lab Tests for contamination of material, soil contamination legislation



Industrial recycling expertise, local recycling possibilities, logistical challenges, outside cities



Certified product made with recycled content



Use of recycled concrete on site for new building

INDUSTRIAL TAKE BACK LOOPS : FLOAT GLASS



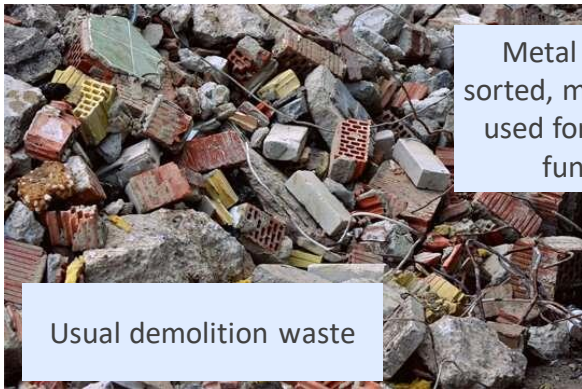
INDUSTRIAL TAKE BACK LOOPS : MINERAL CEILINGS

Sorting properly demolition waste on site, in order to define the right recycling loop and process



Industry requirement for remanufacturing process

Recycling rules since 2000 as production date.



Metal and bricks are sorted, mixed material are used for landscaping or fundation soil.

Usual demolition waste

Existing tiles made of mineral wool are difficult to be reused after several years of use, they are perfect for upcycling, when they have been fabricated no later than 2000, because they are biosoluble.

New products are fabricated out of raw materials, with the industrial performance and the Manufacturer guaranty. Compliance with regulation and environmental performance will always confirmed.



Man power, storage space, logisitc, quality control



Reverse logistic, packaging, transport, optimisation



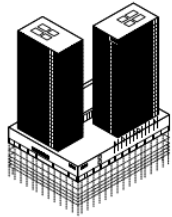
Industrial expertise to reuse materials, supply challenge



New materials made of recycled content.

ZIN – MATERIAL FLOWS

2018: WTC I & II



100 %
281 134 T

63,4 %

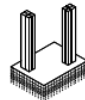
HERBRUIK TER PLAATSE



Houtpanelen 1 T



Computervloer 100 T



Structuur 178 169 T

0,6 %

HERBRUIK ELDERS



Verlichting 58 T



Sanitaire toestellen 11 T



Hars tegels 675 T



Isolatie 30 T



Scheidingswanden 150 T

31,3 %

VOOR RECYCLAGE



Beton 19 250 T



Gevel 1 335 T



Metaalstructuur 2 530 T

GERECYCLEERDE
MATERIALEN



Dekvloeren, enz.
55 387 T

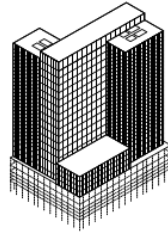
4,7 %

AFVALBEHANDELING



Gevaarlijke producten (asbest, ...) 13 233 T

2023: ZIN in No(o)rd



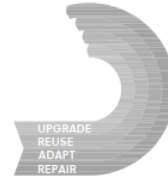
100 %
341 183 T

52 %

32 % NIEUWE MATERIALEN

16 %

97 % van de 48 %
CRADLE TO CRADLE
MATERIALEN of equivalent



News

Building for Tomorrow with Cradle to Cradle Certified®: Belgium's Project ZIN by Befimmo

APRIL 23, 2021



ZIN – FOCUS URBAN MINING

1.646 ton (0,6% of total weight) to be reused on site and on others / 710 tons have been evacuated / 70.000 Tons of materials will be upcycled (concrete, flatglass, aluminium) for reuse on site after manufacturing.



Insulation (20.000 m²), 66 ton



Carpet Tiles (6.800m²), 41 ton



Partition wood panels
(40.000m²), 475 ton



Mineral Tiles (35.000m²), 78
ton



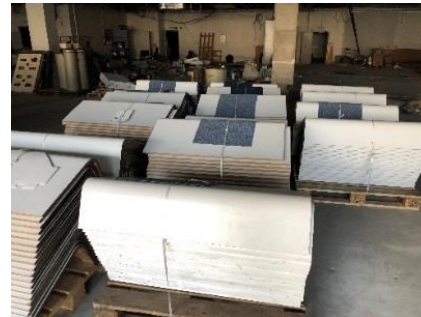
Stone Tiles (1.800m²),
123 ton



Roof Tiles (4.975m²), 636 ton



Raised Floors (6.800m²),
240 ton



Wood Panels (2.860 sticks),
36 ton



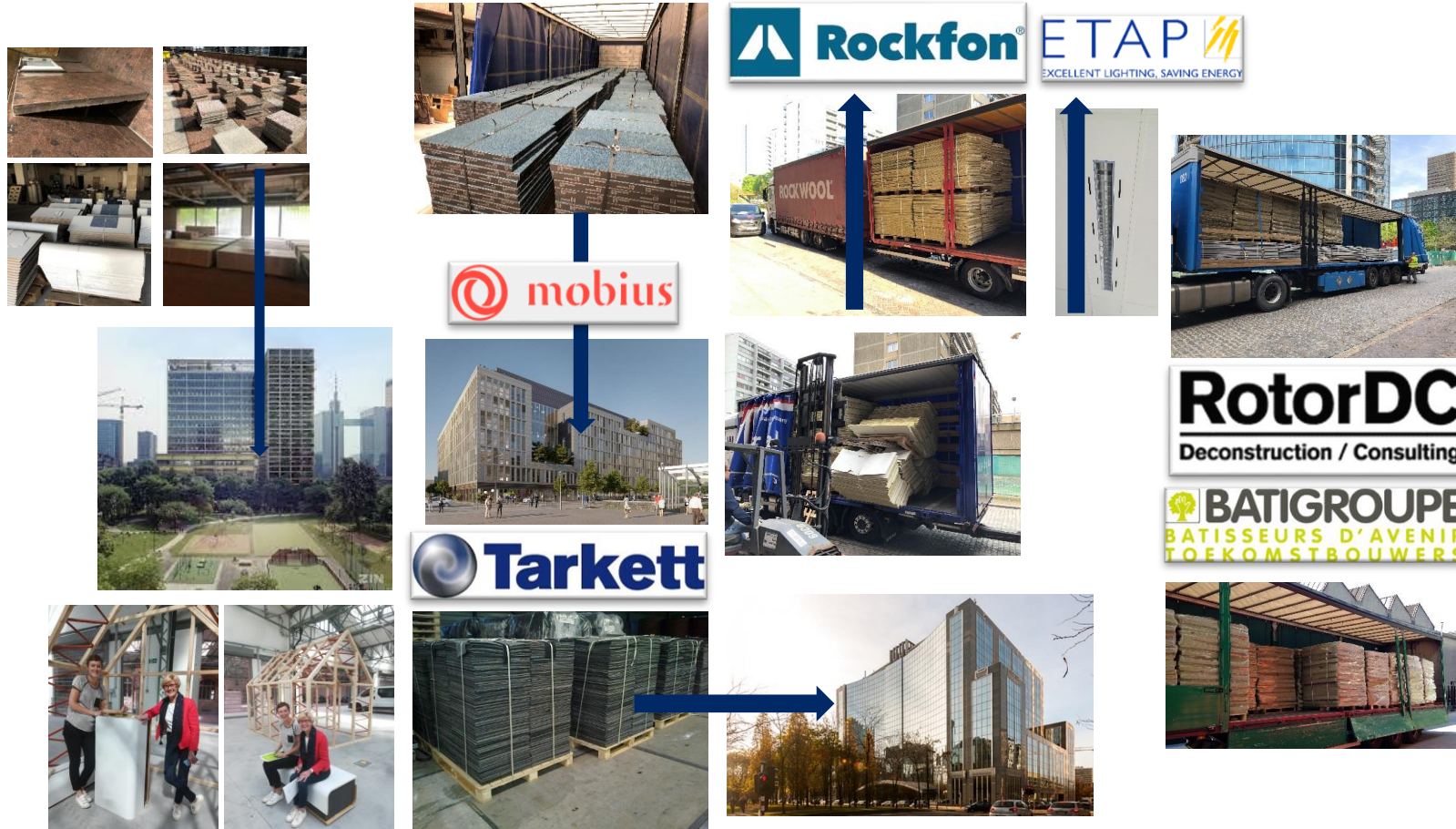
Flatglass (14.000m²),
577 ton



Furnitures 59 Tonnes

ZIN – FOCUS URBAN MINING

1.646 tons of materials to be reused on site and other locations



An aerial, high-angle view of a city skyline. In the center, several tall skyscrapers are covered in greenery, with plants growing through a grid-like structure on their facades and roofs. These green buildings are surrounded by traditional, grey skyscrapers. The city is partially obscured by thick, white clouds. The word "RE.THINK" is superimposed in large, white, sans-serif capital letters across the middle of the image.

RE.THINK



Refurbishment of Multitower, Brussels, Belgium

Whitewood has started the renovation of the “De Brouckère” Building in the center of Brussels, where circular economy is one of the mayor innovation. Urban Mining experts set up a target of 3% to be reused in the new project, and a Material Passport will be defined to keep value of materials in time.

This project contributes positively to the urban regeneration of the pedestrian zone in the city center, and offer complementary public spaces as well as a new definition for public transport.

45.000 m² / 2017 – 2021 / Whitewood

EPEA / Drees & Sommer services :

- C2C Audit
- Urban Mining support according to C2C
- Option :
 - Implementation of the Material Passport
 - C2C Workplace Consulting



Pavilion of the Grand Duchy of Luxembourg in Dubai

Luxembourg wants to design its pavilion at the next International Exhibition according to the principles of the circular economy in order to put into practice the main principles developed by the economic actors, as established by the Circular Hotspot in June 2017. A building that must be dismantlable and representative of the Grand Duchy's know-how in circular economy.

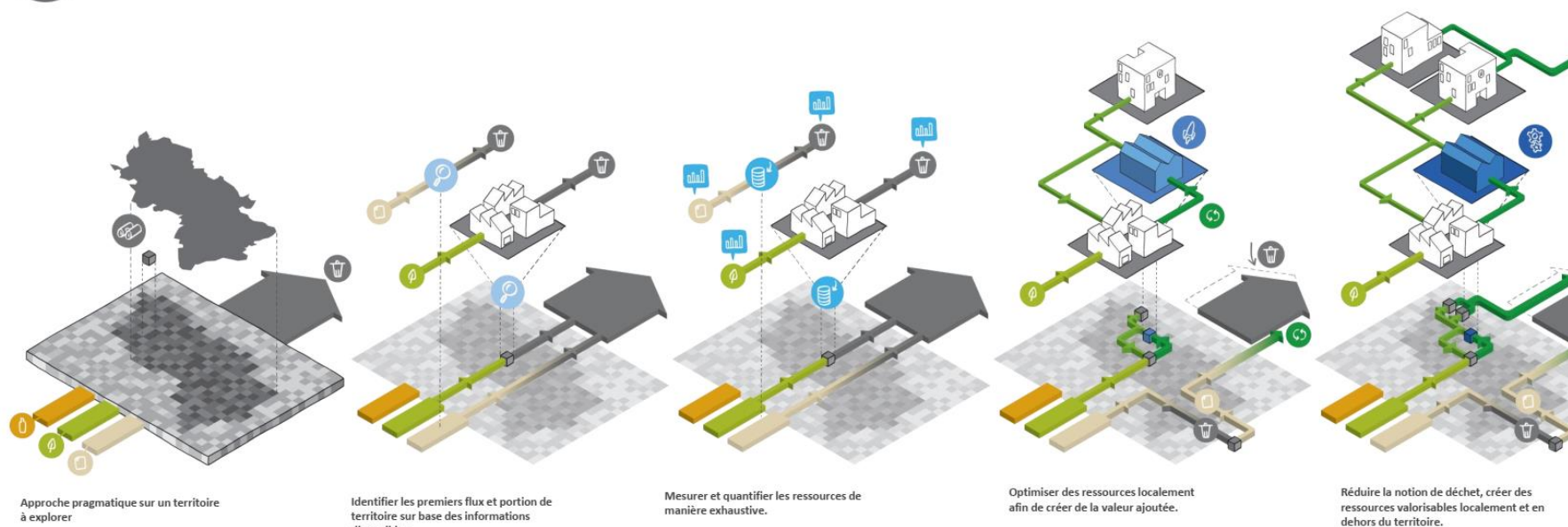
1.400 m² / 2017 – 2020 / ABP Luxembourg

EPEA / Drees & Sommer services :

- C2C Audit
- Integration of a Circular Economy specification book for the design team's tendering phases
- Identification of available materials and solutions and working together with companies to provide innovative solutions
- Global costs analysis for the pavilion's 6 months life cycle including "leasing" and "Take-back" solutions in Dubai, Luxembourg and aiming at Zero Waste objective
- Material Passport implementation



1.2 PROCESSUS MIS EN PLACE



Au travers d'une étude de flux, la Commune de Wiltz souhaite connaître les données sur les matières entrantes et sortantes sur son territoire. L'objectif est de qualifier les ressources disponibles et de pouvoir élaborer des projets pilotes faisant un meilleur usage de ces ressources.

Au travers de la mise en œuvre de ces pilotes, la Commune de Wiltz souhaite diminuer les déchets et augmenter la qualité des ressources localement.

Une telle entreprise demande une stratégie itérative entre données brutes collectées sur le terrain et prises de position sur des projets pilotes presentis par les acteurs.

Deux voies ont été suivies : l'analyse exhaustive d'un « pixel » du territoire, et le suivi d'une ressource clairement identifiée à haut potentiel. Ces données ont permis d'étudier la faisabilité technique et financière de certains projets pilotes, tout en générant une dynamique locale autour de ces projets.

Ces ressources ont été divisées en deux catégories suivant leur source: les données issues des entreprises de la ZA Salzbaach et les données fournies par la Commune de Wiltz et les Services Nationaux. Ceci a permis de traiter des entrants et sortants très différents et de trouver des ponts entre les deux structures de l'information.

Les données fournies par les entreprises sont traitées de manière anonymes, et des recommandations peuvent déjà être proposées individuellement.

Déterminer les impacts des projets mis en œuvre par la Commune de Wiltz, qu'ils soient liés ou non aux projets identifiés dans le cadre de l'économie circulaire, et le vrai défi de cette étude. C'est ce que se donne comme objectif l'outil Excel proposé dans le cadre de cette étude.

Il serait également possible de prédire l'impact de projets futurs, comme le développement d'un nouveau quartier au centre de Wiltz, et ceci via l'approche proposée.

La combinaison de l'optimisation ponctuelle de la gestion des flux entrants et sortants, des projets pilotes et des réseaux locaux qui seront impactés favorablement par ces nouveaux dispositifs urbains, permettra à terme d'augmenter la qualité des ressources entrantes (être plus exigeant en amont) pour maximiser les boucles locales, et in fine augmenter la qualité des ressources sortantes dans le but de les valoriser financièrement ou de les mettre à dispositions d'autres acteurs.

Circular Flow study, Wiltz, Luxembourg

Wiltz has commissioned a study for Pilot projects, based on a Flow study in the industrial area. In addition, basic flows from the Municipality have been investigated.

-m² / 2018-2019 / Municipality of Wiltz

EPEA / Drees & Sommer services :

- Flow Study
- Roadmap
- Tools

Incubator, Bissen, Luxembourg

CDCL is developing a new place for start-ups in Bissen. The client is the Ministry of Economy, and C2C is being implemented through a prefabricated system for the structural element.

4.500 m² / 2020-2022 / CDCL

EPEA / Drees & Sommer services :

- C2C Engineering
- Building Circularity Passport





New Retail Park, Ternat, Belgium

REDEVCO has renovated an old logistic park into a bright new retail park using the C2C principles and the services of William Macdonough architects. A Build for Disassembly strategy has been applied for building elements and material assessment has been provided.

110.000 m² / 2019 / REDEVCO

EPEA / Drees & Sommer services :

- C2C Audit

- Option :

- Implementation of the Material Passport



New head office of Vinci, Paris, France

The Vinci Group has decided to consolidate several of its activities into a new head office located in Nanterre, East of Paris. In order to use the building as a showcase for its know-how and enthusiasm for innovation applied to the construction and building sector, Vinci has set demanding Cradle to Cradle targets to be implemented in an ambitious context.

64.000 m² / 2017-2021 / Vinci Immobilier

EPEA / Drees & Sommer services :

- C2C-design of the whole: guaranteeing 30% C2C products or equivalent
- Search for C2C alternatives to integrate during the design phase
- Circular Engineering with the help of the Material Passport
- At the end of the project, provide help to create a dynamic material library containing the C2C characteristics of the selected products, e.g. level of dismantling, recyclability, recovery channels, etc.

Ampere e+, Nanterre, France

Construction of the new headquarters of SOGEPROM, a Société Générale subsidiary dedicated to real estate development, over a surface area of 15,000 m² at La Défense. The e+ building will showcase the company's innovative know-how and enhance the quality of office promotion for the entire group.

14.500 m² / 2016 – 2017 / sogeprom

EPEA / Drees & Sommer services :

- C2C Audit
- Identification of available C2C materials and work with companies to provide innovative solutions
- Proposal of efficient ecosystems
- Creation of a Material Passport detailing the products and materials used



Renovation of the « Cité des Indes », Sartrouville, France

Urbanera and 1001vies are developing an ambitious urban renewal project over a 20-year period aimed at transforming the “Cité des Indes” into a lively district linked to the city of Sartrouville. Two areas of experimentation are discussed on this project: urban agriculture and the circular economy. Demolitions, renovations and new constructions will follow in order to minimize waste generation and increase the value of materials for the future.

1.640 housing / 2019 – 2039 / Urbanera

EPEA / Drees & Sommer services :

- "Circular economy" study to identify available materials and solutions
- Work with companies to provide innovative solutions
- Technical and financial feasibility study for estimating investment budgets
- Proposal for efficient ecosystems



City Hall, Venlo, The Netherlands

Designed by Kraaijvanger Architects, the new building is an inspiring example of the implementation of the Cradle to Cradle philosophy across the building. Venlo City Hall is one of the first and unique construction projects in The Netherlands where the Cradle to Cradle philosophy is embedded in the design and operation of the building.

13.500 m² / 2015-2018 / Venlo

EPEA / Drees & Sommer services :

- C2C design of the whole: guarantee 12 C2C products
- Research of C2C alternatives to be integrated during the design phase
- Circular engineering using the material passport
- containing the C2C characteristics of the selected products, e.g. level of dismantling, recyclability, recovery channels, etc.




Office building in Essen, Germany.

The development agency Kölbl Kruse 13 GmbH & Co. KG has developed a new office complex on behalf of RAG Montan Immobilien (RAG MI) on the former Zollverein mining site, near the current offices. The new building is developed under the motto "the greenest building in the world" and the philosophy "Back to basics - Compose without high technology". This building is one of the pilot projects of the European BAMB approach.

10.000 m² / 2015 – 2018 / Kruse 13 GmbH & Co.KG

- EPEA / Drees & Sommer services :
- Engineering in Circular Economy, in accordance with the Cradle to Cradle philosophy
 - DGNB certification (German standard)
 - Design carried out with a view to energy efficiency
 - Technical equipment of buildings
 - Architectural physics, BE structures, BE facades
 - Setting up a Material Passport



International Olympic Committee – Headquarter of Lausanne

The collaboration between IOC the architectural firm 3XN has set new standards for a positive environmental impact of the building and reflects the Olympic values of the IOC both externally and internally.

9.500 m² / 2015 – 2019 / CIO

EPEA / Drees & Sommer services :

- Advisory mission on the positive environmental impact, according to C2C principles, of indoor spaces
- Advice on materials and products used in eco-construction
- Design of healthy and flexible interior spaces
- Implementation of a new economic model for the building (Leasing, Take-back System etc.).

DREES & SOMMER

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