



**Delivering on the European
Green Deal and Fit for 55**

Upcoming EU policies in order to support a transition in the built environment

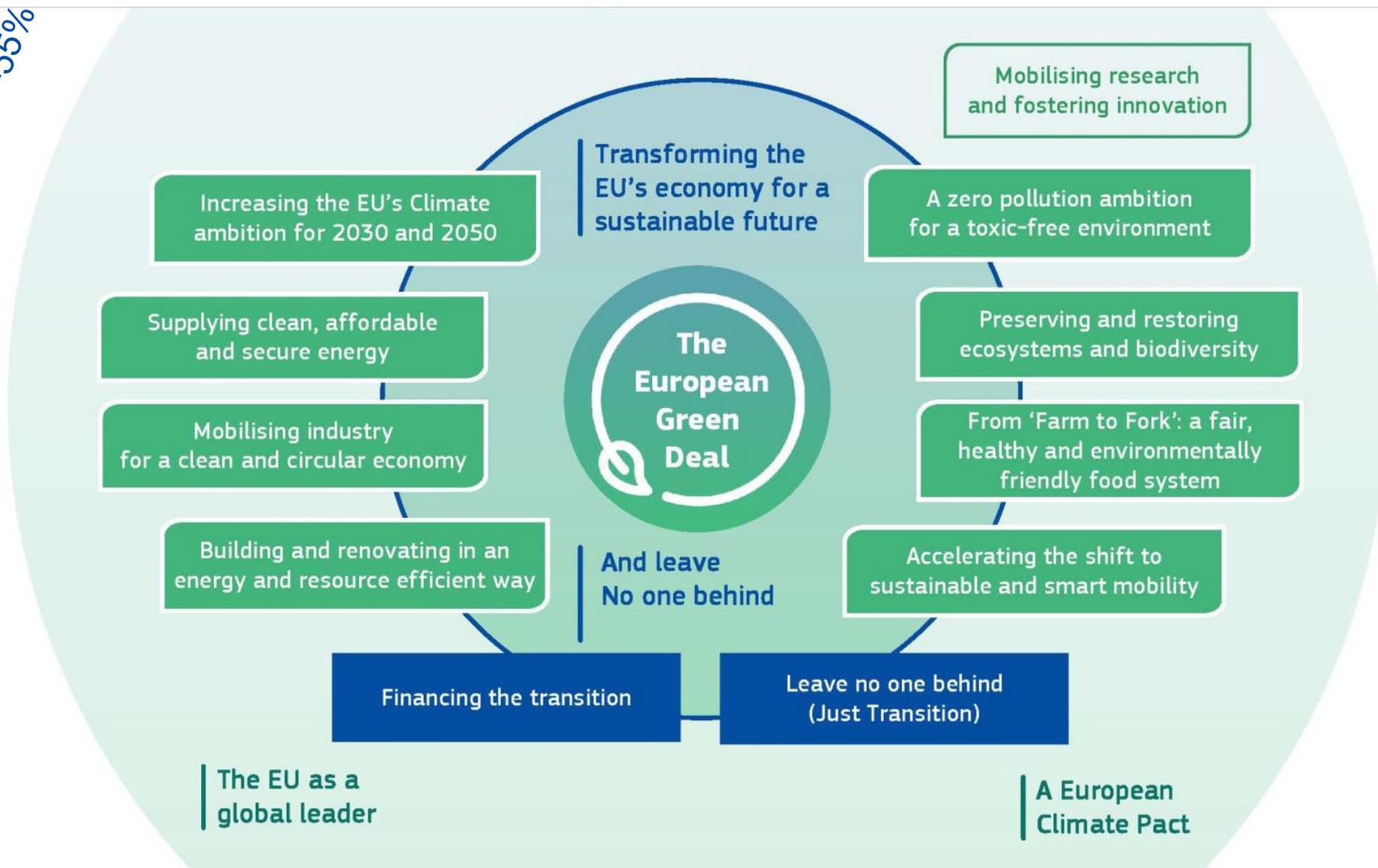
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Current Policy Context

The **European Green Deal**

New climate target: -55%

Recovery after COVID-19 crisis



Building Renovation for Climate Neutrality and Recovery



The building sector is one of the **largest energy consumers** in Europe, responsible for more than one third of the EU's energy-related emissions.



Effective actions are crucial to make Europe climate-neutral as:

- Only 1% of buildings undergo energy efficient renovation every year
- Roughly 75% of the building stock is energy inefficient
- Almost 85-95% of today's buildings will still be in use in 2050

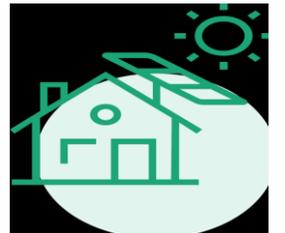
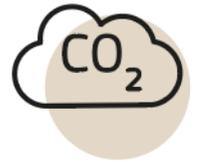


On 14 October 2020, the European Commission presented its Renovation Wave Strategy. The Commission aims to at least:

- **double renovation rates** in the next ten years;
- make sure renovations lead to **higher energy and resource efficiency**.

Making Europe's Buildings Remarkably Different

- **Decarbonisation** of heating and cooling
- **Tackling energy poverty** and **worst-performing buildings**
- **Renovation of public buildings and social infrastructure** such as schools, hospitals and administrative buildings
- **Life-cycle thinking** and **circularity**. Minimising the footprint of buildings requires resource efficiency and circularity combined with turning parts of the construction sector into a carbon sink.
- **A set of policy measures, funding tools and technical assistance instruments** to break down of existing barriers throughout the renovation chain – from the conception of a project to its funding and completion



Fit for 55: Key proposals for buildings

- The revised **Energy Performance of Buildings Directive** will facilitate and increase building renovation, modernising and decarbonising the EU's building stock. It is an essential part of delivering on the **Renovation Wave strategy**.
- The new **Effort Sharing Regulation** sets emission reduction targets for all Member States by 2030 for sectors including buildings.
- The revised **Energy Efficiency Directive** and **Renewable Energy Directive** will make buildings more energy efficient and boost the use of renewable energy in buildings.
- **Emissions Trading** for building fuels will speed up emissions reductions and stimulate investments in renewables and energy efficiency
- The new **Social Climate Fund**, funded by revenues from emissions trading in road transport and buildings, will provide **financial support to citizens**, in particular the vulnerable households, to invest in renovation or heating systems and ensure a fair transition.

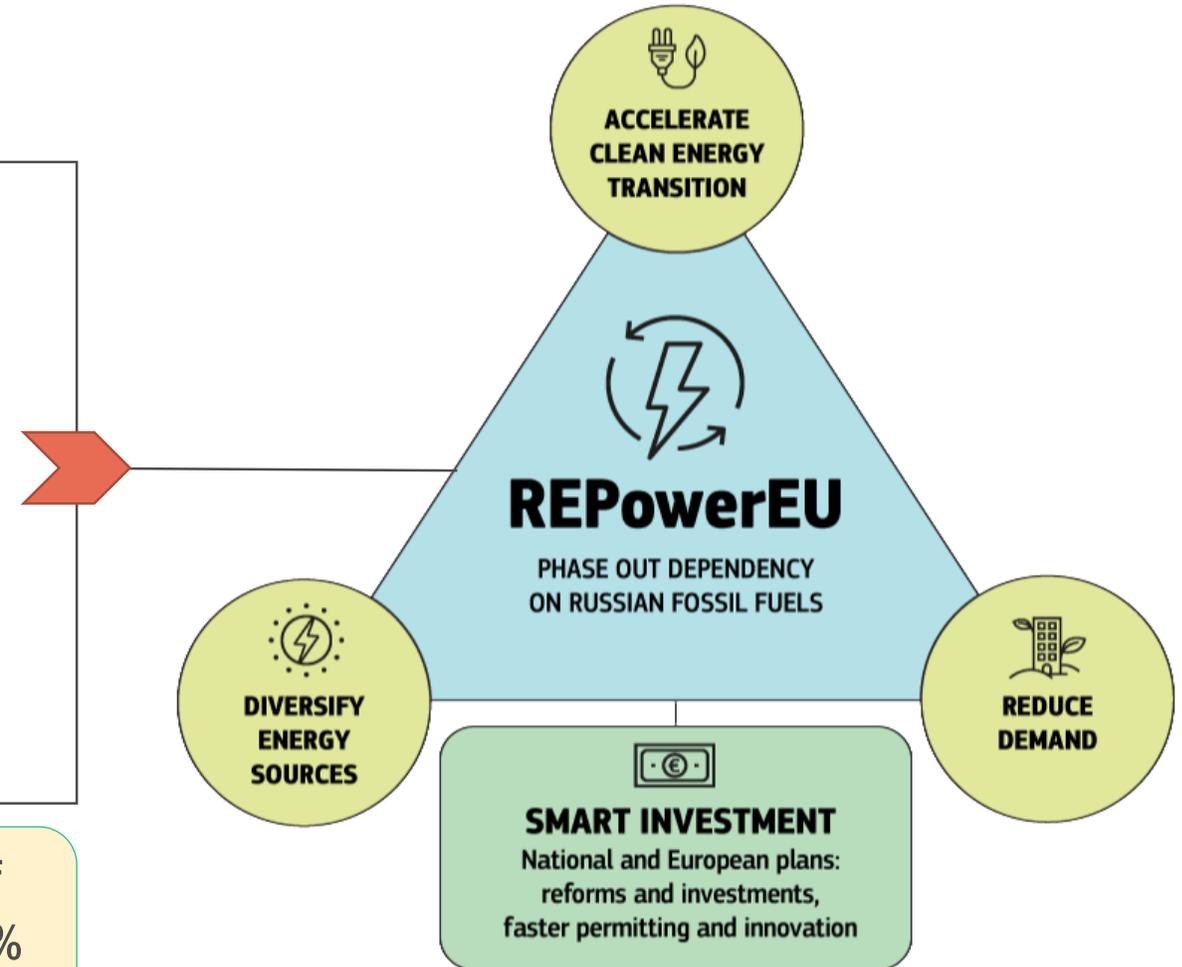
REPowerEU: from goals to action

Independence from Russian fossil fuels by 2027 (all figures expressed in billion cubic metres/equivalent)

- Increase imports of **liquefied natural gas** (LNG) by 50 bcm
- Increase **pipeline gas** imports by 10 bcm
- Increase **biomethane** production by 3.5 bcm
- EU-wide **energy saving** to cut gas demand by 14 bcm
- **Rooftop solar** to reduce gas demand by 2.5 bcm
- **Heat pumps** to reduce gas demand by 1.5 bcm
- Reduce gas demand in the power sector by 20 bcm by deployment of **wind and solar**

Increase the target of renewable energy from 40% to **45%** by 2030

Increase the target of energy savings from 9% to **13%** by 2030



Revision of the Energy Performance of Buildings Directive (EPBD)



➔ As of 2030 all new buildings must be zero-emission; new public buildings must be zero emission already by 2027.

+ Consideration of life-cycle Global Warming Potential (GWP)



➔ The **worst-performing 15% of the EU building stock will have to be upgraded** from Energy Performance Certificate (EPC) label G to at least label F by 2030, public and non-residential buildings leading the way by 2027. Residential buildings should be renovated from G to at least F by 2030, and to at least E by 2033.



➔ The **obligation to have an energy performance certificate is extended** to buildings undergoing major renovation, buildings for which a rental contract is renewed and all public buildings.



➔ Requirement to **roll out charging infrastructure** for electric vehicles in residential and commercial buildings and to promote **dedicated parking space for bicycles**.



➔ Buildings or building units which are offered **for sale** or rent must have **an energy performance certificate**, and the energy performance class and indicator should be stated in all advertisements.

Revision of the Energy Performance of Buildings Directive (EPBD)



➔ **National Building Renovation Plans will be fully integrated into National Energy and Climate Plans** to ensure comparability and tracking of progress – they will need to include roadmaps for **phasing out fossil fuels in heating and cooling by 2040 at the latest**.



➔ A Building 'Renovation passport' will **give access to information and lower costs for consumers** to facilitate their planning and a step-by-step renovation towards zero-emission level.



➔ Member States are invited to include **renovation considerations in public and private financing rules** and to establish appropriate instruments, in particular for low-income households.



➔ A **sunset clause is introduced for financial incentives to use fossil fuels in buildings**: no financial incentives should be given for the installation of boilers powered by fossil fuels as of 2027 and Member State are given the legal **possibility to ban fossil fuel use in buildings**.

Construction Products Regulation (CPR)

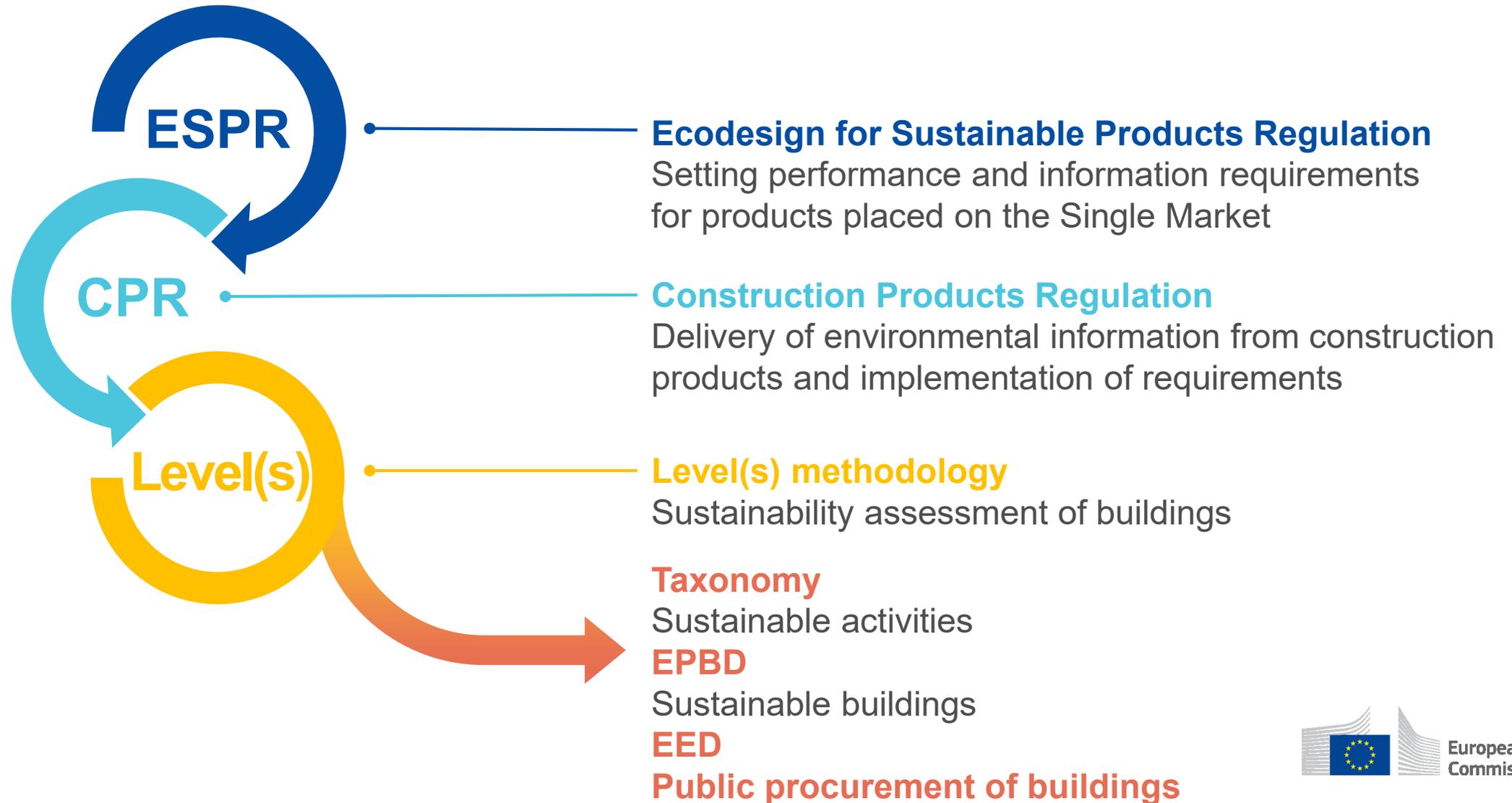


- Lays down EU-wide rules for marketing construction products
- Undergoing revision to:
 - ✓ Improve functioning of single market for construction products
 - ✓ Integrate sustainability requirements

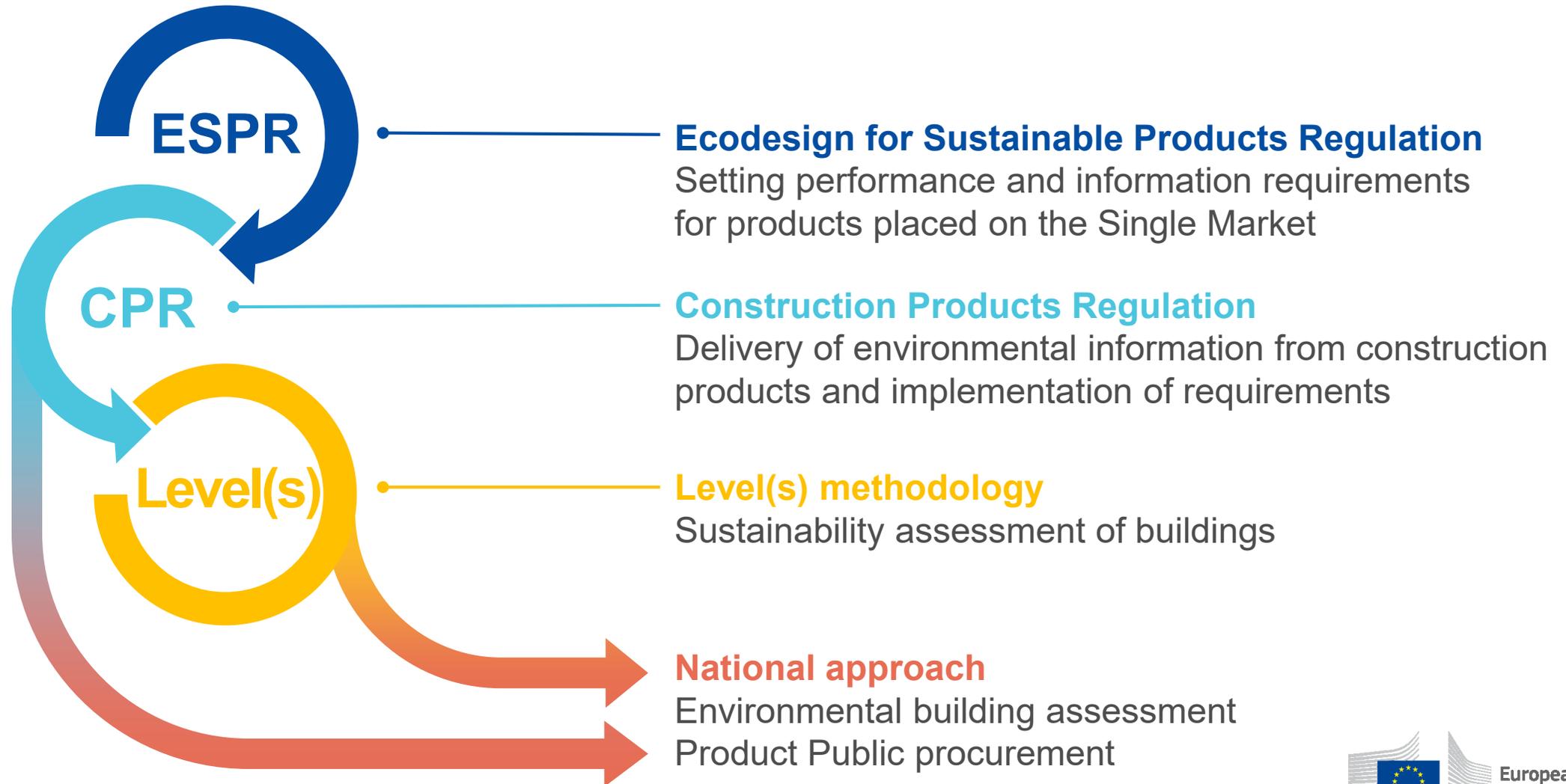
CPR review:

<https://europa.eu/!Dy69pr>

EU Regulatory framework



National Regulatory framework



Technical approach

Basic Requirements of Construction Works
Annex I Part A point 1

Environmental performance

Declaration of environmental indicators using Life Cycle Assessment methodology including compulsory declaration of global warming potential (CO2 eq.) when the applicable standards are cited

Art. 4
Annex I Part A

Information requirements

Declaration of environmental related information relevant for the customer directly applicable or according to the standard e.g. relevant information to extend service life, facilitate dismantling, reuse, recycling, etc.

Art. 5(1)
Annex I Part D

Environmental requirements

Implementation of requirements on product and production processes through delegated acts and voluntary harmonised standards e.g. durability, reparability, recyclability, etc.

Art. 5(2)
Annex I Part C

Product Declaration of performance

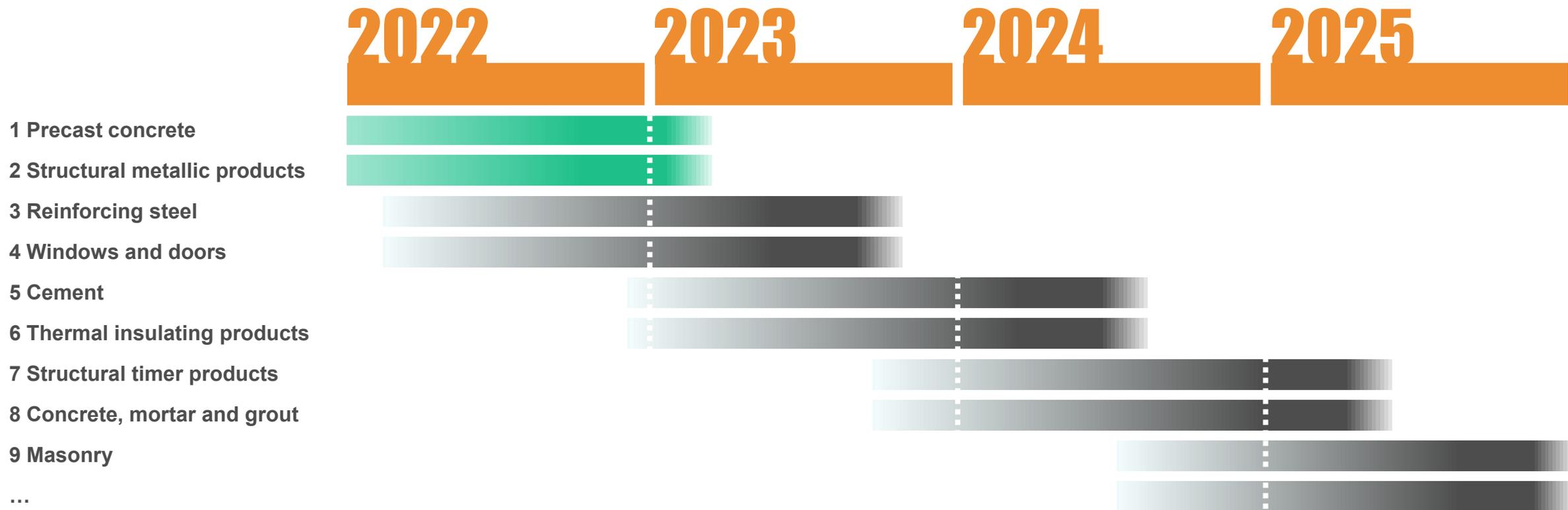
Climate change total	Climate change fossil	Climate change biogenic	Climate land use and land use change	Ozone Depletion	Acidification	...
[kg CO ₂ eq.]	[kg CFC11 eq.]	[mol H ⁺ eq.]				

Product stage	Raw material supply	A1
	Transport	A2
	Manufacturing	A3
Construction process stage	Transport	A4
	Construction – installation process	A5
Use stage	Use	B1
	Maintenance	B2
	Repair	B3
	Replacement	B4
	Refurbishment	B5
	Operational energy use	B6
	Operational water use	B7
End of life stage	Deconstruction demolition	C1
	Transport	C2
	Waste processing	C3
	Disposal	C4
Benefits and loads beyond the system boundary		D

Mandatory declaration

Mandatory declaration if required by the regulatory framework of the Member State market in which the product is placed

CPR acquis preparatory work



Implemented by harmonised standards to be cited in the Official Journal
Level playing field for construction products (no barriers to trade)
Regulatory consistency to guarantee healthy internal market

EU Taxonomy for sustainable activities

- Objective: direct investments towards “sustainable” projects
- Climate Change Adaptation & Mitigation (in force since January 2022)
- Circular Economy (draft published April 2023)

EU Taxonomy:

<https://europa.eu/!WV46yv>



EU Taxonomy: circular economy draft DA

Annex II chapter 3 ‘Construction and real estate activities’

Construction and renovation of buildings:

- Treatment of waste (pre-demolition audits, sorting, preparing for re-use, recycling)
- Calculation and disclosure of life cycle emissions
- Design for adaptability and deconstruction
- Recycled content thresholds for top 3 materials used by weight
- Use of electronic tools

Draft Delegated Act consultation until 3 May 2023:

<https://europa.eu/!x4YKQy>

Waste Framework Directive

The WFD requires MS:

- to **reduce waste generation** in processes related to construction and demolition” (Article 9)
- to promote **selective demolition and removal of materials**, and to establish **sorting systems for construction and demolition waste** at least for wood, mineral fractions (concrete, bricks, tiles and ceramics, stones), metal, glass, plastic and plaster (Article 11 (1))
- **by 2020**, the **preparing for re-use, recycling** and other **material recovery**, including backfilling, of non-hazardous CDW excluding naturally occurring material shall be increased to a minimum of 70% by weight (Article 11, 2b)
- The 2018 amendments of the WFD also introduced a new and more precise definition of ‘backfilling’ (Article 3, 17a)
- The WFD requires the Commission to consider the setting of preparing for re-use and recycling targets for construction and demolition waste and its material-specific fractions by 31 December 2024 (Article 11 (6))

Transition Pathway



Transition pathway published 15 March 2023:
<https://europa.eu/!FcbxNr>

- Introduction
- 1. Competitiveness
- 2. Skills and talent
- 3. Enabling framework
- 4. Research, Innovation, Technology
- 5. Funding
- 6. Towards a fair and safe built environment
- Annexes

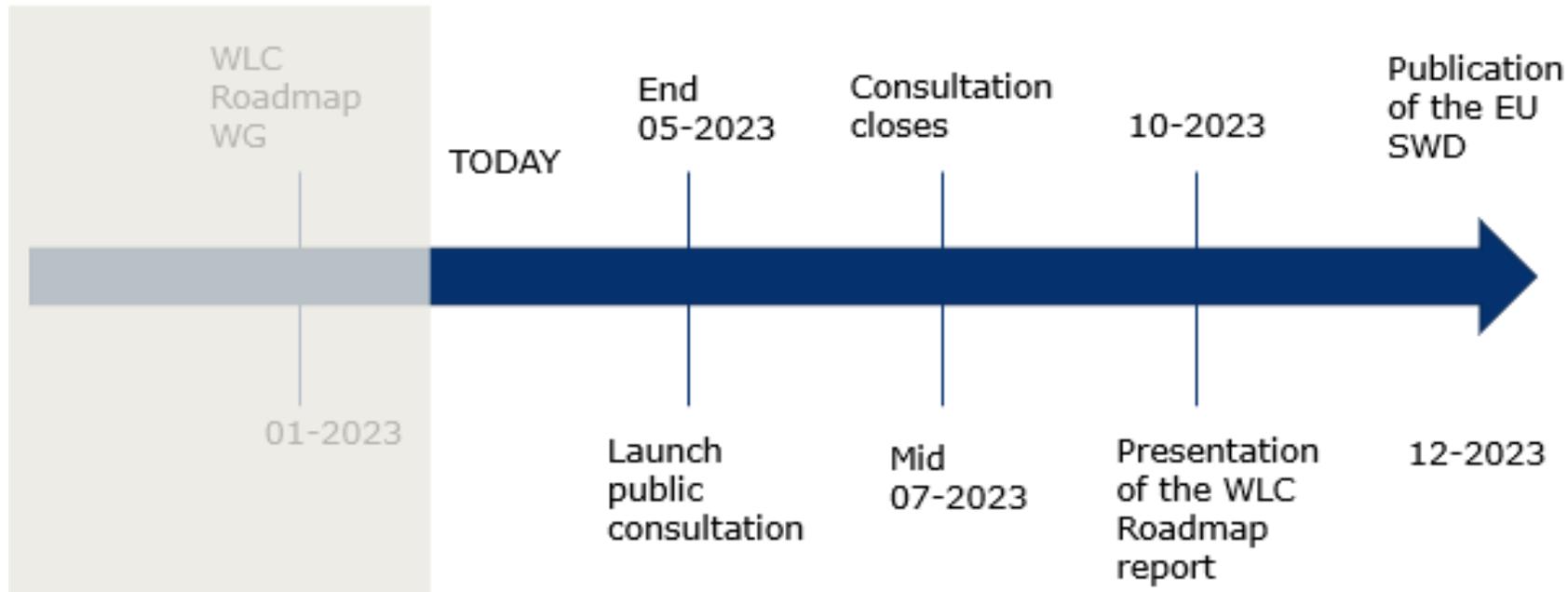
Transition Pathway for construction

Recommended action	Actors	Timeframe
3.4 Prioritise renovation over demolition and reconstruction in policies, programmes and developments Industry and	EU/MS	S/M
3.12 Require disclosure of whole life cycle GHG emissions of buildings and infrastructure works and consider the setting of maximum target values	EU/MS	S/M
3.14 Encourage disclosure of buildings' environmental performance , both designed and as built, to enable benchmarking according to Level(s)	Industry and MS	S
3.15 Facilitate consistency in calculation and disclosure of whole life cycle greenhouse gas emissions in buildings based on Level(s)	EU/MS	S/M
3.18 Align national building assessment schemes to the EU framework , in particular Level(s) and the information delivered in the context of the Construction Products Regulation and the revised EPBD.	MS/Industry	S/M

Transition pathway: <https://europa.eu/!FcbxNr>

2050 Roadmap for whole life cycle emissions reduction in buildings (Renovation Wave action)

- DG ENV background study (2022-2023)
- Roadmap development (2023)



Our work gives unprecedented insights into the EU's building stock emissions



Embodied carbon reduction solutions

Defined solutions catalogue on the level of technical design & implementation

[CE Actions project commissioned by the European Energy Agency](#)



Building LCA model (MMG/SLiCe)

Bottom-up modelling with regionalized archetype variations

[Using data of Tabula/Episcope projects, funded by Intelligent Energy Europe](#)



EUCalc building stock model

Top-down framework for upscaling and efficiency scenarios

[EUCalc project funded by Horizon 2020](#)



Applied to



Scaled up with

- Comprehensive review of measures to **avoid new construction, improve building design and construction, and shift to low-carbon materials**
- Detailed **bottom-up building level results** to understand the impact of embodied carbon reduction solutions across various European countries/regions and building types
- **Top-down calibration** of the EU's building stock to observed and projected **activity levels** in terms of floor space, energy and material demand

Solutions to reduce embodied carbon are grouped into three categories

Avoid new construction	Improve building design	Shift to low carbon materials
<ul style="list-style-type: none">• Optimize/reduce the use of space in offices and residential buildings• Use existing assets that are currently unused instead of new buildings• Renovate instead of building new	<ul style="list-style-type: none">• Design based on light construction method instead of massive construction• Design for flexibility, resilience and extended lifespan• Design for disassembly• Reduce concrete demand by use of void formers in concrete slabs	<ul style="list-style-type: none">• Re-use existing building components and materials• Full timber construction• Hybrid timber structures in new construction• Use other bio-based materials• Use industry by-products instead of clinker in cement• Use alternative cementitious materials instead of cement in concrete• Use recycled concrete and other by-products for new concrete• Use recycled steel in steel production• Use recycled glass in glass production• Use renewable energy in cement production• Use renewable energy in steel production and other metals• Use renewable energy in glass production• Carbon capture in cement production• Carbon capture in steel production

Modelling emissions from the EU building stock:

1. **Baseline year** (2020)
2. **Business-as-usual** scenario: projections based on current policies and practices
3. **TECH-Build** scenario: Extremely ambitious implementation of WLC reduction solutions
4. **LIFE-Build** scenario: Complements TECH-Build with lifestyle changes to avoid new construction

We quantify the current baseline and three scenarios up to 2050

Solutions	Definition	Boundaries	TECH-Build
Improve	Optimise design, construction and production practices	Technical boundaries	
Shift	Use circular, low carbon or bio-based materials	Availability boundaries	
Avoid	Make best use of existing building stock	Social boundaries	LIFE-Build

New and renovated buildings drive the embodied share of whole life carbon...

- Embodied emissions on average account for **34% of WLC in new standard buildings** and **74% of advanced energy performance** buildings.
- In absolute terms, **advanced energy performance levels clearly result in lower whole life carbon emissions** across all regions and building types modelled.
- On average, **upfront embodied emissions** (A1-A5) account for **84%** of whole life embodied carbon.
- Embodied carbon from **refurbishment** (B5) of existing building archetypes reveal **large differences between the typologies**, with higher embodied carbon per m² for single-family houses and offices than the multi-family houses.

Baseline **average whole life embodied emissions** for **new construction**:



SFH

915
kgCO₂e/m²
UFA



MFH

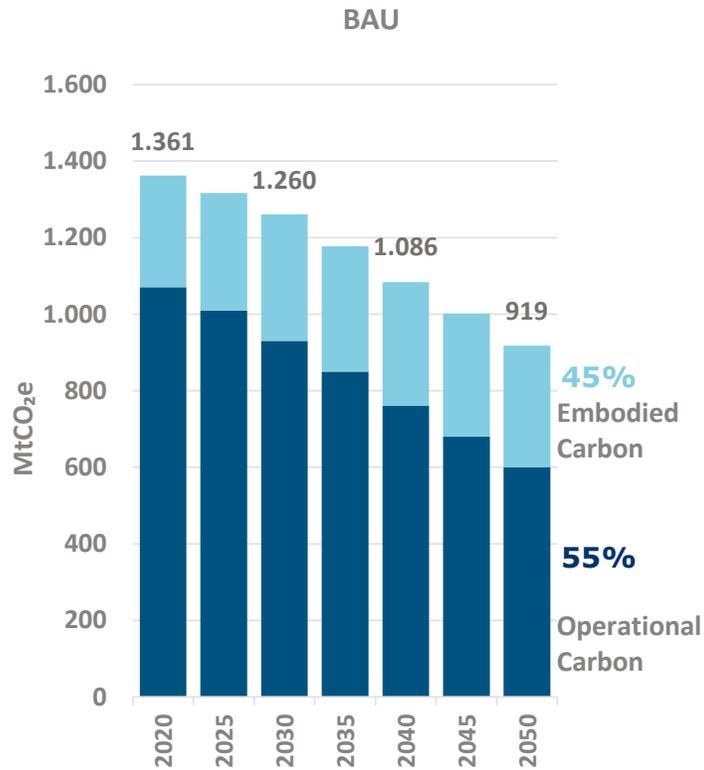
560
kgCO₂e/
m² UFA



Office

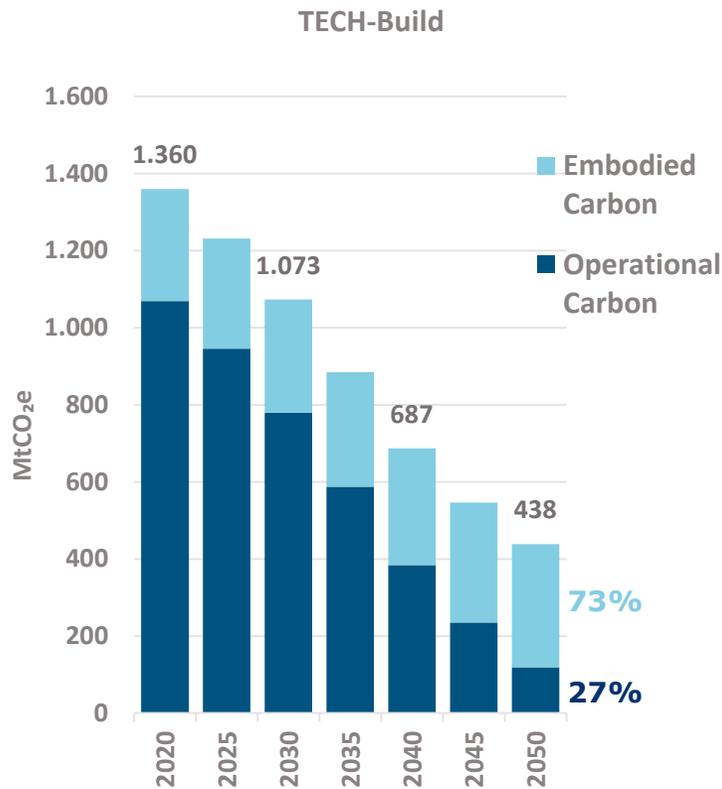
685
kgCO₂e/
m² UFA

The BAU scenario reduces building stock emissions by 32% compared to the baseline



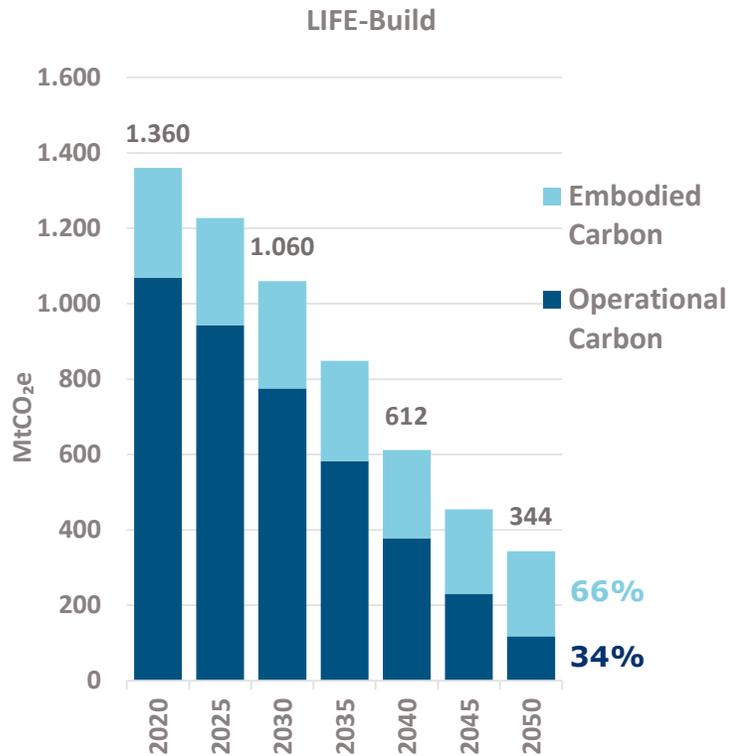
- The overall effect is driven by **reductions of operational emissions as a result of renovations and decarbonisation of space heating**. Importantly, these reductions are projected against a 40% increase of the building stock floor area.
- **Embodied emissions are expected to increase** over time, similarly as a result of increased renovations.
- **Total WLC emissions decrease steadily** as savings in operational emissions outweigh the increases in embodied carbon.

Ambitious technological change can achieve reductions of 68% in 2050



- **Operational emissions are expected to fall by about 90%** relative to the baseline. This is achieved by a steady increase of renovation rate up to 3% in 2040 and beyond, combined with decarbonisation of space heating.
- **Embodied carbon will overtake and exceed operational carbon between 2040 and 2045.** The absolute amount of embodied carbon will decrease slightly by 2025 and then will increase due to new construction as well as higher renovation rates and depths.
- While renovation embodied carbon is growing due to the high renovation rate, **upfront emissions of new construction show important reductions.** Until 2030 new constructions are the largest source of embodied carbon; as of 2035 the renovation embodied carbon emissions take over.
- Still, renovation projects result in **lower embodied carbon levels than in the BAU.** A **larger number of renovations** results in a higher total.

Technological and lifestyle changes to avoid and reduce emissions can achieve 75% reductions in 2050



- The LIFE-Build scenario cuts **further 94MtCO₂e in 2050** compared to TECH-Build by avoiding the need for new construction.
- **Operational emissions are expected to fall by about 90%** relative to the baseline, same as in TECH-Build.
- The absolute amount of **embodied carbon will decrease consistently between 2020 and 2050** - a significant change compared to the TECH-Build which saw overall increasing embodied carbon emissions.
- **Sufficiency measures** which avoid the demand for materials and energy services **are more effective today than in a highly decarbonised future**. Sufficiency measures are also essential to ensure technological solutions **are able to cover the demand and rebound effects are avoided**.

Analysis of GHG emissions & removals of EU buildings & construction

DG GROW Preparatory Action 2023-2025

- Follow-on of Roadmap modelling work, adding more detail
- Modelling at EU and national level, integrating carbon removals and WLC
- Generation & gathering of new data
- Carbon reduction & removal strategies at national building stock level => recommendations per MS
- Scenario modelling tool
- Methodology for future data collection enabling continuous monitoring

Carbon Removal Certification

- Aim: to **scale up carbon removal activities** and fight greenwashing by empowering businesses to show their action in this field
- **Voluntary EU-wide framework** with criteria to define high-quality carbon removal and process to monitor, report & verify the authenticity of these.



PERMANENT STORAGE



CARBON FARMING



CARBON STORAGE IN
PRODUCTS

https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/carbon-removal-certification_en

QU.A.L.I.TY criteria for all carbon removals



QUANTIFICATION

Carbon removal activities are measured accurately and deliver unambiguous benefits for the climate



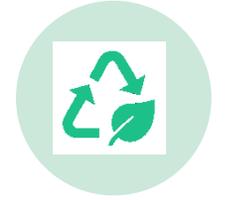
ADDITIONALITY

Carbon removal activities go beyond market practices and what is legally required



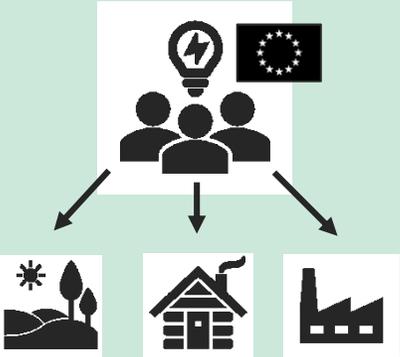
LONG-TERM STORAGE

Certificates clearly account for the duration of carbon storage and distinguish permanent storage from temporary storage



SUSTAINABILITY

Carbon removal activities do not harm the environment or even benefit other environmental objectives such as biodiversity



To operationalise the EU quality criteria, the Commission, supported by an expert group, will develop **tailored certification methodologies** for the different types of carbon removal activities

EU-Level Technical guidance on adapting buildings to climate change

POLICY & STANDARDS REVIEW

European Policy & Standardization Environment Adaptation Review

Review of EU and member state national policies and regulations relevant to the adaptation of buildings for climate change.



Climate Resilience in Structural Design Review

Review of the structural design of buildings to the Eurocodes and national regulations relevant to designing for climate resilience in buildings.



RISK ASSESSMENT & RATING REVIEW

Climate Vulnerability & Risk Assessment Methodology

Review of Climate Vulnerability & Risk Assessment methodology for buildings and blocks of buildings from existing methodologies.



Climate Resilience Rating Approach

Review of rating approaches for climate resilience for buildings, exploring the criteria, approach type, and link to CVRA methodology.



BEST PRACTICE GUIDANCE

Best Practice for enhancing Climate Resilience

Assembly of best practice climate resilience guidance for buildings and as integrated into the local environment. Best practice case studies will be categorised by climatic hazards with supporting guidance given in reference to the different processes or priorities by climatic zone, project stage and building sector actor.



✓ Developed in the context of a **dedicated study** that lasted one year, from January 2022 to January 2023

Download the Technical Guidance



Download the both the [Technical Guidance](#) and the [Best Practice Guidance](#) from the EU Publications Office.

Read more about them and on climate resilience in buildings in general on the [Climate-ADAPT platform](#).



Thank you