Alliance HQE GBC FRANCE

CIRCULAR ECONOMY, SUSTAINABLE BUILDING SPRINGBOARD FOR EVERYONE

15 LEVERS TO ACT

FRAMEWORK DEFINITION OF CIRCULAR BUILDING ECONOMY

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET SOLIDAIRE

MINISTÈRE DE LA COHÉSION DES TERRITOIRES

ADEME
Agence de l'Environnement et de la Maîtrise de l'Energie

CSTB
le futur en construction

orée
Entreprises, territoires et environnement

SUMMARY

Contact us

Alliance HQE-GBC
4 avenue du Recteur Poincaré
75016 PARIS

www.hqegbc.org
@hqegbc
Tél : 01 40 47 02 82

INTRODUCTION

THE CIRCULAR ECONOMY REALISES THE OBJECTIVE OF MOVING FROM AN IMPACT REDUCTION MODEL TO A POSITIVE VALUE CREATION MODEL ON A SOCIAL, ECONOMIC AND ENVIRONMENTAL LEVEL.

Institut de l'économie circulaire

In the HQE approach, **sustainable building is defined as a structure, in interaction with its territory, which offers a good quality of life, respects the environment and brings energy and economic performance** (figure 1).

The circular economy is a lever for sustainable development. Its objective is to reduce environmental impacts (resources, pollution and waste) and to create value both socially (jobs, lifestyles and consumption) and economically (cooperation and territorial development.

However, **if the circular economy is a new paradigm that must re-examine practices, it does not replace sustainable development,** it is an integral part of it. Indeed, don't let us forget the quality of life, through comfort, health and biodiversity, which remain strong objectives of sustainable building.

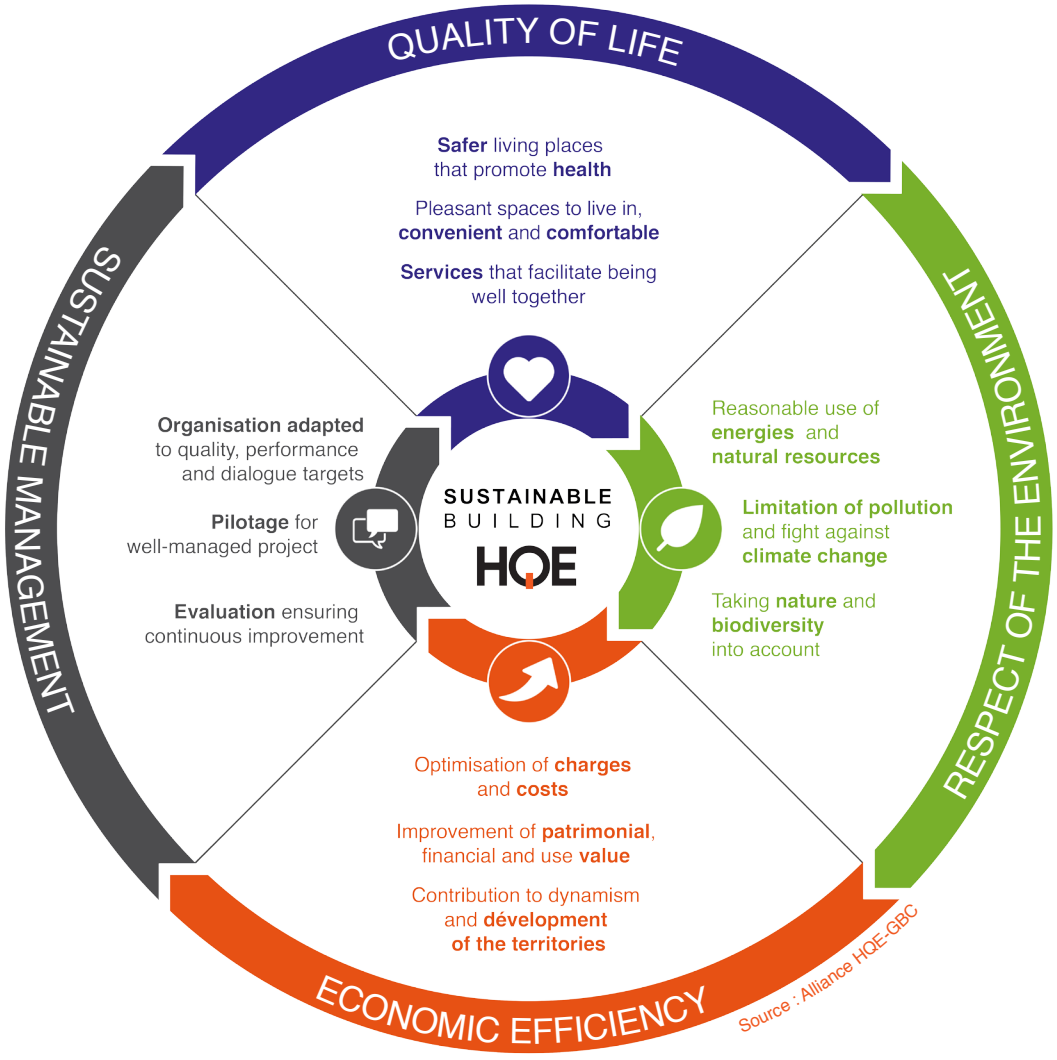

Figure 1: framework definition of sustainable building for everyone

From this perspective, the **circular economy** represents a way forward. It requires, as the sustainable building reference framework invites, **collaborative and interdisciplinary work, anticipation and reflection on the entire lifespan of a building**, from its design through its construction and operation, to its deconstruction or demolition.

The issues of developing a circular economy are strong. Indeed, buildings, both for their construction and their operation, currently represent 40% of European energy consumption and more than 50% of the raw materials extracted.

In France, the building sector generates about 42 million tons of waste each year, which is more than households (30 million tons), but 4 to 5 times less than public works (185 million tons) [1]. More than 90% of building waste comes from demolition / rehabilitation work, the rest being allocated to new construction (7%) [2]. The annual cost of their disposal was estimated in 1999 at € 2.54 billion, or 3.5% of the turnover of the building sector, or even 1 to 8% of the amount of the lots depending on the trades [3]. In addition, analyses on other sectors highlight a significant impact of material recovery on job creation.

Thus, according to Ordif, the average number of Full Time Equivalents (FTE) for 10,000 tonnes processed varies between 1 FTE for landfill, and up to 31 FTE for public sorting centers for selective collections. **The issues are therefore clearly as much environmental as economic**, and this for all the relevant stakeholders: inhabitants, professionals, public authorities.

With the circular economy, we are therefore changing our model: it is no longer enough to have the sole ambition of reducing environmental impacts in a linear approach, nor to limit it to reuse and recycling as many still think. It is a global approach to transforming the production - distribution - consumption triptych, with, at the end, new business models, surely more resource efficient, but above all, holders of activities, new services and products.

Engaging in the circular economy means promoting the development of new practices that contribute to the green value of real estate assets. Ultimately, these investments will therefore benefit to all players in the real estate sector, contributing to the emergence of a responsible economy.

SOURCES

[1] Enquête SOeS Déchets BTP 2014

[2] [FFB] http://www.ffbatiment.fr/federation-francaise-du-batiment/le-batiment-et-vous/construction-durable/la-gestion-des-dechets-de-chantier.html

[3] FFB & ADEME] http://www.ffbatiment.fr/Files/pub/Fede_N00/FFB_PUBLICATION_3349/282cdf9f-3298-4e1b-9065-0bd54a998f5e/PJ/gerer-dechets-chantier.pdf

GENERAL DEFINITIONS

Several general definitions of the circular economy are available. To bring more operationality, this definition framework specifies them for the construction and the sustainable development.

According to the United Nations

"The circular economy is a production, exchange and sharing system allowing social progress, preservation of natural capital and economic development as defined by the Brundtland commission. Its ultimate objective is to achieve decoupling of economic growth from depletion of natural resources by creating innovative products, services, business models and public policies that take into account all flows throughout the life of the product or service».".

Source : https://www.economiecirculaire.org/economie-circulaire/h/du-concept-a-la-pratique.html#page1:local

According to Ademe

"The circular economy can be defined as an economic system of exchange and production which, at all stages of the life cycle of products (goods and services), aims to increase the efficiency of the use of resources and reduce the impact on the environment. It is about doing more and better with less, taking into account three areas of action and seven pillars (figure 2).

The circular economy is defined as an economic system aimed at increasing the efficiency of the use of resources and reducing the impact on the environment at all stages of the product life cycle:

- production: limit the use of primary raw materials and hazardous substances;
- distribution: reduce the distance travelled by the product from the point of production to the consumer, provide take-back at the end-of-life, repair and maintenance services;
- use: improve energy efficiency and extend service life, for example through reparability;
- End of life: favour material recovery through repair, transformation, refurbishment, reuse, resale and, only failing that, by energy recovery. This approach is at the crossroads of environmental issues (efficiency of resources and energy saving), economic issues (evolution of business models, strengthening of customer relations and loyalty), product safety for users, legal certainty for companies and maintaining their performance throughout the life cycle. "

According to ORÉE Association

"The circular economy aims to optimize the management of resources - materials and energy - in order to save on the consumption of raw materials. This model is inspired by the loop operating of natural ecosystems unlike the standard linear model (extract, produce, consume, discard) which is based on an unlimited use of resources."

According to the Institut de l'Economie Circulaire

"The circular economy breaks with the traditional diagram of linear production, which goes directly from the use of a product to its destruction, for which it substitutes a logic of «loop», where one seeks the creation of positive value at each step by avoiding waste of resources while ensuring consumer satisfaction. [....] If products are designed to be deconstructed and not simply destroyed ... then, with the use of non-toxic resources and components, they could have many lives in an economically viable process."

Figure 2:
3 domains, 7 pillars

FOCUS - REGULATORY OBJECTIVES RELATING TO BUILDING WASTE

Waste management is a major issue that concerns and mobilises all players in the construction industry: project owners, contractors, companies, waste managers, manufacturers, etc.

At the legislative level, quantified results commitments have been defined in the short and medium term.

In application of the hierarchy of waste treatment methods, **prevention** is the first path to be favoured. This is the case of the **reuse**, on the same site, of excavated material which then will not have the status of waste, or of building heritage elements if they are reused in an architectural or landscaped project.

The Energy Transition for Green Growth Act (LTECV) of August 17, 2015 provides, from 2020, recycling and recovery of material for more than 70% of the construction waste (they represented 40 to 50% of the waste in 2015).

It also includes other provisions in favour of the recovery of construction waste:

- **50% of the materials used by the State and communities for road construction** sites must come **from reuse, recovery or recycling of construction waste** in 2017; the rate will rise to 60% in 2020;
- the establishment of a **network of professional construction waste collection centers** with obligation, for distributors of materials and products, to organize with professionals take-back of waste of the same types of materials that they sell;
- **the obligation of source separation of 5 waste streams:** plastic, glass, metal, wood, paper;
- **the supervision of developments carried out using waste.**

In addition, the LTECV imposes a reduction of the amount of waste from economic activities per unit of product value, in particular from the building sector, as well as:

- **30% reduction of the amount of non-hazardous and non-inert waste admitted to disposal facilities in 2020,** compared to 2010, and 50% in 2025;
- **50% reduction of the amount of non-recyclable manufactured** products placed on the market before 2020.

Efforts have already been made to improve treatment schemes, particularly in terms of:

- **waste diagnosis before work**. Since March 1, 2012, the project owners have been required to carry out a diagnosis of the materials and waste resulting from demolition or rehabilitation work for buildings with a floor area greater than 1,000 m2, or having hosted one or more hazardous substances;
- for technical building equipment, extended producer responsibility (EPR) channels are in place for recovering, recycling and treatment of the products.;
- **development of the territorial network of collection, sorting and preparation facilities,** as close as possible to waste generating sites or those likely to recover waste.

These objectives could be strengthened with the **update of the 2008 European framework directive on waste,** which should be published in 2018 and through the results of the consultation initiated by the Ministry for the Ecological and Solidarity Transition for the development of **a Circular Economy roadmap** scheduled for release in March 2018

DEFINITION FAMEWORK

The framework for defining the circular economy (figure 3) in the Alliance HQE-GBC building applies to all types of new buildings, under renovation or in operation. It offers a structuring vision to support stakeholders and make its operational implementation in the construction sector easier for them.

Through these shared benchmarks, common vocabularies understandable by all, this framework should facilitate transversality and encourage the various stakeholders (professionals, residents or users) to work together, a sine qua non condition for the circular economy. From the designer, so that he can immediately plan an easy dismantling of the building, to the occupant, so that he can extend its useful life, until the waste manager who takes part in putting back on the market the materials to be recycled.

This definition framework is the link with the reference framework for sustainable building. It is not based on the typical course of an operation (program, design, worksite, operation ...), all the **ambitions** and **levers** are transversal to the different phases of the project.

Figure 3: circular economy definition framework for buildings, 15 levers to act

TERRITORIAL FLOW OPTIMISATION

Space and location are at the heart of this ambition of territories, which must be more inclusive. In this context and to minimize the environmental pressures on a given territory and thus contribute to its economic and social development, three levers must be implemented: knowledge of deposits and possibilities, synergies and sustainable supply.

LEVER 1. KNOWLEDGE OF DEPOSITS AND POSSIBILITIES

Knowledge of the territorial fabric, both in terms of deposits and possibilities, is a fundamental prerequisite for territorial optimisation. This knowledge of the existing «**Urban mine**», **stock** status, incoming and outgoing **flows**, environmental pressures on resources but also **local businesses and know-how** (old or recent), allows to seek synergies and cooperation between the various players in the territory. Note that buildings, unoccupied or underused, are also a resource to consider.

The development of digital technology in the sector should facilitate inventories and knowledge relating to deposits of secondary raw materials and remove some of these obstacles.

Example of actions:

- Metabolism study at the scale of a site, identifying territorial economic players, incoming / outgoing flows, poolable spaces, public transport and the possibilities for soft mobility ...
- In the concerned territory, identification of platforms, product and equipment exchanges; collection points; a resale network, recycling centers, poolable spaces; rehabilitation / demolition of current or future buildings...

FOCUS - DEEPENING KNOWLEDGE AT THE LOCAL LEVEL

Good knowledge of the territorial context of each building project is a lever for the circular economy. This is the raison d'être of the OVALEC project (Tools for VALuing transition actions towards a Circular Economy in construction - in progress 2016-2019), based on the Life Cycle Analysis method. It aims to develop a new decision-making and design support tool that will have the specificity of taking into account the characteristics of the area where the structures are located, and of integrating different prospective scenarios for the management of materials at end of use / end of life.

LEVER 2. SYNERGIES

Material resources, fluids (water, energy, etc.), **transport** and **waste** constitute categories of flows for which, along with **employment**, the search for synergies and cooperation between economic actors should be implemented in perspective of territorial "looping". This is the principle of territorial and industrial ecology. **Proximity as well as the optimisation of transport flows and logistics activities** will facilitate these synergies, the conditions for their implementation must however be well anticipated.

Example of actions:
- Energy loops: at the scale of a district, between buildings ...
- Use of free energy sources: heat recovery from extracted air, grey water, computer servers, etc.
- Heating network
- Rainwater harvesting
- Loops of materials (cuts and fills ...)
- At the site level: pooling of site equipment and / or exchange of flows between companies (ex: reuse of waste from one site to another)
- Implementation of shared shuttles

FOCUS - THE SMART GRID, FACILITATOR OF LOCAL ENERGY SYNERGY

At the level of a district or a group of buildings, a Smart Grid approach optimises comfort and reduces the overall cost of the end user's energy bill, by providing access to optimised management of the energy mix. The means implemented can be production, storage, production arbitration between energies, offload and increase of consumption between buildings. This reduction in the energy bill of users represents a vector of attractiveness of the territory and a way to fight against energy poverty.

LEVER 3. SUSTAINABLE SUPPLY

The aim of sustainable supply is to have supplies of water, air, soil and raw materials which favours recycled materials, an efficient use of renewable resources (respecting their renewal conditions), as well as an extraction of raw materials **limiting the impact on the environment and on wasting**.

The logics of sustainable supply and **responsible purchasing** encourage us to question the **origin**, the **mode of transport**, the **packaging** (over-packaging for example) and the **production conditions** (ethical, fair, etc.) but also about **traceability** of materials, substances, products and equipment, as well as their specific qualities (environmental performance.)

Example of actions:
- Use of products and equipment: reused, recovered, repaired; containing recycled and / or biobased material resulting from sustainable management
- Choice of products and equipment with verified environmental declarations (FDES and PEP)
- Use of renewable energies
- Use of short circuits
- Suppliers involved in a societal or environmental commitment system (ISO 26000, 14001, Environment charter for UNICEM's quarrying industries, etc.)
- Promotion of job creation and integration

FOCUS - FDES AND PEP

The Life Cycle Assessment (LCA) is an environmental assessment method making it possible to quantify the impacts of a product, a service or a process, over its entire life cycle, from the extraction of raw materials until processing at the end of their life. Standardised and recognised (ISO 14040 series standards), it is the most successful method in terms of global and multi-criteria assessment. LCA results are expressed in the form of a series of environmental indicators presenting potential impacts (for example: X kg of CO_2 equivalents for GHG emissions (climate change indicator) and physical flows (for example: example Y kg of hazardous waste). LCA results for construction products and equipment as well as health information are recorded in the Environmental and Health Declaration Sheets (FDES) and in the PEP ecopassport® (Product Environmental Profile). These are online, on the INIES base (http://www.inies.fr/).

SOBRIETY

The preservation of natural resources and the limitation of tensions on them are at the heart of this ambition tending towards "frugal" innovation which aims to create more value with fewer resources.
To implement this sobriety and minimize the impact of a project on the environment, three levers are identified: optimization of needs, sustainable design and economy of functionality.

LEVER 4. OPTIMISATION OF NEEDS

Optimisation of needs, aimed at reducing consumption through demand, is a lever for reducing its environmental impact. In buildings, it involves re-examining needs from a functional and technical point of view and then optimising them by working in particular on the **intensification of uses and multifunctional spaces.**

This approach recalls the importance of the upstream phases, even before the design, and in particular that of programming during a construction or renovation operation. This lever also concerns **existing spaces** that are underused and represent an opportunity to densify cities rather than expanding them.

Example of actions:
- Choice of location (depending on public transport service)
- Early consideration of the energy impact, technical and programmatic choices and the environmental impact of the project
- Analysis of the pooling possibilities
- Question about the building's heating / air conditioning needs
- Determination and display of the target energy performance level
- Registration of a requirement to integrate recycled materials into the specifications
- Declination of the concept of «flexoffice» . . .

FOCUS - CHRONOTOPY OR INTENSIFICATION OF USES ACCORDING TO TIME

The "urban chronotopy", or the building / city for all "temporal and temporary", envisages sharing places whose specialisation limits their use to a few hours per day. Thus, car parks, company restaurants, auditoriums and cinemas would experience several lives in the service of the greatest number by offering more services and more comfort to users of the buildings concerned. Remember that today office spaces are used 20% of the time over a week and of these 20%, only 60% of the surfaces are used.

LEVER 5. SUSTAINABLE DESIGN

From its construction to its end of life (or new life) through its operation, the building generates impacts on the environment. Ecodesign or sustainable design allows to reduce them effectively. The Life Cycle Assessment (LCA), an environmental assessment tool based on recognised scientific methods, offers a detailed view of the environmental impacts of a project and helps preventing possible pollution transfers.
Used today in the E + C- (Positive Energy - Carbon reduction) experiment to learn about GHG emissions, LCA includes among its output indicators all the environmental impacts including **waste and depletion of resources**. It also allows to assess the benefits and costs (Module D) linked to end-of-life recycling by quantifying the impacts avoided thanks to the use of Secondary Raw Material (SRM) versus the use of virgin material.

Example of actions:
- Targets of waste reduction, energy and water consumption, resource depletion (LCA indicators)
- Registration in the specifications of requirements or indicators for the use of recycled, recovered, secondary, bio-based materials.
- Prevention of waste and wastage in design: layout / precut, industrialization / prefabrication, improved logistics, packaging, lean purchasing
- Choice according to procurement or employment criteria
- Sizing of structures, technical lots and spaces
- Bioclimatic approach, biomimicry
- «Disassembly» of the elements
- BAZED approach for a zero waste design
- «Deconstructibility» of the elements in order to facilitate their reuse or recycling

FOCUS - NEW CONSTRUCTION VS RENOVATION, THAT'S THE QUESTION?

The European project I3E shows that renovation generally always has less impact than new construction.

The dissemination of LCA methods for buildings and their multiplication tends to demonstrate the importance of earthworks, foundations and structures in the environmental impact of projects. However, it seems premature at this stage to conclude on this question, in particular on taking into account the non-depreciation of prematurely deposited materials (structural but also finishing). Experiments and work in progress (HQE Performance Renovation) will shed light on these different aspects which could lead to qualify the first intuitions and show that the answer is not universal but to be found on a case-by-case basis.

LEVER 6. ECONOMY OF FUNCTIONNALITY

Sell the use, not the building! Beyond this simplified slogan, the economy of functionality is an economic model that favours use over possession by selling services related to products and properties and not the products themselves. Applied in the building industry, it offers possibilities for pooling defined as the sharing by individuals or groups of individuals of goods, housing or mobility solutions, so as to **optimise access to these resources** and their profitability (by sharing costs, maintenance costs, insurance, repair...).

This **pooling of resources** responds first of all to an economic logic and also promotes exchanges between individuals and entities participating in social cohesion. At the same time, it helps reducing environmental impacts.

Example of actions:
- Common car parks, shared premises and / or gardens, collective laundries
- Inter-company restaurants
- Shared mobility solutions
- Coworking spaces
- At the site level: rental of construction machinery or equipment (instead of buying it)
- Network of sharing and exchange at the scale of a district or a block: the inhabitants can lend each other tools or devices

FOCUS - INTERCOMPANY POOLING

Intercompany synergies can take the form of substitution synergies, i.e. exchanges of material, water or energy allowing the waste of some to become the resources of others, or of pooling synergies aimed at optimizing, through sharing material, logistical and human resources of companies (Inter-Company Restaurants, mobility solutions, car parks, co-working or remote working spaces...).

LONGER LIFETIME

The notion of time is at the heart of this ambition for sustainable consumption. To limit the environmental impact of buildings, integrating those already existing, it is necessary to increase their useful life, via three levers: the durability of building products and equipment, the flexibility of the building and the in global cost approach.

LEVER 7. PRODUCT AND EQUIPMENT SUSTAINABILITY

To influence the duration of use of a product or equipment and limit its technical obsolescence, it is a matter of paying particular attention to the technical and environmental performances linked to the quality and to the **implementation of the products and equipment** used, their **upkeep**, and their **maintenance** and **use**.
But making a product or equipment last can paradoxally go against the logic of building performance, technological progress often bringing benefits in terms of respect of the environment, quality of life or economic performance. It is therefore advisable to carefully consider the “advantages / disadvantages balance” and decide to extend the lifespan or replace all or part of the property depending on the situation on a case-by-case basis.

In terms of **automation, home automation** and connected objects, the use of low-tech solutions, based on controlled opening systems, improves the durability of the equipment serving the structure.

Example of actions:
- Qualitative choices based on product certification, proof of suitability for use ...
- Repair, upkeep, maintenance
- Disassembly

FOCUS - NOTION OF OBSOLESCENCE

Obsolescence may be:
• technical, if it concerns performance in use, environmental...
• commercial or heritage, if the product or equipment no longer corresponds to market demand, to the current trend.

LEVER 8. BUILDING FLEXIBILITY

Commercial or **patrimonial** obsolescence occurs when the structure no longer corresponds to market demand and a more suitable offer succeeds it. Preventing it requires more flexibility of spaces and use, allowing the structure to meet new functions.
The flexibility of a building is its ability to perform different functions over time and possibly change its destination. It is therefore a question of **anticipating the evolution of uses**, of allowing **modularity** and **reversibility** of places to promote a change of function meeting new needs.

Example of actions:
- Reversible design by separation of functional layers: Structure / space / fluids
- Bearing structures allowing functional and technical redistribution
- Flexibility of comfort equipment (rental, reversibility of energy...)
- Reconfigurable electrical installation

FOCUS - ADAPTATION OF BUILDINGS TO CLIMATE CHANGE

We talk about scalability and flexibility of buildings to facilitate changes in use or allocation of different spaces. However, we must also be concerned with the adaptation of buildings to meteorological changes linked to climate change. At the scale of metropolitan France in particular, the average rise in temperatures as well as the increase in the frequency and duration of heat waves are already very real and are accelerating. The criterion of summer comfort becomes an issue to be integrated into the design of buildings.

LEVER 9. GLOBAL COST APPROACH

The global cost approach allows taking into account the economics of a construction project beyond the simple investment, by focusing on operation, maintenance, replacement of products or equipment, but also on the deconstruction of the building.
The logic favouring more **investment** for qualitative choices limiting **maintenance and replacement costs** is beneficial. The notion of **depreciation** will be all the more interesting, including from an environmental point of view, as the duration of use is extended. The reparability requirement and any provision favouring effective upkeep-maintenance can lead to better **profitability** and contribute to the **economic viability** of the project.

Finally, global cost approaches, as a decision making tool, offer better consideration of both positive and negative **externalities**, i.e. the environmental and social impacts of products throughout their life cycle, the costs of which are, for the most part, borne by the Community.

Example of actions:
- Durability of the envelope
- Arbitration insulation / heating modes
- Evaluation of maintenance and demolition costs
- Repair possibilities and costs (availability of parts...)

FOCUS - DEVELOPING GLOBAL COST CALCULATIONS IN THE BUILDING

The ministry has launched an action to encourage global cost calculation in the building sector aimed at helping public and private clients to take into account in a reasoned manner the costs throughout the life of the structure and not to limit their analysis to simple initial costs. This tool, based on ISO 15686-5 standard, offers environmental, health-related criteria (configurable) and, in particular, the most well-known externalities such as greenhouse gas emissions, the impact on the environment (biodiversity, water).
Freely available on: http://www.coutglobal.developpement-durable.gouv.fr/.

CREATION OF RESOURCES TO LIMIT WASTE

The prevention, reduction and management of waste are at the center of this ambition tending towards a circular approach to construction. To reduce ultimate waste and generate new resources, there are three levers: selective dismantling and deconstruction, reuse and recovery as well as recycling of materials, products and equipment.

LEVER 10. DISMANTLING AND SELECTIVE DECONSTRUCTION

Dismantling is the ability to separate and remove the different components of a building for maintenance, recovering or recycling. A design aiming at this objective must be particularly sensitive to the methods of assembling the different products and to the multiplication of commercial references for the same function. Optimizing the end of life of the building since the design stage can also involve the deconstructibility the elements, i.e. the ability to easily separate the various materials constituting the waste in order to optimize recycling.

Selective deconstruction can be implemented, even when dismantling has not been thought of in design, even if it remains more complex.

It consists in removing elements, without compromising their **integrity**, which can then be **reused** in a new project, or treated in a **recycling** circuit.

Example of actions:

- Integration of dismantling instructions in the BIM model and buyers-users booklet
- Resource diagnosis
- Work schedules adapted for the deconstruction phases, to allow the non-destructive removal of products and equipment
- Selection of products and equipment according to their dismantling...

FOCUS - INNOVATION SERVING DISMANTLING

Innovation is underway and there are numerous research programs to find and test new solutions that better anticipate, in new products and equipment, their end of life. Thus, the DEMODULOR project, winner of an Ademe call for projects, is a systemic approach to dismantling, facilitating the separation of systems and components on construction sites but also their recovery. Four construction solutions have been conceived and tested in real size: a mixed steel / concrete solution, a multi-component dry floor, a modular terracotta wall and a wooden frame wall for the facade. DEMODULOR called on the skills of the 4 Industrial Technical Centers for construction: CERIB, CTICM , CTMNC and FCBA.

LEVER 11. REUSE AND RECOVERY

Reuse is an action to give a second life to the product. **Recovery**, for its part, includes a passage through the **status of waste**. Despite the difference in legal nature, reuse and recovery often concern the same actors and can strengthen each other.

If using products or equipment from reuse is growing in the building industry, some difficulties remain:
- prior retrieval under conditions optimised for future use
- traceability, technical assessment as well as warranty and insurance issues and related legal constraints
- their social acceptability by the owners and users

By allowing the traceability of products and equipment, the **digital model** facilitates reuse and recovery during renovation or rehabilitation operations.
If reuse is often considered at the product scale, this concept is also applicable at the building scale since not destroyed but rehabilitated m^2 remain the best reused material and the avoided environmental impact is positive in most cases.

Example of actions:
- Provide in the design, valuing of excavated material and building rubble and the integration of products and equipment for reuse or recovery
- Carry out a «Resources» diagnosis for any deconstruction / renovation project, with identification of solutions for reuse in situ and then ex-situ
- Use of platforms, exchanges, resource centers for products and equipment, associations... (ex : Imaterio, Boursomat, Cycle Up, Batiphoenix ...)

FOCUS - REUSE

The study «identification of brakes and levers for the reuse of construction products and materials» was commissioned by Ademe in 2016 on the basis of the observation of the existence of brakes in terms of responsibility of producers and users of reused products and materials, guarantees as to their quality and insurance conditions inherent in the reuse of construction materials and products. The report available online also provides feedback based on concrete reuse operations.

Reuse is an alternative in particular to the extraction of raw material and to the landfill of waste. It can limit transport times and promote a better distribution of the added value of a site. Unlike recycling, this involves working with second-life materials without subjecting them to too much transformation, as with the REPAR program carried by Bellastock, CSTB and Encore Heureux.

LEVER 12. RECYCLING

Recycling avoids **wasting natural resources and energy**, limits dependence on the supply of raw materials and reduces environmental impacts. It aims to transform waste into reusable material, also called **Secondary Raw Material** or **recycled material**, coming as a total or partial replacement of raw materials.

Examples of actions:
- Examples of operational recycling channels for building waste: inert materials, plaster, PVC, wood, WEEE, flat glass, etc.
- Implementation of an approach of excellence in these channels (e.g. certification of qualirecycle construction platforms, etc.)
- Incentives for the use of recycled material
- Qualification of benefits and costs related to end-of-life recycling (LCA - module D)
- Valorisation of building rubble into recycled materials

FOCUS - INNOVATION

- The Démoclès project, initiated by Récylum, demonstrates that it is possible to recycle up to 80% of the finishing work waste at no additional cost. An encouraging prospect, given that ambitious objectives have been set by the energy transition law for the management of building waste: from 2020, 70% will have to be recovered as material. Find the recycling and valorisation channels for construction waste on the smartphone application «Déchets BTP» and www.dechets-chantier.ffbatiment.fr
- The “Valorisation croisée” project, which aims to recycle non- or little-valued materials in certain industrial fields (foundry, paper industry, etc.) in other activities (concrete, terracotta, etc.) has demonstrated the feasibility of substituting traditional raw materials by these secondary raw materials, proving the technical, economic and environmental benefits of such an approach.
- The Recybéton project allowed identifying the conditions for using recycled concrete aggregates, resulting from deconstruction, in new concrete. The main properties of these recycled aggregates have been analysed in order to define rules for use and to develop normative texts. Experimental projects have also been carried out

MANAGEMENT OF STAKEHOLDERS

The forms and methods of managing projects are at the heart of this cross-cutting commitment to responsible management. For an organisation adapted to the objectives of the circular economy throughout the projects, there are three levers, from upstream to downstream: awareness, planning, CSR and assessment.

LEVER 13. AWARENESS RISING

It is essential to set up specific awareness-raising actions aimed at everyone. All the players agree on the key role that the **project owners** play in the incentive, or not, of circular economy actions. Regarding waste, they own it and therefore are responsible for it during a renovation or rehabilitation.

All the actors involved, however, remain too little or poorly informed on this issue and must be made more aware in order to know and disseminate **good practices**. This may in particular concern public project owners under the **eco-exemplarity of public procurement**.

In the same way as their management, waste prevention must necessarily be integrated as early as possible in the reflection linked to a program. It can also benefit, as in the examples of territorial ecology, from better **cooperation between economic actors**.

Examples of actions:
- Communication on the potential of prevention, in particular its economic benefits
- Increase in skills of actors through training
- Round tables and debates
- Demonstration sites

FOCUS - MOOC, SPOC…

Free digital training (MOOC, SPOC ...), can benefit everyone, companies and associations, stakeholders in the act of building and citizens, in order to raise awareness about the circular economy to enrich skills and techniques. In a study conducted by the General Commission for Sustainable Development (CGDD), these tools are considered as a lever for the dissemination of knowledge, training in environmental issues and federating multiple actors around the ecological transition…

LEVIER 14. PLANIFICATION

Making the right decisions at the right time allows managing costs and deadlines, and ensure the achievement of expected results throughout the projects. This is why the planning of the operation, from the contractualisation to the realisation through the design, must also be an ambition and object of anticipation to better integrate the circular economy in building projects.
This planning requirement is all the more true for site management (in particular depending on the provision of equipment for recovery sorting or the implementation of operational planning}. Indeed, waste management should be anticipated upstream of the site to facilitate organisation. Coordination and the level of cooperation between all the actors in the value chain are therefore essential throughout the projects.

Examples of actions:
- Request for development of a waste management organisation sheme (SOGED) in the CCTP.
- Provision of suitable containers for sorting waste on the site (skips, big bags, pallets, etc.)
- Double freight (loading of materials on the outward journey and waste on the return)
- Online mapping to find collectors, sorting centers, recycling platforms and other recovery centers as close as possible to construction sites
(ex: www.dechets-chantier.ffbatiment.fr)

FOCUS - ENVIRONMENTAL SITE MANAGEMENT

Noé, managed by Bordeaux Euratlantique, is a shared service platform for construction sites. The goal is to minimise the impact and nuisance of construction sites which will multiply on both banks of the Garonne by making construction companies available. This tool offers a wide range of services: base camp, site waste reception center, management of excavated soil and polluted soil, parking, transport of personnel from the base camp to construction sites, storage and transport of materials, HR center specialised in building trades to meet needs in terms of integration, training, safety and prevention, digital information processing platform, food truck...

LEVER 15. CSR AND ASSESMENT

Any project, any action, any policy must be able to be analysed and evaluated in terms of its objectives and consequences. This is the case with the circular economy, which primarily aims at the efficient management of resources and which carries promises or hopes in terms of job growth and reduction of environmental impact. One of the difficulties of evaluating the circular economy comes from its broad spectrum which can lead to wanting to evaluate all the aspects, when it seems necessary to select a few indicators to create monitoring and evaluation dashboards. The other difficulty is the availability of data: with a view to reducing wasting and managing the building as a source of material, it seems essential to adopt as of now an approach of collecting and storing data at scales of building / district / city (using BIM in particular).

Examples of actions:
- Responsible purchasing policy,
- Environmental management and CSR approaches...

FOCUS - INDICATORS

Ademe, based on the work of the European Commission, identifies three structuring axes for the development of indicators on the circular economy:

- the circularity of resources around the rate of recourse to recycled or renewable resources or the rate of recycling of waste;
- the impacts induced by the circular economy with the creation of value such as employment and growth;
- structural changes favouring the circular economy with the evolution of business models and behaviours or the levels of cooperation between actors;

GLOSSARY

Waste
Article L. 541-1-1 of the Environmental Code specifies that: «any substance or object, or more generally any movable property which the holder discards or intends is required to discard is waste.

Deconstruction
Deconstruction is the selective dismantling of building elements, especially for recovery, recycling and waste management.

Eco conception
It consists of integrating the environmental aspects into the design of a product, in order to reduce its negative environmental impact, while maintaining its intrinsic performance.

Functional economy
Functional economy favours use over possession, leaning towards product-linked services rather than the products themselves. It applies to “durable” or semi-durable goods.

Secondary raw material
Waste which has been transformed and / or combined, in order to obtain a material which can be used in the manufacturing processes to replace the initial raw material.

Material recycling and recovery
Article L. 541-1-1 of the Environmental Code: “any recovery operation by which waste materials, including organic waste, are reprocessed into products, materials or substances whether for the original or other purposes. Energy recovery, reprocessing as fuels, and backfilling operations cannot be qualified as recycling.»

Recycling
Center for the recovery by reuse (renovation) of certain products deposited in waste reception centers (in the bulky category) or brought directly to the center. The four services offered are · multi-product collection. reuse and recycling in the workshop, sale, environmental awareness.

Reuse
Article L. 541-1-1 of the Environmental Code: « Reuse means any operation by which substances, materials or products that are not waste are used again for the same purpose for which they were conceived.»

Recovery
Article L. 541-1-1 of the Environmental Code: «any operation by which substances, materials or products which have become waste are used again.»

Framework directive on waste proposes a hierarchy of treatment methods: Prevention, Reuse and recovery, Recycling, Energy recovery

According to the proponents of the resource economy, the hierarchy - from an efficient management mode to a degraded mode of waste treatment, dictated by their environmental impact, is established as follows:
- Prevent and reduce waste production at source.
- Reuse materials after a first life.
- Use recycled materials or based on recycled materials.
- Incinerate combustible waste with energy recovery.
- Store and bury non-recovered waste.

AKNOGNLEDGMENTS

This document was drawn up by the working group “Cicular economy” of the collaborative innovation programme HQE Performance, driven by Antoine Desbarrières. It has been subject to a call of comments from all members of Alliance HQE-GBC.

Alliance HQE-GBC thanks its members for their mobilisation and especially for their contribution:

- ADI, Saint-Donat Magali
- AIMCC, Lestournelle Caroline
- Alliance HQE-GBC, Oury Nadège, Perrissin-Fabert Anne-Sophie, Sément Nathalie
- CERIB, Lapouge Audrey, Rougeau Patrick
- CERQUAL, Berliat Lucile
- CERTIVEA, Ait Amar Nadia, Kamelgarn Yona
- CERWAY, Reitzer Juliette
- CIMBETON, Costa Jean-Aymeric
- CINOV, Peroto Jacques
- CHAMBRE SYNDICALE DU ZINC, Roland Cécile
- CLUSTER ECO-HABITAT, Sinasse David
- CSTB, Laurenceau Sylvain
- CTICM, Herbin Stéphane
- CTMNC, Péchenart Elodie
- EGF-BTP, Allain Virginie
- EGIS, Blaison Coline
- EODD, Lutton Nicolas
- FFB, Coullon Stéphanie
- FONCIERE DES REGIONS, Fournier Jean-Eric
- GECINA, Rebaudo-Zulberty Aurélie
- GREENATION, Philippe Aurélien
- ICADE, Guisnel Alain
- IGNES, Michel Valérie
- INGETEL, Genin Gilles
- LAFARGE HOLCIM, Dubois Florent
- MAIRIE DE PARIS, Lardin Isabelle
- ORÉE, Saint-Jean Camille, Vellet Stevan
- POSTE IMMO, Durand Marie-Thérèse, Ventejou Claire
- PROMOTELEC, Dardant Marie, Woodrow Mariana
- QUALITEL, Desbarrières Antoine
- SAINT GOBAIN HABITAT, Wojewodka Christèle
- UNICLIMA, Brière Emmanuelle
- UNSFA, Pellegrin Elisabeth
- VINCI CONSTRUCTION FRANCE, Mehu Nathalie, Sarton Marc

As honorary member:

- Troadec Pierre
- Piron Olivier

As individual members:

- Brachet Léa
- Laroche Sophie
- Tartarin Sarah

The present guide was approved on December 2017 by the advisory board of Alliance HQE-GBC chaired by Philippe Van de Maele and consisting of:

ADI, AIMCC, ARSEG, BNP PARIBAS REAL ESTATE, CAPEB, CERIB, CERTIVEA, CINOV, CSTB, DATASOLUCE, FEDENE, FILMM, FFB, FPI, FSIF, NOVABUILD, QUALITEL, SYNTEC, UNAM, UNSFA, UNTEC, USH.

Creation : Studio Cirsé

© Photos : Couverture · Fotolia · ICADE PROMOTION Amarante Ilot F - NF HQE BBC EFFINERGIE Pessac (33) (87 coll) / Page 4 · Eiffage Immobilier – Smartseille – Reconversion de l’ancienne usine à gaz de Marseille - © EODD Ingénieurs Conseils / Page 8 (photo du bas) · BPD MARIGNAN Cergy 530 NFL HQE BBC EFFINERGIE Cergy Pontoise (95) (222 coll) / Page 9 · Fotolia / Page 10 · PRIAMS HORIZON 180 NFL HQE BBC EFFINERGIE-EFFINERGIE + Argonay (74) · Fotolia / Page 11 · BPD MARIGNAN Vill’Actuel NFL HQE BBC EFFINERGIE Argenteuil (95) (60 coll) / Page 12 · © AIA – Salle à tracer · CACF – Caisse Régionale du Cantal – BEPOS tous usages - © EODD Ingénieurs Conseils / Page 13 · @ Vinci Construction France / Page 14 · Fotolia · © FFB / Page 15 · SRP Chantier - Bâtiment - La Forezienne - St Junien (97) / Page 16 · Fotolia · BioMerieux – Bâtiment de Recherche la Balme-les-Grottes – Certifié NF HQE® Bâtiments Tertiaires - © EODD Ingénieurs Conseils / Page 17 · © Pouget Consultants · Fotolia

Alliance HQE GBC FRANCE

DEFINITION FRAMEWORK OF CIRCULAR BUILDING ECONOMY

15 LEVERS TO ACT

Source : Alliance HQE-GBC

Alliance HQE-GBC is the alliance of professionals for a sustainable quality of life. Thanks to its voluntary initiatives in France and abroad, the Alliance HQE-GBC acts for the general interest to anticipate, innovate, improve knowledge, disseminate best practices and represent the building, urban planning and sustainable instrastructure sectors. Alliance HQE-GBC is the French member of the World GBC. Recognised as public-interest organisation, it pays attention to all stakeholders. Alliance HQE-GBC promotes collaborative network working to leverage its action and promote local exchanges between the actors.

www.hqegbc.org