



Analysis of European initiatives related to the green, digital and resilient construction ecosystem



Executive summary

General views about the green, digital and resilient construction ecosystem

Our **built environment is one of the main assets of the European economy**. It evolves continuously around us, and we may now have the opportunity to transform it to meet the needs of society, to respond to known environmental challenges, and to lead our economy towards sustainability, decarbonisation, growth, and inclusiveness.

Whilst our decision-makers should steer this transition, the **construction industry and its value-chain have a decisive role to play**. Indeed, based on the future **Transition Roadmap for construction** that will be drafted in the coming months, we can deliver on the key priorities set by the European Union and so help achieve the target that lies at the heart of the EU 2050 strategy, reaching **climate neutrality** by 2050.

In its New Industrial Strategy, the European Commission has identified construction as one of the key sectors, now referred to as ecosystem, to “build a stronger Single Market for Europe’s recovery”. The Commission is now keen to discuss future actions with our sector and to collate recommendations to form our Transition Roadmap. Our guiding principles are to be found in the European Green Deal and such documents as the Renovation Wave and the new Circular Economy Action Plan.

There are **numerous challenges** to delivering a sustainable built environment. As far as regulation is concerned, construction products belong to the European Union area of competence, whilst national, regional and local authorities regulate buildings and construction works. Therefore, cohesion between these authorities is essential if we are to address and improve building performance. More so, the diverse nature of our local environmental and climatic conditions and availability of local resources means that we cannot deliver a single solution that fits all, we need to develop a variety of technical solutions that best responds to our local built environment. Lastly, **clear targets and measurable indicators** must be agreed upon as we debate and agree on such concepts as sustainability, circular economy, climate neutrality, affordability, and decarbonisation.

Achieving EU Green Deal goals through sustainable built environment

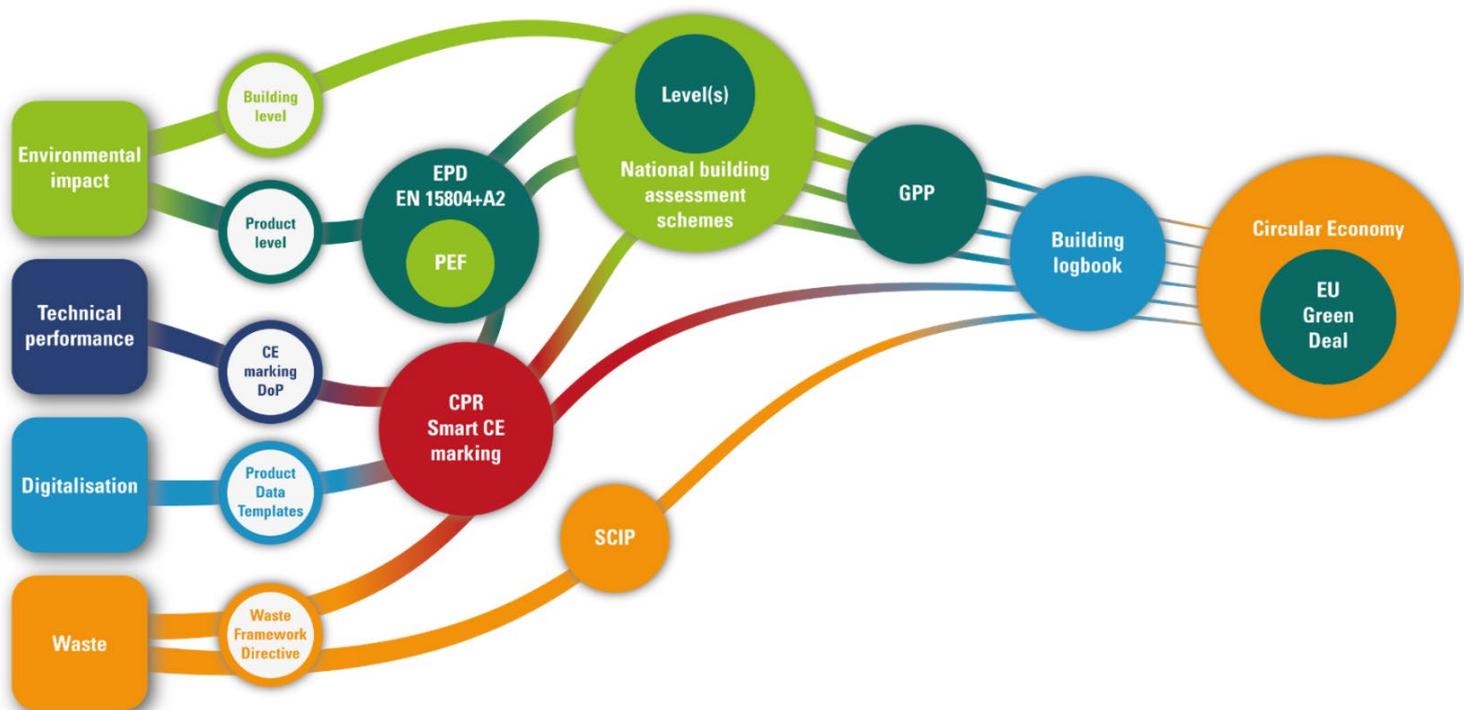
Theoretically, sustainability may be defined for entire systems, their constituting parts alone cannot be sustainable as it is their interrelations that allows for an effective overall sustainable outcome. It must be clear that the same rule applies for construction, whatever the nature of the build, from homes, to hospitals, from bridges to dams. Indeed, local conditions, engineering, design, installation, operation, end-of-life phases, and many more characteristics all have specific impacts. Therefore, the **built environment must be envisaged as a whole**, with information collated from all phases and actors of the value-

chain, work carried out in coordination, aiming at the same goals. This is where digital technologies may come in as supportive tools, ensuring efficient transfer of data and knowledge, improving performance. As all construction information should be available for built assets, an example of a digital solution would be building logbooks that would compile open data and improve long-term management.

It is essential that regulatory provisions and incentives are based on a **scientifically accepted assessment methodology**. In our industry, Life Cycle Assessment (LCA) and Environmental Product Declarations (EPDs) are trusted tools; instruments that have delivered product information throughout the value-chain for many years. The Construction Products Regulation (CPR) has proven to be the most adequate regulatory tool to provide product performance while guaranteeing a healthy internal market.

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The construction industry is subject to a large number of regulations, directives, standards, and other initiatives. Regulatory and voluntary implementation must be compatible, and competence shared between Member States must be applied coherently, thereby preventing gaps and overlaps. **A coherent and overarching European strategy** may assist in the delivery of a sustainable built environment and, ultimately, help to achieve the aims of the Green Deal.



Construction related initiatives alignment towards achieving EU Green Deal goals

In summary, we believe that the key principles to establishing a sustainable built environment are:

- ▼ Defining clear targets that are validated at all levels of decision-making,
- ▼ Carrying out sustainability performance assessments at building level,
- ▼ Using Level(s)¹, the EU sustainable buildings framework, as the reference methodology,
- ▼ Improving the secondary materials market to enhance circularity in construction,
- ▼ Using digital technologies as support tool.

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For the sake of clarity, this document is divided in chapters, each of them includes one initiative, but they cannot be considered as isolated elements because all are interconnected, as described in the text. Order is also not relevant:

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¹ Usually implemented through national provisions

This communication of the European Commission describes the actions to achieve a transformation of the European society and economy to take place until 2030 and 2050. It is focused on climate change mitigation, but it also covers investment, growth, other harmful effects and related strategies such as adaptation to climate change, research, innovation and training.

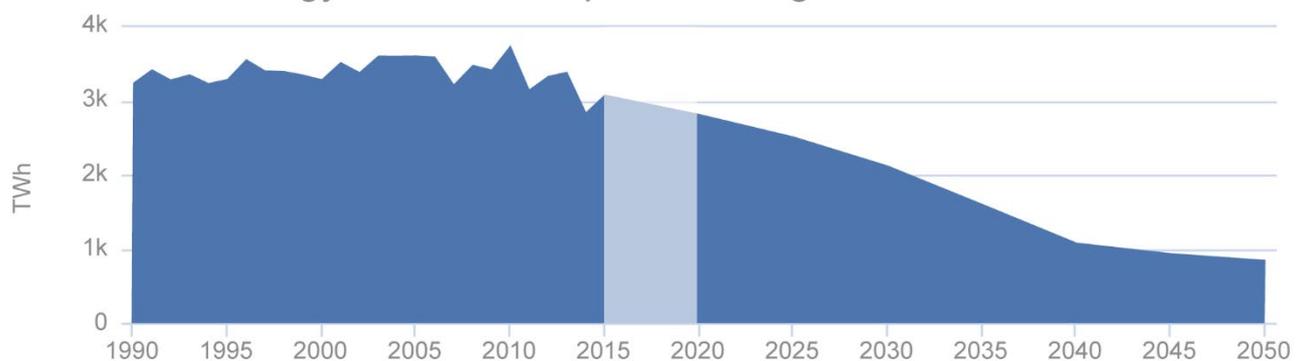
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The communication refers to construction as one of the main European industries and covers our products as part of the European industrial strategy and [circular economy](#) but also in the clauses related to construction (buildings and renovation). It includes references to a new [Renovation wave](#), to the [Construction Products Regulation](#) (CPR), the [Energy Performance of Buildings Directive](#) (EPBD), a potential [Building Emission Trade System](#) (Building ETS) and describes the need for [digitalisation](#) as key enabler for change.

Construction is ready to be a key sector to achieve the EU Green Deal goals, but a coordinated and efficient overarching strategy is needed

The core of the Green Deal is the objective to achieve climate neutrality by 2050 through a plan delivering results from 2030. In the construction field, environmental impacts are targeted paying special attention to the use phase and integrating manufacturing of products and construction activities in the more general industrial strategy.

Final energy demand for space heating



[EUALC](#) estimation for the pathway focused on buildings

The initiative also addresses other side effects of this ambitious target and stresses the need to protect the environment and human health together with stable economic growth and societal equity.

Metrics is one of the most relevant topics as regards climate neutrality. Regulatory provisions and incentives must be based on a scientific accepted assessment methodology. Our industry trusts on Life Cycle Assessment as the best instrument to deliver sustainability information and the [Construction Products Regulation](#) (CPR) proved to be the most adequate regulatory tool to provide product performance while guaranteeing a healthy internal market.

However, product information is not enough to know what the best environmental solution is because design, installation, operation and end of life plays the most important role. On the regulatory field, only the market of construction products belongs to the area of competence of the European Union. Member States regulate buildings and construction therefore, they oversee implementing the necessary measures to address their performance. For this reason, the European instruments addressing buildings are, either voluntary methodologies such as the building assessment framework [Level\(s\)](#) and the [European Construction and Demolition Waste Protocol](#) or policy instruments to be implemented by the Members States such as the [Energy Performance of Buildings Directive](#) (EPBD).



Extract of policies, initiatives and communications in the sphere of the EU Green Deal related to construction

Construction Products Regulation (CPR)

Regulation (EU) 305/2011ⁱⁱ

It should be noted that construction is subject to the subsidiarity principle: Works regulations (including buildings) are under the sole competence of Member States while the common market for construction products is solely regulated at European level.

The CPR establishes the rules for the marketing of construction products respecting this principle and the division of competences. The approach of the CPR is performance based. Manufacturers declare information about their products' performances in a unique harmonised way to fit the national requirements. The methods and rules for assessing the performance of products are predominantly developed within the European standardisation system. The process follows mandates or standardisation requests issued by the European

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CPR is an excellent regulatory framework for the delivery of product performance and guarantees a level playing field in the European market

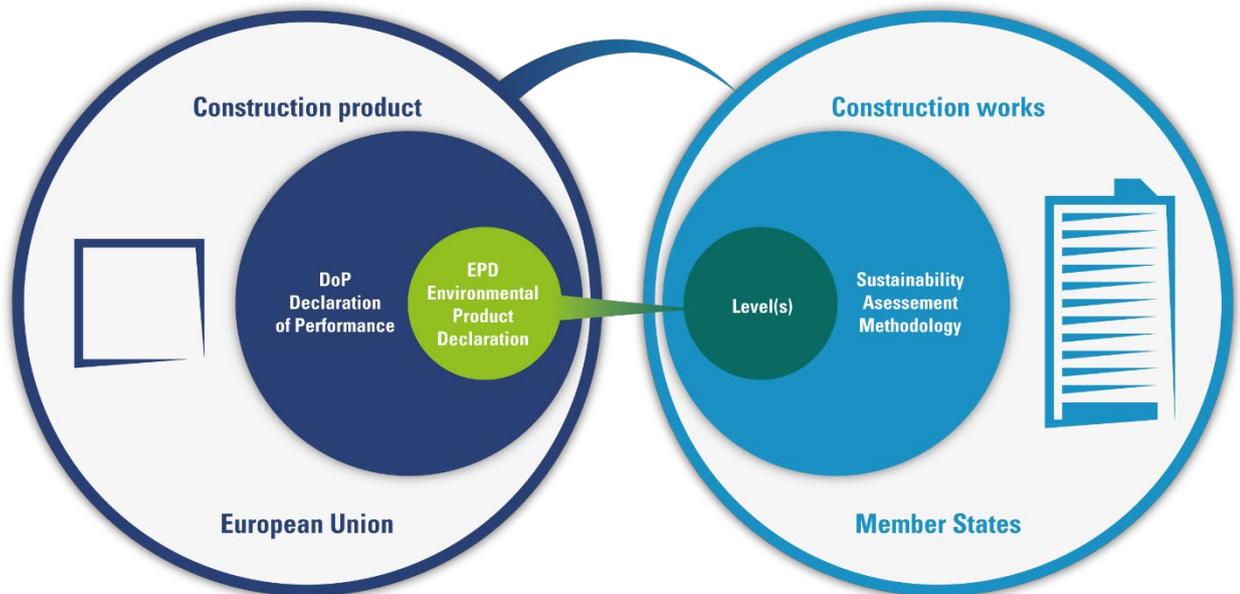
Commission which are drafted according to the regulatory needs of Member States and, when necessary, European regulatory demands.

Assessments and declarations constitute a single common technical language developed at European level which grants the free movement of construction products while reducing the cost of the assessment (competitiveness increase).

To achieve European goals as regards building performance a complementary approach of National and European actions is required. On this specific point, the regulation obliges Member States to only apply the common technical language in their regulations, refraining from requesting non-harmonised product information, thereby preventing barriers to trade.

The CPR is the regulatory flagship for construction products. It is construction specific and responds to the specific needs of the construction industry. Therefore, it should remain the default legal framework for delivering construction product information including such related to environment, circularity, release of dangerous substances or any other product performance, which may be assessed and declared. The integration of environmental information through the CPR regulatory framework was initiated when the European Commission mandated CEN with developing necessary assessment rules and a communication format: [Environmental Product Declarations \(EPDs\)](#) based on the EN 15804 methodology but it is not implemented yet.

EPDs have the potential to guarantee a scientifically meaningful implementation of sustainability principles across Europe. They are since several years available and already a legal requirement in some Member States. However, they are still voluntary and not yet part of the common technical language. The European Commission commenced its integration in the CPR regulatory framework in 2018 but stopped it again, due to legal uncertainties related to the citation of harmonised standards..



National and European competences as regards product performance

In response to the recommendations of the European Parliament and to the [Green Deal](#), the revision of the Construction Products Regulation will set a particular focus on the environmental performances of construction products. However, as explained afore, it worth stressing and should be noted that the present CPR as adopted in 2011 already allows the integration of environmental product information in Declarations of Performance.

One of the key features of the CPR is the possibility to deliver product information in a digital harmonised format. Yet while the CPR defines the paper format for the Declarations of Performance, as a pillar of the common technical language, a harmonised product data template for declaring construction product performances is however indispensable for exchanging this information in a digital built environment, such as for using it in BIM. To close this gap Construction Products Europe developed in 2018 a standardised approach called Smart CE marking proving that it was possible to define a format complying with the CPR and compatible with other digital environments, such as BIM. Some industries are in the process of implementing it in the market. The revision of the CPR has to provide the missing digital format for the Declarations of Performances and should build upon the experience of the industry and benefit from the investments already made by building upon the standardised Smart CE approach.

Environmental Product Declarations

European Standard EN 15804ⁱⁱⁱ

An Environmental Product Declaration (EPD) contains information related to the product environmental performance obtained using life cycle assessment methodology. Results are expressed for a detailed list of indicators declared for each stage of the construction product from the sourcing/supply of raw materials to the end of life.

One key indicator in EPD is the Global Warming Potential expressed in CO₂ eq. yet it is not singled out, but provided together with other key indicators such as ozone depletion, acidification, eutrophication, depletion of abiotic resources, etc. The set of life cycle key indicators is complemented by other indicators including use of secondary materials, renewable energy etc. This is because complete information is key to preventing burden shifting and biased assessments.

EPDs provide the core and necessary information for the assessment of buildings and construction works in a holistic approach together with the design options, climate conditions and other constraints to the construction life cycle.

Environmental performance assessment must be carried out at building level, as environmental performance of construction products is only one of the elements required to calculate the overall results

The assessment method for EPDs is described in the European standard EN 15804. The first version was recently revised and aligned as much as possible to the Product Environmental Footprint (PEF). The main remaining differences to PEF are related to the declaration: EN 15804 follows a modular approach and a different way for assessing and declaring end of life. These differences are justified and necessary because the environmental performance of construction products across their life cycle in the building or constructions works depends on the design, installation, operation, demolition, etc. Further developments might be possible including the use of a common upstream database and more consistent system boundaries, in order to increase comparability of EPDs and alignment with PEF.

The information provided in EPDs is neutral, objective and according to the last version of the European standard must cover at least production and end of life. EPDs may also provide information related to the other product life stages such as transport, installation and operation.

The European methodology for the assessment of the environmental performance of buildings - [Level\(s\)](#) is based on EN 15978^{iv} and on EPD information according to EN 15804. Similar methodologies are implemented in private and public schemes in Europe and

worldwide but only those using LCA and EPD information can be considered the state of the art in environmental assessment. The standard for the assessment of civil engineering works² follows the same premises and is expected to be published in 2022.

Verified EPDs are already available on the market for several years and it is expected that in the coming years more companies will provide their product environmental information on a voluntary basis. As any other performance declaration, the EPD content could also be integrated in the European regulatory framework, the [Construction Products Regulation](#). In fact, the process was already initiated by the European Commission. Then, it was stopped again, but may be relaunched before or after the planned revision of the regulation.

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Management of complex information available in EPDs require a [digitalisation](#) approach, which is now being, standardised in ISO 22057 including product data templates to exchange EPD data. The development of IT tools in the context of the building assessment such as the methodology [Level\(s\)](#) will boost the use of accurate, digital manufacturer information for the assessment of construction works.

Core indicators	Indicators describing resource use
Climate change - total [kg CO ₂ eq.]	Use of renewable primary energy excluding renewable primary energy resources used as raw materials [MJ, net calorific value]
Climate change - fossil [kg CO ₂ eq.]	Use of renewable primary energy resources used as raw materials [MJ, net calorific value]
Climate change - biogenic [kg CO ₂ eq.]	Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) [MJ, net calorific value]
Climate change - land use and land use change [kg CO ₂ eq.]	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials [MJ, net calorific value]
Ozone Depletion [kg CFC 11 eq.]	Use of non-renewable primary energy resources used as raw materials [MJ, net calorific value]
Acidification [mol H ⁺ eq.]	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) [MJ, net calorific value]
Eutrophication aquatic freshwater [kg PO ₄ eq.]	Use of secondary material [kg]
Eutrophication aquatic marine [kg N eq.]	Use of renewable secondary fuels [MJ, net calorific value]
Eutrophication terrestrial [mol N eq.]	Use of non-renewable secondary fuels [MJ, net calorific value]
Photochemical ozone creation [kg NMVOC eq.]	Net use of fresh water [m ³]
Depletion of abiotic resources - mineral and metals [kg Sb eq.]	Environmental information describing output flows
Depletion of abiotic resources - fossil fuels [MJ, net calorific value]	Components for re-use [kg]
Water use [m ³ world eq. deprived]	Materials for recycling [kg]
	Materials for energy recovery [kg]
	Exported energy [MJ per energy carrier]
	Environmental information describing output flows
	Biogenic carbon content in product [kg C]
	Biogenic carbon content in accompanying packaging [kg C]

List of indicators in EPD according to EN 15804+A2

² prEN 17472 Sustainability of construction works - Sustainability assessment civil engineering works - Calculation methods

EC has presented many initiatives dealing with circular economy. Initially the focus was on resource extraction and waste, but the topic was enhanced progressively to cover dangerous substances, resource efficiency and lastly a complete action plan dealing with the goals of the [Green Deal](#).

The last action plan on this topic address construction with the following actions:

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- ▼ Address the sustainability of construction products through the [Construction Product Regulation](#) revision, potentially including introduction of recycled content requirements
- ▼ Promote the durability and adaptability of buildings and develop digital [building logbooks](#).
- ▼ Use [Level\(s\)](#) to integrate life cycle assessment in public procurement and the [Sustainable finance taxonomy](#) and exploring the appropriateness of setting of carbon reduction targets and the potential of carbon storage.
- ▼ Consider a revision of material recovery targets for construction and demolition waste.
- ▼ Increase the use of excavated soils.
- ▼ Launch the [Renovation Wave](#) to significantly improve energy efficiency.
- ▼ Widen the Ecodesign Directive which would become the [Sustainable Product Initiative](#).

When it comes to construction, the EC indicated that they would address high impact intermediary products such as steel, cement and chemicals. Other product groups will be identified based on their environmental impact and circularity potential.

A fit for all approach to circularity will not work in construction due to the diversity of materials and the longer loops in service life time

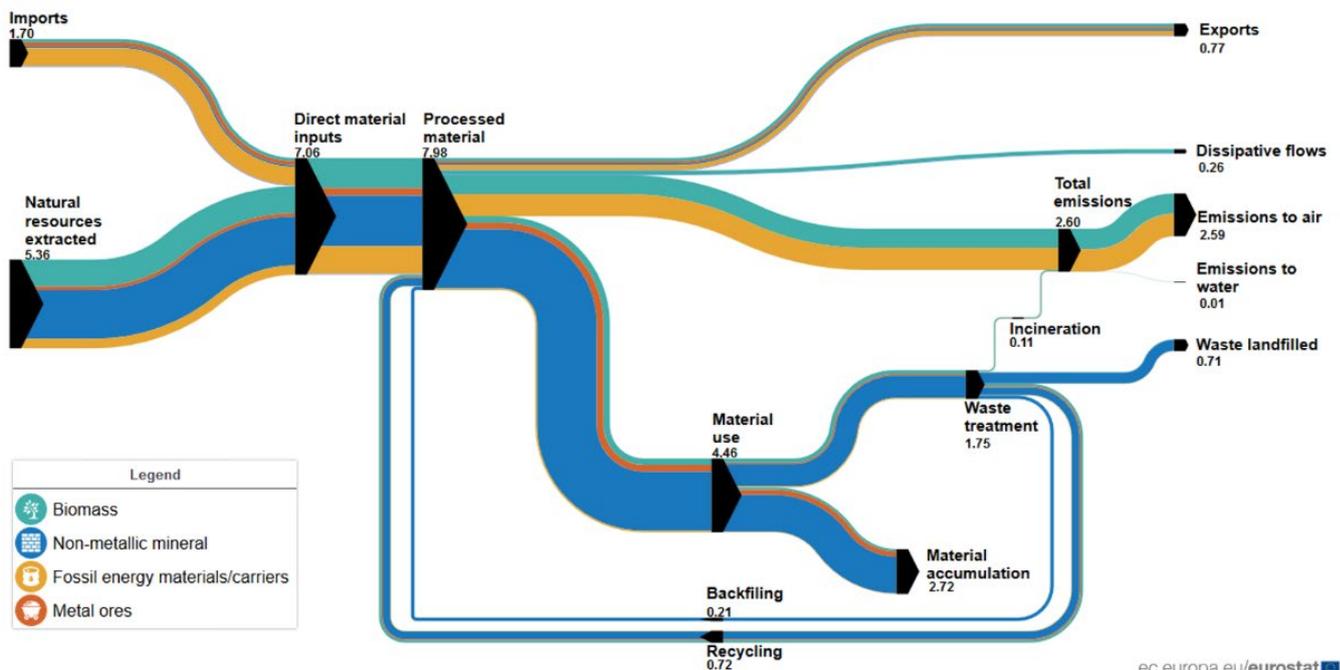
The “toxic-free environment” concept was explained and linked to the Chemicals Strategy for Sustainability. This strategy will address the interface between chemicals, products and waste legislation and the implementation of the reporting action regulated in the [Waste Framework Directive](#) (SCIP database).

The crucial point of the circular economy action plan is the reintegration of resources in the global European material cycles. This approach may not be easily implemented in construction because construction life span is very long. Therefore, design related actions will only provide results in the long term and material recovery needs to consider current market and the demolition of the existing construction which was built several years ago.

[Environmental Product Declarations](#) according to EN 15804 provide reliable and detailed information as regards circularity but it is not enough to promote circular design because issues such as legacy substances or availability of secondary materials may slow down circularity. Actions such as the [EU Construction and Demolition Waste Package](#) are required to progress in the waste hierarchy, promoting reuse, repair and recycling of existing materials.

In all cases, the building block of a more circular business is information and the [Construction Products Regulation](#) proved to be the best tool to address it in the complex European market and EU chemical legislation is able to complement the necessary inputs for certain products (certain substances and admixtures).

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Sankey diagram of material flows, European Union 2017 – Source Eurostat

Level(s) is a methodological European framework for the assessment and reporting of the sustainable performance of buildings across their whole lifecycle. Level(s) is not directly linked to any policy but it is used in the context of the [Sustainable finance taxonomy](#). It is expected to be the reference methodology in National regulations dealing with the sustainability of buildings, to be used in other regulations at European level and to become the basis for the future EC Green Public Procurement criteria for offices and schools.

The framework offers three levels of complexity for the assessment level 1 being a basic assessment and level 3 the most complex and detailed. In any of the levels, the methodology addresses sustainability in three areas:

- ▼ Resource use and environmental performance during a building's lifecycle
- ▼ Health and comfort
- ▼ Cost, value, and risk

Every area is developed using macro objectives which are assessed using indicators. One of them is the Life cycle Global Warming Potential of the building which is calculated at the highest level using Global Warming Potential indicators from [Environmental Product Declarations](#) developed according to EN 15804+A2 and applying the rules in EN 15978. The framework could be more ambitious and request the assessment of the full list of indicators available in EPD, but for the moment, it is only an optional assessment. Future revisions are expected to demand a complete assessment.

Level(s) is a scientific, harmonised and transparent methodology with the potential to mainstream sustainability building assessment

The specific indicator on use stage energy performance is connected to the implementation of the [Energy Performance of Buildings Directive](#) in every country and at the highest levels consider construction quality and occupants behaviour.

Level(s) can be used by investors, owners and occupants as a decision-making tool to improve the total impact of the real state not only taking into consideration the environmental impact, including energy efficiency and water use, but also indoor air quality thermal comfort and cost.

The impact of this framework is shown by the support by World Green Building Council Europe and some Member State regulators who trust the harmonised approach to be the best way to mainstream building sustainability assessments. Manufacturers, architects and

other stakeholder in the construction chain welcome this European Commission initiative and promote its use as a reference for the assessment of buildings in national regulations.

The potential of Level(s) could be unleashed by developing IT tools linking product specific EPD data provided by manufacturers instead of using sectoral data or third party data. This would also allow evaluating different solutions/combination of products at building level, thus identifying the optimal solution and preventing biased or false product to product comparisons.

Thematic areas	Macro objectives	Indicators
Resource use and environmental performance	1. Greenhouse gas emissions along a buildings life cycle	1.1 Use stage energy performance [kWh/m ² /yr] 1.2 Life cycle Global Warming Potential [CO ₂ eq./m ² /yr]
	2. Resource efficient and circular material life cycles	2.1 Bill of materials [kg] 2.2 Construction & demolition waste [kg/m ²] 2.3 Design for adaptability 2.4 Design for deconstruction
	3. Efficient use of water resources	3.1 Use stage water consumption [m ³ /occupant/yr]
Health and comfort	4. Healthy and comfortable spaces	4.1 Indoor air quality 4.2 Time out of thermal comfort range
Cost, Value, and Risk	5. Adaption and resilience to climate change	5.1 Scenarios for projected future climatic conditions
	6. Optimised life cycle cost and value	6.1 Life cycle costs [€/m ² /yr] 6.2 Value creation and risk factors

List of indicators in Level(s)

Sustainable finance taxonomy

Regulation (EU) 2020/852^{vii}

This regulation is intended to establish a common language for sustainable finance (i.e. taxonomy) to define what is sustainable and identify areas where investment can make the biggest impact. It is expected to create EU labels for green financial products, allowing investors to identify investments that comply with green or low-carbon criteria and will clarify the duty of asset managers and institutional investors to consider sustainability.

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According to the European Commission, a European sustainable taxonomy would mean a uniform and harmonised classification system determining which activities can be regarded as sustainable. This approach is expected to set the global benchmark for sustainable finance and to introduce coherence in the current patchwork of labels and methodologies used in Europe.

The technical work is developed by a Technical Expert Group (TEG) established by the European Commission, but the final implementation is done through delegated acts drafted by the European Commission (TEG deliverables are not binding) and then subject to the scrutiny of the European Parliament and Council (approval or rejection without any possibility for amendments).

Coherence with other regulatory and non-regulatory frameworks is the crucial taxonomy implementation challenge

The preliminary work set the environmental objectives of the framework:

- ▼ climate change mitigation and adaptation;
- ▼ sustainable use and protection of water and marine resources;
- ▼ transition to a circular economy;
- ▼ pollution prevention and control;
- ▼ protection and restoration of biodiversity and ecosystems.

In order to qualify, economic activities as sustainable they will have to fulfil the following requirements:

- ▼ contribute substantively to at least one of the environmental objectives;
- ▼ not significantly harm any of the environmental objectives;
- ▼ be carried out in compliance with minimum social safeguards;
- ▼ comply with specific 'technical screening criteria'.

While the intentions and goals of the initiative have a clear merit, the approach should use existing assessments and methodologies to set the criteria. Otherwise, it may result in a parallel and potentially contradicting regulatory framework which may undermine the credibility of the industry and reduce competitiveness due to the additional efforts required to adapt to the new system.



Connection between taxonomy objectives and EU policies and initiatives

The delegated act on climate change mitigation and adaptation refers to indicator 1.2 from [Level\(s\)](#) as the methodology to be used for the assessment of the Global Warming Potential of buildings and to Energy Performance Certificates (EPC) developed according to the [Energy Performance of Buildings Directive](#) but this alignment requires continuous monitoring of the European Commission activities to ensure the system is coherent. This task is difficult considering the overarching approach of the regulation which includes in the construction sector manufacturing processes of some construction products, buildings and civil engineering works. The legislative acts address sustainability under a broad perspective covering environmental impacts, circularity, dangerous substances, etc.

Energy Performance of Buildings Directive

Directive 2010/31/EU 19.05.2010 recast^{viii}

This legislative framework is intended to achieve a highly energy efficient and decarbonised building stock by 2050 in line with the [Green Deal](#) objectives. It regulated the delivery of information to consumers and buildings in relation to building performance to support their choices and investments. As any other directive it needs to be implemented at national level.

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The Energy Performance of Buildings Directive (EPBD) was amended in 2018 and 2019 and is expected to be amended again as part of the [Renovation Wave](#) strategy.

The EPBD covers a broad range of policies and supportive measures pushing Member States to boost energy performance of buildings and improve the existing building stock by implementing actions. For example:

- ▼ Establish strong long-term renovation strategies, in line with the national energy and climate plans (NECPs) energy efficiency targets.
- ▼ Set cost-optimal minimum energy performance requirements for new buildings, for existing buildings undergoing major renovation, and for the replacement or retrofit of building elements like heating and cooling systems, roofs and walls.
- ▼ Require all new buildings to be nearly zero-energy buildings (NZEB).
- ▼ Demand the issuance of energy performance certificates when a building is sold or rented.
- ▼ Establish inspection schemes for heating and air conditioning systems.
- ▼ Introduce minimum requirements for certain car parks supporting electro-mobility.
- ▼ Implement an optional European scheme for rating the 'smart readiness' of buildings.
- ▼ Promote smart technologies including building automation and control systems.
- ▼ Address health and well-being of building users, for instance through the consideration of air quality and ventilation.
- ▼ Draw up lists of financial measures to improve the energy efficiency of buildings.

In addition, under the Energy Efficiency Directive (2012/27/EU), EU countries must make energy efficient renovations to at least 3% of the total floor area of buildings owned and occupied by central governments and National governments are recommended to purchase only buildings that are highly energy efficient.

EPBD focuses on energy performance and should complement the assessment of building sustainability according to European harmonised methodologies

This directive is linked to the Fit for 55 package together with the revision of the Energy Efficiency Directive (EED) and [EU ETS](#).

The pending issues expected to be solved by the revision of the directive are:

- ▼ Improving the quality and consistency of Energy Performance Certificates (EPC).
- ▼ Introduction of phased Minimum Energy Performance Standards to ensure progression towards more ambitious performance standards over time.
- ▼ Address EPC reporting in Building Renovation Passports or in more generic Building logbooks.
- ▼ Setting up deep energy renovation standards.
- ▼ Implement a Smart Readiness Indicator (SRI) for buildings.
- ▼ Ensure coherent and reinforcing complementary frameworks e.g. [Sustainable finance taxonomy](#).

EPBD is a major enabler, for reducing operational emissions of buildings and it should be consistent and complementary with whole life cycle emissions of buildings based on the further deployment of [Level\(s\)](#), which is connected to [Environmental Product Declarations](#).

Construction and Demolition Waste Package

Construction Demolition Waste Protocol and Guidelines^{ix}

The European Commission published non-binding guides as a recommendation to the industry on how to address demolition and Construction Demolition Waste (CDW). The documents are:

- ▼ Construction and Demolition Waste Management Protocol
- ▼ Guidelines for the waste audits before demolition and renovation works of buildings

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Both documents were translated to several European languages to promote their use by market operators.

The main principle considered in the development of the guides is the importance of proper management of CDW and recycled materials, including the correct handling of hazardous waste. Proper waste use can have major benefits in terms of sustainability and provide benefits for the EU construction and recycling industry, as it boosts demand for CDW as recycled materials.

The protocol fits within the [Circular Economy](#) strategy. Its overall aim is to increase confidence in the CDW management process and the trust in the quality of Construction and Demolition recycled materials. This will be achieved by:

- ▼ Waste identification, source separation and collection
- ▼ Waste logistics
- ▼ Waste processing
- ▼ Quality management
- ▼ Policy and framework conditions

Improvement of the secondary materials market was identified by construction products manufacturers as the most relevant action to enhance circularity in construction

The Construction and Demolition waste protocol includes good practices, an overview of definitions and a checklist for practitioners to facilitate tasks related to CDW management.

The guidelines for the waste audits provide guidance on best practices for the assessment of construction and demolition waste streams prior to demolition or renovation of buildings and infrastructures, called "waste audit". The aim of the guidance is to facilitate and maximize recovery of materials and components from demolition or renovation of buildings and infrastructures for beneficial reuse and recycling, without compromising the safety

measures and practices outlined in the European Demolition Protocol. The document offers information on the following topics:

- ▼ Waste audits
- ▼ Quality assessment of waste audits
- ▼ Recommended waste audit process
- ▼ Waste management recommendations
- ▼ European waste catalogue
- ▼ Recommended templates for inventories and waste

This initiative is not a legislative proposal. However, it gives clear indications of the willingness of the EC to move on issues like climate change and reducing greenhouse gas emissions in line with the [Green Deal](#).

The seven key principles listed by the EC can be summarised as follows:

- ▼ Energy-efficiency
- ▼ Affordability
- ▼ Decarbonisation and inclusion of renewables
- ▼ Lifecycle thinking and circularity
- ▼ High health and environmental standards, including air quality, water management, resilience, harmful substances and fire performance
- ▼ Green and digital transition, warning here as “smart buildings” as depicted as a solution following the growing lobby action of the IT industry
- ▼ Architecture “Bauhaus” initiative where again natural building materials are promoted

EPBD focuses on energy performance as part of the assessment of building sustainability according to European harmonised methodologies

Considering that building codes are not an EU competence, European expected actions are the following:

- ▼ Revise Energy Performance Certificates and [Energy Performance of Buildings Directive](#).
- ▼ Expected funding linked to the [Sustainable finance taxonomy](#).
- ▼ Promotion of [Level\(s\)](#) as reference methodology for the assessment of sustainability of buildings.
- ▼ Promote nature-based solutions, or biobased products.
- ▼ Set material recovery targets, reuse of waste and standardised sustainable industrial solutions in line with the [Construction and Demolition Waste Protocol](#).

The strategy refers to the need for a uniform EU machine-readable data format in line with the approach of the industry on data templates and [digitalisation](#) but it needs to be directed in the right direction because it could result in the creation of huge European databases managed by European institutions, which may be far from the market interests.

In connection to regulations, the strategy refers to the Ecodesign Framework Directive and the [Sustainable Product Initiative](#) and to the [Construction Products Regulation](#), in which sustainability criteria is expected to be implemented.

One of the innovative actions within the renovation wave is the EU Bauhaus platform because it addresses renovation under the perspective of architectural design and not only as a way to improve building performance.

2020	<ul style="list-style-type: none"> Supporting Member States to update national training roadmaps of construction workforce Setting up "EU Bauhaus" platform for sustainability in architecture Supporting the development of climate-resilient building standards
2021	<ul style="list-style-type: none"> Consider the introduction of a 'deep renovation' standard as part of the EPBD revision Revising the climate-proofing guidelines for EU projects EU Framework for digital permitting with BIM in public procurement Supporting digitalisation in the construction Launching the Affordable Housing Initiative piloting 100 renovation districts Assessing the extension of the use of emission trading to emissions from building
2022	<ul style="list-style-type: none"> Level(s)-based green public procurement criteria for certain public buildings
2023	<ul style="list-style-type: none"> 2050 whole life-cycle performance CO₂ emissions reduction roadmap for buildings Single, common digital tool for Building Renovation Passports and Digital Building Logbooks
2024	<ul style="list-style-type: none"> Review material recovery targets in support of internal market for secondary raw materials

European Commission proposed actions timeline

Building Emission Trade System

EU ETS & Effort Sharing Regulation (EU) 2018/842^{xi}

The Emission Trade System (ETS) sets a cap on the total amount of greenhouse gases that can be emitted by certain sectors. The cap is reduced over time so that emissions go down, by improving the efficiency of the activities covered. Within the cap, companies receive or buy emission allowances, which they can trade with each other, thereby creating a carbon price.

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For the moment buildings are not one of the sectors included in the EU ETS, they are subject to the binding annual greenhouse gas emission targets according to the Effort Sharing Regulation. This means that European Member States must reduce emissions by 30% by 2030 compared to 2005 but implementation is not homogeneous, higher income Member States take on more ambitious targets than lower income Member States.

In case building ETS is implemented, revenues collected from the linked carbon price should be re-investment to construction

The Communication of the EC on the [Green Deal](#) refers to the potential inclusion of emissions from buildings in European emissions trading system. Communication Stepping up Europe's 2030 climate ambition and the Fit for 55 package also refers to an expansion of ETS to cover buildings. According to this communication, already now, the EU ETS directly or indirectly covers buildings emissions and suggests that covering all emissions of fossil fuel combustion and integrating them in the EU ETS would present important benefits in terms of effectiveness and administrative feasibility.

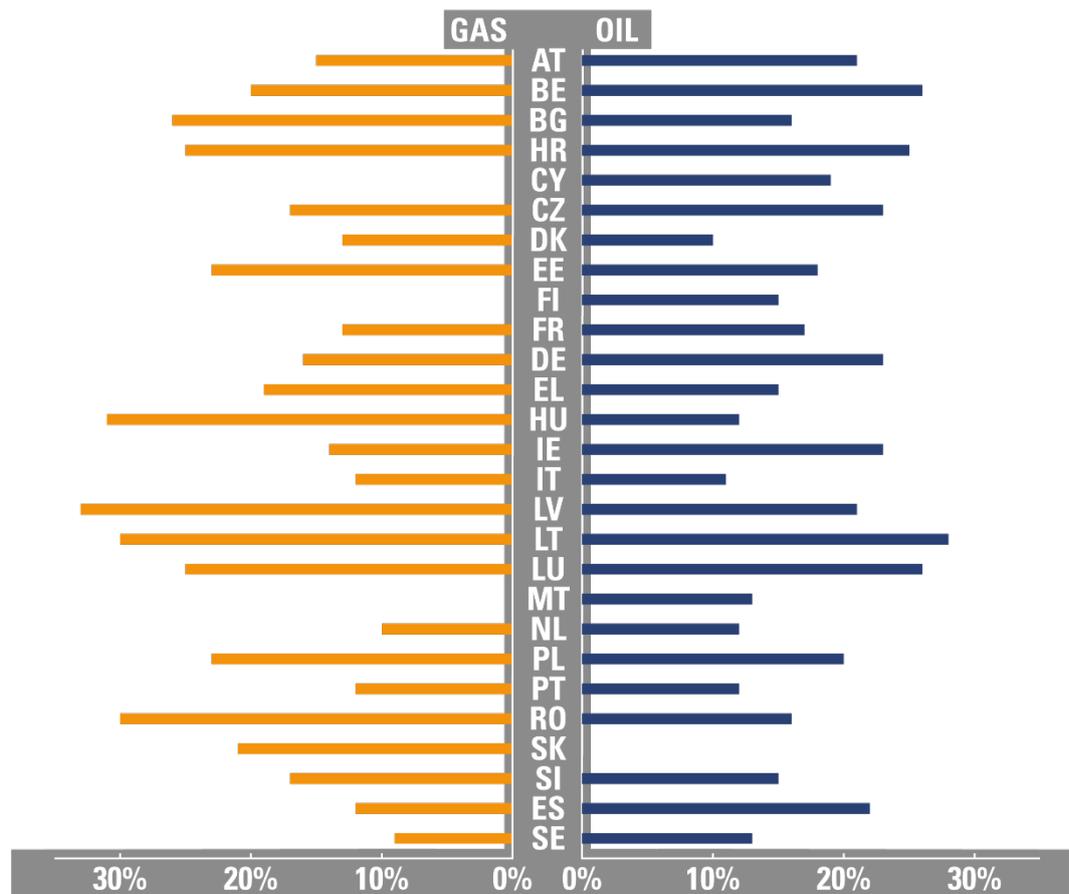
The proposal is in a very preliminary stage and it is not clear if building emission trade will be included in the existing market or an independent market will be created. In any of the two options, the energy mix may have a big impact in the evolution of the prices. The effect may be even higher in the case of an integrated system, because shifts between sectors may occur and considering the rigidity of the construction sector it could promote investments in other sectors instead of improving the building stock.

As a side effect of the building ETS implementation, Member States may be discouraged to invest and promote renovation. They may assume that the carbon tax mechanism will be enough to achieve the desired targets, paying less attention to the implementation of policies such as [Energy Performance of Buildings Directive](#) or other initiatives related to energy efficiency in buildings.

In addition to the previous concerns, this initiative is based on the idea of pushing faster energy renovation and changes in heating/cooling systems by increasing the cost, but this improvement is limited by the income level of the owner and may lead to energy poverty

creating societal gaps. In the extreme case, energy bill increase may have the opposite effect and prevent renovation investments.

Before this kind of measure is implemented, a complete and detailed impact assessment is required. In general, the initiatives included in the [Renovation wave](#) and the political commitment are considered enough to achieve the [Green Deal](#) goals according to most of the construction industry.



Impact of carbon price on consumer gas and oil prices per Member State – Source: Eurostat & Oil price bulletin, EU Commission. Average June 2020 – May 2021

Sustainable Products Initiative

Sustainable Products Initiative – better regulation portal^{xii}

This legislative initiative is intended to establish sustainability principles to regulate:

- ▼ Durability, reusability, upgradability and reparability
- ▼ Presence of hazardous chemicals
- ▼ Energy and resource efficiency;
- ▼ Recycled content
- ▼ Remanufacturing and high-quality recycling;
- ▼ Carbon and environmental footprints
- ▼ Digitalisation of product information, including digital passports and tagging
- ▼ Linking high sustainability product performance to incentives

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The policy implementation of the sustainability principles is expected to take place by widening Ecodesign Directive beyond energy related products, and made applicable to the broadest possible range of products, including construction.

Implementation of Ecodesign to construction products is challenging, because product performance in a building depends on design, construction, operation and external conditions (climate, orientation, latitude, etc.) and due to the risk of creating overlapping and conflicting provisions³ with the [Construction Products Regulation](#).

An effective approach to implement the sustainability principles to construction would be to integrate the necessary product characteristics and indicators in the regulatory framework of the CPR. In fact, some of them are already implemented e.g. declaration of thermal performance of products, durability tests and release of dangerous substances. The digital perspective is also covered because the CPR was considered one of the first regulatory policies to implement efficient delivery of digital documents. In fact, most manufacturers upload their declarations of performance in digital format.

SPI implementation to construction products through the existing CPR framework would deliver results faster than through other policies

A clear benefit of digital declarations is the availability of complex and detailed information but the concept of product passport needs to be implemented together with [Building logbooks](#) to ensure product information can be correctly tracked to the relevant construction

³ Solid fuel stoves are covered by the CPR and Ecodesign. Discrepancies between them were identified and are in the process to be solved by the EC.

site. Finally, any information should be compatible with BIM, the global megatrend to digitalise construction and construction activities in the world.

On the sustainability side, policy implementation should consider the efforts of Member States to establish methodologies to assess sustainability of buildings and the action of the EC to develop a common framework called [Level\(s\)](#). To be efficient, the sustainable product initiative should be built on the existing methodologies and avoid defining parallel routes.

Waste Framework Directive

Directive 2008/98/EC Consolidated text^{xiii}

This directive establishes the legislative framework for the handling of waste in the European Union. It includes the definition of key concepts such as waste, recovery and disposal and puts in place the essential requirements for the management of waste.

A fit for all solution is not applicable to construction demolition waste

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A usual criticism of this directive comes from the divergences in the way it is implemented by Member States, but this point is difficult to solve considering the competence sharing agreed in the European treaties. The definition of end of waste is one of the sources of conflict because, unless a European criterion is established, every Member State is entitled to define them. The EC is discussing the possibility to develop end of waste criteria for the most common waste flows but the resources required and the limited impact in practice is slowing down the process.

Another crucial topic defined in the last revision of the directive is the implementation at European level of a database of product containing substances of very high concern (SVHC) to be available for recyclers and consumers (SCIP database). The initiative is expected to be a solution to the problem of legacy substances in recycled materials, one of the main obstacles for the increase of circularity in the production of goods.

The main concern of the construction products industry is the difficulty to connect the information provided with the product because of the time since the product is installed and the buildings is demolished, the activities in the construction and use phase and the lack of a traceability tool to connect the building, the product and its registry.

This kind of databases only makes sense if properly connected with the delivery of construction products technical information, already covered by the [CPR](#) and if properly [digitalised](#) and integrated in [building logbooks](#) for new products placed on the market. Nevertheless, material flows obtained from demolished buildings will not be reflected in the database. A pragmatic approach for them would be the development of generic waste streams information.

SCIP database is running and manufacturers are obliged to submit notifications related to the products within the scope but it needs to be improved to facilitate the process when dealing with complex products and the registry of product families with identical information or following a worst-case approach.

Manufacturers need to submit the following information to ECHA

If the articles you produce, assemble, import or distribute contain SVHCs on ECHA's Candidate List in a concentration above 0.1% weight by weight you need to notify them to the SCIP database.

Identification of
your article

The name, concentration
range and location of the
Candidate List Substances
present in it.

Other information that allows its safe
use - notably information to ensure
the article is properly managed once
it becomes waste.

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The information in the SCIP database is made publicly available, in particular to waste operators and consumers.

ECHA ensures the protection of sensitive information, for example, the links between actors in the same supply chain.

Summary of information delivered to the SCIP database by manufacturers

Extended Producer Responsibility

EPR applied to construction products

Extended Producer Responsibility is a transfer of financial and / or physical responsibility for management of waste products from governments and consumers to the producer, as defined in a policy instrument. Its goal is incentivise manufacturers to consider durability, reparability and end of life as part of the product design.

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Product take back	Producers are required to take back end of life products
Waste management fees	the final owner pays a fee for management of end of life products
Advance disposal fee	a tax or charge is levied when the product is sold to reflect the cost of managing end of life products
Mandatory deposit refund	a deposit is levied when the product is sold, and refunded when the product is returned to a collection point
Recycling incentives	measures to stimulate recycling markets, such as subsidies to collectors, reprocessors or users of recycled materials, or minimum recycled-content regulations
Disposal disincentives	taxes on landfill and/or incineration

Policy instruments for waste minimisation (OECD)

Construction value chain, on the contrary to other industrial business, is flexible and project specific with disperse decision-making: architect, contractor, commissioner, etc. The role of manufacturers is limited and subject to decisions at a later stage. In fact, the “product” in construction is the building. In any case, these principles are not applicable to all construction products. When the decision-making is short and manufacturers are closer to final users, EPR may present advantages to other approaches.

While EPR is aligned to circular economy principles, it will not work for most material flows in construction for various technical reasons:

- ▼ Demand and offer of secondary raw materials is disconnected and may involve additional environmental impacts
- ▼ Open loops are very common in construction and present additional challenges to the design of the EPR policy instruments
- ▼ Design, installation, geographical area and other conditions influence the life span of construction products and are unknown by the manufacturer

- ▼ Environmental impact of transport may be neglected in some policy options such as take-back.

EPR presents certain problems when implemented to the majority of construction products and its potential to improve circularity is limited

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The previous list is not exhaustive but reflects how EPR potential to change construction industry towards a more circular approach is limited. However, the lack of EPR should not mean high value secondary materials from construction demolition waste continue to subsidise the cost of collection and sorting the materials with little value.

Limiting EPR to certain products does not mean reducing the efforts of the industry in this field. Information used to define EPR policies are available in [Environmental Product Declarations](#) but instead of simplifying the approach to transfer a theoretical burden to the manufacturer. EPD allow the detailed calculation of the environmental performance of the construction. Decision-making based on this second approach is much more reliable, efficient and less likely to distort the market towards solutions which may not be suitable.

For those products for which EPR may be appropriate, it should follow a harmonised system applicable in the different Member States in coherence with European statutes on products and goods trade. This approach will guarantee a well-functioning single market for construction products across the European Union. Having different schemes in Member States will require considerable adjustments from manufacturers to specific markets and will cause significant additional costs and disruption.

Considerations should include:

- ▼ Alignment with regard to rules and guidelines for setting up EPR schemes at national and European level.
- ▼ Assuring fair competition within Europe for products manufactured in and outside EU within the framework of the circular economy.
- ▼ Increased enforcement and market surveillance to ensure a level playing field across Europe.
- ▼ Eco-modulation fees based on criteria rewarding innovation in design for improving the circularity of products, based on harmonized definitions and quality criteria across Europe. This could include uptake of recycled content, design for disassembly and recycling, availability of collection systems and recycling technology.

Building logbooks

EU framework for digital building logbooks^{xiv}

A digital building logbook is a common repository for relevant building data. It facilitates transparency, trust, informed decision making and information sharing within the construction sector, among building owners and occupants, financial institutions and public authorities.

Information obtained from construction products is only part of the data expected to be archived in the building logbook and be interoperable with other sources of information. Unfortunately, the number of different national and regional initiatives is a clear obstacle to align them according to a similar approach.

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Information “Golden thread” starts with the information delivered by manufacturers and ends in the building logbook

The EC launched a study on policy recommendations for the development of a European framework for digital building logbooks and the final report concluded that it should follow a standardised approach and be consistent with the applicable regulations.

Building logbooks are referred in other initiative such as the [Renovation wave](#) but on the contrary to other instruments such as the energy performance certificates, its harmonisation at European level is a challenge. CEN/TC 350 subcommittee 1 – Circular economy may develop a standardised approach but the key of their work is keep consistency with the existing digitalisation initiatives and with the applicable regulations.

Some principles to be used as guidance for the development of building logbooks are:

- ▼ They need to be technology neutral to avoid market distortions and outdated results.
- ▼ Information from construction products should be aligned to the [CPR](#) and it should not create barriers to trade.
- ▼ Digitalisation must be implemented according to a harmonised approach but shall not steer the development but the opposite.
- ▼ In addition to the developments in the field of circular economy (demolition and waste) building logbooks should include REACH/CLP information.
- ▼ Implementation by Member States need to keep basic principles of interoperability and the possibility to deliver aggregated European data.
- ▼ Sustainability should be one of the key topics to be addressed under a construction specific approach compatible with the delivery of information by manufacturers ([EPD](#) information), but focused on building assessment according to the reference European methodology [Level\(s\)](#).

- ▼ Data ownership needs to be properly addressed together with the responsibility of the relevant stakeholder e.g. manufacturers responsible of the declared performance in their DoP but once the product is delivered information is owned by the following stakeholders in the construction chain.
- ▼ Consistency with legislative frameworks need to be addressed and updated in case of regulatory changes.
- ▼ Information should be kept by a dedicated body and bear the responsibility of store, keep and allow access to the information when needed.

All activities in the last years experienced a transformation triggered by the increasing access to data and software applications. Construction was not an exception and a digital environment called Building Information Model (BIM) was created. The main challenge of digitalisation in construction is interoperability. Software applications must be able to exchange information, but it is not possible unless standardised data structures and exchange formats for digital information are provided. In CEN/TC 442, two standards have been developed to enable such interoperability: EN ISO 23386 and EN ISO 23387. Together they provide the framework for data templates. Initiative such as Smart CE marking (digitalisation of declaration of performance within the CPR regulatory framework) were developed according to these standards to maximise its compatibility in the BIM environment.

Manufacturers are the reliable source of product information to be used across the construction value chain

A data template is a common data structure describing the characteristics (properties) of an object (usually a product), according to a source of information. When a data template is completed with information, the output is called a data sheet. In practice, a data sheet includes the performance and the technical characteristics of the object. With an information exchange format, data sheets can be shared and used by different IT tools or digital environments.

Only regulatory and voluntary initiatives developing harmonised data templates will ensure that the concepts they are defining are also implemented in the digital environment. For this reason, Construction Products Europe developed CWA 17316:2018 Smart CE marking for construction products which contains guidance to be used by product standardisers to develop product data templates, including an XML exchange format. In practice, Smart CE marking is the implementation of product data templates to construction products in the scope of the [Construction Products Regulation](#). When manufacturers digitise their Declarations of Performance under the CPR using Smart CE, they are creating the harmonised data sheets containing the relevant regulatory information.

[Environmental Product Declaration](#) can also be delivered as product data sheets. The rules to digitise them are available in ISO 22057, the standard is not published yet but it will contain the necessary guidance. The benefit of this initiative is the interoperability, so if in future EPD information is integrated in the CPR, product data templates will also be integrated.

Other proprietary approaches to digitalisation exist in the market but they will only work in practice if they can be easily implemented by companies of any size without a deep IT knowledge and while the manufacture keeps the ownership of the information. Other approaches such as databases for which an entry fee is requested failed to be relevant in the market and probably will not have the implementation of standardised, open approaches.

The potential benefits of product data templates need to be unleashed in relation to other policies and initiatives. [Building logbooks](#), [Level\(s\)](#), substance declaration will facilitate their market implementation if harmonised European data templates are developed.

Data should be considered as an asset with real value but the only way to get the benefits from the delivery of information is by controlling the digitalisation of product information in interoperable formats within product data sheets.

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- i <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN>
 - ii <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32011R0305>
 - iii European Standard EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
 - iv European Standard EN 15978 Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method
 - v <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:98:FIN>
 - vi https://ec.europa.eu/environment/topics/circular-economy/levels_en
 - vii <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32020R0852>
 - viii <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02010L0031-20210101>
 - ix https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en
 - x <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0662>
 - xi <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32018R0842>
 - xii https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12567-Sustainable-products-initiative_en
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