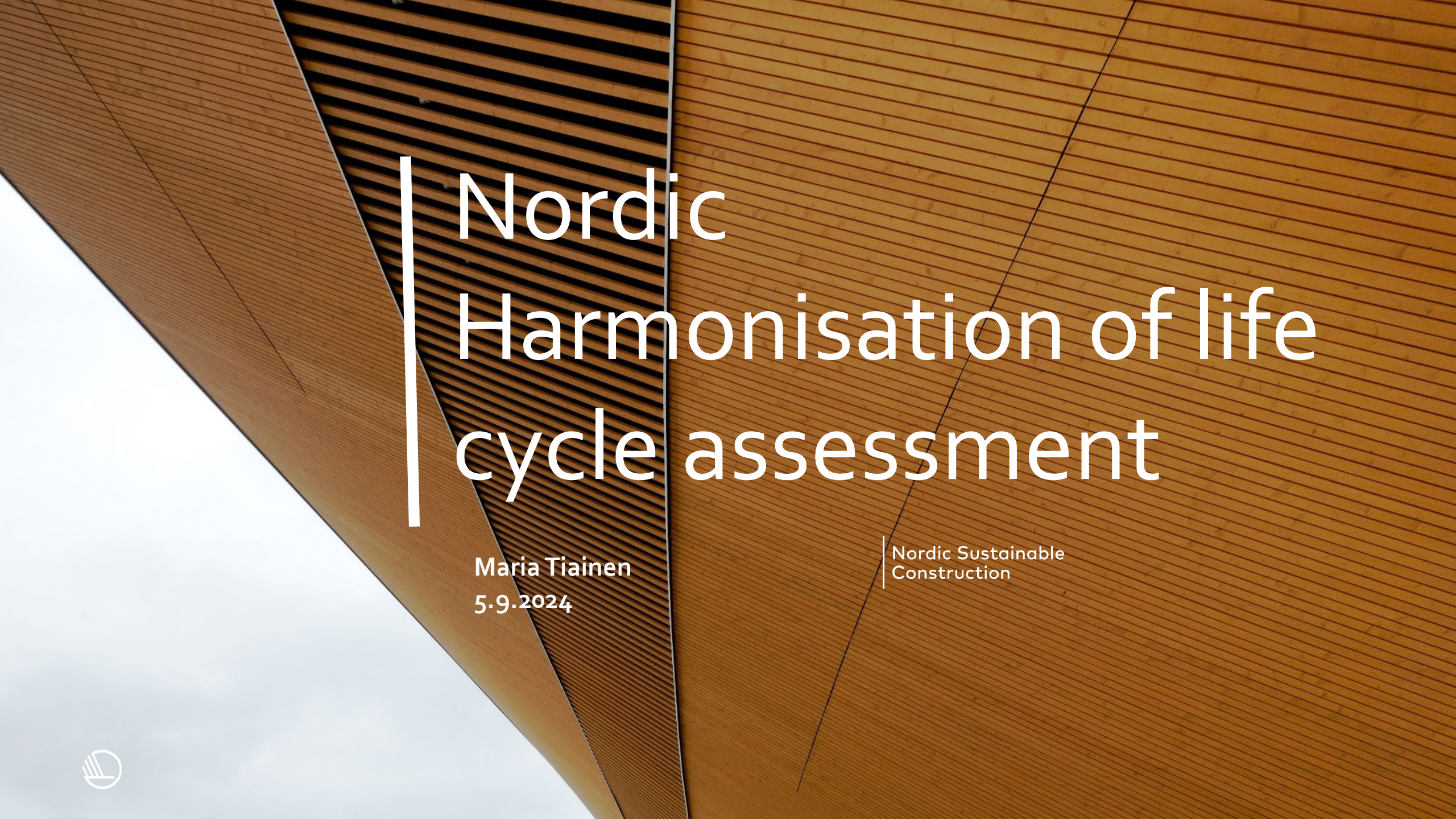


Nordic Harmonisation of life cycle assessment

Maria Tiainen

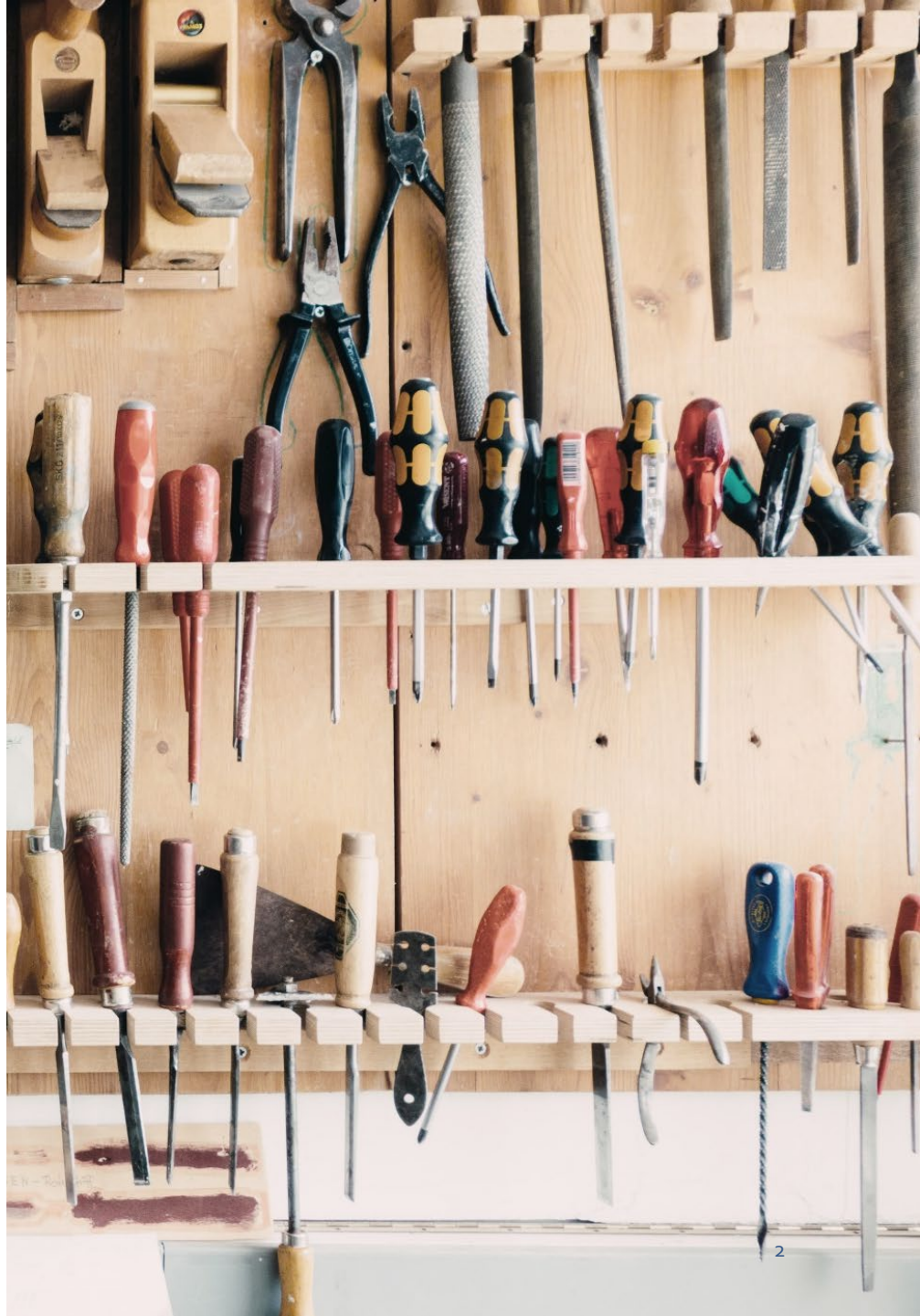
5.9.2024

Nordic Sustainable Construction

Nordic Sustainable Construction

- Nordic Sustainable Construction is a programme under the Nordic Council of Ministers

- Purpose:
  - accelerate the knowledge and capacity for a green transition in the Nordic construction sector
  - strengthen Nordic collaboration
  - ensure an aligned Nordic path



Work Packages

Nordic Harmonisation of Life Cycle Assessment

Harmonisation, regulation, digitalisation, limit values, climate reporting.

Circular Business Models and Procurement

Circularity in the construction industry and for public developer through capacity building.

Sustainable Construction Materials and Architecture

Opportunities and barriers to using wood and other biobased construction materials.

Emission-free Construction Sites

Diminishing emissions through regulation, harmonisation, research and practical guidelines.

Programme Secretariat and Competences for Reuse in Construction

Capacity building, strategic partnerships, knowledge sharing.

WP1 Nordic harmonisation of life cycle assessment

Task 1
Nordic LCA practices

- Feasibility study: how far to harmonise?
- Methodological harmonisation for normative needs
- Compatibility of building LCA and infrastructure LCA
- Timely importance for policymaking

Task 2
Database and scenarios

- Joint processes for gathering and verifying generic data
- Joint processes for setting lifecycle scenarios for normative LCA
- Interfaces to LCA tools

Task 3
Digitalisation of LCA

- Development of LCA guidance for BIM
- Development of national reference buildings into BIM
- Development of training models
- Coordination with BIM and other software developers

Task 4
Limit values

- Joint method for defining country-specific limit values where needed
- Joint process for reporting the climate impacts of Nordic built environment

Task 5
Acceleration Programme

- To accelerate the decarbonisation of building and construction sector

Thank you!

Ministry of the Environment Finland

Nordic Innovation

Form Design Center

Government of Iceland
Ministry of Infrastructure

Danish Authority of Social Services and Housing

Want to know more?

Visit our website www.nordicsustainableconstruction.com

Follow us on LinkedIn www.linkedin.com/company/nordicsustainableconstruction and on Twitter www.twitter.com/NordSustConstr

Or write us an e-mail: Nordicsustainableconstruction@sbst.dk

Nordic Harmonization of LCA

- Limit values and monitoring decarbonization

Sweco, BUILD, EFLA and LCA Support
Report Launch Webinar - 05 09 2024

Nordic Sustainable Construction

Agenda

- Welcome and presentation of the project
- Decarbonization of the building stock
- Development of Carbon Limit Values for Buildings
- Q&A
- End of webinar (12:00)

Questions and comments

Please write your questions and comments in the Teams chat
There will be a short time for questions and comments after each presentation

We have dedicated the last part of the webinar for Q&A. Please post your question in the chat and be ready to pose your question during the Q&A session.

There is limited time for Q&A, we also welcome you to contact us directly on mail with detailed or complex questions or comments that require more time to answer and possibly discuss.

You can send questions and comments to: sm-dk-lca-and-co2-limits@sweco.dk or morten.ryberg@sweco.dk

Nordic Harmonisation of LCA

1

Analysis of Nordic LCA-practices

2

Data for LCA

3

BIM for LCA - calculating the climate impact of buildings through digitalization

4

GHG limit values and reporting of the decarbonizati on of the Nordic building stock

Project organisation

Nordic Sustainable Construction programme under the Nordic Council of Ministers

PROJECT OWNER, Finnish Ministry of Environment
Maria Tiainen

Nordic authority representatives

PROJECT TEAM

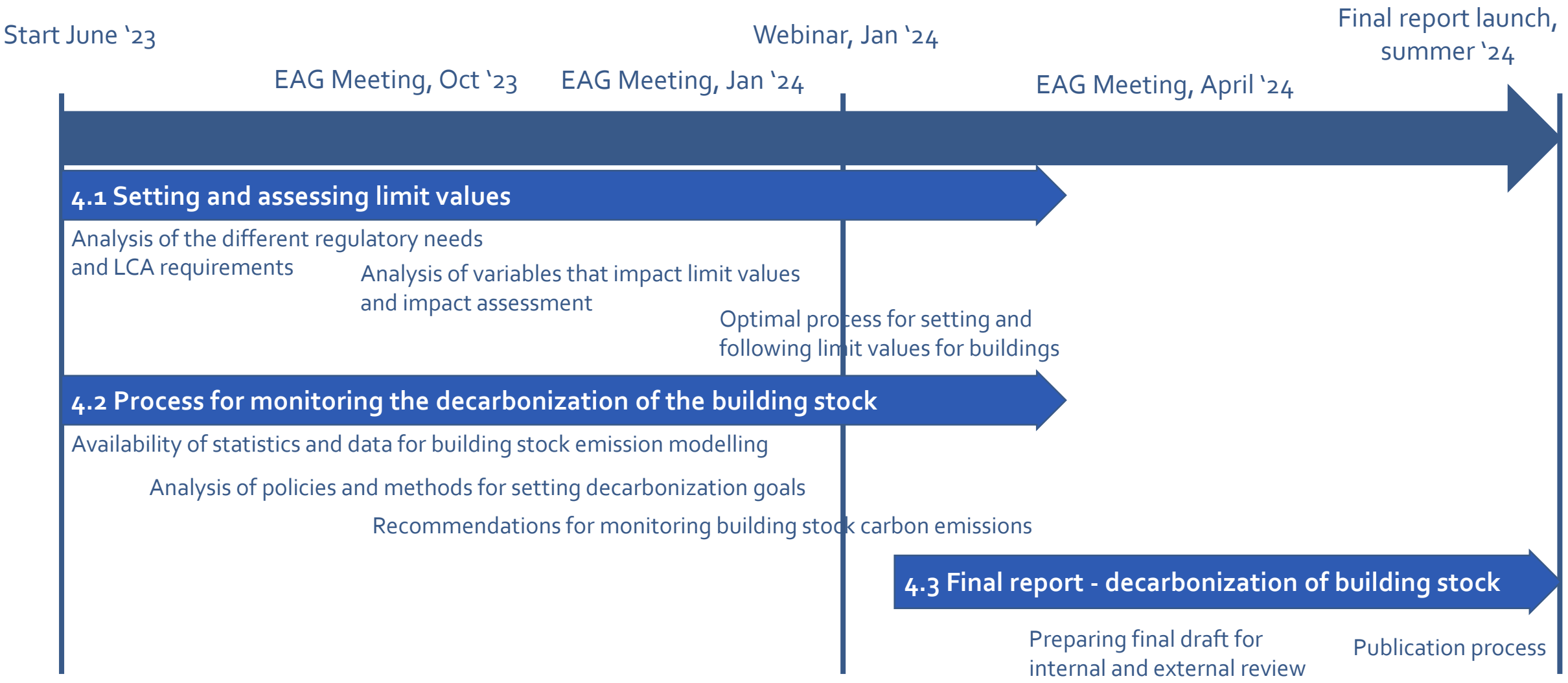
- Sweco Denmark
- Sweco Norway
- Sweco Sweden
- BUILD, Aalborg University, Denmark
- Sweco Finland
- EFLA, Iceland
- LCA Support, Estonia

EXPERT ADVISORY GROUP (EAG)

Project team

- Maria Balouktsi, Kai Kanafani, Nicolas Francart, Harpa Birgisdottir, Endrit Hoxha, Rasmus Nøddegaard Hansen – BUILD, AALBORG UNIVERSITY
- Nicolaj Langkjær, Morten Ryberg, Bjørn Rothmann, Christine Collin – SWECO DENMARK
- Anna Joelsson, Inga Sjöberg – SWECO SWEDEN
- Karin Cochard, Isabel Segura – SWECO NORWAY
- Satu Kangas, Kari Nöjd – SWECO FINLAND
- Anni Oviir – LCA Support
- Alexandra Kjeld – EFLA

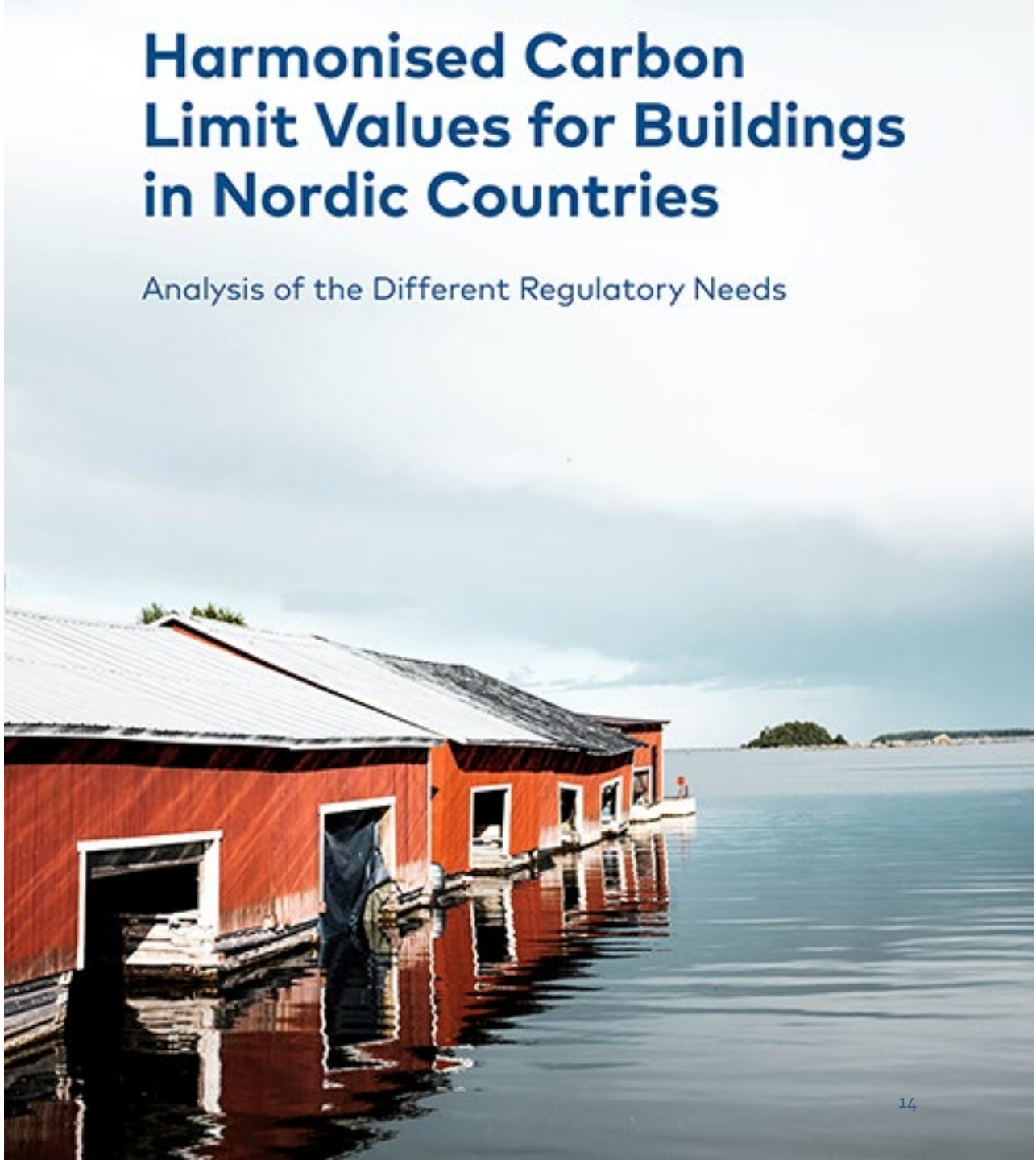
Overall Project Timeline



Report related to setting and assessing limit values

In-depth analysis of the different regulatory needs and LCA requirements for assessing buildings' climate impact

https://www.norden.org/en/publication/harmonised-carbon-limit-values-buildings-nordic-countries-analysis-different-regulatory



Final project report

- **Overview**
  - Current decarbonization policy landscape
  - Methods for assessing buildings' climate impact
  - Methods for setting limit values
  - Methods for assessing climate impact at building stock level
  - Identify implications of choices and affected stakeholders

- **Recommendations**
  - Harmonizing assessments methods for building level assessment and building stock level assessment

https://www.norden.org/en/publication/decarbonisation-building-stock

Intended use of results

- Provide a basis for investigating harmonization of methods for assessing and monitoring climate impact at building and building stock level
- Serve as inspiration for other countries that have not yet developed methods for assessing buildings and building stock
- Provide input for on-going and future development of assessment standards. E.g. at EU level

Monitoring the Decarbonization of the Building Stock

Nicolaj Hostrup Langkjær
Sweco

Nordic Sustainable Construction

Decarbonization goals

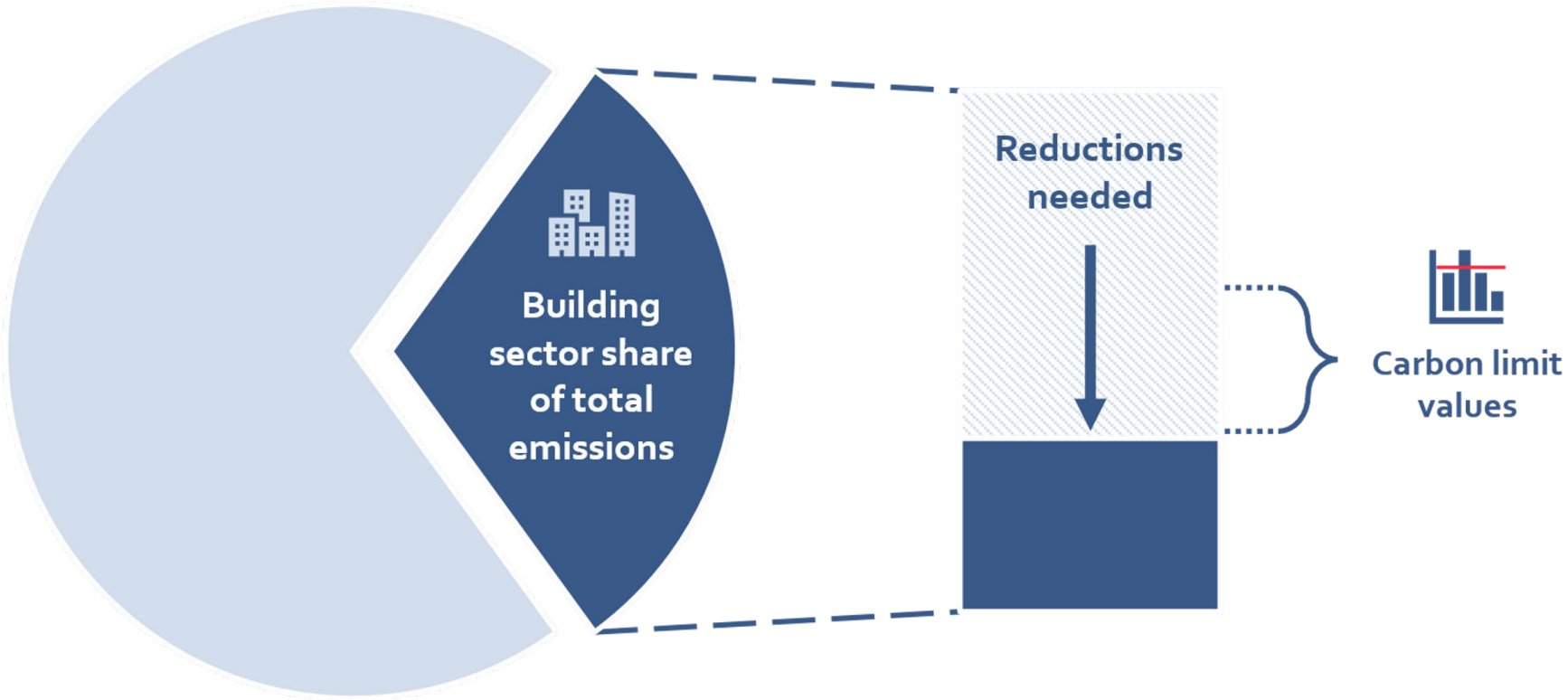
	2030	2035	2040	2045	2050
Denmark					110%*
Estonia					
Finland					90-95%**
Iceland					
Norway					90-95%***
Sweden				85%****	
EU					

Climate neutral

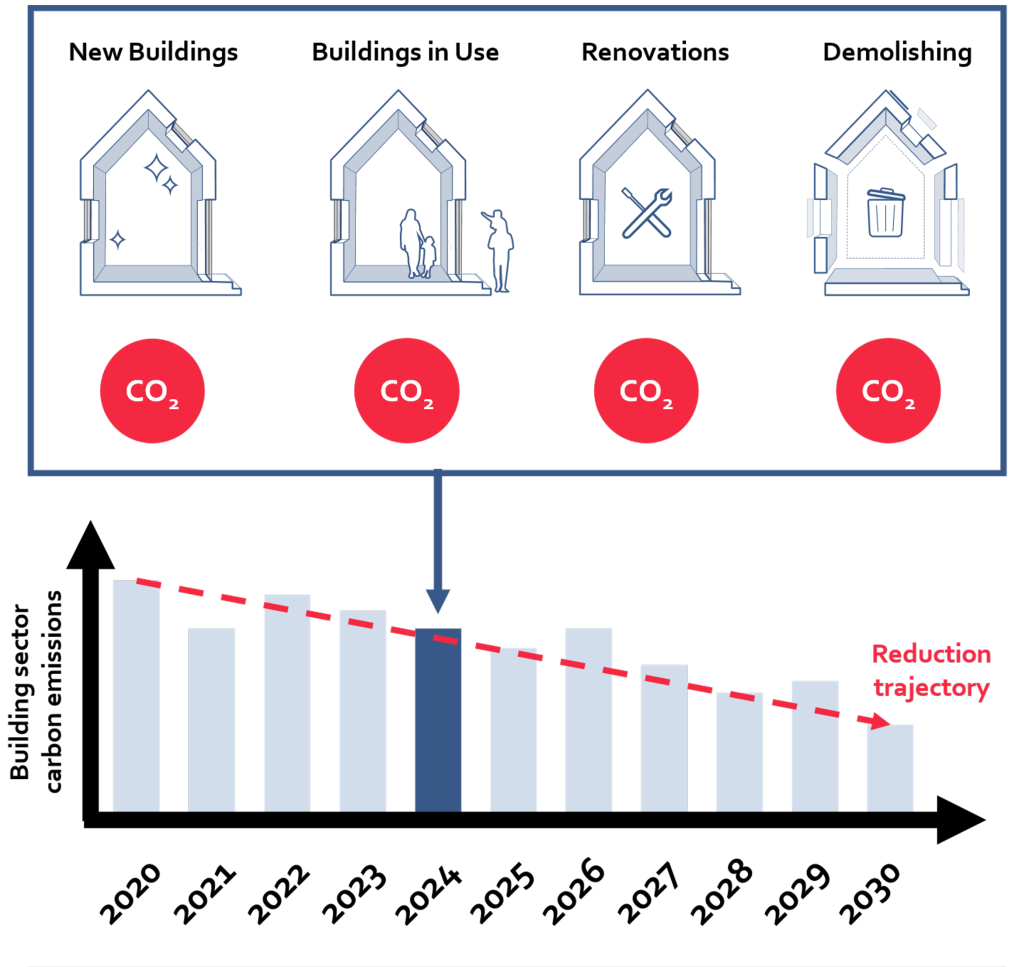
	2030	2035	2040	2045	2050
Denmark	70%				
Estonia		80%*			
Finland	60%				
Iceland	55%				
Norway	50-55%				
Sweden	63%		75%**		
EU	40%				

2030 reduction

Decarbonization goals



Building stock dynamics



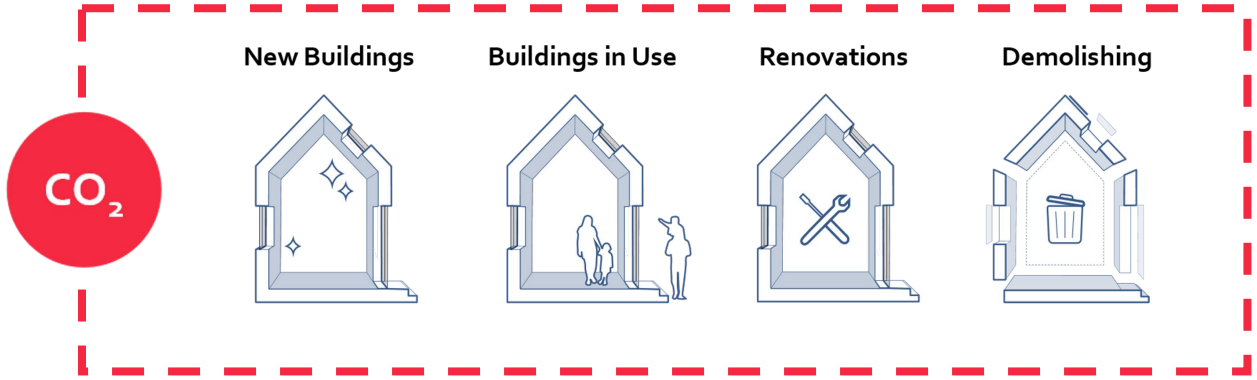
Environmental building stock modelling

National emissions accounts

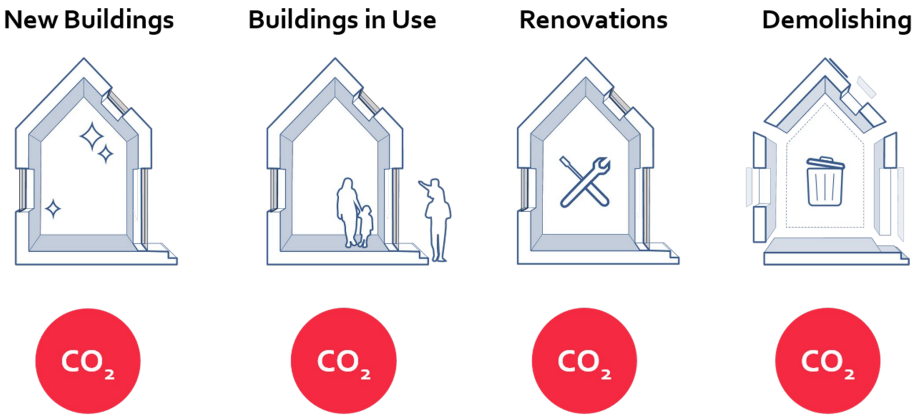
Building-level emissions accounts

Environmental building stock modelling

National emissions accounts



Building-level emissions accounts



What building related data is already being recorded?

Can we utilize the data for environmental building stock modelling?

Data?

Denmark	Estonia	Iceland	Finland	Norway	Sweden
Building and Housing Register (BBR)	Estonian Building Register (EBR)	Building register (Mannvirkjaskrá)	Generic climate impact data (Rakentamisen ja infrarakentamisen päästötietokannat, SYKE)	The land register (Kartverket)	Property register (Lantmäteriet)
DK1	*EST1*	*ICE1*	*FIN1*	*NOR1*	*SWE1*
Protected and listed buildings (FBB)	Land Register /Immovables Register	Property register (Fasteignaskrá)	Energy certificate database (Energiatodistusrekisteri)	Statistics Norway (Statistisk Sentralbyrå)	Building register (Bebyggelseregistret)
DK2	*EST2*	*ICE2*	*FIN2*	*NOR2*	*SWE2*
Waste database (ADS)	Statistic Estonia	Statistics Iceland	Registry of Finnish Heritage buildings (Museovirasto)	Cultural heritage search (Kulturminnesøk)	Generic climate impact database (Boverket)
DK3	*EST3*	*ICE3*	*FIN3*	*NOR3*	*SWE3*
Energy certificate (Energimærke)	Waste database (JATS)	Data library of The National Energy Authority (Orkustofnun)	Land, property, and ownership registry (Maanmittauslaitos)	Energy certificate (energimerke)	Energy certificate database (Boverket energideklaration)
DK4	*EST4*	*ICE4*	*FIN4*	*NOR4*	*SWE4*
Building archive (Byggesagsarkiv)	Planning database (PLANK)	Energy use (Veitur Utilities)	Statistical information on buildings, land, and everything (Tilastokeskus)	GeoNorway - Listed buildings (freda bygninger)	SCB - Statistics Sweden
DK5	*EST5*	*ICE5*	*FIN5*	*NOR5*	*SWE5*
Generic climate impact data (LCAbyg component library)	Emission factors for building materials (CO_2 calculator)	Waste statistics (Úrgangstölfræði)	Built environment information data (Suomen Ympäristökeskus, paikkatietoaineistot)	Case inspection (Saksinnsyn)	Energy statistics (Energiläget)
DK6	*EST6*	*ICE6*	*FIN6*	*NOR6*	*SWE6*

Data?

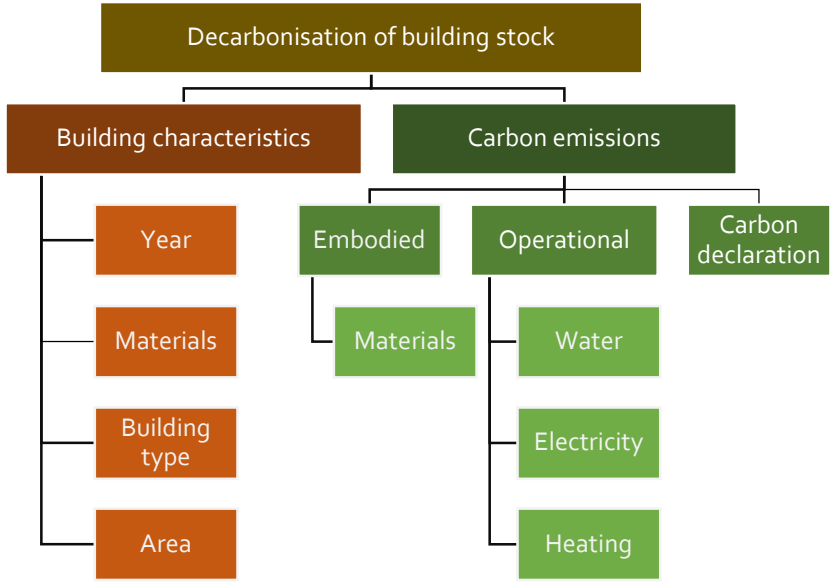


Table 11. Building related databases in the Nordic countries mapped according to key attributes for building stock modelling.

		DENMARK (DK)	ICELAND (ICE)	ESTONIA (EST)	FINLAND (FIN)	NORWAY (NOR)	SWEDEN (SWE)
Building Characteristics	**Year**	DK1	ICE1	EST1	FIN2	NOR2	SWE1
		DK8	ICE2	EST3	FIN3	NOR3	SWE2
			ICE3		FIN4	NOR5	
					FIN5		
	Materials	DK1	ICE1	EST1	FIN4	NOR6	SWE2
		DK2	ICE2	EST4	FIN5		
		DK3			FIN1		
		DK5					
	Building type	DK1	ICE2	EST1	FIN4	NOR1	SWE1
		DK8	ICE3	EST3	FIN5	NOR2	SWE5
				EST5	FIN2	NOR3	
	Area	DK1	ICE1	EST1	FIN4	NOR1	SWE1
		DK2	ICE3	EST3	FIN6	NOR2	
		DK8			FIN5	NOR3	
Carbon Emissions	**Embodied (Data on construction products)**	DK7		EST6	FIN1	NOR7	SWE3
						NOR2	
	Operational	DK1	ICE3	EST1	FIN2	NOR2	SWE4
		DK2	ICE4	EST3	FIN5	NOR4	SWE5
		DK4	ICE5		FIN1		SWE6
		DK8	ICE7				
	Carbon declarations						SWE7

Data?

Data availability and accessibility for building characteristics and operations

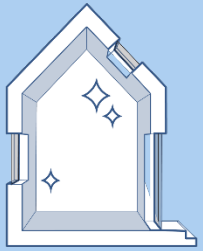
No national or crossboarder coherence on platforms, dataformats, reporting schemes, etc.

Very limited data on materials in building characteristics data

Only Sweden is officially recording (gathering, storing, analyzing, etc.) the data from climate declaration (emission data)

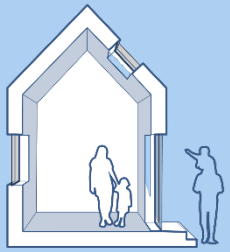
Recommendations

New buildings



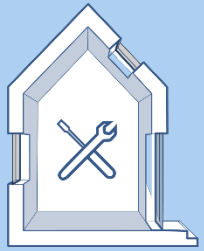
A building-level monitoring approach needs to be established, including approaches to collect and analyse carbon declarations from new buildings.

Buildings in use



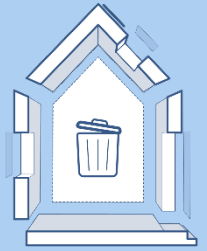
For a cost effective and harmonized approach to building-level monitoring of emissions related to operational energy use, data from the EU building stock observatory with relevant emission factors could be utilized.

Renovations



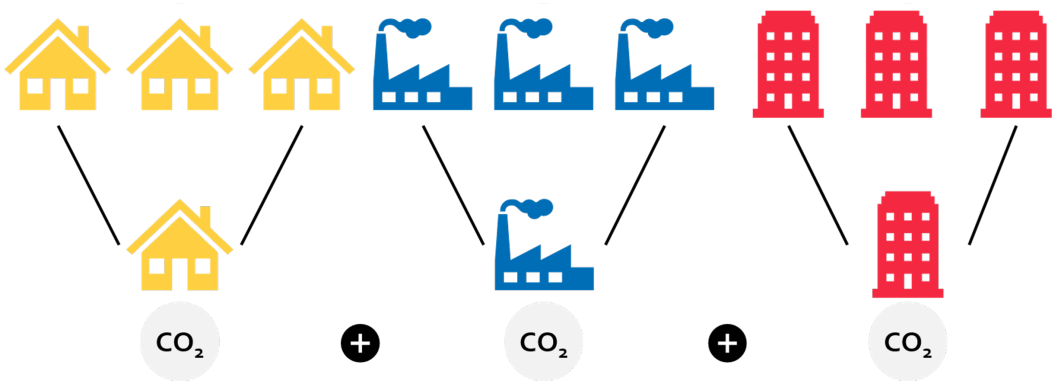
Climate declaration for renovations should be introduced to monitor the environmental impact related to renovations.

Demolishing

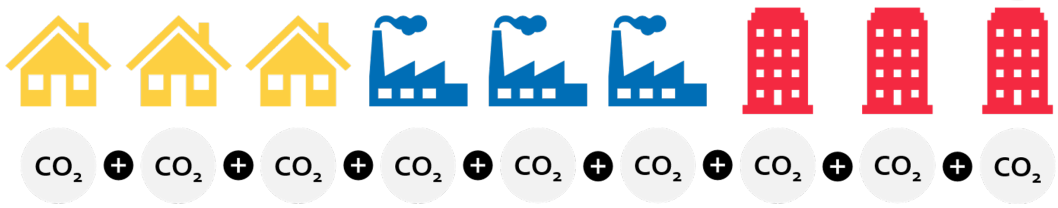


Data collection on the amount of construction waste divided in fractions could be utilized with emission factors for waste management. The quality of construction waste data should be considered for this approach.

Environmental building stock modelling



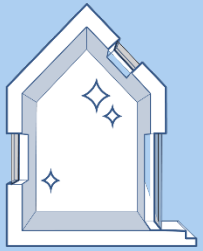
Archetype



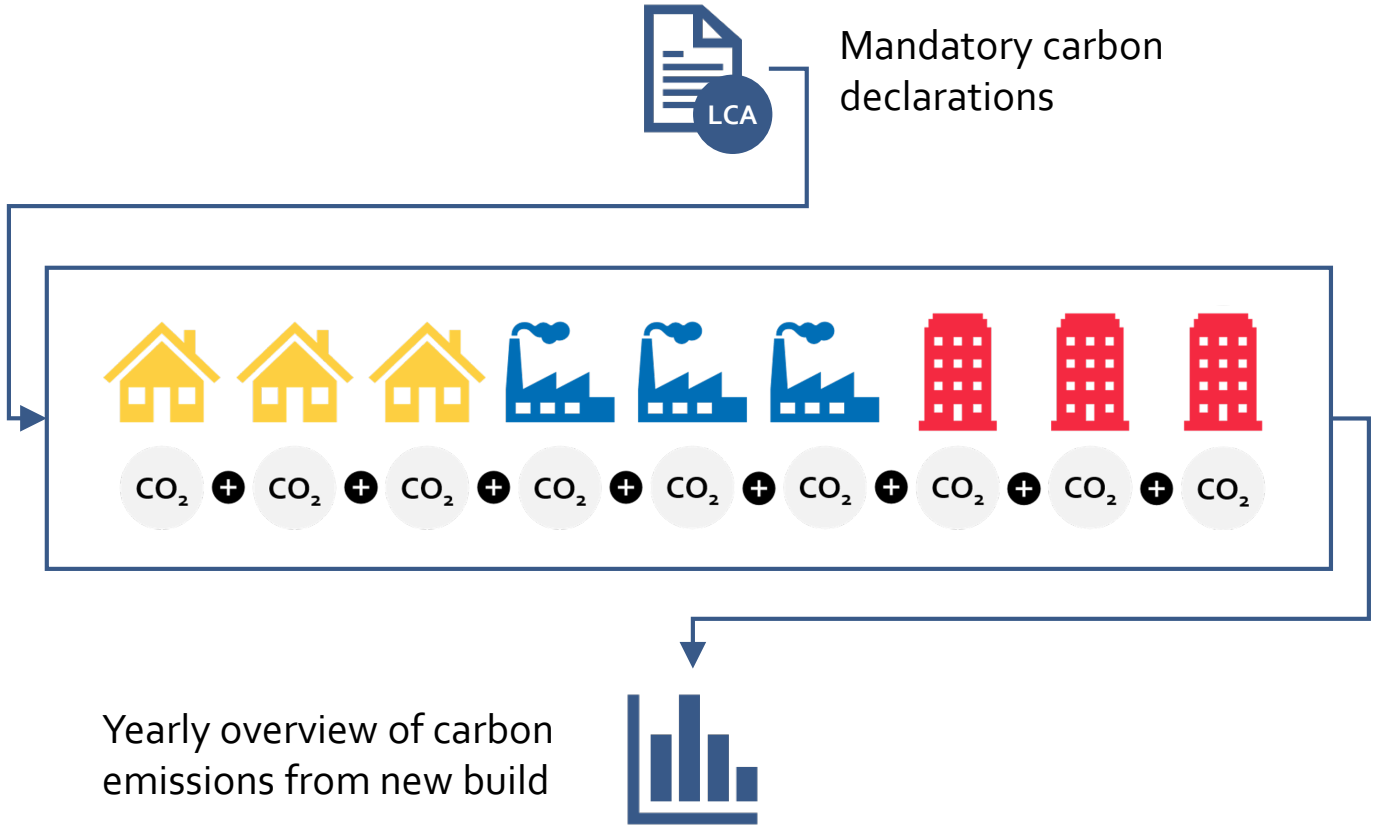
Sampling

Recommendations

New buildings



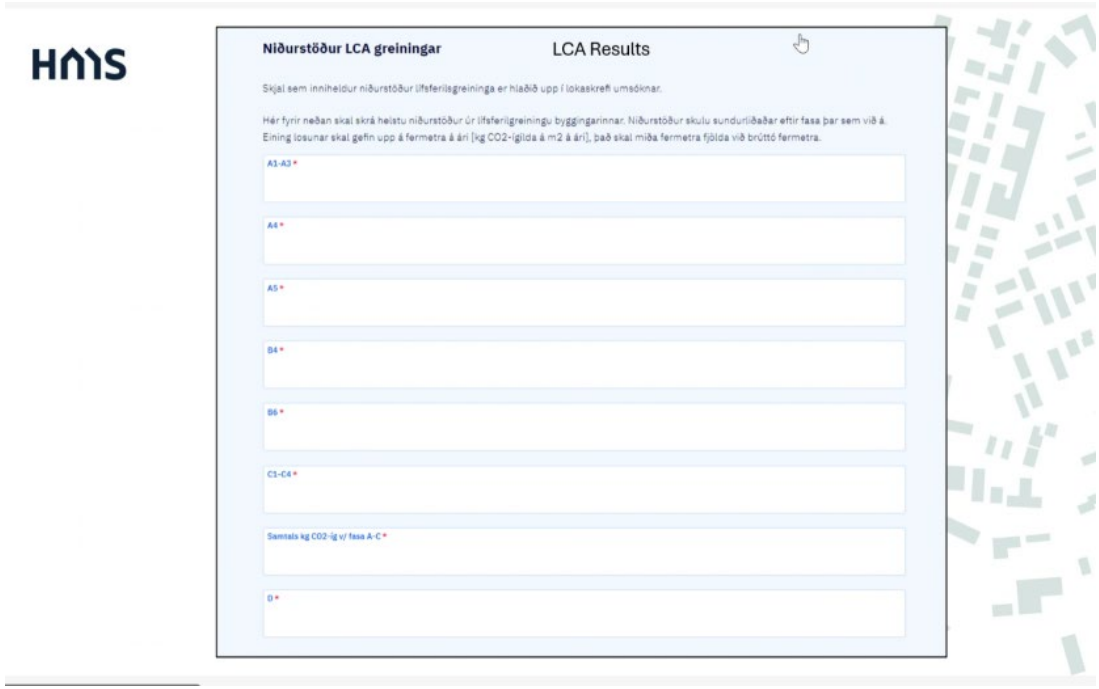
A building-level monitoring approach needs to be established, including approaches to collect and analyse carbon declarations from new buildings.



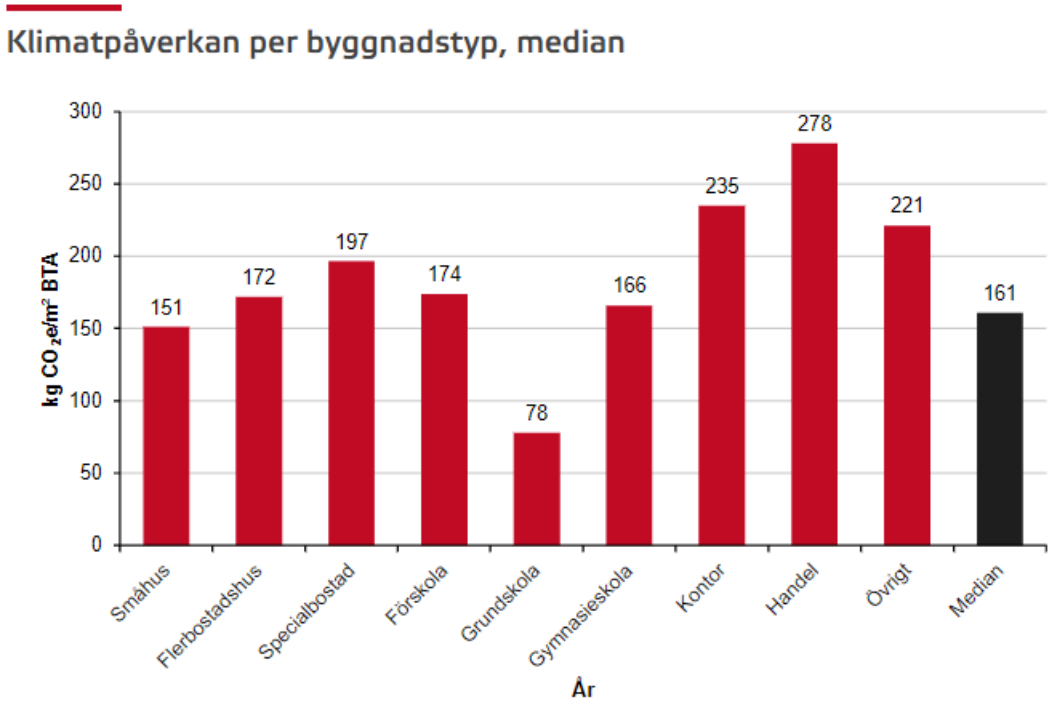
Data from carbon declarations

Iceland and Sweden

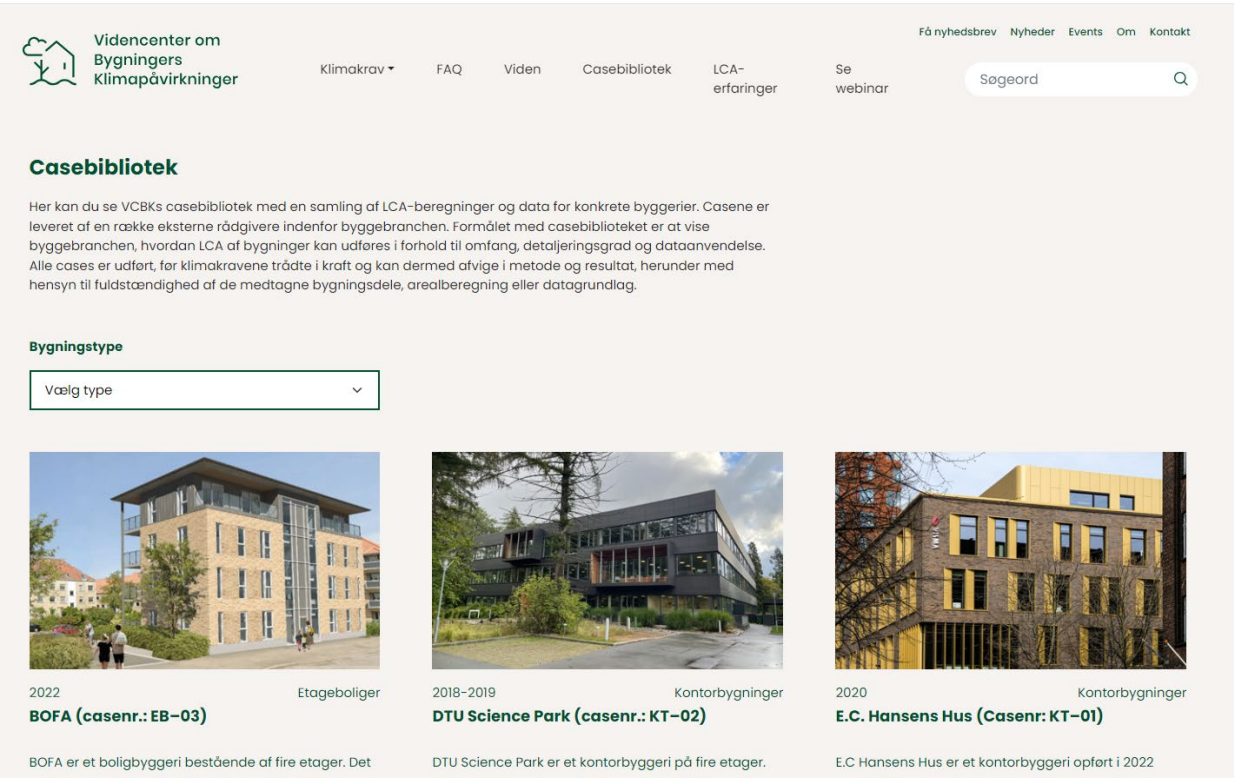
Submission Portal
(Iceland)

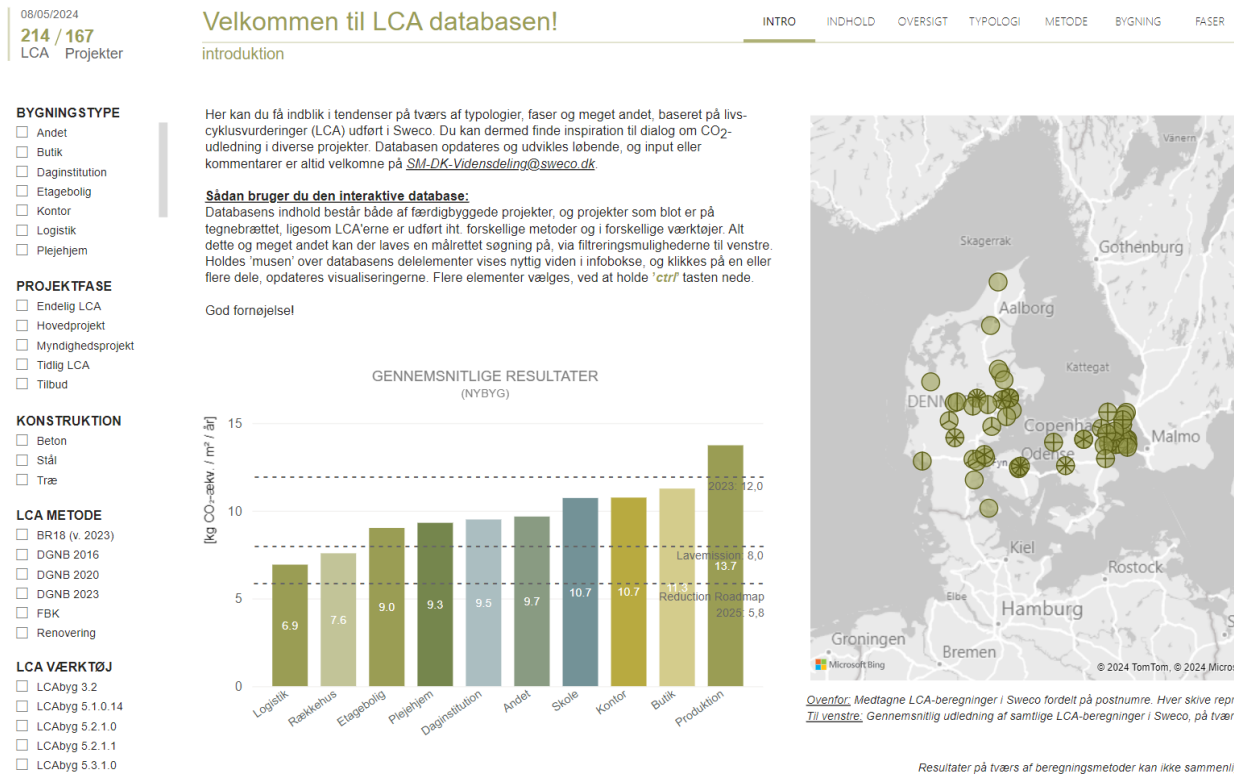


Data disclosure
(Sweden)



Case libraries and databases





Task 5.2 – Best case catalogue

Best Case Catalogue

Catalogue of best case examples across the Nordics and Estonia

Online interactive case representation

Webinar with the insights from the case catalogue

Development of Carbon Limit Values

Maria Balouktsi
BUILD, AAU

Nordic Sustainable Construction

European initiatives

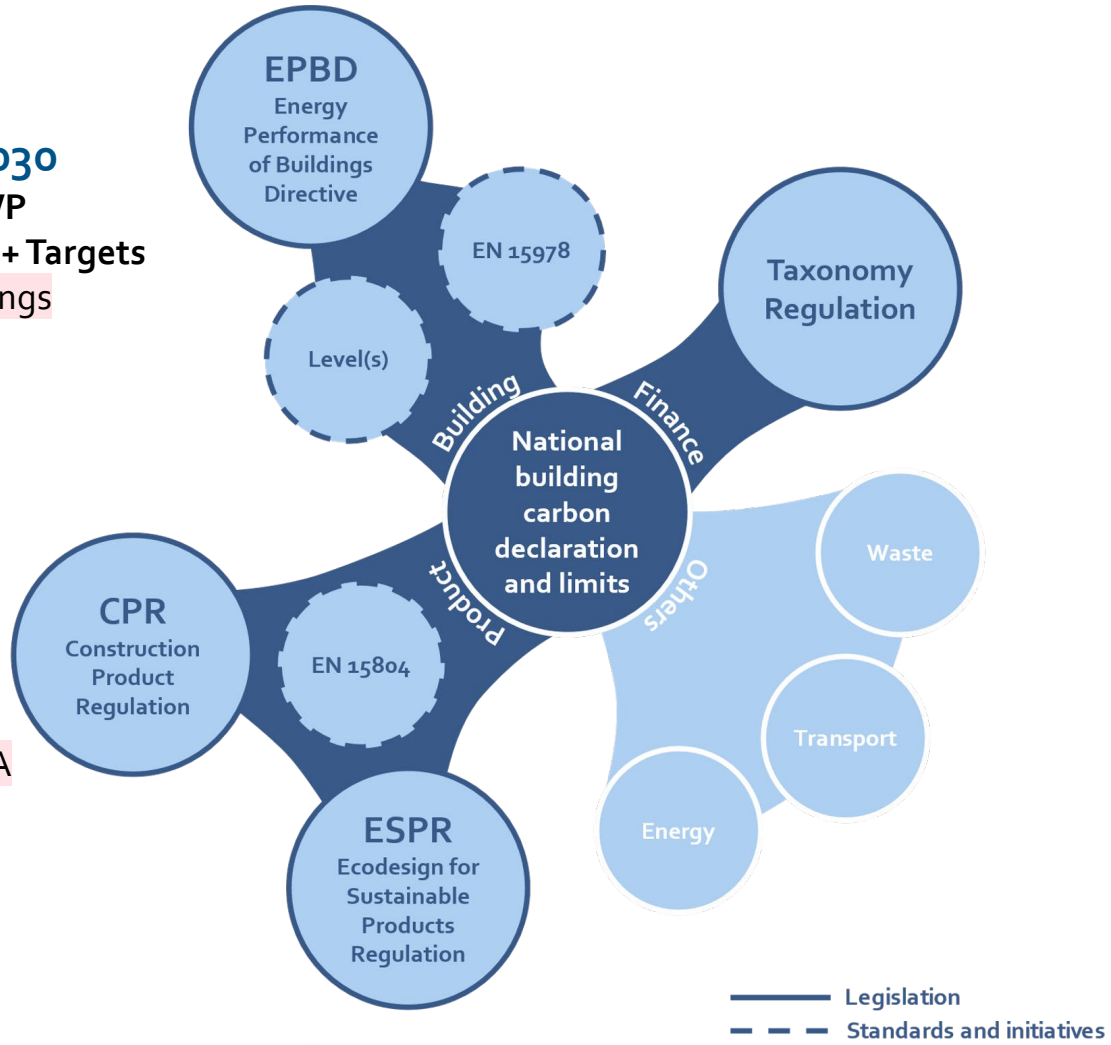
Mai 2024
Publication of the EPBD & enter into force
First method aspects defined

January 2027
Member States shall publish a roadmap of limit values and targets
Guidance is being prepared

January 2030
Life cycle GWP Declarations + Targets
All new buildings

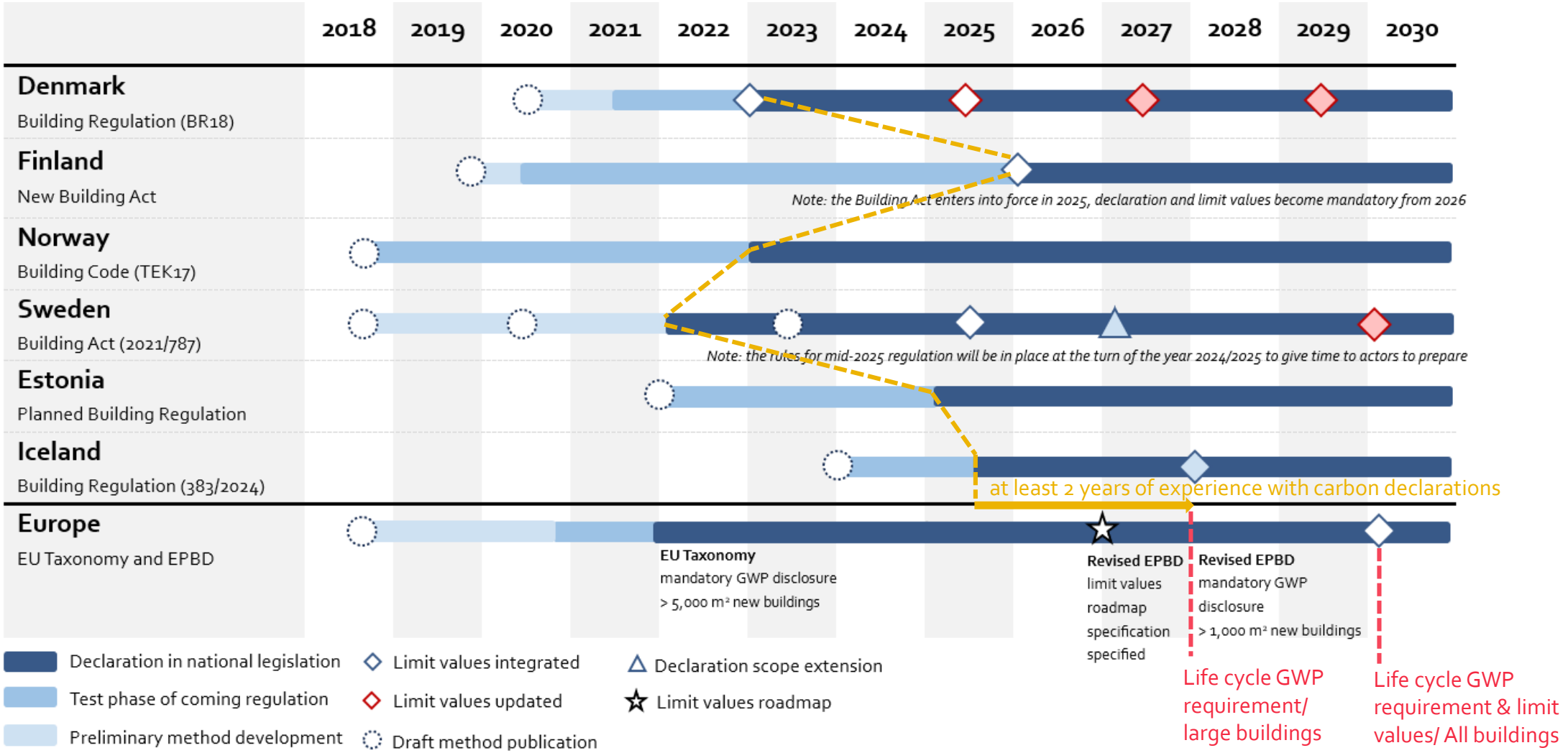
December 2025
Delegated Act for a Union framework for the national WLC
More method details to be defined

January 2028
Life cycle GWP Declarations:
New buildings over 1000 m² UFA as part of Energy Performance Certificate



Nordic initiatives

Timeline of existing and proposed carbon declaration and limit values integration



Building uses and sizes covered

Building TYPE	Denmark	Estonia	Finland	Iceland[9]	Norway	Sweden	Europe (EPBD)
	limit value + carbon declaration	carbon declaration	limit value + carbon declaration	limit value + carbon declaration	carbon declaration	limit value + carbon declaration	carbon declaration
Single-family homes	✓			✓		✓[1,2]	✓
Other residential buildings	✓	O	O	✓	✓	✓[1,2]	✓
Office	✓	O	O	✓	✓	✓[1,2]	✓
Retail and restaurant	✓	O	O	✓	✓	✓[1,2]	✓
School and daycare	✓	O	O	✓	✓	✓[1,2]	✓
Laboratory	✓	O	O	✓	✓	✓[1,2]	✓
Hospital and health	✓	O	O	✓	✓	✓[1,2]	✓
Sports facilities	✓	O	O	✓	✓	✓[1,2]	✓
Cultural and other public buildings	✓	O	O	✓	✓	✓[1,2,8]	✓[6]
Religious	✓			✓	✓	✓[1,2]	
Industrial	✓			✓	✓		✓[6]
Holiday cottages[5]	from 2025				✓[4]	✓[1,2]	✓
Other	✓[7]	O		✓	✓	✓[1,2]	✓[6]
Renovation projects				✓	✓	O[3]	
Size of buildings	**2023-2025:** > 1,000 m^2 **From 2025:** > 50 m^2 for unheated buildings; > 250 m^2 for extensions of single family, terraced and holiday houses	unspecified	no size requirement, except for warehouses, transport and communications buildings, indoor swimming pools and indoor ice rinks (> 1,000 m^2)	unspecified, buildings under scope classes 2 and 3 in Building Regulation	no size requirement, just building type	> 100 m^2	**2028:** > 1,000 m^2 **From 2030:** > 50 m^2

limit value — carbon declaration

✓ = **included** in limit value(s)
✓ = **included** in declaration

O = **suggested or planned** inclusion in future limit value(s)
O = **suggested or planned** inclusion in future declaration

1. Sweden provides detailed requirements on which buildings are exempted from declarations and are independent of the building type, such as temporary building constructions, buildings built by private.
2. it can be assumed that the same building types included in the 2022 climate declaration will also be subject to the limit values proposed for July 2025.
3. when a building permit is needed according to a building regulation definition (and according to further exemption rules in Sweden)
4. included when they are in blocks.
5. called “leisure homes” in Norway.
6. Member states may decide not to set or apply the requirements to buildings owned by the armed forces or related government buildings, as well as temporary and agricultural building.
7. Socially critical buildings are exempted from the 2025 limit value, but not from the carbon declaration requirements.
8. Some public authorities are exempted.
9. it can be assumed that the same building types included in the 2025 carbon declaration will also be subject to the limit values proposed to be introduced by 2028

Methodological choices in Nordic regulation

Notable differences:

- Definitions of building reference area (gross, heated, etc)
- Limit value scope full life cycle, or only upfront carbon (A1-A5)
- Biogenic carbon in definitions of Global Warming Potential
- Building parts included

Methodological choices in Nordic regulation		Denmark	Estonia	Finland	Iceland[9]	Norway	Sweden		Europe
		2023/ 2025	2022	2023	2025	2022	2022	2025	2024 (EPBD)
General	Reference unit definition	**GFA** for embodied **HFA** for operational	**HFA**	**HFA**	**GFA**	**GFA**	**GFA**	**GFA**	**UFA**
	GWP indicator	**GWP-total**	**GWP-fossil** and **GWP-total** (most likely)	**GWP-total**	**GWP-total**	**GWP-GHG**	**GWP-GHG**	**GWP-GHG**	**GWP-total**[5]
	Handling of biogenic carbon	**-1/+1 method** not handled separately yet	**0/0 and -1/+1 methods** not handled separately yet	**-1/+1 method** also separately (GWPbio) and in carbon handprint (D4)	**-1/+1 method** also separately as per EN 15804+A2 (GWPbio)	**0/0 method** not handled separately yet	**0/0 method** not handled separately yet	**0/0 method** not handled separately yet	**-1/+1 method**, temporary carbon storage may be reported (Annex V)
Assessment scope	Life cycle modules considered	**2023: A1-3, B4, B6.1, C3-4**; D1 & D2 separate declaration **2025**: **A4-5** added individually	**A1-3, A4, A5, B4, B6.1, C3-4**; D1 & D2 separately	**A1-3, A4, A5, B4, B6.1, C1, C2, C3-4**; carbon handprint separately	**A1-3, A4, A5, B4, B6.1, B6.2, C1, C2, C3-4**; D1 separately	**A1-3, A4, A5** (only waste), **B2, B4**	**A1-3, A4, A5**	**A1-3, A4, A5** (planned to include B2, B4, C1-4 from 2027 in carbon declaration)	full life cycle scope; the Delegated Act will specify the minimum modules required
	Building model parts included	**Substructure** (piling: allowance for exclusion) **Superstructure** **Building services** (without electricity and firefighting systems) **External works** (partly)	**Substructure** **Superstructure** **Building services**	**Substructure** (foundations: only declaration or excluded[1]) **Superstructure** **Building services** **Furnishing** (only fixed)	**Substructure** **Superstructure** **Building services**	**Substructure** (only pile and shallow foundation) **Superstructure** (without stairs, ramps and balconies)	**Substructure** **Superstructure** **PV panels**	**Substructure** (piling: only declaration from 2027) **Superstructure** **Building services** (for some building types; PV panels: only declaration from 2025) **Furnishing** (only fixed, for some building types)	EPBD refers to LEVEL(s): **Substructure** **Superstructure** **Building services** **External works**[3] **Furnishing**

Legislation Limit value Proposal

Methodological choices in Nordic regulation (continues)

Methodological choices in Nordic regulation		Denmark	Estonia	Finland	Iceland[9]	Norway	Sweden		Europe
		2023/ 2025	2022	2023	2025	2022	2022	2025	2024 (EPBD)
Other	**Exported energy calculation**	Inclusion of max. 25 kWh/m²/year renewable energy (embodied + operation)[2]	To be clarified	Exported energy is part of D3	To be clarified	Not applicable	Not applicable	Exclusion of solar cells (embodied + operation) in the 2025 limit value, and only separate reporting	prEN 15978 proposes two approaches[4]; The Delegated Act may require a specific approach
	Handling of long-term carbon removals	Not yet specified	Not yet specified	Not yet specified	Not yet specified	Not yet specified	Not yet specified	Not yet specified	Must be addressed, no further specification of a method yet (Article 7)
	Template to use when reporting the LCA	Voluntary template to help more uniform submissions (the 2.0 Standard format for LCA delivery) (BR18 - Bygningsreglementet, 2021)	Not yet specified	Not yet specified	online reporting format	No specific format	mandatory data reporting format prepared by Boverket		requires a digital logbook (no specification yet)

1. together with the foundations, it is also investigated whether site preparation and external areas will be only declared or fully excluded.
2. no distinction between self-consumed and exported renewable energy.
3. While LEVEL(s) includes external works, EPBD directive only covers the building, it may be assumed that external works are excluded from the inventory scope of the EPBD carbon declaration.
4. Approach A where embodied impacts of energy-generating systems are fully allocated to the building (exported energy is shown in module D2 as emissions-free) and Approach B where a proportional allocation takes place.
5. Level(s) requests for detailed subdivision as per 15804+A2

Legislation Limit value Proposal

Generic data, scenarios and standard values in Nordic regulation

Notable findings:

- Decarbonisation scenarios for energy supply (B6) are used in some Nordic countries, but not for other scenario-based modules
- Conservative factors are defined differently in conservative generic values for construction products used in Nordic countries

Generic data and scenarios in Nordic regulation		Denmark	Estonia	Finland	Iceland[9]	Norway	Sweden	Europe
		2023/ 2025	2022	2023	2025	2022	2022/ 2025	2021/ 2024
Decarboni-sation scenarios	Energy decarbonisation scenario for B6 (operation)	**Yes** 2023: Danish national policy scenario (2020) 2025: new national policy scenario[1]	**Yes** Estonian national policy scenario (2023)	**Yes** Finnish national policy scenario (to be updated 2024/Q3)	**No** Iceland already has 99% renewables and district heating	**Not relevant** B6 is excluded from the scope.	**Not relevant** B6 is excluded from the scope. May become relevant from 2027 where carbon declaration is planned to include B6.	**Yes** Level(s) chooses EU PRIMES model (EU Reference scenario)
	Decarbonisation scenarios for B/C modules (embodied)[2]	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Generic emission factors	Data source (base)	Table 7 in Appendix 2 of BR18, §297	Approved national generic data expected in 2024	CO2data.fi	no national generic database for building products yet, EPDs or other generic databases are used	no national generic database for building products, EPDs are used	Boverket's climate database	No specific plans for development of a common European database
	Conservative emission factors	New generic data for specific product types are based on the 75% percentile of related EPD Danmark values[3]	1.2	1.2 but not for energy and fuels emission data	1.25 added only if not already included	1.25 added only if not already included	1.25 but not for energy and fuels emission data	No specific proposal

Generic data, scenarios and standard values in Nordic regulation (continues)

Generic data and scenarios in Nordic regulations		Denmark	Estonia	Finland	Iceland	Norway	Sweden	Europe
		2023/2025	2022	2023	2025	2022	2022 /2025	2021/2024
Standard values	Building elements[4] ($kgCO_2e/m^2$)	**Building services** (for A1-3, C3-4: 33-62 $kgCO_2e/m^2$; range due to differences per building type)	**Building services** (for A1-3: 42-125 $kgCO_2e/m^2$; for B4: 6,1-141 $kgCO2e/m^2$; range due to differences per building type) As a rule, CO_2 data.fi also includes C3, D, but not for the broad standard values for building services available per type of building		**Building services** (for A1-3: 56-94 $kgCO_2e/m^2$; range due to differences per building type)	**Not relevant**	**2022: No** **2025: Building services** (for A1-5: 12-60 $kgCO_2e/m^2$) **Internal finishes and furnishing** (for A1-5: 22-53 $kgCO_2e/m^2$)	No specific proposal
	Life cycle modules[4]	**No**	Under investigation	**A4**, C2 (20,4 $kgCO_2e/m^2$) **A5** (43-59 $kgCO_2e/m^2$) **C1** (10 $kgCO_2e/m^2$)	**A4** (19.8 $kgCO_2e/m^2$) **A5** (42.5 $kgCO_2e/m^2$) **C1-C4** (43.75 $kgCO_2e/m^2$) **B6:** average data on energy consumption	**No**[5]	**Yes**, derived from a study, but only provided as a guide, project-specific values must be used.	No specific proposal

1. the new scenario reflects 2022-2050 projections by the Danish Energy Agency (DEA), which also incorporate political objectives and not just approved investments (frozen policies); this results in factors being reduced by nearly 40%, 80% and 45% for electricity, district heating and gas, respectively (Nilsson, Høibye, & Maagaard, 2023)
2. Although this aspect is not currently integrated into any of the mandatory methods in Nordic countries and Estonia, it is part of some national voluntary methods such as the FutureBuilt Zero method in Norway. This method follows a simplified approach, where: (a) a technology factor of 0.33 is assumed for the production of PV systems in year 30; (b) for other material-related processes (production, transport and waste incineration) an 1% annual technology development is used, which is based on historical development in Norwegian industry. Such considerations are also seen in the new draft DGNB method in Denmark which applies an 1% annual technological improvement factor (on top of a time factor), (Green Building Council Denmark, 2024)
3. see: Kragh, J., & Birgisdottir, H. (2023). Udvikling af dansk generisk LCA-data. (1 ed..). BUILD Report 2023:16
4. standard values for building elements are usually provided per building type and life cycle module. The sources of the provided values (building elements and life cycle modules) and other values from recent studies done in Sweden and Denmark can be found in Appendix B.
5. A5 can be given as a% of A1-4 and varies per material type. Standard values in terms of transport distance and other parameters can be used for A4.

Legislation Limit value Proposal

Influential variables for limit values

Inventory scope:

Differences represent a large source of variability

In particular the inclusion of deep foundations, external works, building services, interior finishes and refrigerants.

Reference area:

Differences influence whether basements and balconies are seen as advantageous

For buildings with very low embodied emissions, basements and balconies might be detrimental regardless.

Scenarios in modules B and C:

The choice considerably influences the results

Scenarios for replacement and waste treatment should be implemented without break the -1/+1 balance of biogenic carbon.

Generic emission factors:

Differences in national databases can be considerable

This can lead to differences of about 25% for a given building, and above 70% for specific materials.

There are actual differences between products found on each national market, but also methodological differences.

Composition of case basis:

Archetypes or a representative building sample may be used to set the limit value

Ex: set the limit so that x % of buildings in a representative sample would not meet it (Denmark).

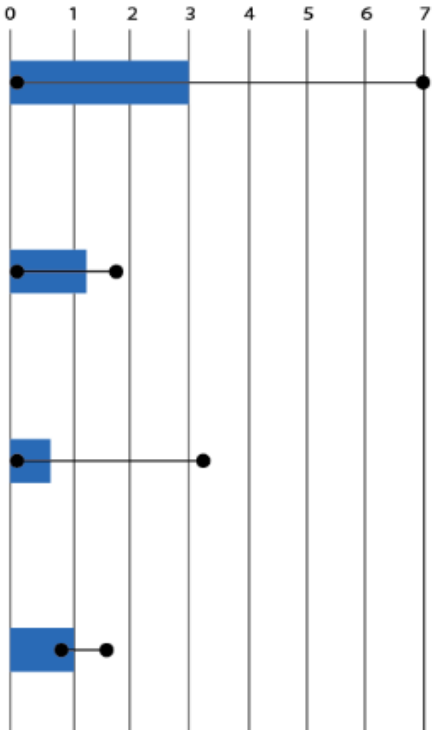
The composition of the building sample is highly important.

Example: Building and life cycle scope for context- & location-sensitive aspects

Should carbon limits influence the choice of location?

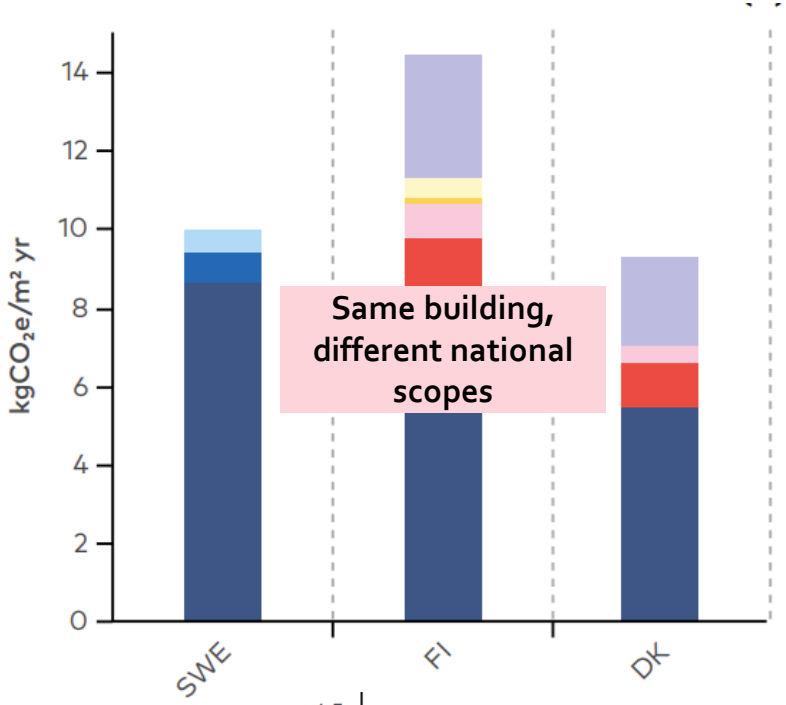
Options for location-sensitive factors:

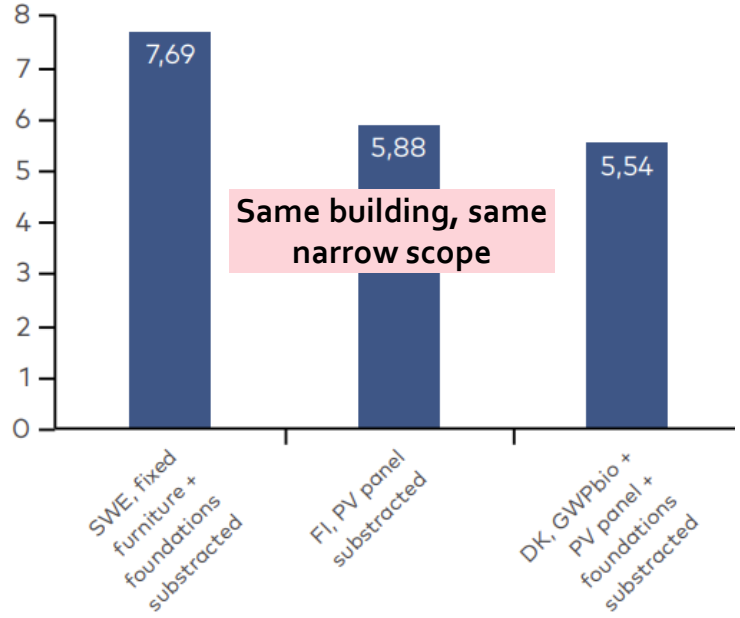
- Exclusion from the assessment scope
- Separate limits
- Exemptions for extreme cases

		LCA scope aspect (building part and/or LC process)	Absolute impact (kg $CO_2e/m^2/yr.$)	(Average) median
Context- and location-specific aspects	1	**Building part:** Deep foundations/ Soil stabilisation (A1-3)		2.90
	2	**Building part:** Basement parking (A1-3, C3-4)		1.20
	3	**Building part:** External works/ Landscaping		0.50
	4	**LC process:** Construction site (A5)		1.00

Example: Generic emission factors for products

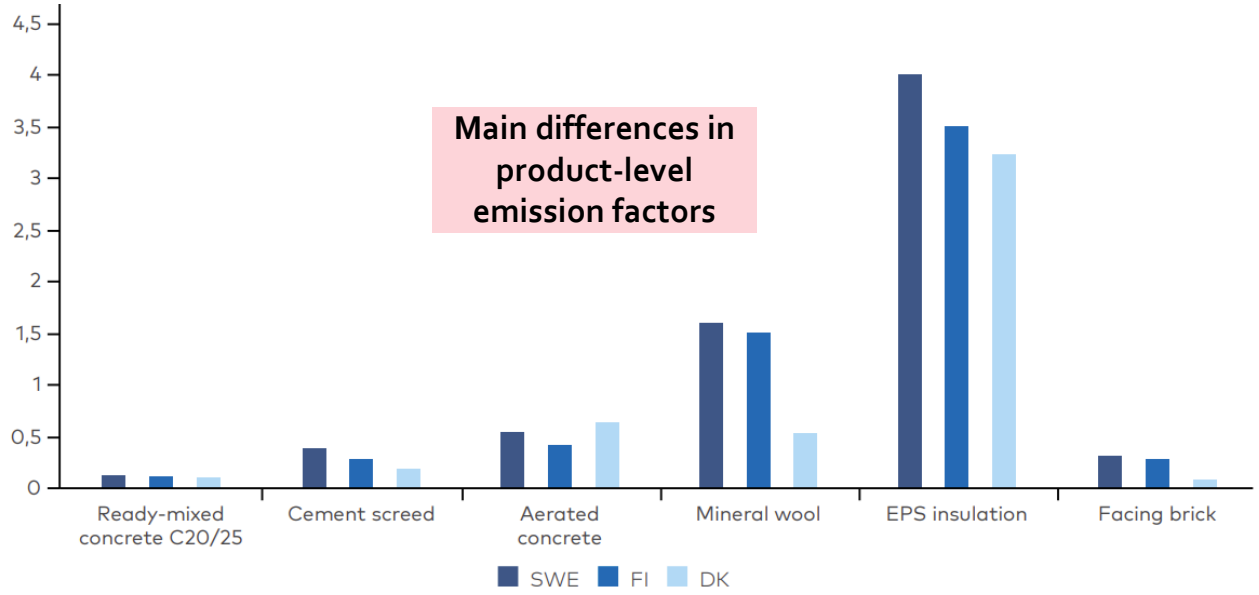
Would we still see significant variations if we align the scopes (modules, building model)?





Need for joint efforts to:

- Harmonise database structure and conservativity approach
- Create a joint generic database for low volume construction products



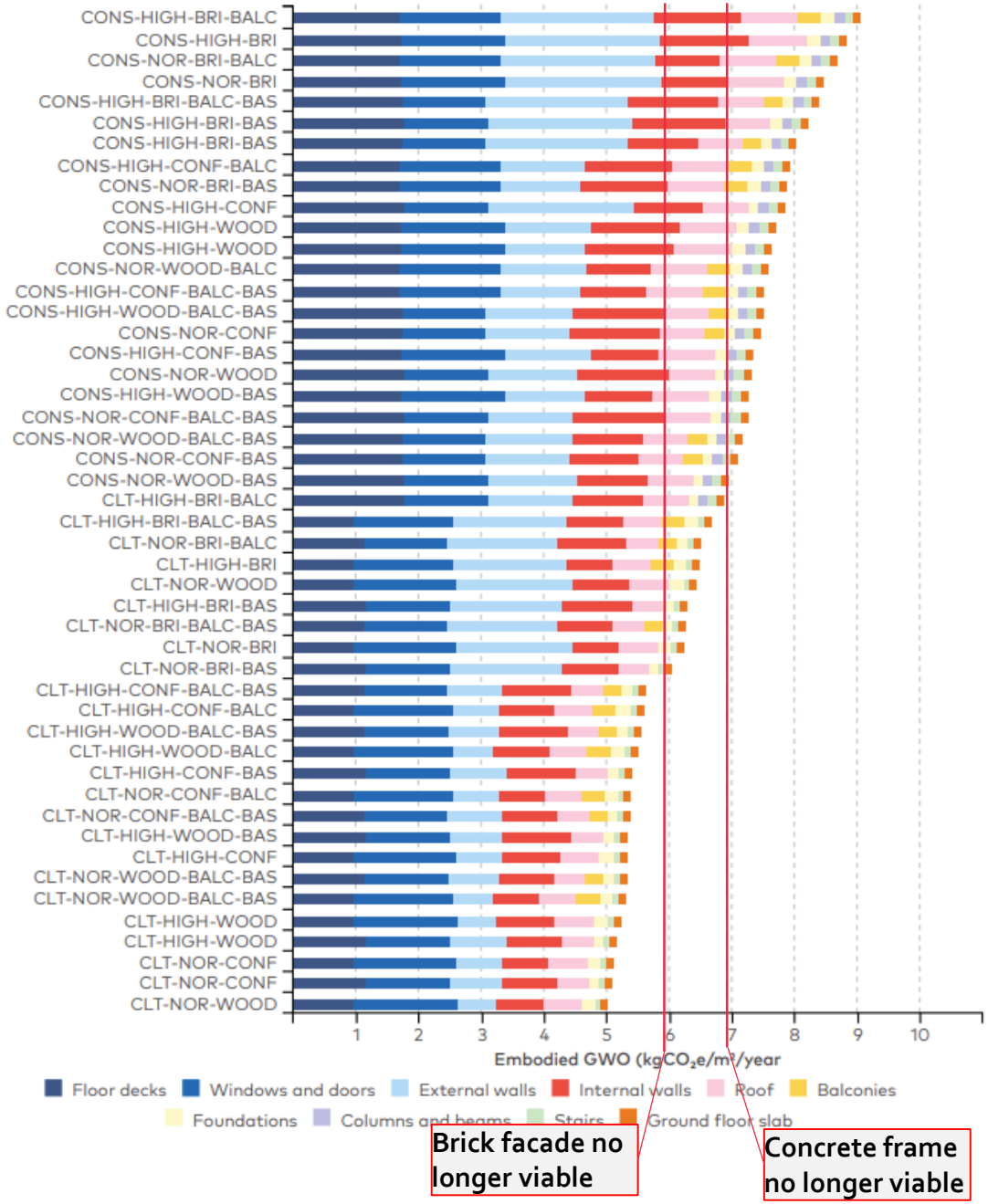
Further implications

- Some mitigation can be achieved through decarbonization in the supply chain and careful choice of product, without significantly changing building design.
- Limit values might increase the demand for timber, which is a limited resource.
- Limit values might increase costs in development projects.
- Sufficiency-based targets for building less, smaller or with different quality standards may become vital for achieving ambitious climate goals.

Building design

Example of embodied climate impacts (A1-A3, B4, C3-4) of an archetypical apartment building, for various combinations of:

- **Structural frame**
  (concrete elements; Cross-laminated-Timber)
- **Internal wall surface**
  (normal surface; high surface)
- **Façade material**
  (concrete sandwich; brick; wood)
- **Balconies**
  (Yes; No)
- **Basements, unheated**
  (Yes; No)



Creating regulation: Key steps to consider

1 Build up competence

Academia
Industry

- **Learning resources** adapted to national contexts
- **Certification schemes** to foster competition

2 Secure stakeholder involvement

- **Balance current readiness** with future requirements
- **Monitoring and revisiting** regulation

3 Ensure access to generic data and standard values

- **Phasing out of the conservativity factor** in generic data
- Use of **standard component values for as-built** reporting
- **Alignment of structure and content** of databases

4 Improve availability and digitalization of EPDs

- **Subsidies or automated tools** designed to generate EPDs

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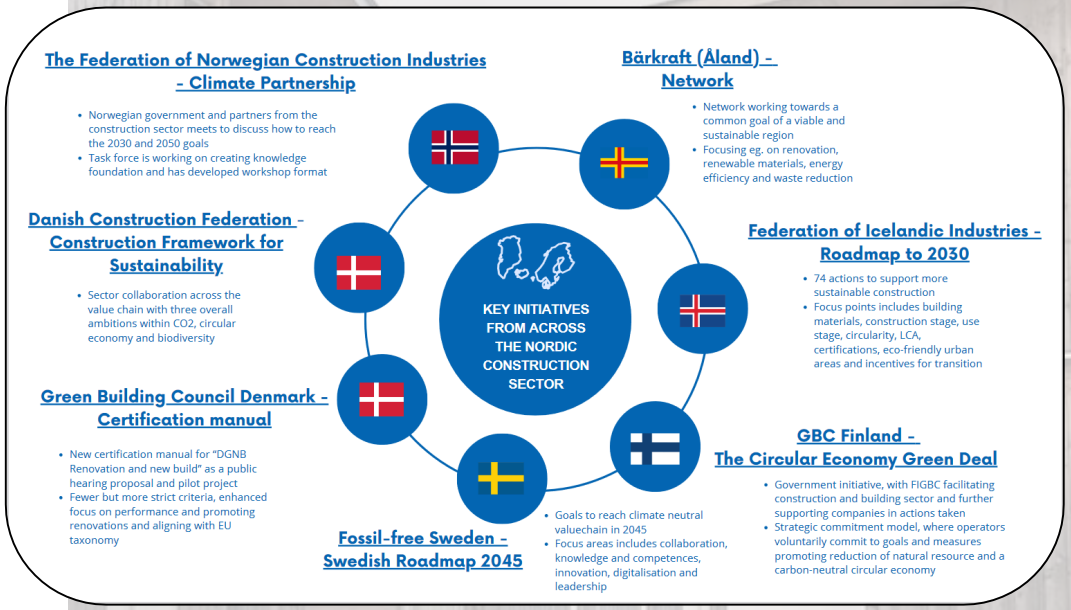

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BR 18, bilag 2, tabel 7
Generisk datagrundlag

CO2data.fi/rakentaminen

Boverket

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Authorities
EPD Operators

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Creating regulation: Key steps to consider

5 Create a case basis and structure for the limit values

Academia
Authorities

- **Real cases sample** for feasible limit values (archetypes for potentials)
- **Need for differentiation** of limit values

6 Determine the initial scope and method

Policymakers
Authorities
Academia

- **Start with a limited scope** (size and type, modules, building model)
- **Need to highlight upfront carbon reduction** (several options)

7 Establish a suggested limit value pathway

Authorities
Policymakers
Industry

- **Incremental implementation** of methods and limit value levels (long-term roadmap)
- **Impact assessments** to support gradual expansion (scope/ projects)

8 Expand the regulation to renovations

Authorities
Academia
Industry

- **Avoid creating burdens** for renovations with environ. benefits
- **Develop a harmonised approach** (start with deep renovations)

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	2022		**All new buildings** A1-A5
1/10 buildings to perform better **New buildings > 1,000 m²** **12 kgCO₂e/(m² yr.)** A1-A3, B4, B6, C3-C4 **All new buildings** A1-A3, B4, B6, C3-C4 + D	2023		
	2024		
17/20 buildings to perform better **New buildings/Extensions > 50 m²** **Extensions for small houses > 250 m²** **4-8 kgCO₂e/(m² yr.), building type dependent** Average: 7.1 kgCO2e/(m² yr.) A1-A3, B4, B6, C3-C4 **Construction process: 1.5 kgCO₂e/(m² yr.)** A4, A5	2025	**1/2 buildings to perform better** **New buildings > 100 m²** **180 kgCO₂e/m², 1-or 2-family houses,** A1-A5, *~3,6 kgCO₂e/(m² yr.) for 50 years RSP* **330-460 kgCO₂e/m², building type dependent,** A1-A5, *~6,6-9,2 kgCO₂e/(m² yr.)*	
	2026		
~ 10% ↓ *Likely inclusion of outdoor areas*** *Potential extension to further life cycle modules (B1, B2, C1, C2) following European developments***	2027		**New buildings and deep renovations** A1-A5, B2, B4, B6, C1-C4
	2028		
~ 10% ↓	2029		
	2030		**15% ↓ 1-or 2-family houses** **25% ↓ other building types**

limit value carbon declaration

* Initially planned tightening to "1/3 buildings to perform better"
**still open to political negotiations

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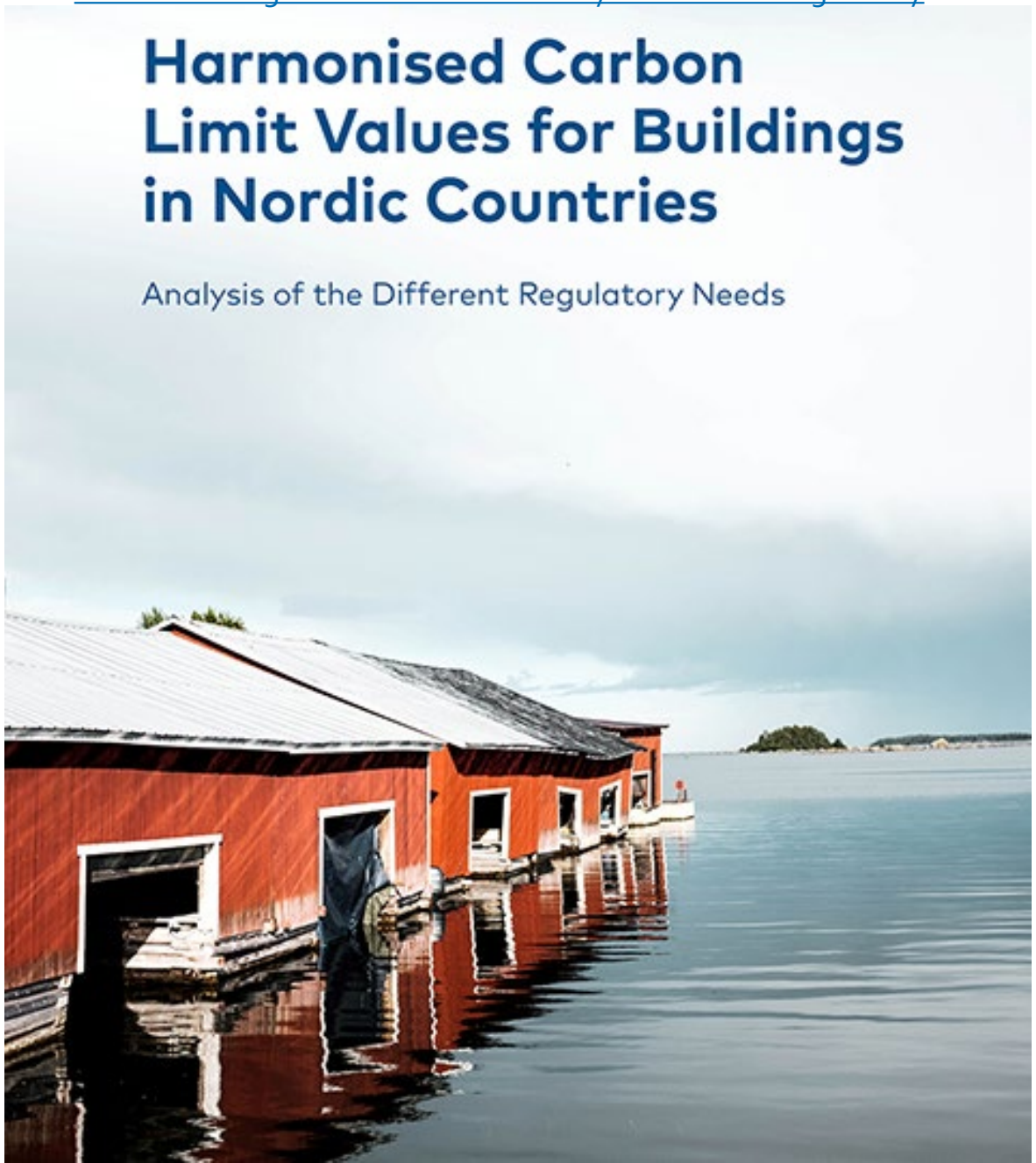
Thanks for listening!

Nordic Sustainable Construction

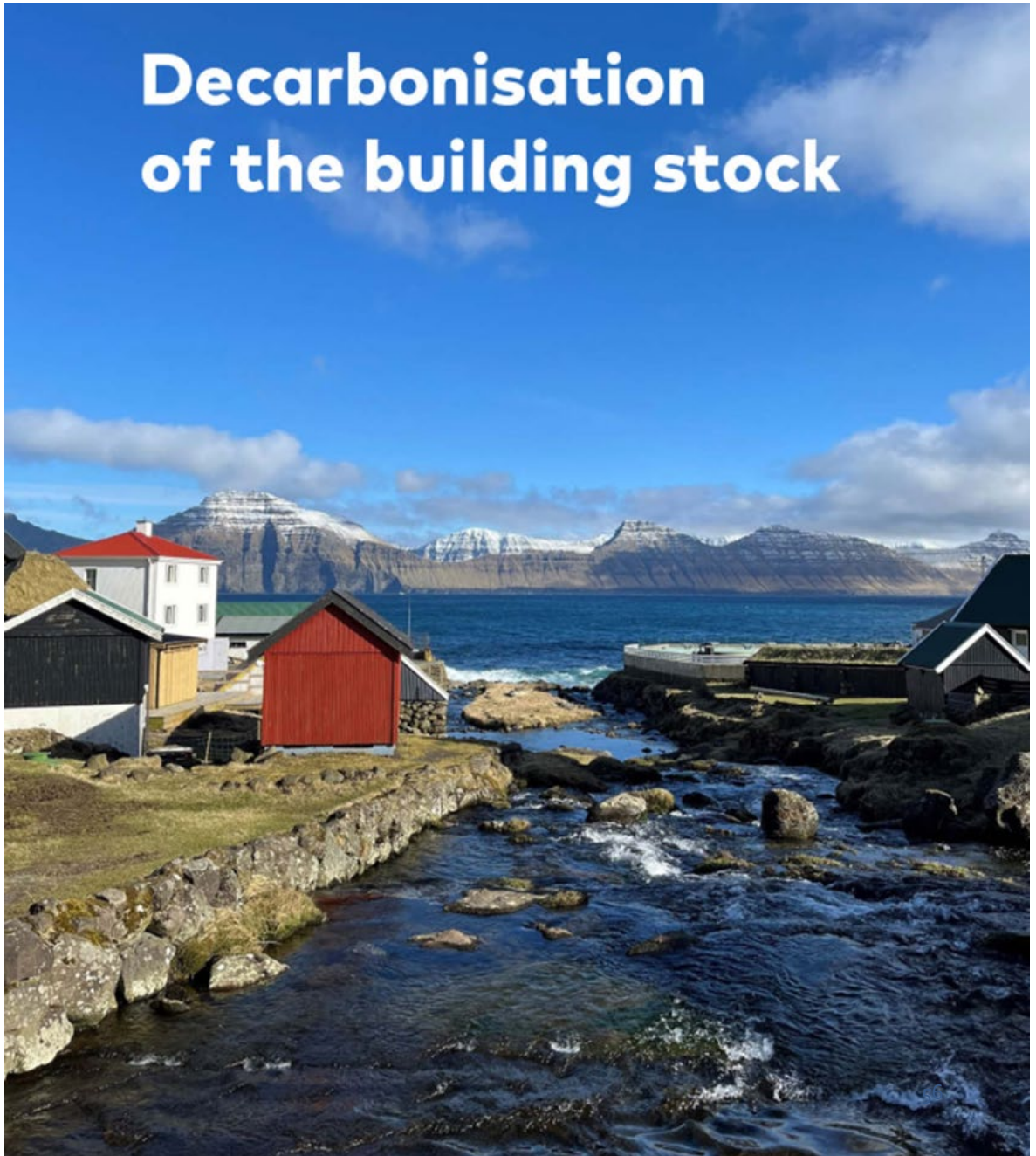
Q&A

Questions and comments can also be send to:
sm-dk-lca-and-co2-limits@sweco.dk
or morten.ryberg@sweco.dk

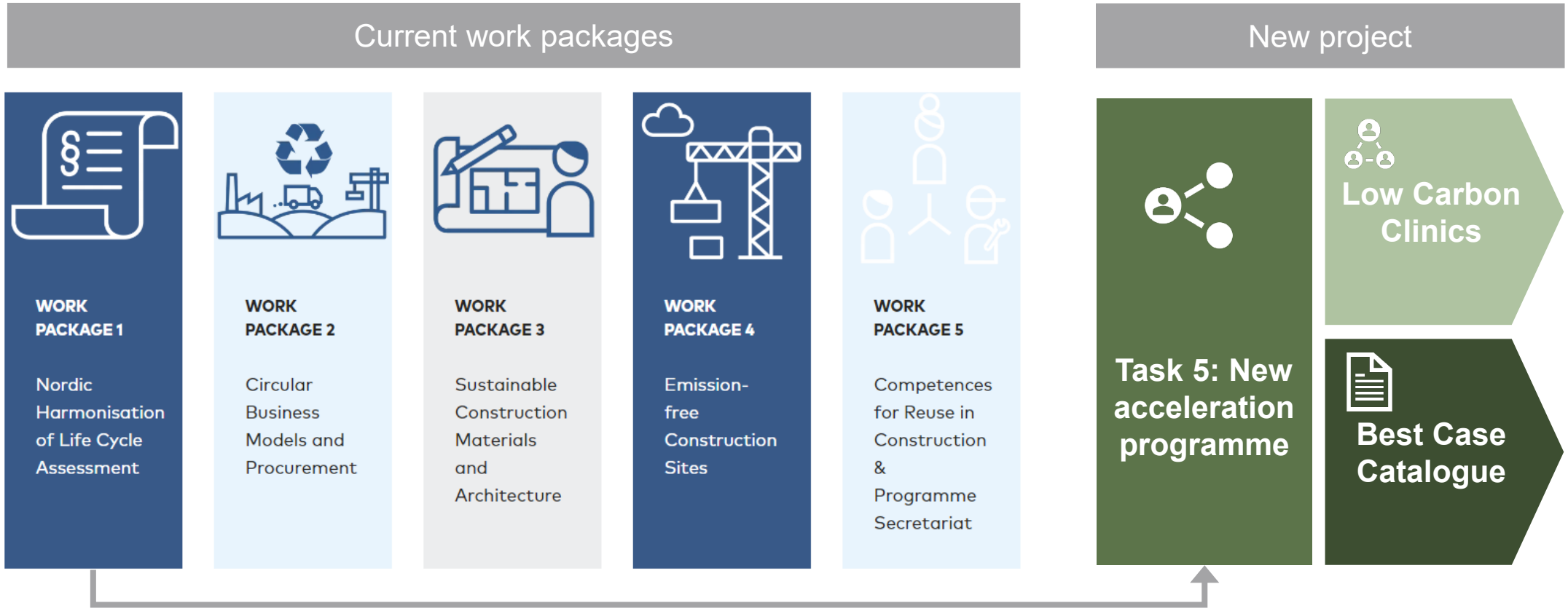
https://www.norden.org/en/publication/harmonised-carbon-limit-values-buildings-nordic-countries-analysis-different-regulatory



https://www.norden.org/en/publication/decarbonisation-building-stock



Task 5: New Acceleration programme



Nordic Sustainable Construction

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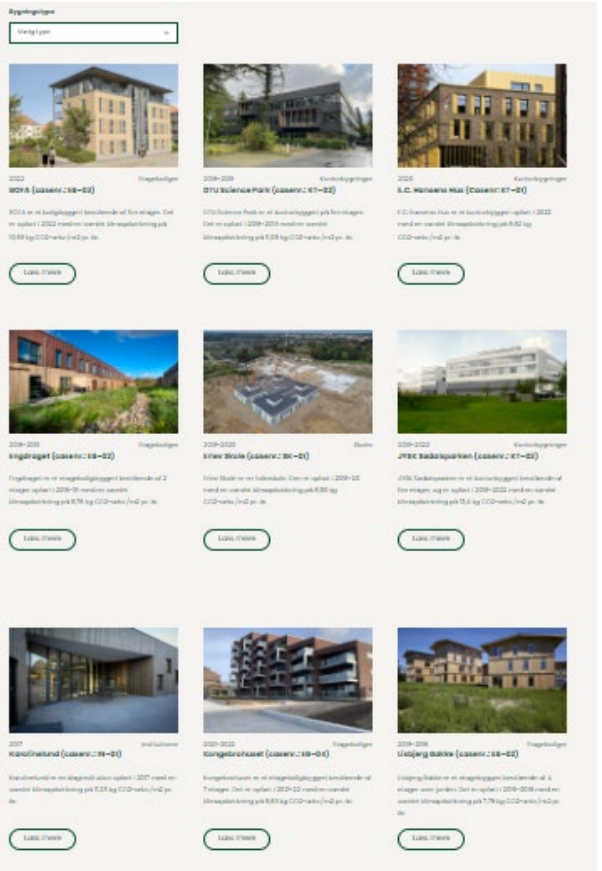
Task 5: New Acceleration programme

Project is running until end of 2024. Results will be published Nov/Dec 2024 and Jan. 2025

Low Carbon Clinics

Best Case Catalogue



Nordic Sustainable Construction

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Thank you for joining

Nordic Sustainable Construction