

A guide for facilitating the integration of reclaimed building materials in large-scale projects and public tenders

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The document corresponds to Deliverable 1.1 of Activity 1 of the Implementation Work Package 3 (WP T3).

WP T3 aims at fostering the integration of reclaimed materials and products in new projects, especially in the context of large-scale developments and public tenders. This deliverable provides a set of methods, advice and recommendations to assist building owners, architects and construction professionals in doing so.

This working draft is not the final version. It will be tested further in the course of the project through pilot operations and workshops. A final version is expected to be released at the end of the project, taking into account feedback, comments and new findings.

To follow the project:

<http://www.nweurope.eu/fcrbe>

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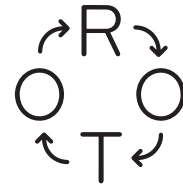
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Introduction

This manual is intended to facilitate the integration of reclaimed building materials and products in a construction project. It is addressed to public owners, architects, contractors and anyone involved in construction projects.

The manual has been developed with large-scale projects and public tenders in mind. Its content, however, is perfectly applicable in the context of smaller and private developments.

This manual is based on practical cases. We analysed construction projects of different scales and types, all of which have succeeded in integrating batches of reclaimed materials and products. **We drew on these examples to develop a set of methods, advice and practical recommendations to help users of this guide achieve similar reuse targets.**

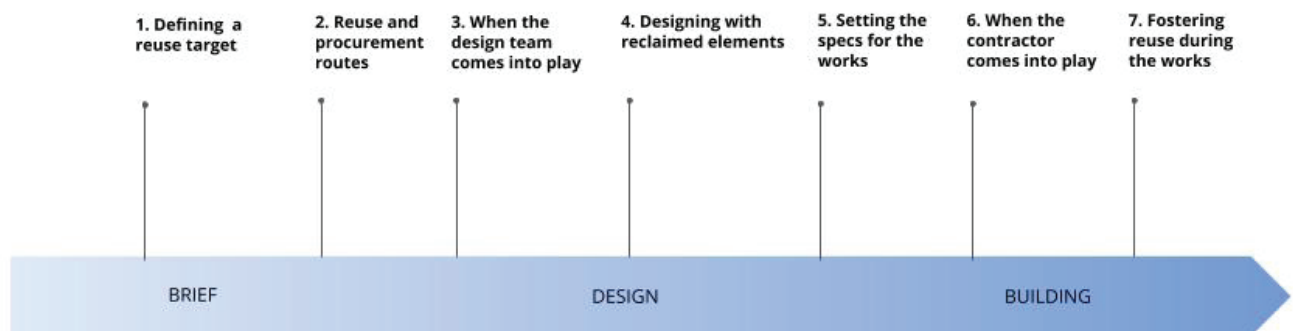
The manual is divided into two sections:

- The first section, a general introduction, explains what reuse is, highlights the benefits of this practice, and lists the main

sources of reclaimed products (from p.10 to p.22).

- The second section is the core of the document. It develops different approaches to integrating reclaimed building elements in a construction project, throughout the different stages of the project development (from p.24 to p.65).

The second section is structured following the general chronology of most project developments. It is based on a continuum ranging from the early definition of the brief to the actual building works. This timeline is punctuated by important steps. Each step marks a milestone in the concretisation of the project. Some of them correspond to the arrival of new actors in the process, notably the design team and contractors. We have focussed on seven steps, corresponding to the chapters of Section 2:



Depending on the context of each project, each of these steps will be subject to specific procedures framed by (inter)national regulations and internal management requirements. This is especially the case in the context of public tenders, which entail stricter protocols that may have to be adapted in order to work with reclaimed building materials and products. Certain chapters (or subchapters) in this document focus specifically on these issues. These are identified by the explicit mention of public tenders in the title and the use of a pictogram.



This manual is not intended as a vade-mecum for public tenders in general. While some passages elaborate on these issues in the specific context of integrating reclaimed building materials, it is up to the reader to assess and adapt the recommendations to their own project and the regulatory framework in which they work.

As a final introductory comment, it is important to emphasise the fact that each step of the project inherits decisions and actions taken during earlier phases. In this sense, the very first step - defining a reuse ambition - is probably the most crucial one. We therefore recommend that you thoroughly read the corresponding chapter.

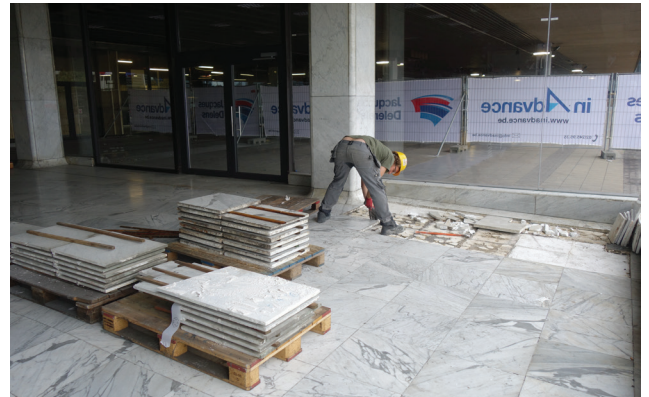
Section 1 — General Introduction

1. What is reuse?

In this document, reuse refers to the practice of using again, in a new context, a construction element or product that has been carefully extracted from a building undergoing demolition. During this operation, the reclaimed elements are kept as intact as possible. In this sense, reuse differs from recycling, which involves using mechanical or chemical processes to transform an element back into a raw material.

After dismantling (or 'deconstruction'), reclaimed elements may undergo additional steps before being re-installed, such as cleaning, conditioning, cutting to size, document-

ing and storing. These processes can involve different actors such as salvage dealers, construction or demolition contractors, or architects.



Reclamation of marble floor slabs, from dismantling to resale point (marble from Brussels North Station, by Rotor DC).

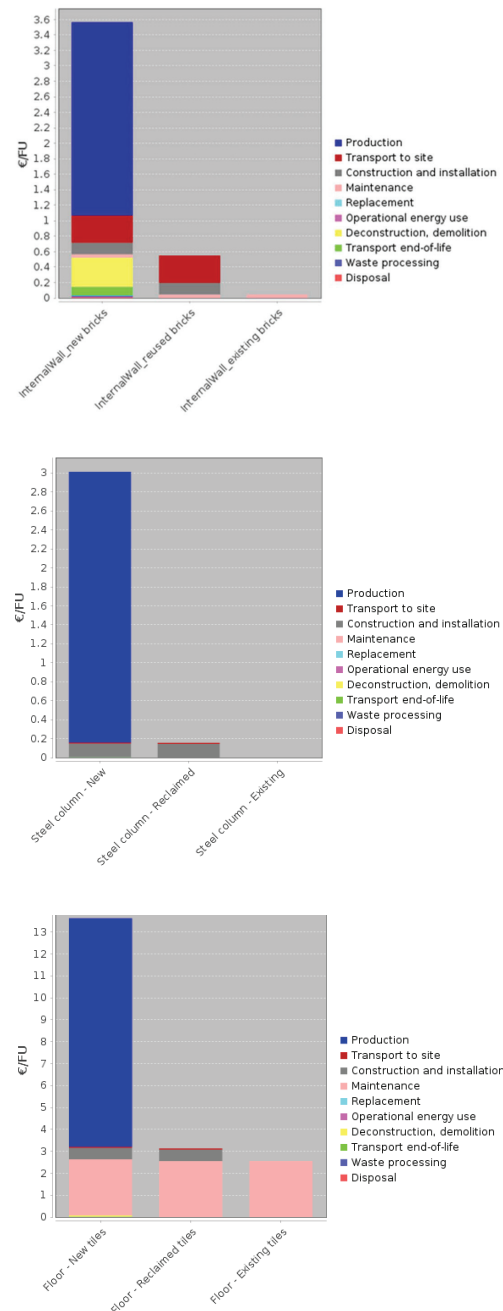
2. What are the benefits of reuse?

2.1 Lowering the environmental impact of the construction industry

Reusing building products avoids the impacts related to the manufacture of new products. Life Cycle Analyses comparing three alternative solutions to the same requirement at the same place in the same building - the use of a new product, the use of a reclaimed element, and the conservation of an existing product, respectively - have shown that **reclaimed products have an impact 1:5 to 1:20 times lower than the equivalent new products¹**.

By keeping a construction product in circulation, reuse also prevents the production of construction and demolition (C&D) waste.

An issue that is often raised when scrutinising the environmental impact of building elements are the impacts related to transport. One of the questions posed is whether the environmental benefits are reduced or even negated if a reclaimed building material must travel considerable distance in order to be re-used? This is a valid concern, which should be assessed on a case-to-case basis. Aside from the distance travelled, the transport impact also depends on the quantity and the weight of the reclaimed materials, and the means of transportation.



Each graph compares the global environmental impact of three alternative solutions: new, reused and retained building elements. They are based on the tool Totem².

¹ Cf. Waste & Resources Action Programme (WRAP), *Reclaimed Building Products Guide - A Guide to Procuring Reclaimed Building Products and Materials for Use in Construction Projects*, 2008 (p. 5-8) and Michaël Ghyoot et al., *Déconstruction et Réemploi. Comment Faire Circuler Les Éléments de Construction*. Presses Polytechnique et Universitaires Romandes (PPUR), 2018.

² Totem (Tool to Optimise the Total Environmental impact of Materials) is an online tool developed by the three regions in Belgium to assess the environmental impact of buildings and construction solutions. It takes an approach that incorporates the energy performance of buildings and life-cycle analysis.

In order to fairly assess this impact, the same comparison should be made regarding the distance covered by equivalent new products. Such a comparison shows wider margins for reclaimed elements regarding the point when the impacts of transport begin to outweigh the environmental benefits. A study conducted by BRE in 2000 estimates the additional distance that a reclaimed product can travel in comparison with a new equivalent before it loses its environmental benefit³:

2.2 Stimulating interesting local economies.

Reuse is not necessarily a synonym for cheaper products; neither is it restricted to upmarket elements. In fact, there is a large spectrum of commonly found reclaimed products between these two extremes. When one buys through a salvage dealer, or reclaims materials directly from a building for reintegration in a new project, the final cost of the activity is often comparable to the price of equivalent new products.

But even equivalent prices can foster very different economies. A reclaimed construction element is kept in circulation thanks to a succession of processes which will foster local employment and small to medium businesses. These processes thus engender **a strong potential for the creation of new jobs with a low environmental impact and a local anchorage**⁴.

Specifying reclaimed elements is an effective tool that can be employed by architects and property owners to trigger and stimulate the development of this kind of industry.

2.3 Preserving the cultural value of existing building components

A building does not need to be listed to bear witness to our (sometimes recent) past or to be considered heritage. When there is genuinely no other option than to tear a building down, keeping its components in circulation is a way to preserve the memory of the original building.

Reuse also acknowledges the material and immaterial heritage present in the built environment. Working with reclaimed construction elements often adds architectural value to a project. It is also an interesting way to have access to original and meaningful building materials and products.

3 Jane Anderson and Nigel Howard, *The Green Guide to Housing Specification. An Environmental Profiling System for Building Materials and Components Used in Housing*. Garton, Watford: BRE Press, 2000.

4 Samuel Sauvage et alii. *Emplois circulaires au carré. L'économie circulaire, ses emplois et ses opportunités pour l'ESS dans l'Île-de-France de 2030*. Research report for Auxilia and J.P. Morgan. June 2019.



Most salvage dealers and allied businesses (such as restorers) are SMEs sustaining local jobs, high skills and low environmental impact.

3. The main sources of reclaimed building materials and products

Reclaimed construction elements can come from different sources. The source of the products will influence the project development in terms of procurement strategy (how and by whom are the elements acquired?), logistics (how, where and when are they handled?) and actors involved (by whom are they taken in charge?).

The three main sources detailed in this document are:

1. The reclamation market: construction products supplied by professional companies specialised in this trade.
2. The same site as the new project: construction products are dismantled from the building that undergoes transformation, and reused in the new project. This is a case of same-site reuse (or 'in-situ' reuse).
3. Another demolition site: construction products are dismantled from a building undergoing demolition and transferred to a new project where they are re-installed. This option usually aims to minimise any necessary storage and transport.

It is of course possible to combine these different approaches within the same project. These three options are developed in more detail below, with a focus on their respective pros and cons.

3.1 Purchasing building products from the reclamation market

General principle

The specifiers opt for reclaimed elements purchased by the contractor from a salvage dealer. Online directories such as Opalis.eu and Salvoweb.com aim to simplify the search for these materials and products, by helping contractors make contact with established and reliable suppliers.

Expected benefits and challenges

This approach has been used in the construction sector for decades, even before the environment became a major concern. The suppliers play an important role in the chain of operations that enables reuse.

- They act as market-places: stockholding elements broadens the window of opportunity during which demand and supply are likely to meet
- They process building materials and products and adapt them to the requirements of their future clients (cleaning, preparing, handling, documenting, etc.)
- They usually have an in-depth knowledge of the materials they sell and can provide useful recommendations on how to choose and install them

Relying on the expertise of these dealers is a good way to ensure that the purchased con-



Cowancourt student residence. An elegant façade cladding made from reclaimed wood purchased at a major salvage dealer.

Cowancourt is a student residence on the Cambridge University campus built in 2016 by 6a Architects. The architects, wishing to hint at the brutalist features of nearby buildings, opted for reclaimed wood. The exterior cladding is made from 1,500 m² of oak planks, originally train carriage floors. The wood was delivered by BCA Matériaux Anciens, a French dealer of salvaged materials. The roughness of the boards, naturally aged by time and use, is tempered by a precise layout and the overall elegance of the architecture.

struction products will meet the expectations of the specifiers.

It is also fully compliant with public procurement regulation insofar as the existence of a well-established market allows for competition.

The contemporary market for reclaimed products, however, does not (yet) cover the wide range of products found in buildings. More recent building materials are typically less common and harder to find. As such, an important consideration to bear in mind with this approach is that specifiers are limited to the existing supply.

A stable supply relies on a stable demand. Salvage dealers constitute their stocks based on what is easy to sell. At present, they are forced to refuse many offers from demolishers because they know they will not be able to find a buyer. Hence buying from salvage dealers can be an effective way of expanding the available offer, since increasing and maintaining demand will have a knock-on effect on supply, making some type of products more stable and introducing new ones to the salvage market.

Specifying reclaimed building elements has an impact which goes further than the project itself, since it will make reclamation dealers aware of the interest shown by buyers in a type of material or product. In this way, it can become an effective leverage to stimulate the development and stabilisation of the supply of these products. Owners of large property portfolios, for instance, may focus on a few materials widely present in recently constructed buildings slated for demolition: by working with reclamation dealers, they will induce a virtuous loop of reinforcement for a better management of these materials.

3.2 Same-site reuse

General principle

Same-site reuse consists of dismantling building components from an existing project and reintegrating them in a new project on the same site (although perhaps in a different position than the original one) following any necessary preparatory steps. In France and Belgium, it is sometimes referred to as 'in-situ reuse'.

Expected benefits and challenges

Same-site reuse comes with a wide range of benefits:

- There is no need to purchase the elements since they are already in the owner's possession (however, the subsequent operations of dismantling, cleaning, processing, and installing need to be part of a suitable contract).
- It saves transport costs (both financial and environmental).
- It preserves the heritage value of the building components, which retain their connection to the original site.
- It can lead to cost savings since these elements don't need to be purchased. However, this needs to be offset against the costs of any potential extra steps necessary to enable reuse. The entire operation needs to be carefully assessed from an economical, technical and logistical point of view.

Same-site reuse also comes with a few challenges, which need to be anticipated in the planning phase:



Standaertsite project in Ghent: same site reuse of glulam beams to build a covered courtyard

Ledeberg is a dense residential area in Ghent (Belgium). The project for Standaertsite aims to transform a former DIY materials shop into an outdoor meeting place for the neighbourhood.

Early in the design process, the architects spotted a set of glued laminated timber (glulam) beams in a warehouse slated for demolition. They decided to reuse these beams to build a canopy in the middle of the site. They wrote bespoke specifications for the careful dismantling of the beams, their storage and their eventual reuse in the construction of the canopy.

Images: courtesy of Rotor and ae-architecten

- The architect may have to start the design process with some uncertainties (especially if this phase precedes dismantling). Unpleasant surprises may occur during reclamation, reducing the opportunities for reuse (such as higher loss rates than expected, accidental damage during the works or inappropriate storage conditions).
- Logistics have to be well planned. Sorting, cleaning, conditioning and storing of elements all require space in order to be carried out under the best possible conditions. This may prove difficult in dense urban sites. In this case, alternative solutions such as off-site temporary storage should be considered.
- The contracting authority or the design team should ensure smooth communication with the contractors during all phases of the works (especially if the demolition phase precedes the design by a long time).
- General contractors are not always familiar with the specific tasks entailed by reclamation (cleaning bricks, sorting wooden floors, etc.). This lack of familiarity may lead them to overprice their bids.

Some of these aspects can be easily mitigated by involving specialists in the process, for instance by means of sub-contracting. Also, most of the challenges currently faced are likely to progressively reverse if reclamation know-how becomes more widespread.

3.3 Site-to-site reuse

General principle

Demolition works on one site can foster the development of a project on another site. Such opportunities, occurring at different stages, may be initiated by multiple actors:

- When they manage large property portfolios, building owners can foster the exchange of materials and products between the sites in their possession. This approach can be extended beyond the owner's estates to include other owners and promoters active in the same area.
- The architect (or an associated expert) can scout for opportunities in local ongoing or soon-to-begin demolition works.
- The contractor also has access to many opportunities via their other construction or demolition sites, their own networks, or their warehouse of reclaimed products.

Expected benefits and challenges

This approach entails the same kind of benefits and challenges as same-site reuse. It relies on a coincidental match between supply (a batch of material becoming free on a certain site) and demand (a different project in which this material can be reused). The window of opportunity is often small, from a few days to a few weeks, requiring quick reaction times.

The specifiers involved in the project development need to carefully plan the logistics of this operation. Even though the materials travel directly from one site to another and bypass a long-term storage phase, solutions



Segro Project: moving a 3.320 m² steel structure from one site to another

In 2013, the company Segro was developing a new industrial building in Slough (UK). At the same moment, they were demolishing a 13-year old building located a few kilometres away. The contractor was briefed to reuse as many elements as possible from the original building in the new one. The primary steel structure, precast floor slabs, raised floors, staircases, curtain walls and glazing were all successfully reused¹.

In this case, the architects and structural engineers of the original building were also involved in the new project, which facilitated access to as-built plans and original drawings.

In total, 70 % (in mass) of the original building could be reused, leading to a 40 % cut in the CO₂e emissions and reducing the build cost by 25%.

Image courtesy of Simon Sturgis, Targeting Zero.

¹ Report from the EU-Progress (Provisions for Greater Steel Reuse) 2017-2020 research project., 'Factsheet No.2: SEGRO Warehouse, Slough, UK' <<https://www.vtt.fi/sites/progress/Documents/FS02%20Segro%20warehouse%20Slough.pdf>>..

for transport and short-term storage may still be needed - in effect, it often necessitates the setting up of a type of salvage yard, close to or on the new construction site.

It is best to involve the contractors and, if possible, reclamation specialists in such an operation. Not only can they check whether the products are suitable for the planned use, but they can also make sure these are delivered at the right place and moment, and in the right conditions.

Section 2 — How to

1. Defining a reuse target

Over the next few years, in response to the challenges of climate change and environmental preservation, new frameworks (both green building certification schemes and regulations) will increase the demand for products with a very low environmental impact, notably in terms of CO₂e production.

Maximising the integration of reclaimed elements in building projects should therefore be an important objective for the construction industry as a whole.

Expressing this objective as early and as clearly as possible is the best way to ensure that all involved partners can consider reuse in their contribution to the project development. It is important to bear in mind that there are many different ways to integrate reclaimed elements in a project; since each project is specific, there is no one-size-fits-all solution.

1.1 Who initiates the reuse target, and when?

In an ongoing project, reuse targets can be initiated by different actors. In this manual, we focus mainly on the following contributors:

- The building owner, also referred to as the client or the contracting authority.
- The architect (or designer). Architects usually work with specialised consultants who assist on specific areas of the project (HVAC, energy performances, etc.). This group will be referred to as 'the design team'.
- The contractor.

The term *specifiers* will be used to designate architects working according to their client's interests. The specifiers prescribe what elements will be used to actually build the project.

Since they are the ones who initiate it, the building owners usually determine the general direction that a project will take. They define what the other actors are expected to achieve, and how they will operate. Because integrating reclaimed building products in a project is likely to influence the entire process, it is better to take it into account as early as possible. Ideally, it should be during the very first steps that the client sets an ambitious reuse target, which will trickle down to the other actors involved.

Even if a client does not set reuse targets at the beginning of a project, it is not too late to introduce them at a later stage.

The design team can still propose the use of reclaimed elements during the successive design phases⁵, since that is usually when the project is elaborated and its constitutive materials chosen. During the technical design phase, for instance, it becomes clearer which reclaimed products could be integrated into the global design. The design team can thus develop the project in such a way as to facilitate the use of reclaimed products.

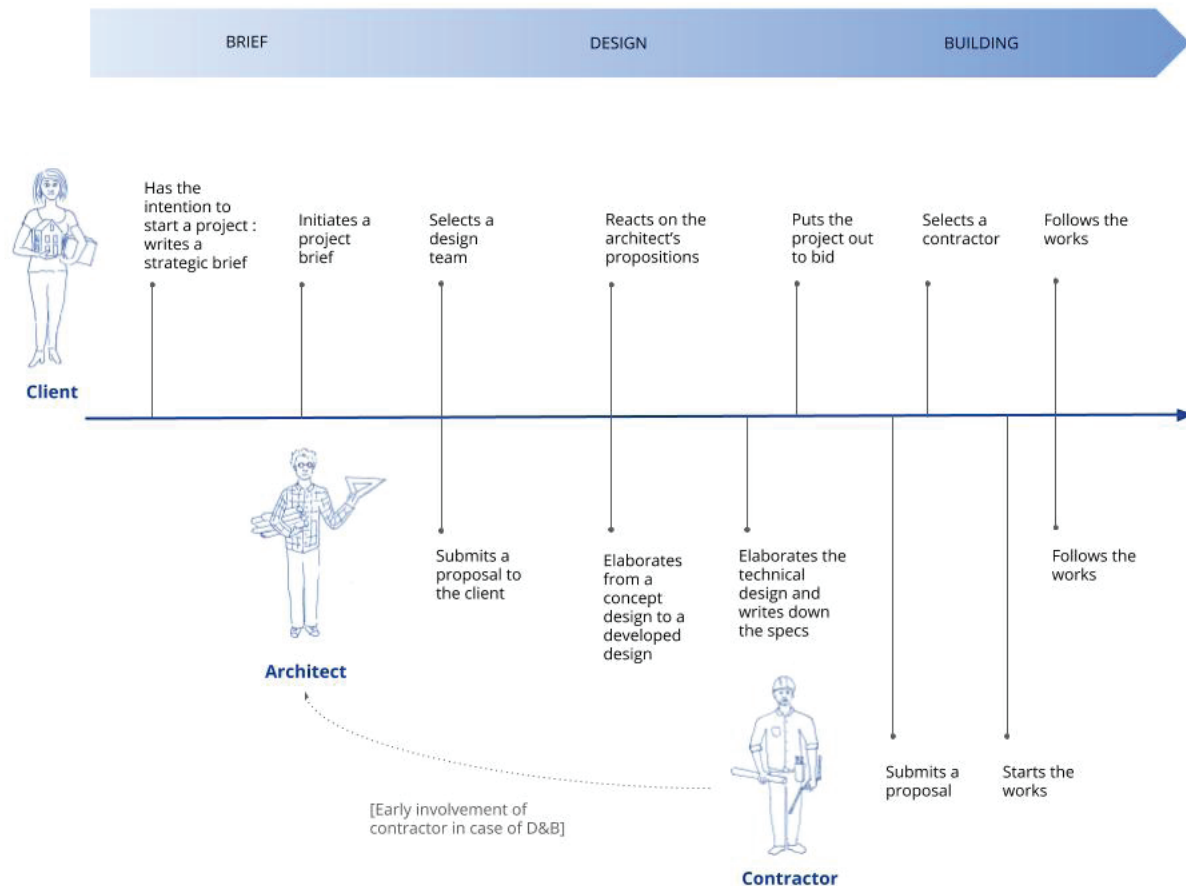
The construction phase offers yet more opportunities for reuse. It is not until this moment that most of the building elements are finally chosen and purchased. Contractors can buy reclaimed products from specialised

⁵ Based on *RIBA Plan of Work 2013*, Royal Institute of British Architects, 2013: the 'design phases' are respectively 'concept design', 'developed design' and 'technical design'.

dealers or co-ordinate the dismantling of reusable products during the demolition of a building. If their contract allows for and fosters substitutions, contractors can even come with new suggestions for using reclaimed elements sources from their own stocks, or reclaimed products to which they have access through their other ongoing works.

1.2 How to support a reuse ambition

Reuse features prominently in many official documents, from regulations to governmental declarations and strategic plans. **Contracting authorities have plenty of documents to which they can refer in order to support their reuse ambition.** These usually refer to the general framework of environmental protection, which is increasingly viewed through the notion of circular economy. This general concern is reflected in specific frameworks for public authorities, which aim to act as role



This timeline represents the usual succession of steps in the development of a project. Note that there can be variants to this scheme. Notably, in design and build formats, contractors are involved earlier to take part in the design phase. In the UK, it is also common to call for a contractor's consultancy earlier in the project development.

models through exemplary public procurements.

Annex 1 for a more detailed description of these references.

The following summary lists the main resources available per country or region. See

At European level

- Waste Directive 2008/98/EC (2008, amended in 2018)
- Annex 1 of Construction Products Regulation (2011)
- Directive on Public Procurement of 26 February 2014.
- Closing the loop - An EU action plan for the Circular Economy (2015)
- European Council conclusions on circular economy in the construction sector (8 November 2019)

In Belgium

Federal level

- Circular for the integration of sustainable development into federal public procurements (2014).

Flanders

- Green deal *circulair bouwen* (2019)

Wallonia

- *Plan wallon gestion déchets ressources* (2018)
- Parliamentary resolution to support the development of a circular economy in Wallonia (3 May 2019)
- Green Deal *Achats Circulaires* (2019)

Brussels-Capital Region

- *Programme Régional en Économie Circulaire* (2016)
- *Feuille de route des acteurs de la construction à Bruxelles* (2019)

In France

- *Loi relative à la Transition Énergétique et la Croissance Verte* (2015)
- *Feuille de route économie circulaire* (2018)
- *Plans régionaux de Prévention et de Gestion des Déchets* (PPGD)
- *Loi anti-gaspillage pour une Économie Circulaire* (2020)

In the UK

- Report of the Government Chief Scientific Adviser (2016)
- Government Construction Strategy 2016-2020 (2016)
- A Green Future: Our 25 Year Plan to Improve the Environment (2018)
- Climate Emergency Motion (1 May 2019)



Green public procurements in the Netherlands: the example of the MVI-criteriatool

In the Netherlands, public authorities aim to be exemplary in their public procurements. To this end, the government has developed generic criteria that can be included in any public procurement. These criteria concern various aspects of sustainability. Public authorities select the most relevant criteria for each tender. Reuse figures prominently in this collection of generic clauses:

"The greater the proportion of reused products or products consisting of reused components among the products supplied, the higher the tender will be rated.

Reused components are defined as follows: components that have already been used in the same form. Recycled raw materials are not covered by this definition because they are obtained through a conversion process; the original form of a product is not preserved during recycling.

On submitting a tender, the tenderer must indicate:

- *which components are reused components - what proportion of the total product is of reused origin*
- *the origin of the product or component of the product in question and the function it previously fulfilled (and, if applicable, its performance)*
- *the warranty period of reused components*
- *the assumptions on which the tenderer is basing the bid and/or the risks the tenderer has identified in respect of the reused products to be supplied.*



Government of the Netherlands

Reused products and products containing reused components must, of course, also meet the technical, functional and Sustainable Public Procurement requirements in the Schedule of Requirements. This requirement may, where appropriate, be departed from in consultation with the contracting authority.

Explanatory note

Circular procurement involves a tailored approach. Make sure you carefully consider the options available during the exploratory stage of the tendering process.

Reusing existing product components will immediately reduce the raw materials and processes required to create the product in question. Reuse is the preferred option in the hierarchy of material consumption. This award criterion will therefore usually supersede the "Use of bio-based and recycled material" award criterion and should receive a higher rating.

Verification

The purchaser will determine the verification method. For instance, the tenderer may be asked to supply documentation that:

- *demonstrates that the product or component of the product performed a previous cycle of use*
- *indicates the function that the product or component of the product previously fulfilled."*

Source: <https://www.mvicriteria.nl/>

1.3 How to set a reuse target

It is best to start by analysing the contextual elements that can foster the integration of reclaimed building products. Is there an experienced design team? Are there possibilities to access nearby buildings presenting high reuse potential? Is there specific funding available for additional R&D or an opportunity to turn the project into a pilot project? All these aspects will influence how far the integration of reclaimed elements can go. It is equally important to assess contingencies likely to hinder this objective, such as short deadlines, administrative complexities or complicated programmes.

In general, contracting authorities can set a target:

- In an open way. They will challenge the tenderers to formulate different answers, leading to stimulating and possibly surprising results. This ap-

proach is relevant for projects seeking to foster creativity, innovation and exemplarity. The design team is given a lot of flexibility, meaning this path requires clear communication between the various stakeholders.

- In a more precise and limited way, focusing on a very clear quantity target, on specific materials, or on specific parts of the project.

1.4 How to measure a reuse target

One can then opt for either an open objective: for instance, integrating as much reclaimed building materials and products as possible; or a precise target: for example, a 5% reuse target in mass and value. In both cases it is important to specify how the target will be measured. Different metrics are possible, each of them having pros and cons.

Example of an **openly set target**
(project Zinneke/Masui4ever, Brussels)

"[...] The refurbishment project is envisioned as a large-scale pilot project for the reuse of construction materials and equipment [...]"

Extract from the subject matter of a contract related to this project.

Example of a **precisely set target**
(project Multi, Brussels)

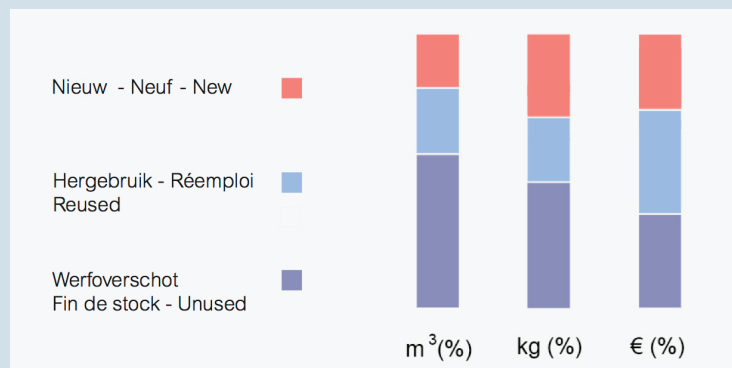
The building owner, helped by a reuse assistant, fixed an objective to integrate 2% (in value) of reclaimed elements in this refurbishment project. These can be sourced either from the building itself or from external sources such as salvage dealers. The reuse assistant scouts for opportunities. These are discussed with the architects. When confirmed, these are acquired by the client to be implemented by the contractor.



Only a third of this building is made from new materials (in mass)

This small building houses the toilets for a youth movement organisation. The building was constructed using materials sourced in three different ways: reclaimed building elements (e.g. bricks, interior tiles, insulation panels, sanitary fittings, lighting fixtures, doors, windows), unused materials from other construction sites (e.g. concrete blocks, insulation panels, roof structure, roof tiles) and new materials (e.g. concrete foundations). In this case, the general objective was formulated in an open way: the project team aimed to use as much reclaimed material as possible. Ultimately, the proportion of materials used from each of the three sources was as follows:

The difference between mass and volume is due to building materials such as insulation panels, which are not very heavy but nonetheless quite bulky. In this project, reclaimed elements represent about 20 % of all inflowing building materials and products in terms of mass and volume, and account for about 45 % of the budget¹.



¹ Combined 'non-new' building materials and products would represent in mass, volume and budget respectively 80 %, 70 % and 77 % of all inflowing materials. Because unused and overstock materials involve quite a different economy of reclaimed elements, these are counted separately.

Tons or cubic metres

The ton is a widely used unit in the context of waste management and landfill mitigation approaches. It is sometimes complemented with or replaced by volume. These are convenient ways to express the quantity of spared resources.

However, using tons can introduce a bias towards heavy-weight materials. During the phase of integrating construction elements in a project, expressing a reuse target in tons will probably lead to strategies involving mostly heavier materials (stone, paving setts, etc.), to the detriment of more light-weight yet significant elements that may contribute to lower the carbon impact.

Tons or cubic metres also say little about the economic value of the elements that are kept in circulation.

Euro (or GBP)

When it comes to determining a target for the integration of reclaimed elements, economic value can be a convenient metric. **A contracting authority might for instance commit to using a percentage of its budget for integrating reclaimed elements in a project. It has the advantage of providing a very precise target whilst leaving open a wide range of solutions through which that target can be achieved, helping ensure reuse operations remain economically viable.**

However, money can also be an elusive metric, since it may suggest equivalencies where in effect there are none: behind two products of the same price, there can be very different economies and processes. The target price should always be backed up with environmental and technical quality requirements. Comparing different solutions solely on the

basis of their respective cost can be very misleading and should be avoided⁶.

Environmental impact

There are different ways to express the environmental impact of a construction product, new or reclaimed.

The first approach mostly focuses on embodied energy and carbon emissions. It considers that reusing a building product avoids the need to fabricate a new equivalent product. It thus offsets the impacts of the production, notably in terms of carbon or carbon equivalent (which contribute to global warming). So, if producing a typical clay brick embodies 0.214 kgCO₂e/kg, reusing this brick beyond its first use will save the equivalent amount of carbon⁷. This approach has the advantage of being relatively easy to implement. You only need to multiply the mass of the reused building element by the embodied carbon (measured in kilograms of CO₂ equivalent per kilogram of material) to assess carbon savings.

The second approach is more holistic and considers other environmental impacts than just the carbon equivalent, although the rationale behind it is the same. It consists in undertaking life cycle analysis (LCA) of products throughout their entire life cycle, from production to end-of-life (or alternatively from production to installation phase). In this approach, the different impacts on the environment are measured at each stage⁸. These

⁶ In some tender procedures, it is even explicitly forbidden. Cf. Annex 2.

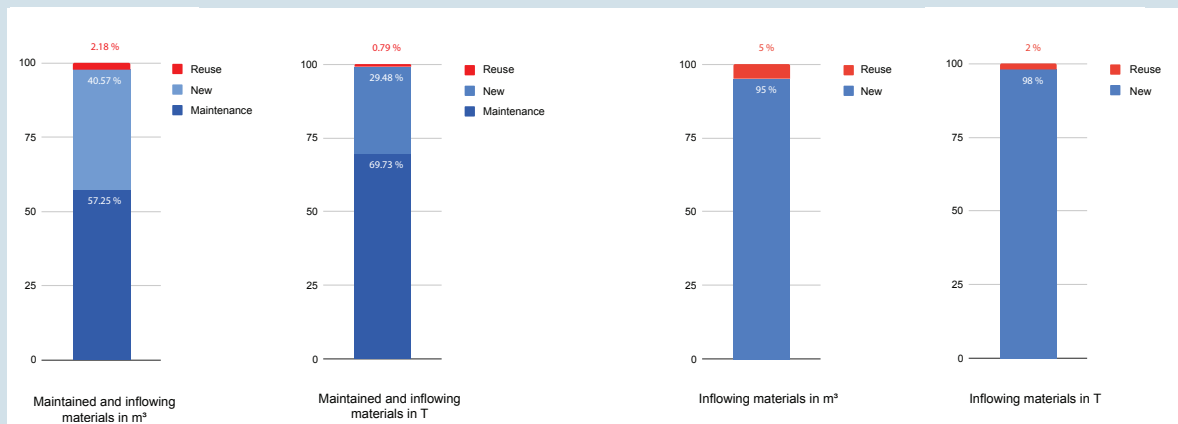
⁷ The data is based on ICE database v3.0. Craig John, Bath University. It does not consider the amount of CO₂e emitted into the atmosphere during the reclamation process nor the variation of embodied carbon in bricks through time.

⁸ In addition to global warming, additional impacts are thus considered, such as emissions of fine particles and other



2 % of inflowing materials are from reclamation (in mass)

This refurbishment of 80 housing units in Brussels aimed to preserve as much of the existing building as possible. The first two graphs show, in volume and in mass respectively, the proportion of retained materials (dark blue), new materials (light blue) and reused materials (red). The main reused material is a 1,500 m² batch of wooden parquet. In this project, reclaimed elements represent 2% (in mass) or 5% (in volume) of all inflowing building materials and products, as shown by the second graph.



Pictures and graphs: courtesy of Cenergie

impacts are then aggregated to give an idea of the overall general impact, expressed in 'eco-points' or other bespoke units.

Libraries and applications collect these sets of data and allow, to a certain extent, the comparison of alternative solutions to the same requirement⁹.

New regulatory frameworks and voluntary green building labelling schemes increasingly require that these additional environmental impacts are taken into account in the choice of building materials.

Combining indicators

The best way to mitigate the biases of using only one metric is to combine different indicators. For example, it is possible to express the reclaimed content of a project in mass, in economical value, in volume and in carbon savings.

Retaining vs. circulating building elements

Any measured approach must always be carefully thought through, as figures can be manipulated. In this document, we advocate for a clear distinction between the elements that are retained in an existing building and those that are recirculated (i.e. dismantled, processed and re-installed).

polluting substances, formation of tropospheric ozone, ozone depletion, depletion of resources, human toxicity, terrestrial and water toxicity, water eutrophication, etc.

⁹ Since conducting LCA necessitates the establishment of a series of hypotheses and the definition of very precise boundaries, it is important to use data from the same source. It is also crucial to compare things that are comparable, i.e. alternative solutions meeting the same set of requirements. The definition of the 'functional unit' is the very first step of any LCA.

'Conservation' (sometimes referred to as 'adaptive reuse') entails that some parts of an existing building are retained during transformation works. Most often these are structural elements (load-bearing walls for example), but occasionally these can be non-structural (for example, an antique fireplace). From the perspective of resource preservation, retaining existing structures in place is the best way to avoid wasting materials and to take advantage of the spaces and materials already existing on the site. It also significantly lowers the impact of raw material consumption.

Conservation differs from reusing building elements because reused elements are dismantled from their initial position, processed and then re-installed in a new position (either on the same site or elsewhere). This approach requires more labour and, from the perspective of stimulating the local economy, offers more opportunities for job creation.

In the overall view of circular economy, these two approaches of conservation and reuse are thus complementary. Both should be considered for translation into ambitious objectives, but since they entail different approaches and practices, it is better to employ them separately when deciding the targets of a project and when reporting on the results. Always make sure to clearly distinguish between:

- The parts that are retained in an existing building.
- The proportion of reused building elements in the inflows (i.e. materials and products that are brought in for new development).
- The proportion of reclaimed building elements in the outflows (i.e. materials

and waste that are evacuated from the site).

The use of materials with a recycled content and the redirection of waste flows towards the recycling industry should not be counted in the same category as reclaimed materials and products.

Only such careful accounting will produce an accurate perspective on reuse efforts that will enable honest comparisons with other projects.

1.5 Which building materials and products are suitable for reuse?

In principle, most building materials and products are able to be reused. In practice, the reuse of certain materials is much easier and more common than others.

The most commonly reclaimed products vary according to regional specificities and building traditions. Belgium, for instance, has a well-developed tradition of building with bricks. Reclaimed bricks are quite common and, for most of their traditional uses, raise relatively few issues. Most construction professionals are able to easily manage these elements. There is also a well-developed network of professional reclaimed bricks dealers. Reusing steel structures, by comparison, is less common in Belgium. It is, however, more frequent in the Netherlands and in the UK, where some suppliers of reclaimed steel have even developed specific protocols to assess the structural performance of reclaimed elements¹⁰.

The difference between 'common' and 'exotic' depends a great deal on the know-how

¹⁰ See for instance, SCI, *Structural Steel Reuse. Assessment, Testing and Design Principles*. Ascot: SCI, 2019.

and previous experiences of the construction professionals involved. This know-how is unevenly distributed throughout the construction industry. Some professionals may have already had first-hand experience with this one or other reclaimed material and as a result will know how to proceed in order to reuse it properly. For others, the same material intended for the same use will seem more unusual and therefore raise more concerns.

It is possible that the renewed interest in reuse will most likely enhance the diffusion of skills, know-how and good practices throughout the construction industry.

To give a general overview, in Northwestern Europe, building materials and products such as solid bricks, tiles, slates, paving setts, kerbs, flagstones, timber framing, stone elements, steel structures, timber cladding and paneling, high performance window frames, doors, parquet floors, sanitary equipment, insulation panels, radiators and lightning systems are quite commonly reused. These can all be found on a regular basis at professional salvage dealers.

That being said, there are also many construction products which are less commonly reused despite their strong potential. This is the case, for instance, with prefabricated concrete facade elements, precast floor slabs, modular partitions from office buildings, suspended ceilings and technical equipment. These should certainly not be overlooked, but their reuse will probably raise newfound questions that require bespoke approaches and novel learning curves.

1.6 Cost impact

Will the reuse of construction elements lead to additional costs? Or is it an opportunity

to reduce expenses? There is no definitive answer to these questions.

Batches of reclaimed products are sometimes sold at a very low price on the reclamation market (especially on the less formal end of this market, such as P2P platforms). In this sense, they may appear to offer good value for money, but one must also consider the possible extra costs associated with cleaning, preparation or storage. For DIYers who do not count their hours, these batches might still seem to represent a very good deal. In the context of a more formal project, however, involving construction professionals and stricter requirements in terms of protocols, deadlines or management, these additional steps and their associated extra costs may make such offers a less interesting proposition.

Some dealers supply installation-ready reclaimed construction products. In these cases, the sale price will include the cost of any preparatory processes, meaning the contractor will not have to perform any extra handling before being able to use the material. For the most commonly reclaimed products, prices are often equivalent or cheaper than those of new products with equivalent performances.

In the case of same-site reuse or site-to-site reuse, the economy of the operation must be assessed on a case-by-case basis. While these types of reuse may reduce expenses (as in the case of the previously mentioned Segro project), they may also present unpleasant surprises that adversely impact the budget (for example, should the elements ultimately prove impossible to reuse or necessitate unplanned actions).

Involving experienced partners (reclamation trade specialists, architects, contractors) is the best way to assess and mitigate these risks

and ensure the viability of the activity. For very ambitious undertakings, it may be worth conducting preliminary studies in order to assess the possibilities at stake.

1.7 Managing uncertainty

Reuse can entail an element of uncertainty, which requires flexibility on the part of the actors involved. This uncertainty can nevertheless be managed and controlled. It is mostly a question of having a clear view on the parameters for which a degree of flexibility is possible, and those for which definitive answers need to be provided.

It is important for the contracting authority to assess their own flexibility during the project development: is it possible to remain open to last-minute opportunities, even during the construction works? Is it possible to wait until the later stages before having a final overview of the project?

It is not necessarily a choice between 100% flexibility or none, but rather a question of establishing how much uncertainty can be handled in a project.

1.8 Complementary circular targets

Integrating reclaimed building materials in a project can represent only one facet of a more general circular ambition. On top of your integration target, you may want to add other objectives related to reuse or other circular aspects such as design for change, including:

- Establishing a general reuse strategy for the entire development (from very early on to the completion of the works)

- Coupling reuse strategy with a waste-management plan, possibly by defining a broader 'circularity plan'
- Conducting a reclamation audit of an existing building slated for demolition
- Surveying and sourcing interesting batches of reclaimed building products, either on the reclamation market or from other sources (such as upcoming demolitions in the area)
- Purchasing and collecting building elements from diverse sources prior to or in parallel to the works
- Undertaking complementary research to assess the reuse potential of specific building products and realising performance tests
- Integrating the inventory of available reclaimed materials in a BIM model

In this case, as a contracting authority you will have to assess who will carry out these missions, as well as when and how they will be carried out. Some may be undertaken internally (for instance, conducting a preliminary reclamation audit of an existing building) but many will probably need to be contracted to external experts. In that event, you will have to assess whether these experts can be recruited from the classical actors within a project development scenario (i.e. architects, engineers, contractors), or if you will need to employ specific expertise (and if so, at what stage).

1.9 Call for expertise

Some professional organisations (reclamation experts, architects, consultants) have devel-

oped solid expertise in reuse, either in project development or at the scale of construction products. Relying on their know-how is a good strategy to avoid unnecessary expenses or delays, and to make sure that reuse will not adversely affect the general development of the project.

There is a balance to be found between the added value of reuse expertise, the scope of the ambition, and the scale of the project. Depending on these factors, assistance can take different forms:

- The building owner asks for direct assistance. The reuse expert intervenes from the outset of the project planning, including during the selection of the design team, and maintains an overview by closely monitoring the project development. This is essential in large-scale and urban projects. In addition to the tasks mentioned above, the reuse expert can assist the design team with integrating reclaimed products and help specifiers to draft bespoke specifications adapted to reclaimed elements.
- The building owner requires a design team with reuse expertise and other technical knowledge (for example, focused on a type of material or product targeted in the reuse ambition). Designers can team up with reuse experts to achieve the objectives¹¹.
- The building owner requests a contractor with reuse expertise. Here again, the contractor can be asked to team up with reuse experts to carry out specific tasks.

¹¹ Cécile Van Oppen, Godard Croon, and Dirk Bijl De Vroe, *Circular Procurement in 8 Steps*, 2018



1.10 The case of public tenders

The context of public tenders can raise several additional questions and difficulties when it comes to working with reclaimed construction products.

Public tenders refer to situations in which public authorities (or related entities) contract with private operators. Because these transactions involve the allocation of public money, they must be compliant with the core principles of public procurement: transparency, equal treatment, open competition and sound procedural management¹².

The contrast between the complexity of the administrative procedures and the relatively modest scale of reclamation businesses can sometimes discourage small to medium reclamation companies from applying for large-scale public tenders.

Another difficulty relates to the principle of competition, central to all public procedures. Unique opportunities are often missed simply because a comparison with other products is complicated or impossible. This complicates the use of sources of materials such as advertisements, online platforms or auctions. Salvage markets and same-site reuse strategies, however, are still perfectly compatible.

¹² Principles enacted by the Directive 2014/24/EU on public procurement (02/26/2014).



2. Reuse and procurement routes

'Procurement' refers to the process of purchasing goods, services or works¹³.

Many different strategies are possible when it comes to procuring a building in the context of public tenders. The choice of a specific path will depend on the subject-matter of the contract, the expected costs (with regard to regulatory European thresholds), the habits of each local contracting authority and, of course, the general regulations in effect (especially in the context of public tenders).

As established by the previously-analysed reuse projects, **all of the usual procurement routes are compatible with the objective of integrating reclaimed elements**. There is certainly no contraindication to any of the most common procurement strategies (traditional contract, design and build, framework agreement).

Even so, when selecting a procurement route, there are several points of attention that should be considered with regard to the reuse target¹⁴.

2.1 Contractual structure

Some procurement strategies are sequential: contracting authorities organise a succession of different contracts which ultimately lead to the completion of the building. For instance, the contracting authority first awards a service contract to select an expert to carry out

an initial pre-study, then another service contract to select the architect, and finally work contracts to select the contractors.

In such cases, it is important to make sure that the initial reuse target can trickle down through all the subsequent steps. Each contract will need to refer to the target (see '1. Defining a reuse target'). Successively involved actors need to be made aware of this ambition in order to adapt their offers accordingly.

Other formats are more integrated: different stakeholders are contracted at one go. They are asked to collaborate more intensively during the whole process. This is for instance the case of design and build contracts (D&B), in which the architect and the contractor team up to develop the design of a building and its subsequent construction together.

Integrated formats aim at fostering dialogue between stakeholders and taking advantage of the different expertises around the table. In principle, they are conducive to reuse since they offer the ability to tackle different aspects in a holistic way. In practice, the interdisciplinary dimension of these formats requires a willingness to function as a team. Being flexible, open to dialogue and willing to accept changes is also recommended, with a view to ensuring that the development as a whole remains unhindered¹⁵. The reuse target must also be clearly set and monitored throughout the process, lest it gets overlooked by the team.

¹³ Cf. Annex 2 for a résumé of the main public procurement routes in Belgium, France and the UK for services and works contracts.

¹⁴ Cf. Annex 3 for a résumé on how reuse may affect the choice of a procurement route.

¹⁵ Elodie Léonard, 'Bouwteam et Conception' (presented at the Presentation in the framework of 'Séminaires Bâtiments Durables', Bruxelles Environnement, Brussels, 2013).

2.2 Procurement routes for innovative projects

Some procurement strategies are adapted to situations involving innovative processes such as in the case of projects with unusually high or very innovative reuse targets. If you plan to dismantle a 1970s precast concrete tower block and reuse the slabs to build new pavillons, or if your reuse ambition entails the development of new tools and methods requiring R&D efforts, you may want to opt for innovative partnership or partnering contracts. These will allow contracting authorities to develop tailor-made solutions.

structural works, for instance, could be procured with a reuse target of 25 % in mass (which is quite ambitious but still realistic), while the lot for interior design could aim for a target of 50 %, since reuse is often easier at this scale and for these elements.

2.3 On allotment

According to European regulations and their transpositions into the laws of each member state, above a certain threshold (€144,000 in 2019), the contracting authority must at least *consider* dividing the contracts in different lots¹⁶. If they ultimately decide not to divide, they must provide justification as to why.

This allotment rule can be used to adjust the level of reuse ambitions to the specificities of each lot. Examples:

- If it is decided to renovate a public square, the works could be divided into two lots: a first lot for the sewage system and all underground infrastructure that has zero or low reuse ambitions; and another lot for pavement and street furniture, featuring a much higher reuse ambition.
- The refurbishment of a building could also be divided into several lots. The

¹⁶ Check the allotment rules defined by your state regulation, since the enforcement of this regulation varies between France, Belgium and the United Kingdom.

3. When the design team comes into play

Whatever the procurement route chosen, as a contracting authority you will have to select a design team. In this chapter, we examine how your reuse target may affect the scope of the design team's mission (3.1). We then focus on how to adapt the selection procedures for this team in the context of public tenders (3.2). Finally, we shift to the tenderers' point of view and explain how designers can submit an offer that meets a reuse target (3.3).

3.1 Defining the scope of the design team's mission

First of all, you should advertise your reuse expectations clearly in order to support all the specifications that will follow, and award criteria related to these expectations. The definition of the subject matter of the contract is a good place to highlight that reuse represents an important aspect of your project. It may also encourage candidates to take initiatives.

As mentioned in the chapter *Defining a reuse ambition*, it is recommended to outline the incentives driving your ambition (policy roadmaps, internal policy of your organisation) and fix a target in your strategic brief.

More broadly, the reuse target defined earlier should be reflected in the definition of the design team's entire mission.

You may have added new facets to the classical role of the architect or the design team, such as conducting a reclamation audit, sourcing specific batches of reclaimed materials, or supervising additional studies. If that is the case, it should be explicitly stated in the scope of the design team's mission. If these

Example contract subject matter involving a reuse target

"[...] The challenge of this project is to explore the integration of reclaimed materials and products in a significant way, by tackling the challenges, either conceptual or related to the design process, at all phases, including legal and procedural aspects of public procurement. [...]"

Extract from the subject matter of a contract published in the context of the Zinneke/Masui4ever project. Depending on your procurement route, this kind of general formulation can be repeated for different contracts.

missions entail an extension of the traditional role of the team, the honorarium and planning should be adapted accordingly.

Clearly specify the deliverables expected from your design team with regard to reuse aspects. For instance, these could be:

- Indicating clearly in the plans, models and surveys of the building where reused products will be integrated
- Taking part in meetings dedicated to developing the reuse strategy.
- Providing a catalogue of reclaimed products likely to be reused in the project, with an assessment of their reusability and availability.

As for any contract, don't forget to specify what happens if the missions cannot be

fulfilled according to the terms of the contract. Anticipate alternative solutions should a preliminary study demonstrate that reuse is too complicated - never pleasant but always a possibility. For example, a batch of materials expected during the early stages of the project brief to be reused on site may in fact prove to be impossible to dismantle properly once more detailed tests have been conducted at a later stage. By default, switching to new products is always a possible back-up.



3.2 Reuse in public tender procedures

The introduction of a reuse target does not need to run counter to the habits of each practitioner. The challenges are quite similar for every public tender process.

Thresholds

In Europe, any public works contracts costing more than €5.5 million falls under the EU regulation on public procurement. For contracts below this threshold, each EU member state has its own regulations and procedures for tendering design services (besides the fundamental principles of transparency and equal treatment which remain mandatory in every case). Different cultural habits within the various building sectors result in differences in the enforcement and the frequency of use of each procedure: France, for instance, has a tradition of design contests, while the UK commonly opts for restricted tender calls.

First selection

Most public tender processes involve a first selection phase (with the exception of open procedure).

This first phase is not about the project itself but focuses on the project developer. Questions regarding the actual offer are not permitted. In relation to reuse, since it still remains a relatively new concern in the construction industry, applicants may have no actual references in terms of reuse but might be motivated and well-equipped to explore this aspect. **Applying reuse experience as a limiting parameter or as the only criteria during this phase is therefore probably not the best way to go. It is more useful to instead look at more general qualities which are relevant to tackling reuse challenges,** such as:

- A capacity to be creative and to adapt to circumstances
- A sensitivity to environmental issues
- A specific training, an involvement in workshops or relevant research projects
- A well-balanced team composition: a lack of reuse references can be over-balanced by a diversity of skills (architecture, engineering, life cycle analysis, etc.)
- A capacity to produce high quality architecture evidenced by previous realisations.

Award phase

At this stage, the contracting authority can ask the tenderers to work on the project in question, via plans, models, sketches, notes, etc.

Past experience with circularity?

"In terms of circularity, we have often seen that including past experience with respect to circular projects as a requirement can unwillingly exclude interesting suppliers. As circularity is still a relatively new concept, setting high requirements can potentially exclude innovative suppliers. Prior to including 'past experiences' or reference project as part of your requirements, make sure to analyse if enough suppliers actually have circular reference projects to include."

Cécile Van Oppen, Godard Croon,
Dirk Bijl De Vroe, *Circular procurement in 8 steps* (2017)

In terms of reuse, it is essential to assess the capacity of a design team to be flexible and reactive to opportunities. Possible alternative and complementary formats other than mere design renders include:

- A note in which tenderers can explain their position regarding reuse and circularity in general¹⁷. They can be asked to highlight the key strengths of the project regarding reuse, intended strategies, or how they will source the reclaimed building elements.
- A site visit followed by a questions and answers session is a valuable opportunity for the clients to repeat and highlight the expectations formulated in their original call.
- A demonstration of how the tenderer includes reuse in the concept designs and a budget estimate.

¹⁷ At certain phases of some procedures, the contracting authority must be careful that the methodological note will not be regarded as a premature execution of the tender.

Standard Selection Questionnaire in the UK

The Crown Commercial Service published a policy note with a template of recommended questions to ask during the selection process. The standard question to assess prior experience is formulated in such a way it avoids being too restrictive:

"Please provide details of up to three contracts, in any combination from either the public or private sector; voluntary, charity or social enterprise (VCSE) that are relevant to our requirement. VCSEs may include samples of grant-funded work. Contracts for supplies or services should have been performed during the past three years. Work contracts may be from the past five years. [...] If you cannot provide at least one example [...], in no more than 500 words please provide an explanation for this e.g. your organisation is a new start-up or you have provided services in the past but not under a contract."

Crown Commercial Service, *Procurement Policy Note: Standard Selection Questionnaire (SQ)*, Action Note 8/16 9th September 2016

- A waste management plan or a circularity plan.
- Participation in a workshop (see the Zinneke/Masui4ever example).

Depending on the scope of your reuse target, it may or may not constitute a specific award criterion:

- If you chose for an open reuse ambition, challenging the design team to

Zinneke/Masui4ever: awarding a project by organising a workshop

In the context of this pilot project for the renovation of their facilities¹, the Brussels socio-cultural association Zinneke organised the design team selection process so as to assess, among other qualities, reuse motivation. Zinneke opted for a negotiated procedure with publicity. The selection consisted of two phases. The first one assessed the candidates on the basis of:

- A presentation of the team's interest and capability to work with reclaimed elements.
- A motivation note including a reference project. This project did not necessarily have to be designed by the candidates themselves, it just needed to be relevant to the project.
- 2 references of projects realised by the candidates.

On this basis, the building owner selected 4 candidates, who were then invited to the second phase.

Phase 2 consisted of a **90 minute workshop** during which the tenderers were invited to develop a project methodology. This included different aspects, such as working

in a multidisciplinary design team and integrating reclaimed elements. Prior to the workshop, the tenderers visited the building. This allowed them to develop a first position on the programme and the existing spaces. On top of this, they were asked to present spatial propositions for specific parts of the project.

These proposals were evaluated by a committee comprising:

- 7 representatives of the project commissioner (Zinneke)
- 2 representatives of the reuse assistant (Rotor)
- The *bouwmeester*² and a representative of their team

This selection procedure, quite different to a classical design competition, proved to be a good way to assess not only the overall capability of the candidates, but also their motivation to tackle specific project challenges (including reuse).

1 This project is funded by the ERDF for the Brussels-Capital Region. The organisation of this alternative selection process was developed in close collaboration with the Brussels bouwmeester-maître architecte team (cf. footnote 43).

2 In Belgium, the 'bouwmeester' (or 'maître architecte') is a public function whose role is to foster architectural and urban quality in the built environment. A central part of their mission involves assisting contracting authorities with organising procurements that feature high architectural ambitions.

be creative and ambitious, it is wise to make an award criterion out of it. It can be a self-standing criterion named 'Reuse performance' or part of a more general criterion such as 'Sustainability', 'Circularity', or 'Environmental performance'.

- If you defined a precise reuse specification (integrating a specific material for a specific lot), a specific criterion is not necessary. It is an either/or situation: candidates failing to meet your requirement will automatically lose points in the global assessment of their offer.
- An intermediate option would consist of setting minimum requirements and giving extra points to outperforming offers¹⁸. This can be a great way to

push tenderers to take initiatives and value their inputs.

Selection committee

The composition of the selection committee (or 'jury', in the case of architectural contests) needs to be in tune with the selection criteria. There should be at least one member of the committee who is able to assess how realistic the different offers are in their reuse promises. Contracting authorities are often afraid of being seduced by glamorous projects that ultimately prove to be unviable¹⁹. Inviting a reuse expert onto the committee can help identify and avoid unfeasible offers.

As evidenced by the example below, **in many cases the reuse strategies proposed by the candidates can be assessed by well-informed building professionals.**

18 Service Public de Wallonie, *Marchés Publics Responsables - Note de Cadrage et de Conseils Juridiques Pour l'intégration de Clauses Environnementales, Sociales et Éthiques Dans Les Marchés Publics*, 2019

19 Cabinet Nomadéis, *Batiflux 3: Transformons Nos Bâtiments En Réserves de Matériaux - Pratiques, Perceptions et Attentes Des Architectes et Des Maîtres d'ouvrage En Matière d'économie Circulaire Dans Le Bâtiment En Région Provence-Alpes-Côte d'Azur*, June 2019

Ponderation examples based on different cases in Belgium and France

Urbanity : 30	Architectural, urban and landscape qualities: 35	Technical value: 40
Habitability : 30	Habitability (including sustainable approach): 35	Price: 40
Technicity: 20	Feasibility: 30	Environmental quality: 20
Feasibility : 20		
In cases 1 and 2, reuse is likely to affect all three criteria: architectural quality, habitability and feasibility. In case 3, reuse could easily be specified as a sub-criterion of the "Sustainable development" and "Environmental quality" criteria.		

A learning process

"A contracting authority called us for assistance with all the reuse aspects of their project. They wanted to foster reuse and were therefore looking for design teams able to tackle this challenge. When it came to selection time, they were worried that they would not be able to distinguish the wheat from the chaff in terms of reuse. We proceeded in two steps. First, both we and the contracting authority made our own separate assessments and ratings, before sharing and comparing our respective results. In the end, they proved almost identical: the contracting authority was perfectly able to make a sound judgement. They just needed to understand that reuse mostly involves common sense!"

Bellastock, reuse experts and assistants to the contracting authority for this project.

3.3 Recommendations to the tenderers on proposing reuse

Many architects are excited by the new challenges emerging in the construction sector. Even when the tender requirements do not specifically express a reuse ambition, architects have not been afraid to take the lead. Many successful reuse stories were kickstarted by enthusiastic designers.

For designers submitting a proposal to a contracting authority, here are a few ideas to start with:

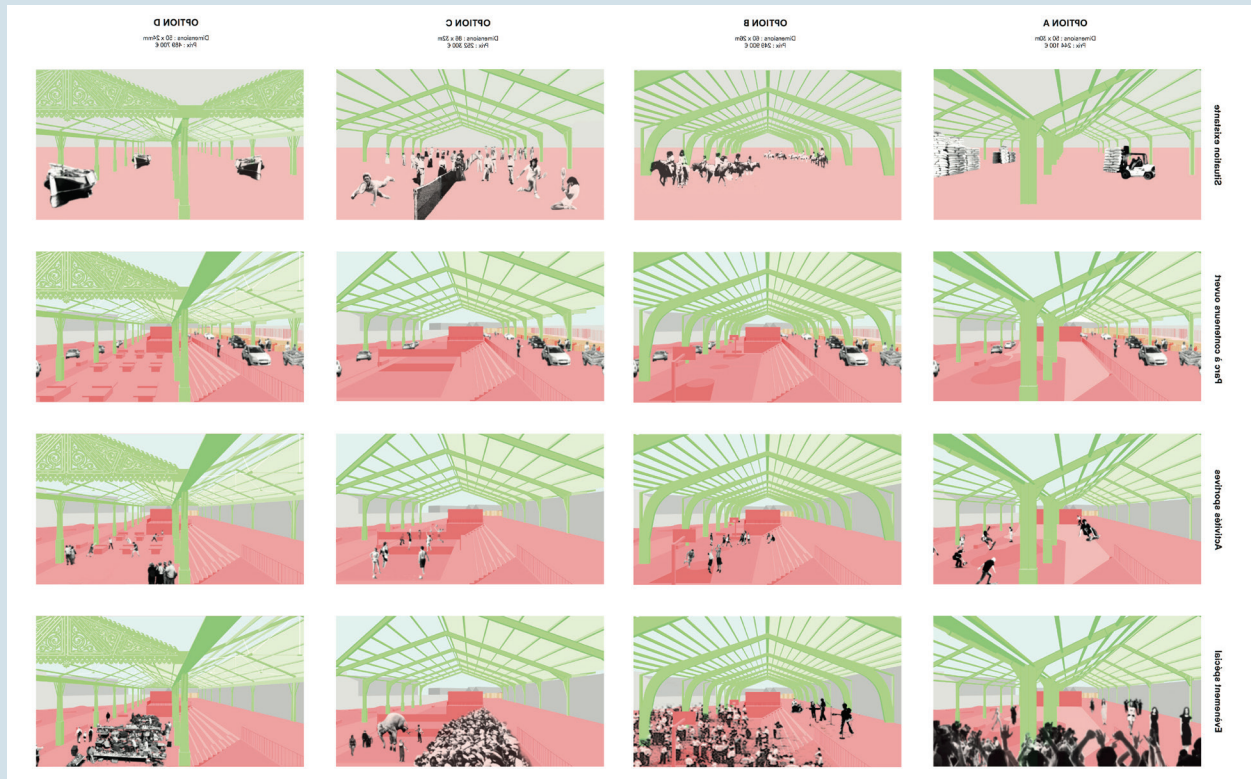
- Highlight the positive impacts of integrating reclaimed elements, such as reduced carbon footprint, no extraction of raw resources, stimulation

of the local economy, or architectural quality.

- Propose to retain and refurbish existing built structures. Architects can be very good at spotting and revealing the spatial qualities of existing facilities, and well equipped to demonstrate the benefits of preservation.
- Assess the reuse potential of the elements present in existing buildings in order to have them salvaged for reclamation dealers or reuse them on site.
- Propose to integrate reclaimed elements in the new project.
- Point out to the commissioners what kind of support and funds are available if they engage in a circular strategy.

For many clients, reuse raises certain questions and concerns (see '1. Defining a reuse target'). It is rarely (if ever) possible to solve everything at the stage of an offer, but many uncertainties can already be managed once they have been clearly identified:

- Show that you have planned back-ups and alternative solutions to mitigate the risk of not finding every reclaimed construction product you propose.
- Budget reuse strategies as precisely as possible. Don't forget to consider the extra work it may require (cleaning, etc.).
- Consider teaming up with experts. If the project raises structural challenges, for instance, be sure the engineers are ready to tackle them.
- Develop scenario-based proposals to frame the range of possible outcomes.



Recypark: winning a design competition with a multi-scenarios-based proposal

During the design competition stage for the construction of a new 'Recypark' (a waste-collection facility) in Brussels, the architecture office 51N4E, assisted by Rotor, proposed to reclaim an entire warehouse structure to cover part of the facility. The brief did not explicitly mention architectural reuse, but the architects were keen to develop an ambitious reuse approach.

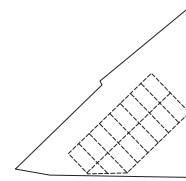
At the concept design stage, Rotor spotted four potential available structures slated for demolition. The architects demonstrated how they would integrate each of these structures in their project, resulting in four slightly different proposals. All of these scenarios, however, bore evidence to the concrete feasibility of the approach and the project was selected as the winner.

The subsequent design phase first entailed an active scouting phase to spot suitable structures (in terms of availability, dimensions, price, etc.), as well as an adequate procurement strategy. One of the structures presented in the original offer turned out to still be available at that moment and could be purchased by the building owner via a separate contract once the structural engineers had given the green light following an extensive analysis of the existing structure. The glulam structure was then dismantled and warehoused until the start of the construction works.



OPTION A

Structure en Acier
Entrepôt aux Pays-Bas
Deux travées
Dimensions : 50 x 30m
Prix : 244 100 €

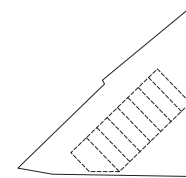


1790 m²

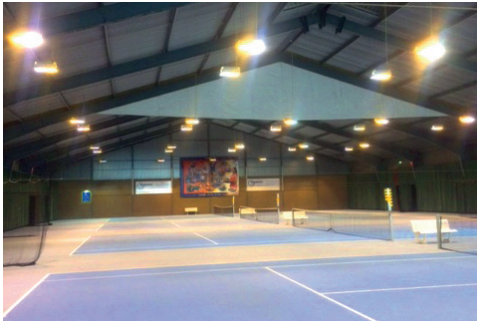


OPTION B

Structure en bois lamellé-collé
Manège équestre à Liège
Une travée
Dimensions : 60 x 26m
Prix : 249 900 €

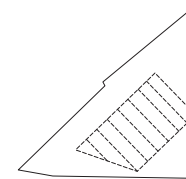


1650 m²



OPTION C

Structure en Acier
Terrains de tennis couverts aux Pays-Bas
Une travée
Dimensions : 86 x 32m
Prix : 252 300 €

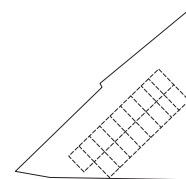


1680 m²



OPTION D

Structure en Acier
Anciennes halles de stockage portuaires à Anvers
Deux travées
Dimensions : 50 x 24m
Prix : 489 700 €



1560 m²

Spatial scenarios showing the different possible structures. Courtesy of 51N4E

4. Designing with reclaimed elements

Designing with reclaimed elements requires a level of flexibility from designers and, consequently, their contracting authorities. This should not necessarily be seen as a handicap, but can instead be seen as a springboard for new ways of approaching contemporary design challenges and devising novel solutions.

4.1 Exploring alternative sources of reclaimed building elements

When designing with reuse, it is key to integrate the research of potential elements as early in the process as possible, since the choice of materials will influence the design development. When working with elements reclaimed on the same site, the design will even need to be developed *around* these existing elements. In that case, make sure to have a complete reclamation inventory, conducted by knowledgeable actors. This will give you a solid understanding of the reuse potential of the materials and products present on site.

As well as the three main sources of reclaimed products mentioned earlier (see '3. *The main sources of reclaimed building materials and products*'), other paths can also be considered. These might be less common but, depending on the project context, may reveal interesting opportunities. Examples are:

- Existing internal stocks. Where applicable, it is always interesting to have a look at the owner's basement, attic or warehouses. More often than not, clients stock building elements and potentially reusable products. Cultural actors, large-scale organisations

or municipal authorities are typically in possession of stocks of materials awaiting a second life. These are in effect small-scale internal reclamation yards, often worth a visit.

- There is an increasing amount of online market-places publishing adverts for batches of reclaimed building materials and products. These can be good places to source products, although these platforms rarely provide solutions for storage. As a consequence, this solution (barring a few exceptions) is only really workable when there is a coincidental match between supply and demand, as well as the necessary means to prepare the materials should this be required.

4.2 Being flexible

Design choices can either foster or hinder the integration of reclaimed products. Because reclaimed elements do not always reach the same levels of uniformity in comparison with new products (for example, in terms of dimensions or colours), some margins of tolerance need to be considered in the design.

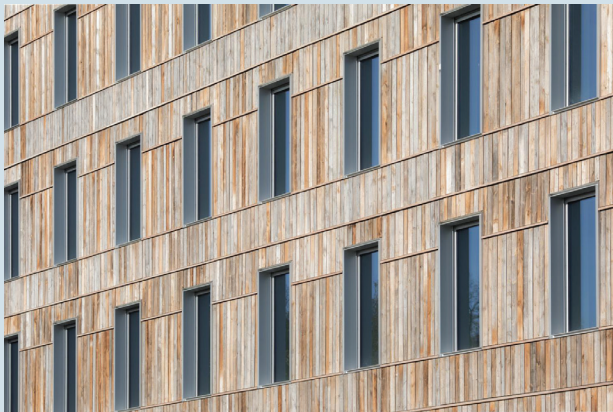
Certain patterns may make it easier to integrate elements of variable dimensions. For instance, it is possible to specify a fixed dimension for the width of a wooden flooring system while at the same time allowing elements of variable length (see example below). For most applications, a certain degree of variability in colour or texture is also acceptable. This can make it possible to 'patchwork' different batches of materials.

Botanical Institute of the University of Liège: façade cladding in wood composed from heterogeneous elements

The Botanical Institute building is part of the Sart Tilman campus of the University of Liège. This site was developed in the 1960s and 70s and is home to a collection of modernist buildings. The Botanical Institute is one of these: a geometrical monolith in concrete.

The architects in charge of the renovation chose a cladding of reclaimed wood. It evokes the rough and imperfect aspect of the original wood cast concrete façades, which have now disappeared under insulation panels.

Designing these façades was an exercise in 'controlled surrender of control'. The architects asked that the planks were cut into plank sets of fixed lengths, but the width could vary. As a consequence, a variety of planks of different sizes could be used for the cladding, whilst still ensuring a certain regularity, and hence a certain ease of installation. Moreover, by including short standard lengths in the overall composition, the design allowed for the integration of offcuts and shorter planks, further reducing waste.



Images: courtesy Samuel Dufourny.

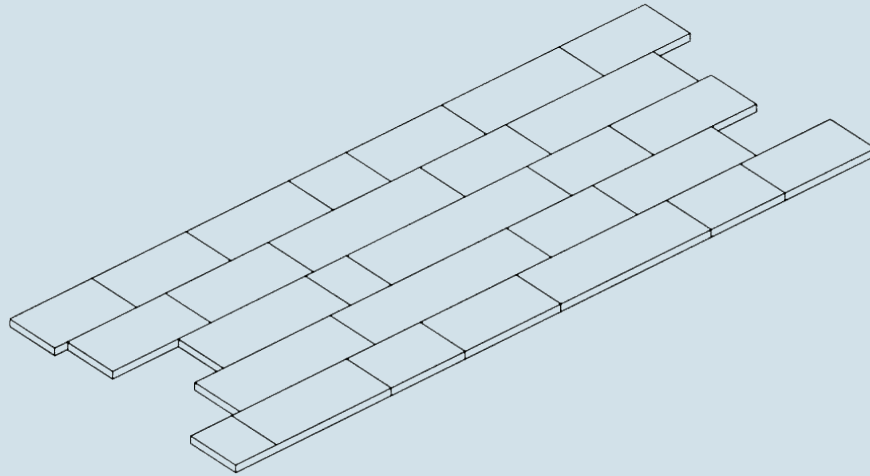
Paving Sett dimensions

Reclaimed setts come in various dimensions (12 × 12 cm, 13 × 13 cm, 14 × 14 cm...). A dealer specialised in reclaimed setts has highlighted how many public specifiers in Belgium use the same generic technical specifications that always refer to setts of the same dimension. As a result, the reclamation market struggles to meet this demand, while stocks of setts with slightly different sizes are left waiting to be reused.

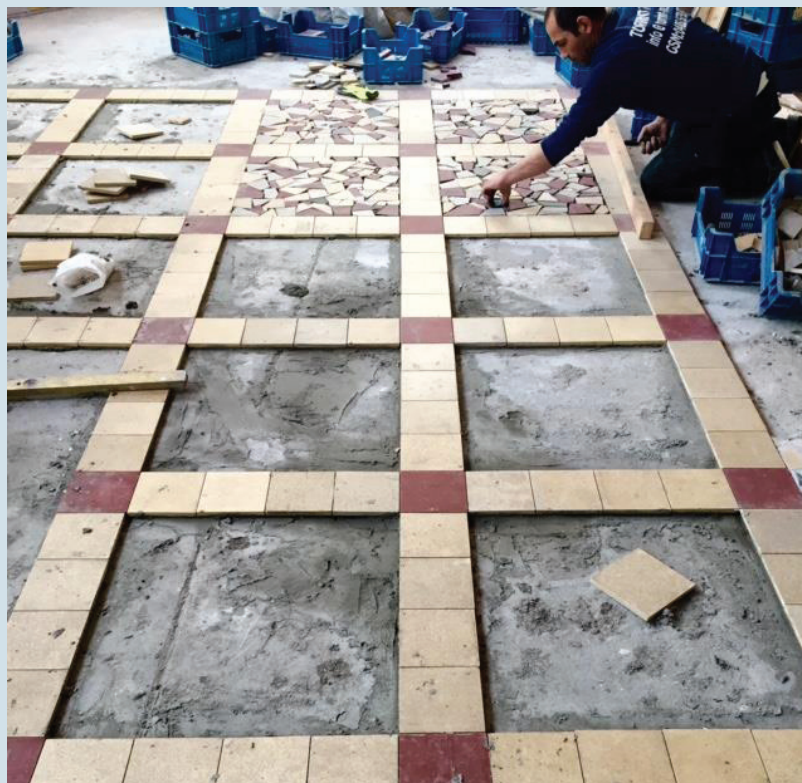


Variable dimensions

The principle of a fixed width and a variable length applied for a flooring system.



Yet another variation of the same principle: intact ceramic tiles are used to define a geometric grid, in which broken tile pieces can be placed in an opus incertum pattern.



None of these aspects need undermine the essential performances of the building. Conversely, being more open to such variations has the potential to greatly expand the range of building products able to be reused.

4.3 Anticipating future dismantling

Someone's reuse target today will be someone else's dismantling project tomorrow. Design decisions taken now will influence recovery possibilities in the future. This concerns not only reclaimed products but also new ones. Opting for reversible assembly modes is a basic way to meet the essential principles of circular economy.

Designing for future dismantling and reuse will always come with a lot of uncertainties: nobody knows how the trade will evolve or what tomorrow's dismantling techniques will be. It is not necessary to entirely rethink the way we build in order to already consider this aspect when designing a new project. Sometimes tweaking small details is enough to prevent irreversibility: that is, the impossibility of future recovery. For example, avoid using unnecessarily strong glues, privilege accessible fixings, opt for durable products, do not place a glass partition directly into a fresh concrete slab (true story!)... Most of these principles are essentially a question of common sense²⁰.

²⁰ There is abundant literature on the topic of 'design for deconstruction' or 'design for disassembly'. For a good and practical introduction to the topic, refer to Paola Sassi, *Strategies for Sustainable Architecture* (Oxon: Taylor and Francis, 2006.), especially Chap. 4.1 "Design for Longevity", p. 149-157. For examples of how slight changes in common construction details can facilitate future reclamation, see Chris Morgan and Stevenson, *Design and Detailing for Deconstruction* (SEDA Design Guides for Scotland n.1. SEDA, 2005).

5. Setting the specifications for the works

The design phase usually ends with the technical design. At this stage, when all the choices have been made and before putting the project out to tender, it is time to formulate the specifications and produce documents such as surveys, execution plans and technical specifications. In this chapter, we examine how to adapt standard technical specifications to reclaimed products (5.1). We then address the question of the fitness-for-use of reclaimed products (5.2).

5.1 Adapting standard technical specifications

Nowadays, most of the pre-existing technical specifications refer to industrial standards. Referring to these standards avoids overloading the spec book by repeating requirements which can be found elsewhere. However, since many of these references originate from the context of industrial mass production, they can become irrelevant or even contradictory in the case of reclaimed building elements. Referring to a standard that explains how to conduct quality control on a production line, for instance, would be of little use when attempting to ensure the fitness-for-use of reclaimed building products.

In order to avoid this, specifiers often need to write bespoke specifications for reclaimed products. Most of the time, though, it is not necessary to start from scratch. It is rather a matter of adapting existing specs to the specificities of reclaimed materials and products, while still complying with the principles of unbiased

description in the context of public tenders.

A good way to proceed is to start from the template of an existing technical clause and examine, requirement by requirement, which are fundamental (these should not be changed under in any circumstance), which are important to the project (these should probably not be adapted too much) and which offer more latitude (these can be more extensively edited).

Dimensional threshold, for instance, can often be more flexible than what is specified by default. The same can often be true for the conditions of building elements, for instance in terms of aesthetic aspects. Some uses - although not all - can withstand traces of wear and tear on the materials.

It may also be necessary to add requirements specific to reclaimed products - specifying, for instance, that a tile should be clean from mortar, or that each brick must have at least one unpainted face.

It is important, though, to keep in mind that these specifications must be precise and objective enough to allow for a comparison between different offers (or to reject unsuitable products that might be proposed by a bidder).

5.2 Demonstrating fitness-for-use

Fitness-for-use is a recurring question when it comes to reusing building products²¹. Every

²¹ Cf. Florence PONCELET, Morgane DEWEERDT, Jeroen VRIJERS, "Réemploi des matériaux : comment justifier leurs performances techniques ?", in *CSTC Contact*, n°67, January

Project Zinneke/Masui 4 ever: writing bespoke specifications for reclaimed building elements

General description:

No specific materiality is required but the final use - wall tiles for water points - is defined.

Aesthetical aspect is quite vague: the tiles need to have an «expressive aspect».

Quantities:

As for new product, surfaces to be covered are precisely detailed. Different lots are specified. The tenderer has the choice to supply a unique batch or heterogeneous batches.

Système d'acquisition - Projet Zinneke
Pour toute question concernant cette demande : 0032 2 214 20 23
 Personne de contact : Sandrine Tonnoir

Carreaux muraux "expressifs" (lot 1)

Nous recherchons un **revêtement mural** en carreaux de céramique, faïence, ciment, pierre ou tout autre matériau convenant aux usages visés.

Le revêtement sera utilisé comme **crédence** autour de points d'eau, prévus à cinq endroits du bâtiment.

Les revêtements doivent avoir un **aspect expressif** pour donner du caractère aux zones de rencontre où ils seront placés dans le projet. Cela peut passer par des motifs, des matières, des couleurs, des effets de texture...

On recherche un produit compris dans une gamme de prix compris entre **15 et 40,- €/m²**.

Dimension et quantité

Le lot total à acquérir est de **28,5 m²**.

Les surfaces des crédences sont :

- Surface 1 : 5 m²
- Surface 2 : 5,5 m²
- Surface 3 : 2,5 m²
- Surface 4 : 3,5 m²
- Surface 5 : 3,5 m²
- Surface 6 : 6 m²
- Surface 7 : 2,5 m²

Le soumissionnaire peut proposer une gamme complète pour ces cinq applications ou cinq ensembles distincts. Dans ce dernier cas, chaque ensemble doit être suffisant pour couvrir la surface des crédences décrites ci-dessus.


Les carreaux ont une **épaisseur inférieure ou égale à 12 mm** de façon à pouvoir être placés sur une surface verticale. Leur longueur et leur largeur ne sont pas spécifiées. Chaque ensemble doit être composé de carreaux possédant les mêmes dimensions.

Autres critères

Le revêtement présente une surface facile d'entretien et une **faible absorption** à l'eau.

Les carreaux sont en bon état et prêts à la pose. Les carreaux doivent être exempts d'ébréchantures dépassant un périmètre de 5 mm à l'intérieur du carreau (cf. schéma ci-contre).

Les carreaux sont **nettoyés** des restes de mortier (arêtes et face intérieure). Ils sont livrés prêts à la pose, en boîte ou sur palettes.



Dimensions:

A maximum thickness is defined, but length and width are not mentioned.

Other criteria, specific to reuse:

State of the tiles: the document defines the tolerance to wear and tear.

The tiles should be cleaned, packed and ready to be installed.

This sheet has been produced to procure with a view to procuring reclaimed elements. It defines the expected performances and acceptable thresholds in a way that ensures both a fair and objective assessment of the offers and a compatibility with the means of the reclamation trade.

function in a building comes with a set of requirements, either related to the basic regulatory requirements for construction works²², or set by the specifiers in the context of a specific project. In any case, it must be demonstrated that construction products, new or reclaimed, effectively meet these requirements.

Some requirements are non-negotiable, and there is certainly no reason to lower these when working with reclaimed elements.

New products are generally supplied with attached technical documentation. These data sheets allow specifiers to assess whether the products can be used in such a way that requirements (both regulatory and project-specific) are not undermined. Reclaimed products are rarely supplied with such documentation. This does not mean that they are necessarily of lower quality. In fact, sometimes the opposite might be the case²³. Reclaimed materials will, however, usually require work-arounds to demonstrate their fitness for a specific purpose. For example:

- Some salvage dealers provide guarantees on their products in relation to certain essential aspects. For instance, companies restoring cast iron radiators might guarantee that their products are leak-proof. This product characteristic is thus demonstrated by the supplier to be comparable with that of new products.
- Some products can be assessed through a careful visual inspection or very basic tests. Most salvage dealers sort products according to quality criteria. Most reclaimed bricks dealers, for instance, check each brick and assess their condition.
- More in-depth studies can be conducted, notably by consulting original

2020, p. 23-26.

22 European regulations set seven basic requirements for construction works: 1. mechanical resistance and stability; 2. safety in case of fire; 3. hygiene, health and the environment; 4. safety and accessibility in use; 5. protection against noise; 6. energy economy and heat retention; 7. sustainable use of natural resources. To complement this, European regulations also enforce harmonised protocols to demonstrate that a building effectively meets some of these requirements. For instance, Eurocode methods must be used to design a building in a way that ensures sufficient mechanical resistance.

23 Some building materials and products are like good wine: they age well and improve with time! To give a few examples: reclaimed wood is often more stable than new wood since it has been weathered over many years. The emissions of volatile organic compounds (VOCs) in wood particles boards are much lower after a few months of use than in brand new products. Old bricks often feature a higher density and resistance to compression than newer ones, since previously they were baked at higher temperatures than nowadays.

Laboratory tests for establishing the thermal conductivity of reclaimed insulation panels

Belgian contractor Louis de Waele came upon a huge volume of rock wool insulation panels (800 m³) while refurbishing an office building. This volume corresponded to the amount needed on another renovation project happening at the same moment.

A lab test conducted on a sample of the insulation allowed the coefficient of thermal conductivity to be determined with great precision. The scale of the project made it worthwhile to conduct this additional test. The positive test results made the reuse of these panels possible by removing any doubt regarding their suitability.

Declared performances of reclaimed bricks

Danish reclaimed brick dealers Gamle Mursten pioneered a voluntary protocol to achieve a CE-marking on their products. They did this by having a European notified body adapting harmonised standards developed in the context of industrial production to the specificities of reclaimed products. This provided Gamle Mursten with clear guidelines to establish a Declaration of Performances (DoP) for the most common types of reclaimed bricks. In addition to the possible commercial advantage conferred to CE marked products, this process is interesting because it provides building professionals with a set of trustworthy data on reclaimed bricks, which can be used in models and calculations to assess aspects such as resistance to compression or to freeze-thaw cycles.

documentation, maintenance logs and other original technical specifications.

- On-site or laboratory tests can generate precise data on specific performances (thermal conductivity of insulation panels, hardness of steel, etc).

As a general guideline, when conducting tests to demonstrate fitness-for-use, it is important that they are in proportion to the means of the reclamation sector and the risks at stake. In case of doubt, it is recommended to involve specialists (structural engineers for instance), controllers and possibly insurers as early as possible²⁴.

²⁴ For the French context, extensive guidelines are suggested in Bellastock (J. BENOIT, G. SAUREL, M. BILLET), CSTB (S. LAURENCEAU, F. BOUGRAIN). *REPAR #2. Le réemploi passerelle*

Structural steel reuse

The Steel Construction Institute has published a guide entitled *Structural Steel Reuse. Assessment, testing and design*¹. According to this report, reusing structural steel is fully compatible with actual standards and would result in significant environmental benefits. They propose a protocol to test reclaimed profiles. Its scope is limited to:

- Steelwork erected after 1970.
- Steelwork which has not been subject to significant strains, e.g. plastic deformations.
- Steelwork without significant loss of section due to corrosion.
- Steelwork which has not been exposed to fire.

All steelwork within these criteria can thus be checked using the recommended quality control protocol. It includes, among other steps, an elegant method to determine yield strength by using a non-destructive hardness test².

¹ SCI (Steel Construction Institute), *Structural Steel Reuse - Assessment, Testing and Design Principles*, November 2019.

² To go further, see: <https://www.steelconstruct.com/eu-projects/progress/case-studies/>

The case of restoration can offer inspiration by way of comparison. When engaged in restoration projects, construction professionals often work with building materials and products for which they lack recent technical information, but this does not prevent them from achieving contemporary standards and meeting all necessary basic requirements. Restoration protocols can therefore serve as useful guidelines for working with reclaimed building elements.

Fitness-for-use is closely linked to the question of building insurance. Contracting authorities may worry that when working with reclaimed building materials and products they will have to pay higher insurance premiums. This is not necessarily true, and depends a great deal on the type of building elements and uses involved, the degree of innovation they entail, and the manner in which the fitness-for-use has been demonstrated. On top of that, each country has its own habits and rules. In general, it is recommended to consult insurers early in the process in order to properly assess and validate with them the best risk mitigation strategy.

entre architecture et industrie. Report nr. 1406C0043. ADEME. 2018. See notably p. 61-68, 175 and 263-340.

6. When the contractor comes into play

If a specific tender is organised to select a contractor, it is possible to add specific criteria regarding reuse in the same way as for the selection of design teams (see '3. When the design team comes into play'). In this chapter, we first examine how to define the scope of the works contract (6.1). We then focus more specifically on the administrative clauses in the context of public tenders (6.2).

6.1 Setting the scope and expected results of the contractor's mission

According to predefined objectives, different deliverables can be asked from the candidates as a way of demonstrating their commitment in respect of the reuse target. These can include:

- A listing of companies specialised in reclamation of construction products and able to provide the specified elements.
- A listing of reclaimed elements from the tenderer's own stock, reclaimed (or to be reclaimed) on another (de) construction site, or any other relevant source.
- A methodological note describing how the reclamation process is planned.
- References testifying to the required skills for integrating the targeted reclaimed elements.
- A Waste Management Plan, or a Circularity Plan, for the global development of the project.

- A Monitoring Plan, in order to track the reuse result, capitalize on it and upgrade company skills.

Some tender formats allow for a phase of negotiations²⁵. Where this is an option, such negotiations can be a very useful manner in which to tackle the possible uncertainties and to answer any questions related to reuse.

If some materials are already present on site, either still in place or already dismantled, give the candidate contractors an opportunity to examine them. For instance, during the site visit, the materials expected to be dismantled for the purpose of reuse can be pointed out and identified. It can also be an opportunity for the contractors to have a clear overview of all the already-dismantled elements so that the contractors can have a clear overview on site.

Feedback can often be beneficial: it is a good idea to let the contractors voice an opinion on the reclaimed elements you require them to install. They should be given the opportunity to express reservations if they suspect any major barrier to the reuse ambition.

Provide the candidates with all the information you have on the elements. If you have already received conclusions from a reuse expert who undertook prior research on specific building elements; if you have information about the dismantling process based on previous tests; or if you have already tested different cleaning options and have a clear idea of the expected costs, include this information in the call for contractors. It will assist

²⁵ See annex 2 for more details.

Decoupling dismantling and reuse to compensate for uncertainty

In the context of same-site reuse operations, contracting authorities are often tempted to commit the contractor to reusing the exact elements that they are also required to dismantle. If these operations have been fully analysed and assessed beforehand, they will probably cause no major issues. If, however, there are still several unknowns at this stage, it will most likely lead contractors to over-price their offer in order to compensate for the uncertainty.

This could be the case, for instance, if they have to reclaim and then reuse large quantities of bricks for which no dismantling test could be conducted at an earlier stage and about which there is no information whatsoever. This can easily be prevented by clearly distinguishing two separate operations and specifying the mission in a slightly more open way:

1. Specifying a best-effort obligation to reclaim as many bricks as possible, either on site or via professional salvage dealers.
2. Specifying the use of reclaimed bricks for the new work (possibly specifying a type of brick close to the original).

This ensures that the contractor will not be at a disadvantage if the quality of the bricks reclaimed on-site turns out to be lower than expected, or the loss rate turns out to be higher. If same-site reuse proves unfeasible, bricks that could not be reused on-site are nonetheless given a chance to find a new use via salvage dealers, and reclaimed bricks from a different source can still be integrated in the project. All in all, this is not a bad way to support a local circular economy.

them in preparing their offers while helping to keep the budget under control. Uncertainties in the tender call usually result in higher prices in the offers received: anticipation and information are key to avoiding this.

6.2 Adapting the administrative clauses of work contracts in public tenders



In the context of public tenders, works contracts are awarded through procurements that usually contain both technical and administrative clauses. As a contracting authority, it may be necessary to adapt existing frameworks when formulating calls for tenders. In fact, since each project is unique, having to slightly adapt pre-formatted specifications should be a customary approach. Calls for tenders and contracts are practical tools through which you, as a commissioner, can express the ambitions and the objectives you want to achieve.

6.2.1 Execution clauses

Execution clauses provision the conditions under which the contract should be carried out. Adding some considerations in relation to reuse may be necessary, especially if the reuse target is ambitious.

Means of control regarding the origin of materials and products

You can insert a clause with the aim of ensuring that reclaimed materials and products do in fact originate from an actual dismantling (as opposed to new materials that have been artificially worn or aged to *look* like reclaimed ones). More generally, it is important to pay attention to the question of traceability and avoid using elements from questionable sources (such as stolen materials) or from de-

constructions that may have caused adverse impacts on local community and heritage²⁶.

In order to enforce this requirement, the contracting authority may require the contractor to provide documents attesting to the verifiably sound origin of the materials. The documents requested should correspond to the means and current reality of the reclamation sector. To date, there is no chain of custody or any other formal system to guarantee the origin of reclaimed products. Still, most professional reclaimed dealers can provide relatively precise information on where they source their products. They can be asked, for instance, to state under oath that their products originate from reputable sources.

Social and ethical clauses

As developed in the chapter 'What are the benefits of reuse?', reusing building elements not only impacts positively on the environmental performances of the construction sector, it also helps to foster the local economy.

The specifier should seize the opportunity to insist upon fair working conditions throughout the entire supply chain. Social and ethical clauses can be employed to promote the development of workers' skills through training sessions and to avoid social dumping.

6.2.2 Encouraging substitutions

An effective way to enhance the reuse rate of building materials and products is to allow the contractor to suggest instances where reclaimed equivalent can be substituted for new materials during the works²⁷.

es where reclaimed equivalent can be substituted for new materials during the works²⁷.

The inverse scenario is also possible, although obviously less desirable: despite all precautions having been taken, a specified reclaimed product may ultimately prove impossible to find. It could be that no salvage dealer has it in stock at that particular moment, or in the case of same-site reuse, that materials to be reused were severely damaged during dismantling. Such situations should hopefully be rare in a carefully prepared project, but they are not implausible.

It is better to be safe than sorry. When framing substitution scenarios, attention should be paid to the following aspects:

- Explicitly refer to substitution in the review clauses of the administrative specifications²⁸. The specifier must foresee all possible situations that are likely to affect their project. The review clause in question should frame the possibility to substitute one element for another. It ought to include a protocol detailing who is responsible for this substitution, and how and when to agree upon a suggestion that has been made.
- Maintain a clear oversight of the budget. An effective manner in which to do this is by asking contractors to distinguish between the cost of the purchase of materials and the cost

²⁶ An interesting counterexample is the case of TerraMai, a US company that imported tropical wood from SouthEast Asia. This demand exerted pressure on the local economy and led many residents to demolish their homes to rebuild generic concrete buildings. See Rotor (Lionel Devlieger, Livia Cahn, Maarten Gielen eds.), *Behind the Green Door. A Critical Look at Sustainable Architecture through 600 Objects*. Oslo : Oslo Architecture Triennale, 2014, p. 70-71.

²⁷ In the context of public procurements, some tender formats prevent such negotiations altogether (see annex 2). In such cases, this solution should of course be avoided.

²⁸ This is just a general explanation of review clauses, since the EU members regulations may present slight differences. For Belgium, cf. *Arrêté royal du 14 janvier 2013* (art. 37 and following); for France, cf. *Code de la Commande Publique* (Art. R2194-1 and following).

of their installation. These costs are usually combined in most offers, but keeping them apart enables more transparency and provides a good basis for negotiation should it prove necessary (and where negotiations are permitted). In practice, it allows building owners to acquire specific materials themselves and ask contractors to install them.

- Variants may be used to introduce a degree of controlled flexibility to the tender. Variants are alternative solutions that will achieve the same expected results. In the case of reuse, contractors can suggest new options that introduce reclaimed solutions instead of new products (or the other way round in a less fortunate scenario). However, variants can be a double-edged move since they create

extra work for the tenderers, which might disadvantage SMEs. Their use is usually only beneficial in more ambitious projects.

- Clarify the guarantees and liabilities. The contractors' responsibility should apply to the works they undertake but not necessarily to the products themselves. If the client wishes to reuse technical equipment that has not been purchased by the contractor, for instance, while the installation works would clearly fall under the responsibility of the contractor, a problem due to an intrinsic quality of the equipment, however, would not. These provisions should be clarified in the administrative clauses of the contract²⁹.

²⁹ It is in fact the same for new products, except that in this case, the failure would more clearly fall under the

A reuse lot

The 'reuse lot' is a strategy developed by French reuse expert Bellastock to implement reuse in large-scale projects.

An entire lot, referred to as the 'lot 0', is awarded to reuse experts, who are in charge of searching out reclaimed materials. These materials are then used by the contractors of the other work packages. In effect, the 'lot 0' becomes a small salvage yard on the construction site, providing logistics, storage and supply, but also technical documentation and assistance.

As a consequence of this strategy, each contractor is asked to submit a

mandatory variant in their offer. The initial offer includes a price covering purchase and installation of new materials. Variance only indicates the installation price and mentions a potential shortfall (if any). A maximum rate reuse of 25 % is fixed per lot. This maximum is a helpful way to reassure the contracting authority by limiting uncertainty while setting an ambitious target.

Contractors accept liability for the installation of the materials. Reuse assistance ensures that these materials are compliant with the relevant standards.

7. Fostering reuse during the works

In principle, when construction work starts, it is too late to make significant changes to your project. The project is determined by the plans and specifications and deviations are unwelcome.

Still, some unexpected reuse opportunities may arise during this phase. For example, your contractor might be working on another project in which a beautiful staircase is going to be demolished, and it turns out to be perfectly adaptable to your project. Or you realise that a vacant building from in your real estate portfolio contains exactly the wooden parquet you require in another project.

7.1 How to take advantage of late opportunities for reuse

The ability to take advantage of such opportunities will depend a great deal on provisions that were planned earlier in the design process (see '6.2.2 Encouraging Foster substitutions'). Do your specifications allow for substitutions? Do you have a basis upon which you can discuss terms with the contractor regarding the cost of such substitutions?

If both these aspects have been anticipated, the dialogue with the contractor should be relatively smooth and allow for to many reuse opportunities. If not, it will depend on the discussion and the general rules governing your project.

responsibility of the supplier.

7.2 Approval protocol

Swapping a new product for a reclaimed one should not happen randomly. It is important to follow a validation protocol involving the clients, the design team and, possibly, the reclamation experts. They will need to assess the proposed substitution with regard to the expected performances.

Equally important is transparency in relation to the budgetary consequences of such a substitution. Will the new solution be cheaper than the original one? Or more expensive? In many cases, the global balance will not be profoundly impacted: even though the purchase of the material will probably be cheaper, the contractor will likely have to invest in additional workforce in order to be able to reuse it (preparation, possible tests, etc.). Knowing the hourly rate of the contractor or the cost of installation is a good way to frame these discussions.

7.3 What if nothing has been marked out in the specifications?

Some architects have humorously defined a construction site as "a space-time in which we realise that a great deal of what has been planned won't work but that it will be ok anyway"³⁰. Despite all the efforts to manage it, uncertainty is inherent to construction. Not all of the surprises that can crop up are unpleasant, though. Sometimes modifying the plans

³⁰ Amandine Dhée, *Les Saprophytes. Urbanisme Vivant*, Lille : La Contre-Allée, 2017. "Espace-temps où l'on se rend compte qu'une bonne partie de ce que l'on a prévu ne va pas mais que 'ça ira quand même'".

can even be beneficial to the project and to the future users. Nothing is ever completely set in stone. The question, rather, is how difficult or easy it is to adapt the plans to the opportunities that may arise.

Reclaimed elements foster an attitude of constructive opportunism, flexibility and adaptive behaviour. This represents a distinct advantage in the context of the construction industry which too often is accused of being overly rigid and stationary, unable to adapt to changing circumstances. Ultimately though, it is up to the project manager to assess whether a change of plan during the later stages of a construction project is worth the supplementary effort it entails.

7.4 Capitalising on what has been learnt

Building with reclaimed building materials and products is likely to present certain challenges to each stakeholder. **Every partner may be required to adapt their usual workflows. It is therefore important to capitalise on the lessons learnt in each project. Monitoring and reporting on the processes and results can be an asset that facilitate this learning curve.** As a contracting authority, you can require the tenderers to report on their results. It is strongly advised to plan opportunities for debriefing and to publish a final statement at the end of the project.

Conclusion

We have now gone through all the stages in the development of a building project, at each step suggesting methods and advice on how to integrate reclaimed construction elements.

By way of conclusion, the main recommendations of this manual are summarised below in a condensed list of the most essential points:

- Reusing building materials and products has many benefits, the main ones being the much lower environmental impact compared to new products, the fostering of local economies, and the preservation of the heritage embedded in existing building elements.
- In the light of the current climate crisis and environmental emergency, maximizing the integration of reclaimed elements in new buildings should be an important objective for the construction industry.
- Reuse features prominently in many official documents and roadmaps, from regulations to governmental declarations and strategic plans. There are many official documents and regulations to which you can refer in order to support your reuse ambition (see Annex 1).
- Expressing your reuse target as early as possible in the development process is the best way to ensure that all involved partners can properly consider this aspect in their contribution to the project development.
- There are different ways to express a reuse target. Depending on your ambition, it is important to choose the most suitable way to define it, to monitor it and to report on it afterwards.
- There are three main sources of reclaimed building elements: the reclamation market, the same site as the new project, or another construction/ demolition site nearby. The first option takes advantage of the know-how of existing reclamation traders. The latter two are likely to minimise the need for transportations. Each source will have different impacts on the workflow and the preparation of the building elements for reuse. It is possible to combine all three approaches in the same project.
- No procurement route prevents reuse, while some of them actively facilitate it. Do not hesitate to opt for a procurement strategy tailored to your reuse target.
- Carefully adapt the selection process for your design team to match your reuse target. Alternatives to classical tenders are often more suitable to assess the ability of the design team to tackle reuse. The same applies to the selection of the contractor (when this forms part of a separate tender).
- Designing with reclaimed elements implies a degree of uncertainty and therefore requires a certain flexibility. This can represent an opportunity to

re-think the role and leverage of architects within the contemporary materials economy.

- Technical and administrative specifications are good tools to help achieve your reuse target. Don't hesitate to adapt preformatted templates in order to meet this target.
- If well planned, even the construction phase can present interesting reuse opportunities, especially when working with enthusiastic and well-informed contractors.

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Annex 1 - Public policies which can be referred to in order to support a re-use ambition

At European level

Waste Directive 2008/98/EC (2008, amended in 2018). This regulation enforces the waste treatment hierarchy in Europe. Re-use is mentioned as a preferential waste prevention strategy³¹, while “preparation for re-use” features at the top of the waste hierarchy (just after prevention)³². This regulation has been transposed into most national (and/or regional) regulations of the European member states.

Annex 1 of Construction Products Regulation (2011). The main scope of this directive is the marketing of new construction products. In this regard, it does not directly address re-use. However, the first annex mentions the basic requirements that any buildings have to meet. Among them, one concerns “the sustainable use of natural resources”. This is where reuse is mentioned as a preferred way to meet this objective³³.

31 ‘Prevention’ means measures taken before a substance, material or product has become waste, that reduce: a) the quantity of waste, including through the re-use of products or the extension of the life span of products; [...]”. *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing Certain Directives* tt

32 Ibid. Art. 4 §1.

33 “Sustainable use of natural resources. The construction works must be designed, built and demolished in such a way that the use of natural resources is sustainable and in particular ensure the following: (a) reuse or recyclability of the construction works, their materials and parts after demolition [...]”, *Regulation (EU) N° 305/2011 of the European Parliament and of the Council Laying down Harmonised Conditions for the Marketing of Construction Products and Repealing Council Directive 89/106/EEC, Annex 1 (Basic Requirements for Construction Works)*, 2011., Art. 7.

Directive on Public Procurement of 26 February 2014³⁴. This new directive aims to support the Europe 2020 strategy for smart, sustainable and inclusive growth. In this perspective, the Commission has published a series of “Green Public Procurement Criteria” guides. One of these is dedicated to Office Building Design, Construction and Management³⁵. This directive is to be transposed into the regulatory context of each member state.

Closing the loop - An EU action plan for the Circular Economy (2015)³⁶. In this declaration plan on circular economy, it is stated that “the Commission will take a series of actions to ensure recovery of valuable resources and adequate waste management in the construction and demolition sector”³⁷. This document serves as a framework for further actions.

European Council conclusions on circular economy in the construction sector (8 November 2019). Through this declaration, member states submitted 11 recommendations and tasks to the European Commission with the aim of promoting the reuse of construction products. These recommendations highlight the potential for creating 6.5 million jobs and contribute to the EU’s climate objectives³⁸.

34 *Directive 2014/24/UE of the European Parliament and of the Council of 26 February 2014 on Public Procurement and Repealing Directive 2004/18/EC*

35 European Commission, *EU GPP Criteria for Office Building Design, Construction and Management*, 2016.

36 *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Closing the loop - An EU action plan for the Circular Economy*, COM (2015) 614 Final, Brussels, 2.12.2015.

37 Ibid. p.17.

38 European Council, *Council Conclusions on Circular Economy in the Construction Sector*, 2019.

In Belgium

Federal

Circular for the integration of sustainable development into federal public procurements

(2014)³⁹. The federal government sets a framework for its procurements. It fixes a target of achieving 50 % sustainable federal public procurements.

Flanders

Green deal circulair bouwen (2019). The Flemish Minister for Environment, Nature and Agriculture launched a Green Deal scheme to engage the construction industry, material manufacturers, local and regional authorities, private clients, researchers and other organisations in circular practices. Promoting the reuse of construction elements is one of the five key subjects⁴⁰.

Wallonia

Plan wallon gestion déchets ressources (2018)⁴¹. This governmental programme defines general objectives to integrate more circularity within the economy. One of the strategic objectives aims to enhance the reclamation of construction products and materials⁴². Another one aims to support the development of the reclamation industry for construction products⁴³.

Parliamentary resolution to support the development of circular economy in Wallonia (3 May 2019), especially measures 4 and 5 which aim at boosting the supply and demand for circular products and services.

Green Deal Achats Circulaires (2019)⁴⁴.

Frames a partnership between the Walloon institutions, enterprises, civil society and academics in order to allow knowledge sharing and speed up the development of a circular economy in Wallonia.

Brussels-Capital

Programme Régional en Économie Circulaire (2016). In this governmental roadmap, the construction industry is mentioned as a preferred driver to initiate a transition towards a circular economy. The reuse of construction products features prominently in many of the different measures⁴⁵. The programme Be.circular⁴⁶ is meant to implement the regional policy and has already funded several innovative projects.

Feuille de route des acteurs de la construction à Bruxelles (2019)⁴⁷. This document, published by the administration of the environment and energy in the Brussels-Capital Region, lists a set of objectives to foster the transition of the Region towards a more circu-

39 *Circulaire Pour l'intégration Du Développement Durable, En Ce Compris Les Clauses Sociales et Les Mesures Favorisant Les Petites et Moyennes Entreprises, Dans Le Cadre de Marchés Publics Passés Par Les Autorités Adjudicatrices Fédérales*, 2014.

40 Vlaanderen Circulair, OVAM, Vlaamse Confederatie Bouw, Green Deal Circulair Bouwen. Engagementsverklaring. February 2019. Annex 1, p. 15-16.

41 Plan Wallon des Déchets-ressources (PWDR), adopted by the Walloon Government on 22 March 2018.

42 More precisely, Strategic Objective 08 (in PWDR, Tome 2, p. 59)

43 More precisely, Action 44 (in PWDR, Tome 2, p. 119).

44 Wallonia Region, 'Green Deal Achats Circulaires | Développement Durable' <<http://economiecirculaire.wallonie.be/green-deal>> [accessed 18 December 2019].

45 Notably the measure RD15, which aims at "stimulating the creation of a professional sector for the reclamation of construction products". *Programme Régional en Économie Circulaire 2016-2020. Mobiliser les ressources et minimiser les richesses perdues: pour une économie régionale innovante*. RD15, p. 40.

46 Be Circular, 'Be Circular be brussels', *Be Circular be brussels* <<http://www.circulareconomy.brussels>> [accessed 18 December 2019].

47 *Feuille de route des acteurs de la construction à Bruxelles. Vers une économie circulaire*, Brussels, June 2019.

lar economy. One of the strategic objectives directly concerns the development of the reuse sector for construction products⁴⁸.

In France

Loi relative à la Transition Énergétique et la Croissance Verte (2015). This law obliges regional public administrations with an annual budget of more than €100 millions to publish a “Sustainable purchasing scheme”⁴⁹.

Feuille de route économie circulaire (2018)⁵⁰. Started by two French ministries and discussed with stakeholders and citizens, this roadmap lists 50 measures to implement a more circular economy. Measures 33, 34 and 35 specifically target the construction industry and suggest ways to enhance the reuse of construction products.

Plans régionaux de Prévention et de Gestion des Déchets (PPGD). Since 2015⁵¹ every French region must develop a waste prevention and management plan, including an Action Plan for Circular Economy⁵². These plans are to be adapted to the specificities of each region in terms of priorities and policies, and must be updated over the coming years so as to comply with the Circular Economy Directive⁵³.

48 Ibid. Strategic Objective 4, p. 22-27.

49 In November 2018, only 7% of the relevant authorities had complied with this obligation.

50 Ministère de la Transition écologique et solidaire, Ministère de l'Économie et des Finances, *Feuille de Route Économie Circulaire. 50 mesures pour une économie 100% circulaire*. April 2018.

51 *LOI N° 2015-991 Du 7 Août 2015 Portant Nouvelle Organisation Territoriale de La République*, 2015-991, 2015.

52 *Décret N° 2016-811 Du 17 Juin 2016 Relatif Au Plan Régional de Prévention et de Gestion Des Déchets*, 2016-811, 2016.

53 Zero Waste France, ‘Plans régionaux déchets : la montagne va-t-elle accoucher d’une souris?’ <<https://www.zerowaste-france.org/plans-regionaux-dechets-prpgd-montagne-accoucher-souris-2019/>> [accessed 18 December

Loi Anti-gaspillage pour une Économie Circulaire (2020). From 2022, construction products and materials suppliers will be subject to the ‘polluter pays’ principle, meaning they will have to contribute towards the waste management resulting from the consumption of their products. 5% of their contribution will be allocated to ‘solidaire reuse’ (meaning reuse activities dedicated to fostering professional insertion).

In the UK⁵⁴

Report of the Government Chief Scientific Adviser (2016)⁵⁵. This report highlights the need to “promote the reuse of products, for instance through more involvement of the voluntary and non-profit sector (the ‘third sector’) to redress the inequality between recycling and reuse⁵⁶”, although this general principle is not directly applied to the construction industry.

Government Construction Strategy 2016-2020 (2016). In this document, the Infrastructure and Projects Authority enhances whole-life approaches. It sets a target of reducing greenhouse gas emissions in the built environment by 50 % before 2025.

A Green Future: Our 25 Year Plan to Improve the Environment (2018). This plan refers to reuse in the context of a better resource management: “Make sure that resources are used more efficiently and kept in use for longer to minimise waste and reduce its environmental

54 The references for the UK are based on the UK Green Building Council, *Circular economy guidance for construction clients: How to practically apply circular economy principles at the project brief stage*. London, 2019. And more specifically section 2.3 “Policy landscape”, p. 12-13.

55 Report of the Government Chief Scientific Adviser, London, *From Waste to Resource Productivity*, 2016.

56 Ibid. p.10.

impacts by promoting reuse, remanufacturing and recycling⁵⁷”.

Climate Emergency Motion (1 May 2019).

This motion was approved by the British Parliament, after similar declarations by the Welsh Assembly and Scottish Parliament (and several cities in the UK). Although it does not have a compliant effect on the government, it is expected to urge the ministers to outline proposals that make net-zero emissions by 2050 a priority⁵⁸.

57 HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment*, 2018.

58 BBC News, 'UK Parliament Declares Climate Change Emergency' <<https://www.bbc.com/news/uk-politics-48126677>> [accessed 19 December 2019].

Annex 2 - Résumé of tender procedures in Belgium, France and the UK

Procedures for Design Services

In Belgium

Name of the procedure	Applicability	Negotiations	Publicity	Others specificities
Design contest	Always possible. Anonymity is mandatory above European thresholds for services	Possible	Mandatory	
Competitive procedure with negotiation (2 stages)	Always possible below €214,000 for services . Possible above, since the subject matter includes design or innovative solutions. <i>See details of all the specific conditions at L.17.06.2016 - Art 38 §1.</i>	Possible (but more limited above European thresholds)	Mandatory	Above European thresholds for services , only the submitted offer can be discussed. Below the threshold, the client's requirements can also be negotiated (except for the essential ones).
Competitive dialogue	Always possible below €214,000 for services . Always possible above, since the subject matter includes design or innovative solutions. <i>See details of all the specific conditions at L.17.06.2016 - Art 39 §1.</i>	Part of the process	Mandatory	According to the Brussels Bouwmeester, this procedure is particularly suitable for Public-Private Partnerships. It is less so for regular design services contracts. Be careful! When the design services are included within a global works contract, one should apply European thresholds for works contracts.
Restricted call	Always possible	Forbidden	Mandatory	
Open call	Always possible	Forbidden	Mandatory	
Direct negotiated procedure with prior publication	Below European thresholds for services	Possible	Mandatory	
Negotiated procedure without prior publication	Below €144,000	Possible	Optional	
Low amount public procurement	Below €30,000	Possible	Optional	Must still comply with general public procurement regulation (transparency and equal treatment). The contracting authority must be able to demonstrate that different quotes were asked.

In France

Name of the procedure	Applicability	Negotiations	Publicity	Others specificities
Design contest	Mandatory for new constructions above European procurement thresholds for services (with exceptions). Always possible below.	Possible	Mandatory	The tenderer's delivery must be compensated up to 80% of its price.
Competitive procedure with negotiation	Possible above European thresholds for services as an alternative to the design contest in the case of: refurbishment or conservation works, urban development, landscape project, infrastructure. Always possible below European thresholds for services.	Possible	Mandatory	
Competitive dialogue	Possible above European thresholds for services as an alternative to the design contest in the case of: refurbishment or conservation works, urban development, landscape project, infrastructure. Always possible below European thresholds for services .	Yes (inherent to the process)	Mandatory	Recommended for open and complex projects, in which the client experiences difficulties to define their project brief prior to selecting a design team. Be careful! When the design services are included within a global works contract, one should apply European thresholds for works contracts.
Adapted procedure	Below European thresholds for services	Possible (if specified in the contract notice)	Mandatory above €90, 000	
Adapted tender without prior publication	From €40,000 up to €90,000	Possible (if specified in the contract notice)	Optional	
Negotiated procedure without prior publication nor competition	Below €40,000	Possible	Optional	Must still comply with general public procurement regulation (transparency and equal treatment).

In the UK

Name of the procedure	Applicability	Negotiations	Publicity	Others specificities
Design contest	One of the options above the European threshold for services . Also possible below.	Possible	Mandatory above European thresholds. Possible below.	Below the European thresholds for services , the tendering process remains very flexible and must only comply with general public procurement regulation principles (transparency, open access and equality between the candidates). Interviews and negotiation are the basis of the tendering process, rather than design sketches and other productions.
Competitive procedure with negotiation	One of the options above the European threshold for services . Also possible below.	Possible	Mandatory above European thresholds. Possible below.	
Competitive dialogue	One of the options above the European threshold for services . Also possible below.	Inherent to the process	Mandatory above European thresholds. Possible below.	
Open and restricted call	One of the options above the European threshold. Also possible below. Most commonly used.	Possible	Mandatory above European thresholds. Possible below.	

Procedures for Works

In Belgium

Name of the procedure	Applicability	Negotiations	Publicity	Others specificities
Open tender call	Always possible	Forbidden	Mandatory	
Restricted tender call	Always possible	Forbidden	Mandatory	
Competitive procedure with negotiation	<p>Always possible below €750,000 for works.</p> <p>Possible above provided that the CA justify that :</p> <ul style="list-style-type: none"> - it is not possible to define the specs by referring to a norm, a European technical evaluation, a common technical specification or a technical referential. <p>OR</p> <ul style="list-style-type: none"> - that the peculiar nature of the project makes it impossible to award the contract without discussing its modalities. <p><i>See details of all the specific conditions at L.17.06.2016 - Art 38.</i></p>	Part of the process	Mandatory	Above European thresholds for works, only the submitted offer can be discussed. Below the threshold, the client's requirements can also be negotiated (except for the essential ones).
Competitive dialogue	Always possible	Part of the process	Mandatory	If used to contract with a construction contractor, then the contract will include the design service mission.
Negotiated procedure without prior publication	Below €144,000	Possible	Optional	
Low amount public procurement	Below €30,000	Possible	Optional	<p>Must still comply with general public procurement regulation (transparency and equal treatment).</p> <p>The contracting authority must be able to demonstrate that different quotes were asked.</p>

In France

Name of the procedure	Applicability	Negotiations	Publicity	Others specificities
Tender call	Always possible (open or restricted)	Possible	Mandatory	The use of price as a unique criteria is forbidden for works procurements.
Competitive procedure with negotiation	<p>Possible above European thresholds for works but at least one of the following criteria must be fulfilled:</p> <ol style="list-style-type: none"> 1. Needs cannot be met without the adaptation of available solutions. 2. The technical specifications cannot be established with sufficient precision by the Contracting Authority with reference to defined standards or technical requirements. 3. The contract cannot be awarded without prior negotiations due to specific risks or circumstances related to the nature, complexity, or legal and financial matters. 4. The subject matter includes design or innovative solutions. In that case, check that the design contest procedure is not mandatory, i.e.: <ul style="list-style-type: none"> 4.a refurbishment or conservation works. 4.b the client's needs can be satisfied only by negotiating solutions immediately available on the market. 4.c the peculiar nature of the project makes it impossible to award the contract without discussing its modalities. 4.d the client is not able to define the specs by referring to a norm, a European technical evaluation, a common technical specification or a technical referential. 	Possible	Mandatory	

Competitive dialogue	<i>Idem above row.</i>	Part of the process	Mandatory	If used to contract a construction contractor, then the contract will include the design service mission. The European thresholds to refer to are those for works contracts.
Adapted tender	Below European threshold for works .	Possible (if specified in the contract notice)	Mandatory above €90, 000	
Adapted tender without prior publication	From €40,000 up to €90,000	Possible (if specified in the contract notice)	Optional	
Negotiated procedure without prior publication nor competition	Below €40,000	Possible	Optional	Must still comply with general public procurement regulation (transparency and equal treatment).

In the UK

Name of the procedure	Applicability	Negotiations	Publicity	Others specificities
Single-stage tender	Always possible	Forbidden	Mandatory above European thresholds. Possible below	
Two-stage tender	Always possible	Not possible above European threshold for works . Possible below.	Mandatory above European thresholds. Possible below	This procedure is distinguished from the 'restricted procedure' and is especially compatible with Design & Build procurement routes: the first stage takes place during the concept design phase (RIBA Stage 2 or 3), where the preferred bidding contractor is chosen based upon quality criteria rather than on the price. They will then join the team on a consultancy basis using a PCSA (pre-construction service agreement) and contribute to completing the design. The second stage will happen at the regular time (RIBA Stage 4 - Technical design) during which the contractor will present a bid for the works.

Competitive procedure with negotiation	<p>One of the options above the European threshold for works, provided that:</p> <p>1. The needs of the contracting authority cannot be met without adapting readily available solutions.</p> <p>2. The contract cannot be awarded without prior negotiation because of specific circumstances related to the nature, the complexity or the legal and financial makeup or because of risks attaching to them.</p> <p>3. The technical specifications cannot be established with sufficient precision by the contracting authority with reference to a standard, European Technical Assessment, common technical specification or technical reference.</p>	Possible	Mandatory above European thresholds. Possible below.	
Competitive dialogue	<i>Idem above row.</i>	Part of the process	Mandatory above European thresholds. Possible below.	

Current European Thresholds for public procurements

Updated in 2020.

Type of contract	Central institutions and related organisations	Territorial institutions and related organisations
Supplies	€139,000	€214,000
Services	€144,000	€221,000
Works	€5,350,000	€5,350,000

Annex 3 - The main procurement routes and their relevance for reaching reuse targets.

Procurement route	Description	About reuse
Traditional contract	<p>Cumulation of services contract (architect and relevant experts), with one or several works contracts.</p> <p>An alternative is the British traditional contract in two-stages (see inset below)</p>	<p>Offers many possibilities to include reuse. The general chronology of the manual follows the main steps of this route (but its general recommendations apply to other procurement routes as well).</p> <p>Formulating successive contracts necessitates a smooth communication between the consecutive steps. The reuse target needs to be stated in all tender documents. The contractors are usually the last step in this process. They are in charge of acquiring and installing the materials specified earlier in the process by the designers. In such a sequence, designers often have to work without knowing who the contractors will be. It also prevents them from benefiting from the know-how of the contractors and the possible materials to which the contractors may have access. If contractors are asked to install materials that they did not choose, they should be given the opportunity to negotiate and express their possible concerns.</p>
Framework agreement	<p>Several architecture offices are contracted for a limited time span (max. 4 years). Fees are pre-negotiated. Contracting authorities can deal directly with these architects.</p>	<p>This route is usually reserved for simple projects such as housing extensions, light refurbishment and classic public apparatuses. Such projects are, of course, perfectly suited to integrating reclaimed building elements. Nothing prevents public authorities from including a reuse target in their framework agreements. It will allow them to:</p> <ul style="list-style-type: none"> □ - lower the environmental impact of their domain. □ - give several design teams and contractors the opportunity to develop their skills. □ - develop the local reclamation trade by ensuring regular demand.

Design & Build	<p>The building owner directly contracts a construction contractor who teams up with an architect and other relevant experts.</p> <p>This route can be applied to developing an entire project or specific lots in it.</p>	<p>The contractor is in charge of developing and constructing the project. The contractor has the final word on both the technical specifications and the budget.</p> <p>This strategy presents interesting opportunities to foster reuse. The practicability of the different options can be assessed directly and in a holistic way by the design team. Plus, the contractor has access to more opportunities for reclaiming building elements (other ongoing sites, own internal salvage yard, etc.). In D&B projects, however, budget and management choices are often determining factors. If the reuse target is not clearly set by the client, it risks being overlooked by the design team. More generally, this format also raises the question of the architects' professional independence and ability to defend the project commissioner's best interests.</p>
Innovation partnership	<p>Allows the contracting authority to procure an innovative product, service or work and the R&D it entails.</p>	<p>Most of the common construction materials and products can be reused without necessitating specific innovation. However, extremely ambitious reuse targets, very specific reclaimed building elements or related aspects (such as developing an assessment method to measure the impact of reuse) may justify the use of this format.</p> <p>In the scope of a building development including reuse target and R&D, the lead contractor will likely be a consortium including architects, construction contractors and various experts. The conditions of their collaboration will be framed by a contract. Specific attention must be paid to intellectual property rights and confidential agreements (within the consortium and with the client).</p>

Partnering system	<p>Aims to place all the stakeholders together in the project development from the outset, so as to take advantage of the expertise of each partner. The partners agree upon the conditions of their collaboration with the help of a project facilitator.</p> <p>This procedure is mainly used in the UK, where it is mostly reserved for large-scale projects.</p>	<p>This approach aims at fostering a balanced collaboration between the stakeholders. Such a collaborative context is very conducive to discussing the implications of reusing building materials. In opposition to the other formats, budget and design decisions are discussed throughout the entire project development.</p>
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In the UK, the **traditional contract in two stages** is a specificity. It is often used for projects below European thresholds. In this route, contractors are invited to tender as consultants from the outset of the concept design phase. The successful tenderer brings their own individual expertise to the design process, notably with regard to for technical and budgetary matters. The same contractor can simultaneously negotiate with the project manager in order to be contracted for the work. Being already familiar with the project, chances are high that this contractor will ultimately win the contract. This format is conducive to reuse in that it sets the conditions for an early dialogue between designers and builders. Unlike D&B, in this strategy the architect remains in charge of the project and budget management.

Annex 4 - Example of a back-up solution and substitution clauses in a works contract

Extracts from the administrative specifications for the works contract of the EDRF-project 'Zinneke/Masui 4 Ever' (Brussels-Capital Region).

Chaque poste des métrés fait par ailleurs la distinction entre :

- le coût de la **fourniture** (à l'exclusion de tout autre frais) ;
- le coût de la **pose**, qui inclut la main d'œuvre, tous les éventuels services et fournitures accessoires (câblage et tubage, canalisation, vanne d'arrêt ou de réglage, etc.), le transport, le raccordement, la mise en service et tous les autres frais, y compris les frais généraux et financiers ainsi que le bénéfice (ces derniers étant répartis sur les différents postes proportionnellement à l'importance de ceux-ci).

This extract explicitly states the obligation of the contractor to distinguish between the supply and the installation price for each specified element.

2.11 Clauses de réexamen (art. 38 R.G.E.)

2.11.1 Impossibilité pour l'adjudicataire de se procurer certaines fournitures de réemploi (concerne uniquement le lot 1)

Conditions d'application de la clause de réexamen :

- en ce qui concerne un poste pour lequel l'adjudicataire doit en principe acquérir lui-même des fournitures de réemploi, l'adjudicataire a offert dans son offre un prix (hors pose) qui se situe dans la fourchette de prix estimée par le pouvoir adjudicateur ; **et**
- l'adjudicataire démontre, en cours d'exécution du contrat, qu'il n'est finalement pas possible de se procurer les fournitures de réemploi concernées, ou qu'il n'est possible de se procurer celles-ci que pour un prix supérieur au prix maximum de la fourchette annoncée. L'adjudicataire apporte cette preuve en démontrant avoir pris contact et demandé des devis à plusieurs fournisseurs de réemploi, et après avoir recueilli les recommandations du conseiller réemploi de matériaux (Rotor ASBL) ;
- **alors** le pouvoir adjudicateur aura le choix entre les deux options suivantes :
 - i. soit il permettra à l'adjudicataire d'exécuter le poste concerné au moyen de fournitures neuves, pour un prix (d'achat et de pose) à convenir entre le pouvoir adjudicateur et l'adjudicataire ;
 - ii. soit il invitera l'adjudicataire à exécuter le poste concerné au moyen des fournitures de réemploi disponibles, moyennant un prix (d'achat et de pose) à convenir entre le pouvoir adjudicateur et l'adjudicataire.

2.11.2 Autres hypothèses de remplacement de fournitures de réemploi par des fournitures neuves

Sans préjudice de l'article 2.11.1, l'adjudicataire doit exécuter au moyen de fournitures de réemploi les postes concernés des métrés et il ne peut donc pas substituer à ces fournitures de réemploi des fournitures neuves.

Par exception, l'adjudicataire posera néanmoins des fournitures neuves à la place de fourniture de réemploi :

- soit, à la demande du pouvoir adjudicateur, et quel que soit le motif de cette substitution : dans ce cas, les parties conviennent d'un prix adapté pour le poste concerné (prix d'achat et de pose) ;
- soit, à la demande de l'adjudicataire, dans l'hypothèse où une fourniture de réemploi se détériore au moment de la pose, ou si un défaut est mis en évidence après la pose, requérant le démontage de la fourniture défectueuse, son évacuation, et le remontage d'une autre fourniture équivalente. Dans ce cas, les parties conviennent d'un prix adapté pour le poste concerné (prix d'achat et de pose). Néanmoins, si la détérioration ou la disparition de la fourniture de réemploi est imputable à l'entrepreneur, ce dernier assure, à ses frais, le remplacement de la fourniture par une fourniture de réemploi ou neuve équivalente conforme au cahier des charges ;
- soit à la demande de l'adjudicataire, pour tout autre motif justifié, si cette demande est acceptée par le pouvoir adjudicateur, et moyennant un prix d'achat et de pose à convenir par les parties, étant entendu que le prix total (achat + pose) payé par le pouvoir adjudicateur ne pourra dans ce cas pas excéder celui initialement convenu pour l'acquisition et la pose de la fourniture de réemploi.

This extract explains the 'back-up' solutions in case the contractor is unable to purchase the reclaimed elements prescribed in the specifications.

2.11.3 Remplacement de fournitures neuves par des fournitures de réemploi

L'adjudicataire posera des fournitures de réemploi à la place de fourniture neuves :

- soit, à la demande du pouvoir adjudicateur, et quel que soit le motif de cette substitution : dans ce cas, les parties conviennent d'un prix adapté pour le poste concerné (prix d'achat et de pose). Une telle situation pourrait notamment se présenter si, en cours d'exécution du marché, le pouvoir adjudicateur aperçoit une opportunité d'acquérir des fournitures de réemploi qui peuvent être utilisées dans le cadre du présent marché ;
- soit à la demande de l'adjudicataire, si cette demande est acceptée par le pouvoir adjudicateur, et moyennant un prix d'achat et de pose à convenir par les parties.

This extract anticipates the possibility of substituting a new product with a reclaimed one.