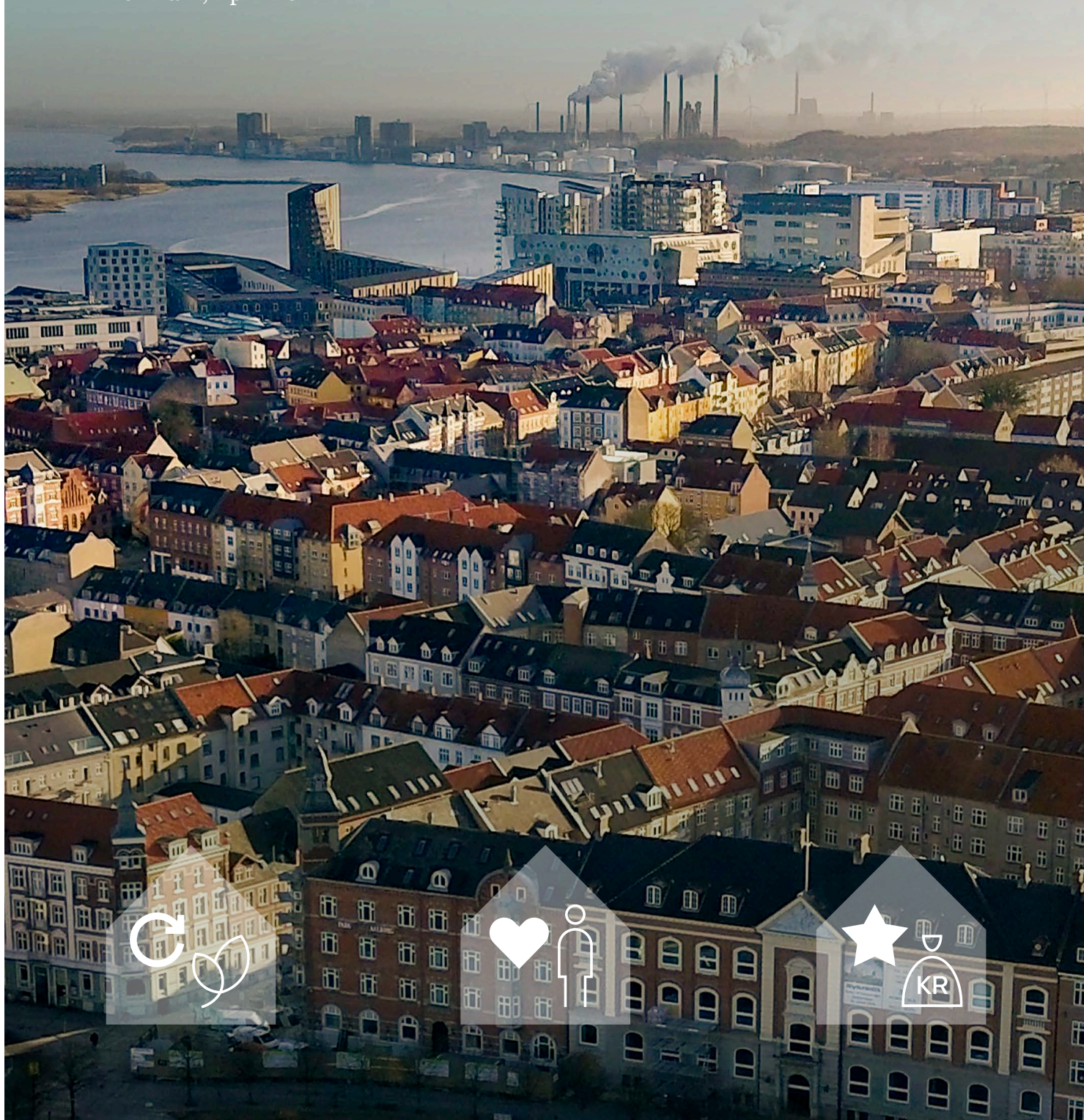


# National Strategy for Sustainable Construction

Denmark, April 2021





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**“The National Strategy for Sustainable construction is the Government’s sectoral action plan for the building and construction sector**

# Introduction

With broad support from the parliamentary parties, the Government has adopted an ambitious Climate Act, which legalises a goal for Denmark to reduce its CO<sub>2</sub> emissions by 70% by 2030, compared to 1990.

With its climate action plan, the Government is further boosting the green transition of the major sectors and the realisation of high ambitions. As part of this initiative, the Government has entered into an agreement with Venstre, Dansk Folkeparti, Socialistisk Folkeparti, Radikale Venstre, Enhedslisten, Det Konservative Folkeparti and Alternativet regarding a national strategy for sustainability.

The National Strategy for Sustainable Construction is the Government's sectoral action plan for the building and construction sector. It also follows up on the recommendations of the Climate Partnership for the building and construction sector, which, on the basis of further work, has presented a number of proposals for reducing CO<sub>2</sub> emissions.

The initiatives can be categorised into a total of five focus areas:



## Focus area 1

More climate-friendly buildings and construction



## Focus area 2

Durable, high-quality buildings



## Focus area 3

Resource-efficient buildings



## Focus area 4

Energy-efficient, healthy buildings



## Focus area 5

Digitally-supported construction

## **The Strategy is part of a cross-disciplinary effort**

Every year sees the construction of a large number of buildings and structures - for example, roads and bridges - and even more are refurbished and reconditioned. Their construction, operation and maintenance consumes huge amounts of energy and resources.

The National Strategy for Sustainable Construction supports the measure aimed at achieving the 70% target. Emissions from heating and energy consumption in buildings are attributed to the energy sector, while the production and transport of building materials is attributed to the industrial and transport sectors. Accordingly, less energy consumption and increased use of climate-friendly building materials will contribute to reductions in other sectors and abroad.

Similarly, there are a number of interfaces between the National Strategy for Sustainable Construction and other elements of the climate action plan, and the initiatives have been devised, so that the sectors can support each other in the process of green transition. For example, the Strategy has interfaces with other sectors in the fields of energy and industry, waste and circular economy.

The 2020 Green Housing Agreement marks the launch of comprehensive refurbishment measures in the council housing sector. The aim of the measures is to raise the level of council housing stock in terms of maintenance. Another priority is the streamlining of energy in many of the 453 approved refurbishment projects that will be realised during the next few years. 72,000 homes are now being refurbished.

In addition, the Government suspended the municipal and regional construction limits in 2020 and extraordinarily raised them in 2021. Meanwhile, the 2021 Budget increased the building pool and the other pools for phasing out oil and gas boilers, establishing a new subsidy pool in 2021 and 2022, which is targeted at energy renovations in regional and municipal buildings.

The Strategy is thus part of a larger endeavour initiated by the Government and a majority of the parliamentary parties.

## **The holistic focus is key**

The green transition must be implemented together with the sectors in a way that supports jobs, welfare, exports and competitiveness. Consequently, the work of the business community and the Government on the climate goals is spurred by ambitions to lead in a green manner and to take advantage of the opportunity to create the green products and solutions of tomorrow. A sustainable restructuring of the building and construction sector also entails a social and economic dimension that is inextricably linked to climate and environmental considerations.

We spend approximately 90% of the hours of the day indoors, and the built environment provides our physical setting in the shape of homes, workplaces, urban spaces and roads. So, the quality of buildings is vital for well-being, health and quality of life.

Construction must also be affordable, and every effort must be made to streamline construction processes and increase the overall productivity of the building and construction sector. In this context, digitisation, for example, can help reduce costs: a reduction that can cover the potential additional costs of investing and implementing new, sustainable solutions. However, the balance between cost and quality must apply to the entire life cycle of a building – from construction, use, operation and rebuilding or refurbishment to possible demolition.

That is why we must think long-term and holistically, if the numerous simultaneous considerations and processes in sustainable construction are to work together. Accordingly, the vision of the National Strategy for Sustainable Construction is to pave the way for better buildings, which incorporate the three dimensions of sustainability: environmental, social and financial.

# The three dimensions of sustainable development in construction

Sustainable construction consists of an environmental, a social and a financial dimension. Together, they are fundamental qualities that must be appraised in a balanced weigh by looking at a building as an entity and throughout its life cycle.

Therefore, the National Strategy for Sustainable Construction aims to support healthy, safe, high-quality buildings that limit environmental impact and can be built in a way that is sustainable and financially sustainable.

## **The environmental impact of buildings must be reduced**

Environmental quality is all about the impact on nature, environment and climate. One efficient way of limiting the environmental impact of construction is to minimise the consumption of energy and resources: for example, by using renewable sources of energy during the construction phase, reducing consumption of materials and incorporating circular solutions. The fewer materials produced, transported and used in a building, the fewer the emissions of greenhouse gases. Similarly, low energy

consumption during the construction phase and operation of a building helps to promote more climate-friendly construction.

Better quality of construction, less waste and energy consumption, fewer deficiencies and longer life spans for individual materials and building components will result in a reduction of a building's climate footprint and general impact on the environment.

The Strategy marks a decisive step towards reducing the environmental impact of construction: for example, by launching measures to phase in climate requirements for construction through the voluntary sustainability standard, to support the development of life cycle assessment tools, to create safe, healthy recycling in the construction sector and to promote fossil-free construction sites.

## **The life-cycle cost perspective must give equal weight to investment and quality**

The financial dimension is partly about streamlining the processes in the design and



construction of a building, and partly about acting on the basis of an overall financial perspective, which give equal weight to investment and quality throughout a building's life cycle. The additional costs that may be associated with the introduction of new, climate-friendly solutions for construction must be financed: in the short term, through increased productivity in construction; in the long term, through the reduction of operating costs.

There are often financial benefits to be gained from investment in long-term solutions. From an overall financial perspective, design and décor must take into account operability of a building, so that, for example, installations are easy to access, building components are durable, and cleaning and ongoing maintenance can be conducted efficiently. Thus, there can be financial benefits to be gained from investment in long-term and holistic solutions. Financial benefits may also be derived, for example, from investment in ensuring a good indoor climate that can increase productivity or reduce sickness absence.

The Strategy also underpins financial sustainability with initiatives that prioritise: the integration of LCCbyg a tool for calculating the total life-cycle costs with BIM (Building Information Modelling); testing a requirement for total economic calculation in the voluntary sustainability standard; digitising and streamlining the council sector; and identifying solutions for cheap construction that incorporate total life-cycle costs and climate considerations

## The health and indoor climate in our buildings must be improved

The social dimension is about creating a safe setting both in and around buildings for the health and well-being of users. For one thing, this implies prioritising functionality, flexibility and a healthy indoor climate.

It is especially important to have a good indoor climate, since conditions such as temperature, air quality and lighting are of great importance for the comfort of users. It has been proven that poor indoor climate has a negative impact on learning and can lead to fatigue and various other discomforts. Consequently, it is crucial for indoor climate conditions to support the well-being and state of health of users in their use of a building.

In addition, a productive construction industry that makes buildings cheaper to build, and an increased focus on long-term operating costs, must support a situation in which all citizens have access to good, healthy housing for a reasonable rent.

The National Strategy for Sustainable Construction sets out to support health and indoor climate with initiatives that include targeted energy streamlining measures to improve the indoor climate of existing buildings, and test more ambitious requirements for the indoor climate through the voluntary sustainability standard.

## The Three Dimensions Of Sustainable Construction:



**Environmental quality,**  
which impacts nature,  
environment, climate  
and resources.



**Social quality,**  
which has overall  
consequences for people's  
health and well-being.



**Financial quality,**  
which entails a balance between  
the total life-cycle costs and the  
quality of a building.

# The voluntary sustainability standard is the first step towards sustainable regulation

The voluntary sustainability standard, launched in May 2020, invites the industry to test new requirements for construction over two-year period. With the broad focus on sustainability, the voluntary standard will play an important part role in the National Strategy for Sustainable Construction and in the conversion and maturation of construction in a sustainable direction.

The purpose of the test phase is to phase in the principles of the standard into the building code by 2023 on a tried-and-tested basis.

## **Future requirements with a holistic focus**

The nine specific requirements of the sustainability standard prioritise the three dimensions of sustainability, tackling, for example, building materials, construction, maintenance, operation and indoor climate, and the potential of reuse and recycling from a life-cycle perspective. Thus, all phases of a building's life cycle are viewed on the basis of an overall consideration of the environmental, social and financial conditions. With its holistic focus on

construction, the sustainability standard can provide value for the client, building owner and user by minimising the environmental impact of a building, ensuring a healthy indoor climate throughout the building's entire life cycle, while also creating a sustainable budget vis-à-vis construction and operation.

## **Phasing in climate requirements for construction**

The National Strategy for Sustainable Construction reflects the fact that the Government is following up on the recommendations of the Climate Partnership for the building and construction sector and starting to phase in specific requirements in relation to the sector's climate footprint.

Consequently, a key element of the sustainability standard is to test a life-cycle assessment (LCA) requirement with a view to phasing it into the building code as a requirement for all buildings by 2023.

In terms of equal competition and innovation, it is important for the regulations and ambitions, which form the context for the transition of the construction sector to greater sustainability, to be not only impressive, but also achievable for an industry that is very much on the ball. This enables companies to develop better methods and tools for streamlining and for reducing emissions from construction processes and building operations. It will therefore be crucial to strike the right balance between ambitions and requirements for the climate footprint of the construction sector in the coming years.

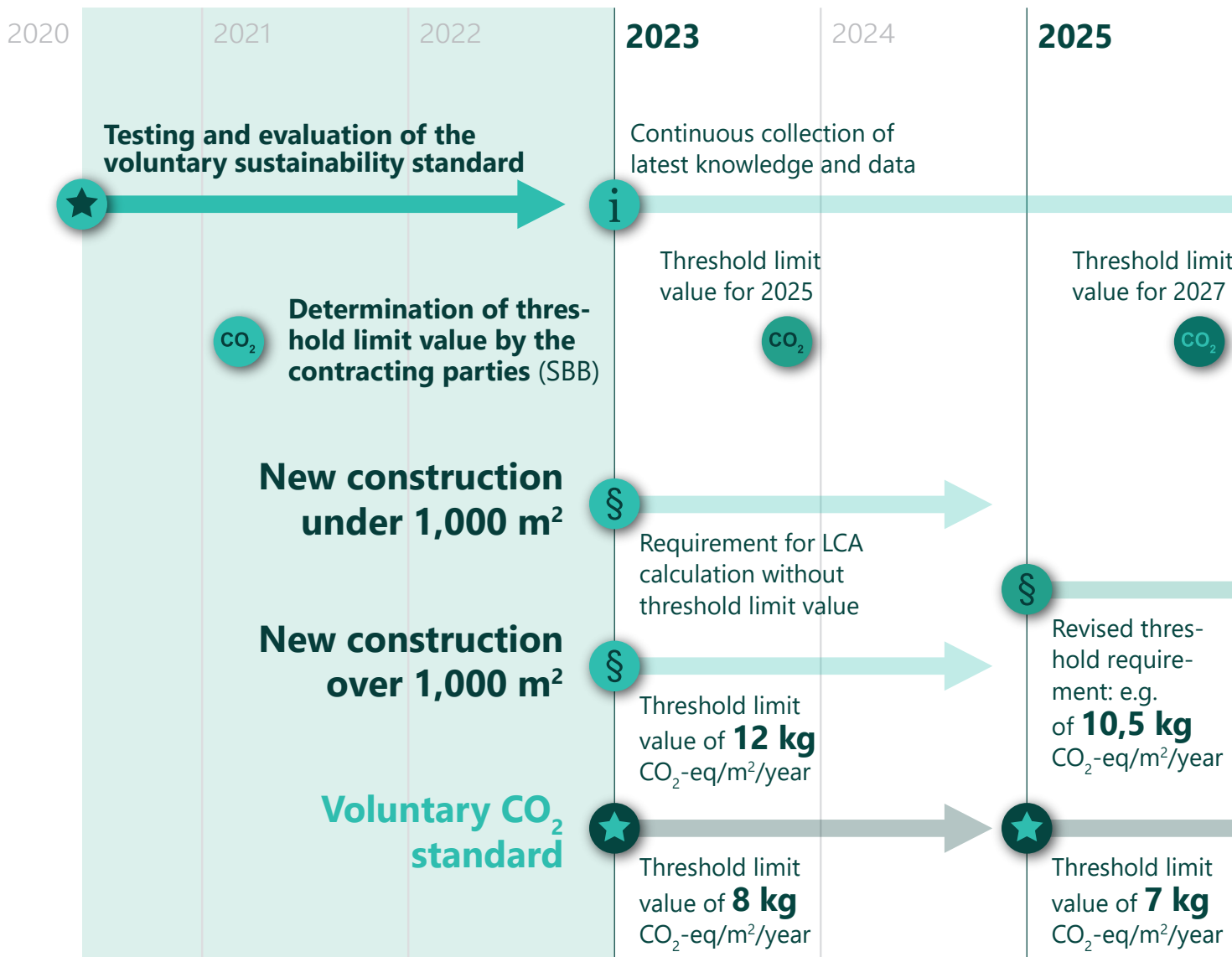
The Strategy introduces a threshold limit value into the building code for the environmental impact of new buildings of more than 1,000 m<sup>2</sup> from 2023: in other words, an actual requirement for maximum CO<sub>2</sub> emissions. The requirement can help to reduce the climate footprint of construction and to teach the industry and

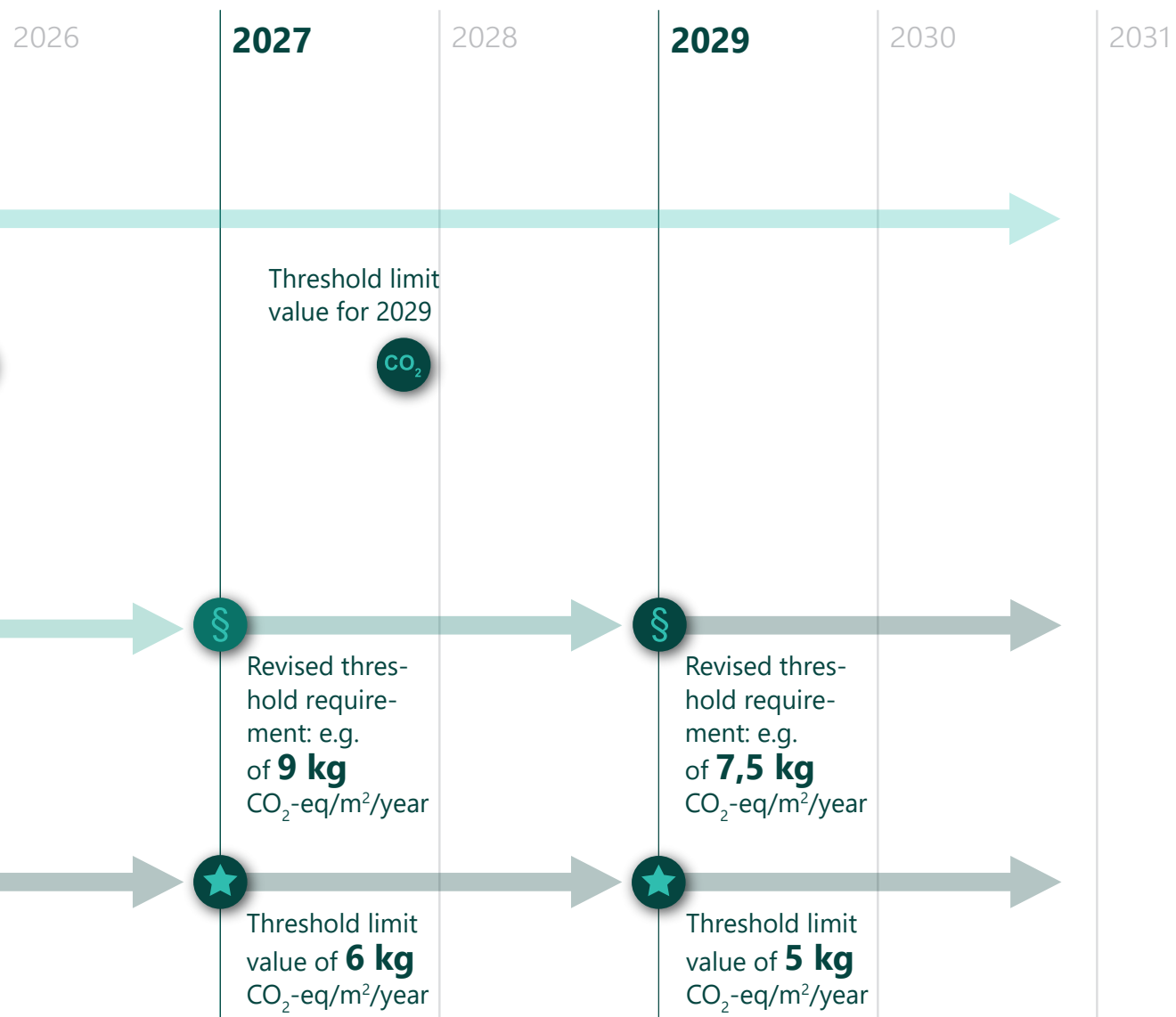
developers to build more sustainably and promote climate-friendly construction solutions. The phasing in of maximum CO<sub>2</sub> emission requirements will take place gradually, and in 2025 a threshold limit value will be introduced for other new construction. The phasing-in of LCA requirements and threshold limit values is expected to reduce CO<sub>2</sub> emissions from construction. That includes other sectors and abroad.

It is currently estimated that the requirement for LCA calculations of the climate footprint of buildings will entail additional costs of DKK 218 million. A number of the Strategy's concrete initiatives aim to help reduce the costs of the requirement. Similarly, we aim constantly to identify and implement relief of financial burdens for construction.

*“The National Strategy for Sustainable Construction reflects the fact that the Government is following up on the recommendations of the Climate Partnership for the building and construction sector and starting to phase in specific requirements in relation to the sector’s climate footprint.”*

# Step-by-step phasing in and scaling up of CO<sub>2</sub> requirements





# Sustainable development must be created in interaction with foreign countries



Sustainable construction is on the agenda of many other European countries, and Denmark has plenty of opportunities to further develop sustainable solutions in interaction with them. So, Denmark benefits from the experiences of comparable countries and attaches great importance to harmonisation and cooperation.

## **Nordic cooperation for reducing the climate impact of construction**

The Government is working together with the other Nordic countries to reduce the climate impact of construction. The Nordic Ministers for Construction and Housing have agreed that there is a need to exchange far more knowledge and experiences. For example, we can learn from the experience of the likes of Sweden and Finland, both of who are engaged in promoting sustainable construction by introducing climate requirements for construction.

There are a huge number of ambitious prospects in Nordic cooperation, which will ensure discussion and knowledge sharing between authorities, the construction industry

and research institutions. For example, we need to investigate how to develop a joint Nordic method to assess a building's overall climate impact. We also need to consider the possibilities of a joint database, which would contain generic data on the climate impact of construction products.

Circular thinking for buildings is also high on the Nordic agenda. Countries are working together to create a joint network for sharing knowledge and experiences with the goal of promoting circular construction.

Nordic cooperation also aims to continue ensuring a strong joint market. This is done with a joint approach to regulation, and Denmark is active in the Nordic network in terms of the harmonisation and regulation of the climate impact of buildings.

## **Joint sustainable solutions in the EU**

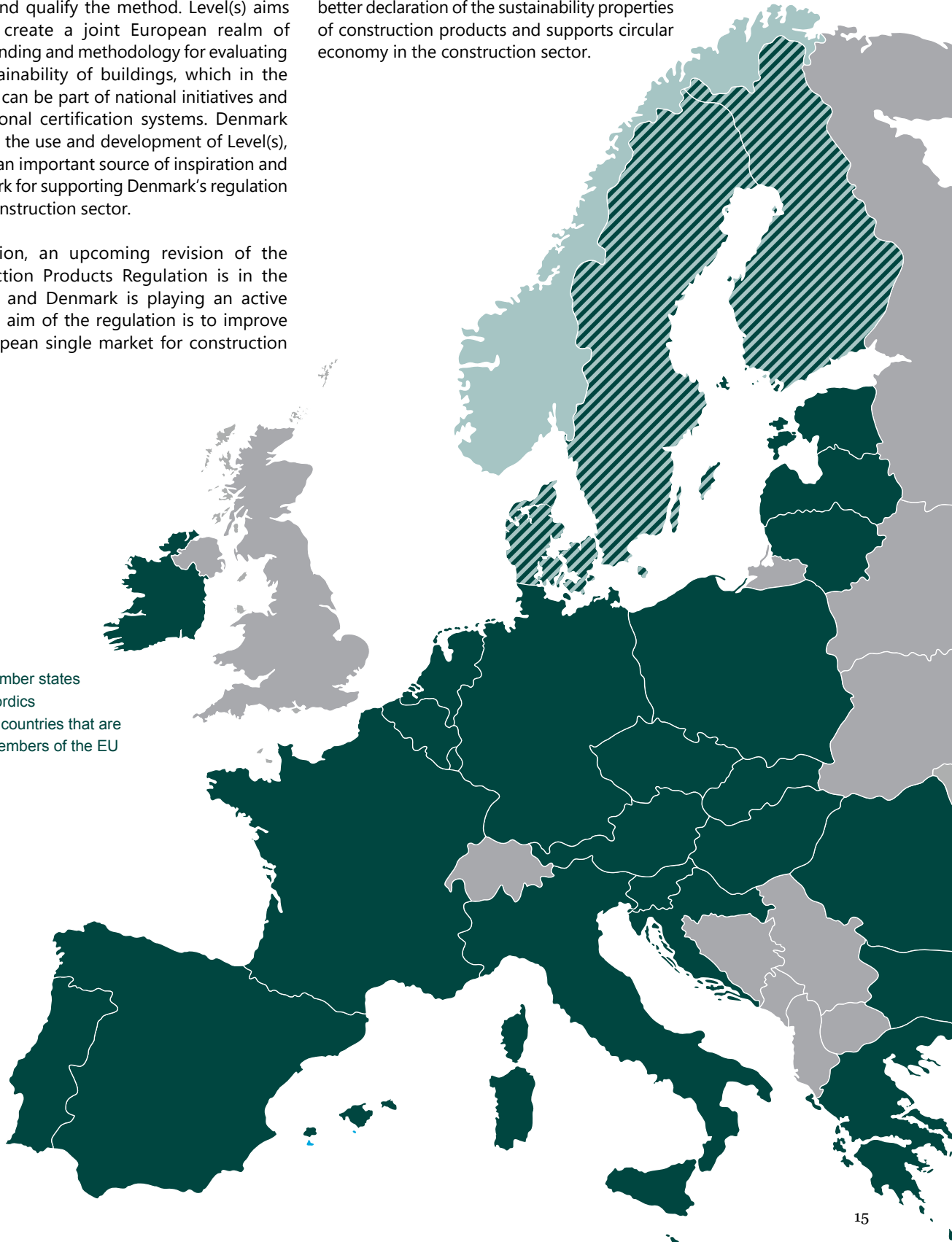
The EU is also working to find joint sustainable solutions. The EU Commission has launched a voluntary European documentation method,

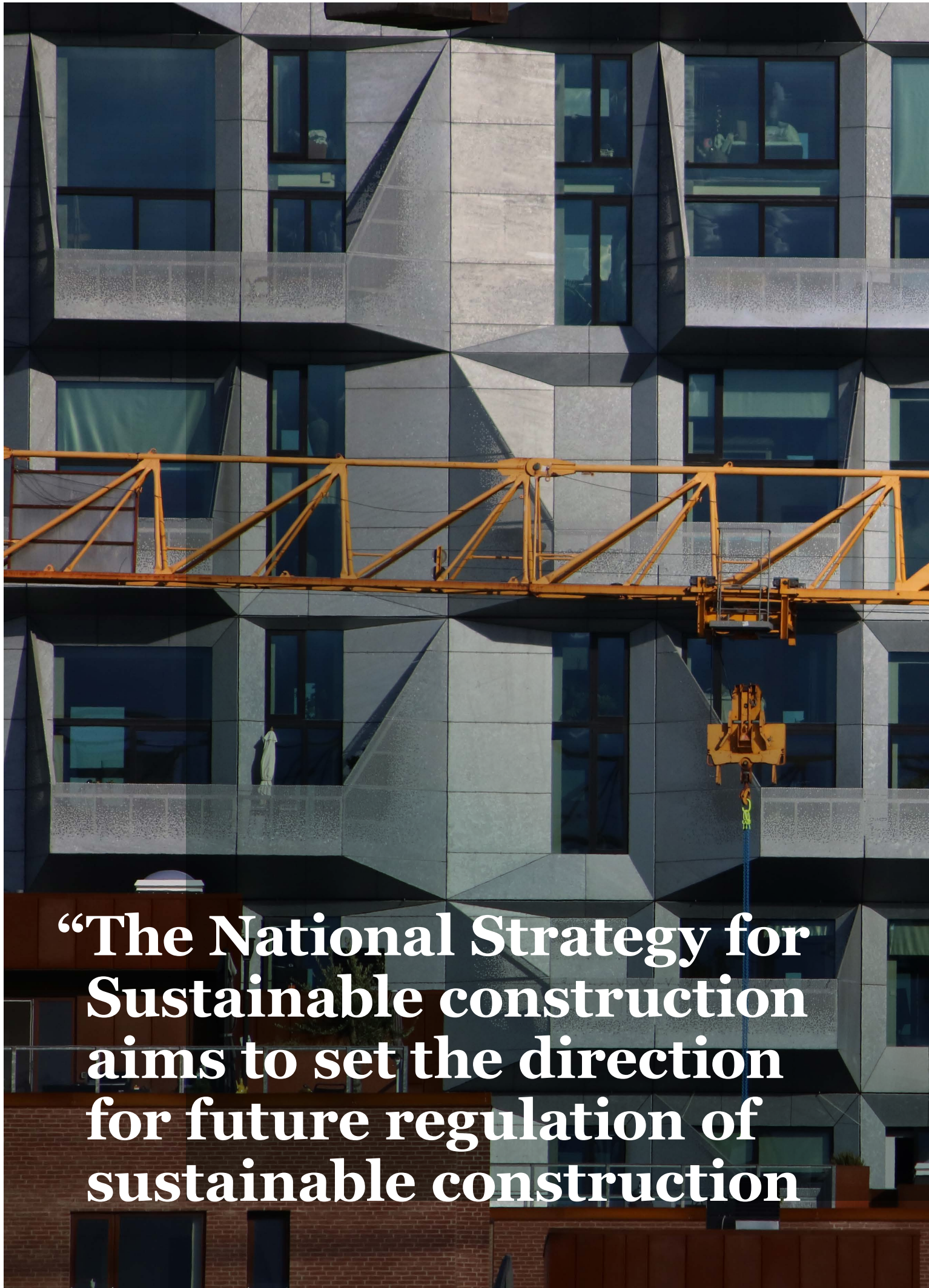
Level(s), for sustainable construction. A wide range of Danish companies and organisations from the construction industry have helped to test and qualify the method. Level(s) aims to help create a joint European realm of understanding and methodology for evaluating the sustainability of buildings, which in the long run can be part of national initiatives and international certification systems. Denmark monitors the use and development of Level(s), which is an important source of inspiration and framework for supporting Denmark's regulation of the construction sector.

In addition, an upcoming revision of the Construction Products Regulation is in the pipeline, and Denmark is playing an active role. The aim of the regulation is to improve the European single market for construction

products by establishing harmonised conditions for marketing and sales. Denmark will seek to shape the work so that the regulation facilitates better declaration of the sustainability properties of construction products and supports circular economy in the construction sector.

- EU member states
- The Nordics
- ▨ Nordic countries that are also members of the EU





**“The National Strategy for Sustainable construction aims to set the direction for future regulation of sustainable construction**





# The five focus areas of the Strategy

The National Strategy for Sustainable Building aims to set the direction for future regulation of sustainable construction and contains a wide range of initiatives within five focus areas that cover the three dimensions of sustainability.

The initiatives aim to create the knowledge base for the sustainable solutions of tomorrow, to prepare future regulation of sustainable construction and to propagate technologies and digital working methods that can make sustainable construction more efficient and simpler.

The five focus areas represent a toolbox for the development of more sustainable construction. The development needs a strong, evidence-based knowledge base and balanced regulation. It needs to ensure that the building and construction sector contributes to the green transition, but at a pace with which the entire industry can keep up.



**Focus area 1:**

**More climate-friendly buildings and construction**

1. Regulation based on the voluntary sustainability standard
2. Phasing in a threshold limit value for the climate footprint of buildings
3. Further development of life-cycle assessment (LCA) and total economic calculations (LCC) for design tools
4. Coordination committee for sustainable construction
5. Enhanced Nordic cooperation in the area of sustainability
6. Work for sustainability in the revision of the Construction Products Regulation
7. Promote fossil-free construction sites
8. Investigate the possibility of introducing CO<sub>2</sub> reduction considerations into tenders



**Focus area 2:**

**Durable, high-quality buildings**

9. Analysis of potential for more sustainable constructions (green check of Eurocodes)
10. Safe and healthy recycling in construction
11. Promote climate-friendly building materials
12. Development of more accurate environmental data on materials
13. Holistic assessments for refurbishments



**Focus area 3:**

**Resource-efficient buildings**

14. Strategic survey and investigation of flaws and deficiencies
15. Less waste of materials on construction sites
16. Collation of examples of cheap sustainable construction
17. Proposals for reduced requirements for the establishment of parking areas
18. Clarification of the possibilities of expanding special transport regarding modular construction



**Focus area 4:**

**Energy-efficient, healthy buildings**

19. Targeted energy efficiency efforts
20. Subsidies for energy savings in households and businesses



**Focus area 5:**

**Digitally-supported construction**

21. The public housing sector as a frontrunner for digitization of the entire building life cycle



## More climate friendly buildings and construction

1. Regulation based on the voluntary sustainability standard
2. Phasing in a threshold limit value for the climate footprint of buildings
3. Further development of life-cycle assessment and total economic calculation
4. Coordination committee for sustainable construction
5. Enhanced Nordic cooperation in the area of sustainability
6. Work for sustainability in the revision of the Construction Products Regulation
7. Promote fossil-free construction sites



## Durable, high quality buildings

8. Investigate the possibility of introducing CO<sub>2</sub> reduction considerations into building codes
9. Analysis of potential for more sustainable constructions (green check of Building Code)
10. Safe and healthy recycling in construction
11. Promote climate-friendly building materials
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13. Holistic assessments for refurbishments



## Resource efficient buildings

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## Energy efficient, healthy buildings

19. Targeted energy efficiency efforts
20. Subsidies for energy savings in households and businesses



## Digitally supported construction

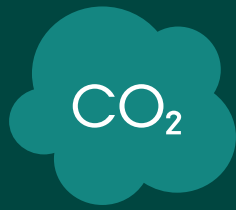
21. The public housing sector as a frontrunner for digitization of the entire building sector

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
itions for design tools										
ation										
to tenders										
(Eurocodes)										
as										
modular construction										
uilding life cycle										



An aerial photograph of a residential neighborhood. The houses are scattered across a green landscape with many trees. The roofs are in various colors, including red, grey, black, and brown. A paved road runs vertically through the center of the image. In the lower half, there is a large white text overlay.

**“Development must  
be based on a strong  
and evidence-based  
knowledge base and on  
balanced regulation**”



## Focus area 1:

# More climate-friendly buildings and construction

The emissions from construction come partly from energy consumption not only by building and construction but also by maintenance and the materials used for construction, new construction, refurbishment and maintenance.

As the emissions from heating and energy consumption in buildings decreases, the construction materials' proportion of a building's emissions become relatively larger. There must, therefore, be greater focus on reducing emissions from the use of construction materials in new buildings. Today, it is possible to make more climate-friendly choices by assessing the building's overall climate footprint using a life-cycle assessment (LCA). The solutions must also stem partly from greater knowledge of CO<sub>2</sub> emissions from the extraction, production and transport of construction materials.

In many construction projects, the main focus is on the construction budget, which does not take into account the costs of operating and maintaining the finished building. We must focus far more on the total life-cycle costs of buildings, if we are to promote improved balance between costs and quality during the entire life cycle of buildings. This means that decisions about design and building solutions

should not only be made out of consideration for the lowest possible construction cost, but with a view to the long-term operating costs and climate impact of buildings.

Consequently, in tandem with life-cycle assessment (LCA), financially sustainable choices should be a driving force when it comes to choosing building solutions.

We must also make every effort to make construction sites as fossil-free as possible. The Danish Road Directorate is focusing on climate and sustainability in procurement, for example by examining the possibility of making demands for the maximum CO<sub>2</sub> emissions of services and



# Initiatives

## 1. Regulation based on the voluntary sustainability standard

### Issue

We need to accrue experience of the voluntary sustainability standard before the requirements of the standard can be introduced into the building code. For example, there is a lack of data on the environmental, climatic and financial effects.

### Description of initiative

During a two-year test period, the requirements of the voluntary sustainability standard will be discussed, tested and evaluated together with the construction industry. During the test period, we must clarify how the voluntary sustainability standard is to be incorporated into the building code from 2023. It is expected that the development of sustainable solutions, expertise, product development and technology for construction will be enhanced in the test phase of the voluntary sustainability standard, and when the requirements of the standard are introduced into the building code in 2023.

To ensure a broad-based test, we are initiating a number of initiatives and analyses to support the evaluation and testing of the voluntary sustainability standard and the development of requirements for sustainability in the building code.

### *Evaluation of the voluntary sustainability standard and test panel*

On the basis of buildings registered for the test phase, we will conduct an evaluation of the experience of the application of the voluntary sustainability standard. To support the ongoing testing and evaluation, a test panel has been set up that broadly represents the construction value chain.

### *Supporting analyses*

We are initiating a number of analyses of the individual requirements and the overall standard to support the evaluation of the voluntary

sustainability standard and the development of the requirements. The analyses must incorporate the environmental, climatic, social and financial conditions and outline the expected and actual costs of introducing the voluntary sustainability standard.

Simultaneously, we must investigate how the EU Commission's tool for evaluating the sustainability of buildings, Level(s), can contribute to the regulation of sustainable construction in the building code. We constantly take Level(s) into account in the work on the voluntary sustainability standard to ensure that the Danish requirements do not develop into special national requirements.

The analyses will also form part of the Nordic cooperation on the climate impact of buildings, so that the countries can exchange knowledge and experiences to a greater extent.

## 2. Phasing in a threshold limit value for the climate footprint of buildings

### Issue

The voluntary sustainability standard contains a life cycle assessment (LCA) requirements, partly aimed at providing a picture of a building's CO<sub>2</sub> emissions during its entire life cycle. We need to phase in a threshold limit value: in other words, an actual requirement for the maximum CO<sub>2</sub> emissions from new construction.

### Description of initiative

Requirements are being phased into the building code regarding the climate footprint of buildings, based on the criterion from the voluntary sustainability standard for life-cycle assessment (LCA), which calculates the CO<sub>2</sub> emissions of a building. The requirement will be introduced into the building code in the same way as the other technical requirements of the building code.

*“Given that the construction sector is known for its many small operators, we must help the entire industry to keep up with the phasing in of requirements for the climate footprint of buildings.*

Given that the construction sector is known for its many small operators, we must help the entire industry to keep up with the phasing in of requirements for the climate footprint of buildings. The voluntary sustainability standard is an easily accessible and consistent basis for constructing sustainable buildings, and the test phase of the standard in 2020-2022 aims to help increase the level of experience throughout the industry.

The test phase also aims to collect data from specific building projects for coordinated data collection. This will increase the knowledge base for the requirement of LCA calculation and the CO<sub>2</sub> threshold limit: for example, through analyses of the climate and socio-economic effects.

A requirement for LCA calculation for new construction will be introduced in 2023. For new construction over 1,000 m<sup>2</sup>, a requirement for a CO<sub>2</sub> threshold limit corresponding to 12 kg CO<sub>2</sub> eq/m<sup>2</sup>/year will be introduced.

At the end of 2023, the parties to the agreement will meet with a view to determining a threshold limit value from 2025 on the basis of the latest knowledge and data. From 2025 threshold limits will also apply to new construction under 1,000 m<sup>2</sup>.

The future threshold limit values (see Pages 12-13) will not be immediately applicable to conversions and refurbishments, since there are too many differences in nature and scope to be

incorporated into the same methodology as for new construction. We must, therefore, conduct analyses of how to create a yardstick or basis for CO<sub>2</sub> threshold limit values for conversion and refurbishment projects.

Threshold limit values must be continuously evaluated, and the contracting parties must therefore also meet prior to setting threshold limit values in 2027 and 2029.

As a voluntary option for the industry, a voluntary CO<sub>2</sub> standard with a threshold limit value corresponding to 8 kg CO<sub>2</sub> eq/m<sup>2</sup>/year, which will be increased in the years to come with established threshold limit values in 2025, 2027 and 2029.

The initiative will contribute to the ongoing development of the life-cycle assessment tool, LCAByg, and to guidance and propagation of it.

### **3. Further development of life-cycle assessment (LCA) and total economic calculations (LCC) for design tools**

#### **Issue**

Life-cycle assessments (LCA) and calculations of total life-cycle costs (LCC) are mainly conducted in the final design phases of a building. The analytical tools need to be simplified so they can

be included in design decisions on an ongoing basis. This includes the early design phase.

#### **Description of initiative**

Denmark uses the LCAByg and LCCbyg calculation tools, which were devised by BUILD. The relevant information about the individual materials and building components are manually entered in relevant data fields to calculate the environmental profile and resource consumption. This makes it time-consuming and thereby expensive to try out different solutions or to recalculate changes in a construction project. Improving usability and reducing the amount of manual entries can make it easier to compare material choices at an early stage in the construction process.

An increasing number of consultants and contractors are using digital building information models (BIM) as the main tool for planning all phases of a construction project. As well as providing a three-dimensional digital representation of buildings, BIM can include standardised data on the amounts of building materials and a wide range of other properties. Consequently, it is obvious to use BIM as a basis for making LCA and LCC calculations easier and more flexible, because BIM will already contain a wide range of relevant data. Work is under way to make LCA and LCC calculations easier and more flexible by reducing the complexity of the analyses: for example, on the basis of better user interfaces and easier and software-neutral integration between BIM and the calculation tools, using open data models and joint standards.

Thereby, environmental total life-cycle cost considerations could have more impact on decision making in the earlier design phases, where there is the best opportunity to change overall decisions.

The initiative to improve the calculation tools facilitates the testing and comparison of different solutions, so that the decision-making basis for sustainable and total life-cycle cost construction solutions will become more qualified. Furthermore, if they are linked to their other workflows in BIM, this will motivate consultants and contractors to deploy the calculation tools.

The industry will experience administrative

benefits, because LCA and LCC calculations will be easier, when documenting compliance with requirements and the voluntary sustainability standard.

## **4. Coordination committee for sustainable construction**

#### **Issue**

Work is needed to develop and implement sustainable solutions in construction in a number of networks and in the construction and civil engineering cluster, demonstration buildings and spearhead projects, research groups, committees etc.

If there is no coordination between the various initiatives in both Strategy For Sustainable Construction and in the industry, there is a risk that knowledge and effects will be lost or that different solutions will be developed.

#### **Description of initiative**

The Danish Agency for Housing and Planning is setting up a coordination committee to pull together the Strategy's initiatives and existing initiatives in the industry. The goal of the coordination committee will be to ensure that the Strategy's initiatives are anchored in the relevant professional environments and that, conversely, members can qualify and contribute to the implementation of initiatives.

Since the members of the coordination committee will all be professionals, it must continuously communicate its results at a political level. So, the coordination committee can be a regular agenda item in the Branchepanelet for Byggeri (Panel for the Building Industry), a permanent working group, where the industry and the Danish Agency for Housing and Planning meet about three times a year to discuss construction policy and regulations.

There also needs to be a close relationship with the test panel for the voluntary sustainability standard.

## 5. Enhanced Nordic cooperation in the area of sustainability

### Issue

The sustainable conversion of construction is a challenge facing all the Nordic countries, and all countries are developing relevant regulation. The Nordic ministers for construction and housing have agreed on the need to increase Nordic cooperation to increase the exchange of knowledge and experience in this area and, where relevant, harmonise regulation and methods.

Differences in the method of conducting life-cycle assessments and requirements for the climate impact of buildings are an obstacle for companies who wish to deliver sustainable construction throughout the Nordic region. The differences have a negative effect on competition and on the possibility of developing sustainable solutions across the Nordic market.

### Description of initiative

Nordic cooperation needs to be strengthened: partly by continuing to participate in the work of reducing the environmental impact of building, and partly by investigating the possibilities of further areas of cooperation.

Denmark plays an active role in the Nordic network in terms of harmonising the regulation of the environmental impact of buildings. Denmark also contributes to Nordic studies aimed at developing a harmonised Nordic methodology for assessing environmental impact, and to a joint Nordic database, whose generic data on the environmental impact of building materials can make it easier to conduct life-cycle assessments (LCA) of buildings.

In addition to harmonisation, the cooperation is also about the sharing and accumulation of knowledge between countries. In collaboration with the Nordic Council of Ministers and the other Nordic authorities, we will initiate further studies: for example, including cooperation on circular economy, recycling and reuse and enhanced cooperation on the Construction Products Regulation.

Nordic cooperation also needs to keep abreast of European initiatives on climate-friendly construction: for example, the EU Commission's

tool, Level(s) for assessing the sustainability of buildings

## 6. Work for sustainability in the revision of the Construction Products Regulation

### Issue

The aim of the Construction Products Regulation is to harmonise conditions for the marketing of construction products within the EU, and is expected to be revised in the coming years. In the context of the revision, Denmark will work for an enhanced focus on sustainability.

### Description of initiative

The European Commission has launched a review of the entire set of technical regulations in the Construction Products Regulation (Acquis work). The aim of the work is partly to focus on the incorporation of the Regulation's sustainability requirements into the standards of the Regulation, which has not been successful in the current version of the Construction Products Regulation. Consequently, it is currently impossible to support the efficient recycling of construction products in the building code, and it is very difficult to declare the performance of recycled construction products vis-à-vis durability, safety and health.

Denmark is playing an active role in the revision of the Construction Products Regulation to ensure efficient regulation of the internal market, with increased focus on being able to declare the sustainability properties and safety- and health-related performance of construction products, including those that can potentially be recycled. In order to ensure the comprehensive incorporation of Danish interests into the revision of the Construction Products Regulation, we have set up a working group, made up of representatives of key industry organisations. The working group will also be involved in discussions on how best to obtain specific technical assistance for the revision of the technical requirements.

### *Nordic cooperation*

The Nordic ministers want better harmonisation of regulation between the Nordic countries. The Acquis work under the aegis of the

Construction Products Regulation provides a good opportunity for the Nordic countries to work together on the development of joint technical specifications. The co-operation will be able to help reduce Nordic border barriers.

Accordingly, Denmark will contribute to a joint Nordic study of the regulatory needs of the Nordic countries, with a view to identifying joint Nordic interests vis-à-vis the future version of the Construction Products Regulation.

## 7. Promote fossil-free construction sites

### Issue

The construction of roads involves moving large quantities of soil and road construction materials. Construction machines are operated almost entirely with fossil fuels, so their energy consumption has a huge impact on the total CO<sub>2</sub> emissions of the construction industry.

### Description of initiative

Ved at fremme fossilfrie byggepladser kan By promoting fossil-free construction sites, we can achieve CO<sub>2</sub> reductions during the actual construction phase. This must be done by prioritising alternative fuels such as biodiesel or electric machines in government construction projects. Emissions from mobile, non-road machines are also being reduced on the basis of the CO<sub>2</sub> displacement requirement: cf. 'Aftale om grøn omstilling af vejtransporten' (Agreement on the green transition of road transport).

The CO<sub>2</sub> emissions of a construction site must be included as an important part of any overall LCA (in other words, a life-cycle assessment of environmental and climate impacts). This is also the case with the construction of roads, which serve as a moving construction site. The aim of the initiative is to phase out on-site energy consumption of fossil fuel sources, and to replace them with alternative energy consumption: particularly electricity that can be produced from renewable energy sources. To work further on the fossil-free construction site initiative within the existing financial framework, there could be a focus on preparatory work, consisting of several sub-efforts, to identify future opportunities for achieving a definite implementation of fossil-free construction sites.

This could consist of actions related to relevant contracts where lessons learned from them can be used on other contracts.

Collaboration and knowledge sharing across other, and similar industries could contribute experience. This might consist of cross-disciplinary collaborations to establish tender requirements for fuels on construction sites. In addition, specific analyses could be launched on how to reduce the additional price currently associated with fossil-free solutions on construction sites. This should be done in cooperation with relevant industries, equipment manufacturers and other related industries etc.

The use of biodiesel or electric machinery will also help to promote the reduced use of fossil fuels in the context of operation and maintenance work.

## 8. Investigate the possibility of introducing CO<sub>2</sub> reduction considerations into tenders

### Issue

For at sikre CO<sub>2</sub>-reduktion i forbindelse med anlægsprocesser skal det være muligt at indføre bestemmelser om energieffektivitet i forbindelse med produktionen af materialer samt selve anlægsfasen. Dette kan ske enten ved at opstille egentlige krav i udbuddet til et bestemt CO<sub>2</sub>-reduktionsniveau, eller ved at tillægge CO<sub>2</sub>-reduktion i tilbud vægt i forbindelse med tildelingen af opgaven – eller en kombination af de to. Dette skal ske på baggrund af verificerede udgangspunkter (baselines), der gives ved de såkaldte miljøvaredeklarationer på produkter.

### Description of initiative

CO<sub>2</sub>-reduktionskrav i udbud af anlægsprojekter eller tilbud om CO<sub>2</sub>-reducerende løsninger, som tillægges vægt ved tildeling, skal dokumenteres med udgangspunkt i miljøvaredeklarationer (EPD'er). Ved at basere dokumentationen på EPD'er, kan den samlede klimapåvirkning udregnes ved hjælp af livscyklusvurderinger (LCA). På den måde sikres det, at den udførende part anvender materialer og produkter, der dokumenteret er CO<sub>2</sub>-besparende, samt udfører en energieffektiv anlægsproces, der ligeledes bidrager til en CO<sub>2</sub>-reduktion.



**“We must establish wide-ranging cooperation with stakeholders from the construction and demolition sector, including the public authorities, working to promote circular economy in construction.**”





## Focus area 2:

# Durable, high-quality Buildings

One efficient way to make construction more sustainable, in terms both of climate and of budget, is to construct buildings that are both durable and have a long life cycle. Therefore, when constructing new buildings, it is important to ensure that they are both of high quality and future-proof.

The appropriate load-bearing structures are crucial when it comes to ensuring the durability of buildings' order to ensure sustainability, unnecessary material consumption must be avoided.

We must accrue experience in terms of how to decide which materials can best assist climatic considerations, while durability, price and quality must also be included when making the right construction choices.

In this context, we face a challenge. There is a lack of product-specific environmental data from the manufacturers, which can support a more accurate assessment of a building's climate footprint.

A sustainable conversion of buildings also requires knowledge about when it makes environmental and financial sense to reuse and recycle materials in construction, while ensuring that we do so in a healthy and safe manner.

It is not only materials, workmanship and structures that ensure durable buildings; duty of care in terms of operation and maintenance is also pivotal. This means, for example, that building components will not decompose, and that timely preventive maintenance and management of moisture and wear are conducted.

Operation of buildings is energy-intensive, which means that refurbishments of older buildings are important when it comes to reducing energy consumption. Given that a refurbishment can result in CO<sub>2</sub> emissions that are greater than any CO<sub>2</sub> reductions in subsequent operational energy consumption, climate considerations must be a priority when choosing solutions and materials.



# Initiatives

## 9. Analysis of potential for more sustainable constructions (green check of eurocodes)

### Issue

The building code and appurtenant Eurocodes (joint European building standards) state requirements and a basis of calculation for load-bearing structures. Eurocodes are common European building standards that must be used in Denmark for the design of safe and durable load-bearing structures in the field of building and construction. The Eurocodes comprise of around 35 parts, covering all traditional materials such as steel, concrete, wood and brickwork. The Eurocodes were devised by the European Committee for Standardisation (CEN) and are currently being revised (the process is expected to be completed in 2025). The pan-European Eurocodes and appurtenant national annexes need to take more account of sustainability in construction.

### Description of initiative

Sustainability can be achieved through the implementation of more up-to-date calculation methods and detailed rules that support the execution of constructions that are both safe and do not involve unnecessary material consumption. This will reduce both cost and carbon footprint.

The purpose of this initiative is to ensure that the use of Eurocodes and national annexes does not lead to unnecessary material consumption, and that Eurocodes are designed in a way that enables the implementation of new sustainable initiatives that prioritise the right levels of safety.

The initiative consists of the following:

1. Clarification of what measures can promote sustainability in Eurocodes and national annexes.
2. Review of the individual parts of the

Eurocodes to ensure that the rules both support and are open to sustainable methods and do not result in unnecessary material consumption.

3. Strengthening Nordic cooperation both in terms of increasing the influence of European standardisation work and greater coordination when drawing up new national annexes.
4. Increased impact by the European standardisation work, so that a 'Sustainability review' of all the individual parts of the Eurocodes is carried out at European level. This is to ensure that the final versions live up to the objectives of the European Commission in the field of sustainability.

Sustainable load-bearing structures are expected to become a competitive parameter for sustainable construction both nationally and internationally. Development of methods and regulatory framework must support the industry's competitiveness in the field.

## 10. Safe, healthy recycling in buildings

### Issue

Reuse and recycling require knowledge of how the properties of materials can be documented, especially with regard to the documentation of problematic substances and durability. There is hardly any potential for further recycling and recovery if hazardous substances such as PCB, lead, arsenic and asbestos continue to go out of circulation in waste management. But there may be potential for more appropriate reuse and recycling in construction.

### Description of initiative

The building and construction sector accounts for about one third of the total amount of waste in Denmark, approximately 85% of which is

recycled and utilised. The remaining 15% mainly includes hazardous substances (PCB, lead, arsenic and asbestos), which need to be taken out of circulation when disposing of waste. But there may be potential for more appropriate reuse and recycling in construction. We need a knowledge base for when and how it makes environmental and financial sense to reuse and recycle materials in construction, while ensuring that we do so in a healthy and safe manner. This includes creating the basis for more appropriate use of non-renewable raw materials such as sand and gravel.

#### *Propagation and analysis measures*

We are drawing up 'best practice cases for buildings with recycled/reused building materials that take an in-depth look at the use, procurement and processing of recycled materials in buildings, documentation of recycled materials and regulatory approval, along with health and safety in the use of the building materials and expected durability. The development of business models included in the measures. In continuation thereof, we are drawing up guidelines on specific recycling options and a supportive analysis of options for the increased recycling of certain materials and methods for testing recycled materials.

What is also required is an analysis of the benefits of design for separation. This should accrue knowledge of long-lasting buildings can be designed, that make it easier, for example, to replace worn parts of a building, where the materials can then potentially be recycled.

#### *Development of building and materials passports*

Digitale bygnings- og materialepas skal Digital building and materials passports should contain information about which building materials have been used in a building, about replacements during a building's life cycle during refurbishments, and about individual building materials. The purpose is to increase the options for reuse/recycling on the basis of better documentation and knowledge of the building materials used in buildings from construction to demolition.

The initiative aims to identify what specific information the passports should contain and how it can be deployed in Denmark. The initiative

should be linked to Nordic and European initiatives and make it possible to incorporate Danish interests and specific experience into the development of any future European standard.

#### *Industry collaboration on barriers, solutions and knowledge sharing*

We need to establish wide-ranging cooperation with stakeholders from the construction and demolition sector, including public authorities, on the promotion of circular economy in construction.

The industry collaboration should help identify which barriers the various parties experience in the context of reuse and recycling in construction, and how best to address the barriers.

## **11. Promote climate-friendly building materials**

### **Issue**

There is a lack of experience in how to decide which materials in a specific building can best promote climatic considerations, while at the same time not being unnecessarily expensive and ensuring that a building is of high quality.

### **Description of initiative**

There is potential for reducing the CO<sub>2</sub> emissions from building materials. The UN Environment Agency estimates that the emissions from production and transport embedded in the materials make up just over 10% worldwide.

Efforts must be made to create greater awareness of the climate impacts of building materials and embedded emissions. This must be done partly on the basis of analyses of building materials - for example, wood and green concrete - the voluntary sustainability standard, and by working to achieve increased availability of accurate environmental data, so that it becomes easier to determine which emissions are associated with the building materials.

We must also propagate knowledge about the options for the use of timber in construction and the positive climatic effects that this can entail.

- We are devising pre-accepted solutions for load-bearing structures in combustible material, which supports the construction of wooden buildings of up to 5 storeys. The goal is to arrive at pre-accepted solutions for wooden construction available on a par with pre-accepted solutions for non-combustible building materials.
- We are developing examples of how to construct buildings with more than 5 storeys, outlining how, calculation-wise, it can be documented that the safety level in the building code is complied with.
- When it comes to timber construction, it can be a challenge to comply with the building regulations' requirements for noise and acoustics. That is why we are defining structural solutions for multi-storey buildings with wooden load-bearing structures, taking into account noise and acoustics.
- We are conducting an in-depth analysis of the environmental impact of wood in a wider environmental perspective, which includes relevant aspects for timber construction: for example, primary energy, biodiversity, changed land use and water consumption. We propose the implementation of the initiative as a Nordic project.
- We regularly follow up on experiences with timber construction: for example, the construction of a new state office hub in the city of Odense. The building is around 31,000 m<sup>2</sup>, and the idea is to construct the load-bearing structures in timber.

## 12. Development of more accurate environmental data on materials

### Issue

With the life-cycle assessment (LCA) requirement in the voluntary sustainability standard and the introduction of the requirement into the building code from 2023, there is a need to develop accurate environmental data for materials to contribute to precise calculations of a building's climate impact. In order to conduct better life-cycle assessments, we need to develop accurate generic data for typically-used construction products and to promote the development of environmental product declarations for construction products (EPDs).

### Description of initiative

The initiative consists of three constituent parts, which aim: (1) to promote the preparation of EPDs, (2) to promote more accurate generic data, and (3) to improve the availability of EPDs.

### Promotion of EPDs

We are establishing industry collaboration to find solutions that ensure the anchoring and preparation of EPDs in Denmark. We also aim to examine the potential for developing an EPD generator. An EPD generator is a tool that allows an individual company or industrial collaboration to generate their own EPDs for specific products more easily and more quickly. At the same time, we aim to examine whether public developers can take the lead and promote development

*“Given that a refurbishment can result in CO<sub>2</sub> emissions greater than any CO<sub>2</sub> reductions in subsequent energy consumption, we must prioritise climate considerations when choosing solutions and materials.*”

by setting requirements for material suppliers for product-specific EPDs for the main building components.

#### *Promotion of more accurate data*

Although generic data is not as accurate as EPDs, it can still provide significant knowledge, and is particularly useful in the design phase, where the specific materials have not yet been decided. In the case of typically used building materials in Denmark, we need to develop generic data and make it available in LCAByg or other LCA tools. Generic data must be developed in collaboration with industry. Denmark is also contributing to Nordic studies aimed at developing a joint database that will eventually encompass generic data for the Nordic countries. This is related to the 'Strengthened Nordic cooperation on sustainability' initiative.

#### *Improve EPD availability*

In the context of the 'Further development of life cycle assessment (LCA) and total life-cycle costs (LCC) for design tools' initiative, we need to ensure easier application of EPDs in LCAByg or other LCA tools. In other words, EPDs will eventually be available in the database or easy to import. The availability of EPDs must also be improved by examining option of collating EPDs for the Danish construction industry in a single place.

### **13. Holistic assessments for refurbishments**

#### **Issue**

A building may be run down, contain problematic substances or not meet the needs of its users. The owner of the building can choose either to demolish the building and build a new one or to maintain and refurbish it.

Around 40% of national energy consumption is used for the operation of buildings. This is partly due to the fact that many older buildings are built in such a way that operation results in high energy consumption. This can be changed with energy renovation. So, frequently it is finances, the quality of the building and the indoor climate that are top of the list when planning a refurbishment. Since a refurbishment can result in greater CO<sub>2</sub> emissions than any CO<sub>2</sub> reductions in the event of subsequent lower

energy consumption, we also need to focus on climate considerations when carrying out refurbishment.

#### **Description of initiative**

We must make sure that decisions regarding possible demolitions or conversions and refurbishments can reflect the right balance between economy, quality and climate impact in the long term. In other words, it will help to clarify when an energy renovation needs to take place and when further focus is required on new builds with a particular eye for high quality. These decisions should also take into account EU directive and regulation requirements. In order to propagate knowledge about the link between refurbishment and the environmental costs, for example, of choice of materials, we must launch development work that will result in propagation measures: for example, examples of buildings and comparable calculations for refurbishments, which can be used for inspiration and guidance in future refurbishment projects. Collaboration between the Danish Agency for Housing and Planning and the Danish Energy Agency could also lead to propagation measures on embedded energy and CO<sub>2</sub> emissions in buildings before planning new energy renovations.

Initially, we are launching an analysis to highlight the most advantageous choices between the building's energy consumption (detected through energy projection) and the overall environmental and climate impact of the building, detected using a life-cycle assessment, which includes assessment of embedded energy. In the life-cycle assessment, we need to analyse choices such as the amount of insulation and choice of insulation material.

In order to accrue knowledge about the environmental and economic challenges and potentials of refurbishment and conversion versus demolition and new construction, an analysis is required that sheds light on the subject, including identifying reasons for the demolition of buildings that are still high quality in terms of structure. We need to include proposals for assessing the results of a life-cycle assessment and total life-cycle costs when considering refurbishment or demolition. The correlation with values such as the preservation of building culture and cultural environments can also be included in the initiative's analyses.



**“We must establish new habits and ways of working together, so we reduce errors, deficiencies and waste of materials on construction sites**



### Focus area 3:

# Resource-efficient buildings

Construction accounts for a large part of Denmark's overall resource consumption, and resources are wasted, particularly during the building process.

Studies of construction productivity have shown that there is a significant waste of time on construction sites. Inefficient work processes on construction sites and poor coordination can also lead to other value losses such as material waste. Material waste can occur when ordering over-large quantities of materials, when materials are exposed to weather conditions, or when materials are mishandled.

It is also important to prioritise high quality during the construction phase. By avoiding flaws and deficiencies, which then need to be rectified, or which may result in a total rebuild, resources can be saved, thereby benefiting not only developers and contractors, but also the climate.

We need to improve the way we think out and organise the construction process and establish new habits and ways of working together that reduce errors, deficiencies and waste of materials on a construction site.

Resource-efficient construction is also about taking into account climate impact and total life-cycle costs, when the goal is to build cheaply. Accordingly, we need to create awareness of sustainable choices, in which materials and construction engineering solutions, construction, operation and maintenance are regarded as a whole, based on the relationship between life cycle assessment (LCA) and total life-cycle costs (LCC).

# Initiatives

## 14. Strategic survey and investigation of flaws and deficiencies

### Issue

Flaws and deficiencies lead to significant value loss in construction and have negative consequences, for example, for productivity and resource consumption. This results in increased CO<sub>2</sub> emissions, when flaws and deficiencies have to be rectified and new building materials consumed. What is needed is systematic knowledge of the causes of flaws and deficiencies, which can thereby qualify and target future measures.

### Description of initiative

We are launching a survey of flaws and deficiencies in construction and a detailed analysis of flaws and deficiencies and their climatic and financial consequences. The survey will be frequently updated, so construction can keep up with developments and monitor the expected effect of measures.

When the survey is available, the Danish Agency for Housing and Planning will invite industry representatives to a workshop with the goal of devising a catalogue of ideas, containing measures to address the efficiency loss and climate impact, for which flaws and deficiencies are responsible. These could be measures jointly initiated by the Danish Agency for Housing and Planning and industry, bridging the gap, for example, between competence and education, standardisation, contract law and digital education, cooperation models and process management. The work can also be merged with the analysis of compliance with the building code.

## 15. Less waste of materials on construction sites

### Issue

Construction waste accounts for about 35% of the total waste from new construction, refurbishment and demolition. It is estimated that the waste of resources during the execution phase is around 10% of overall material consumption. In order to reduce the extent of material waste on the construction site, we need to provide a knowledge base for causes and possible solutions.

### Description of initiative

We need a closer analysis of the amount of waste for the various building materials, in order to take the appropriate remedial action. Accordingly, we are conducting a survey, partly aimed at measuring the volumes of waste on construction sites. The analysis will identify relevant focus areas in relation to waste such as digital learning, phase transitions, cooperation processes, liability and risk conditions.

The analysis aims to provide a basis for specific instruments that can reduce waste: for example, through better planning, cooperation and communication across the construction process and its phases. For example, wrongly ordered and damaged materials can be reduced by accounting for how materials are stored on site.

Following up on the analysis, we will establish industry collaboration with the aim of finding and propagating efficient instruments across trade differences and throughout the construction value chain to prevent waste. It is essential to get industry actively involved in this work, because ultimately the main difference will only come into effect if there is more focus on the problem on construction sites.

Waste in the construction process is also part of the voluntary sustainability standard's requirement for life-cycle assessment. The initiative will also focus on the issue with a view to the subsequent introduction of requirements in the building code.

*“Materials and structural solutions, construction, operation and maintenance should be regarded as a whole, based on the connection between life cycle assessment and total budget calculations.*

## **16. Collation of examples of cheap sustainable construction**

### **Issue**

We need greater knowledge and experience of cheap, sustainable construction across the construction industry. Previous analyses of the climate impact of constructed buildings focused in particular on the choice of building materials, while there was less focus on how affordable housing is built, while also taking climatic sustainability into account. The conversion process in the construction industry can be a challenge for developers, especially in the correlation between the construction’s climate impact (LCA), the total life-cycle costs (LCC) in procurement, operation and maintenance, choice of materials and structural solutions, and how quickly new knowledge and new competencies can be translated into existing solutions and processes.

### **Description of initiative**

To support the transformation of the industry, we aim to collate a range of easily-accessible examples of cheap, sustainable construction, in which climate-friendly solutions and total life-cycle costs are presented contextually. The collation should be simple, easily accessible and targeted at builders, consultants, project supervisors, contractors and manufacturers of building materials. The collation of examples

should also be available in vocational colleges and other building technology programmes.

The examples will:

- Present both actual and theoretical examples, in which the choice of solutions is made on the basis of LCA and LCC calculations.
- Illustrate and propagate practical and theoretical examples of buildings and structural solutions in general and in detail with pertinent descriptions, data and calculations of climate impact and budget.
- Feature examples from specific contributions from industry and the testing of the voluntary sustainability standard.
- Include examples of refurbishments and conversions of existing buildings (in which they now have new functions), in which the choice between demolition and subsequent construction versus refurbishment is included, with calculations on the basis of life-cycle assessment (LCA) and total life-cycle cost calculation (LCC). There should also be examples of the circular use of material in the construction process, including both the reuse and recycling of building materials and structures.
- Be presented on a Danish Agency for Housing and Planning platform with a view to a dynamic and ongoing expansion.



## 17. Proposals for reduced requirements for the establishment of parking areas

### Issue

In dense urban areas where densification of the housing stock may be desirable, requirements for the establishment of parking areas can constitute significant challenges for construction and increased costs. Furthermore, the current rules do not take sufficient account of the cities and towns of tomorrow, where they may be less car ownership than at present. Nor is it possible to plan, say, car-free districts or the like.

### Description of initiative

Especially in dense urban areas where densification of the housing stock may be desirable, requirements for the establishment of parking areas can constitute significant challenges. These include:

- Significant additional costs and an increase in housing costs
- Increased car ownership and consequent exacerbation of congestion, air pollution and CO<sub>2</sub> emissions
- Committing the towns and cities of tomorrow by not taking sufficient account of the fact that, for example, there may be less car ownership than at present.

It should be possible for municipalities to reduce their parking requirements for the developer, if in return the developer ensures that there will be no increased car load in the area. So, we propose the provision of a legal basis, in accordance with a desire on the part of a developer, to reduce the possibility of a resident's licence on a public road for a specific building or area of district planning, which may provide a basis for reducing or exempting the developer from the parking requirement in district plans and specific building projects.

## 18. Clarification of the possibilities of expanding special transport with a view to promoting modular construction

### Issue

There are certain barriers with regard to the use of prefabricated modules due to challenges involved when the modules have to be transported from the place of production to a construction site.

### Description of initiative

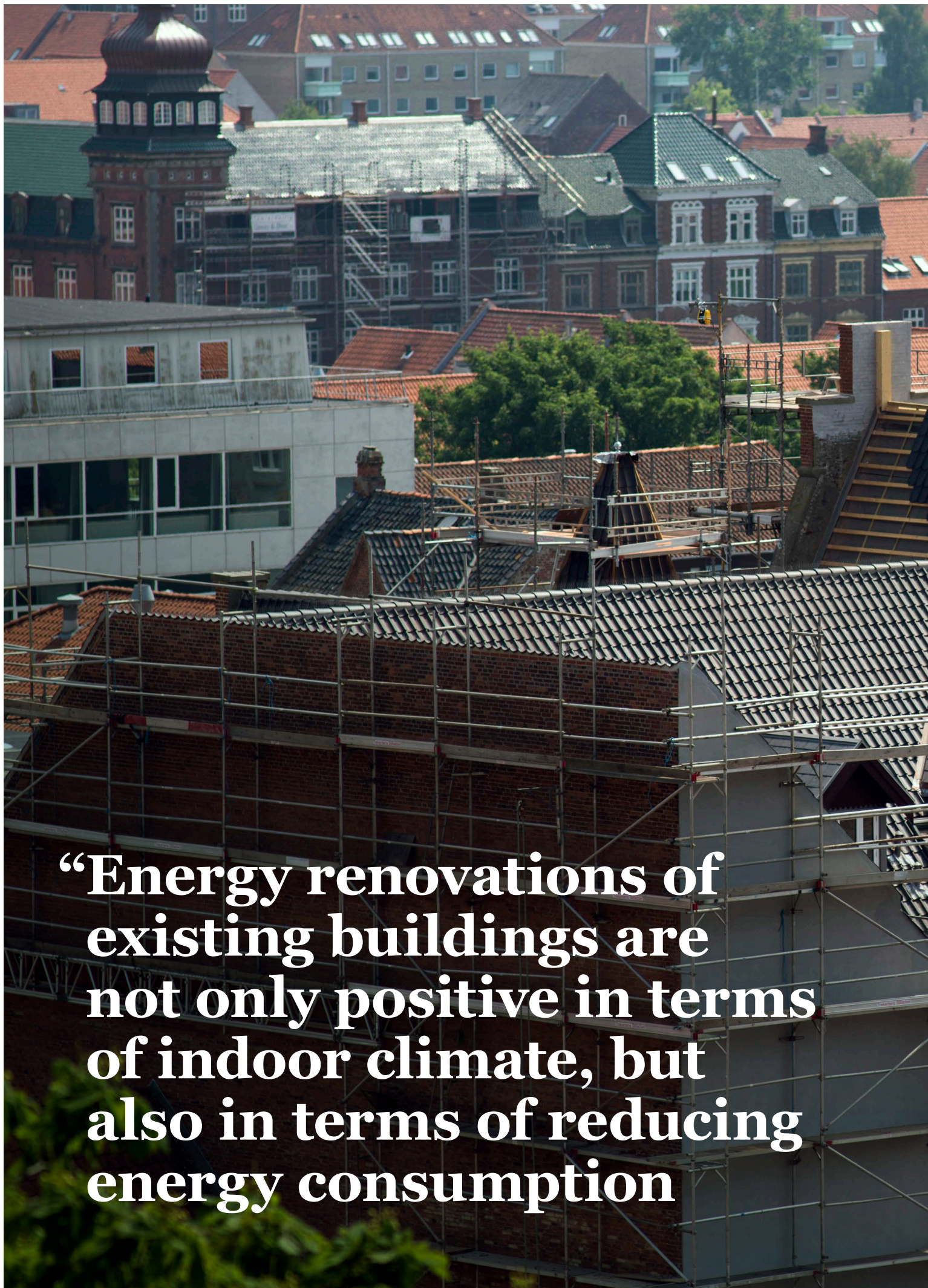
Modular construction is construction consisting of prefabricated, room-sized modules: for example, made of timber. The prefabricated modules can be delivered more or less in complete form with windows, doors, kitchen, bath, toilet etc. Thereby, the modules can be regarded as large 'building blocks' that can be installed efficiently on the construction site and commissioned shortly afterwards.

Prefabricated modular construction can contribute to quick, cost-efficient, cheap buildings. Below, we outline some of the advantages of modular construction:

- Better control and management of the construction and manufacturing process.
- Optimisation of the consumption of building materials.
- Good opportunities for recycling and reuse when dismantled.
- Improved working conditions for tradesmen.
- Flexibility and competitiveness in terms of both time and price.

There are certain barriers vis-à-vis module construction, because some of the modules are too wide to be transported from the place of production to a construction site.

Therefore, we need to investigate the possibility of a pilot scheme or the like for the transport of wide modules with a view to promoting modular construction.



**“Energy renovations of existing buildings are not only positive in terms of indoor climate, but also in terms of reducing energy consumption”**





#### Focus area 4:

# Energy-efficient, healthy buildings

A good indoor climate is important for the state of health of users and residents. Old windows, poor insulation or thermal bridges may be the reason why a building has a poor indoor climate, while using a disproportionate amount of energy for heating. That is why energy renovations of existing buildings are good, both for the indoor climate and for reducing energy consumption.

In many buildings, the indoor climate deteriorates over time. This is due to a lack of inspection and timely maintenance and renovation. One way of addressing this issue is to make an overall operation and maintenance plan for the indoor climate. This can contribute to a greater focus on the operation and maintenance of the entire building and create a basis for the ongoing monitoring of the indoor climate. At the same time, various building materials contain problematic substances that may have a negative effect on the indoor climate of a building.

Therefore, in order to ensure a good indoor climate, we need increased attention on documenting and handling any problematic substances in construction. That is why we need to test more ambitious indoor climate requirements using the voluntary sustainability standard.

On the basis of several agreements, the Government has ensured a significant increase in measures aimed at energy streamlining. What we need now is digital support for energy renovation efforts, which should, for example, identify savings opportunities and potentials for building owners by collecting data on buildings and further developing the energy labelling scheme.

We should also set targets for energy savings in government buildings, which should play an active role in energy streamlining efforts. There should also be discussion about the energy renovation of municipal and regional buildings, including a focus on indoor climate.

# Initiatives

## 19. Targeted measures to streamline energy

### Issue

On the basis of several agreements - namely the Green Housing Agreement (2020), the Agreement on the Finances of Municipalities and Regions (2021), the Climate Agreement For Energy And Industry Etc. (2021) and the 2021 Budget - the Government and a number of parliamentary parties have significantly increased energy-streamlining efforts. So, energy savings in the state are continuing, focusing on energy-streamlining measures into the digital age.

ESCO projects have significant potential to encourage more energy renovations with the ESCO supplier providing loans for energy renovation and being repaid through the energy savings offered by the ESCO supplier. Investments in energy savings in municipal buildings financed by a private ESCO partner are not a municipal capital expenditure and are not covered by the construction framework. Municipal co-financing of ESCO projects is covered by the construction framework.

### Description of initiative

With the implementation of the Climate Agreement For Energy And Industry Etc., the following have been agreed:

#### *Digital support of energy renovation efforts*

Better use of data and digitisation can be a good tool, for example, for identifying energy streamlining in buildings and making building owners aware of savings opportunities and potentials. That is why we are initiating the following measures:

- Starting work to collect, present and possibly release data on buildings, including data on their energy consumption, energy condition, BBR (building and residence register) information etc. by developing a comprehensive digital platform.

- Further development of the energy labelling scheme, including enhanced quality through better data use and an expansion of the scheme focusing on measures that can improve the indoor climate of buildings.
- Improve the 'BedreBolig' scheme, which gives homeowners a comprehensive solution proposal for the energy renovation of their homes on the basis of a one-stop-shop concept, so that the scheme can also support the role of the financial sector and municipalities as initiators for building owners.
- Testing the potential of the Smart Readiness Indicator scheme, which provides information about the intelligence readiness of buildings and options, for example, for supporting flexible energy consumption.

#### *Energy savings in public buildings*

New targets are being set for energy savings in the state building stock up to 2030, as the current effort expired at the end of 2020. We need to ensure that the state continues to play an active role in energy-streamlining efforts, and that Denmark meets the requirements of the EU Energy Efficiency Directive. The Government will also engage in discussions with the municipalities and regions about energy renovations, including ESCO projects and indoor climate in the rest of the public building stock. The 2021 Budget allocates DKK 150 million a year in 2021-2022 and DKK 5 million a year from 2021 to a subsidy fund for energy renovations in public buildings (municipalities and regions).

## **20. Subsidies for energy savings in households and businesses**

### **Issue**

There is potential for energy savings in both households and business premises that can reduce energy consumption and the use of fossil energy sources. In certain cases, there may be a long payback time for individual projects, which is why the necessary investments are not being made.

### **Description of initiative**


To support the green transformation of industries, on 1 October 2020 we launched a subsidy scheme (the business fund), which will provide investment subsidy to companies that move away from fossil energy and streamline their energy. The same applies to private households. On 15 October 2020, we launched a fund (the building fund). Private individuals can apply for a subsidy when renovating their energy and converting, for example from an oil or gas boiler to heat pumps, and a combination of energy renovations and conversions.

*“What we need now is digital support of energy renovation measures. For example, they must identify savings opportunities and potential for building owners by collating data on buildings and further developing the energy-labelling scheme.*”







An aerial photograph of a residential complex featuring several long, multi-story buildings with prominent red-tiled roofs. The buildings are arranged in a U-shape around a central green courtyard. The courtyard contains several basketball courts and other recreational areas. A paved road runs along the top and right sides of the complex, with a parking lot visible on the right. The surrounding area includes more residential buildings and lush green trees.

**“The complexity of the holistic approach to construction calls for digital solutions that can tackle many processes and considerations simultaneously**”



## Focus area 5:

# Digitally-supported construction

In recent years, the construction industry has been paying increased attention to digitising construction processes. The development has been particularly boosted by the regulation of public and public construction, which must, for example, use digital building models and a number of other digital tools in tenders and the building process.

Nevertheless, the construction sector is still one of the least digitised sectors in Denmark. Even though a number of digital technologies and tools have been developed, which the major operators in particular have deployed to achieve increased efficiency and sustainability, there is still untapped potential for the industry as a whole. We must ensure to a much greater extent that experience is gathered, to make clear the potential for deploying digitisation for supporting sustainable solutions and efficiency.

More sustainable construction requires solutions that reduce resource consumption and CO<sub>2</sub> emissions through efficient construction processes and building operations, at the same time constructing high-quality buildings that last a long time and are comfortable to live in. Therefore, on the basis of the 2020 Green Housing Agreement, by developing a digital infrastructure in the sector, the public sector must ensure streamlining of new construction and building operations.

The complexity of the holistic approach to construction calls for digital solutions that can tackle many simultaneous processes and considerations: for example, when there is a need for accurate life-cycle assessments, when the operational usability needs qualifying, or when different trades need to communicate.

# Initiatives

## 21. The council housing sector as a pioneer for digitalisation of the entire life cycle of a building

### Issue

Currently, the building and construction sector is one of the least digitised sectors in Denmark. Today, there are all manner of digital technologies and tools, which developers and suppliers can use to achieve increased efficiency and sustainability. However, the industry as a whole is adopting these technologies slowly and in an uncoordinated manner. This means that experience is only being accrued to a limited extent, and the potential for benefiting from streamlining remains large.

### Description of initiative

Based on the 2020 Green Housing Agreement, we aim to prepare a digitalisation strategy for the council housing sector, aimed at expanding and providing digital infrastructure in the sector, in which all relevant data can be collated, and monitor buildings throughout their life cycle.

The projects that are being initiated aim to help streamline new construction and building operations in the council housing sector in particular, and to make it more sustainable. Council housing constitutes a large part of the Danish building stock, and the demands of developers and managers in the council housing sector will boost digital development in the rest

of the construction sector and support the green transition in the council building stock.

For example, the National Building Foundation will collect data on the state of maintenance of the entire council building stock. This will improve the maintenance planning of housing organisations and promote the ability to perform preventive maintenance, which can be up to five times cheaper than having to replace or repair a building component that has suffered damage because it has not been maintained. Preventive maintenance is also climate-friendly, since it reduces the need for new building materials.

In addition, future initiatives could focus on the efficient implementation, for example, of refurbishment projects using digital tools, and the implementation of digital solutions for subsequent operation: for example, deploying digital Building Information Modelling (BIM) for financial management, time and site planning of construction production, simulation of energy needs, life-cycle assessments etc. The efforts of the Strategy must be documented and evaluated so they can benefit the entire council housing sector and the construction sector.

In addition, as part of the Strategy, we will develop registers with new data on the likes of structural, financial and operational conditions, which can be utilised for the development of sustainable solutions and supporting management and political decision-making processes.

*“Although we have seen the development of a number of digital technologies and tools, which the major operators have deployed to achieve increased efficiency and sustainability, there is still a long way to go for the industry as a whole.*





**“We must focus far more on the total budget for buildings, if we are to promote improved balance between costs and quality during the entire life cycle of buildings**



# Colophon

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