



# New regulation schemes and requirements for sustainable building and the role of biomaterials

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2024



**RÅDET  
FOR  
BÆREDYGTIGT  
BYGGERI**

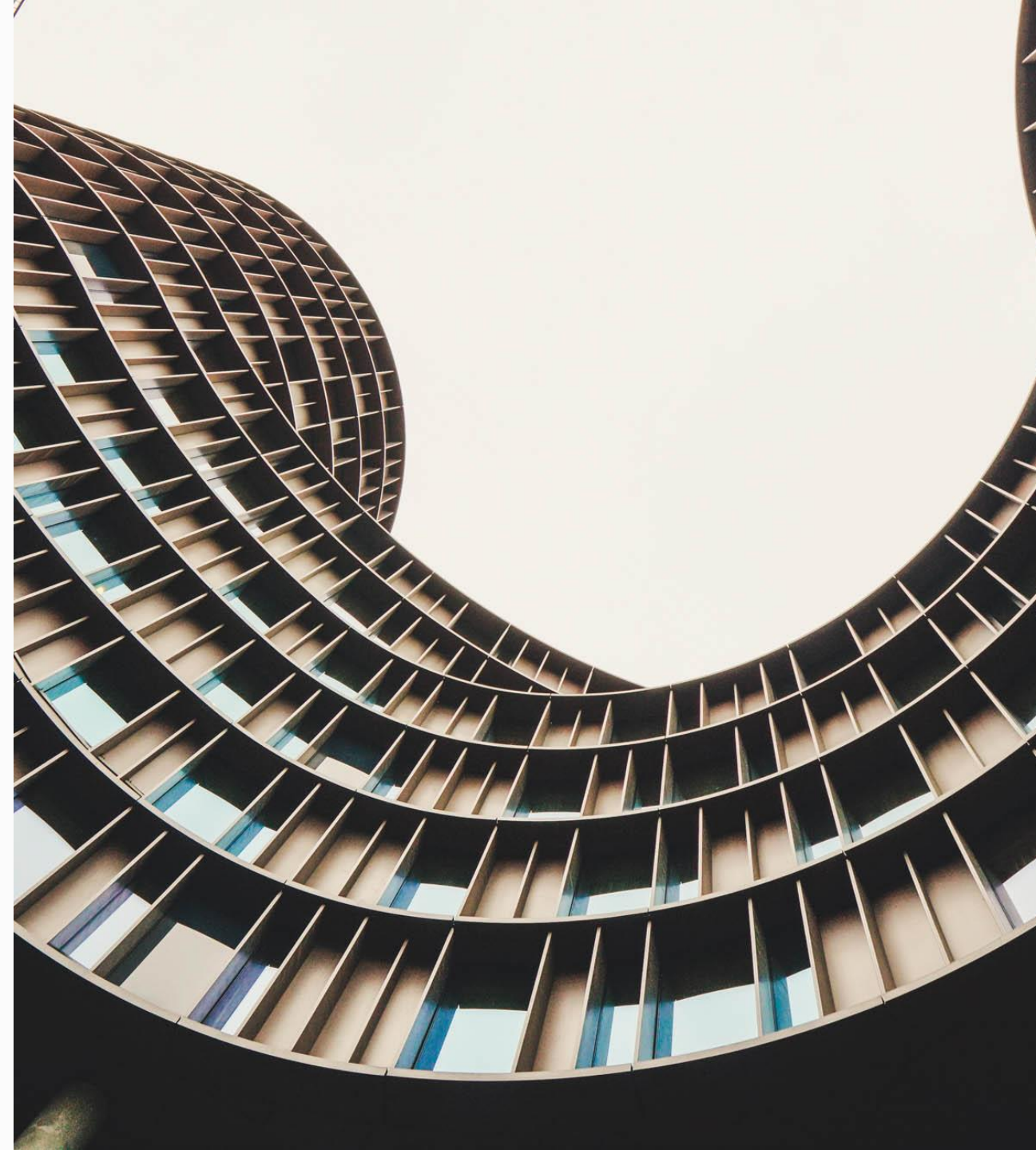
# VCBK

Center for Buildings Climate Impact

- Helping the construction industry get ready for the new climate requirements
- Strengthens the industry's knowledge of and competencies in documenting the climate impact of new buildings
- VCBK is anchored under the Danish Housing and Planning Agency.

## Background for VCBK:

In May 2021: Political agreement. DKK 11.4 million was allocated to VCBK for the years 2022-2024.



# About us

## Green Building Council Denmark

- Non-profit membership organisation
- 800+ members across the Danish construction and real estate industry
- More than 50 employees in Copenhagen and Aarhus

### Mission statement:

*With proven evidence as a starting point, we set a common ambitious direction for a sustainable future in construction, buildings and urban development - economically, socially and environmentally.*





# We work with...



DGNB  
certification



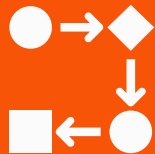
EU taxonomy



Political  
advocacy



Knowledge-  
sharing



Developing  
projects



Events



Courses and  
education





## LCA for CONSTRUCTION

**EN 15978** – Assessment of the environmental quality of buildings

**EN 15804+A2** Sustainability in Building and Construction – Environmental Product Declarations  
– Basic Rules for the Product Category Construction Products

From 2023 part of the building regulations in Denmark

**The EU Building Directive (EBDR) sets requirements with limit values for all countries in the EU from 2030 at the latest**

# 2023 GWP requirements Denmark

1. Two new provisions on the climate impact of new buildings have been introduced in the **building regulation** from 1<sup>st</sup> of January 2023:

1. The climate impacts of new buildings must be documented with a GWP calculation (i.e. a life cycle assessment, LCA)
2. New buildings over 1.000 m<sup>2</sup> must comply with a limit value of 12 kg CO<sub>2</sub>-eq./m<sup>2</sup>/year



≤ 1000 m<sup>2</sup>

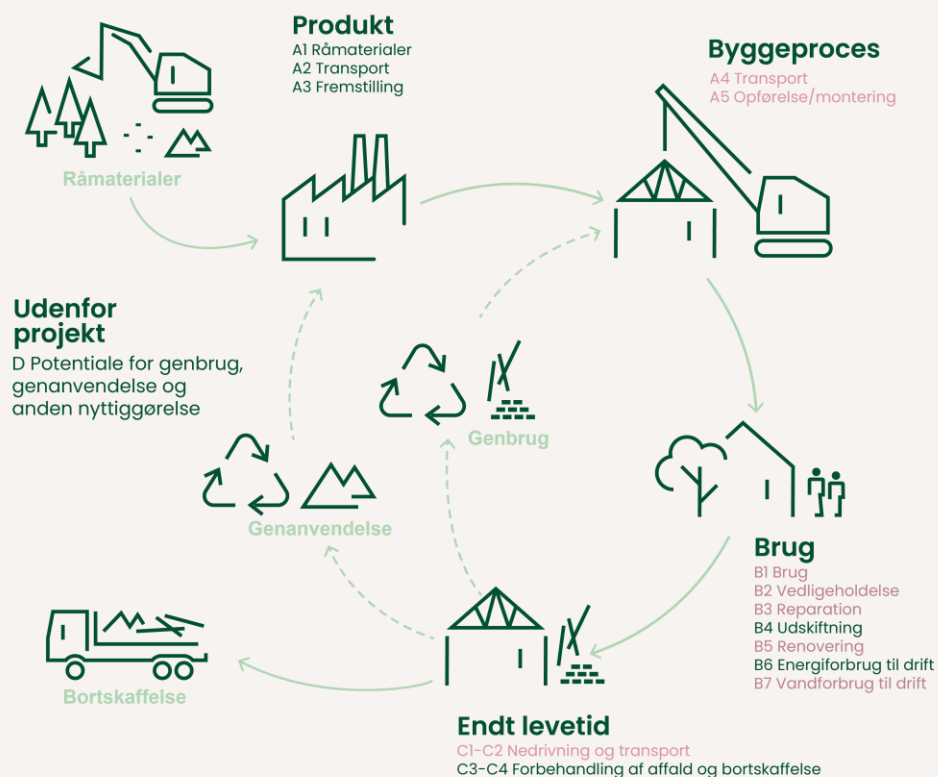
- Rapporteringskrav (klimaberegning)
- Ingen grænseværdi



> 1000 m<sup>2</sup>

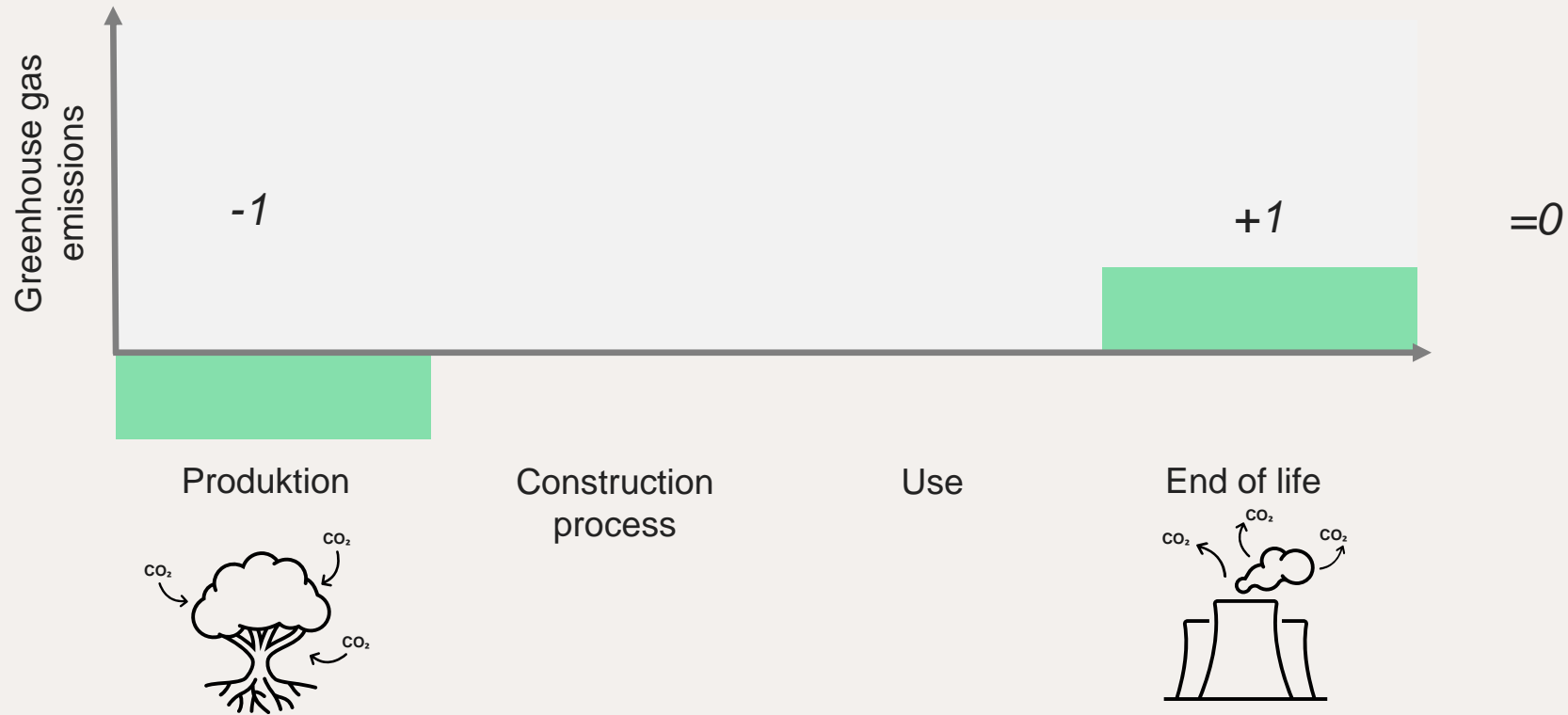
- Rapporteringskrav (klimaberegning)
- Grænseværdi på 12,0 kg CO<sub>2</sub>-ækv. pr. m<sup>2</sup> pr. år

# What should the LCA include?



- The following lifecycle modules must be included in the calculation:
  - A1-A3, B4, B6, C3-C4, D
- A 50-year reference period must be applied
- The result is calculated as kg CO<sub>2</sub>-eq./m<sup>2</sup>/year
- The calculation must follow the standard EN15978

# Biogenic Carbon rules





# LCA tools

LCaByg is free and available in english

LCaByg 2023.3 (5.4.0.4) - (Projekt ikke gemt)

**Welcome to LCAByg 2023.3**

LCaByg is a digital tool, which can be used to calculate environmental impacts and resource use associated with a building over its life cycle. It is possible to enter information about a building's energy use, building components (materials), as well as the construction process on the construction site. Based on that information LCAByg will calculate a Life Cycle Assessment, and the results will be compiled in different formats (pdf, Excel, png., svg.), which can be used for further analysis or documentation.

**Relevant links**

- LCAByg Support
- LCaByg's YouTube kanal
- LCA user manual
- BR18 Climate impact
- VCBK
- BUILD publications

**Other tools from BUILD**

- LCAlive
- BSIM
- BE18
- veff.sbi.dk
- Indoor climate compass
- Savings calculator

**Latest projects**

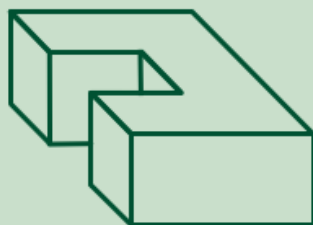
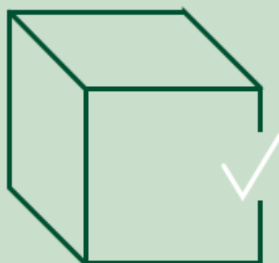
A new version of lcabyg is available at: <https://www.lcabyg.dk/download>

Results are up to date

## Optimering af klimabelastning på forskellige niveauer

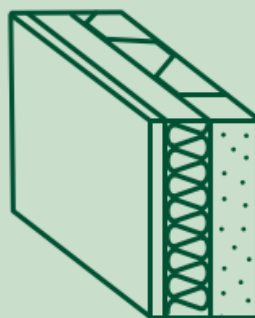
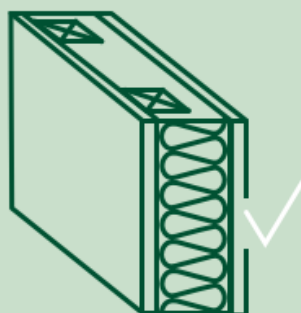
### Optimering på design

Kompakt bygningsvolumen vs. flad og forgrenet længebygning



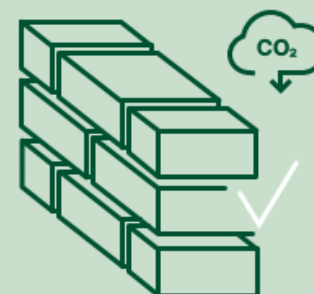
### Optimering på materialer

Trækonstruktion vs. porebetonvæg



### Optimering på produktniveau

Mursten med lavt klimaaftryk vs. mursten med højt klimaaftryk

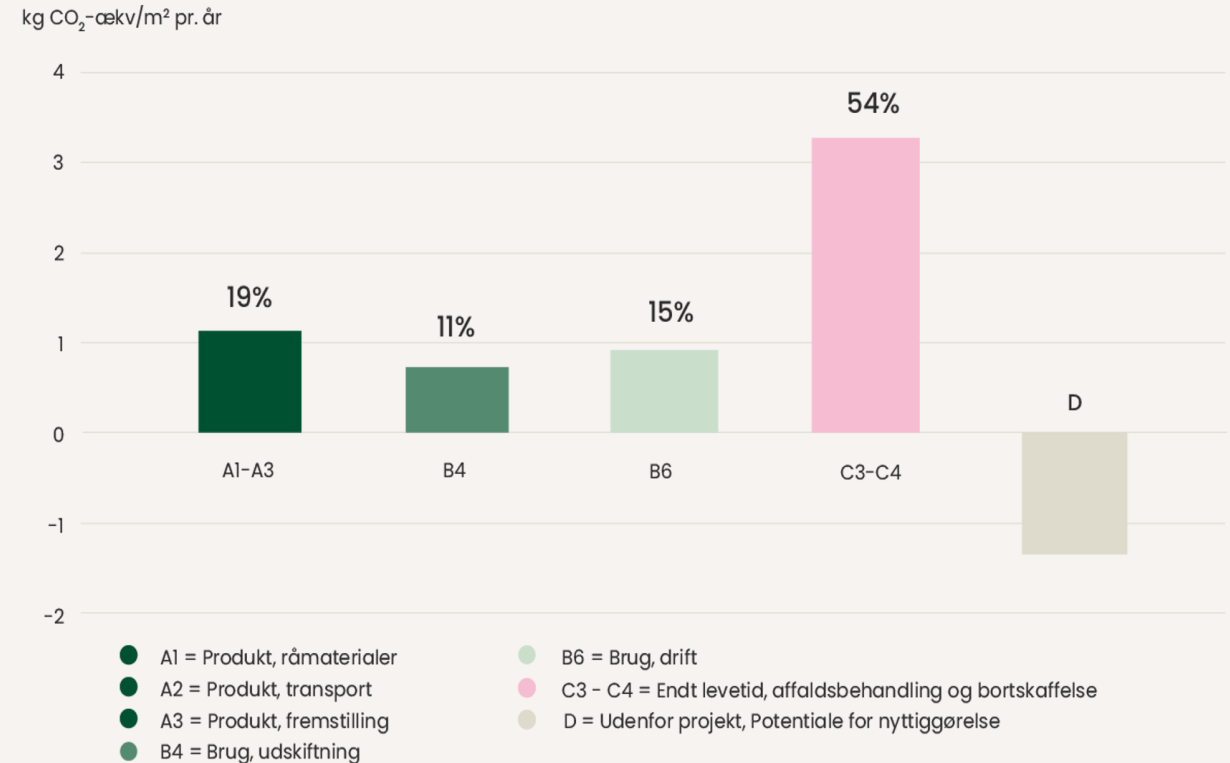


# Example of LCA-resultater – Tankefuld

- Building type: Terraced house
- Built: 2019–2020
- BR Version: 2018
- Case provided by Ramboll
- Result: **6.06** kg CO<sub>2</sub>-eq./m<sup>2</sup>/year



- Foundation: traditional concrete foundation with cast concrete terrain deck
- Exterior walls: wooden frame with mineral wool and a façade cladding of wood or fibercement
- Roof construction: wooden rafters insulated with mineral wool
- Roof covering: plywood with roofing felt and areas with green roof



# 2025 GWP requirements

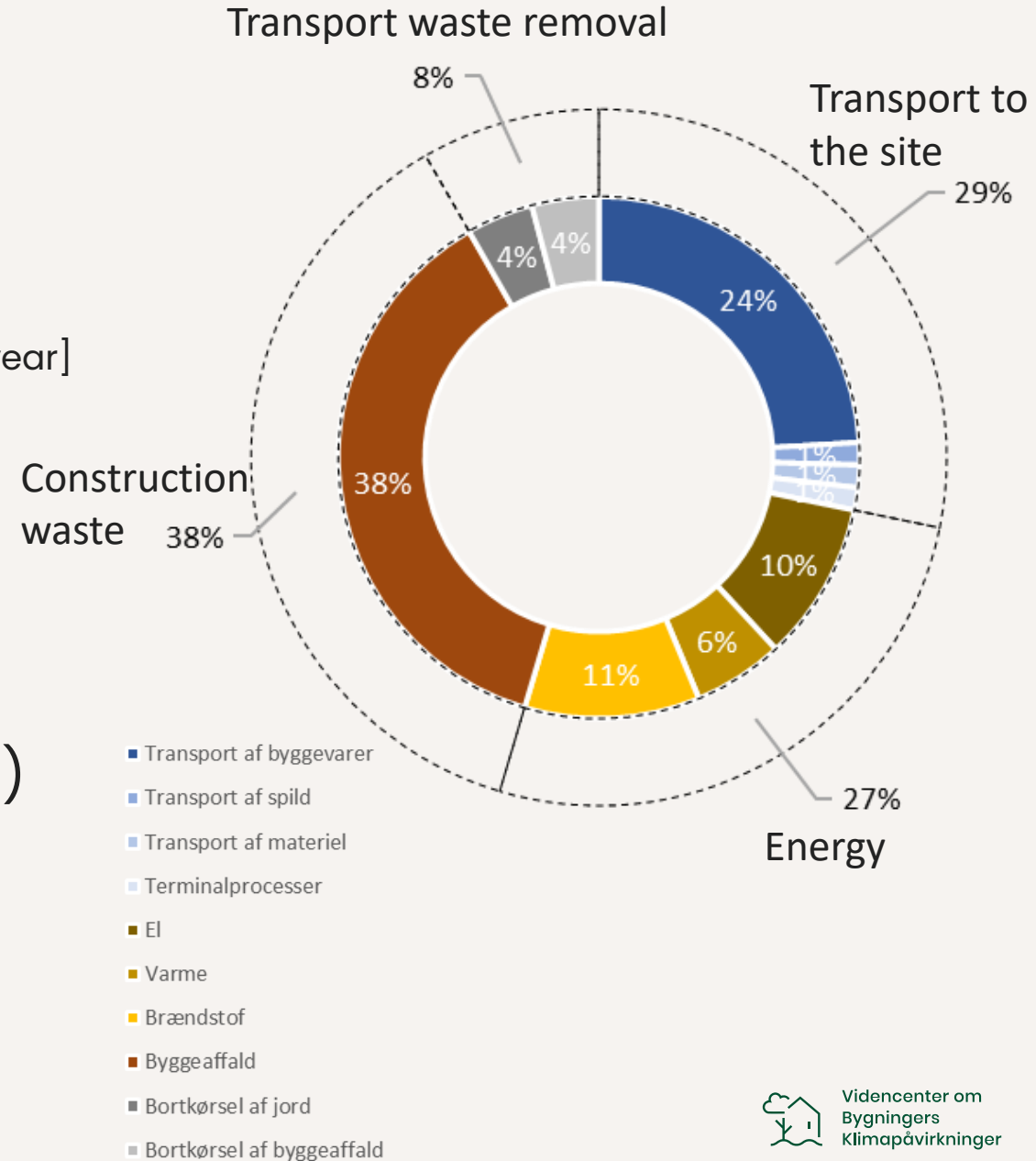
New political agreement.

## 1. New differentiated limit values for GWP [CO<sub>2</sub>e/m<sup>2</sup>/year]

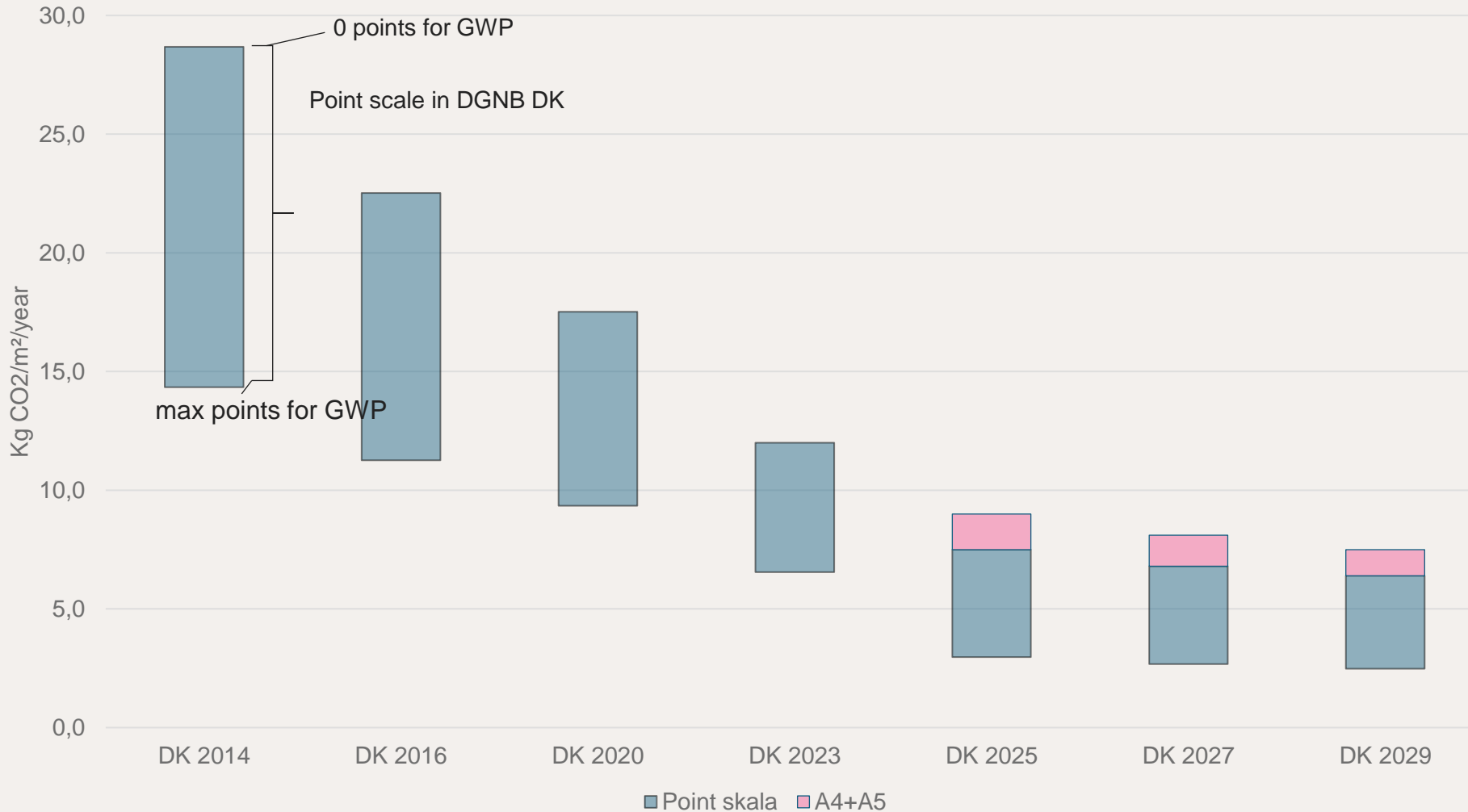
- Small holiday homes: 4,0 Kg
- Single family houses: 6,7 Kg
- Apartment buildings: 7,5 Kg
- Office buildings: 7,5 Kg
- Schools, 8,0 Kg
- Other 8,0 Kg

## 2. Construction process included (A4+A5)

- Limit value A4+A5 1,5 Kg



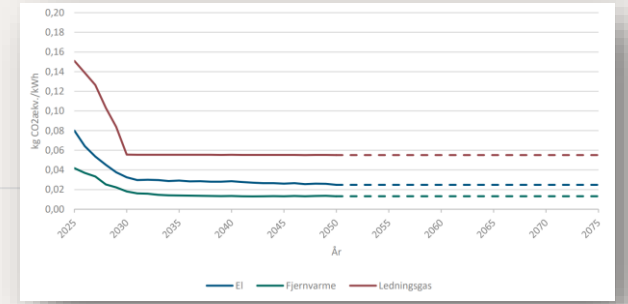
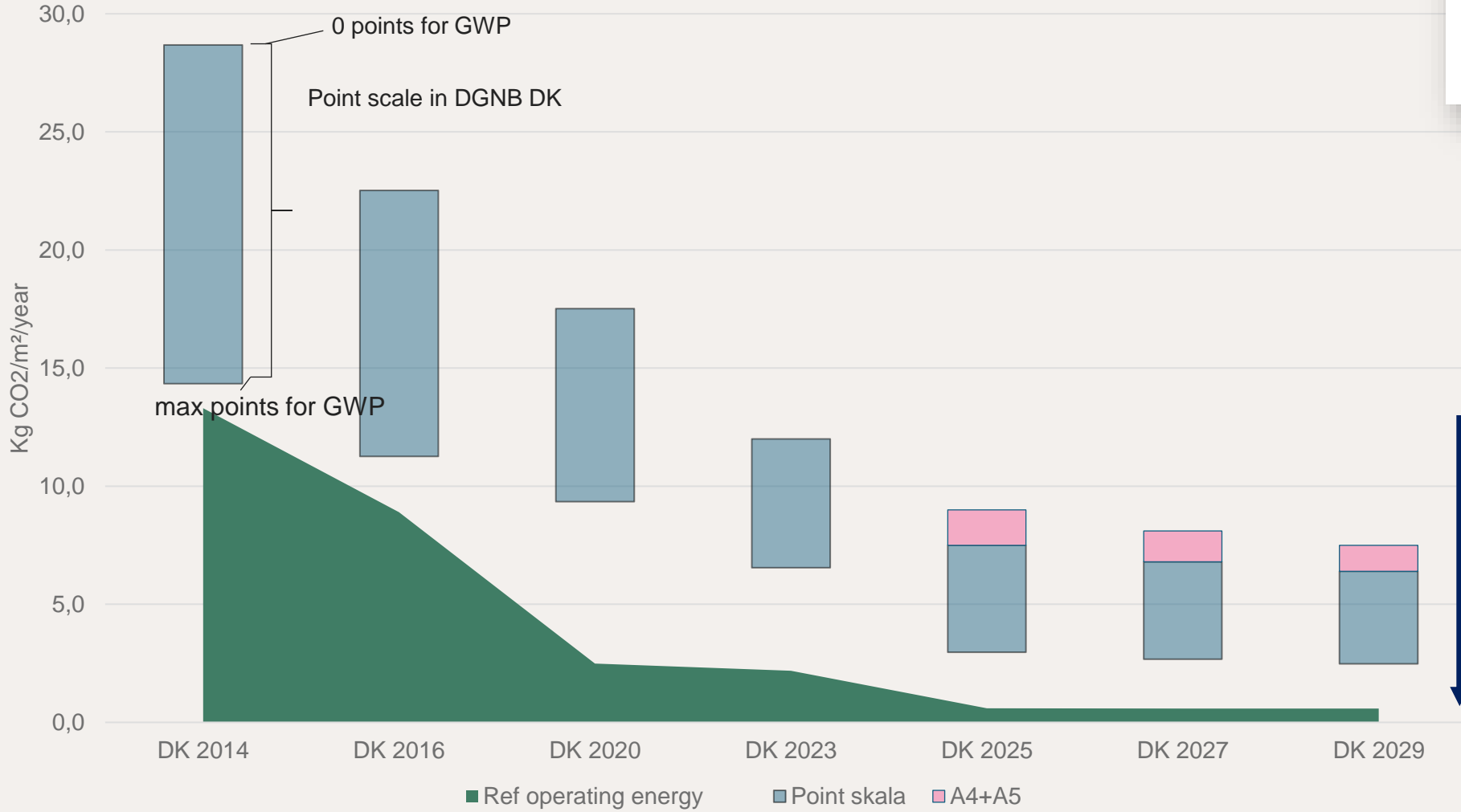
# Multi-story dwellings - GWP point skala in DGNB system Denmark



- Disclaimer.  
System boundaries and methodology have changed over time and are not directly comparable. Of particular notice are:
- 2012-16 included module D.
  - Building energy usage have benefitted greatly from green transition of energy systems.
  - EPD standard have changed from +A1 to +A2. (2023).
  - 2020 reference materials includes 1.3 uncertainty factor.
  - In 2023 limit value in building code is introduced.
  - In 2025 limit value includes A4+A5 construction phases.
  - Operating energy emission reduction is primarily a reduction in emission factor for energy system.



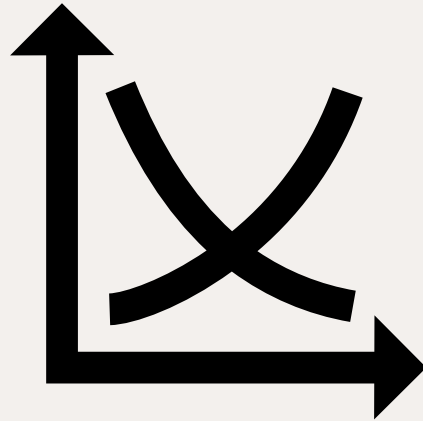
# Multi-story dwellings - GWP point skala in DGNB system Denmark



Kilde: Artelia (2023). Emissionsfaktorer – EI, fjernvarme og ledningsgas, 2025-2075

# Marketplace for CO2 savings

1. A level playing field
  - Transparency



2. Business Model
  - Incentive for all in value chain





Videncenter om  
Bygningers  
Klimapåvirkninger

# Time for questions

# LCA in DGNB 2025



**Environmental quality**  
**40%**

**ENVIRONMENT 1 Global warming**

**ENVIRONMENT 2 Hazardous and harmful substances**

**ENVIRONMENT 3 Resources**

**ENVIRONMENT 4 Biodiversity**

**Environmental impact categories in the new EPD standard (EN 15804+A2)**

Climate change – total

Climate change – fossil

Climate change – biogenic

Climate change – luluc

Ozone depletion

Acidification

Eutrophication aquatic freshwater

Eutrophication aquatic marine

Eutrophication terrestrial

Photochemical ozone formation

Depletion of abiotic resources – mineral and metals

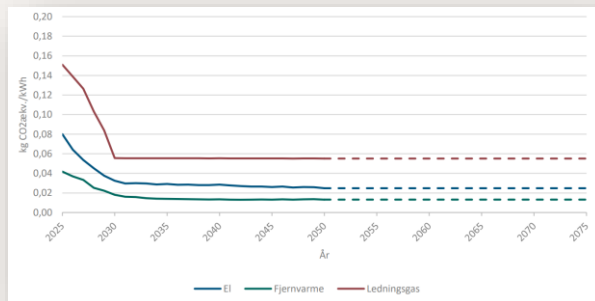
Depletion of abiotic resources – fossil fuels

Water use

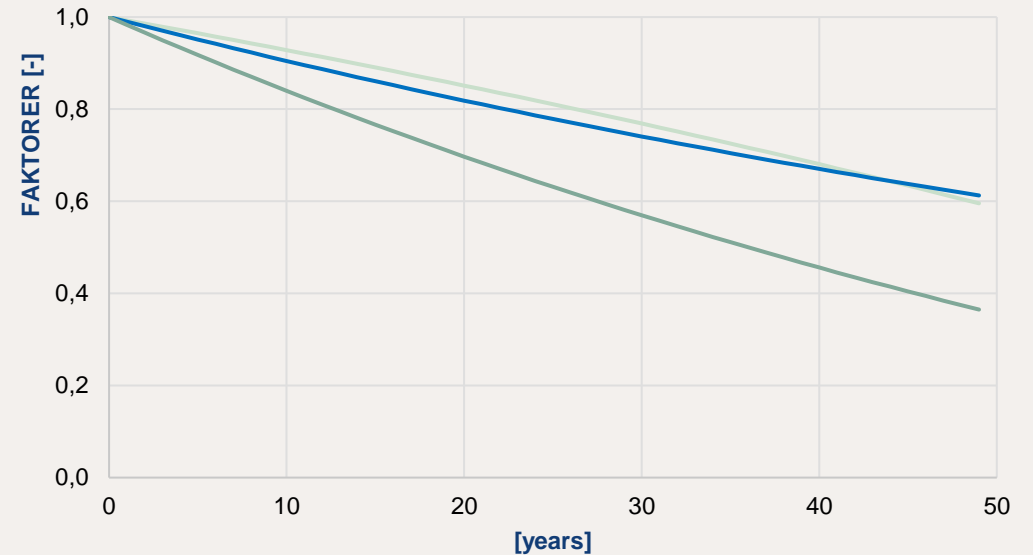
# Global opvarmning

## Dynamic effect on climate impact

- The **technological factor** is multiplied by the materials.
- The **time factor** is multiplied by both the materials and the **operating energy**.
- The dynamic effect reduces the emissions with the greatest uncertainty → i.e. those furthest into the future.



## Dynamic effect on climate impact



tidsfaktor    teknologisk faktor    reduktionsfaktor

Kilde: Artelia (2023). Emissionsfaktorer – El, fjernvarme og ledningsgas, 2025-2075

Resch et al. (2021). Estimating dynamic climate change effects of material use in buildings—Timing, uncertainty, and emission sources.