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# INTRODUCTION

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## Context

This document has been produced as part of the Interreg NWE 739 FCRBE project (*Facilitating the Circulation of Reclaimed Building Elements*), implemented between October 2018 and December 2023.

The FCRBE project aims at enhancing by 50% the quantity of materials being reclaimed for reuse in North West Europe by 2032. This report has been prepared in the context of the project capitalisation (2022-23). It corresponds to the deliverable WP T4.2.3.

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## Links with other FCRBE deliverables

This document reports on the efforts conducted as part of four live tests which were aimed at testing how to express a reuse objective in a quantitative way in diverse tendering procedures.

It is one of the four documents produced within the FCRBE project and addressing this topic of reuse and reclamation rates. These four documents are as follows:

➔ *Set, monitor and report on reclamation and reuse rates in construction projects. A common approach.* This document sets out the necessary definitions and presents the main methodological aspects for dealing with the issue of reuse and reclamation rates.

➔ *Ex-post analysis of 32 construction and renovation works. Results and discussions.*

This document sets out how we calculated and analysed the reuse rates achieved in a sample of 32 recently completed projects.

➔ *32 detailed project sheets. Projects info, reused rates and reused elements.* This document complements the analysis of the 32 projects. It details the results achieved in each project with regards to their specificities. It also provides a detailed overview of the quantity and the nature of the reused elements.

➔ *Live tests. Report on 4 operations using reuse targets.* This is the present document. It reports on live tests which explored how to implement reuse rates in various procurement procedures.

Finally, it must be noted that these different aspects of setting reuse requirements are drawing on a general guidance document explaining how to use public tenders to foster the adoption of reuse habits.

This guidebook makes part of the *Reuse Toolkit* released in a first phase of the FCRBE project.

For more details, see FCRBE, [Reuse Toolkit. Procurement Strategies. Integrating reuse in large-scale projects and public procurements](#) (published in February 2022).



# 1° BERNADOTTELAAN

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# Bernadottelaan

## Outdoor space redevelopment

### 1.1 About

*Large-scale redesign of the outdoor space of 7 streets in the Bernadottelaan area. A project ambition is to reuse as much of the original pavers from the project area as possible.*

### 1.2 Challenges

- Incomplete insight into the quality and requirements for reusing original pavers.
- Strict requirements from designers and asset managers on image and functional qualities.
- Incomplete insight into the dynamics of an award criteria based on reuse and environmental costs (ECI).
- Limited access to good examples on balancing reuse with other project objectives (and general constraints such as time and money).

UTRECHT – NL – 2023 – Public procurement

Project area: 50.000 m<sup>2</sup>

Interreg FCRBE partner, project owner and

designer: [Gemeente Utrecht](#) – Contractor: to be

selected – Material auditor: [GBN](#) – Procurement

advisor: [Aveco de Bondt](#)

### 1.3 What is it all about ?

The live test Bernadottelaan concerns a large-scale redevelopment (50.000 m<sup>2</sup> – 7 streets) of sewage and roadworks between Bevinlaan and Bernadottelaan, in the Kanaleneiland neighbourhood (Utrecht). Since their construction in 1955, these developments had not undergone any large-scale renewal operation. Many elements needed to be renewed and adapted to contemporary standards. Among these, pavers, sewage system, vegetation and street furniture. In parallel, the housing corporation Woonin is engaged in the renovation of all 10 porch flats in the area. These concurrent operations entail a complete makeover for this neighbourhood. The project aims at reaching high levels of circularity in the design, tendering and implementation phases.

The FCRBE live test more specifically focussed on two tangible objectives:

- Reduce the **environmental costs** (ECI) of the project, a.o. through reusing materials, using new materials with a low environmental impact and limiting transports.
- Increasing the **on-site reuse within the project**, a.o. through reclaiming and reusing the most impactful materials, such as paving elements (a.o. pavement tiles, tiles, concrete paving stones, baked pavers and curbs)

The Bernadottelaan is a pilot project exploring what can be done in these typical postwar developments in need of renewal. In this sense, it has a high replication potential.

### Key project information

Project area: 50.000 m<sup>2</sup>.  
 Surface area of original pavers: 40.000 m<sup>2</sup>  
 Pavers for the new situation: 34.000 m<sup>2</sup>  
 Replication potential in Kanaleneiland and Overvecht neighbourhoods (~53.000 inhabitants)











## 1.4 Live test description

### Preparatory phase (2021-2022)

The Objective of the preparatory phase was to better understand possibilities for circularity and reuse in the project.

**Step 1 :** Internal **ambitions definition** to explore opportunities for increasing circularity and sustainability within the group of internal stakeholders. Opportunities identified as 'expected to be impactful' for carbon savings and sustainability have been integrated into design and tendering preparation process.

**Step 2 :** The advantage with materials from public space is that there are often homogeneous materials that can be easily reclaimed, and with a high reuse potential. In order to get a better picture of all the surface materials that will be released during the redevelopment of the project area, a **material audit** has been conducted. It provides insight into the type of material, the condition, the quantity, the expected economic value, the disassembly process and the additional steps (such as cleaning, processing or transport) needed to enable their reuse. These criteria have translated into a top 8 of highly reusable paving elements (see table 1). The audit also highlighted reuse opportunities for lighting, sealing posts, waste containers, wells and gullies. These materials were discussed with designers and asset managers, and sufficient space was provided in the design to enable the reuse of materials of sufficient quality.

	Material: paving stone Surface: 15000 m2
	Material: concrete slab Surface: 9400 m2
	Material: tile Surface: 1700 m2
	Material: brick Surface: 1400 m2
	Material: curb Surface: 4600 m2
	Material: bumper Pieces: 67
	Material: drive-in block Pieces: 265
	Material: speed bump Pieces: 45

**Step 3** : Research questions and possible bottlenecks were also identified, which led to input from internal follow-up discussions and a **market consultation**. The market consultation enabled to collect input on the most adequate procurement strategy, the definition of the award criteria and the requirements to be set. As a result, the City of Utrecht decided which tendering format to use. The market consultation stressed the interest of involving market parties as early as possible in the design process in order to build on their knowledge. Traditionally, the City of Utrecht draws up a detailed design that meets all the requirements of the managers, within which only limited space for reuse is defined. In the context of the Bernadottelaan project (especially considering the timing), the City decided to slightly adapt the call for tenders, letting more leeway than usual for circularity and sustainability.

The City did not choose to set a quantitative target for reuse in advance, but rather to challenge the market to maximize reuse on specific parts of the work (clearly indicated in the call for tenders). In discussion with market parties, it was also decided to emphasise a reduction of the overall environmental impacts over the entire project. For that, the project makes use of the Dutch framework **MKI**, a widely used single-score indicator for assessing the overall environmental impact of a project over its entire life cycle. This approach makes it possible to balance the bias that can come with a focus on reuse only (for instance, taking into account the impacts of transport). However, since reuse is not yet fully included in the ECI, the City choose to combine it with additional requirements for reuse.

### Results of the preparation phase

- Use a 'traditional' call for tenders with building specifications letting leeway for reuse.
- Embed reuse within a project-wide assessment of the environmental impacts (through ECI).
- Integrate possibilities for reuse into the preliminary design of the roadworks surfaces and infrastructures.

## Procurement phase

Objective is to include ECI & on-site reuse in the tendering documents

## Selection phase - up to summer 2023

In 2023, the knowledge and insights from the preparation phase were translated into the selection and award phases. It took place through a (pre)selection phase and an award phase. In the selection phase, the City selected 5 out of 8 parties that scored best on the selection criteria. These were invited to submit a bid in the award phase. The following selection criteria have been included, all with regard to circularity and reuse:

- Vision on the circular economy.
- Experience with reusing materials. Scoring on surface of reused paving elements. The order of magnitude of the scoring categories are inspired by the reuse rates achieved in the *FCRBE project analysis*

- Experience with MKI (ECI) calculations. Scoring on experience with making, applying and reducing the environmental impact of projects.

### 6.2 Selectiecriteria

De gemeente hanteert de volgende selectiecriteria:

Selectie criterium	Weegfactor
1. Visie op de circulaire economie	50
2. Ervaring met hergebruik van vrijgekomen materialen.	25
3. Ervaring met MKI-berekeningen	25

- ▲ Extraction of procurement guide

### Award phase - from summer 2023

Through the award phase, the City picks up the contractor who will carry out the work. The final award will take place at the end of 2023, with the project being implemented from 2024 onwards. The work on defining the award criteria is in full swing. Three award criteria are expected to be chosen for the circular aspects:

- Price. We work with a fixed part based on building specifications items and a fictitious part.
- Quality. Bidders need to deliver a plan of action in which a.o. collaboration, sustainability and circularity in the project are presented. For sustainability and circularity, bidders will have to prepare a project-wide MKI calculation and reuse estimation, accompanied by a plan in which they discuss how the plan is implemented, what results they expect and how impacts are measured. In terms of reuse, tenderers will express the expected 'reclamation rate and the 'reuse rate'.
- Tenderers must also discuss the opportunities and risks of the project, including in the field of sustainability.

### Results section and award phase

- Decision on traditional call for works and building specifications with more leeway for reuse of materials through functional request.
- Control of reuse by controlling 30% price and 70% quality. There is a fictitious price part and a quality part in which tenderers must come up with a plan of action regarding sustainability.
- A final design of both the outdoor surfaces and infrastructures situation. The designs have been drawn up leaving as much room for reuse as possible.
- Expected result at the end of 2023: selection winning bid with a reduction of environmental impact and increased local reuse.

### 1.5 General lessons learned and recommendations

- Design from the existing situation and the material reclamation audit.
- Material audit of the existing situation is always a good first step in the early phases of a project.
- Leave room for more sustainable material alternatives and reuse.
- When including criteria on circular economy in the selection phase: do not make the assessment too complex – preferably one total score.
- For awarding criteria, choose for a combination of lowest environmental impact (MKI) and a target on reuse and other circular and sustainable opportunities.

## **Before 2022**

2019: Official start preparation

2021: Functional design

2021: Ambitions definition

## **2022 – Summer 2023**

September 2022: Material audit

Oktober 2022: Market consultation

March 2023: Preliminary design ready

July 2023: Final design ready

April-August 2023: Selection phase

August 2023: Start draft contract and award phase guides

## **After summer 2023**

January 2024: Start of the award phase

June 2024: selection of contractor

September 2024: Start of the work

End of 2024: Completion of project



# 2° IDEAL BUILDING

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# IDEAL Building

## Retain and reuse

### 2.1 About

*A social housing public landlord decides to renovate a former company offices built in 1912 to become the direction site offices of the « [Wunne mat der Wooltz](#) » project.*

### 2.2 Challenges

- Preserve as much as possible of the existing building.
- Reuse materials salvaged from other buildings scheduled for demolition on the same site (offices, industrial hall).
- Reclaim the natural slate from the roof and reuse it for cladding.
- Convince the bidding companies on the interest of reusing elements.

Wiltz - LU - 2023

Project type: renovation

Programme: collective housing

**Public procurement** - Project Size: 2300 m<sup>2</sup> -

Interreg FCRBE partner: [LIST](#)

Project Owner: [Fonds du Logement](#)

### 2.3 What is it all about ?

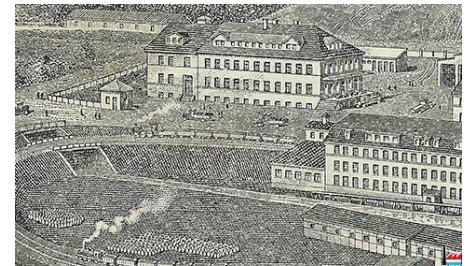
The existing building was built in 1912 to host the former administrative center of the Tannery IDEAL of Wiltz. It consists of a basement, two floors and an attic. Its redevelopment is planned as part of the "Wunne mat der Wooltz" project, through which this former industrial site of 34 hectares will be redeveloped. More than 1.000 dwelling units will be built where the company Eurofloor used to have their production plants and facilities.

Retaining the IDEAL building is a way to preserve the historical character of the site. It is a testimony for the industrial heritage of this area. Its programme, however, will be adapted to host offices for the Fonds du Logement and the Wiltz Circular Economy Hub, including a showroom, offices and workshop rooms.

The Fonds du Logement wanted this renovation to be an demonstration of how a circular approach in the construction industry can foster the sustainable management of material resources.

In this view, the project aims to preserve as much as possibly can and to repair the damages caused by years of vacancy (e.g. rainwater infiltrations). A thorough audit enabled to shed light on the high quality of many original architectural features, such as the walls of the corridors, the stairs or some wall surfaces. They will all be retained in the renovation. What could not be kept as such was to be repurposed. It is notably the case of more recent wooden shelves and boards that will be reworked and reused for new interior applications. The project also seeks to reuse building elements salvaged from nearby buildings still scheduled for demolition : sanitary equipments, radiators, metal cladding systems, etc.

Because of its significant mass (8 to 9 tonnes), the roof in slate has a significant impact on the results of the stock and flows model. The first idea was to preserve it as such, with a view to reach the highest preservation rate possible. However, this was hardly feasible for technical reasons. After some investigations, it has thus been decided that the slate tiles would be carefully reclaimed and inspected. Those which are still in good condition will be reused for wall cladding, in the context of a same-site reuse operation.





◀ Exterior and interior views of the building (ground floor)

Despite damages provoked by rainwater infiltrations, the Fonds du Logement decided to preserve most of the building character, including some wall coverings and interior finishings.





◀ Interior views of the building- 2<sup>nd</sup> floor and attic

Ceramic tiles, radiators and wood elements will be reclaimed for reuse, either on the same site or in other sites. A thorough reclamation audit has been carried out to identify the materials with the highest reuse potential.

The roof is made of approximately 9 tonnes of natural slate. The original slates have a characteristic fish-scale shape. They are probably originating from local slate quarries which were still in activity in the early 20th century. The slates will be carefully demounted and inspected in order to be reused on site.



Approximately 15 cast iron radiators will be reclaimed, refurbished and reused on site.



Wood beams and planks will be reclaimed for reuse onsite and in other construction and renovation sites.



## 2.4 Using rates

During the design phase, the project team developed a stock and flows model. It allowed them to get a quantified expression of the project's general ambitions (until then, these were expressed mostly in a qualitative way). The results of the model brought to light the efforts to preserve the original building (with a preservation rate of almost 80 %, in mass). They also reflect the high attention to the reclamation opportunities, with an expected rate of 12,5 % (in mass), and these to foster reuse in a context where this approach remains largely overlooked.

It must be noted that these efforts are complementary : maximising the preservation of the existing stock (the original building) translates into the minimisation of flows (out and in).

Within these minimised flows, it then becomes easier to maximise waste prevention strategies (e.g. reclamation for reuse) and the sourcing of low-impacting materials (e.g. reused elements).

This model was used as a support for decision making in the design phase. It helped the project developers to organise their efforts for the next steps (notably in the discussion on the reuse of the roof slates). The model will also be used to monitor the project's development and the possible deviations it may face. Having these successive models until the project completion will be useful to learn from this experience and identify what can be improved in a next project.

Preservation rate	Quantity [tonnes]	[%]
Existing building	3.066	
Preservation of existing materials	2.429	79,2 %
Materials out-flows	[tonnes]	[%]
Reclaimed for reuse	80	12,5 %
Recycled (including shredding, crushing,...)	303	47,5 %
Landfill	255	40,0 %
TOTAL out-flows	638	100,0 %
Materials in-flows	[tonnes]	[%]
Reused materials	5	0,8 %
Biosourced	26	4,0 %
Conventional / primary	612	95,2 %
TOTAL in-flows	643	100,0 %

▲ Estimation of the *Preservation, Reclamation and Reuse Rates*, at the stage of the project design.

**Before 2022**

2020: Official start preparation (studies)

01/2020: Functional design definition

07/2020: Fonds du Logement's ambitions  
definition

2021: First material audit

11/2021: Preliminary design ready

**2022 – Summer 2023**

08/2022: FCRBE deliverables first input

2022-2023: Material audit (complementary)

10/2022: Architectural project ready

05/2023: Public procurement procedure  
start (separate lots tendering)

07/2023 : Awarding phase start

09/2023: Start of work

**After summer 2023**

11/ 2025: Completion of project (planned)



# 3° GREENBIZZ II

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# Greenbizz II

## Predefined reuse rates

### 3.1 About

*A Brussels public developer sets minimal reuse targets for a series of applications in a design and build procurement. Bidders are encouraged to aim for higher targets.*

*This project was already a pilot operation in the phase 1 of the FCRBE project. The current live test allowed for supporting the contracting authority in translating the initial ambitions into the tendering documents.*

### 3.2 Challenges

- Clarify the predefined objectives to simplify calculation, comparison and monitoring of reuse rates.
- Anticipate additional tasks due to reuse objectives.
- Stimulate cooperation and motivate tenderers to go beyond the requirements.

#### **Brussels Capital Region - BE - 2023**

Project type: new construction – Programme: business park with a high reconversion potential – Project size: 4.500 m<sup>2</sup> – Interreg NWE FCRBE partner: [Brussels Environnement](#) – Project manager: [Citydev.brussels](#)

◀ Google maps

### 3.3 What is it all about?

#### Context

GREENBIZZ II concerns the new construction of a 4.500 m<sup>2</sup> building which will host productive spaces for SMEs and start-ups in the field of sustainability, circularity and local production.

The building is located in a recently-developed area which gives pride of place to sustainability, the [Tivoli Greencity eco-district](#), in Brussels. Greenbiz II shares the same philosophy as nearby buildings such as [Greenbizz I](#), [Cityfab I](#) and [Be Here](#).

The project aims to foster sustainable design and to support the local economy. It seeks to achieve high circular ambitions, that can be replicated in future similar developments.

The project will be contracted through a design and build scheme, using a competitive procedure with negotiation. The budget is over 11 M€. Interior fittings are planned for the cafeteria. If the tenants have already been appointed, the productive areas will also be fitted out.

#### A general reuse strategy as defined earlier on

In terms of circularity, the contracting authority set expected reuse rates for a range of building applications. These rates are mandatory and fall into two categories: (1) requirements and (2) opportunities. Tenderers can decide to exceed the rates in order to achieve a better score in a specific award criterion. The more they exceed the initial rates and/or the more batches of materials they commit to reuse, the better their score.

#### Broader circular objectives

This criterion complements other circular ambitions, such as designing for space and technical reversibility, and reaching high environmental performances in general.

#### Diversity of materials and targets

The results of the pilot operation led to setting objectives according to a 3 levels approach. A number of specific quantitative targets have been defined, depending on the choice of building materials.



▲ @Gregory Halliday

### The 3 levels approach (as set out in a previous phase)

During the early phases of the project development, the contracting authority (in dialogue with FCRBE project partners as part of a FCRBE pilot operation) set **specific reuse targets**. The target is the ratio of reused materials used for a specific part of the work to the total flow of materials used for that part. These targets have been divided into three main categories: Requirement (R), Opportunity (O) and Bonus.

⇒ **Requirements (R)** concern building materials which do not belong to the building envelope, do not entail major risks in terms of stability and health and safety, and are not complex technical equipment. They target reclaimed and salvaged materials which are relatively easy to source.

Requirements are non-negotiable parts of the call for tenders. Each bidder has to comply with these minimum rates, which are all **above 30 %**.

⇒ **Opportunities (O)** are other batches of material that lend themselves to reuse, although not as easily as those within the 'R' category. These are contractual but can be offset by a better rate in another objective to avoid penalties. However, bidders are incentivised to activate these opportunities to earn a better score in the awarding procedure. These minimum rates are all **below 30 %**.

⇒ **Bonus**, finally, is awarded if the bidder exceeds the minimal targets set in the R and O categories. In this case, they have to provide an explanation on how they will achieve it.

### Requirements (R)

50%	of surfaces of finishing
50%	of pieces of interior woodworks
75%	of pieces of furniture
30%	of pieces of electric equipment
50%	of pieces of sanitary equipment
60%	of surfaces of public spaces

### Opportunities (O)

25%	of price of site installation
25%	of volume of demolition
25%	of volume of earthworks
15%	of surfaces of façade
15%	of surfaces of roof
10%	of price of outside windows
10%	of mass of ironworks
20%	of mass of the open structure
5%	of mass of the lift installation
5%	of price of electrical pipes, fittings, and accessories
5%	of price of HVAC
5%	of price of sanitary pipes, fitting, and accessories
10%	of price of landscaping
10%	of price of gate, fencing, letter box,...
20%	of surfaces of the service area

▲ Predefined REUSE RATES from pilot classified by targets level

### Scope of the live test

As shown above, the present live test built on preliminary work carried out as part of a previous Pilot Operation, which set a general framework for reuse ambitions. The items have been structured by category of construction element to address issues of scale and quantification.

Separation by item has been chosen in order to integrate less conventional items. This has made it possible to choose specific units, which makes for greater objectivity in implementation.

These, however, were then to be translated into proper tendering clauses. During the time span of the live test (2022-23), the contracting authority was mostly busy with the following steps:

1. Publishing a call for tenders to contract a technical controller for the follow-up of the work (March 2023).

2. Publishing a pre-information notice advertising the forthcoming publication of the call for tenders for the D&B contract (April 2023).

3. Publishing the *bona fide* call for tenders for the D&B contract (June 2023).

For all these steps, specific documents had to be drawn up. Standard documents were to be slightly tweaked in order to broaden the reuse opportunities.

In this context, the support provided by the Live test mostly consisted in four different inputs:

- ➔ Clarify the definition, the scope and the value of the different reuse rates. This notably entailed discussions on several practical aspects, such as the choice of unit, how to deal with the flows of “temporary” materials, etc.

- ➔ Anticipate incentives to foster the proper collaboration between all the parties during the execution of the contract.

- ➔ Establish incentives to encourage bidders to outreach the minimal targets.

- ➔ Identify strategies to open some leeway in documents such as administrative and technical clauses, to facilitate and foster reuse strategies.

The following sections report on the discussions that were held in this context, and on their outcome. They highlight the lesson learnt that could be useful for other contracting authorities committed in similar approaches.

### 3.4 Discussions on the predetermined reuse rates

#### How to structure a table of requirements?

Thanks to the as-built analyses and the developed method (links), the live test clarified the way in which these predefined quantitative objectives should be formulated. This made them clearer, more calculable and more comparable, thus avoiding inconsistencies due to different possible interpretations of these targets. Following an analysis of the requirements table attached to the D&B pre-information note, comments were made with a view to structuring objectives and incorporating the method principles, such as the distinction between incoming and outgoing flows and rates :

Predefined REUSE RATES from pilot  
classified by FLOWS ▶

By separating the different flows and rates:

#### OF : Out flows & reclamation rates

25% of volume of demolition (O)

#### IF : In flows & reuse rates

15% of surfaces of façade (O)  
 15% of surfaces of roof (O)  
 10% of price of outside windows (O)  
 10% of mass of ironworks (O)  
 50% of surfaces of finishing (R)  
 50% of pieces of interior woodworks (R)  
 75% of pieces of furniture (R)  
 20% of mass of the open structure (O)  
 5% of mass of the lift installation (O)  
 5% of price of electrical pipes, fittings and accessories (O)  
 30% of pieces of electric equipment (R)  
 5% of price of HVAC (O)  
 5% of price of sanitary pipes & fittings (O)  
 50% of pieces of sanitary equipment (R)  
 10% of price of landscaping (O)  
 60% of surfaces of public spaces (R)  
 10% of price of gate, fencing, ... (O)  
 20% of surfaces of the service area (O)

By creating a Temporary flow:

#### TF : Temporary flows : reclaim & reuse

25% of price of site installation (O)

However, to go further and include the materials needs during the works in reuse objectives, a temporary flow can be created. This additional flow includes installation materials that were not present on the site before the works and that will no longer be present afterwards. Nevertheless, this flow is part of the materials circulating on the site. These aspects can be clarified at information sessions for bidders.

➤ *More description and structure in the objectives make it easier to submit a tender, to compare the bidders and to monitor the process.*

### The question of same-site reuse

Description of the reclamation & reuse targets :

In this project, the existing building stock is limited to a few outdoor facilities. Although nothing can be maintained, the out flow is very small compared to the in flow.

Nevertheless, in the choice of materials, there is an explicit request to prioritise the use of materials reclaimed on site but without a quantitative target.

Same site reuse (materials reclaimed from the original building and reused on the same site) combines the two flows and can be a preferential approach. However, it can also hinder reclamation and reuse because of logistics problems. It is therefore useful to differentiate the objectives according to the in and out flows logic, and to make of same site reuse a special case of the general model.

### The question of excavated soils

Objectives that go beyond the themes of recovery and reuse of construction materials are to be excluded :

Excavation of soil falls outside the scope of reclaim and reuse. This does not, of course, prevent the circularity of excavated soil from being included in a specific paragraph with sustainable defined objectives.

Plantations is another example that should exclude Reuse objectives.

Items beyond the scope:

#### Out flow : reclamation rates

~~25%~~ of volume of earthworks (O)

□ *Plants and soil from excavation do not concern a reclaim or reuse objective.*

### Discussion on the units

Surface :

The surface unit is interesting for finishing layers. What is included in this case must be specified.

15% of surfaces of façade

15% of surfaces of roof

50% of surfaces of finishing (indoor)

60% of surfaces of public spaces

20% of surfaces of the service area

▲ Predefined REUSE RATES from pilot classified by unity

In the facade item, the elements to be counted are detailed as follows:

“ - the cladding itself,  
- the insulation,  
- the sills  
- the awnings,...”

**Surface :**

This system of units (surfaces for the facade) can cause problems of interpretation.

For example, the sills and the awnings are not in the same plane as the facade cladding and the insulation. They could be considered as accessoires of the façade and therefore have another targets unit.

It is important to ask the tenderer to explain their calculation method in order to ensure the transparency of the results if the method is detailed in the specifications as follows:

*“ 15% of equivalent surface area in the plane of the façade with all the layers”*

**Without sills and awnings, the threshold can be reached with:**

- 30% of cladding or insulation
- or 15% of each

In the roof item, the reuse rate of 15% of the surface described as follows:

*“insulation, waterproofing, concrete slopes, smoke vents, skylights, etc.”*

**Without gutters, skylights and smoke vents, the threshold can be reached with:**

- 45% of insulation or waterproofing or slopes (if not part of insulation)
- or 15% of each

Other elements are roof accessories and require another targets unit.

In the landscaping item, it is preferable to limit the calculation to outdoor surfaces, excluding outdoor equipment such as street furniture (benches, bicycle racks, signage, etc.).

> Outdoor furniture can be the subject of a quantitative objective, but preferably using *the unit of price or the number of pieces or modules*.

> If the *price unit* is chosen for outdoor furniture, this objective can be integrated with landscaping or fencing, gates, letter boxes.

➤ *The surface unit as a measure of the reuse thresholds to be reached is very useful, but should be limited to items that only include comparable layers.*



**Price:**

The price unit should specify whether the cost of installation, preparation and storage is included:

Are they taken into account in order to reach the required threshold, or only the cost of materials? In this case, whether delivered or not?

25% of price of site installation,  
10% of price of outside windows,  
50% of price of electrical and sanitary pipes,  
fittings and accessories,  
5% of price of HVAC,  
10% of price of landscaping,  
10% of price of gate, fencing, letter box,...

**Mass:**

The mass unit is a good choice for heavy materials:

10% of mass of ironworks  
20% of mass of the open structure  
5% of mass of the lift installation

> The mass density has to be calculated with data's of technical specification or to refer to a data table with standard unitary mass or volumic mass.

*To ensure comparability, it would be useful for these data to be supplied by the adjudicator.*

**Pieces:**

The piece unit or module unit is more accurate for objects : doors, cabinets, toilet bowls, radiators, bench...

50% of pieces of interior woodworks  
75% of pieces of furniture  
30% of pieces of electric equipment  
50% of pieces of sanitary equipment

*The same logic has to be applied to the calculation of new materials to make the calculation of rate possible.*

### 3.5 Incentivise cooperation

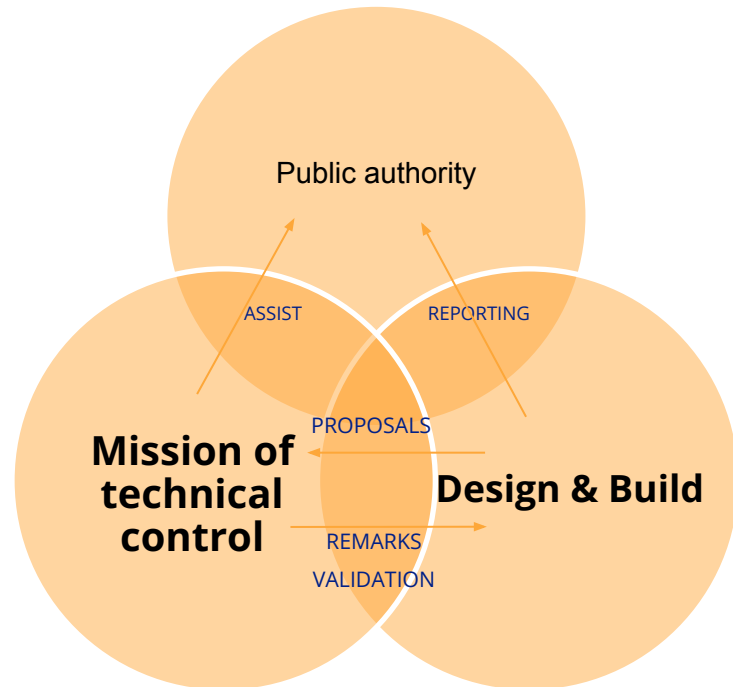
This chapter reports on the main approaches that have been chosen to incentivise cooperation between the different parties involved in the project - a key success factor.

#### Involvement from early on

The public authority choose in this case to create a general technical support team. Before publishing a pre-information notice for the Design & Build contract, Citydev.brussels launched a contract for a **TECHNICAL CONTROL MISSION** with a well described sub-task from reclaim to reuse.

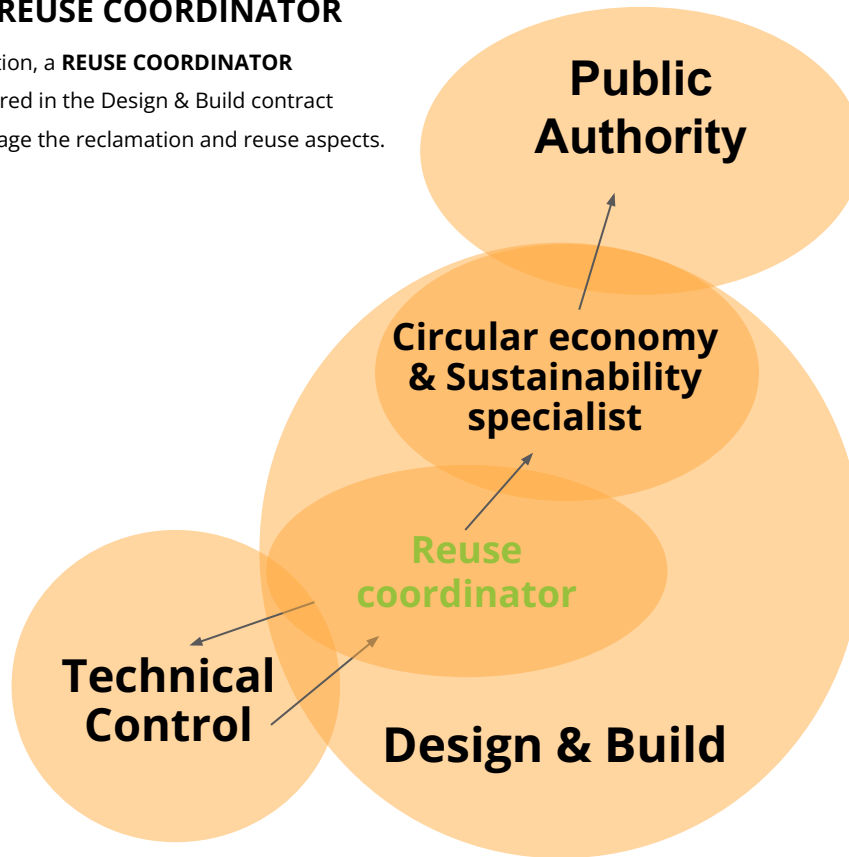
The interactions between the 3 entities throughout the development of the project are detailed phase by phase.

## TECHNICAL CONTROLLER MISSION



## THE REUSE COORDINATOR

In addition, a **REUSE COORDINATOR** is required in the Design & Build contract to manage the reclamation and reuse aspects.



The Reuse coordinator of the D&B team is required to submit its own documents for **approval by the technical control**, at any stage of the project, and to make any changes to its own documents requested by the technical control. As part of this project, the technical control office is also responsible for **validating the use of reused materials**. The reuse materials coordinator must provide all the necessary information requested by the technical control so that the validation protocols can be defined. The report generated by the technical control office must be incorporated into the project's design and construction assumptions. Without the prior validation of the technical control office, reused materials cannot be used.

### **Define interactions and set the chain of command between the different parties**

Create cooperation :

- to achieve and go beyond the predefined objectives and
- to anticipate additional tasks arising from the use of reused materials :

## **TECHNICAL CONTROL MISSION + Design & Build MISSION**

Before publishing a pre-information notice for the Design & Build procurement, the project owner launched a contract for a **TECHNICAL CONTROL MISSION.**

*"The purpose of this Technical Control Mission is to appoint an approved control company to analyse the tenders for the Design & Build contract (in the context of possible negotiations and technical solutions put forward by tenders), and to monitor and provide technical control of the design and execution of the following elements of the project as a whole:*

...

*On-site monitoring of deconstruction  
The use of reuse materials or facilities.  
Inspection by this approved body will allow unconditional application of the guarantees for the entirety of the works delivered, covering both the design and execution  
Inspection of the execution of the works, covered by the insurance bodies of both the contractors and the service providers (architects, engineers, etc.)*

*The mission of the Control Company is aimed at this primary objective, and all the services described in these specifications are motivated by this objective."*

▲ Extract from the technical control mission Specific Specifications

## TECHNICAL CONTROL MISSION + **Design & Build** MISSION

In addition, a **REUSE COORDINATOR** is required in the Design & Build contract

« *The materials reuse coordinator is responsible for the following tasks, among others :*

- *Drawing up a reuse audit to identify materials and technical installations with a high re-use potential;*
- *Drawing up an inventory of materials and any technical installations for reuse;*
- *Define deconstruction protocols to enable recovery and effective reuse ;*
- *Monitoring the steps of deconstruction and implementation of materials and technical facilities for effective reuse ; ...*

- *Assist designers in making construction choices and propose products that meet designers' requirements;*
- *Check the technical and financial feasibility of implementation with the contractor;*
- *Provide all documents and certificates requested by the inspection office and participate in drawing up the waste management plan;*
- *Include companies specialising in re-use, particularly social economy companies, in the procurement;*
- *Update the table of opportunities for reusing materials;*
- *Draw up a report on the use of reused materials, highlighting the specific features of the current or future reuse approach in terms of quantity, quality and creativity.;*
- *Advise on new tools for quantifying gains in terms of environmental impact ...»*

◀ Extract from the D&B Specific Specifications

### 3.6 Anticipate possible additional tasks

This live test analyses the reuse strategy chosen in order to anticipate the additional tasks involved in reuse.

For each phase, the special D&B specifications include the reuse targets by describing specific deliverable all along the process. This descriptions will enable correct planning, a clear distribution of tasks and a correct offer with full knowledge of the facts.

#### Adapt technical specifications per phases

- For the **preliminary design** phase  
« - A report on discussions with the "reuse" control office appointed by the contracting authority in order to validate any tests to be carried out on reuse..

- A file compiling all the reused materials envisaged for the project, including :

- o Their location, their technical characteristics and their implementation constraints;
- o Potential suppliers, including any guarantees;
- o Calculating the percentages and monitoring the ambitions pursued on allocation in the Reuse Table of Requirements;
- o A note highlighting how the reuse coordinator ensures the supply and certification of the reuse materials to be used. »

- For the redaction phase of the execution file

« Updating the file compiling all the re-use materials envisaged for the project; » **IN & OUT FLOWS**

For the preparation and monitoring phase of the **construction itself**

« - monitoring the integration of reused materials and those with a low environmental impact; **IN FLOW**

- any tests required to validate the use of reused materials; **IN FLOW**

- making an inventory of the elements present on site so that they can be reclaimed; » **OUT FLOW (with same- site reuse possibilities / in flow)**

- For the **as build** phase (reporting)

« - The final reuse rates and reclamation rates, as well as the rate of materials with a low environmental impact »

▲ All extracts are from the Specific Specifications

### **Adapt technical specifications per involved organisations**

This live test analyses the reuse strategy chosen in order to anticipate the additional tasks involved in reuse.

The specific specifications clearly list the respective tasks of the various D&B team specialists involved in reuse as the contractor, stability design office, the specialist in circular economy and sustainable development,...

- For the **contractor**

*« The implementation of re-used materials in accordance with the requirements of the re-use coordinator and the control office »*

- For the **stability design expert**

*« It will also incorporate the specific calculation assumptions prescribed by the*

*"re-use" part of the control office for the implementation of reused materials.»*

- For the **landscape designer**

No task relating to reuse is included in the specific specifications for this trade. In view of the quantitative reclamation target of the outdoor landscaping with a request to encourage reuse on site, it is appropriate to develop this point by an info session before awarding the D&B mission.

- For the **reuse coordinator**

*« Services to be provided by the re-use coordinator : The role of the reuse coordinator is to support the integration of reuse materials and technical installations into the project. They are involved at all stages of the project, from the submission of the tender to the final acceptance and monitoring of the building's operation. It ensures the long-term*

*traceability of the elements used in the project. Its role is both to guide the design towards technical choices in line with the field of re-use, and to monitor the execution to ensure that the products are used correctly. »*

▲ All extracts are from the Specific Specifications

### 3.7 Encourage outreaching the minimal reuse rates

#### An award criterion dedicated to “technical sustainability”

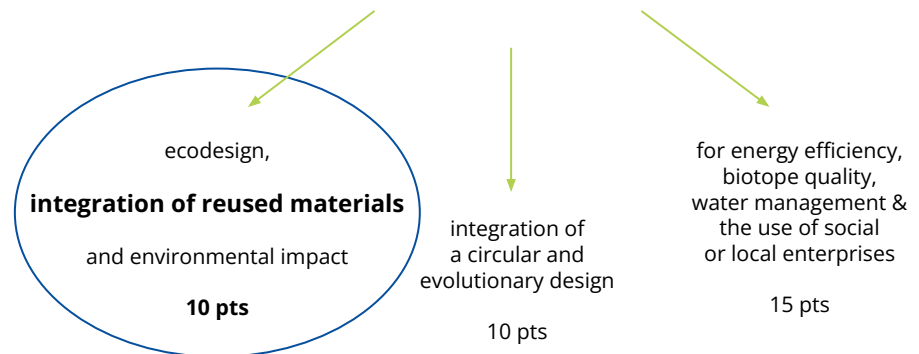
The main aim of this criterion is to highlight the technical and design choices made to integrate the sustainable vision into the project. This includes, in particular, **analysis of the integration of reused materials**, environmental impact, design in terms of circularity and future development, energy performance, biotope quality and water management.

The contracting authority will assess all of these elements on the basis of the documents in the preliminary architectural design, the "technical" note, **the table of objectives and minimum requirements for the recovery and reuse of materials** and the checklist attached to the tender.

*This chapter details how the contracting authority managed to encourage the bidders to go beyond the minimal targets.*

## 75 pts for Technical Quality criteria:

### in which 35pts for Technical sustainability criteria:





### et bonuses and penalties regarding the reuse targets

« 3.6.2.2 **Productivity bonus** on reuse results:

*The successful tenderer has stated in his tender which items of reused materials, via the table of opportunities for reused materials, he undertakes to use. In the event that the successful tenderer achieves a higher percentage in terms of the use of reused materials, per item taken separately, the successful tenderer will receive a productivity bonus calculated as follows :*

- 5.000 euros per 1% overrun per item. »

« 3.6.3.2.5 Special **penalties** for non-compliance with minimum reuse thresholds : *If the minimum requirements are not met, a penalty of :*

- **1.000 euros for every 0.1% not achieved for a basic minimum threshold; (Requirements)**

- **500 euros per 0.1% not reached for a minimum threshold; (Opportunities)**

- *The maximum penalty is set at 5% of the total contract value. Beyond this percentage, the project will be considered inadmissible. »*

▲ All extracts are from the Specific Specifications

**The percentages exceeding the basic targets compensate for the targets not achieved, making the application of the thresholds flexible.**

**In addition, the project owner reserves the right not to apply penalties based on evidence of an average effort.**

**So there is no risk of the project being inadmissible and there is plenty of scope for action.**

### **Provide leeway in the tendering documents for possible material substitutions**

« *Impossibility for the selected tenderer to obtain certain reused supplies :*

**a) with regard to an item for which the selected tenderer proposes a reuse solution, the selected tenderer demonstrates, during the performance of the contract, that it is *ultimately not possible to obtain the reuse supplies concerned, or that it is only possible to obtain them at a price higher than the maximum price estimated in its tender:***

*The selected tenderer will provide this **proof** by demonstrating that it has contacted and requested quotes from several reuse suppliers, and after having obtained the recommendations of the materials reuse coordinator;*

*The contracting authority will then be able to choose between the following **three options** :*

➤ *or it will allow the selected tenderer to carry out the item in question using **new but end-of-series supplies**, for a price (purchase and installation) provided for in the tender;*

➤ *or it will invite the selected tenderer to carry out the item in question using the **reused supplies available, in return for a price (for purchase and installation) to be agreed between the contracting authority and the selected tenderer;***

➤ *or it will allow the selected tenderer to carry out the item in question using **another reuse material, for a price (purchase and installation) provided for in the basic offer for the reuse items.***

▲ All extracts are from the Specific Specifications

### **Provide leeway in the tendering documents for possible material substitutions**

« *Impossibility for the selected tenderer to obtain certain reused supplies :*

**b)** *In other cases of replacement of reused supplies by new supplies: Without prejudice to point a), the successful tenderer must use reused supplies to carry out the items concerned in his tender and he cannot therefore replace these reused supplies with new supplies.*

**As an exception,** *the selected tenderer will nevertheless install **new supplies in place of reused supplies.** :*

➤ **or, at the request of the contracting authority,** *whatever the reason for the substitution: in this case, the parties agree on an appropriate price for the item concerned (purchase and installation price).*

➤ **or,** *at the request of the selected tenderer, in the event that a reused supply **deteriorates at the time of fitting/installation, or if a defect is revealed after fitting/installation,** requiring the defective supply to be dismantled, removed and another equivalent supply to be reassembled. In this case, the parties agree on an appropriate price for the item concerned (purchase price and fitting/installation price). Nevertheless, if the deterioration or disappearance of the reused supply is attributable to the selected tenderer, the latter shall ensure, at its own expense, the replacement of the supply with an equivalent new or reused supply that complies with the specifications.*

➤ **or at the request of the selected tenderer, for any other justified reason,** *if this request is accepted by the contracting authority, and in return for a purchase and installation price to be agreed by the parties,*

*it being understood that the total price (purchase + installation) paid by the contracting authority may not in this case exceed that initially agreed for the purchase and installation of the reused supply. »*

▲ All extracts are from the Specific Specifications

### 3.8 Main lessons learnt

#### To set general ambitions (from pilot)

- Consult the market to check what the **availability** of materials on the **reuse market** before defining a rate
- Define **reasonable targets** for jobs with **high technical requirements and performance**
- Define more **ambitious targets** for jobs with **low technical requirements and performance**
- Encourages bidders to exceed targets and leave then **flexibility** to allow a degree of creativity and the implementation of other circular and environmental aspects.

#### To translate general ambitions into call for tenders

- Provide **definitions and formulas** for your targets as **recovery rate, reuse rate,...**
- Separate the different FLOWS of materials : **IN FLOW** > < **OUT FLOW** and exclude what cannot be considered as re-use
- If you want to go further create a **Temporary Flow** to integrate reuse objectives for barracks, cranes, shuttering,...
- explain clearly what has to be from reuse market and what has to be reclaimed after to reach the threshold.
- Choose the **right unit** and **detail** what is included and how to calculate the rate
- **Limit transport** of reclaimed and reused elements to a maximum radius per material

- Provide for the possibility of implementing an **alternative** to the proposed re-use in specific cases
- Describe the **specific tasks** involved in reuse by stage and function

### To select the right team

- Includes the predefined reuse thresholds in the **award criteria** for the D&B procurement.
- During a qualitative selection, ask for **references** in reuse but adapt the type of references required according to existing exemplary projects. This can be a double-edged sword: on one hand, it allows to work with experienced contractors; on the other hand, it may be an obstacle for companies that are new to the topic while still being apt and motivated to address this question.
- Even if the use of a **negotiated procedure** is not compulsory because of the value of the works, provide for this possibility. It offers an opportunity to better understand each other. The foresees negotiations don't have to happen. The contracting authority decides whether or not to activate it.
- Creates a specific function dedicated to

- reuse in the D&B team: **the reuse coordinator**.
- Creates a specific function dedicated to Circularity & Sustainability to integrate the reuse strategy into a broader framework: **the circular economy & sustainable specialist** in charge of reporting from concept to final acceptance. Depending on project size and ambitions, it could include the reuse coordination.
- Launch a **separate reuse technical control mission** (or broader) before awarding the D&B mission.
- Choose and develop a strategy to encourage outreaching set targets through **bonuses and penalties**.

### To report on the results transparently

- In the **bills of quantities**, ask to work with different columns for reclaimed elements and reused materials. It will avoid any confusion (in the specific case of an

element reused on the same site, both columns will be ticked).

- Ask to the selected tenderer to describe the calculation method used and to provide the references used (technical data sheets, sources of generic data, etc.).
- Even though it is possible to use units adapted to each application (m<sup>2</sup> for surfacic elements, m<sup>3</sup> for volumes, etc.), ask to convert all quantities to a common metric– **the mass** – This will facilitate as-built reuse reporting, which is usually a time-consuming exercise at the end of the process. So ask to put a column calculating the mass "[kg]" of all materials in circulation (to extract in and out flows separately so as reuse and reclaim).
- Accept an **alternative** without penalties based on evidence of the effort made
- Give a **table** with clear and structured targets

## Before 2022

2012: TIVOLI 10

2016: GREENBIZZ I

2019: TIVOLI GREEN CITY

2021: FCRBE pilot operation GREENBIZZ II

[EN version - FR version](#)

## 2022 – Summer 2023

2023: FCRBE-CAP Live test GREENBIZZ II

03/2023: public procurement publication for the technical control mission

04/2023: publication of a pre-information notice D&B

06/2023: public procurement publication D&B

09/2023: submission of applications D&B / selection tenderer for technical control mission

## After summer 2023

11/2023: Selection of candidates

2024: Negotiation & Selection of winning bidder

2029: End of works + 24 months monitoring

# 4° 1% REUSE

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## 1% REUSE

### Dedicating 1 % of the works budget to foster reuse

#### 4.1 About

*A public authority has set a mandatory reuse rate of 1% in value for any operation taking place on its territory. A local social landlord has to translate this general objective into a specific project.*

#### 4.2 Challenges

Support the contracting authority and the design team in identifying tangible pathways to achieve this 1 % target.

- Develop a monitoring tool allowing the design team to follow-up the 1% reuse objective in the different phases of the project (design, work, completion)
- Test this approach in one pilot project: adapt the call for tender of a design competition for the construction of 60 housing units.

La Courneuve – FR – 2023

Project type: new construction

Programme: collective housing

Project size: 5.000 m<sup>2</sup>

Interreg NWE FCRBE partner: **Bellastock**

Project manager: **Seine-Saint-Denis Habitat**



### 4.3 What is it all about ?

The project concerns the **construction of a new 60-units apartment building**. It is led by a local social landlord, Seine-Saint-Denis Habitat, and aims at converting a 10 ha industrial wasteland into a new part of the town La Courneuve, a municipality in the northern suburb of Paris.

The project takes place in a particular context. Together with 8 other towns north of Paris, La Courneuve is part of a larger territorial entity called Plaine Commune. Recently, in the context of its circular economy policy, Plaine Commune has set a mandatory reuse objective for every construction taking place on its territory. The goal is expressed as follows: **"dedicate 1% of the total work budget to the supply of reclaimed materials."**

This requirement applies to the project in La Courneuve, as well as to any future project undertaken by Seine-Saint-Denis Habitat. This operation was therefore an opportunity to establish a proper long-term strategy.

▼ Formulation of the 1% reuse objective by the local authority Plaine Commune, in its [Circular Economy charter](#)

The reuse objective is separated from other types of environmental objectives (recycling, use of low carbon products, design for deconstruction...)

- sur les projets de construction neuve :
  - **dédier 1% du montant des constructions / rénovations à l'achat de produits issus du réemploi ou de la réutilisation ;**
  - généraliser le recours à du béton de construction incorporant à minima 5% de matériaux recyclés ;
  - étudier systématiquement la possibilité de recourir aux éco- matériaux notamment issus des terres du Grand Paris Express, conformément au partenariat signé entre la Société du Grand Paris et Plaine Commune sur l'économie circulaire ;
  - d'une manière générale, prendre en compte les critères de ré employabilité/recyclabilité/démontabilité des matériaux choisis, afin de rendre possible les futures actions de valorisation des matériaux.

Afin d'aller plus loin dans la démarche, il s'agira également de contribuer au déploiement des filières émergentes identifiées comme « stratégiques » pour le territoire (béton, bois, métallerie- serrurerie, terre cuite, menuiseries extérieures, terres), en étudiant systématiquement la possibilité d'y recourir, et en faisant le lien avec les démarches d'insertion du territoire afin d'assurer des retombées pour les habitants et les acteurs les employant.

## 4.4 Reuse strategy, pilote operation summary

The project is contracted through a two-stage procurement: first a service contract for the design, then a work contract for the build. **The FCRBE live test focuses on the preparation of the tender for the design.** It tackles the question: how to translate this 1% objective (in value) into a design contract?

The contracting authority's strategy consists in:

1. Testing preliminary design scenarios that reach this 1% objective, in order to give the design team a better understanding of possible solutions.

2. Adapting the call for tenders – Setting a framework in the offers

- Set and express the 1% reuse objectives

- A table for the reuse objective, to be completed by the design team.
- Definition of the other deliverables expected from the candidate.
- Bidder's commitment to monitor reuse objectives.
- Description of the deliverables for each phase : design, construction, final reporting.

3. Setting a tender process that can be replicated in future operations

Material sources:

The former industrial buildings will be entirely demolished before the construction happens. Therefore, no material will be available on site. **Designers have to source the materials off-site.** A separated tender for demolition will be launched by the local planner, including reclamation objectives for off-site reuse.

Remark : this situation is quite unusual as it is more common to set a qualitative objective in a design contract. As the project's design evolves, the architects translate this open objective into specific requirements for the work contract. Reuse practices in the construction, however, are progressing fast and this new approach may become more common in a nearby future.

## 4.5 Simulation of scenarii

### Scenarios to reach the 1% target – Approach by layers

Since the costs of a building are not evenly spread between its constitutive layers, reaching the overall 1% target in value may entail much **higher rates if reused materials are concentrated in specific layers.**

This fact was revealed while sketching first scenarios drawing on the statistics about the breakdown of the costs of a typical collective housing buildings<sup>1</sup>. It shows that the structure and the skin alone can represent a bit more than half of the construction costs (57 % precisely). Accordingly, if these two layers were to contribute alone to the overall 1 % target, they should contain a bit less than 2 % of reused materials (1,8 % precisely).

The reuse rate in each layer increases in inverse proportion to the weight of this layer in the total construction costs.

<i>Layers</i>	<i>Relative weight of the layer in the total construction costs.</i>	<i>Reuse rate that needs to be achieved in the layer if it has to contribute alone to the 1 % overall target.</i>
Structure + Skin	57,0 %	1,8 %
Services	18,7 %	5,4 %
Space plan	16,5 %	6,1 %
Outdoor infrastructure (soils)	4,2 %	23,7 %
Outdoor surface and furniture	3,3 %	30,2 %
Total	100 %	

<sup>1</sup> Source: *Conseil supérieur de la construction et de l'efficacité énergétique (CSCEE)*, final report of the working group « Coûts de construction », 2016. This analysis draws on average ratios.

## Scenarios to reach the 1% target – Method

A key information to know is the relative impact of each batch of material in the contribution to the overall 1 % target. This question can be addressed in four steps.

### 1. Listing potentially reusable materials

A first shortlist of potential materials has been established following these criteria:

- Materials that are frequently used in the social landlord's operations (data available from a previous study).
- Materials that are available on the reclamation market.
- Materials that have demonstrated their reuse potential in previous operations.
- Materials that are economically viable.
- Materials that do not raise too many questions in terms of risk management and insurance.

### 2. Estimating the costs of materials

The estimation builds on retail prices observed on the market. When relevant, it also factors in additional costs such as time spent for sourcing the materials, transport, cleaning, sorting, performance tests, etc. All of these are built on previous experiences.

### 3. Estimating the quantity of each material in the project

It can prove difficult to determine the quantity of material during the first inception phase since a lot of architecture decisions are still to be made. However, some assumptions can be set at this stage:

- First, despite the lack of detail on the actual project, some quantities are straightforward. For instance, whatever the

architect's design, it is known that 1 apartment in this context contains 1,2 toilet bowl, 4 radiators, 4,5 interior doors, 65 m<sup>2</sup> of floor surface.

- Then, for less straightforward materials, rough assumptions can be made based on parameters such as the surface of the facade, the length of the metal balustrade and of ventilation ducts, the surface of outdoor pavers, etc.

### 4. Calculating the respective share of each material in the overall 1% target

To do this, it is needed to calculate the share of each material in the total budget of the works, as established above. The total budget is set by the building owner.

Localisation	MATERIAUX	Quantité totale	Unité	Part dans l'objectif 1 %	Masse (T)
LOT 01 - structure, gros oeuvre, maçonnerie					
LOT 02 - Couverture, étanchéité, charpente					
Terrasse priv. ou collect.	Lame de terrasse bois	240	m2	0,11%	192,00
Terrasse priv. ou collect.	Dalles gravillonnées	480	m2	0,19%	28,80
LOT 03 - Façade et menuiseries extérieures					
Bardage de façade	Bardage bois	800	m2	0,95%	432,00
Bardage de façade	Pierre agrafée	800	m2	2,12%	324,00
Bardage de façade	Brique pleine non porteuse	800	m2	0,74%	1600,00
Serrureries extérieures	Garde-corps	240	m2	0,32%	13,20
LOT 04 - Cloisonnement, faux plafonds, menuiseries intérieures					
Logements	Portes de distribution (bâti non compris)	265	u	0,14%	6,66
Logements	Plafonds intérieurs	120	m2	0,07%	3,60
Parties communes	Marches escaliers	360	u	0,14%	0,00
Parties communes	Main courante escalier (metal)	106	u	0,14%	0,00
Parties communes	Plafond suspendu acoustique	40	m2	0,03%	0,05
LOT 05 - Aménagements intérieurs, décoration, mobilier					
Logements - Pièces	Carrelage de sols	540	m2	0,36%	10,80
Logements - Pièces	Faïence murale	380	m2	0,28%	4,18
Logements	Parquet logements	2 385	m2	1,90%	23,85
Logements	Lambris	530	m2	0,28%	4,24
Parties communes - hall	Habillage muraux	36	m2	0,03%	0,40
Parties communes - hall	Carrelage sol (hall)	40	m2	0,03%	0,80
Parties communes	Boîtes aux lettres	50	u	0,04%	0,28
LOT 06 - CVC					
Logements et parties	Radiateur acier	239	u	0,69%	171,72
Logements et parties	Radiateur fonte	239	u	0,88%	0,00
Logements et parties	Gaine de ventilation	300	ml	0,12%	0,00
LOT 07 - Equipements sanitaires					
Logements	Cuvette WC	80	u	0,10%	3,20
Logements	Lavabo	80	u	0,05%	0,00
Logements	Receveur de douche	60	u	0,05%	2,70
Logements	Evier	60	u	0,03%	0,33
LOT 08 - Réseaux énergie et courant fort					
Parties communes	Luminaires	106	u	0,06%	0,00
Parties communes	chemins de câbles	500	ml	0,13%	0,00
LOT 09 - Aménagements extérieurs, VRD					
Espaces ext	Pavé	80	m2	0,04%	208,00
Espaces ext	Clôtures extérieures grillagées	80	m2	0,13%	1,69
Espaces ext	Clôtures extérieures maçonnées	80	m2	0,08%	0,00
Espaces ext	Mobilier extérieur	15	u	0,04%	0,00

## Scenarios to reach the 1% objective - First results

This column indicates the contribution of each material in achieving the overall 1% target (assuming that the whole batch is reused)

For example, the cost of all interior doors represents 0,14 % of the total work budget – equivalent to about one sixth of the overall 1% reuse objective.

Additional indicators : mass This column indicates the total mass of each material (in tonnes, assuming that 100% of the batch is reused).

## Scenarios to reach the 1% objective – First results

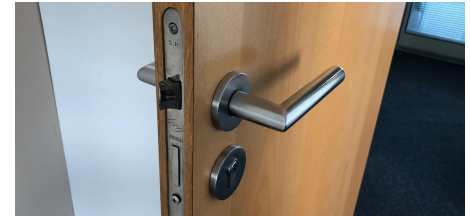
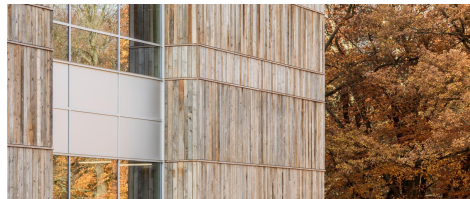
It appears that **many scenarios** lead to achieving the expected results. Some extracts from the findings:

- A 100% reused wooden facade would almost reach the objective (0,95 %).
- A facade entirely made of reused bricks would contribute to 3/4 of the objective (0,74 %).
- Reused toilet bowls and sinks would represent a much smaller contribution to the overall objective (0,15 %), and so would reused interior doors (0,15%).
- Reusing cast iron radiators would meet the objective in one go (1%).
- Reusing metal for the balustrades would contribute to a third of the objective (0,32%)

Pictures credits from left to right and from top to bottom: David Boureau, Samuel Defourny, Bellastock, Bellastock, Opalis., Opalis ▶

## General observations

- The 1% objective is actually quite ambitious ! Contributions of some materials were a surprise for many involved parties (lower or higher than expected).
- This scheme favours relatively expensive materials (like radiators) to the detriment of cheaper items (sanitary equipment or interior doors).



## 4.6 Adapting the call for tender - Set and express the reuse objectives

▼ Extract from the design tender – expression of the reuse objectives

<b>Quantitatifs</b>
<ul style="list-style-type: none"> <li>• 1% du montant des constructions dédié à l'achat de produits issus du réemploi</li> <li>• Les matériaux de réemploi ciblés seront répartis entre trois lots différents au moins, hors VRD</li> </ul>
<b>Qualitatifs</b>
<ul style="list-style-type: none"> <li>• La compétence réemploi est demandée dans le groupement. Le groupement devra fournir les efforts économiques et humains pour répondre aux attentes de la maîtrise d'ouvrage sur le sujet de l'approvisionnement extérieur en matériaux de réemploi. L'engagement de l'équipe pour répondre aux objectifs de réemploi sera suivi et évalué tout au long du projet par la MOA.</li> </ul>

Le montant dédié à l'achat de produits issus du réemploi intègre :

- l'organisation et le temps passé pour la recherche des matériaux
  - la fourniture de matériaux de réemploi à proprement parlé (achat)
- Le cas échéant :
- la préparation à la remise en œuvre des matériaux (nettoyage, finitions, etc)
  - le coût des essais éventuels
  - le stockage temporaire et le transport

1% objective in value.

A monetary value objective may steer the company towards high-cost materials to the detriment of others. This perverse effect can be limited by requiring a minimum number of targeted batches (in this case, 3).

Qualitative objective: skills and best effort obligation.

Precisions of what is included in the supply cost.

## Adapting the call for tender - Setting a framework in the offers

▼ Extract from the design tender – A table for the reuse objective, to be completed by the design team

Désignation	Quantité	Unité	Poids total (t)	Prix de fourniture total (€)	Source d'approvisionnement envisagée	Caractéristiques architecturales recherchées	performances techniques recherchées	remarques (conception, fourniture, travaux, logistiques...)
LOT 01 - structure, gros oeuvre, maçonnerie								
LOT 02 - Couverture, étanchéité, charpente								
LOT 03 - Façade et menuiseries extérieures								

The design team selects the materials that will be incorporated into the project and indicates the quantities, the weight and the price estimations. They also indicate the expected source, architectural features and technical performances.

LOT 10 - Aménagements extérieurs, VRD								
<b>budget de l'operation (€)</b>				7 550 000,00 €				
<b>montant total dedie a l'achat de materiaux (€)</b>				- €				
<b>Taux de réemploi atteint (%)</b>				X %				
<b>Masse totale de matériaux de réemploi (t)</b>				Y tonnes				

The table calculates the total amount of reuse supplies and reveals the percentage of reuse achieved.

The bidders are provided with the simulations carried out in the preparatory phase, as an inspiration for their own approach.

1. Tableau objectifs réemploi

2. Simulations\_résultats

3. Simulations\_méthode

4. Simulations\_BDD

+



## Livrables

Le maître d'œuvre transmet dans son offre :

1. **le tableau d'objectifs** complété : identification des matériaux de réemploi ciblés, quantités, estimation des prix.
2. **une note méthodologique** de 3 pages maximum, faisant état de la compréhension de l'objectif, des solutions proposées (choix des matériaux, disponibilité des matériaux, qualité architecturale et technique...), et des moyens méthodologiques déployés pour atteindre l'objectif (notamment, la capacité à proposer un projet viable en phase d'étude, et à trouver au moment des travaux les matériaux identifiés). Enfin, le candidat explicite en un paragraphe sa méthode de chiffrage des coûts unitaires de matériaux ciblés.

Description of the expected deliverable:

- Table of reuse objectives
- Methodological note

## Aide à la maîtrise d'œuvre pour renseigner le tableau d'objectif

Pour faciliter le travail de l'équipe, le maître d'ouvrage a fait réaliser des **simulations** lors d'un travail préalable. Ces simulations indiquent dans quelle mesure différents matériaux contribuent à la réalisation de l'objectif de 1 % si l'ensemble du lot est fourni avec des produits de réemploi.

Nota

- Ces simulations sont données à titre purement indicatif et ne sont pas nécessairement des solutions à privilégier par le maître d'œuvre, leur unique objectif est d'aider les concepteurs à mieux appréhender ce que représente l'objectif de 1% de réemploi ainsi que certaines configurations pour y arriver.
- Ces simulations donnent un aperçu de quelques configurations possibles. Cependant, elles ne couvrent pas l'exhaustivité des cas. En ce sens, il n'est pas demandé à l'équipe de maîtrise d'œuvre de choisir ses matériaux parmi cette liste
- En particulier, l'utilisation de matériaux de réemploi avec détournement de l'usage initial n'a pas été étudiée, mais le concepteur pourra tout à fait intégrer de tel matériaux à son projet

Explanation of the purpose of the simulations and their purely indicative function: they are not to be understood as literal expectations from the contracting authorities, they are just an illustration of the approach and of the multiple pathways that can lead to the expected outcome.

**Les résultats des simulations figurent au côté du tableau d'objectif dans le document excel à remplir par le maître d'œuvre dans le cadre de son offre.**

▲ Extract from the design tender – Deliverable expected from the candidate and suggestions.

## 5. Livrables attendus en phase projet

Le sourcing et la faisabilité technique, économique, logistique et assurantielles pour chaque matériau seront approfondies en phase études. Les livrables attendus à chaque phase (ESQ / APS / APD / PRO / EXE / DET / OPR) sont :

### Tableau de suivi

À chacune des phases du projet, le maître d'œuvre met à jour le tableau de suivi. Il pourra utiliser pour cela le tableau d'objectif remis en phase concours, qui servira de document de synthèse du projet de réemploi envisagé. L'objectif est de

- faciliter le suivi de l'objectif de réemploi par le maître d'ouvrage, le maître d'œuvre et les entreprises de la conception jusqu'à la réalisation ;
- permettre au maître d'œuvre de rendre compte régulièrement de l'avancement de ses recherches de matériaux
- encourager les maîtres d'œuvre à se questionner sur l'impact du choix des matériaux de construction au fur et à mesure du projet

### Fiche matériaux (description de la solution de réemploi)

En complément, le maître d'œuvre met au point une fiche réemploi par matériau qui décrit la solution proposée :

- le domaine d'emploi
- l'identification de la source (approvisionnement)
- les caractéristiques techniques des matériaux identifiés (ou recherchés)
- l'identification des performances à vérifier en accord le futur domaine d'emploi, et le protocole de validation des performances à mettre en place
- une description des étapes de remis en état (les cas échéant)
- une description de la mise en œuvre
- un récapitulatif des coûts décomposés comme suit : prix d'achat, prix de remise en état (le cas échéant), prix de pose. A comparer avec le prix d'achat et de pose d'un matériau neuf équivalent.

Au moins une réunion de restitution du groupement relatives au réemploi devra avoir lieu à chaque phase, à l'intention de la maîtrise d'ouvrage.

Make sure that the efforts are properly monitored during the project implementation

At each phase of the project, the project manager updates the table of reuse objective, to guarantee a proper monitoring.

In addition, the project manager draws up a reuse sheet for each material, describing the proposed reuse solution (use, source of supply, technical characteristics, identification of the performances to be verified, costs...).

▲ Extract from the design tender – Bidder's commitment to monitor reuse objectives

Last but not least, all deliverables are precisely described for each phase: design, construction, final reporting.

#### Phases APS / APD

Le maître d'œuvre transmet un dossier réemploi comprenant :

- Le tableau de suivi complété pour la phase APD, permettant de suivre le respect de l'objectif réemploi.
- Les fiches réemploi par matériau. Ces fiches devront être validées par le contrôleur technique dans son RICT et transmises aux assureurs ;
- Le planning des travaux donnant à voir l'impact du réemploi (le cas échéant)
- La notice économique et estimation du coût prévisionnel des travaux intégrant les coûts des opérations de réemploi ;

#### Phases PRO / DCE

Le maître d'œuvre transmet un dossier réemploi comprenant :

- Le tableau de suivi complété pour la phase PRO, permettant de suivre le respect de l'objectif réemploi. Cet outil permettra de fixer les objectifs de réemploi obligatoires pour les entreprises, et fera partie des pièces contractuelles du marché de travaux.
- Les fiches réemploi par matériau. Ces fiches devront être validées par le contrôleur technique dans son RICT et transmises aux assureurs ;
- Les CCTP par matériau (incluant les clauses techniques et les pièces graphiques)
- Les adaptations des autres pièces marché (CCAP, AE)
- La stratégie d'alotissement (lot réemploi ou pas)
- Les DTGFI/BPU spécifiques au réemploi

#### ACT

Le maître d'œuvre transmet aux entreprises consultées :

- Le résultat de la recherche des matériaux de réemploi et des études de faisabilité
- Les fiches matériaux, qui serviront de cahier des charges pour l'entreprises sur :
  - l'identification des performances à vérifier en accord le futur domaine d'emploi, et le protocole de validation des performances à mettre en place
  - une description des étapes de remis en état (les cas échéant)
  - une description de la mise en œuvre

Le maître d'œuvre transmet au maître d'ouvrage :

- La note d'analyse des offres sur le volet réemploi, permettant notamment la mise au point du marché de travaux de construction sur ce sujet.

#### EXE / DET

Le maître d'œuvre transmet :

- Les fiches descriptives des matériaux identifiés (par lui et/ou par l'entreprises)
- La présentation d'échantillons et un avis sur les matériaux identifiés pour validation
- Le tableau de suivi complété et actualisé au fur et à mesure de la pose des matériaux
- Les CR de réunion de chantier ainsi que les bons de livraison permettant le suivi des travaux de construction et la fourniture des matériaux de réemploi sur site.
- Les factures permettant de calculer précisément le montant des fournitures de réemploi

#### AOR / Bilan du réemploi

Le maître d'œuvre transmet :

- La version finale du tableau de suivi (quantités, prix, sources d'approvisionnement), dont le bilan économique du réemploi, détaillant les prix de fourniture pour chaque matériau (à l'appui de factures qui seront récoltées pendant le chantier)
- Le bilan environnemental et social de la démarche de réemploi mise en place sur le projet

## 4.7 Lessons learnt

### Is relevant if

- As a building owner, you want to define the quantitative objective yourself before the design, and keep control over it. This reflects a high level of ambition.
- A higher authority has set you such a target, and you must monitor it right from the start (design stage)
- As a building owner, you are assisted by a professional and you have carried out studies to define the objective (audit, market study, etc). Of course, you can have the reuse skills internally, but this situation is scarce currently.

### Challenges

- At the competition stage, the project
- ◀ Extract from the design tender – Bidders' commitment to monitor the reuse objectives.

and the materials are not yet defined in detail. In particular, materials are summarily costed, making it difficult (and unusual) for the design team to measure material quantities and precise costs. Moreover, many prices on the reuse market are not stable.

- Unless you're already an expert in the field of reuse, you will need a dedicated assistance (and assuming its costs).
- As the subject can be new and complex for the design team, it is recommended to opt for a procurement procedure that allows for negotiation.
- The contracting authority must anticipate how to follow the objective during the design phase and the construction phase. Nevertheless, monetary value objective is quiet easy to follow (with documents such as the economic offer at the contracting phase, invoices for purchase of materials, etc)

