



Venlo City Hall, Venlo, Netherlands



Fire Station, Straubenhardt, Germany



SCHÜCO-Office, Bielefeld, Germany



Moringa, Hamburg, Germany



The Cradle, Dusseldorf, Germany



LIVING, Brussels, Belgium



Office Building, Essen, Germany



Multi Tower, Brussels, Belgium

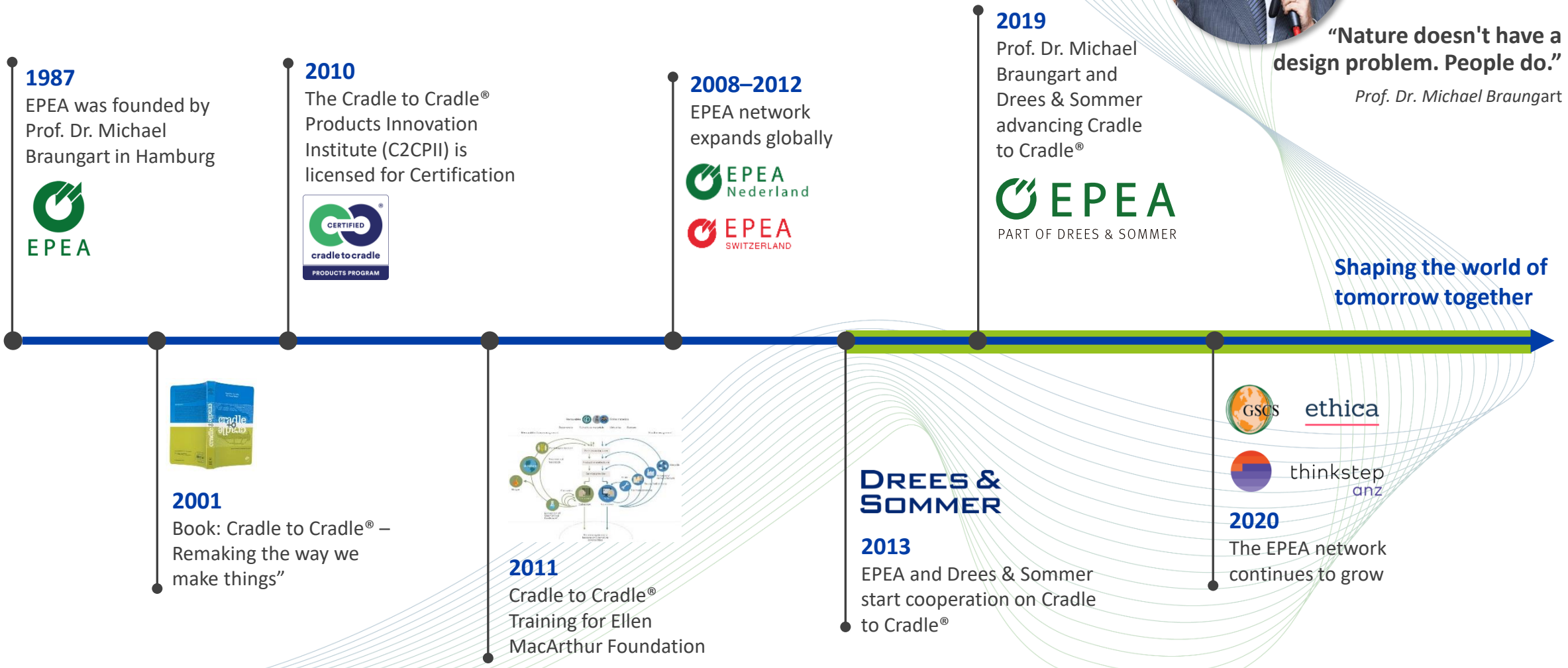


Renovation of WTC-Towers, Brussels, Belgium



OUR MISSION WITH EPEA

Co-developer of the Cradle to Cradle® design concept



“Nature doesn't have a design problem. People do.”

Prof. Dr. Michael Braungart

Shaping the world of tomorrow together




WHAT WE OFFER

Key Services – Engineering and Sustainability Consulting



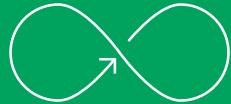
ESG AND
COMPLIANCE




ENERGY
AND CARBON



SUSTAINABILITY



CIRCULAR
ECONOMY



MOBILITY



DIGITIZATION



VALUE
OPTIMIZATION



VALUE
MONITORING AND
MANAGEMENT



ENGINEERING AND SUSTAINABILITY CONSULTING

Key Services

CIRCULAR ECONOMY

STRATEGY AND CORPORATE

- Circular Economy Guidelines and Strategies
- Procurement Strategies

DEVELOPMENT

- Life Cycle Carbon Assessments
- C2C Industrial Product Passports
- Material / Product Consulting
- Building Circularity Passport®

OPERATION

- Urban Mining



CIRCULAR ECONOMY CHALLENGES

Life Cycle Assessment

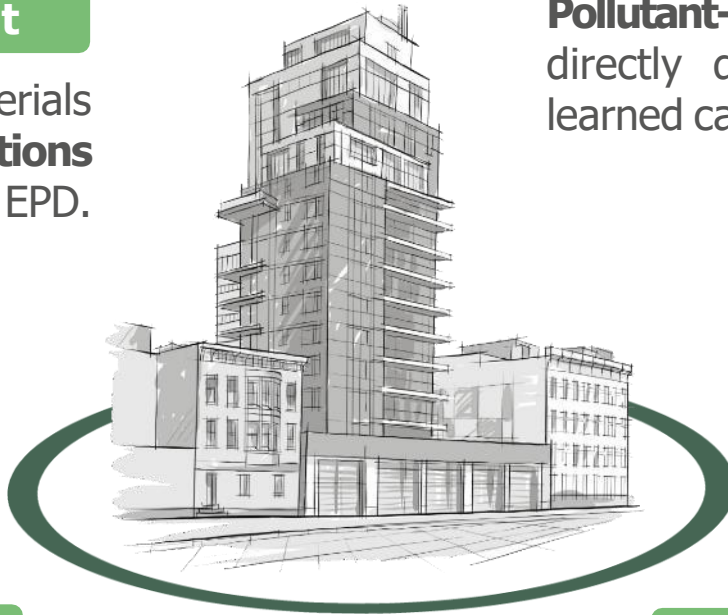
Ensure detailed documentation of all materials procured from different **suppliers and locations** through a third-party certified EPD.

Separability

Facilitate **connection techniques** adopted between different layers that require frequent replacements.

Dismountability

Design for disassembly by focusing on **interchangeability and adaptability** of individual functional units.



Material Health

Pollutant-free design can be implemented directly during design stages and lessons learned can be used across different projects.

Material Sourcing

Ensure a **locally sustainable supply** of resources with the focus on secondary materials.

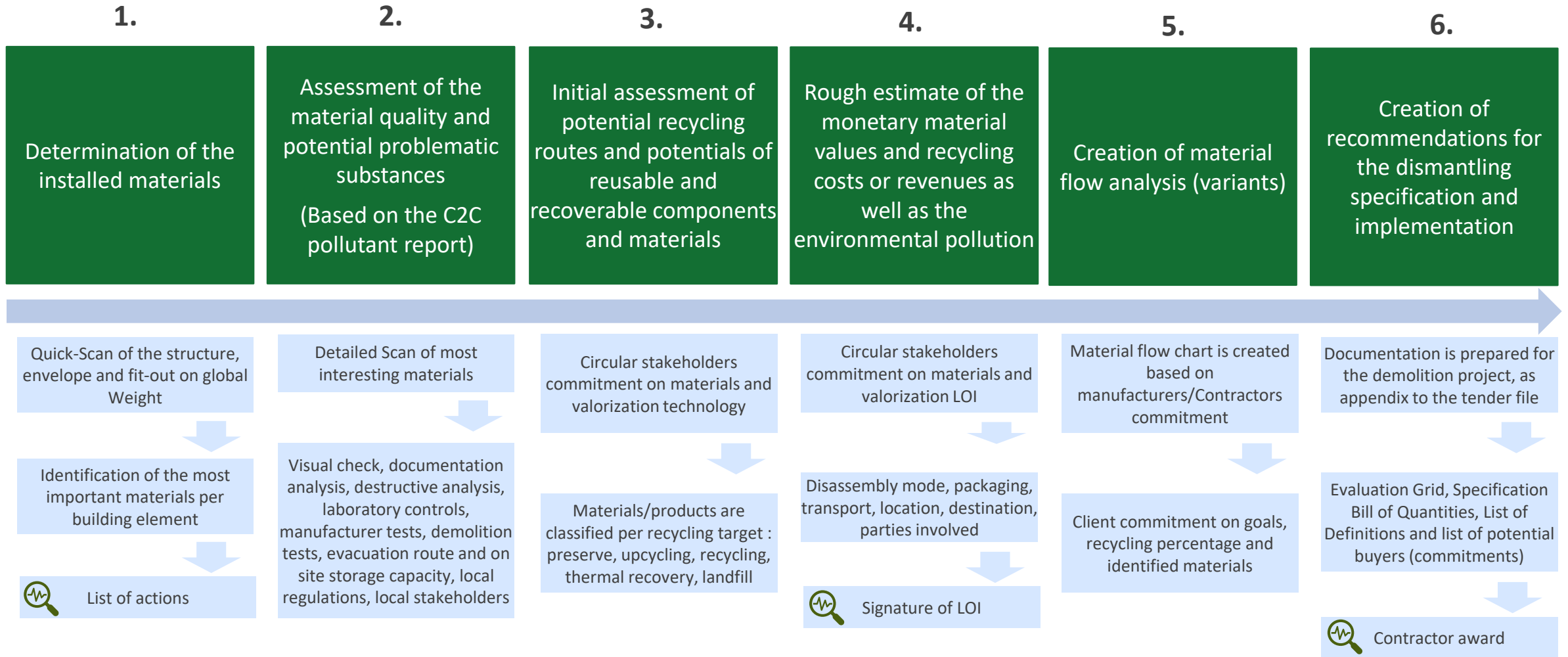
Material Recovery

Intelligently **planned materials** can be recovered in a high-quality manner, thus increasing the residual value.

URBAN MINING – powered by Cradle to Cradle®



STEP I - METHODOLOGY - URBAN MINING – INVENTORY (BUILDING LEVEL)





OUTPUT : INVENTORY

Localisation

Quantities

Recycling potential

Health –
disassembly –
market interest

DREES & SOMMER		Type of Product												Quantities								Potential information								Verifications required				Date: 04/01/2023
N° Technical sheet	Current Classification - type	Materials	Level	Area [m²]	Height, thickness or length [m]	Volume [m³]	pcc	USR	Density	Weight [kg]	Weight [t]	% total weight	Material	Recycl	Upcycling	Demolishing	Reuse	Energie Information	Performance	Health Environmental	Circularity	Market Potential												
	Fondations																																	
	Structures																																	
	Façades																																	
	Roof																																	
	Interior Wall Finishes																																	
	Interior Floor Finishes																																	
	Interior Ceiling Finishes																																	
	Stairs and Elevators																																	
	Interior SS out																																	
	Technical Equipment																																	
	Outdoor Facilities (Sports)																																	
	Totals																																	



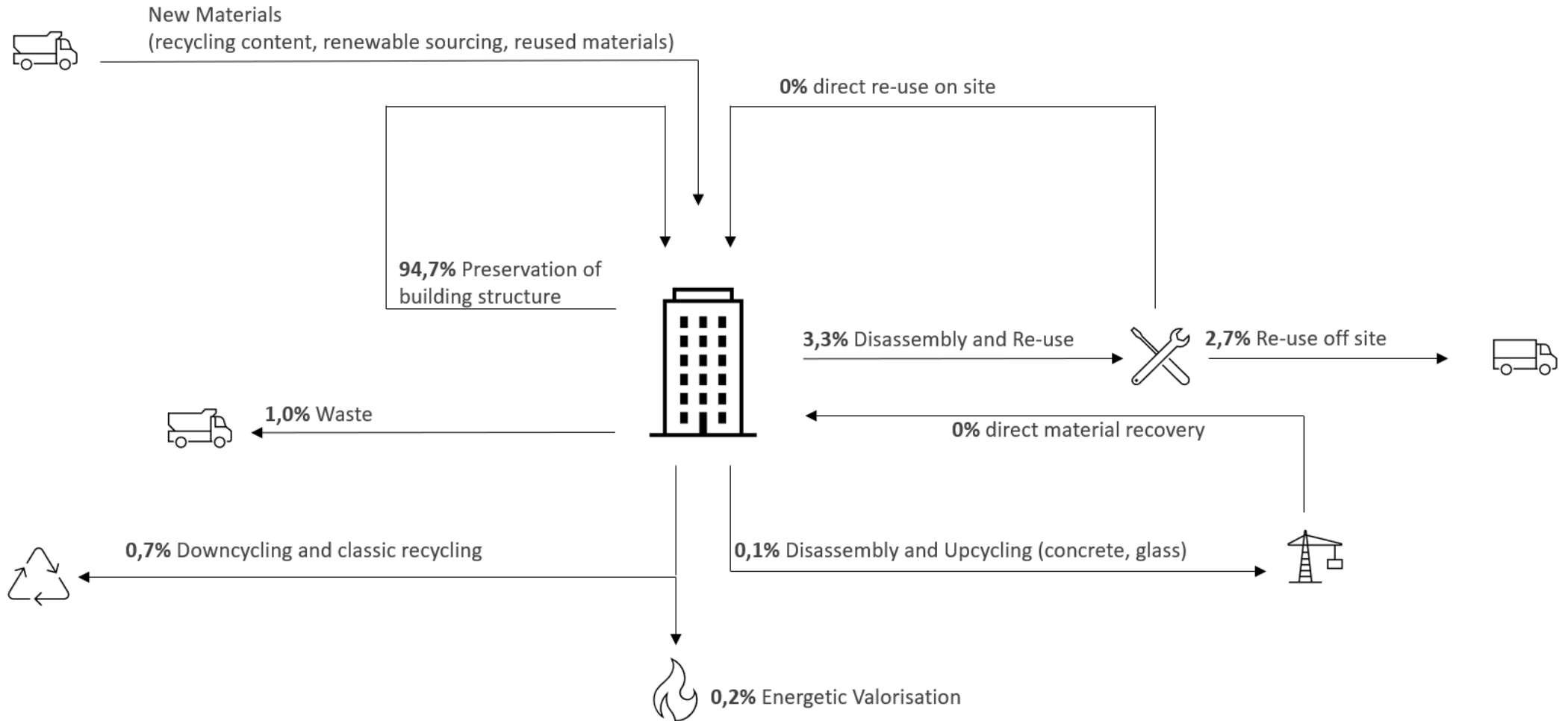
OUTPUT : TECHNICAL SHEET

DREES & SOMMER																					
Projet	Arlon 77																				
	07 Réf Fiche																				
Matériau identifié	<table border="1"> <tr><td>Matériau</td><td>Laine de roche</td></tr> <tr><td>Emploi actuel - type</td><td>Isolation des cloisons démontables</td></tr> <tr><td>Localisation</td><td>Niv. +1 et +9.</td></tr> <tr><td>Quantité disponible estimée</td><td>1251 m2</td></tr> <tr><td>Poids total estimé</td><td>3.128 kg</td></tr> <tr><td>Mode d'assemblage</td><td>Pose entre panneaux sans fixations</td></tr> <tr><td>Dimensions</td><td></td></tr> <tr><td>Etat</td><td>Bon état</td></tr> <tr><td>BIM - Code BBa/Bb</td><td></td></tr> <tr><td>Article CDC</td><td>Cf cdc AR curage (art. 12.07.05, à vérifier)</td></tr> </table>	Matériau	Laine de roche	Emploi actuel - type	Isolation des cloisons démontables	Localisation	Niv. +1 et +9.	Quantité disponible estimée	1251 m2	Poids total estimé	3.128 kg	Mode d'assemblage	Pose entre panneaux sans fixations	Dimensions		Etat	Bon état	BIM - Code BBa/Bb		Article CDC	Cf cdc AR curage (art. 12.07.05, à vérifier)
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Photos																					
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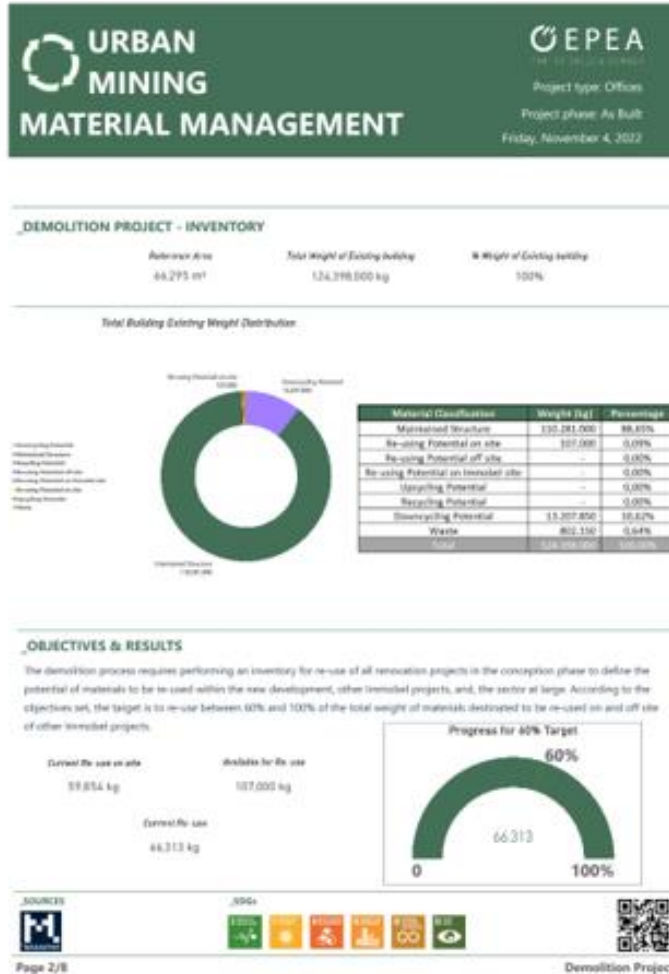
OUTPUT : URBAN MINING STRATEGY



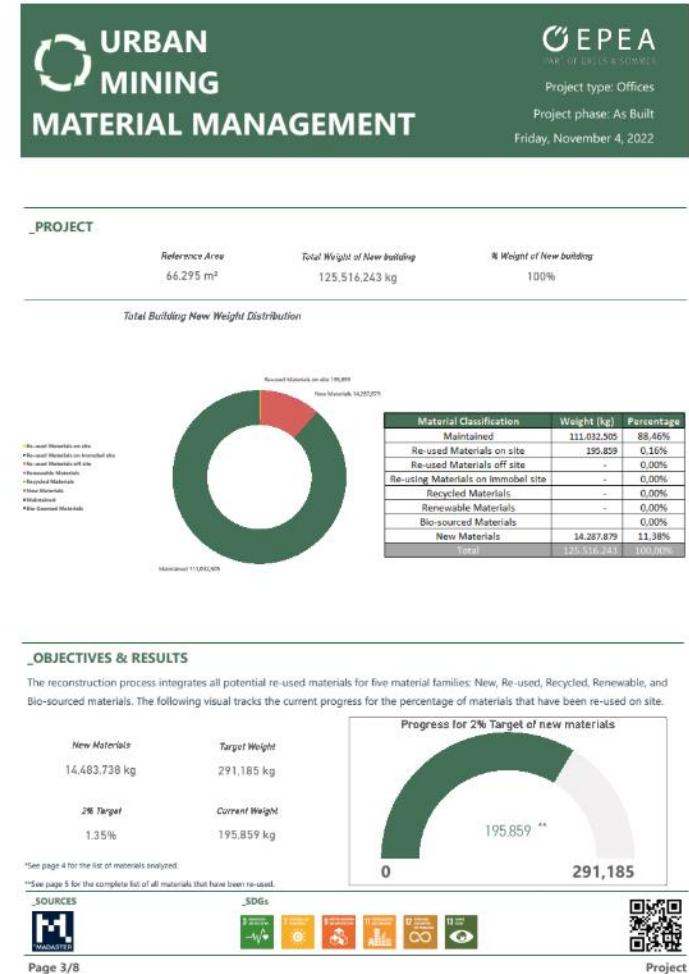


OUTPUT : URBAN MINING PASSPORT

Bâtiment existant



Projet



URBAN MINING – ZIN/WTC



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.

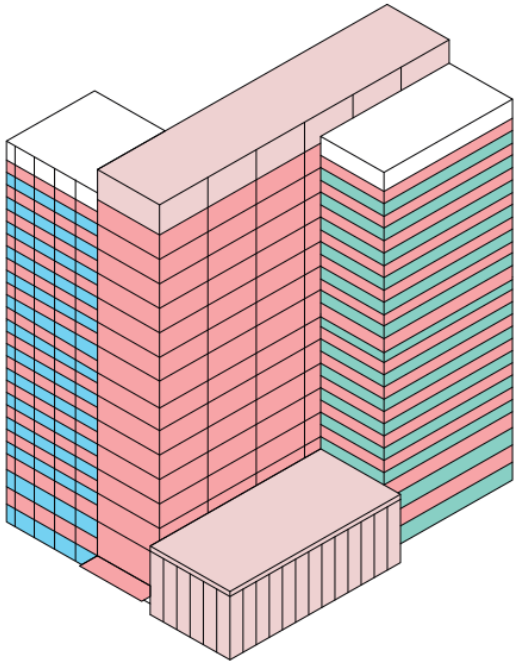
Circular thinking is not only based on recovery and certification, it is also based on a very long-term perspective for the building. ZIN is therefore not only focused on today's needs, but can also be adapted in the future to meet tomorrow's needs.

Main topics

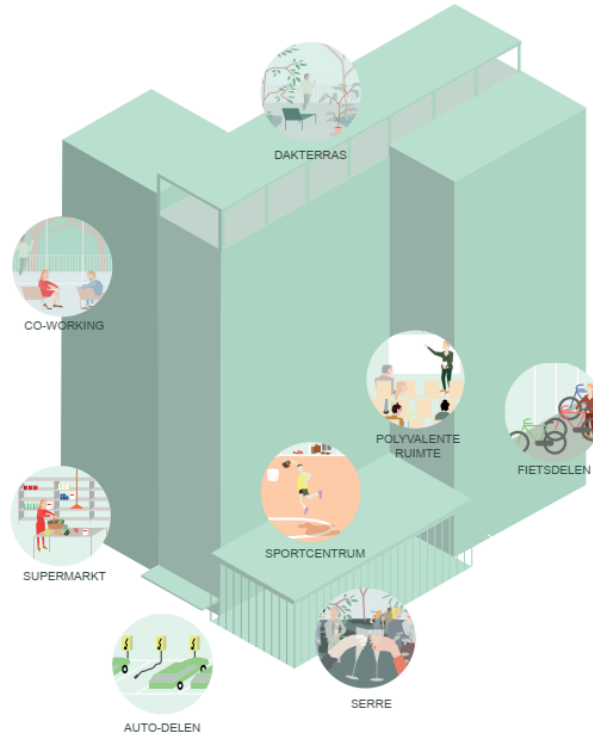
- Urban Mining with C2C Mindset
- Upcycling
- Material Passport
- Build for Disassembly Design



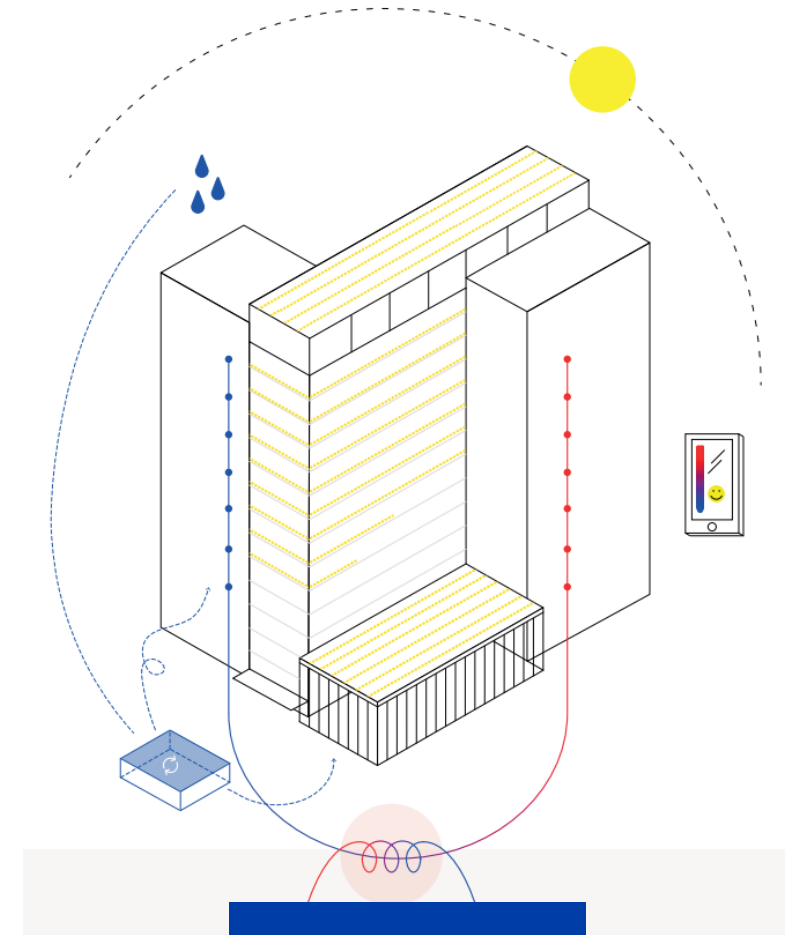
ZIN – FLEXIBILITY & ADAPTABILITY



Physical Flexibility :
building elements
can be adapted.



Functionnal
Flexibility : space can
be adapted.

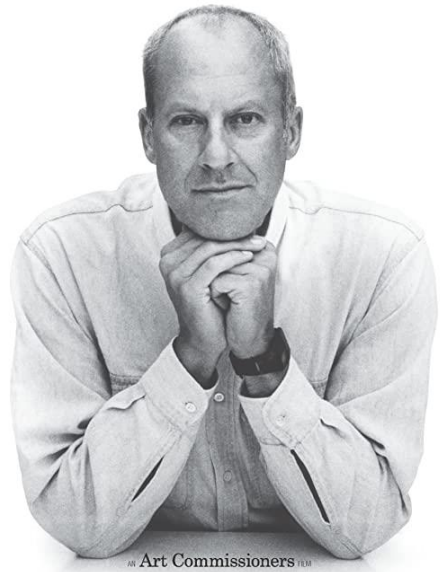


Technical Flexibility :
technics can be
adapted.



ZIN - URBAN MINING STRATEGY

Industrial approach



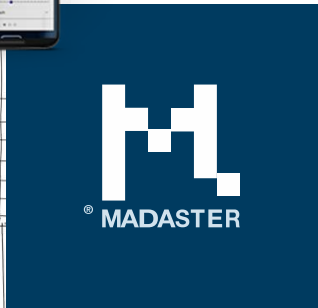
an Art Commissioners FILM
**HOW MUCH DOES YOUR BUILDING WEIGH,
MR. FOSTER?**



DIRECTED BY NORBERTO 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 LINE PRODUCER PALOMA LOPEZ VAZQUEZ
ASSOCIATE PRODUCERS IMANOL URIBE & ANDRES SANTANA
AN ART COMMISSIONERS PRODUCTION IN ASSOCIATION WITH AIETE ARIANE FILMS
MORE INFORMATION AND PRESS MATERIALS AT WWW.ARTCOMMISSIONERS.COM



275.000 Tons of materials

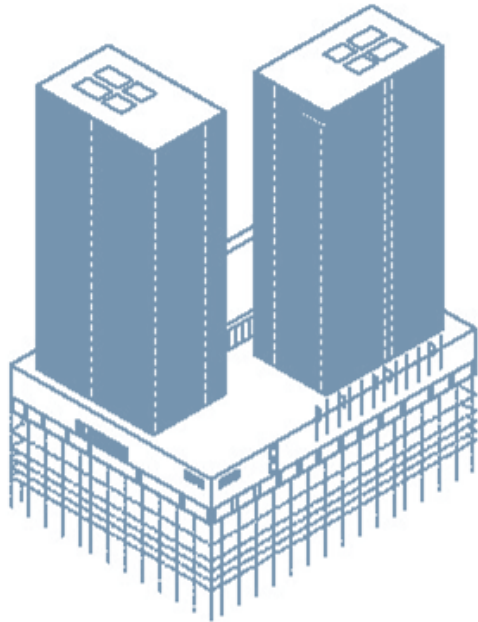


Or other...



REFURBISHMENT

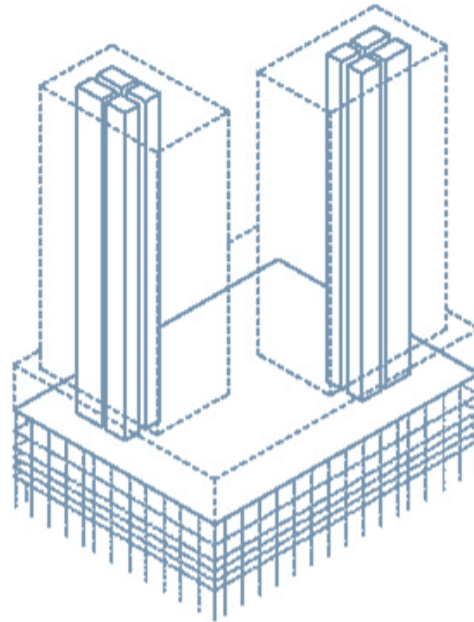
1972



Vloeroppervlak: 170 000 m²
Gewicht : 275 000 T

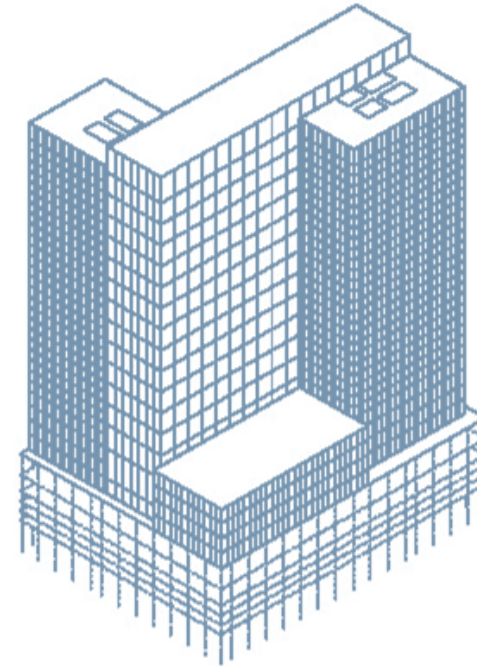
Nieuw: 275 000 T
Grond: 400 000 T
Afval: 41 000 T

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



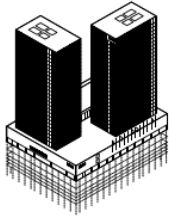
Vloeroppervlak: 170 000 m²
Gewicht : 315 000 T

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



ZIN – MATERIAL FLOWS

2018: WTC I & II



100 %
281 134 T

63,4 %

HERBRUIK TER PLAATSE



Houtpanelen 1 T



Computervloer 190 T



Structuur 178 169 T

HERBRUIK ELDERS



Verlichting 58 T



Sanitaire toestellen 11 T



Hars tegels 675 T



Isolatie 30 T



Scheidingswanden 150 T

VOOR RECYCLAGE



Beton 19 250 T



Gevel 1 335 T



Metaalstructuur 2 530 T

GERECYCLEERDE MATERIALEN



Dekvloeren, enz. 55 387 T

31,3 %

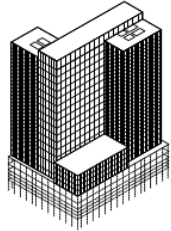
AFVALBEHANDELING



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

4,7 %

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

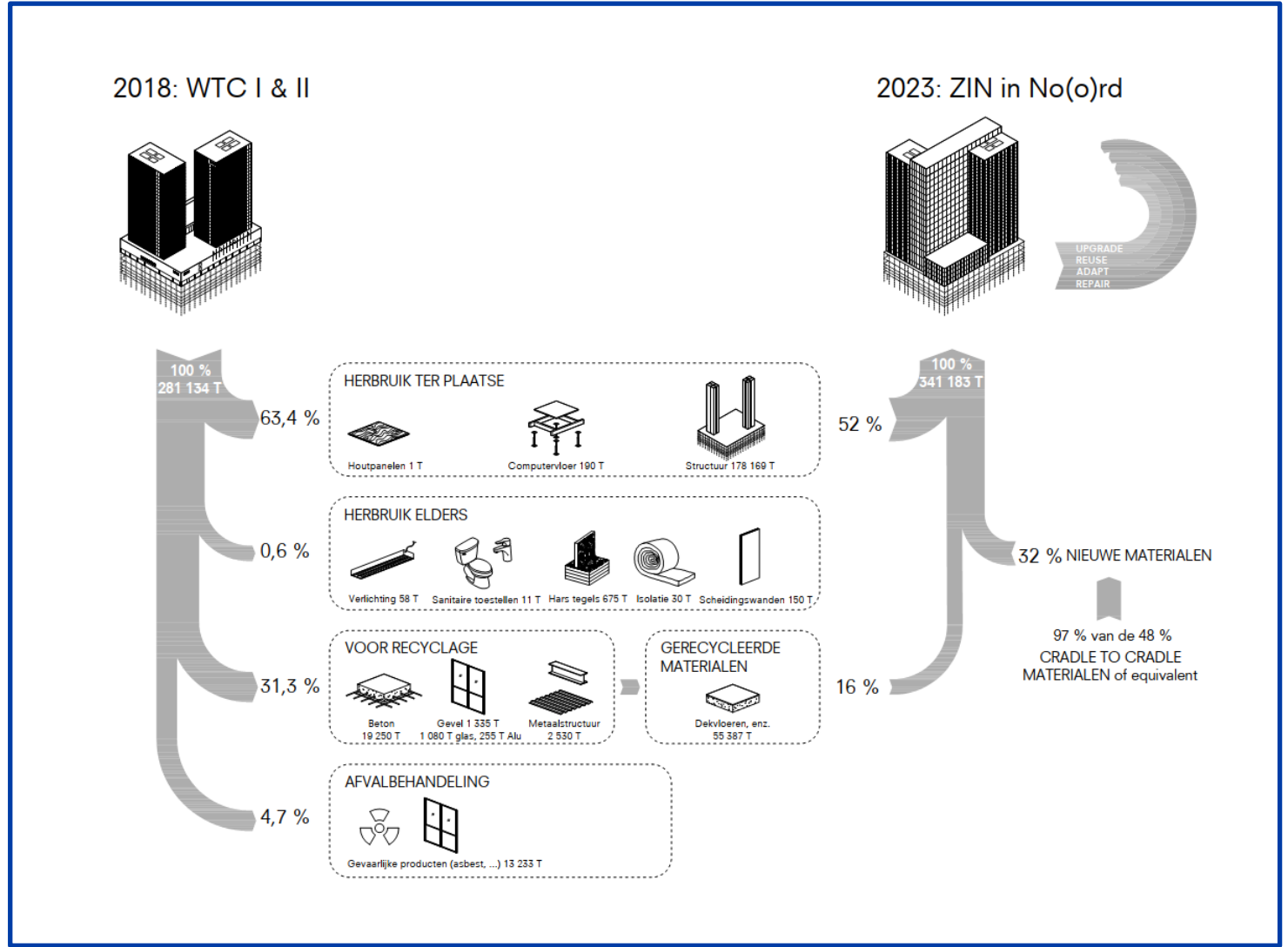
Building for Tomorrow with Cradle to Cradle Certified®: Belgium's Project ZIN by Befimmo

APRIL 23, 2021





URBAN MINING - ZIN





URBAN MINING - ZIN

Ucycled materials and reused materials (insulation, concrete, partitions, stones, raised floors)



Isolation



Carreaux de tapis



Partitions



Fibre minérale



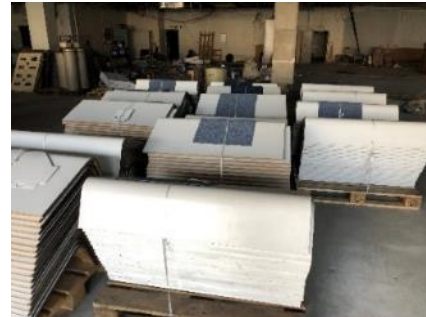
Pierre naturelle



Carreaux de terrasse



Faux planchers



Panneaux de bois



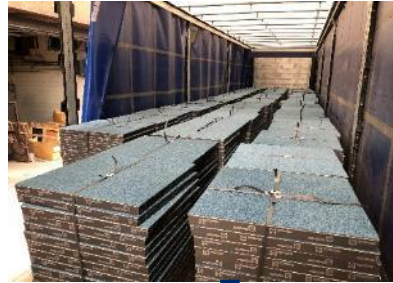
Vitrages



Aménagements intérieurs

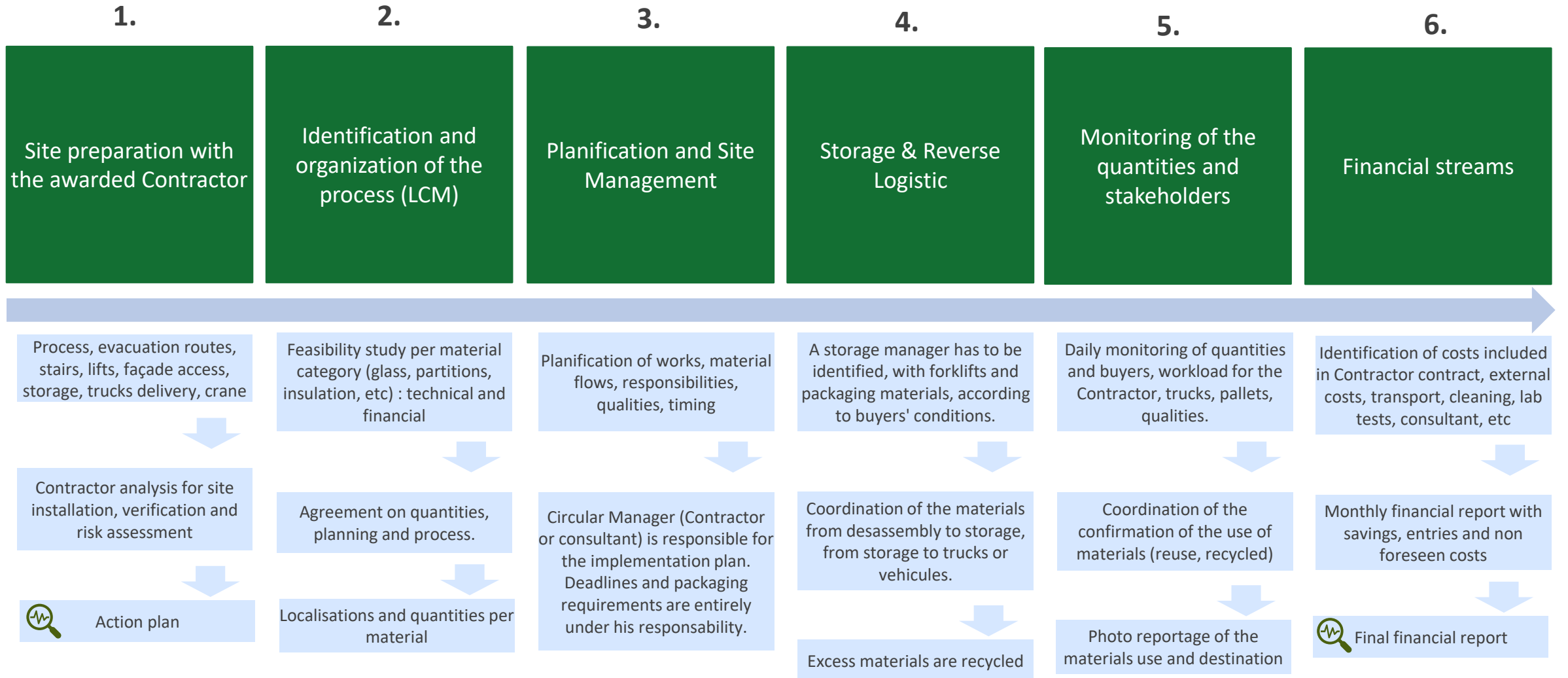


URBAN MINING - ZIN





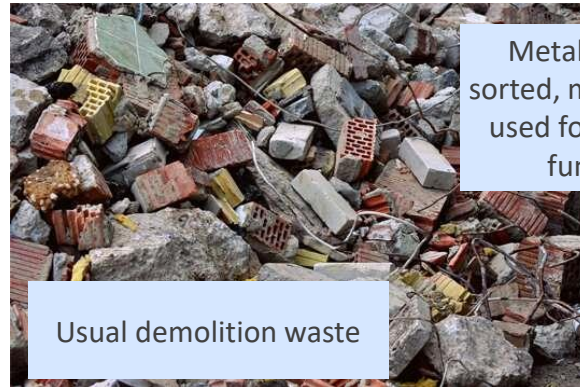
STEP II - METHODOLOGY - URBAN MINING - IMPLEMENTATION (BUILDING LEVEL)





INDUSTRIAL TAKE BACK LOOPS : MANUFACTURER IS KEY

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



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

Usual demolition waste

Industry requirement for remanufacturing process

Recycling rules since 2000 as production date.

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, logistic, quality control



Reverse logistic, packaging, transport, optimisation



Industrial expertise to reuse materials, supply challenge



New materials made of recycled content.



INDUSTRIAL TAKE BACK LOOPS

Glass out of demolition waste is recycled for bottles purpose.



Reuse the glass in interior or upcycle it into a new glass can be a challenge.

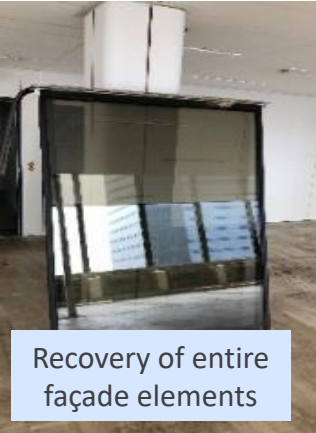


High quality glass is then converted into bottle glass, then green glass and brown (beer bottles).

Glass thrown in container and evacuated to a third party.

Reusing pure float glass waste (not polluted) generates savings in carbon, energy and raw materials. Industrial process is cheaper and environmental more efficient.

Façade elements and glass panels performance are changing quickly, and usually are tailor made for a project. Reuse those materials are not possible, unless it has been designed in such a way.



Recovery of entire façade elements



Man Power, logistics on site, time constraints



Clear separation of material

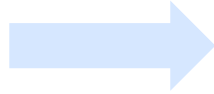


Material Upcycling, production of high-quality new glass for windows and façades



INDUSTRIAL TAKE BACK LOOPS

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



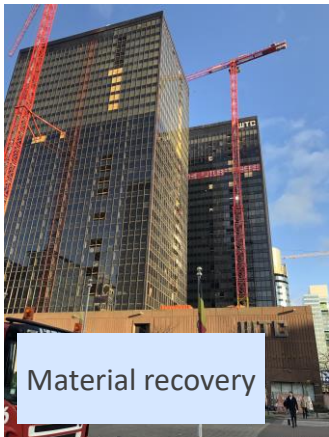
Concrete Upcycling to be reused as structural material in future buildings



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



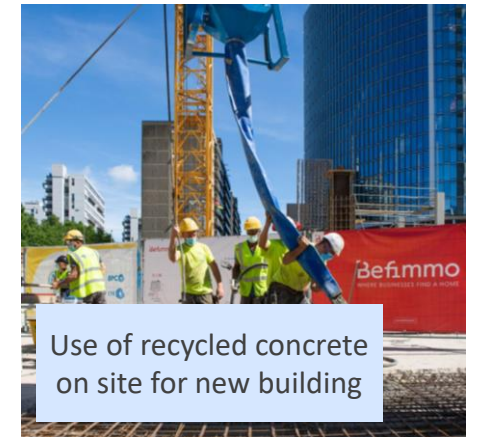
Lab Tests for contamination of material, soil contamination legislation



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

Material re-use instead of thermal treatment of wooden elements



Health concern for composting, reuse products before incineration in a safe project.

Local authorities help circular projects by reusing products in fair and furniture



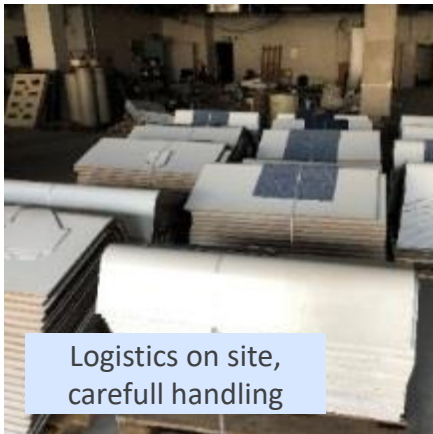
Dismantling of structural components, treatment and remanufacturing

If a certain material is attractive, small projects are effective to attract bigger contractor and sell a good quality product.

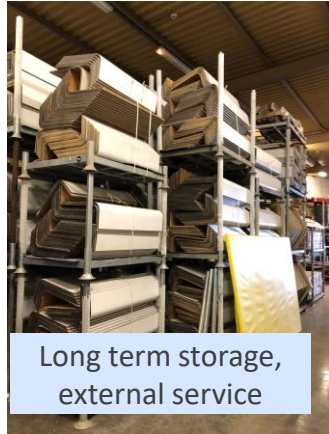
Reuse of High-quality materials have hidden costs difficult to resolve for a long-term project : storage, transport, mock-up, technical and financial studies, quality control, guaranties, controls, contractor risk.



Dismantling of building components



Logistics on site, carefull handling



Long term storage, external service



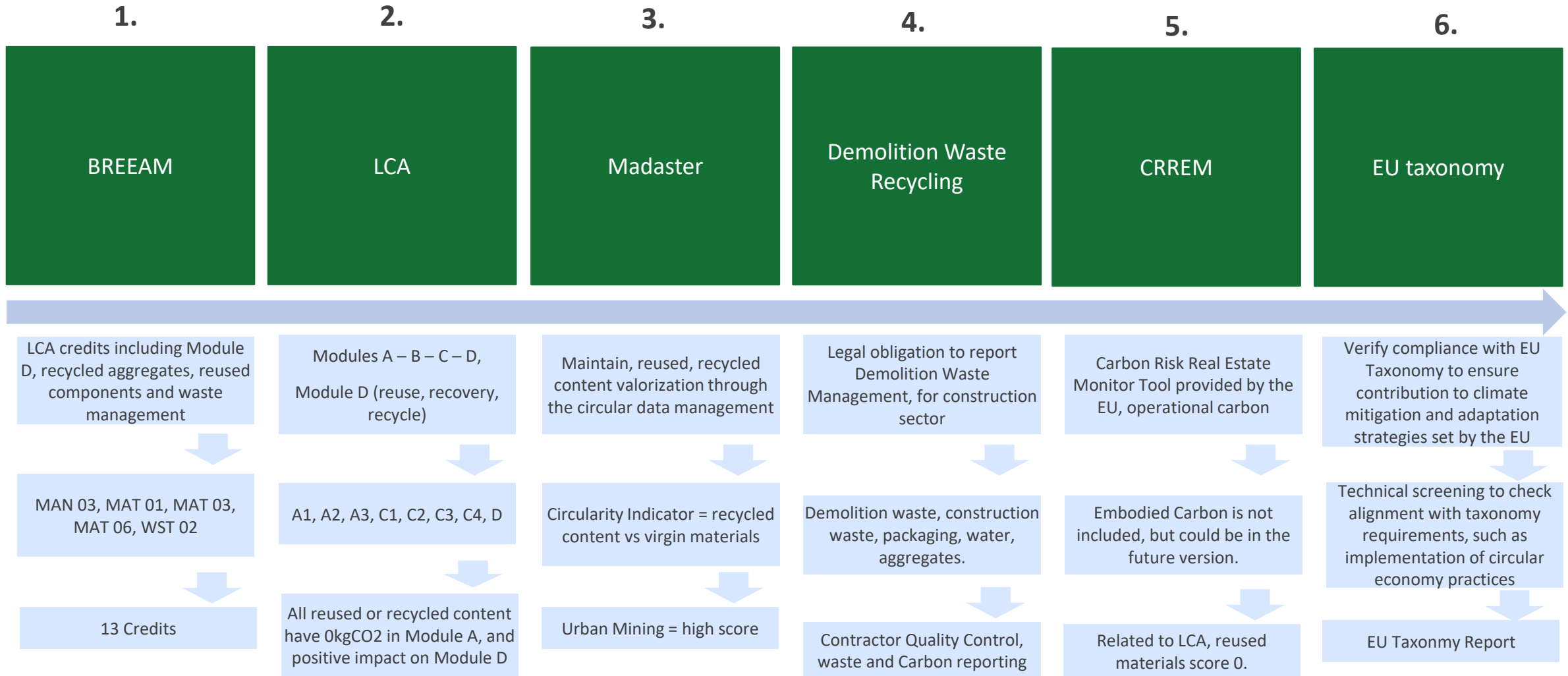
Mock-up, reused on site, design challenge versus new cheap materials



Designer reuse materials as raw material, story telling

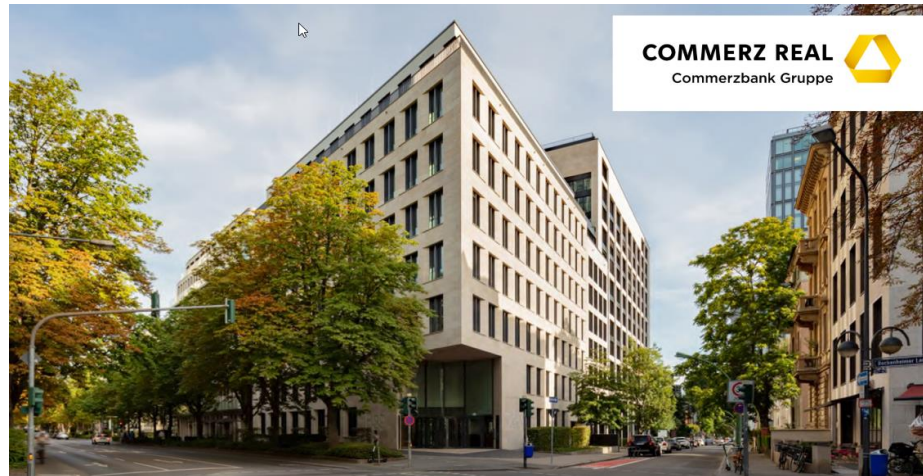


STEP III - METHODOLOGY - URBAN MINING - REPORTING (BUILDING LEVEL)





URBAN MINING AND EMBODIED CARBON PASSPORT



URBAN MINING & EMBODIED CARBON PRE-SCREENING

Commerz REAL WE 326 WESTEND WINDOWS

AKTUELL ERFOLGTE MAßNAHMEN

- Wired-Score-Zertifizierung Silber

2009	59.021	11.552
Baujahr	BRI Gebäude [m ²]	BGF [m ²]

DETAILTIEFE: PRE-SCREENING

Mengenberechnung basierend auf Gebäudedatenbank
Berücksichtigung generischer Materialdaten, keine exakten Produktwerte

PRE-SCREENING PRE-CHECK CONCEPT-DESIGN & MATERIAL MANAGEMENT

DEFINITION
Die ermittelte Massenberechnung basiert auf einer generischen Datengrundlage (Bruttonauminhalt, Gebäudetyp Büro und Bauteil). Das Säulendiagramm zeigt den Anteil der jeweiligen Materialgruppen in Kilogramm, das Kuchenendiagramm die prozentuale Verteilung bezogen auf die Gesamtmasse.

DEFINITION
Die Darstellung zeigt die Aufteilung der Materialgruppen im Gebäude. Sie sind horizontal in Materialfamilien unterteilt. Vertikal wird eine Unterteilung in die verschiedenen Gebäudeebenen ("Layers of Brand") vorgenommen.

DEFINITION
Die Darstellung zeigt die CO₂ Menge aufgetrennt pro Materialgruppe auf die verschiedenen Module (A1-A3 & D) auf Grundlage der Gebäudedatenbank. Der Lebensweg des Gebäudes wird dabei in die Module A bis C unterteilt. Modul A1-A3: Beschreibt die Herstellungsphase. Modul D: Beschreibt das Wiederverwendungs-, Rückgewinnungs- oder Recyclingpotenzial.

DEFINITION
Die Darstellung zeigt die CO₂ Menge aufgetrennt pro Materialgruppe auf die verschiedenen Module (A1-A3, C1,C2,C3,C4,D) auf Grundlage der Gebäudedatenbank. Der Lebensweg des Gebäudes wird dabei in die Module A bis C unterteilt. Modul A1-A3: Beschreibt die Herstellungsphase. Modul C1-C4: Beschreibt die Phasen der Entsorgung inklusive Abbruch und Transport. Modul D: Beschreibt das Wiederverwendungs-, Rückgewinnungs- oder Recyclingpotenzial.

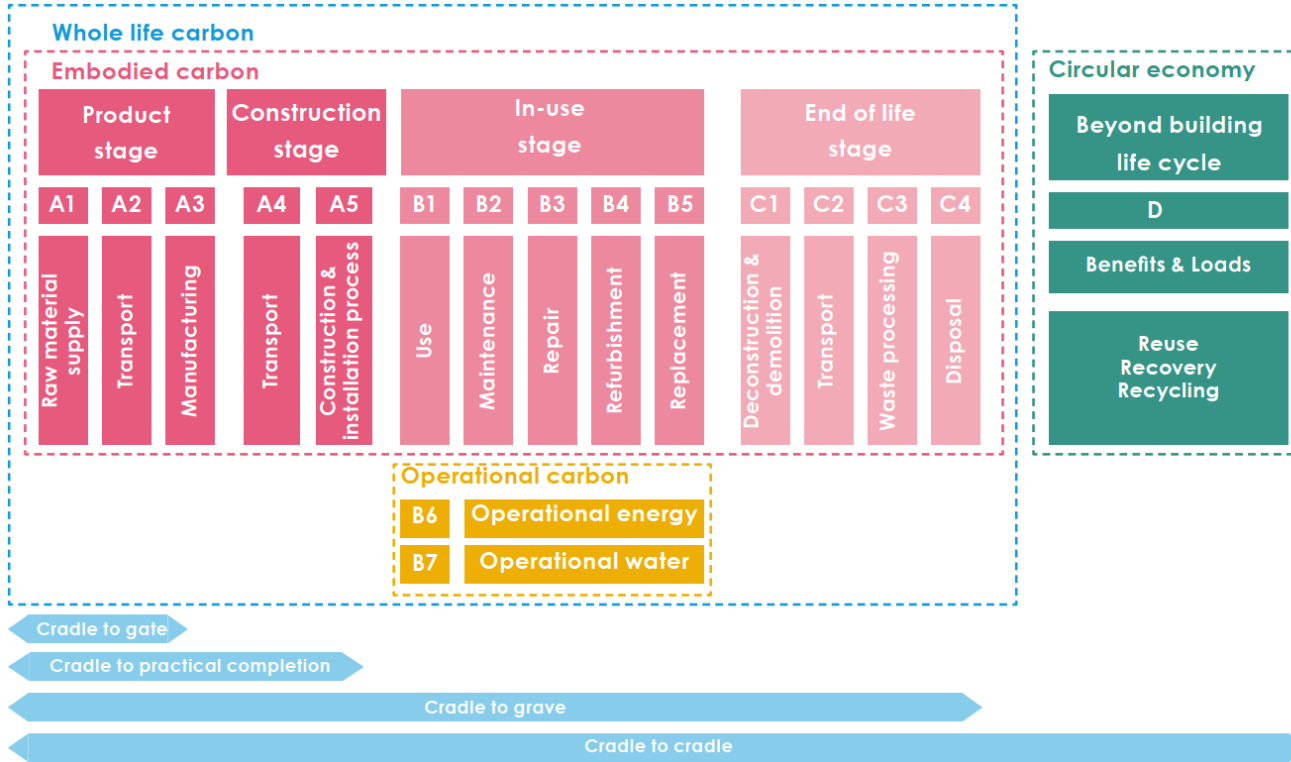
DEFINITION
Bei der Ausführung eines Pre-Checks lässt sich eine detailliertere Berechnung des "Embodied Carbon" darstellen. Daraus folgt eine genauere Darstellung auf Madaster. So lässt sich auch eine ausführlichere Darstellung des freizulegenden Wertes berechnen.



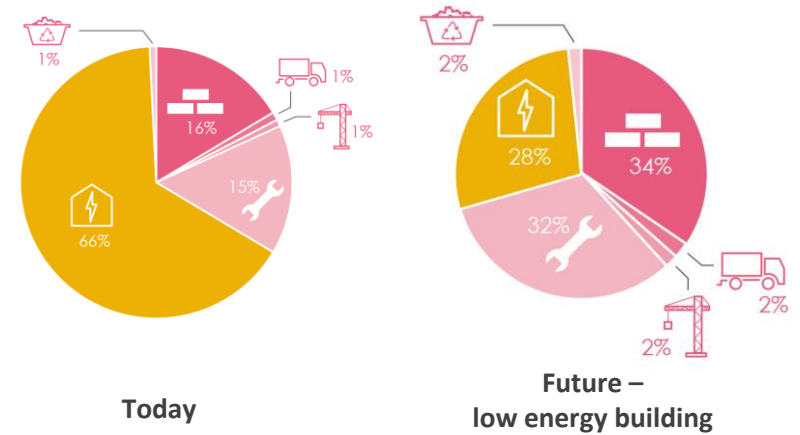


LIFE CYCLE ANALYSIS – CARBON FOOTPRINT OF A BUILDING

Carbon Footprint = embodied carbon + operational carbon



Comparison distribution of carbon footprint for an office building.



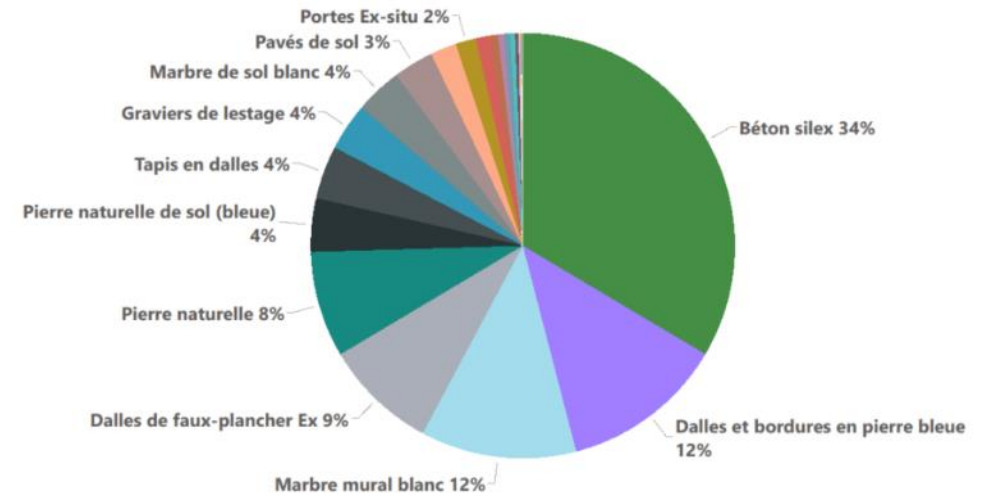
Better buildings fabrics for the building envelope reduces the operational carbon and increases the impact of embodied carbon of the overall building. To comply to our climate targets the overall carbon footprint of the building stock needs to be reduced. Material re-use and recovery has an important impact and helps to achieve this goal.



URBAN MINING - MARAIS



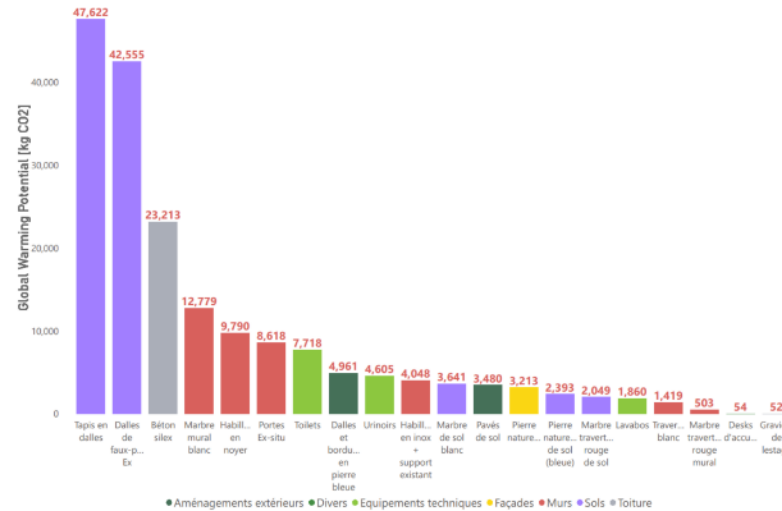
- Writing the urban mining note
- Monitoring of on-site operations
- Outgoing flow assessment : monitoring of quantities of demolition and construction waste
- Reuse of materials from demolition





URBAN MINING - MARAIS

Desassembly and storage of on-site materials





URBAN MINING - MARAIS

Non-separable materials are waste





URBAN MINING - U-SQUARE : MISSION



- Writing the urban mining note
- Monitoring of on-site operations
- Outgoing flow assessment : monitoring of quantities of demolition and construction waste
- Reuse of materials from demolition
- EFRO reporting (fiches, CO², waste, etc)



URBAN MINING - U-SQUARE

Reused materials

- Briks
- Windows
- Tiles
- Floor
- Door
- Stones
- Toilets
- Stairs
- Radiators
- Etc..





URBAN MINING - U-SQUARE

Destination of the reused materials



Bricks



Outdoo glass used for indoor glass



Blue stones as indoor stones



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 **EPEA**

PART OF DREES & SOMMER