Nordic view

- data needs and scenario settings for building LCA

Helle Redder Momsen
18 09 2024

Nordic Sustainable Construction

Agenda

- Why are the Nordic countries collaborating to build better?
- What is the focus of the collaboration "Nordic Sustainable Construction"?
- What specific areas have been in focus regarding BIM and digitalisation in the collaboration? Any results?
- What might be a focus in a new phase of a Nordic collaboration on construction?

It began with a Vision

Our vision 2030

A **competitive** Nordic region

Together, we will promote green growth in the Nordic region based on knowledge, innovation, mobility and digital integration.

A **green** Nordic region

Together, we will promote a green transition of our societies and work towards carbon neutrality and a sustainable circular and bio-based economy.

The Nordic region will become the most sustainable and integrated region in the world

A **socially sustainable** Nordic region

Together, we will promote an inclusive, equal and interconnected region with shared values and strengthened cultural exchange and welfare.

Nordic collaboration on Building Regulations

Nordic Vision 2030

2019
Nordic Vision 2030
Nordic Prime Ministers

2019
Nordic Ministerial Declaration Housing and Construction

2021
Nordic Sustainable Construction Programme

2023
Nordic Ministerial Declaration Housing and Construction

Nordic Ministerial Declaration, 2023

Nordic Ministers responsible for construction and housing

"We reaffirm our commitment to the ongoing work towards **low carbon solutions** and the integration of **circular principles** in the **Nordic construction and building sector**"

"… reaffirm our commitment to continue our collaboration on **harmonising relevant regulations, methods, data, tools, and policies for carbon neutrality in the built environment**, in accordance with the **basic principles of a Roadmap**, jointly developed within the Nordic Sustainable Construction network.

"Acknowledge the need to reduce the **emissions and waste** from the construction process, and **work towards emission free construction sites**"

"Recognise the potential in **preserving** and **developing existing building stock** as a contribution to reduced emissions"

Nordic Council of Ministers

Nordic commitment to low carbon construction and circular principles in the construction sector – common effort and common gain

The building and construction sector plays a significant part in the shift towards a greener and more climate-friendly built environment. The global climate change and ongoing energy crisis in Europe underline the importance of a joint Nordic effort to cope with the challenges that we are facing.

Adopted: 27.09.2023

Location: Reykjavik

Organisation: Nordic Council of Ministers

We, the Nordic ministers responsible for construction and housing:

Affirm our commitment to fight climate change by facilitating reductions in emissions from the built environment. Further, we state our commitment to work towards making the Nordic construction sector the most sustainable in the world.

Recognise that the construction sector has a significant environmental impact, and that buildings affect the climate throughout their lifespan. At the same time, we recognise the construction sector's potential to play a major part in the transition to a sustainable future.

Call for collaboration in the search for low carbon solutions in the Nordic construction sector, through Nordic co-operation and harmonisation where possible.

Acknowledge the need to reduce the emissions and waste from the construction process, and work towards emission free construction sites.

Will work towards reducing greenhouse gas emissions from building materials.

Recognise the potential in preserving and developing existing building stock as a contribution to reduced emissions

Reaffirm our commitment to continue our collaboration on harmonising relevant regulations, methods, data, tools, and policies for carbon neutrality in the built environment, in accordance with the basic principles of a Roadmap, jointly developed within the Nordic Sustainable Construction network.

Call for continued collaboration on establishing a common framework for calculating greenhouse gas emissions in building projects.

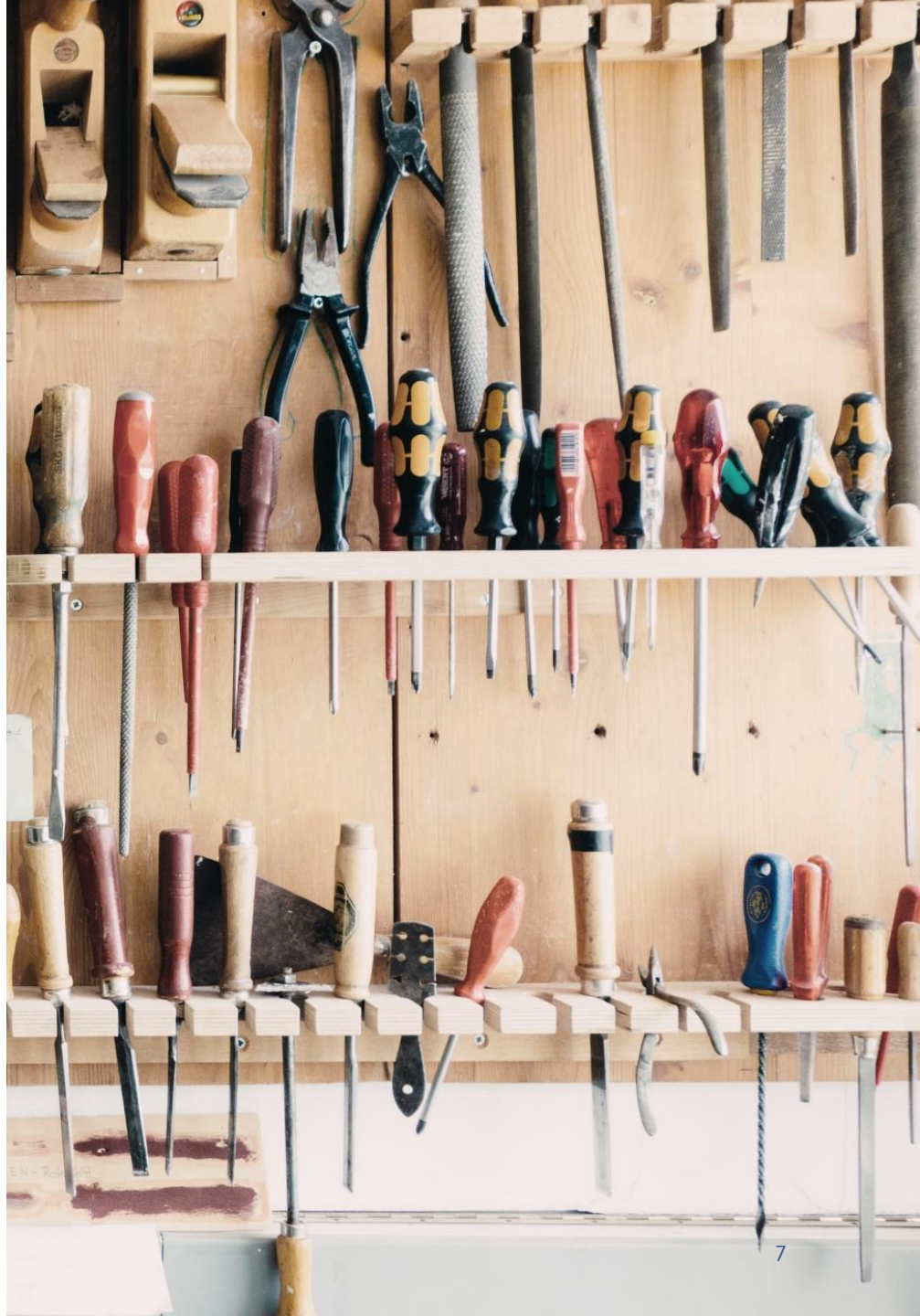
Recognise that using and enhancing EU initiatives, can contribute to making the Nordic countries the most sustainable region in the world.

Call for continued Nordic collaboration on developing a framework for facilitating the circular economy in the building sector.

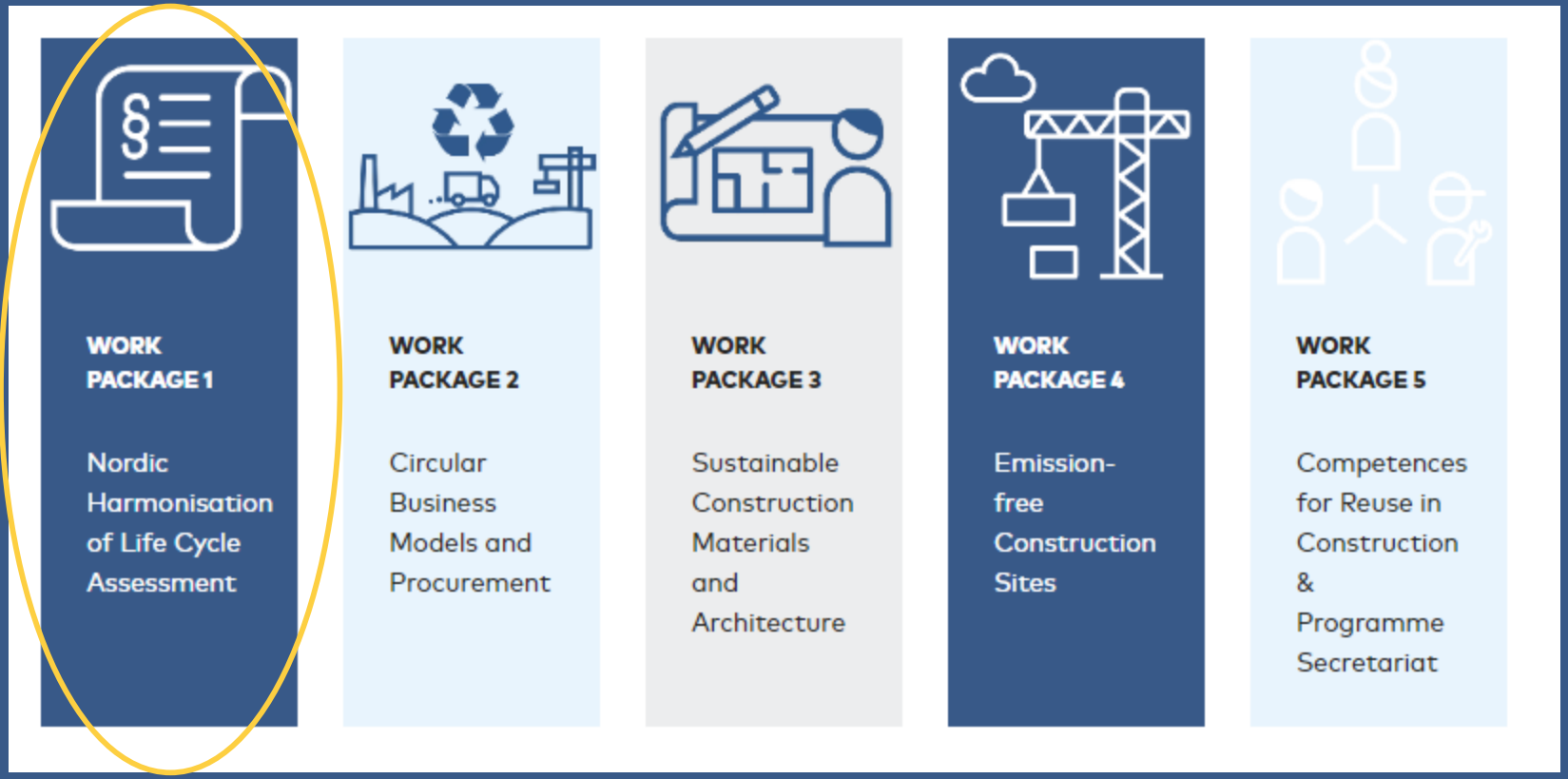
Stress the importance of continuing and strengthening Nordic collaboration.

Our purpose

The Nordic Sustainable Construction programme aims to support the ambition in the Nordic Vision 2030 of establishing the Nordics as a leading region in sustainable and competitive construction and housing – with minimised environmental and climate impact.



Nordic collaboration to Nordic vision



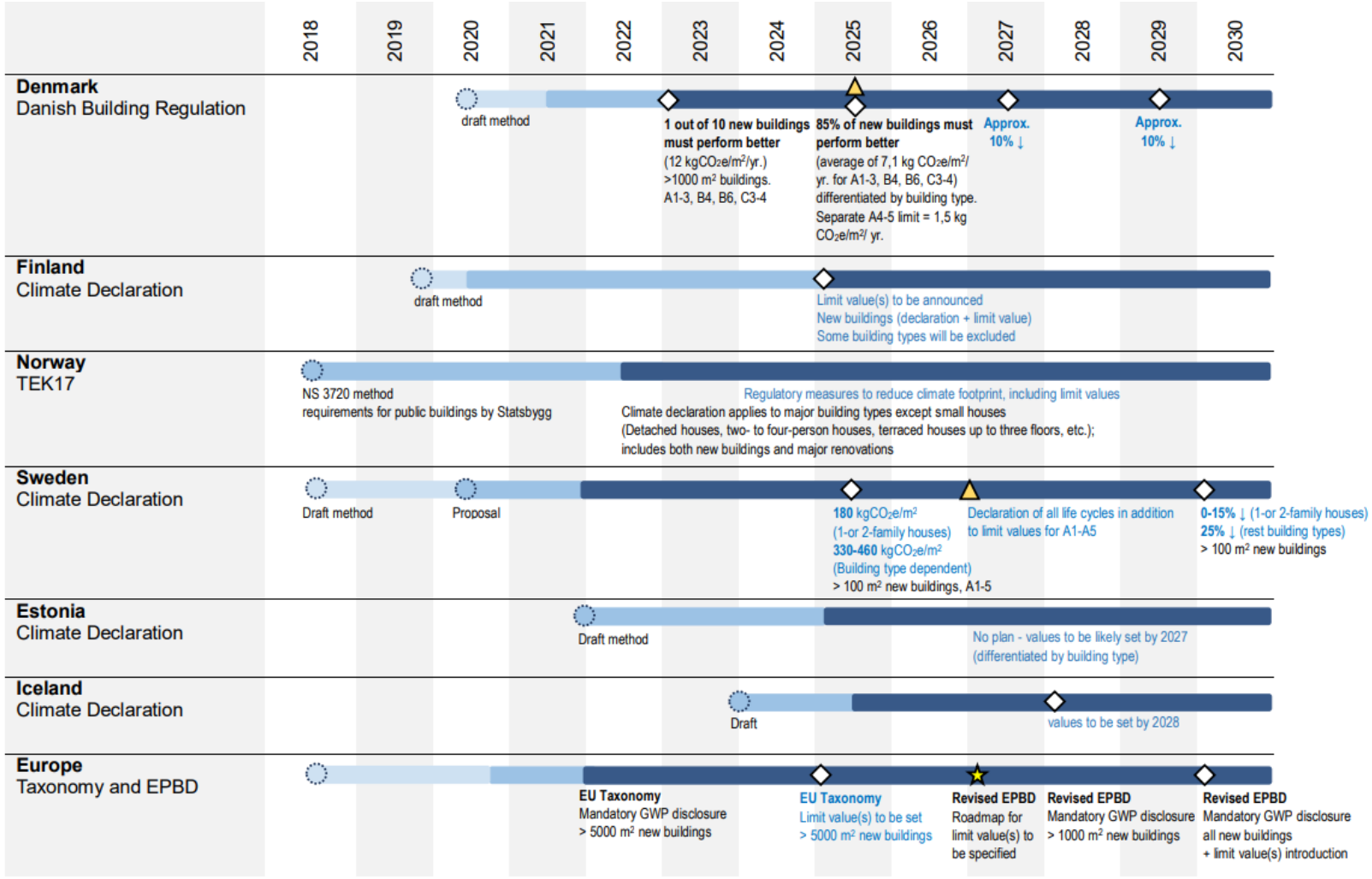
Ympäristöministeriö
Miljöministeriet
Ministry of the Environment

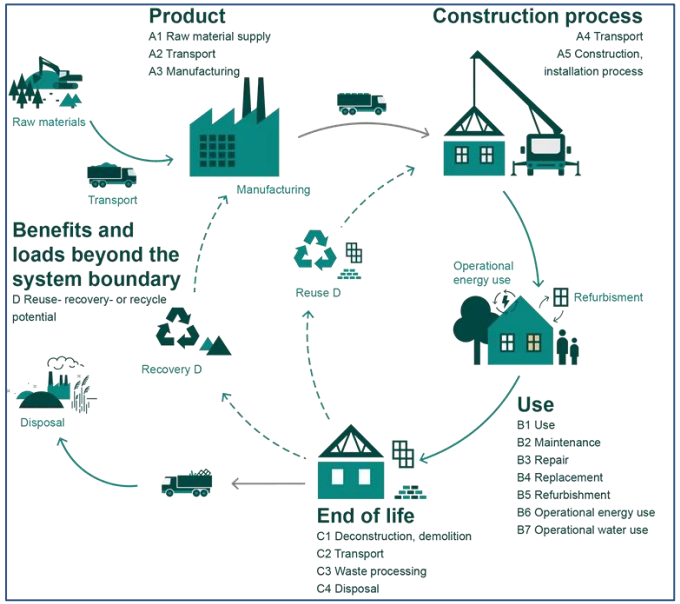
Work Package 1

Nordic Harmonisation of Life Cycle Assessments

Task 1	Task 2	Task 3	Task 4	Task 5
Analysis of Nordic LCA Practices	**Data for LCA**	**BIM for LCA - Calculating the Climate Impact of Buildings Through Digitalisation**	**Limit Values and Monitoring the Decarbonisation of the Nordic Building Stock**	**Acceleration Programme: Knowledge Sharing Clinics and Best Practice Catalogues**
2 reports: • Nordic feasibility study on harmonisation of building LCA (June 2022- internal) • Roadmap for Harmonising Nordic LCA regulation (Sep. 2023)	1 big report: Nordic view on data needs and scenarios settings for full life cycle building environmental assessment (June 2024) Strengthen collaboration between Nordic data LCA experts 2 webinars 5 workshops	2 reports: • The operating environment of building LCA and BIM in the Nordics and Estonia (Dec. 2023) • BIM-based building LCA - instructions for material inventory for climate declarations (Sep 2024) 2 webinars (one coming) +30 BIM models (Sep 2024) 8 short e-learning videos on how to use the BIM models (Sep 2024)	3 reports: • Process for Monitoring the Decarbonization of the Building Stock (Jan. 2024) • Harmonising limit values for buildings across the Nordics (March 2024) • Decarbonization of the building stock (*Sep 2024*) 2 webinars	The acceleration programme to speed up decarbonisation of the building and construction sector 1 launch webinar 1 workshop and tailor made consultancy (Sep. 2024) Report: Nordic Low Carbon Building Catalogue (Dec 2024).

Timeline of carbon declaration and limit values integration





Integration in national legislation
Test phase of coming regulation
Preliminary method development
Limit values (to be) integrated
Draft method publication
Declaration scope extension
"Blue" indicates proposals, not final decisions
Roadmap

[Overview of Nordic Climate Declarations and Limit Values integration | Nordic Sustainable Construction]

European initiatives

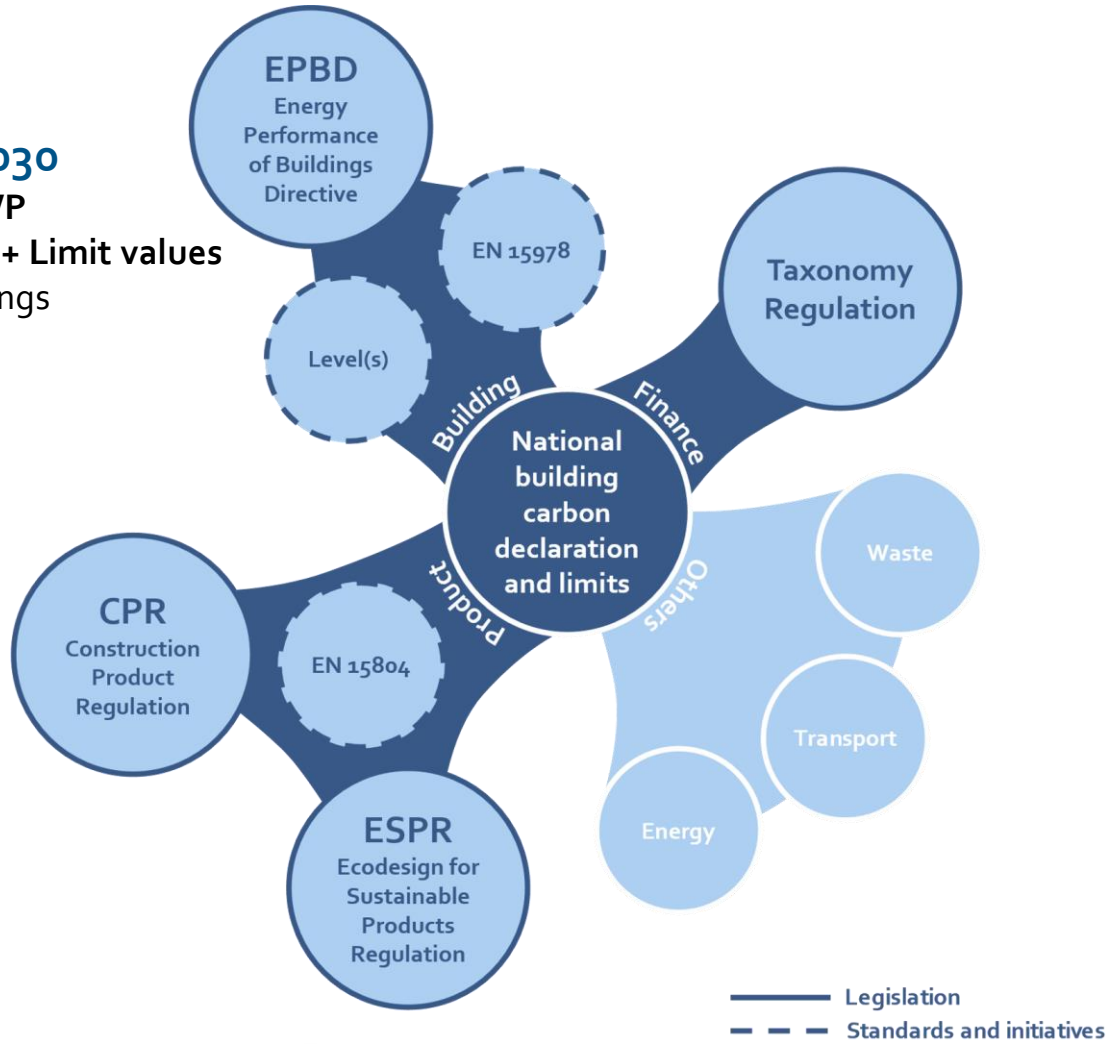
May 2024
Publication of the EPBD & enter into force
First method aspects defined

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

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

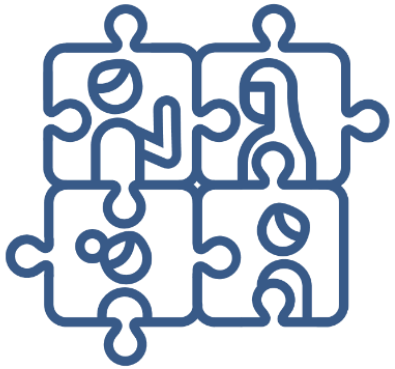
January 2028
Life cycle GWP Declarations:
New buildings over 1000 m2 Useful Floor Area as part of Energy Performance Certificate

January 2030
Life cycle GWP Declarations + Limit values
All new buildings



Differences between the Nordic countries

- What buildings to include in the regulation?
- What area and building parts to regulate?
- What scope to include in the limit value calculation?
- When in the building process to declare?
- How to report the LCA data?
- Etc….



Building uses and sizes covered

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

Building TYPE	Denmark	Estonia	Finland	Iceland[9]	Norway	Sweden	Europe (EPBD)
	◎ 🗎	🗎	◎ 🗎	◎ 🗎	🗎	◎ 🗎	🗎
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

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

Organisation of the task 4

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

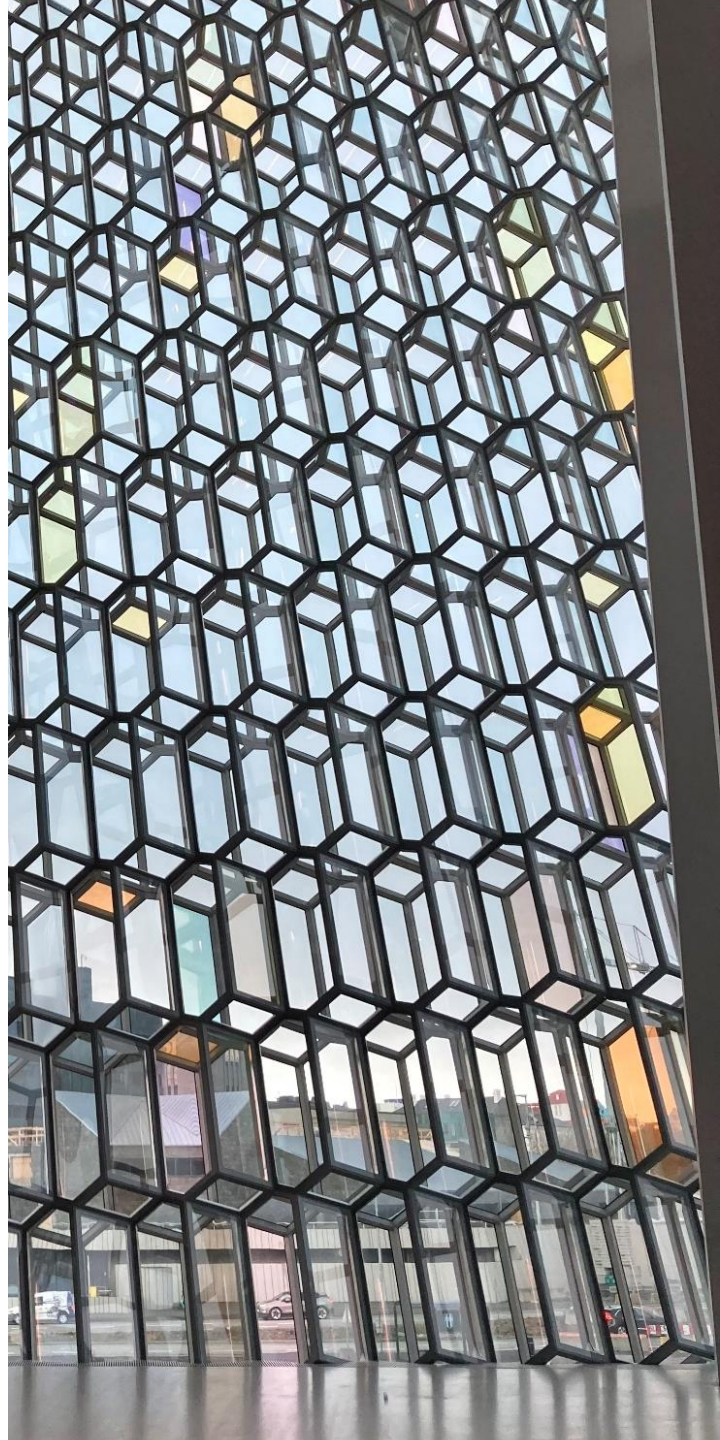
EFLA, Iceland

LCA Support, Estonia

EXPERT ADVISORY GROUP (EAG)

Can digitalisation help?

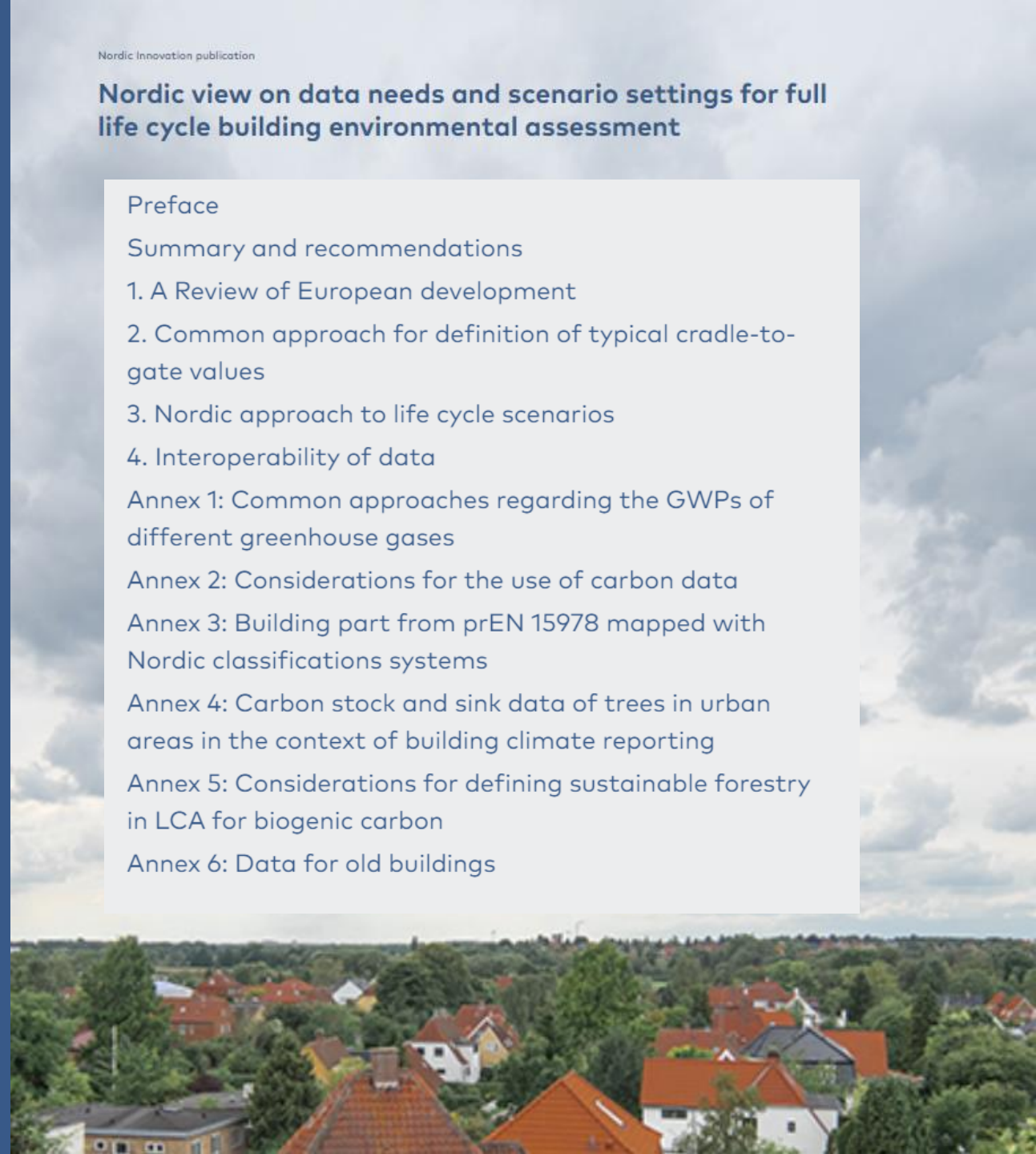
- Regulation of embodied carbon = more data to handle
- Tightened limit value = need for improved building designs
- Mapping between building classification systems
- Machine readable templates for out put data
- Databases and product specific data
- …



Data, data, data

- Strong focus on data quality, machine readable data and how to make data talk together so it can also be used in BIM.

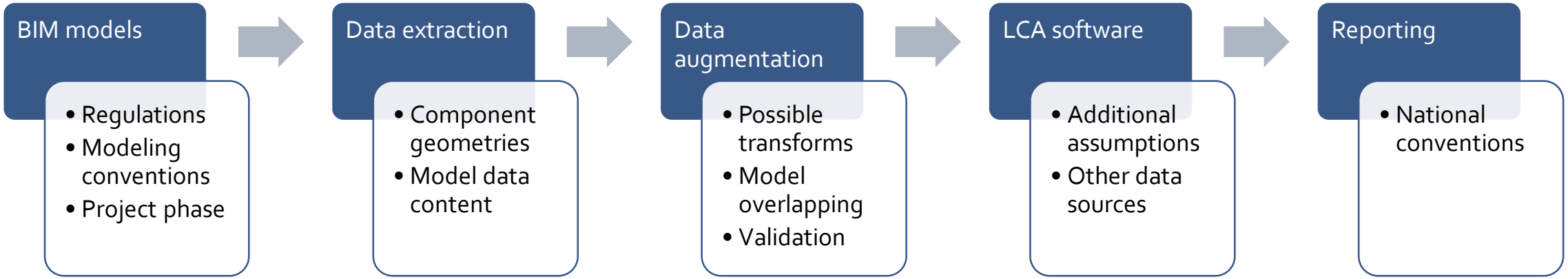
- Details in REPORT: Recommendations for a Common Nordic Approach to Combat New Buildings Life Cycle Climate Impact | Nordic Sustainable Construction



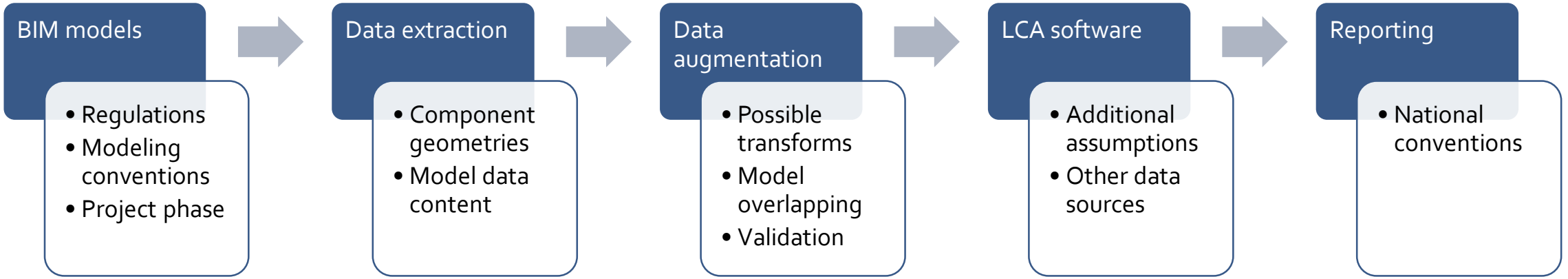
New report

Contents

Current state: steps from BIM to LCA



Possible issues in the data flow



- Objects modelled incorrectly
- All objects not modeled
- Data may be recorded in different properties
- Varying naming and typing conventions

- LCA system boundary may differ from modeled content
- Take-off units not corresponding to LCA databases
- Data in nonstandard locations
- Reliability of quantities?
- Manual extraction work, error-prone

- No knowledge on missing information
- Difficult to solve overlapping between modeled domains
- Object types in BIM models not easily mappable with other documents

- Lacking coordination from BIM modeler to LCA analyst
- Not sure of materials and products

- Not clear, to which LCA reporting category a BIM object belongs
- Low automation in previous steps leads to repeated work

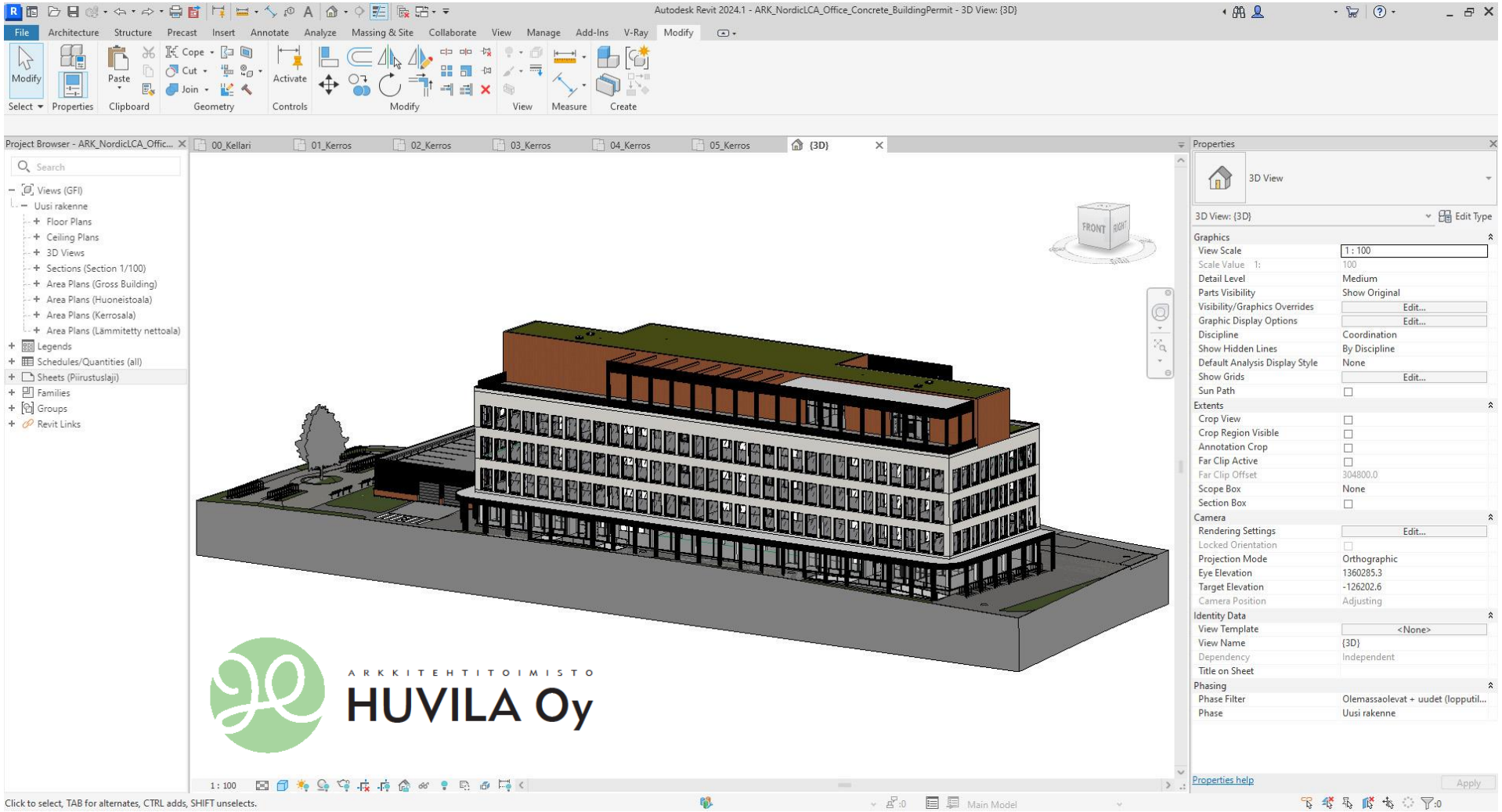
BIM-based building LCA process

Native

IFC

Processing

LCA



BIM-based building LCA process

- BIM provides adequate information on correct quantities
- This information is linked with the emission data in the LCA software.

Native

- Modelling in native software (Revit, ArchiCAD)
- Specifications for required properties for the objects, based on LCA requirements

IFC

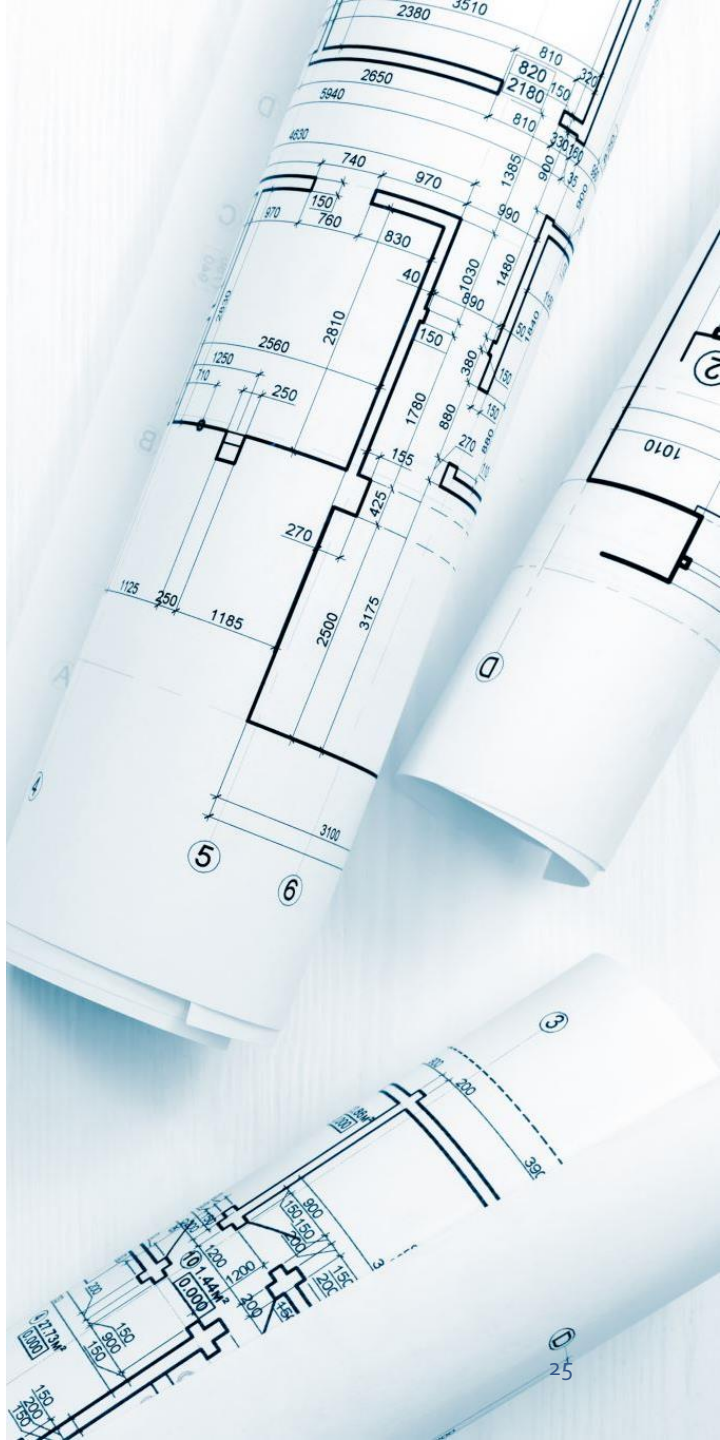
- IFC format as standardized exchange format
- Data specification in IFC property sets
- Export to material inventory lists with standardized fields

Processing

- Data augmentation and additional assumptions (manually, or later in the LCA software)
- Possible processing into format accepted by LCA software

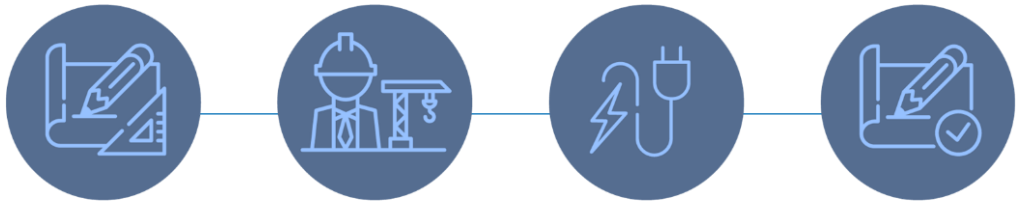
LCA

- Examples of importing material inventory lists into LCA software
- Reporting and calculation in LCA software, business-as-usual - creating national reports in LCA software is not included



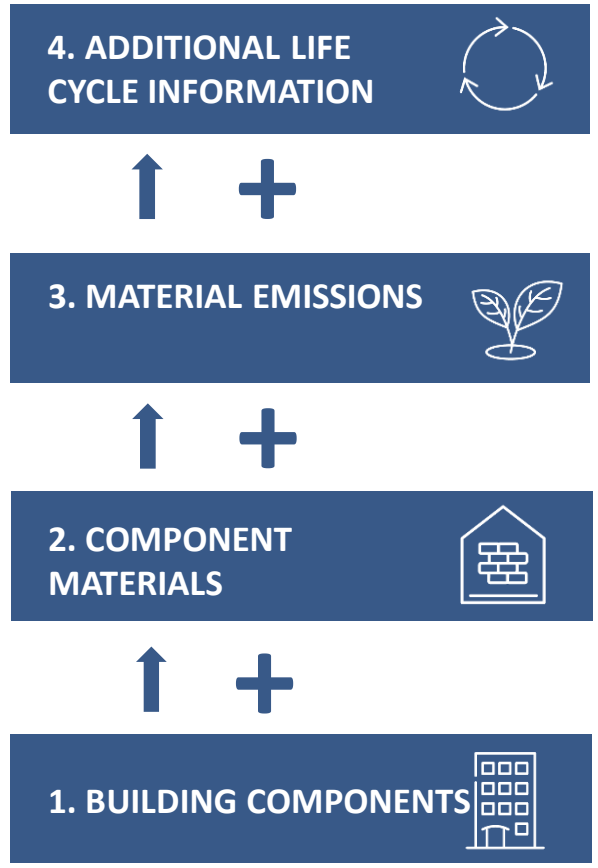
Whole life carbon assessment

Whole life carbon of a building, kg CO_2e



PRODUCT STAGE | CONSTRUCTION | USE STAGE | END OF LIFE

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY



Use of the IFC model to calculate the CO_2 of a building

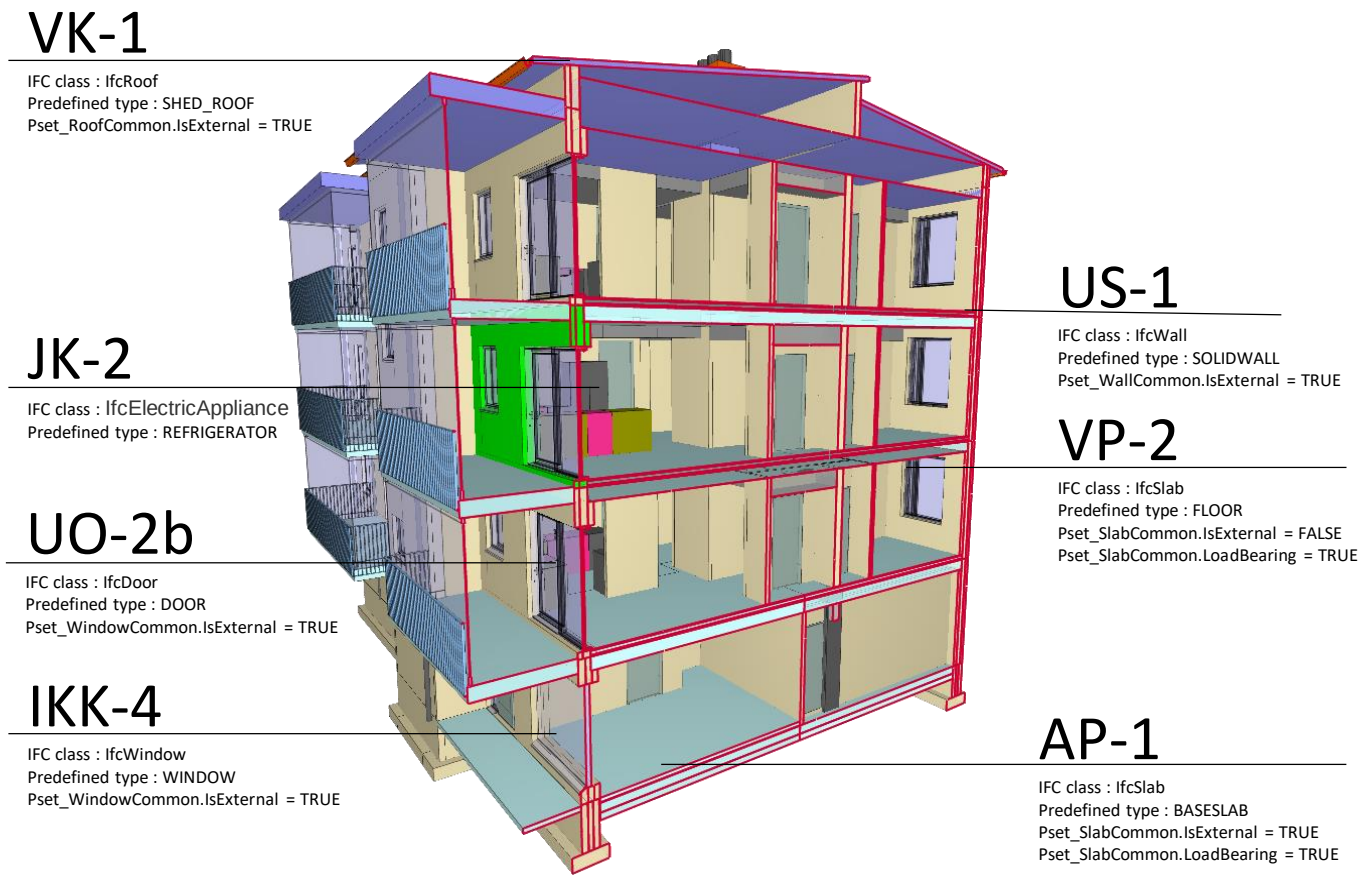
1. For each element in the design model, the correct IFC class, pre-defined type and required properties are defined. This information allows the IFC model to be filtered by element group.

2. In addition, in the IFC, each type of building element and product element is assigned a project-specific type designator (e.g. US-1). This allows the elements to be linked to external material and product data.

3. The IFC data model provides the quantity information for each element. Quantities can be read from the model as lengths, areas, volumes or number of items, depending on the elements.

4. The IFC model data is transferred to the LCA calculation software. The IFC model contains quantitative data only for the elements to be implemented. Waste material, formwork, supports and other temporary structures must be considered separately. In addition, the LCA software must include quantitative estimates for elements not included in the design model.

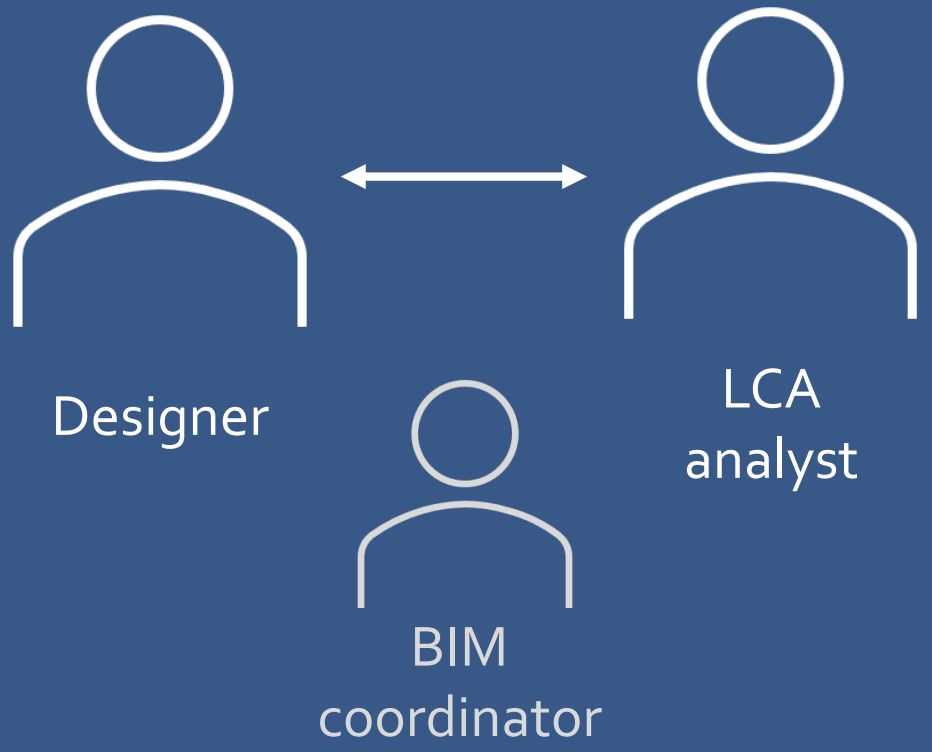
5. The project-specific type designators in the IFC model can be used in the LCA calculation software to link the breakdown structure and product information for each element.



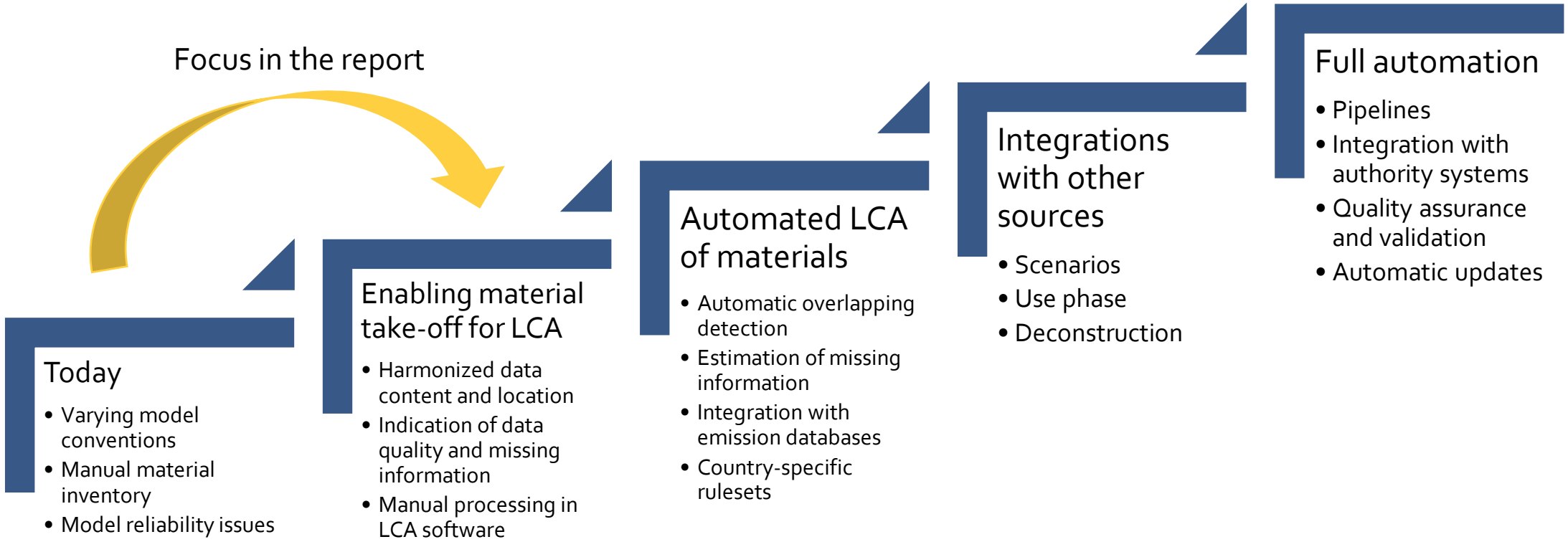
Communication as the key to success

— Information requirements
  - Geometries and type designators

— Documentation of the models
  - What has been modelled, and the level of detail
  - What building parts or details are not modelled
  - Which IFC properties are employed to store data
  - Where can the LCA analyst find supplementary information



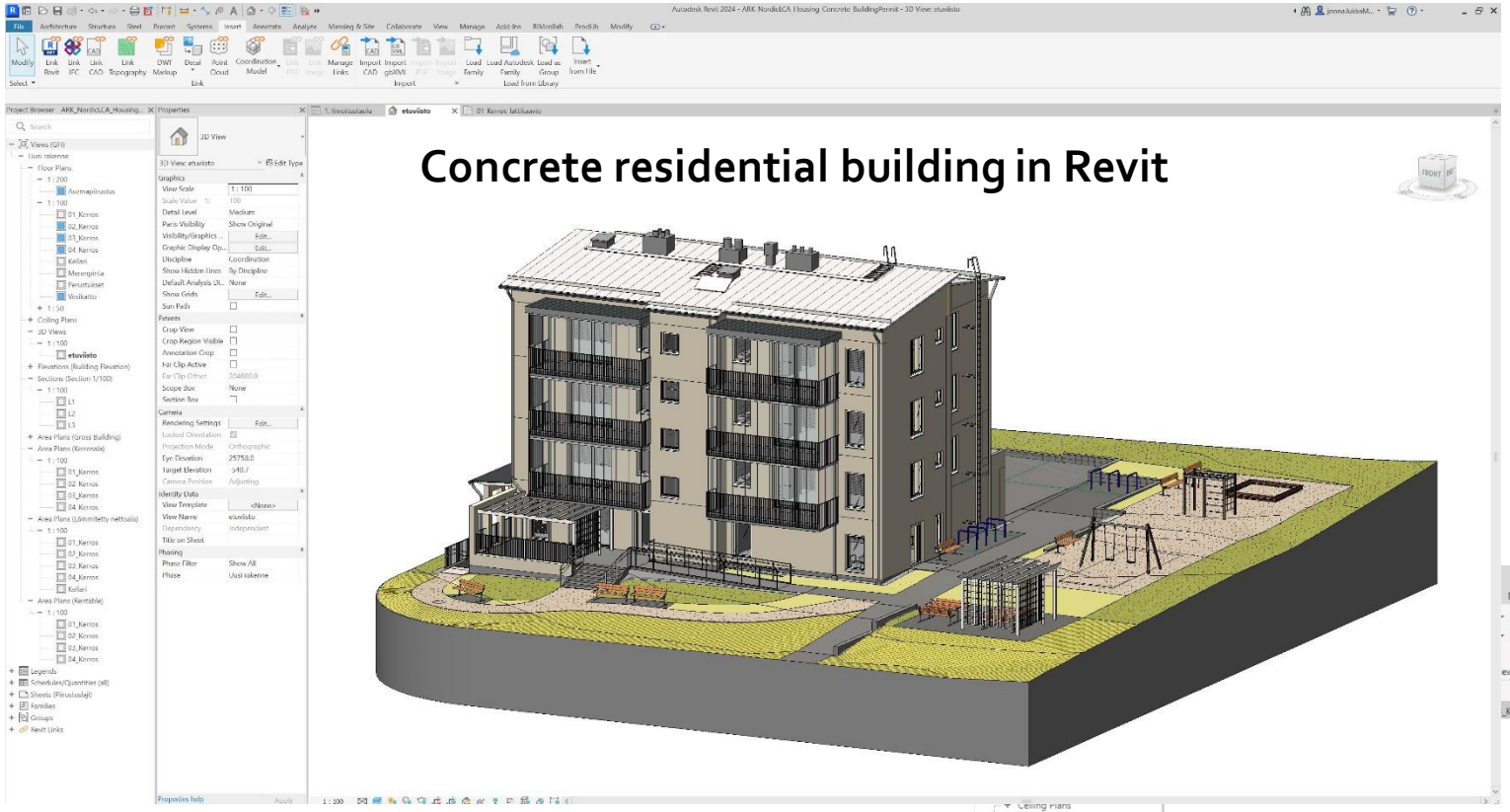
Steps towards automated LCA from BIM

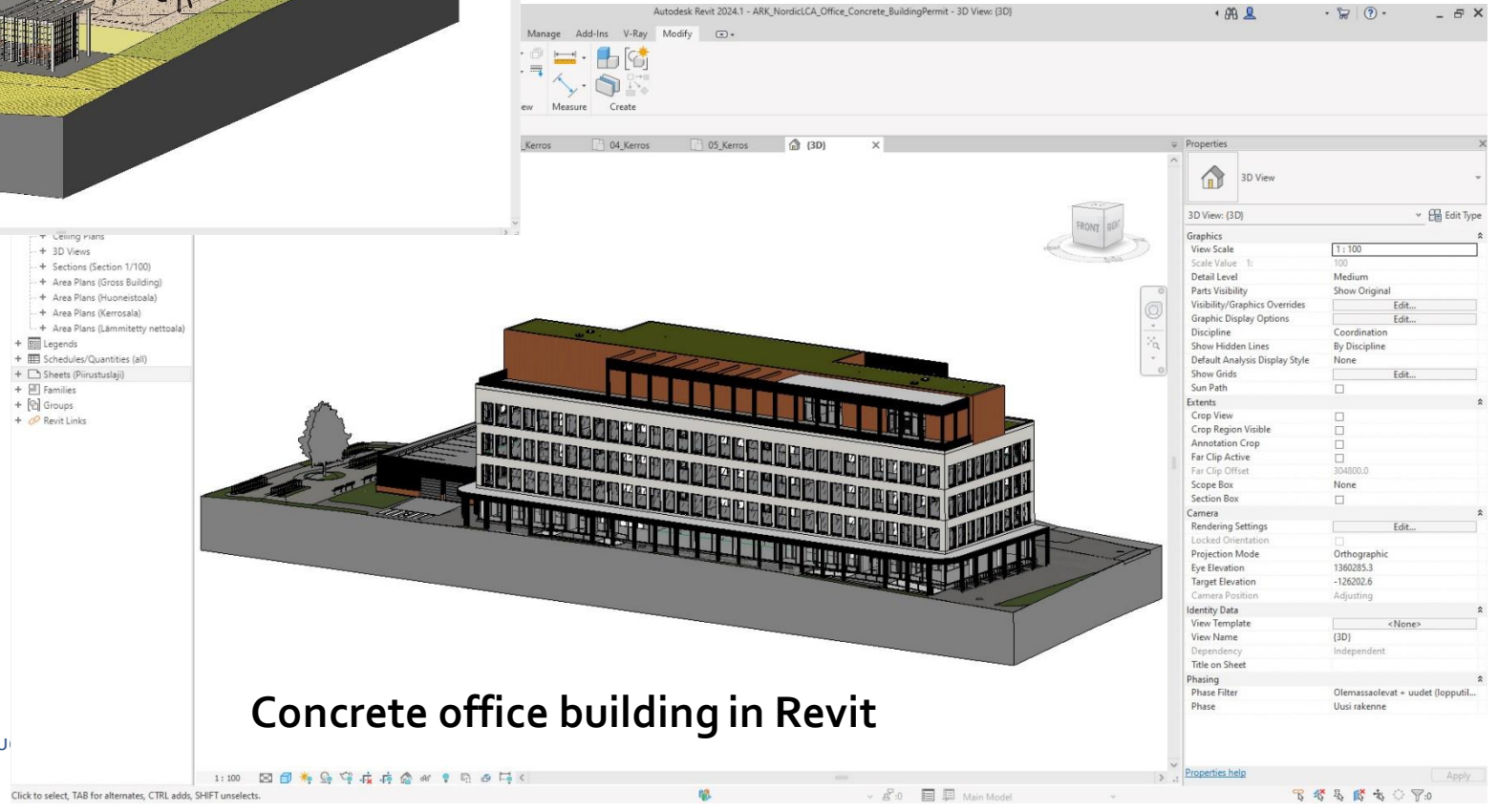


Status of LCA automation

- Some manual input from the LCA expert is always required for normative LCA
  - The extent of additional input from the LCA expert depends on the project phase
  - Less estimates in the as-built phase, but still some on non-material related modules
- In certain design fields, there is already working automation
  - Example in structural analysis: Tekla → OneClick LCA
  - Does not extend to complete building LCA
  - Always requires adherence to strict modelling principles
- The report specifies general modelling principles and data requirements for architectural, structural and HVAC modelling, so that the material inventory lists can be processed more effectively
- Information required for calculation of non-material related LCA modules will not be likely to be contained in BIM models

Example buildings: residential & office building



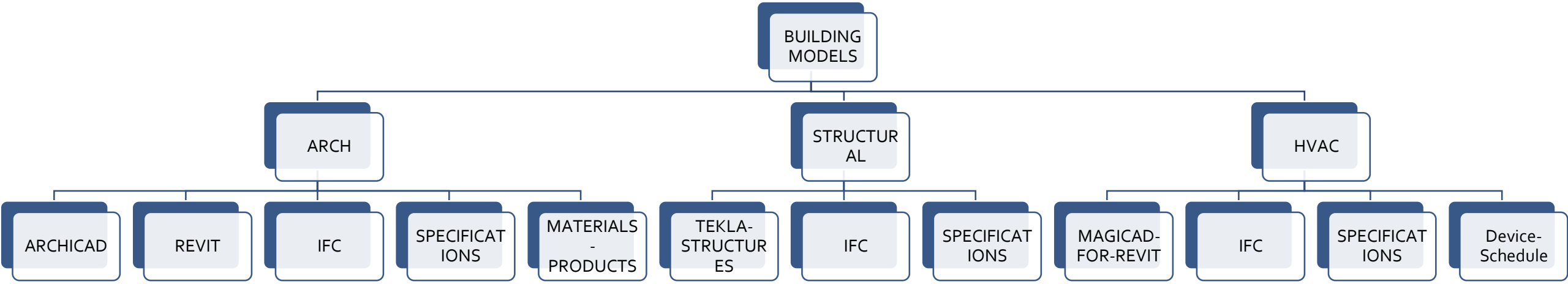


ARKKITEHTITOIMISTO
HUVILA Oy

Design models (native BIM models and IFC)

Group	Wooden		Concrete		Site models	IFC files
Architectural **building permit** models	Residential building in Revit	Office building in Revit	Residential building in Revit	Office building in Revit	Residential and office building sites for Wooden and Concrete versions in Revit, Office building site in Archicad	As many as the native models = 10 IFC files
Architectural **as-built** models	Residential building in Revit and ArchiCAD	Office building in Revit	Residential building in Revit	Office building in Revit and ArchiCAD	Residential building site in Archicad	= 2 IFC files
Structural models	Residential building in Tekla Structures	Office building in Tekla Structures	Residential building in Tekla Structures	Office building in Tekla Structures		= 4 IFC files
HVAC models (Wood frame also includes sprinkler - systems)	Residential building in MagiCAD for Revit	Office building in MagiCAD for Revit	Residential building in MagiCAD for Revit	Office building in MagiCAD for Revit		= 4 IFC files
Electrical models	Residential building in MagiCAD for Revit	Office building in MagiCAD for Revit	Residential building in MagiCAD for Revit	Office building in MagiCAD for Revit		= 4 IFC files

The folder structure of models



YouTube training videos

1. Introduction to the BIM4LCA project
   - Generic description of the results produced in the BIM4LCA project: BIM-based building LCA, process, BIM models, the operating environment report of building LCA and BIM in the Nordics.
2. BIM-based building LCA process and building LCA calculation principles
   - The principles of the LCA process and how to calculate LCA using BIM-based material at the building permit phase model level.
3. Architect's building permit and as-built phases: information content, IFC export
   - How architects can put the necessary information in the right machine-readable form and codes to the architectural model and take the IFC export for that content; how they can take the quantities out of the IFC model and use this machine-readable data in LCA calculation software.
4. Structural designer: information content, IFC export, Excel import
   - How to make structural design model and data that can be used in LCA calculation, how to take the report of material quantities and different material lists out in machine-readable form, e.g excel files.
5. HVAC designer: information content
   - How to make needed information for HVAC LCA calculation in the native software Magicad
6. HVAC designer: IFC export
   - How to make needed information to IFC export in Magicad so that the IFC file can be used based on LCA calculation
7. LCA expert: IFC export, LCA software import, example on calculating the CO_2 of e.g. a wall structure
   - Instructions for BIM-based material inventory, how to transfer the data to LCA calculation software, and examples of how to use different structural parts from the IFC file to be used in LCA calculation software.

Working group

- VTT Technical Research Centre of Finland (coordinator)
- Granlund
- Gravicon
- Insinööritoimisto Kallinen
- Nordic partners supporting R&D
  - Rangi Maja OÜ
  - Bengt Dahlgren
  - Asplan Viak AS
  - Gravicon DK
  - SBEResearch
  - Arkkitehtitoimisto Huvila

Summary of Results

1. BIM to LCA process supporting the calculation and reporting of normative LCA in building construction projects
2. Generic guidelines for reliable BIM-based material inventory (bill of materials):
   - specifications for information needed for modelled building components,
   - data transfer from BIM tools to LCA tools, and
   - iterative design and analysis workflow between BIM and LCA tools
3. Pathway towards automated BIM-based LCA for instant feedback and low-carbon design solutions
4. Two example buildings with BIM models for practitioners to learn BIM-based building LCA
5. Educational videos on BIM-based LCA

New Nordic Construction Collaboration 2025-2027…?

Our Vision 2030

2020-2025

2025-2030

Cooperation programme for each sector

3-4 goals per sector

Action plan

2025-2027

2028-2030

Thematic areas for a new programme 2025-2027

Climate

- Continue to maintain focus on coordination and improvement of building regulation (including LCA) with a strong relationship with EU regulation and initiatives
- When renovating buildings in accordance with the revised EPBD, minimize the building's climate and resource impact by using/installing new elements and materials vs. energy perspectives
- Increase/activate knowledge about how we in the Nordics can use low-emission building materials to replace high-emission materials Improve the use/continue innovation of biogenic/"new" building materials and identify Nordic potential

Circularity

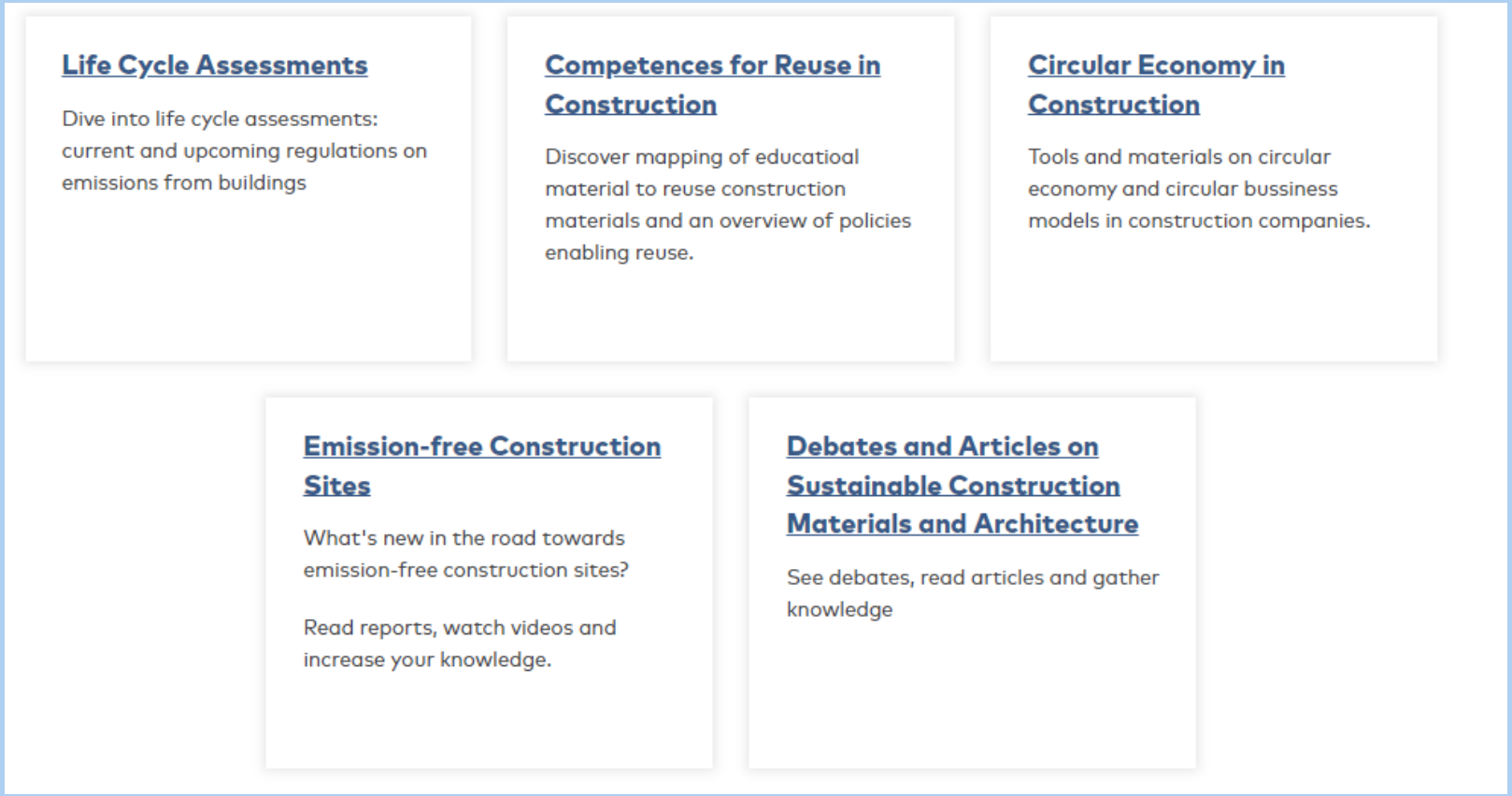
- Support policy initiatives to preserve and utilize existing buildings, rental structures and building products and reduce the use of chemicals
- Improve building skills with bio-based, low-carbon and/or reused materials, DFD (design for disassembly) and improved building design that promotes less material use and better buildings.
- Make sure we use our reused products for what they are suitable for / capable of.
- Create standards for reused building materials Increase the multi-use or purpose of buildings and square meters

Digitalisation

- Increase knowledge of AI methods to build better
- Use digitization to reduce the administrative burden of new regulation of the climate impact of buildings and enable material mapping and reduce negative health impacts from reuse
- Increase compatibility between existing platforms in the value chain – harmonization across the national systems in the Nordics Improve the digitization of the entire value chain - and create an overview of how data (input and output) is handled by various actors across the value chain, with a focus on data availability, behavior and skills
- Research and create data collections and systems for tracking material flows along the value chain

EU

Find details in Nordic knowledge centre



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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

Nordic Sustainable Construction - financed by Nordic Innovation, an organisation under the Nordic Council of Ministers