

FutuREuse

How to build a Roadmap

The do's and don't's of reuse
in the construction sector



Brussels Environnement for

Interreg 
North-West Europe

FCRBE
European Regional Development Fund

REUSE IN THE CIRCULAR ECONOMY

In the European Union and around the world, construction materials have a massive impact on climate change, ecosystems collapsing and natural resource overconsumption. As a waste prevention strategy, reuse is a great solution to overproduction and natural resource depletion.

Despite its waste prevention potential, the salvage and reclamation trade is largely overlooked, especially in the context of formal construction projects. Better consideration for this approach in tools widely used by the construction industry would be interesting leverage to foster, support and further develop the reclamation sector.

THE FCRBE PROJECT

FCRBE stands for Facilitating the circulation of reclaimed building elements and aims to increase by 50%, the amount of reclaimed building elements being circulated on its territory, by 2032. The project involves 7 partners:

Rotor, lead partner (BE), **Bellastock** (FR), **Brussels Environment** (BE), **The university of Brighton** (UK), **Salvo** (UK), **Construction Confederation** (BE), **Belgian Building research Institute** (BE) and the **Scientific and Technical Center for Building** (FR)

For more information on FCRBE: <http://www.nweurope.eu/fcrbe>

FUTUREUSE: 7 SHORT INTRODUCTIONS TO THE WORLD OF REUSE

This is one of a series of seven booklets that have been produced to serve as a taste of what the FCRBE project aims to achieve. The subjects span the broad spectrum of reuse, covering considerations before, during and after with useful information to guide and inspire working with reclaimed materials. The booklets also highlight environmental benefits, clarify grey areas and frequently asked questions regarding best practices, whilst sparking curiosity for a future where use is reuse.

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1.

Circular Economy and Reuse: Challenges for the Construction Sector

Waste to resources: a circular economy perspective

The sustainable use of natural resources, reducing waste and measuring resource efficiency have become essential challenges for Europe especially in times of dependence on supply. These issues are commonly linked to circular economy strategies that have been supported by European institutions in recent years starting with the Roadmap to a Resource Efficient Europe [1] and resulting in the EU Action Plan for the Circular Economy [2, 3, 4]. In fact, the development of circular economy strategies and roadmaps has experienced exponential growth across European countries over the last few years. A recent study shows this trend by highlighting more than 60 strategies in place across Europe at the end of 2019 [2]. In view of urgent current issues and Europe's climate change objectives, this tendency is likely to continue in the future.

What is meant by Circular Economy?

Circular Economy is a relatively broad concept which is difficult to define in precise terms. This is due to the 'novel features' of this concept¹. Nevertheless, it is increasingly used in this context and the issues involved are becoming clearer. Despite the numerous definitions proposed for the 'circular economy' (CE) concept, the following principles are universally accepted [5]:

- CE has been developed to challenge our industrial linear economy based on a 'take-make-waste' model.

- CE aims to extend the lifecycle of products and maintain the environmental and economic values of already extracted and manufactured natural resources in the same way as reuse.
- The model distinguishes between technical and biological cycles. Biological cycles concern food and biologically-based materials whose cycles regenerate living systems. Technical cycles on the other hand recover and restore products, components and materials through strategies such as reuse, repair, remanufacture or (as a last resort) recycling.

The term 'circular' can be confusing because it suggests that flows and materials have to 'circulate'. However, the cascade principle (supported by EC) advocates a hierarchy of action that places maintenance in pole position ahead of reuse, refurbishment, and lastly, recycling. Maintenance can be understood as the action required to keep a building, infrastructure, etc. in good condition². The underlying objective is therefore to maintain and extend the life cycle. This precision often appears to be overlooked in the action hierarchy.

Where do reuse and the construction sector fit in?

As mentioned in the context, the construction and demolition sector is responsible for generating one of the largest volumes of waste in Europe and uses no less than half of the Earth's raw materials. The embodied carbon of construction products represents 10 to 20% of the total embodied carbon in EU buildings [6]. Despite the efforts made in recent years to reduce energy consumption and improve waste treatment, the challenge remains significant for this sector. In addition, construction is also a

1. Even if 'circular' practices have always existed, the name 'circular economy' and the concepts which result from it are relatively recent on the political strategy stage

2. Definition given by the Cambridge Dictionary

major player in the European economy both at country and city level – hence it is defined as a priority sector for action. Its potential is indeed considerable not only in socio-economic terms (job creation, SMEs, etc.) but also in terms of circular economy opportunities involving reuse.

Indeed, circular economy strategies usually mention reuse as one of the main mechanisms involved in the transition towards a more resource efficient industry (and economy). By preserving the value and utility of the products and therefore extending their lifespan, reuse reduces the impact on raw resources and lowers waste production. Reuse also nurtures local economic activities and, to some extent, preserves the cultural and (crucially) heritage value of the materials.

'Reuse' is viewed as a preventive act by diverting waste flows. Prevention is at the top of the action hierarchy defined by the European Waste Framework Directive. However, the Directive also refers to 'preparation for reuse' as part of a waste management strategy (as opposed to prevention). Ranking in second place in the action hierarchy, 'preparation for reuse' would serve to remove reusable elements from the status of waste (through certain light restoration operations). One of the FutuREuse collection booklets³ attempts to clarify these definitions and the status of reuse elements.

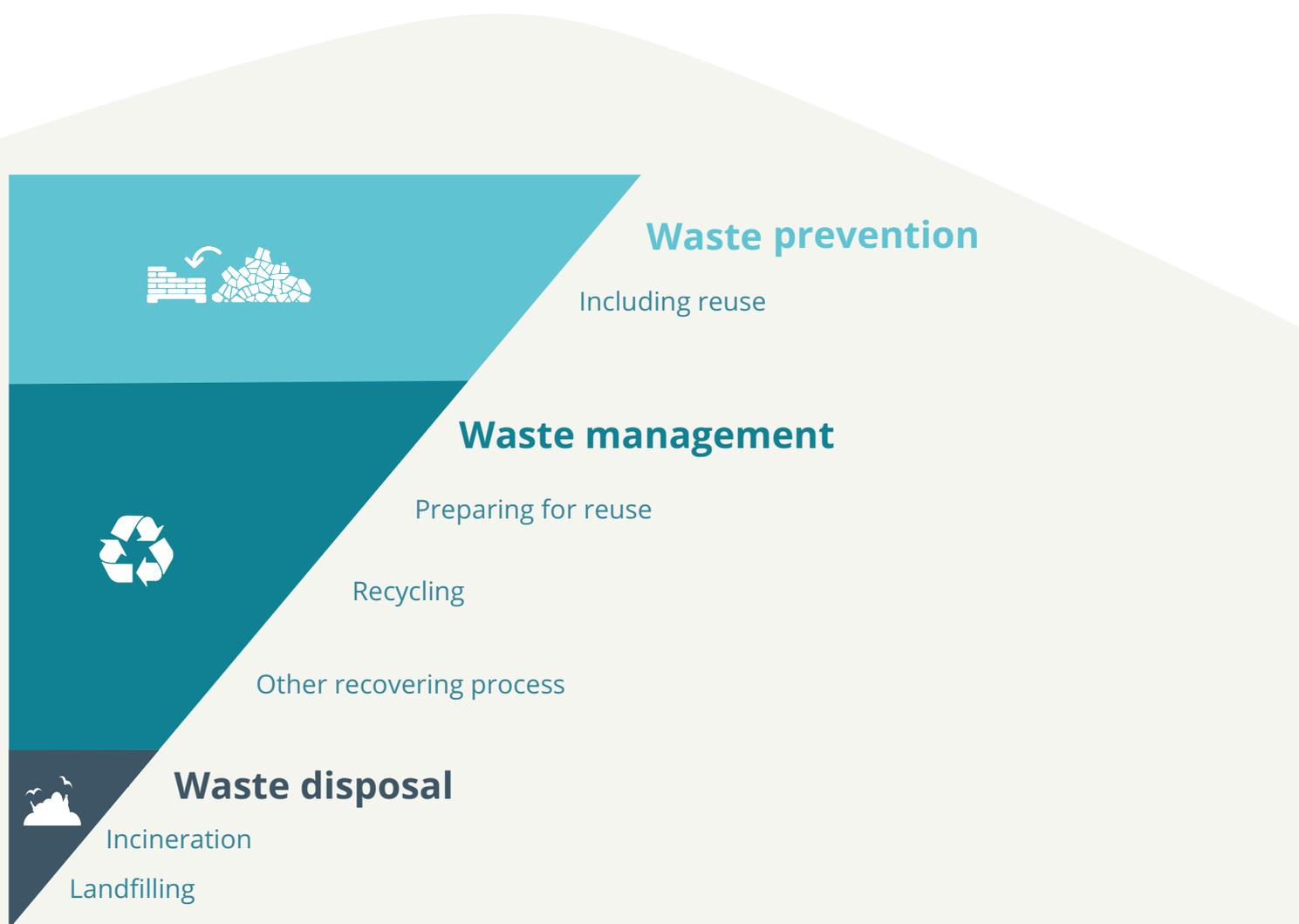


Figure 1: Action hierarchy (based on the European Waste Framework Directive)

3. Refer to *Waste or product? Criteria for reuse* of the futuREuse booklet series (by Susie Naval for Rotor, Interreg Project FCRBE, 2021)

2.

A brief overview of existing roadmaps

Circular economy strategies in Europe

In recent years, the development of circular economy strategies and roadmaps has experienced exponential growth across European cities, regions and countries. A study carried out for the European Economic and Social Committee listed no less than 33 strategies⁴ at the start of 2019 with a further 29 in the pipeline. In total, more than 60 circular economy strategies had been developed or were under development by the end of 2019, the first one appearing in 2014. Literature reviews have not been updated since then. As this information already dates from 2019, the number of existing strategies is expected to rise even further by the time it is published. Strategies are being developed in various countries around the globe such as France, UK, Belgium, Luxembourg, the Netherlands, Germany,

Finland, Denmark, Norway, Italy, Spain, Portugal, Greece, Slovenia and Poland. In most cases, circular economy strategies propose either a horizontal vision or a more sectoral perspective, and are categorised according to 3 distinct types [7] (see Figure 2).

Despite this classification system, each strategy has its own specific features which can be explained by various parameters: distinct territorial context, variable degree of understanding and definition of the concept, different competences and involvement of players/stakeholders, type of governance, etc. Local strategies are generally more targeted and propose more concrete measures. However, strategies should be developed with transversal vision (inter-sectoral and inter-scale) with an outward vision extending beyond territorial and institutional boundaries at local level. Indeed, material flows and stakeholder dynamics very often exceed the local scale and authority-related competences. This aspect



Figure 2: Different types of strategies [7]

4. 13 cover national levels, 9 regional, and 12 local levels

-  national scale
 -  regional scale
 -  local scale (cities)
 -  Reuse strategies
 -  outside EU countries
 -  focus on construction sector
- } CE strategies

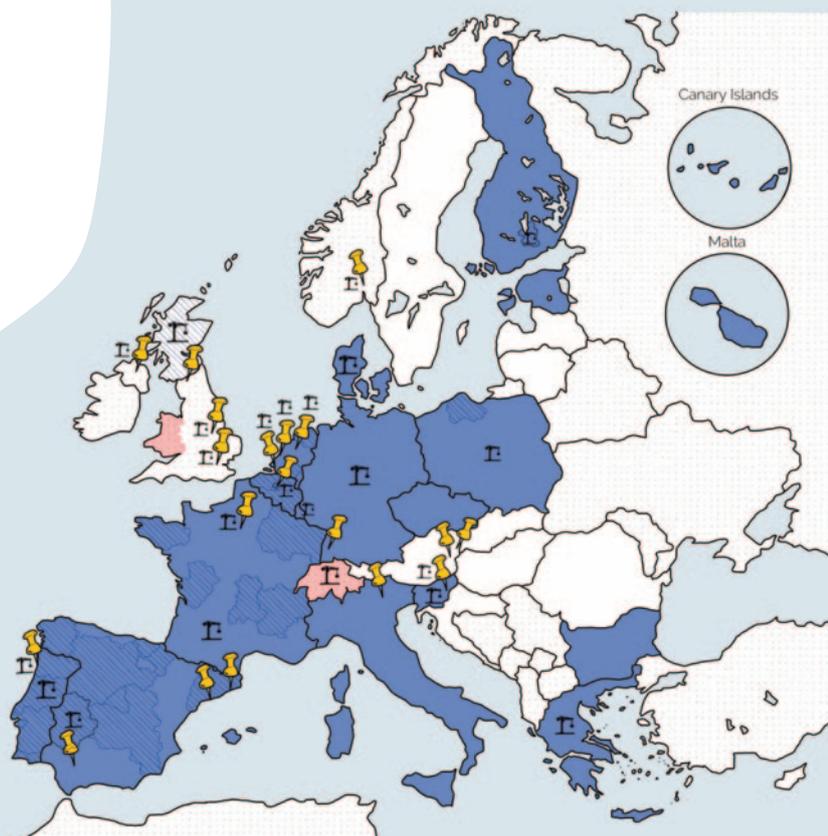


Figure 3: Map showing the key existing roadmaps in Europe (based on [7])

should be neither forgotten nor underestimated in the development of more local strategies. The map on Figure 3 outlines the key existing strategies. As the development of circular economy strategies is of growing interest, this map is not exhaustive and should soon include new initiatives.

Existing strategies may inspire new ones, thereby accelerating the process and the shift towards a more circular economy by forging links between sectors, territories and stakeholders. Whereas the initial circular economy strategies seemed more focused on recycling and waste management, the most recent approaches highlight a growing interest in integrating the entire value chain [7]. Changes are therefore afoot in the guise of circular economy strategies. Indeed, a cross between a global, transversal and specific, sectoral approach seems inevitable and is key in developing this type of strategy. The answer is to strike a balance between promoting ambitious strategic objectives on the one hand and ensuring that they remain both achievable and quantifiable on the other hand.

The role of reuse and the construction sector in CE strategies

While the circular economy is well represented in developing current strategies, the role of reuse is not always as clear-cut or apparent in this regard. Waste and recycling clearly continue to play an important part in the development of such strategies. But their evolution highlights the inclusion of other aspects related to circularity to an increasing extent with reuse being of paramount importance. However, *repair, reuse and refurbishment* are classed as horizontal topics and key components in circular economy strategies, as evidenced in *Public Procurement and Design* [7].

Reuse is considered a horizontal topic because it concerns many sectors and actions including consumption, legislation, training and skill development as well as networking, etc. It is linked to production and product life cycle but requires the operation of other levers such as regulatory changes, innovation, public procurement, platforms or

territorial development. Similarly, Construction, Waste Processing, Food & Feed and Manufacturing, are more frequently implicated in circular economy strategies than other economic sectors such as Mobility, Energy, Heat and Electronics [7].

Reuse is therefore a key topic in the implementation of the circular economy, just as construction is defined as a priority sector. The salvage and reclamation trade is declining in NWE, especially in the context of formal construction projects. Greater consideration of this approach in a strategy and tools context would provide interesting leverage to foster, support and further develop the reclamation sector [8]. In this particular scenario, the development of a distinct roadmap for reuse (including, but not limited to, the construction sector) would better target action to support the necessary implementation process. Moreover, it would provide a proper, relevant definition and thus promote a general understanding of reuse in terms of the construction sector in particular.

Specific reuse strategies

Although circular economy strategies are witnessing strong growth, it is more difficult to identify and list similar strategies applied specifically to reuse, particularly in the construction sector. This could be due to the highly specific nature of reuse compared to the circular economy, which has a broader spectrum of action. It should be noted that the circular economy is an axis very clearly identified by the European Commission and supported in its priority actions, while reuse is present, but perhaps less 'precisely'. The term appears in various programmes such as the circular economy, the field of resource and waste management, and renovation, etc., but is not as specific as in the case of the circular economy. However, the references, books, guides and practices relating to reuse have also expanded in recent years. The following documents have been developed as or in conjunction with strategies or roadmaps, but this list is by no means exhaustive.

Preparation for re-use: a roadmap for a paradigm shift in Wales [9]

This roadmap focuses on local authority-collected municipal waste streams such as clothing, furniture, wood, carpet/underlay, paint/varnishes and waste electrical and electronic equipment. It is not,

therefore, directly applicable to the construction sector but the approach is of interest. The objective pursued by this roadmap is to support increased preparation for re-use that takes place in the municipal waste stream in Wales. To this end, the roadmap seeks to model different scenarios from 2015-2050 and estimate their impact in terms of job creation, avoidance of greenhouse gas emissions, national reuse, recycling and composting rates, and direct and indirect added value to the economy. On this basis, the document outlines the potential actions and interventions needed in order to achieve the objective, namely greater preparation for reuse.

Reuse objective for the Brussels Capital Region [10]

The characteristics, constraints and issues specific to the reuse of construction materials require the development of an approach specifically adopted for this type of element. Without being a regional strategy *per se*, the 'reuse objective' document proposes concrete courses of action to develop the reuse sector for building elements in the Brussels-Capital Region. It defines reuse and the advantages of this practice for the construction sector. The report defines 7 major challenges which the reuse sector must face: clichés, labour cost, market competition with new products, supply and demand, etc. It then proposes 14 milestones to develop the reuse sector in Brussels through 3 lines of action: activation, support and encouragement, and last but not least, regulation.

The Swiss reuse roadmap [11]

This roadmap has been devised specifically for the construction sector. It is based on an analysis of the context and a survey of sector stakeholders. The document initially proposes to define the term 'reuse' before placing it in the construction sector context and circular economy concept. The roadmap presents a list and the locations of the (150) stakeholders involved in reuse in Switzerland. It defines the type of activities they offer and their motivations. These stakeholders were questioned on what they deem to be the hindrances or levers to reuse. The hindrances included the lack of experience, excessively short deadlines, inertia to changes in building habits, the cost of manual labour, networking, logistics (transport, storage), standards and guarantees, etc. While the most frequently cited levers concern ecological aspects (saving resources,

embodied energy) and the stimulation of creativity and economic activity, the roadmap seeks to carve a niche for reuse in the construction market by identifying five interdependent fields of action:

- The reuse of architectural and design achievements must be encouraged, documented and disseminated.
- The reuse scene must be organised more efficiently.
- The construction sector and vocational education must integrate reuse into their programmes of work.
- The public must be made aware and informed about the achievements of architecture and design of reuse.
- The political world must support and consolidate reuse.

The document also refers to the reuse situation in the construction sector in France and Belgium.

3.

Key ‘ingredients’ to implement a roadmap

Some 'ingredients' are necessary to design and build a roadmap. Several references to guidelines for developing a circular economy strategy are discussed in this chapter. Many books and guides also focus on reuse in the construction sector with the emphasis on technical

or concrete considerations. This document mainly focuses on the basics of developing a strategy, while documents discussing reuse will assist in putting theory into practice in a generally more contextualised setting. The 'list of ingredients' is introduced in the form of 7 key questions for developing a strategy or roadmap. They are listed in Table 1 below.

Table 1: Key questions in roadmap development

THE KEY QUESTIONS TO ASK WHEN DEVELOPING YOUR ROADMAP ⁵ :	
 Strategic objectives?	> Definition (common understanding of the topics and concepts targeted)
 What is the scope? And what are the needs and anticipated outcomes?	> Foundations (scale, sector, value-chain, stakeholders)
 What is the context?	> Challenges posed and what already exist
 What are the goals and priorities?	> Objectives (in terms of problems and opportunities)
 How to achieve them	> Implementation (actions, competences needed and/or levers of action, key partners and stakeholders involved, governance, instruments, time frame and milestones)
 How to measure and evaluate progress	> Monitoring and evaluation (linked to implementation)
 How to improve the strategy and make it evolve	> Improvement

5. Based on [7]

Common definition

To use a roadmap effectively and appreciate its usefulness, it is necessary to understand what type of tool it is. It is essential to define a common understanding of the topics and concepts targeted. In this case, the idea is to replace reuse in the circular economy context for a specific economic sector, namely construction. This exercise is not always simple, as there is currently no consensus on the exact definition of circular economy. As for reuse, its definition is given in a directive but is still subject to interpretation. Finally, the construction sector may appear to be the simplest to understand, but it is important for the strategy to set the framework (what types of activities are targeted, how far up the value chain do we go and which stakeholders are brought on board). Indeed, vague concepts lead to misunderstanding and may jeopardise effective strategic implementation. This is how we propose to interpret these different concepts and topics. Clarification is given on the type of tool represented by a roadmap and possible interpretations of reuse in the context of the circular economy and the construction sector in particular.

What kind of tool constitutes a roadmap or strategy?

The roadmap is a strategic document that defines a vision and overarching objectives, setting out the major, tactical steps required for their achievement. A strategic roadmap meets the WHY and WHAT criteria and is usually broken down into an action plan to describe HOW. Roadmaps present the issues and *objectives to be met*, explain why action is needed, outline policy options and describe the main features of the consultation strategy [12]. Consequently, the roadmap is also used as a tool to define the scope of major new legislation or policy, to evaluate existing legislation or policy and to compare the strengths and compatibility of inter-related legislation and policies[12]. As previously mentioned, each roadmap and strategy has its own specific features depending on scale and context. Some explain the HOW aspect in more detail, but this does not pose a problem provided that vision continues to be the common thread.

Considering the construction sector from a circular economy perspective

Applied to the construction sector, the loop principles proposed by the EC can be interpreted according to the different scales of the building. The figure below adapted from [13] illustrates this concept. Priority is ordered from left to right and from inner to outer loops.

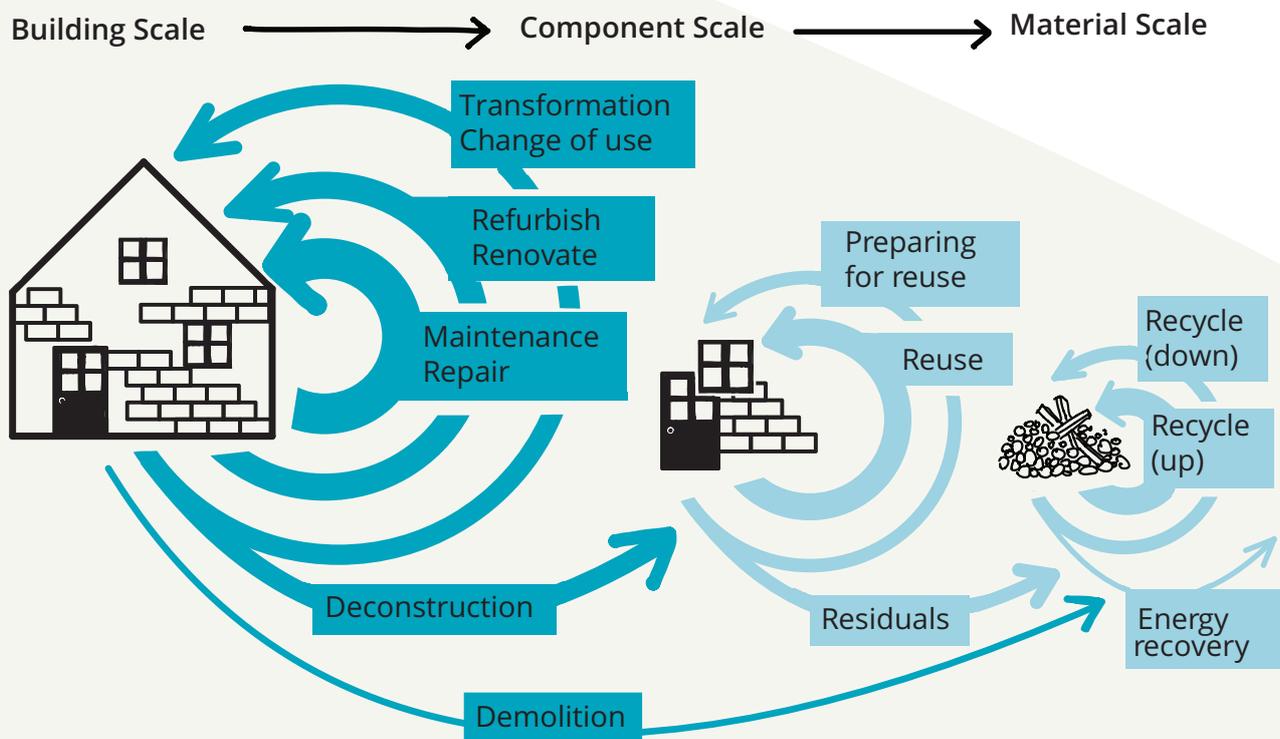


Figure 4: Circular economy loop hierarchy applied to the building industry (based on [13])

How does reuse fit this context?

As mentioned earlier, the majority of current and existing roadmaps deal with circular economy and reuse is included as one of the priority action loops of the cascading model. However, the term 'reuse' is often confused with 'recycling' but implies a different approach and other specific features that are not usually discussed in strategic detail. This leads to some confusion that is unfavourable to reuse even though it has considerable potential in many sectors such as construction and demolition activities. Moreover, *recycling statistics generally do not consider reuse. Thus the waste that has been prevented is not assigned any value* [14]. Therefore, reuse measurements often remain unclear and hamper data collection from one project to the next [8].

When talking about 'reusing construction elements', the Interreg-FCRBE Project refers to a *series of practices focusing on reusing a construction element or material after its initial use. Reuse has to be distinguished from recycling, which entails the physical or chemical transformation of a construction product in order to recover its constituting matter (e.g. crushing concrete rubble to make aggregates, or mulching wooden elements to make chips).*

On the other hand, reuse tends to keep the relevant construction elements as intact as possible, notwithstanding that the reuse of a construction element can involve a series of element repair or renovation activities such as cleaning, altering dimensions and conditioning, etc. Ideally, the installation of the reused material or product should be reversible to allow the same product to be put to future use. Reuse includes handmade and low-tech recrafting, repurposing or remanufacturing, such as the sawing of reclaimed timber beams into planks for use as flooring, or making new furniture, for example. A reclaimed construction element can be used either for a similar purpose to its original one, or for a completely different application [15].

The Swiss roadmap [11] defines the reuse of construction elements, in the generic sense, such as the recovery of construction elements during construction work, remediation, transformation or demolition and reusing them in a new project. This roadmap identifies two distinct concepts in the term 'reuse':

- **Reuse** which consists of reusing the element in its primary function, for example a window reused as a window.

- **Reuse** which consists of reusing the element in another function, for example a window reused as a separating element between two interior spaces.

The definition of 'reuse' (and its translation from one language to another) therefore remains subject to differences in terms of understanding and interpretation although some regions agree on a certain number of points. When developing a roadmap for reuse in the construction sector, it seems essential to provide a clear definition of the terms and stages of the value chain targeted in accordance with the regulatory framework and the specific characteristics of the sector and context⁶.

Foundations and Scope

After establishing a common understanding, it is important to be accurate about the scope of the roadmap, by precisely identifying the specific needs and anticipated results.

Scope

Scale

Strategies and roadmaps can be developed at numerous levels: European, national and regional or local. Governance may influence the scale of the strategy. Although the different levels are complementary, it may be easier to begin with a national strategy to establish and agree on common bases. However, it is often essential to link general rationales to local needs in order to reach specific outcomes. Multi-level strategies allow crossing top-down and bottom-up approaches in a complementary manner. In other words, strategies must be connected to the local economic, social and environmental context to be really effective, but must remain consistent with the visions developed on a larger scale (national and European). As previously mentioned, a transversal vision that extends 'beyond territories' is also essential to ensure strategic success (especially at local level).

..... A reuse roadmap in the construction sector will definitely focus on more local scale strategies especially in an urban area where the building stock and renewal rate are often high. Nevertheless, it must be developed in accordance with a wider policy framework and support new policies to enhance reuse practices more broadly within the sector.

6. Refer to Waste or product? Criteria for reuse of the futuREuse booklet series (by Susie Naval for Rotor, Interreg Project FCRBE, 2021)

Sector

A strategy can be developed for several sectors, particularly in the case of the circular economy. Reuse can involve different sectors such as clothing and textiles, electronics, furniture and construction, etc. although these may be more limited compared to circular economy strategies. Moreover, each sector has its own specific features which would obviously lead to the development of specific strategies for each sector, particularly in construction. Indeed, this economic sector offers numerous relevant reuse opportunities. The resulting sector focus strategy will certainly have a more local scope and implications (see chapter 2 on existing roadmap), not forgetting that 'reuse' implies linking to many other issues such as legislative action, skill and training development, networking and education, etc.

A reuse roadmap in the construction sector presents great challenges in terms of reducing raw material consumption and waste production. Reuse offers real opportunities in environmental, social and economic terms (not forgetting potential links with other areas). The sector has more or less already developed reuse channels but often remains an economic sector little known to stakeholders.

Stages

Production, consumption, waste management, secondary raw materials, innovation and investments - all of these stages in the value chain must be included in the strategy or the loop may not be closed and the paradigm shift to a circular economy may not be achieved [7]. This is a feature of circular economy strategies which target a variety of broad fields. In the case of more sectoral approaches, all stages can be

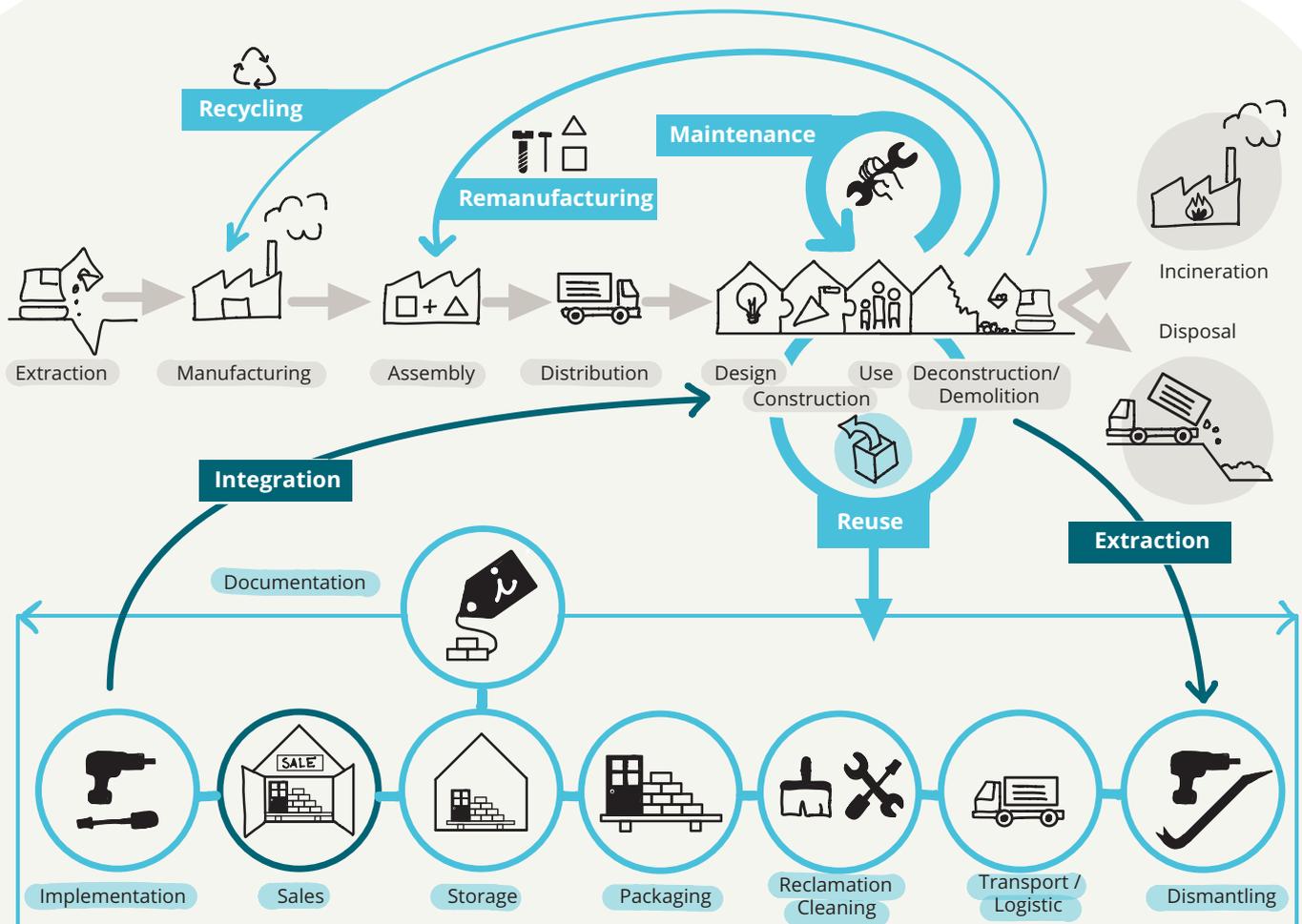


Figure 5: Loop hierarchy: zoom on the reuse value chain

considered but strategies can also focus on specific parts of the value chain depending on the targeted sector. Strategies applying to the construction sector will comply with more specific stages such as production and raw materials [7].

A reuse roadmap in the construction sector should consider all stages of the value chain in an interdependent manner (see Figure 5). The FCRBE project mainly focuses on facilitating the use of reclaimed elements through extraction and integration which incorporate some of these stages (such as auditing for dismantling, resellers and prescription, etc.). Ideally, all stages in the value chain should be integrated into the development of a reuse roadmap to ensure improved strategic implementation.

Stakeholders

Determining the scope also includes understanding the ecosystem of stakeholders who can influence or be impacted by the strategy (see Table 2 below). To ensure a wide integration of strategies, it is recommended to involve each stakeholder in the value chain (or in the targeted stages) and obtain their input in developing a strategy (obstacles, needs, knowledge, etc.).

This could lead to an inclusive approach that supports effective implementation of a strategy. Who/what are the main stakeholders?

The European construction sector is characterised by *many small firms, low labour productivity and limited vertical integration along the value chain* [5; p.112]. Since this sector remains relatively fragmented (extensive subcontracting, overspecialised knowledge and capabilities, etc.) and is based on traditional practices, *industry involvement and cross-government department collaboration are all the more crucial. Other society stakeholders, including citizens and consumers, labour unions and environmental organisations, should also be engaged* [5; p.14].

The role of the different stakeholders is not always specified, but targeting the audience will be necessary during the strategy implementation phase (see the paragraph on governance on page 17). These stakeholders can interact with each other directly or indirectly (see Figure 6).

 Public authorities Policymakers	<p>They have a key role as they are mainly responsible for the development of strategies and their implementation (they have the instruments and capacities) in a long-term perspective. Procedure inertia can delay the implementation process.</p>
 Businesses / Private stakeholders	<p>They are a driving force since they can assist with implementation through pilot projects, new products/services or business models. They can generally contribute more quickly to the implementation of measures requiring the support of public authorities.</p>
 Universities/ Research centres	<p>They usually contribute in strategies by conducting studies, sharing knowledge and/or innovative solutions and education. They are usually less involved in the implementation stage.</p>
 Civil society organisations	<p>They can promote the transition and model change, and scale-up the initiatives. They are less involved in developing strategies compared to implementation even if direct contribution is rarely planned. But they can share knowledge on which strategies can be based. In circular economy strategies, these civil society organisations are mainly represented by business associations. Their structure can communicate results to a broader audience. Their involvement in building strategies should be taken into greater consideration.</p>
 Citizens	<p>Their participation is important even if their direct involvement in building strategies is difficult to manage. However, they also are agents of change.</p>

Table 2: Stakeholder profile (based on [5] and [7])

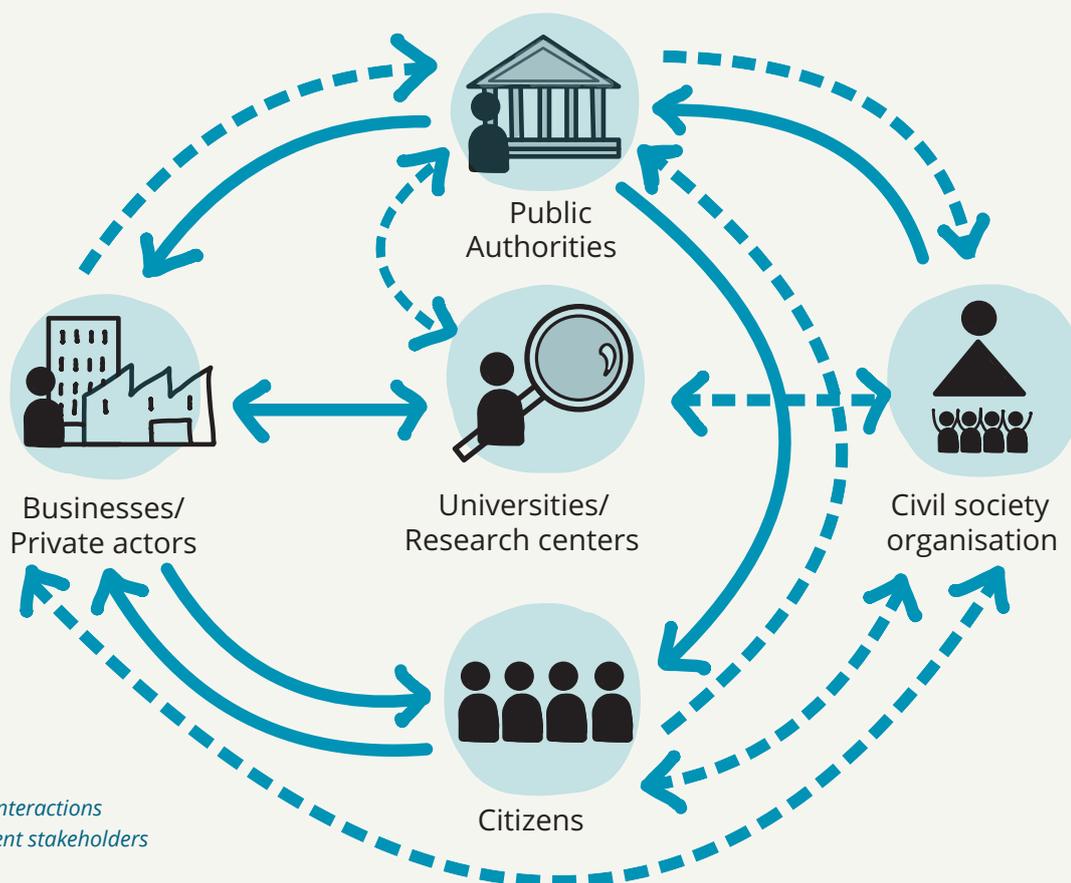


Figure 6: Possible interactions between the different stakeholders

Needs and anticipated results

Overall, when building a strategy, it is equally important not to compartmentalise the objectives (keep the transversal approach in the value chain, territory and sectors, etc.) and, at the same time, not to be overly ambitious (particularly in the case of the circular economy which encompasses several sectors).

The type of needs and anticipated results can vary depending on the context, sector, sub-sector and/or topic targeted.

In relation to circular economy and reuse issues, anticipated benefits can include the following: a reduction in CO₂ emissions and environmental impacts, waste reduction, encouragement of short circuits and local labour, job creation and stimulation of growth, greater research and innovation, and resource efficiency⁷. Needs may arise as obstacles, constraints or characteristics will have to be overcome in order to

achieve the desired objectives. In this climate, it is important to analyse the situation and monitor the stakeholders and sector targeted.

For example, the circular economy strategy for the construction sector in Brussels has been developed by following three main steps [16]:

- Understand what is meant by 'construction sector': analyse and survey the sector (obstacles and opportunities)
- Develop a long-term vision for 2040: involve the various stakeholders in the reflection (participatory and co-construction process via workshops)
- Define how to implement this vision: continuation of the process with stakeholders that resulted in the development of a specific circular economy roadmap for the construction sector.

7. According to the European Commission, resource efficiency means using the Earth's limited resources in a sustainable manner while minimising impacts on the environment. It allows us to create more with less and to deliver greater value with less input (https://ec.europa.eu/environment/resource_efficiency/).

	Characteristic	Needs
1	Limited ongoing activities and initiatives	Create awareness of the benefits and needs
2	Disconnected ongoing activities and initiatives	Mobilise stakeholders
3	No impact on economy or society	Create leverage in activities and initiatives at grassroots level
4	(Overly) focused ongoing activities and initiatives	Diversify the scope and nature of CE initiatives
5	Lack of further specification and financial support	Focus the scope and nature of activities and initiatives in preparation of programme development

Table 3: Identifying characteristics and needs [7]

Needs can be formulated on the basis of characteristics identified in the situation analysis. In this respect, the report on CE strategies and roadmaps in Europe identifies 5 main requirements to build a strategy [7; p.45-46] (see Table 3).

Context

This is where context analysis comes in. A strategy can only be developed in relation to a given context. Analysis of the latter is therefore a crucial step in developing a roadmap. This context is specific to each country, region and city. It also depends on the sectors considered. Each level of context is interdependent. Thus, the local or sectoral context will depend on the general framework in which it operates, while the general framework will be defined in a more specific manner according to each situation. The context analysis aims to identify **issues** and **challenges** to be addressed whilst adopting a global approach. The links between the different context levels must be established to ensure strategic consistency.

In addition, an analysis of material flows and stocks (also known as urban metabolism, territorial metabolism, industrial ecology or urban mining studies), based on top-down but also bottom-up methods, could also prove decisive. This would allow the context to be taken into account more precisely, in order to target the most relevant sectors for reuse or to establish the reference point on which to base an assessment of the

improvements brought about by the implementation of the strategy. Moreover, having a map of the materials contained in the building stocks could help format the up-scaling approach for reuse⁸.

Objectives

Context analysis leads to the identification of **challenges and needs** to be addressed. The objectives can then be formulated to overcome these issues. The number of challenges can be significant. To achieve certain results, it is advisable to set a limited number of challenges which can then be broken down with several objectives for each one (1 to 3 or more). It is important to clarify the goal and the starting point in the earlier strategy development stages. Defining a common and clear target and specifying the tools to measure the progress on a timeline are key to good implementation. Thus the objectives must be [7]:

Contextualised: ensure coherence between programmes, visions and strategy at multiple scales (see the paragraph on 'The context')

- Concrete: focus on a single element per objective
- Clear: ensure comprehensive and common understanding
- Timely: align with other local and larger scale objectives (see the paragraph on 'Actions')
- Measurable: allow monitoring and progress evaluation (see the paragraph on 'The monitoring and Evaluation').

8. For more detail on the subject refer to *Understanding urban material stockpiles* of the futuREuse booklet series (by Emilie Gobbo for Brussels Environment, Interreg Project FCRBE, 2021)

Implementation

Actions

Action plans can be devised in order to achieve the previously defined objectives. Actions can be grouped by type and association to formulate **initiatives** according to the guidelines and objectives to be achieved. They also can be further divided into sub-actions for greater precision. After listing the actions and grouping them into initiatives, it is important to fix priorities and schedule them in a phased timeline. Moreover, it is necessary to identify the resources (including human resources) necessary for their implementation. However, this degree of precision will be more easily achieved by translating the strategy into an action plan.

An example of 'initiatives' on how to achieve the objectives of a circular economy strategy for the construction sector could include the following [17]:

- Integrate circularity and reuse into practices
- Stimulate demand
- Stimulate supply
- Develop and support channels and sectors
- Prepare/create a favourable logistics framework
- Prepare/create a favourable regulatory framework

Competencies

In order to guarantee the proper implementation of actions, it is important to quickly review the competences and resources needed both internally and externally: what are my competences and levers for action? Who are my key partners, who will be impacted by the approach, who should be mobilised? (internally and externally: developers, sponsors, etc.).

Governance

Based on the previous step (competencies and stakeholder ecosystem), strategies need clearly established governance that allows for co-construction. This point is often underestimated but remains an essential step in building a strategy. It is important to understand the stakeholders to be brought to the table, the common objectives and how the whole process should be managed. *Setting a national ambition level can be a powerful lever to align project stakeholders on the overall direction.* Likewise, it is important to consult businesses and stakeholders early in the process [5].

Engage and map the relevant stakeholders

As previously mentioned in the scope definition (see 3.2.1), involving value-chain stakeholders in strategic development can ensure improved integration of strategies. In addition, since certain stakeholders play significant roles in strategic implementation, partnerships are equally important. The following should be defined in order to put action plans in motion:

- The stakeholders involved (in the value chain, in the targeted stages with regard to actions)
- The target audience (for the strategy or actions described)
- The resources and key stakeholders needed to support the implementation process
- The contribution of each stakeholder in the said implementation process.

Their interactions in the context and value chain should then be mapped with regard to realistic objectives.

When to engage the stakeholders

Encouraging an inclusive partnership and developing networking will facilitate and ensure implementation. This partnership can start small and grow over time as the roadmap develops, in order not to delay the process. But it is important to engage relevant stakeholders early on in the process. There are various degrees of partnership involvement in creating a roadmap and these can be characterised as pictured on figure 7 [7].

How to organise the governance and co-construction of a strategy/roadmap

The co-construction of a roadmap requires the organisation of governance and synergies between stakeholders. This can be structured through several 'working bodies' with specific responsibilities, objectives and deadlines. This kind of organisation is proposed in the Brussel's circular economy strategy and is illustrated on figure 8 on the next page [16].

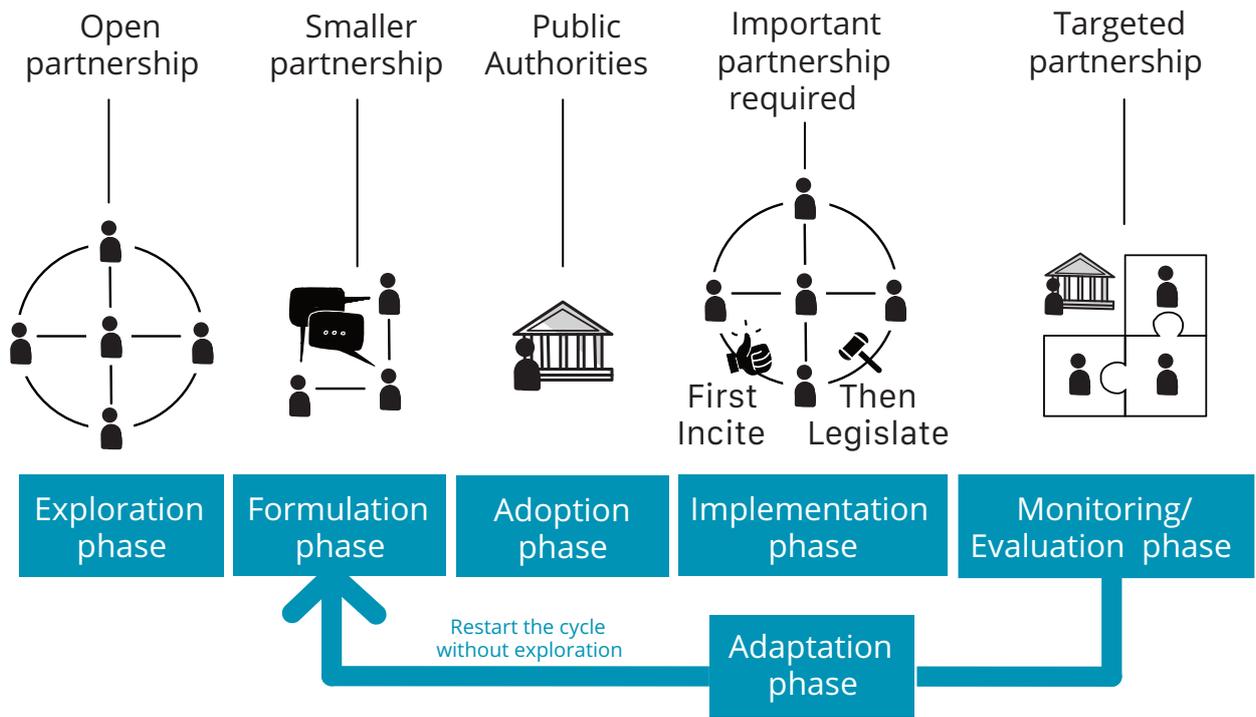


Figure 7: Different stages of stakeholder engagement (based on [5])

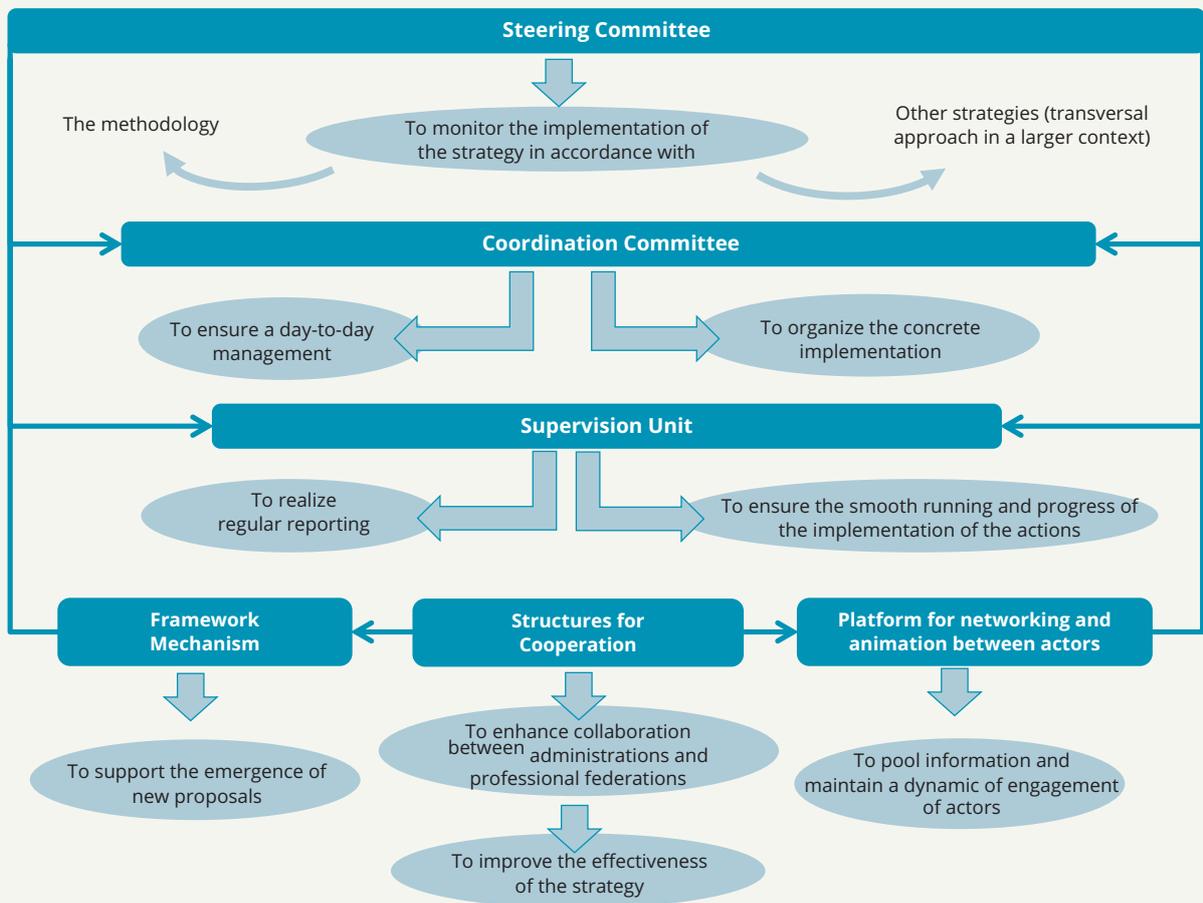


Figure 8: Governance structure proposed under the Regional Circular Economy Programme (Belgium)

Instruments

The instruments facilitate and support strategic implementation and can target different phases of the value chain and reach various stakeholders. There are different types of instruments, as indicated in Table 4.

Depending on the type, they can be binding (hard) or non-binding (soft). For example, regulatory instruments are binding by nature while facilitation instruments are less so. Some instruments can also be straddled between the two.

Regulatory changes apply to varying degrees but generally refer to action at national and/or European level (especially definition of waste and waste treatment obligations). Soft instruments are often used more than hard ones in strategy development. Although they are complementary, only a combination of these two types of instruments would ensure the implementation of a strategy over time. A non-exhaustive table showing the various types of instruments is appended.

Timeframe and milestones

To ensure the implementation of a strategy, it is essential to place the different objectives in a realistic timeline and define how the actions and initiatives are sequenced over time. A roadmap can be envisaged with two types of timescale: short and long term. The **short term** refers mainly to actions and initiatives that can be carried out more easily (e.g. tools or initiatives already in place to encourage and generalise, minimal changes, etc.). The **long term** approach is aimed at more ambitious or greater goals requiring bigger changes in line with the vision. Both time scales work in conjunction and are complementary. Actions and initiatives must then be staggered into several important stages known as milestones. Progress reports are required to assess strategic implementation and any adaptations must be permitted, if necessary (especially for the long-term approach).

	Type		Binding	Non-binding
	Regulatory	Political and legal instruments such as ordinance, permits, planning, contracts and regulations	✓	
	Economic (fiscal)	Financial incentives such as taxes, grants and loans, etc.		✓
	Technical	Such as technical prescriptions, specifications, guarantees, inventories, environmental/impact studies and labels, etc.	✓	✓
	Facilitation	Communication, training, education, support networking and platform, etc.		✓

Table 4: Types of instruments

Monitoring and Evaluation

Since a strategic roadmap has a starting point and goals to achieve, it is essential to monitor the progress of the strategy and evaluate it over predetermined time frames. If this is not done, it becomes difficult to measure the effectiveness of its implementation. Indicators can be defined for this purpose depending on different sustainability concerns, for example environmental, economic and/or social. Quantitative indicators are usually preferred because they are often deemed 'more objective' or easier to determine. But in preliminary (more experimental) phases, qualitative indicators are also used. How to get information on these indicators is a question that needs to be asked from the outset. If necessary, estimate the difficulty in obtaining them and identify the levers to overcome these difficulties. Above all, measuring or identifying the starting point is necessary in order to assess the progress made. Indicators must be put into perspective in relation to global values. If not, it is difficult to state what an absolute value is worth in a given context. Some examples of reuse indicators in the construction sector include jobs related to reuse, numerous pilot projects dealing with reuse practices, budgeting of financial incentives and embodied energy savings resulting from reuse, etc. A non-exhaustive list of indicators is provided in the appendix.

Improvement

A roadmap can be seen as a 'living' document that can evolve over time, especially when long-term goals and vision are sought. These improvements can be made following phased evaluations according to time intervals previously set by the strategy. Sometimes adjustments will be necessary. They can relate to various elements of the roadmap and will depend on various factors:

- Need to align the strategy with other existing strategies and/or new/adapted policies
- Need to readjust certain indicators
- Need to adapt certain actions, to specify or add some to improve implementation
- Etc.

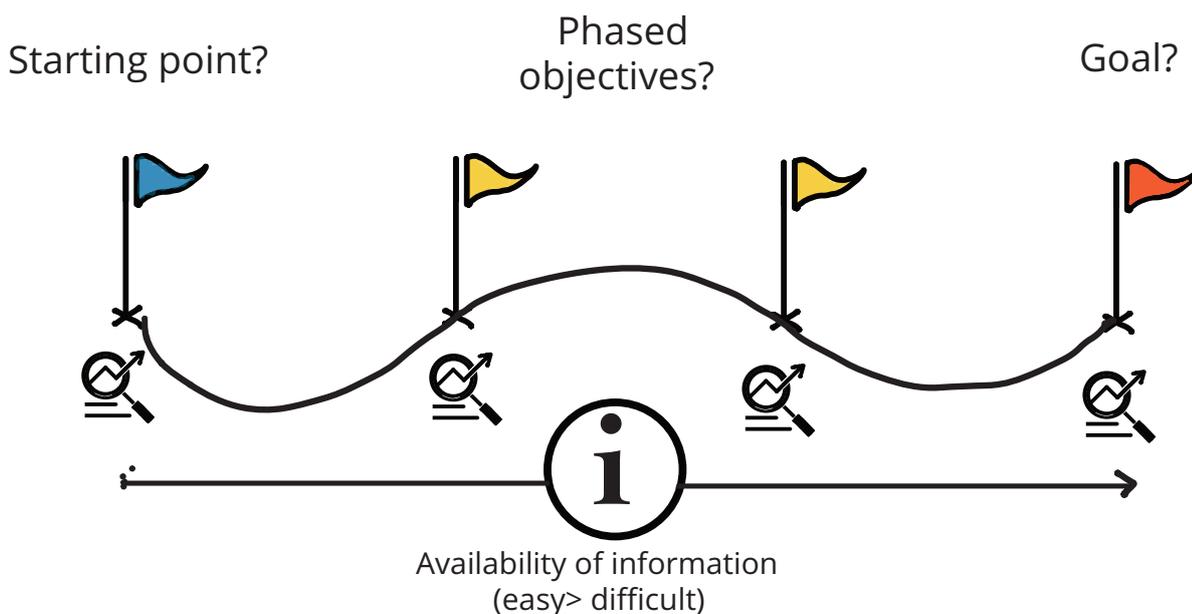


Figure 9: Monitoring and evaluation - main steps

4.

Conclusions

The construction sector faces huge challenges that reflect its impact on the environment. These challenges include reductions in waste production energy, water and raw material consumption as well as pollution, etc. The regulations currently in place mainly concern the energy performance of buildings or waste management. They therefore mainly focus on the design, occupation and end-of-life phases of buildings. However, a more global perspective is increasingly required for this sector accompanied by a shift from 'energy efficiency' objective to 'resource efficiency' objective, as recommended by the European Union. Indeed, energy and waste are already subject to restricting regulations, but the requirements in terms of 'saving resources' are still relatively low and are generally non-binding. More ambitious policies are needed in this area, in particular through the circular economy. This should also be accompanied by a comprehensive approach to assessing and understanding the environmental impact of a building over its entire life cycle. In this sense, reuse has an under-exploited potential in the construction sector and in circular economy strategies. Therefore, building a specific roadmap for reuse in the construction sector has an important role to play in this perspective.

As with any recipe, the list of ingredients provides a sound basis for cooking but does not guarantee the quality or success of the final dish. This document therefore lays the foundations for a strategy, by presenting a list of essential questions to be asked in this context. This approach will help to structure the work and shed more light on how it is organised. In fact, these different stages and a clearer approach to development will ensure greater coherence between the action taken and the objectives sought. Similarly, it would be easier to make connections between different strategies, on different levels and in different contexts. Although there

is no single recipe for the development of a roadmap, there is definitely a specific timeline for its implementation and different degrees of stakeholder involvement. Furthermore, the necessary resources must be identified along with the various stakeholders (administration, universities, associations, federation of companies, manufacturers, etc.), the characteristics of the territory and the current economic forces at play – all of which have a key role in ensuring successful strategic implementation.

Although there are many guides and documents on reuse and despite the fact that reuse is mentioned in multiple circular economy strategies, there are relatively few roadmaps on this topic. However, a roadmap specific to reuse in the construction sector would feature a relatively local and concrete establishment and implementation (at city or regional level). As this is a horizontal topic that mobilises countless stakeholders and various levels of authority, it is essential that these specific roadmaps are linked to larger-scale strategies and accompanied by measures at different levels. Some strategies (even policies) may indeed conflict. For example, in some cases, it may be complicated to meet the EPB requirements with reuse elements. This is why a global approach is required at different levels to ensure coherence and limit contradictory effects.

• A reuse roadmap in the construction sector should be developed within the framework of the FCRBE project. It is developed within the framework of the long-term effect work package and aims to devise a series of recommendations to guide public authorities and the construction industry through the successive steps that can be undertaken in order to stimulate the progress of reuse practices. This roadmap is expected in early 2022.

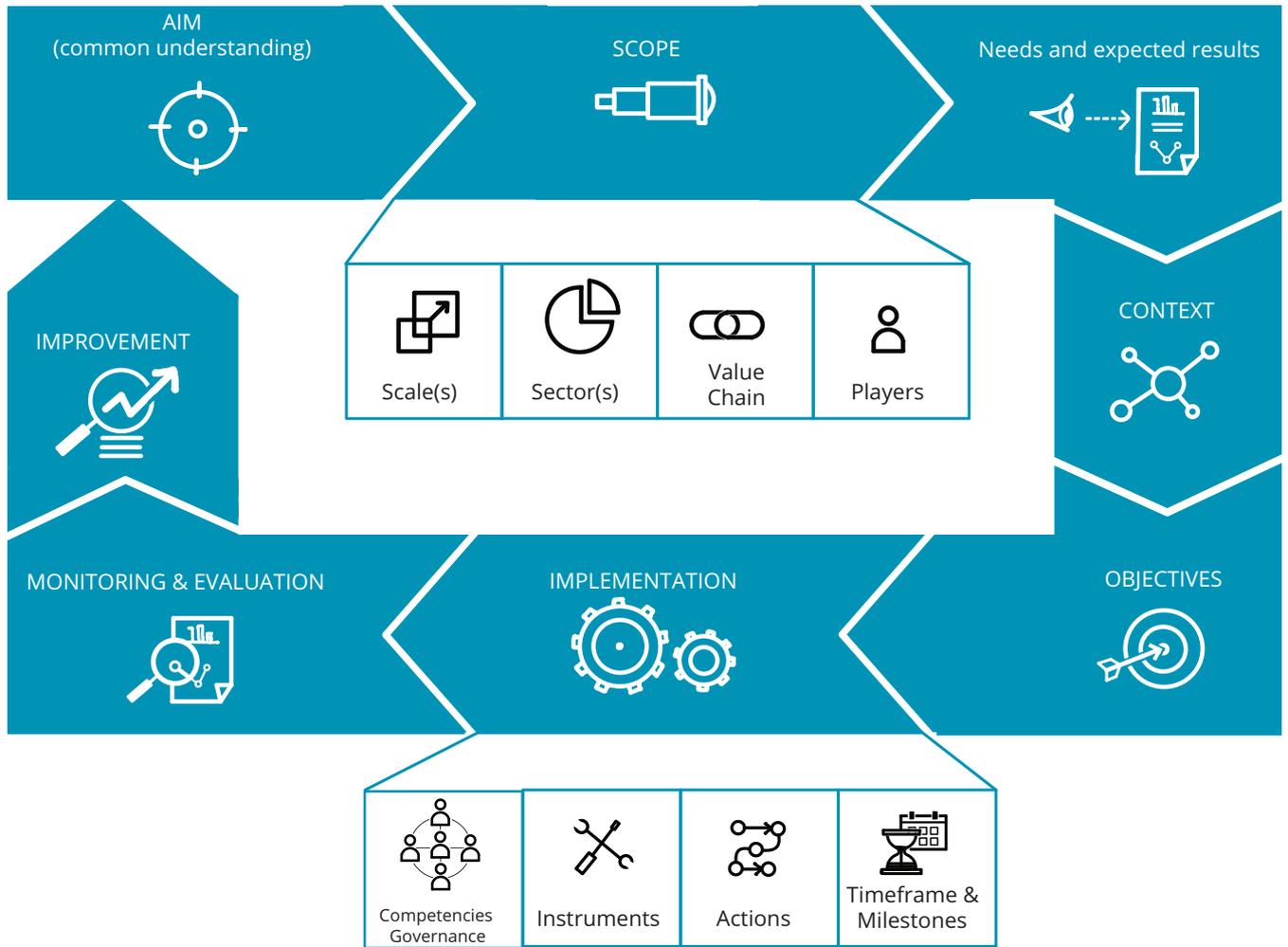


Figure 10: Summary of steps in developing a roadmap/strategy

Appendix

Examples of Instruments and Tools (the list is not exhaustive)

	 Regulatory	 Economic	 Technical	 Facilitation
Soft / Non-binding	/	<ul style="list-style-type: none"> • Grants • Loans • Reduction / bonuses • Funding for projects, research and innovations 	<ul style="list-style-type: none"> • IT Tool (monitoring, mapping resources stocks and flows, etc.) • Practical seminars • Audit • Studies (technico-economic, feasibility) • Technical support • Labels 	<ul style="list-style-type: none"> • Forge and strengthen links between stakeholders and territories • Workshops and conferences • Networking/ partnerships • Platforms (local, national, supra-national) • Working groups • Knowledge production and sharing • International cooperation • Stakeholder mapping • Promotion of sustain-able/circular/ reuse initiatives
Hard / Binding	<ul style="list-style-type: none"> • Law, decree, ordinances • Permits (environmental, demolition/ construction) • Extended Producer Responsibility • End-of-Waste criteria • Waste treatment obligations 	<ul style="list-style-type: none"> • Taxes 	<ul style="list-style-type: none"> • (Audit) • Studies (technico-economic, feasibility) • Public procurement (including circular principles or reuse target) 	/

Examples of Indicators (this list is not exhaustive)

Indicators	Unity	Concerns
Topic-related employment	Numbers	Social/ Economic
Quantity of new materials avoided	Kg / ton or m ³	Environmental
Savings on CO ₂ emissions (e.g. number of lorries avoided)	Kg CO ₂ eq.	Environmental
Embodied energy savings	MJ	Environmental
Pilot project integrating reuse elements (or circular principles)	Numbers or m ²	Economic
Average gross area of projects including reuse practices	m ²	Economic
Budgetary and financial incentives	€	Economic
New products or services on the market	Numbers	Economic
New reseller on the market	Numbers	Economic
Quantity of extracted reclaimed products (outflows)	t/m ² or m ³ /m ² or €/m ²	Economic/Environmental/ Heritage
Quantity of integrated reclaimed products (inflows)	t/m ² or m ³ /m ² or €/m ²	Economic/Environmental/ Heritage
Quantity of maintained elements and structure in existing building	m ² (m ³ or t)	
Pre-demolition audit/demolished building	Numbers	Economic/Environmental/ Heritage
Reuse Inventory/ building	Numbers	Economic
LCA including reuse	Numbers	Environmental/Economic
Training (reuse practices-audit)	Numbers	Economic/Social

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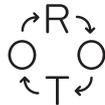
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