



WORLD
GREEN
BUILDING
COUNCIL

ROADMAP

A pathway to decarbonization (2050)

#Buildinglife

- 02 **Edito**
- 04 **Executive summary**
- 06 **Alliance HQE-GBC**
- 07 **The French National Law
Carbon Strategy**
- 12 **New regulations for the
construction sector :
The RE2020**
- 18 **The INIES database, the
RE2020 tool**
- 21 **Focus on 2 levers towards
decarbonization**
- 25 **To go further : a holistic
approach of the sector**



ÉDITO

**by Marjolaine
Meynier-Millefert,
President of the Alliance
HQE-GBC**

The building sector, in France, is responsible for about a quarter of greenhouse gases emissions... that is if you focus solely on the first 2 scopes that are energy consumption within buildings and energy production for buildings.

If you also take into account the third scope, that is the carbon released for the production of materials used for construction or reconstruction (like bricks or concrete), that number climbs to represent about a third of our total greenhouse gas emissions.

This means, obviously, that ever since the Paris agreements, the building sector has been a priority target for France. We are talking about 10 billion tons of CO2 released in 2019. That's 38% of the world's total emissions.

In France, the sector also represents about half of final energy consumption, most of that to provide heating and cooling to people. This means it's also a question of people's health, and a question of being able to afford to pay for that energy. Therefore the first logical step was to reduce energy consumption in new buildings to a minimum. To that effect, the thermic regulation of 2012 has pushed the French energy target to be amongst the lowest in the world : it specified that all new buildings should consume no more than 50 kilowatt hour per square meter per year.

We also needed to take into account that new constructions only represent about 1% of buildings, and that at that rate, by 2050, only 30% at best of the total building stock would have been replaced and achieved the required standards, it was thus important to address existing buildings too.

Therefore, a law named Energy Transition Law on Sustainable Development passed in 2015, parallel to the Paris agreements and the French National Low Carbon Strategy (NLCS), stated that by 2050, all existing buildings, whether public or private, housings or offices, should be renovated in order not to consume more than 80 kilowatt hour per square meter per year.

Beyond building renovation, that represents a great operational and management challenge, the true environmental revolution that the sector has undertaken in the last months in France, is our latest building regulation as a tool for the building sector to achieve the NLCS's goals.

The purpose of that regulation, the RE2020, is to move from essentially thermal regulations (focused mainly on energy use) to environmental regulations. The new standards will thus take into account greenhouse gases emissions throughout the building's lifecycle, that is from construction to demolition. It was indeed demonstrated that a well-designed thermic efficient building, will release more carbon at the time when it's built, rather than in its use phase if it uses low-carbon energy.

Why is that a game changer?

Because it sets the basis for an efficient evaluation of carbon emissions in all aspects of a building and creates a frame of transparency that will basically prevent greenwashing. It will encourage investors to select for each project a combination of materials and technical solutions with a new guideline : it won't just be about costs and services, it will be about the best environmental value as well. And because of that, it will in turn engage industries to increase the environmental value of each of their products... It will also encourage new ways of designing buildings... it's a virtuous circle that grows wider by the minute!

The Alliance for High Quality Environment owns the greatest database for environmental products declarations in the world. It's called INIES. That database is at the core of the RE2020 and of this new evaluation system.

That ENVIRONMENTAL regulation gives us the right incentive and the right tools. It pushes us to ask ourselves all the right questions, in the right order !

As an example, the HQE-GBC Alliance delivered a study on how the new carbon oriented regulation could be applied to renovations as well. We created a carbon payback indicator to help us decide when it becomes more interesting to renovate than to deconstruct and rebuild, and when it's not. What is the carbon balance point? at which point do the benefits of the renovation offset the initial carbon investment? the study shows that if no attention is paid to this indicator, the carbon payback time can exceed 50 years for a building renovation.

In a world where 1,5° is the target, this kind of information is VITAL and should become systematic in our every day life and strategic decisions.

With that kind of method, you ponder what to keep and what to take out of the building you need to renovate. It gives you a steady guideline to prioritise operations and avoid superfluity.

It turns circular economy into more than just a fashion, it makes it indispensable : what can I keep ? What can I reuse? If I do not keep it, can it be reused elsewhere? It questions the use of new materials and equipment as well as their implementation : what should be installed ? where and for what purpose ? When should you choose low-tech or no-tech over energy efficiency tech ?

Finally, it questions the interactions that the building can have with its environment: is it possible to increase the occupation rate of the building ? is it possible to share space ? a car park for example, a room that isn't used much? It helps measure the positive externalities that a renovation can have, such as the reduction of travel for instance. It might (and should) even encourage new low-carbon lifestyles at a neighbourhood scale.

This is an illustration of how the building sector is shifting. We went from thermal regulation toward environmental regulation : building renovation will go the same way soon.

EXECUTIVE SUMMARY

The Alliance HQE-GBC is a recognized association of public utility for a sustainable built environment. Buildings, urban plans, infrastructures at every stage of their life cycle – construction, operation, renovation – are at the core of its DNA, in a transversal vision combining life quality, respect of the environment, economical performances and responsible management.

The Cop21 invited different countries to publish their long-term low emission development strategy by 2050. France submitted her plan with the National Low-Carbon Strategy (SNBC : Stratégie Nationale Bas Carbone) in 2016 that serves as a roadmap in terms of climate change policy.

The two main objectives of the French National Low-Carbon Strategy (NLCS) in the building sector are to reduce emissions by 49% by 2030 compared to 2015 and total decarbonization of the building sector by 2050

To achieve them, there are 4 step: first a radical renovation of the existing stock by 2050, second an eradication of fuel poverty (« thermal sieves ») by 1st January 2028, third in-depth renovation of the public housing stock and fourthly an increasing energy and climate performance in new buildings.

To support this development, the NLCS proposes 4 guidelines : first to guide a change in the energy mix towards completely carbon-free energy consumption during the use phase of new and existing buildings; second to encourage the renovation of the whole existing residential housing stock and tertiary sector buildings;

third to improve the energy and carbon performance levels of new buildings in future environmental regulations and fourthly to aim for more energy efficient equipment and moderated use

Numerous laws have addressed environmental issues in the field of construction (Energy Transition Law for Green Growth, ELAN Law, Law on the fight against waste and the circular economy, etc) and have set ambitious objectives. In 2022, those objectives are reflected in the new environmental regulation for new buildings (RE2020). The goal is to respect the National Low Carbon Strategy objectives.

The RE2020 is taken into account Energy performance, Summer comfort and Environmental performance. Its goal is to give priority to energy sobriety and decarbonization, to reduce the carbon impact of buildings construction and to guarantee comfort in case of heat waves. To achieve those goals buildings must consume less and use less carbon-based energy, a gradual transition to low-carbon buildings, relying on the diversity of building methods and a mix of materials must happen and construction of more comfortable buildings in case of hot weather must be generalized.

There is a long-term view of the RE2020 from its entry into force on 1 January 2022 until 2030 with 3 milestones in 2025, 2028 and 2031.

The INIES database is the RE2020 tool. It provides Environmental and Health Declaration Sheets for construction products and Product Environmental Profiles (PEP) for building equipment. These environmental declarations are provided by manufacturers or professional associations. The INIES database managed by Alliance HQE-GBC, integrates data other than environmental declarations (DED, DES, etc.), provided by the Ministry of Ecological Transition, with the aim of being able to carry out the LCA of buildings.

The purpose of the regulation RE2020 is to move from essentially thermal regulations (focused mainly on energy use) to environmental regulations. The new standards will thus take into account greenhouse gases emissions throughout the building's lifecycle, that is from construction to demolition. Alliance HQE is at the heart of the RE2020 new regulation, because it owns the largest database for environmental products declarations in the world. That database is at the core of the RE2020 and of this new evaluation system. Not only HQE certifications are already aligned with the new regulation, but they also go further.

The circular economy is one of the lever towards decarbonization. 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).

Renovation is another lever towards decarbonization. Life cycle assessment is an environmental assessment method that quantifies the impacts of a product, service, or process over its entire life cycle: from the extraction of raw materials to its end-of-life treatment.

The results of the NZC Renovation collaborative innovation program show that low-carbon renovation is part of a holistic approach to environmental renovation. Two lessons should be learned, first the carbon neutrality approach applied to the NZC project consists primarily of reducing the carbon payback time as much as possible; second there are 5 levers for low-carbon renovation: Tacticity, circularity, materiality, technicality and externality.

To conclude, the outline of this document underlines the need for a holistic approach : the laws and the national regulation reveal a need for doing LCA, which is answered by the INIES database, which uses information on buildings during their whole-life process, and that is complementary with the notion of circular economy.

This notion to follow for a pathway to decarbonization is a multi-criteria and global approach at the scale of buildings. We can use for that purpose the five areas and the fifteen action levers described in our framework of circular economy and the concept of carbon payback time as well as the five levers for low-carbon renovation issued from of NZC Renovation project.

ALLIANCE HQE-GBC

MISSIONS

Alliance HQE-GBC France is the alliance of professionals for a sustainable living environment. It brings together unions, professional federations, companies, local authorities and individual members.



4 GOALS

- Innovating and anticipating
- Improving knowledge
- Disseminating best practices
- Representing and promoting sustainable built environment

MEMBERS

- 362 members
- 29 professional organizations
- 46 companies
- 13 associations, local authorities
- 257 individual professionals
- 17 honorary members

INFLUENCE

- INIES : 3902 data files available (November 2021)
- HQE : 1 out of 4 collective new buildings is certified
- 12% of new tertiary buildings are certified
- HQE exists in 26 countries

Alliance HQE-GBC France is the French established member of the World Green Building Council, global network of sustainable building professionals in 76 countries.

LOW CARBON FRENCH POLICY

1. AN OVERVIEW OF FRENCH LAWS AND REGULATIONS

2015

Paris Agreement

A sustainable and international framework for climate change, aims at limit global warming below 2 degrees.

Energy transition Law on Sustainable development

Tackling energy issues in the building sector (via renovation)

2015

2017

Tertiary Decree : setting intermediate targets to reach the objectives of the Paris Agreement

Reduction in consumption for tertiary buildings : 25% reduction by 2020 and 40% by 2030

Carbon neutrality set in the Climate plan

The Climate plan sets a new course for everyone, that of carbon neutrality by 2050

2017

2018

The law on the fight against waste and the circular economy

The law on the fight against waste and the circular economy aims to accelerate the change in production and consumption models in order to reduce waste and preserve natural resources, biodiversity and the climate. It is part of the implementation of the 2004 environment charter.

Elan Law (low carbon in new buildings)

Goal : to reform real estate law. Green buildings is reinforced by favouring eco-materials and the development of low-carbon solutions

2020

2021

RE2020 : Environmental regulation for new buildings

It aims to increase the energy performance of new buildings, to reduce their impact on the climate. It will come into force in January 2022.

Climate and Resiliency Law

20 articles of the law on housing : favouring renovation of buildings and combatting soil artificialisation

2022

LOW CARBON FRENCH POLICY

2. THE NATIONAL LOW-CARBON STRATEGY

The COP21 invited different countries to publish their long-term low emission development strategies by 2020. Several countries, including France (with the SNBC2015) submitted their plans in 2016. Many other countries have also started the process of drafting and revising their strategies or have adopted similar legislations.

In 2011, the Commission published a roadmap to 2050, which aimed to reduce emissions by somewhere between 80% and 95% in 2050 in comparison to 1990. The European Council adopted the climate neutrality objective for the EU in 2050. The regulation on the governance of the energy union, adopted in 2018, requires EU member states to submit long-term national energy climate plans. The national low-carbon strategy is a part of that national plan.

Long-term objectives have proven to be valuable under the condition that they are able to inform short-term decisions. To make this link, France has chosen to put these objectives into their laws.

Introduced by the law of 2015 on the energy transition for sustainable growth, the National Low-Carbon Strategy (SNBC : Stratégie National Bas Carbone) serves as a roadmap for France in terms of climate change policy development.

On the basis of a forward-looking trajectory to 2050, it defines short- and medium-term greenhouse gas emission reduction targets for France. These are limits on greenhouse gas emissions not to be exceeded at national level over five-years periods, expressed in millions of tons of CO2 equivalent.

It is consistent with France's commitments to the European Union under the Paris Agreement, as well as with national commitments to reduce greenhouse gas emissions by 40% by 2030 compared to 1990.

It provides public policy guidelines for implementing the transition to a low-carbon, energy efficient economy, with circularity principles applied in all sectors of activity and less waste production.

The National Law Carbon Strategy provides a strategy to tackle carbon emissions in the building sector.



Stratégie nationale bas-carbone*



**The National Low-Carbon Strategy*

SNBC was first
adopted

2015

2018-2019

SNBC was revised with the aim of achieving carbon neutrality in 2050 (a higher ambition than the first SNBC, which aimed at a 75% reduction in its GHG emissions by 2050 compared to 1990).

This revised SNBC draft
was submitted to a public
consultation

2020

21 APRIL

2020

The new version of the SNBC and the carbon budgets for the periods 2019-2023, 2024-2028 and 2029-2033 were adopted by a decree

OVERVIEW AND CHALLENGES

In 2017, in France, the residential/tertiary sector is responsible for 19% of national emissions. That figure goes up to 28% when including emissions from the energy consumed in buildings. After a slight decline, final energy consumption has been stagnating in recent years, for all residential and tertiary sectors. CO₂ is the main gas emitted by the residential / tertiary sector, and it represented 84% of greenhouse gas emissions in 2017.

In 2015, a rather ambitious scenario was adopted by the first national low carbon strategy plan. Since then, the residential and tertiary sector is falling behind in the short term, showing a risk of not meeting the national and European targets for 2030. In order to respect those, France must accelerate the emissions reductions in the short term, and do so now that the carbon neutrality goal set in 2017 increases the goals set by the first Strategy National Low-Carbon (SNBC).

The building sector has several particularities :

- the economic and financial size of the energy of the transition work : the energy renovation plan for buildings requires around 20 billion euros over the five-year presidency.
- a characteristic inertia : there is a key-issue that is to speed up the process of renovation.

In 2050, 70% of stock could be made up of buildings built before 2012.

It is essential to renovate this part of the building stock in order to lower energy consumption during the use phase of buildings. There is an urgent need to give incentive prices to renovation projects, so that more projects can be made.

- the need to control impacts in the construction and demolition phases : Impacts in terms of greenhouse gas emissions in the construction and demolition phases should be better controlled. If we look at life cycle analysis

in the building sector, we can see that the construction and demolition phases of buildings are responsible for a large share of the emissions.

France's energy renovation policy is defined in the short term by the Energy Renovation Plan for Buildings, which makes energy renovation a national priority and sets the short-term priority lines of action in order to: increase and improve renovation; increase aid to support all households in renovation work; make public buildings exemplary in terms of energy efficiency and involve the territories by mobilising local players.

The strategy aims to achieve the following objectives :

Reduce emissions by 49% by 2030 compared to 2015

- total decarbonisation of the building sector by 2050. This implies increased sobriety, drastically reducing energy consumption, relying on carbon-free energy source, set performance targets for the carbon footprint of buildings throughout their whole life cycle.

Several steps are defined by the national strategy :

Radical renovation of the existing stock by 2050. This means that 500,000 housing renovations per year are essential until 2030, then 700,000 per year.

- eradicate fuel poverty (« thermal sieves ») by 1st January 2028
- thorough renovation of the public housing stock
- increasing energy and climate performance in new buildings

4 GUIDELINES

GUIDELINE 1 : To guide a change in the energy mix towards completely carbon-free energy consumption during the use phase of new and existing buildings

- Consolidate the clear strategic guidelines : for example, apply incentive pricing signals, give targeted grants for heating and domestic hot water systems that are highly energy efficient and use less carbonised energies, incorporate the “decarbonised energy” objective in the information on building energy performance
- Take into account the pressure on the resources required for carbon-free forms of energy, and prioritize the use of the best adapted carbon-free solutions for each type of building by accounting for changes in the energy mix and the local potential.

GUIDELINE 2 : To encourage the renovation of the whole existing residential housing stock and tertiary sector buildings

- Accelerate the pace of renovation in the residential and tertiary sectors, to reach 500,000 housing renovations per year in the short term, in order to radically renovate the entire existing housing stock by 2050. In the short and medium term, tackle in particular energy “sieves” where gains have the highest potential.
- There must be a rise in renovation projects. To introduce adequate incentives that reach the entire population. To guarantee a high level of performance for the renovation actions, aiming for an equivalent of low-carbon level on average across the stock. To strengthen support for households when optimising renovation work.
- Develop the use of the least carbon-based renovation and insulation products and use materials that contribute to storing atmospheric carbon in buildings.
- Continue efforts in research, innovation and development on knowledge of the stock and the technologies as well as on the instruments used.
- In coherence with the energy renovation plan for buildings, develop and maintain ambitious programmes aiming to support

a rise in the skills of building professionals and a profound transformation in products and services.

- Renovate all of the tertiary building stock, and set an example by initiating very high performance renovations in public buildings (target all of the tertiary building stock)

GUIDELINE 3 : Improving the energy and carbon performance levels of new buildings in future environmental regulations

- To favor approaches included in life cycle analyses.
- To introduce an LCA “building” greenhouse gas criterion and a building envelope criterion.
- To effectively integrate summer comfort when designing buildings, relying in particular on nature-based solutions, so as to limit the use of air-conditioning, given the foreseeable increase in the frequency and intensity of heat episodes.
- In building regulations, to promote less carbonised construction materials and equipment with superior energy and environmental performance, such as, in some cases, those that are bio-based or from the circular economy, via performance objectives set for the carbon footprint of a building throughout its life cycle.

GUIDELINE 4 : Aiming for more energy efficient equipment and moderated use

- To reduce specific consumption: reduce the average unit consumption of electrical equipment, advance the dissemination of smart technologies for controlling demand
- To promote lifestyle and consumption changes shifted towards improved energy sobriety through information and awareness campaigns, by encouraging households to use equipment less frequently or more efficiently, by curbing the amount of equipment used and by providing support to users following works, so as to reduce the risk of possible misuse and negative effects.

NEW REGULATIONS FOR THE CONSTRUCTION SECTOR THE RE2020



WHY THIS REGULATION?

For several years, numerous laws have addressed environmental issues in the field of construction (Energy Transition Law for Green Growth, ELAN Law, etc.) and have set ambitious objectives. In 2022, those objectives will be reflected in the new environmental regulation for new buildings (RE2020). The goal is to respect the National Low Carbon Strategy objectives.

The National Low Carbon Strategy (SNBC) has set guidelines for the sectors in order to achieve the objective of carbon neutrality in 2050. For the building sector, this means mainly an improvement in energy performance and a significant reduction in the use of gas. Such a strategy means firstly

the development of renewable energies, and secondly the connection of buildings to highly virtuous urban heating networks supplied by renewable energies, and to a lesser extent the use of biomass (wood energy). The RE2020 is therefore part of this trajectory, by limiting the consumption of non-renewable and carbon-based energy.

The RE2020 has objectives of improving the energy performance of new buildings, reducing their impact on the climate (taking into account greenhouse gas emissions over the entire life cycle of buildings) and adapting them to future climatic conditions (strengthening summer comfort).

WHAT IS TAKEN INTO ACCOUNT WITH THIS NEW REGULATION ?

Energy performance : the RE2020 aims to improve the energy performance and reduce the consumption of new buildings. The five regulatory uses of the previous regulation are still used : heating, cooling, lighting, domestic hot water production and auxiliaries, with in addition the mobility of the occupants inside the building and other auxiliaries.

Summer comfort : The RE2020 presents an important evolution on the theme of summer comfort. It introduces a new requirement on discomfort degrees hours (DH), with a new calculation method that takes into account

the effects of climate change on buildings: the evolution of future temperatures, heat waves that will become more frequent, more intense and longer.

Environmental performance : Environmental performance is the major regulatory development of the RE2020 which introduces the calculation of the environmental impacts of the building over its entire life cycle (LCA), which allows the impacts of the building to be assessed through a series of environmental indicators calculated over its entire life cycle.

WHAT ARE THE GOALS OF THE RE2020 ?

The RE2020 is the environmental regulation for new buildings. The idea is to prepare the buildings in which French people will be living for decades to come. A quarter of the buildings that will exist in France in 2050 have not yet been built.

With the RE2020, the government is pursuing three main objectives :

- to give priority to energy sobriety and decarbonisation
- to reduce the carbon impact of buildings construction
- to guarantee comfort in case of heat waves.

Because of the major transformations that these objectives imply for the construction sector, the Government has decided that the RE2020, in line with the national low-carbon strategy, will follow a progressive trajectory.

First of all, in line with previous thermal regulations, the main goal is to continue to reduce the consumption in energy of new buildings. The RE2020 will be more demanding than the previous regulation, in particular regarding the performance of isolation (regardless of the heating system used). Besides reducing and saving energy, it is also essential that this energy is as carbon-free as possible, particularly through the use of renewable heat (heat pump, biomass, heating networks...). The requirements of the RE2020 will lead to the gradual disappearance of heating using fossil fuels in new buildings. It will also lead to stop using electric heating systems that are not efficient.

Secondly, there is a question of reducing the impact of new buildings, by taking into account the emissions of a building through its whole life cycle. Indeed, for energy-efficient buildings, most of the carbon footprint is linked to the construction and demolition phases, which account for 60-90% of the impact (calculated over a 50-year period). The requirements to limit these impacts will make it necessary to

use construction methods that emit little greenhouse gas emissions. This will lead to a more frequent use of wood and bio-sourced materials, which store carbon during the life of the building. Through these requirements, there will be a major change in the way we build, which will mobilize the entire building industry in the months and years to come.

Finally, the government wishes to ensure that the buildings of tomorrow will be adapted to climate change and heat waves. Buildings will have to be more resistant to heat waves, which are already common and will become even more frequent in the future. While discomfort in the summer is a common shortcoming of many buildings built according to previous regulations, the RE2020 regulation will impose a specific requirement. With this regulation, there is both a desire to improve the existing laws and a will to move towards the future by meeting climate ambitions.

There is a long-term view of the RE2020, which will be more and more demanding, from its entry into force on 1 January 2022, until 2030, with three milestones in 2025, 2028 and 2031. An observatory will be created on newly constructed buildings and its results will be presented regularly to the High Council for Construction and Energy Efficiency (CSCEE).

This will make it possible to monitor the impacts of the regulation and to review it on an objective basis in order to make any adjustments that may be necessary.

Finally, a consultation will be launched for the development of a State label, which will be introduced after the RE2020. It will allow those who wish to do so, public or private actors, to go further in terms of environmental requirements, and to lead the way to the buildings of tomorrow.

GOAL 1 : BUILDINGS THAT CONSUME LESS AND USE LESS CARBON-BASED ENERGY

In line with thermal regulations, the RE2020 will strengthen energy efficiency requirements, as the best energy is the one we do not consume.

In addition, for the first time, the regulation will set requirements on emissions from the used energy. The RE2020 will thus mark a major breakthrough: the gradual disappearance of new buildings heated exclusively with gas.

30% reduction of needs for more sobriety

To demand more sobriety, the RE2020 will strengthen the requirement on the bioclimatic. It is an indicator that reflects the need in energy of a building to stay at a comfortable temperature, depending on the quality of its isolation and its general design.

Compared to the previous regulation, the maximum threshold for bioclimatic needs of buildings will be lowered by 30% on average, with modulations to take into account the technical and economic constraints specific to small houses and buildings. This is an ambitious but realistic requirement, because today a significant proportion of new housing already meets those criteria. The buildings of tomorrow will thus be better designed and better insulated, for lower bills.

A fossil fuel exit strategy

To ensure that the energy used is using as little carbon as possible, the regulation will for the first time set a maximum of greenhouse gas emissions for energy consumption. The challenge is to stop using fossil fuel in new buildings, when today housing heating entirely with gas is still the majority in new buildings.

In individual housing, where non-fossil fuel solutions are very common and perfectly mastered, the threshold will be set at 4 kgCO₂/m²/year as soon as the RE2020 comes into force, and will de facto exclude systems using only gas. While an existing average house heated with gas emits around 5 tons of CO₂/year, the same house will emit less than 0.5 tons with the regulation.

In collective housing, the transition will be gradual between 2022 and 2025, as today 75% of new buildings are still heated with gas. The alternatives (individual heat pumps, heat networks, solar thermal) are numerous, but still need to be developed on a large scale and the sector must take control of the designs to accompany this change. That is why the threshold will be initially set at 14kg of CO₂/year/m², thus leaving the possibility to install gas heating only if the buildings is very energy efficient.

Then, starting from 2025, the threshold will be reduced to 6.5 kgCO₂/m²/year, thus excluding gas-only heating, but allowing the development of innovative solutions, including hybrid solutions.

With the RE2020, France, like other European countries, is in a position to do without fossil fuels in new buildings.

Systematize the use of renewable heat

Finally, the RE2020 will systematize the use of renewable heat, via a maximum threshold for the consumption of non-primary energy. In fact, unlike some past thermal regulations, there is a wish to prevent a massive return of the electric radiator. Regarding that matter, the case of heating networks will be subject to a special regime, in order to give time for existing heating networks to make the necessary investments to decarbonize.

The aim is to encourage, with ambition and pragmatism, the decarbonization of heating networks.

GOAL 2 : A GRADUAL TRANSITION TO LOW-CARBON BUILDINGS, RELYING ON THE DIVERSITY OF BUILDING METHODS AND A MIX OF MATERIALS

The construction phase is responsible for a significant part of a building's greenhouse gas emissions, when considered over its entire life cycle. In order to take this into account in the regulation, it is necessary to introduce a major methodological change: the calculation of the life cycle analysis (LCA), which adds up the estimated carbon impact of all materials used in a building, based on data that characterize the environmental impacts.

These data are partly produced by manufacturers and are subject to a verification protocol. Greenhouse gas emissions related to the construction

itself will also be taken into account for the calculation, in order to encourage processes as green as possible. The use of life cycle assessment as a regulatory tool, establishing maximum thresholds to be respected, will place France among the European pioneers for low-carbon in the construction sector, alongside some others such as the Netherlands, Sweden and Finland, where regulations incorporating life-cycle analysis calculations are either in force or planned for the future.

Encouraging carbon storage through dynamic life cycle assessment

In accordance with the french Elan law, the life cycle analysis will value the temporary storage of carbon, which is the capacity of certain materials that have captured carbon during their 'biological' life (wood, biobased insulation, bio-based interior fittings, etc.) to store carbon and only release part of it at the end of life (after possible recycling stages). This requires a life-cycle analysis method that takes into account the temporality of emissions and storage effects. Such a method, known as "dynamic", gives greater weight to greenhouse gases emitted into the atmosphere today than those that will be emitted in the future.

This is consistent with climate control policy, as one molecule of carbon emitted starts warming the atmosphere today, while the same molecule emitted 50 years later will only start to have an effect on the climate

50 years later. So when we look ahead to the next century, efforts made today on gas emissions have more weight in avoiding climate degradation. When calculating the regulatory requirements with this method, the qualities of low-emission materials that emit little during construction, or that store carbon (such as wood or bio-based materials), are taken into account. This approach will make it possible to enhance the value of construction methods capable of maintaining a stock of carbon in buildings.

At the same time, the thresholds set will allow a logic of results and not of means and not of means, leaving manufacturers free to choose the materials and techniques they wish to use. Beyond the use of biobased materials, strong incentives will be given through the RE2020 to use more all other materials, techniques and equipment, and to promote manufacturers who are committed to decarbonisation and who are already investing in this direction, such as certain producers of cement and concrete, steel, insulation, bricks, etc. The use of geo-sourced materials (such as raw earth) will also be encouraged by life-cycle regulation as these solutions require few carbon-emitting steps and offer a high reuse or recycling rate. Last but not least, the regulation will encourage manufacturers, designers and project owners to innovate towards a greater mix of materials.

In addition to the life-cycle construction carbon indicator, a carbon storage indicator will be calculated for information purposes only and will allow to see the rate of biomass use in buildings. The life cycle assessment of the impact of the act of building on global warming will also take into account the construction phase in order to encourage the most virtuous practices.

On the basis of the life cycle carbon indicator, measured in kgCO₂/m² of housing area, the RE2020 will set requirements that are compatible with the National Low Carbon Strategy (SNBC). The aim is to reduce emissions from the construction sector by at least 30% by 2031.

The gradual increase in requirements will make the use of all decarbonisation levers systematic by 2031.

An increased use of wood and biobased materials

In particular, the use of wood and bio-based materials will be developed, including in the structure, and in particular in single-family homes and small houses. As an illustration, wood-frame houses represent less than 10% of the market for new single-family houses in France. The proportion of wood-frame use is even lower for collective housing, especially for high-rise buildings, where current techniques still have significant additional regulatory requirements.

In this respect, it will therefore be necessary to ensure the development of national industrial production of construction timber to avoid increasing imports. The Government has already launched calls for projects to finance primary and secondary processing of wood from French forests. Other initiatives involving the Strategic Committee for the Wood Sector will be launched shortly to promote the development of a national production of wood engineering components.

More mixed materials: a transformation of the way we build

More broadly, the trajectory set by the RE2020 outlines a major shift in the construction sector, with the rise of new techniques and designs. Such an evolution must take place gradually so that the industry may adapt. Setting thresholds is also a guarantee of cost control, allowing the industry time to build up their capacity. The French government also intends to support innovation in the field of mixed materials.

A gradual transition, to reduce emissions from the construction sector by over 30%

For all these reasons, the RE2020 will set progressive requirements depending on the type of building (individual or collective). In the first phase (2022-2025), the main challenge will be the appropriation by the whole sector of the life cycle analysis method. This will involve, particularly on the part of designers, project owners, project managers and suppliers, to optimise the environmental characteristics of the materials and equipment used, to improve their performance and to save resources.

During this first phase, the aim is also to improve the robustness of life-cycle analyses of buildings. The regulatory requirements will make it necessary to provide accurate information in the life cycle analyses and to choose environmental data specific to the building materials. This will above all lead to a clear incentive to use materials with a low carbon footprint without creating a constraint on the use of a particular material or a particular technique.

Once this first phase is over, when the life cycle assessment methods and the environmental characterisation of the products will be fully mastered, the requirements will increase in stages (2025, 2028 then 2031), leading to greater and greater use of the various decarbonisation levers.

Evolution of construction carbon impact thresholds
Dynamic carbon impact (Kg CO₂/m² over 50 years)



By 2031, the maximum threshold in kgCO₂/m² will be lowered by more than 30% compared to the current reference level. In single-family houses, the maximum threshold for the construction side will be reduced from 640 from 2022 to 415 kgCO₂/m² from 2031. In collective housing, it will drop from 740 to 490 kgCO₂/m²/year. Such a reduction represents about 7 MtCO₂/year avoided on a national scale. These requirements will be achievable for a wide variety of construction methods. In order not to penalise constructions that require special foundations (most often because the owners must respect geotechnical or urban planning constraints), the carbon impact of these will not be counted. Finally, in the hottest climatic zones (around the Mediterranean and inland Provence), these thresholds will be modulated.

Indeed, unless palliative systems are introduced, the use of certain low-carbon materials (timber in particular) does not always guarantee the same level of comfort. Also, the compatibility between the requirement of comfort, decarbonisation and cost control could be difficult in these particularly hot areas. The requirement will therefore be modulated to allow every French person to benefit from comfortable housing in summer without incurring excessively high costs.

GOAL 3 : MORE COMFORTABLE BUILDINGS IN CASE OF HOT WEATHER

Many buildings built to this day are uncomfortable with hot weather, to the detriment of their occupants or users. Global warming will intensify and increase the number of heat waves. To ensure that tomorrow's buildings are adapted to climate change, the government wanted the RE2020 to significantly improve the consideration of summer comfort and to set a specific requirement. The RE2020 will first integrate the need for the calculation of the building's energy (Bbio), which will be subject to strict requirements. On the basis of a weather scenario similar to the heatwave of 2003, a summer comfort indicator will be calculated during the design of the building, which will be expressed in degree.hours (DH). The RE2020 will set a maximum high threshold of 1250 DH that may not be exceeded, which would correspond to a period of 25 days during which the dwelling would be continuously at 30°C during the day and 28°C at night. This threshold will be the same

throughout France. Because it will be more difficult to respect in the south of France, for housing built in these hot climatic zones, certain construction requirements will be modulated, in particular those relating to the carbon indicator in construction.

At the same time, the RE2020 will set a low threshold at 350 DH, above which penalties will be applied in the calculation of the performance. These penalties will be flat-rate in order to encourage all buildings to make design efforts to reduce the number of hours above the threshold. In all cases, passive air-conditioning solutions will be encouraged by the regulation through its calculation engine, whether it be for example the shape of the building, its orientation, protection against the sun... The aim is to improve the comfort of buildings in summer at low cost and in a sustainable manner. This indicator and this requirement are new for a thermal regulation and the exact reality of the level of comfort in use that they reflect remains to be finely assessed. Therefore, depending on the feedback from experience after the first few years of regulation, this requirement will be subject to a formal review and may be reinforced.

In addition to summer comfort, the RE2020 will also improve the treatment of indoor air quality and ventilation. This is one of the main shortcomings observed in the delivery of current new buildings. A systematic third-party inspection of the quality and proper functioning of ventilation will therefore be introduced at the time of handover, based on the recommendations of the White Paper on Ventilation (2018) shared by a large panel of professionals in the sector.

TIMETABLE FOR ENTRY INTO FORCE

The date of entry into force is 1 January 2022, in order to give the industry a few months to prepare for and take on board the regulation.

→ A transitional application provision will be introduced for the requirements for single-family houses heated with gas, until the end of 2023, if a planning permission has already been delivered.

→ The thresholds will be worked again, and if necessary shifted to 2025, 2028 and 2031, to reinforce the progressive nature of the whole regulation.

THE INIES DATABASE MANAGED BY ALLIANCE HQE-GBC

THE RE2020 TOOL

The Alliance HQE-GBC France is already applying the criteria of the RE2020. The purpose of that regulation, the RE2020, is to move from essentially thermal regulations (focused mainly on energy use) to environmental regulations. The new standards will thus take into account greenhouse gases emissions throughout the building's lifecycle, that is from construction to demolition.

Alliance HQE-GBC France works mainly with two certifying officers : Cerqual and Certivéa. The first one delivers certifications for housing, and the second one for non-residential buildings.

How do certifying offices take into account climate change ?

Starting from January 1st 2022, certification offices integrate the thresholds of the new environmental regulation, in particular those in relation with climate change and the reduction of the carbon footprint of buildings.

Each certification scheme has three levels to be in accordance with the regulation :

- first level : in accordance with the RE2020 threshold 2022
- second level : in accordance with the RE2020 threshold 2025
- third level : in accordance with the RE2020 threshold 2028

It was indeed demonstrated that a well-designed thermic efficient building, will release more carbon at the time when it's built, rather than in its use phase if it uses low-carbon. It will encourage investors to select for each project a combination of materials and technical solutions with

a new guideline : it won't just be about costs and services, it will be about the best environmental value as well.

Alliance HQE is at the heart of this new regulation, because it owns the largest database for environmental products declarations in the world. That database is at the core of the RE2020 and of this new evaluation system. Not only HQE certifications are already aligned with the new regulation, but they also go further.

The INIES database is the national reference database for environmental and health data on construction products and equipment. INIES provides you with Environmental and Health Declaration Sheets (EHDS) for construction products and Product Environmental Profiles (PEP) for building equipment, supplied by manufacturers or professional associations in the format of the European standard NF EN 15804 and its national complement for construction products and the standard NF XP C08-100-1.

The operation of the INIES database is ensured by the supervisory board and the technical committee. The supervisory board, chaired by the Alliance HQE-GBC, ensures the ethics and deontology of the INIES database. The technical committee oversees the collection and processing of data and the updating of the database's content.

Developed since 2004, it is an operational and indispensable tool for the widespread use of eco-design in buildings.



➔ www.inies.fr

WHY INIES ?

The INIES database provides Environmental and Health Declaration Sheets for construction products and Product Environmental Profiles (PEP) for building equipment. These environmental declarations are provided by manufacturers or professional associations.

The INIES database integrates data other than environmental declarations (DED, DES, etc.), provided by the Ministry of Ecological Transition, with the aim of being able to carry out the LCA of buildings.

EPDs on the INIES database take into account the entire life cycle of the product (cradle to grave). They are a major multi-criteria tool to help professionals in their choices to make a building more sustainable.

WHY AN EHPD ?

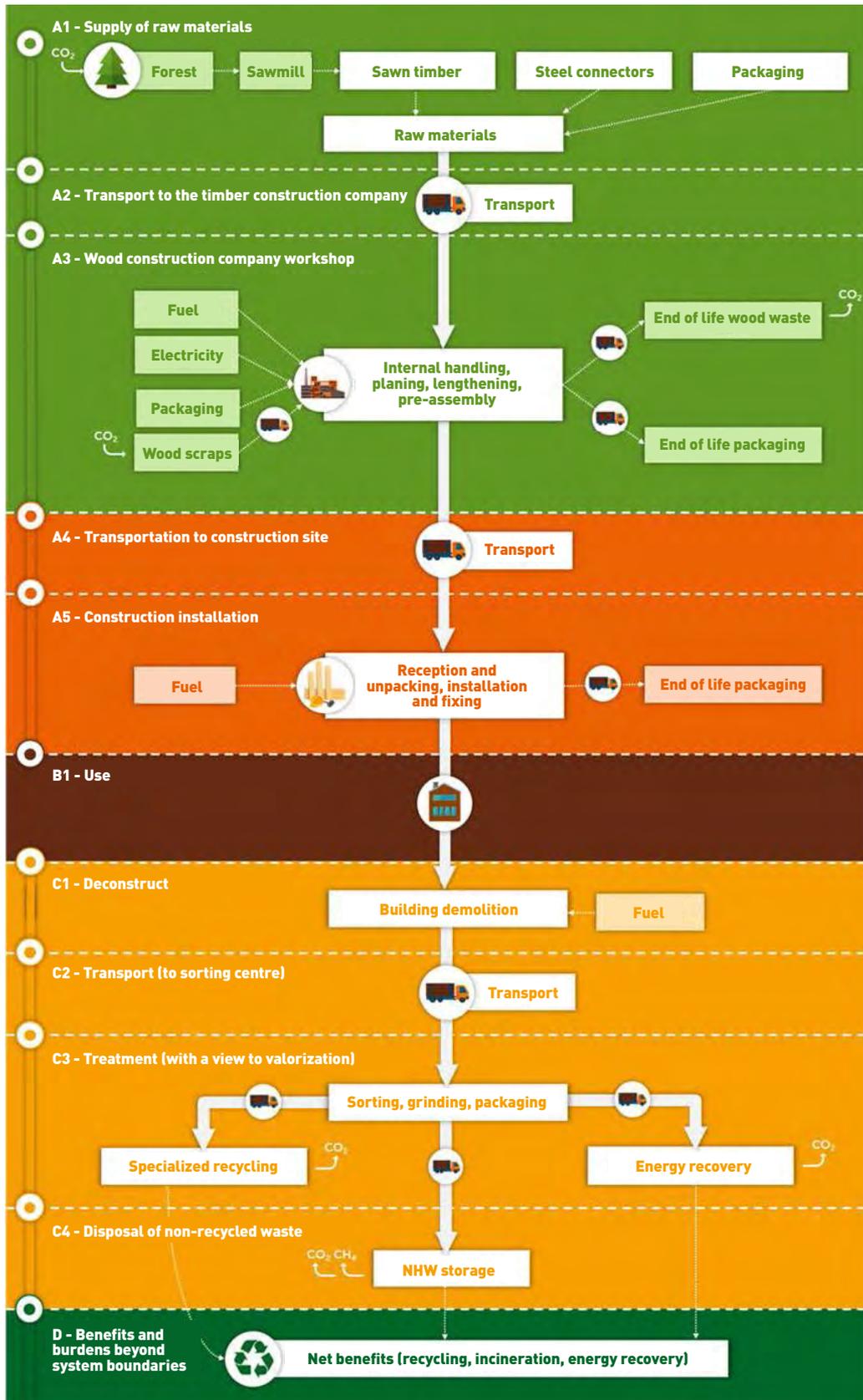
The EPDs offer multi-criteria, objective, quantitative and qualitative information related to a function and a life span of the product in the structure.

Their main role is to provide necessary and useful information to those who want to add environmental and sanitary choice criteria on an unbiased basis to their usual choice criteria (technical, economic and aesthetic).

WHAT CAN BE FOUND IN AN EHPD ?

- a characteristic of the product: main constituents (raw materials, possible dangerous substances...), complementary products, packaging... ;
- the functional unit of the product and its lifespan;
- its environmental profile: a set of environmental indicators calculated over the entire life cycle of the product;
- health and comfort information: the product's contribution to the health quality of interior spaces and water, its contribution to the quality of life in the building
- the identity of the issuer.

STEPS, SCENARIOS AND ADDITIONAL INFORMATION



Source : FNB hardwood load-bearing elements in French wood May 2021
 Example : life cycle stages included in an LCA study

To go beyond than what is asked by the national regulation and the LCA indicator for buildings, there are several other approaches that go further, and allow a global vision of the building, such as circular economy and renovation approaches.

FOCUS

ON 2 LEVERS TOWARDS DECARBONIZATION

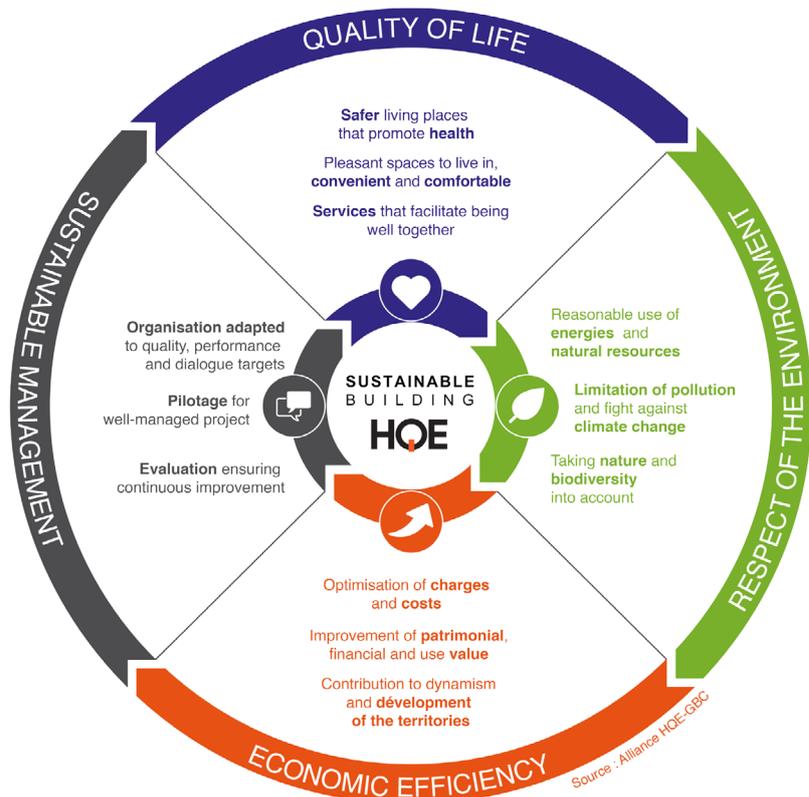
1. THE CIRCULAR ECONOMY

Another mean to reach carbon neutrality would be the circular economy, on which the Alliance HQE-GBC has been working.

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).

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.

DEFINITION FRAMEWORK OF SUSTAINABLE BUILDING FOR EVERYONE



Alliance HQE-GBC worked on a framework to help define what is circular economy and how we could benefit from it (see below)

The framework for defining the circular economy 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.

DEFINITION FRAMEWORK OF CIRCULAR BUILDING ECONOMY

→ 15 levers to act

→ One of the key tools of the circular economy is the renovation of buildings



➤ Circular economy, sustainable building springboard for everyone, 15 levers to act

➤ Bâtiments neufs et rénovés au regard de l'économie circulaire, premières observations (en français)

FOCUS

ON 2 LEVERS TOWARDS DECARBONIZATION

2. RENOVATION

Alliance HQE-GBC has been working on identifying the barriers that the sector must face in order to tackle decarbonization via renovation. A report was made, trying to give stakeholders keys on what can be done to remove these barriers. The Alliance did an HQE Performance test for renovated buildings.

LCA METHOD BASED ON THE FRENCH E+C- STANDARD

Life cycle assessment is an environmental assessment method that quantifies the impacts of a product, service, or process over its entire life cycle: from the extraction of raw materials to its end-of-life treatment.

Standardised and recognised, it is the most widely used method in terms of environmental assessment (see ISO 14044, EN 15978). It works on a voluntary basis today in France, but its use should be mandatory in 2020 for new buildings with the new French environmental regulations.

Life cycle assessment (LCA) takes into account all environmental impacts from the production phase to the end of a building's life. Also, being a multi-criteria method, it prevents unintended consequence of shifting negative impacts from one area to another.

The method of this test allows the calculation of environmental performance indicators for a renovation or refurbishment initiative under the responsibility of a project owner. It is based on the EN 15 978 standard and the Energy-Carbon benchmark for E+C- experimentation

THE HQE PERFORMANCE TEST FOR RENOVATED BUILDINGS AND RESULTS

In 2017-2018, LCA calculations have been carried out with this specific methodology for ten renovated buildings. This HQE Performance test was conducted at a national level for a wide range of projects. It was an opportunity to point out specific issues, to improve the methodology and to observe any initial trends.

- 1) «For the renovated buildings in this test, if the renovation is ambitious from an energy point of view, then they can target the same energy performance levels as a new building»
- 2) «For the renovated offices in this test, embodied energy* represents between 17% and 42% of total primary energy consumption»
- 3) «For the renovated buildings in this test, greenhouse gas emissions are almost equally divided between Construction Product and Equipment (CPE) and all-use energy.»
- 4) «For the renovated buildings in this test, the products and equipment that have the greatest impact on carbon emissions are different from those in new buildings.»
- 5) «For the renovated buildings in the test, the quantity of non-hazardous waste is less than half that of a new building.»
- 6) «For the renovated buildings in the test, the batches with the greatest impact on the hazardous waste indicator are the HVAC and Heating network technical batches»
- 7) «The circular economy also means reducing resource depletion, which is a further LCA indicator to be explored in the future.»

RESULTS OF NZC RENOVATION PROJECT

The results of the NZC Renovation collaborative innovation program show that low-carbon renovation is part of a holistic approach to environmental renovation.

Two lessons should be learned:

→ The concepts of carbon payback time: The carbon neutrality approach applied to the NZC project consists primarily of reducing the carbon payback time as much as possible.

→ There are 5 levers for low-carbon renovation:

1) Tacticity: Preserve the existing, no useless material, re-examine the use value

2) Circularity: In situ, ex situ reuse, selective deconstruction, resource recovery

3) Materiality: Constructive diversity, eco materials suitable for renovation

4) Technicality: Low-tech design, digital discernment, the right technology in the right place

5) Externality: Sharing and pooling with neighbours, compensation with positive externalities in the territories.

Collaborative innovation Programme NZC Renovation :

↗ Optimisation and NZC scenarios
of selected generic cases

↗ Booklet of low-carbon levers
in renovation

TO GO FURTHER : A HOLISTIC APPROACH OF THE SECTOR

The Alliance HQE-GBC firmly believes that a roadmap to decarbonization can only be elaborated and proved efficient if the building sector is considered in a global point of view. This is why our roadmap to decarbonization takes into account the building as a whole (from cradle to grave).

The outline of this document underlines the need for a holistic approach : the laws and the national regulation reveal a need for doing LCA, which is answered by the INIES database, which uses information on buildings during their whole-life process, and that is complementary with the notion of circular economy.

This notion to follow for a pathway to decarbonization is that we need to have a multi-criteria and global approach at the scale of buildings, and that we can use for that purpose the five areas and the fifteen action levers described in our framework of circular economy.



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THANK YOU

CONTACT

Alliance HQE-GBC
4, av. du Recteur Poincaré
75016 Paris
secretariat@hqegbc.org

 @Alliance HQE-GBC

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