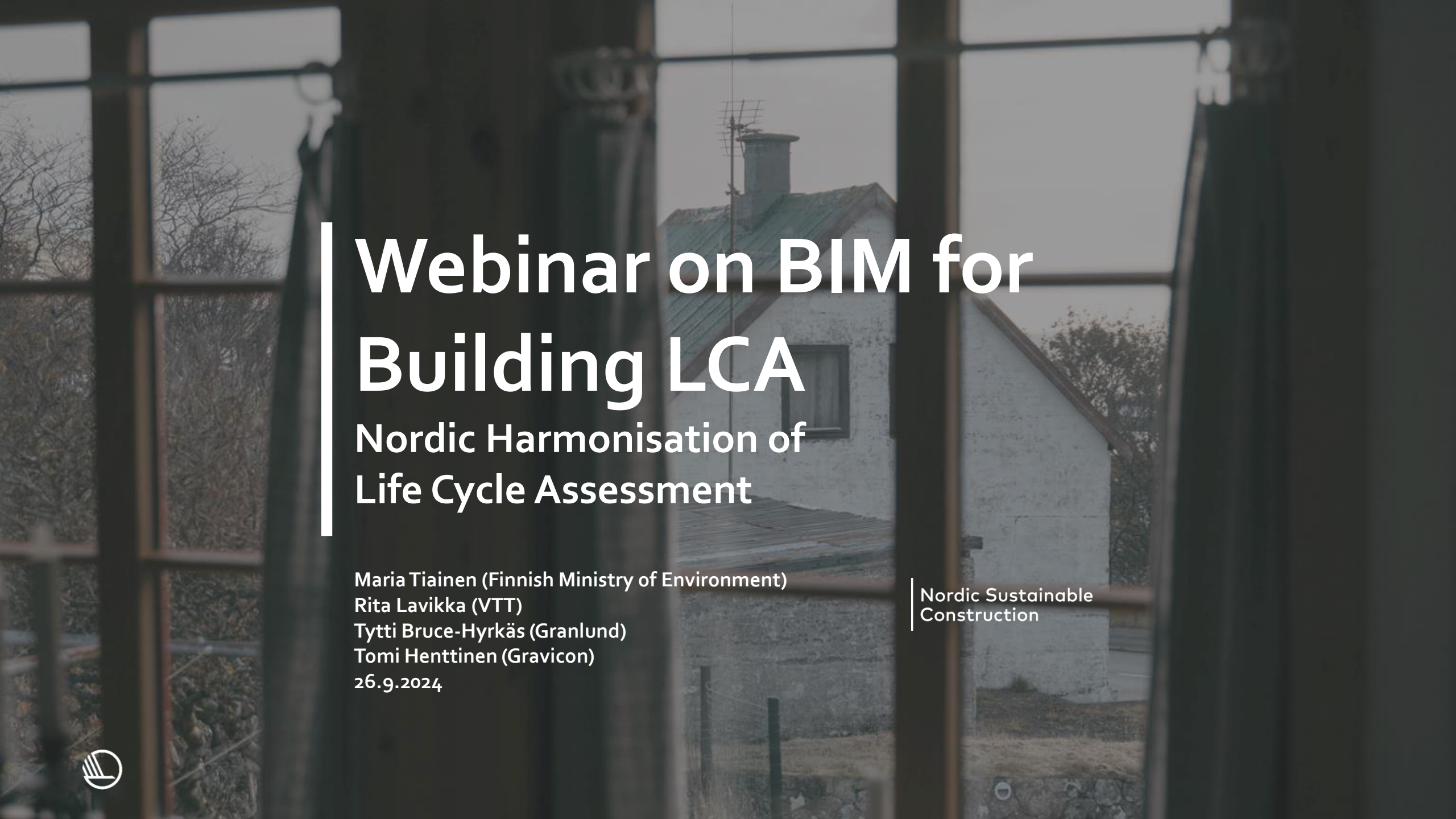


Webinar on BIM for Building LCA

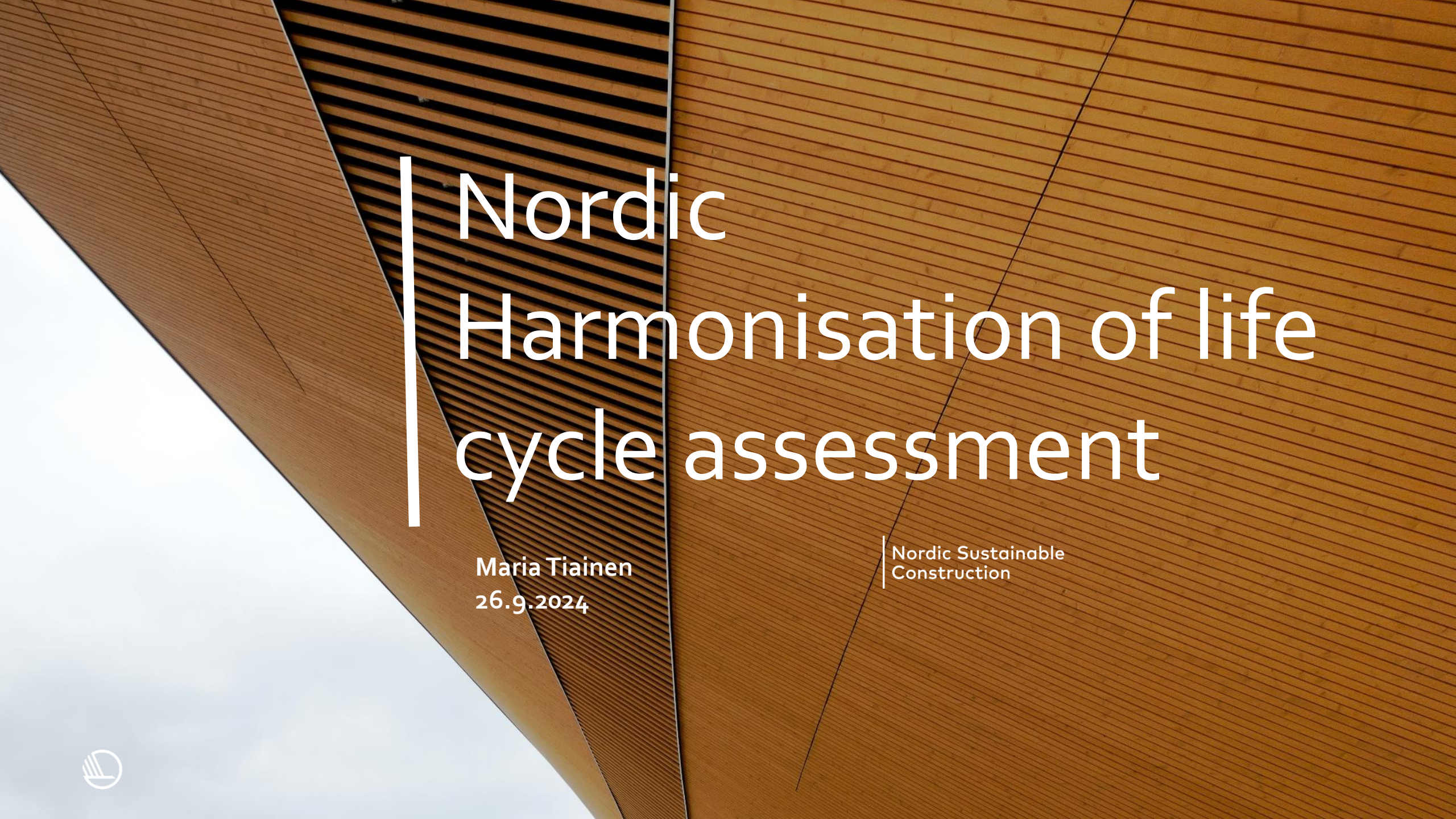
Nordic Harmonisation of Life Cycle Assessment

Maria Tiainen (Finnish Ministry of Environment)
Rita Lavikka (VTT)
Tytti Bruce-Hyrkäs (Granlund)
Tomi Henttinen (Gravicon)
26.9.2024

Nordic Sustainable Construction

Agenda

1. Introduction of WP1 Nordic harmonisation of life cycle assessment (5 min)
   — Maria Tiainen/Finnish Ministry of the Environment
2. Overview of the BIM4LCA project and its results (15 min)
   — Rita Lavikka/VTT Technical Research Centre of Finland
3. Process for BIM-based building LCA and information requirements (20 min)
   — Tytti Bruce-Hyrkäs/Granlund
4. Architectural BIM modelling for LCA: identification of building elements (20 min)
   — Tomi Henttinen/Gravicon
5. Discussion and questions (30 min)
   — Add your questions and comments to Miro
   https://miro.com/app/board/uXjVLdXzr20=/?share_link_id=487683046189



Nordic Harmonisation of life cycle assessment

Maria Tiainen

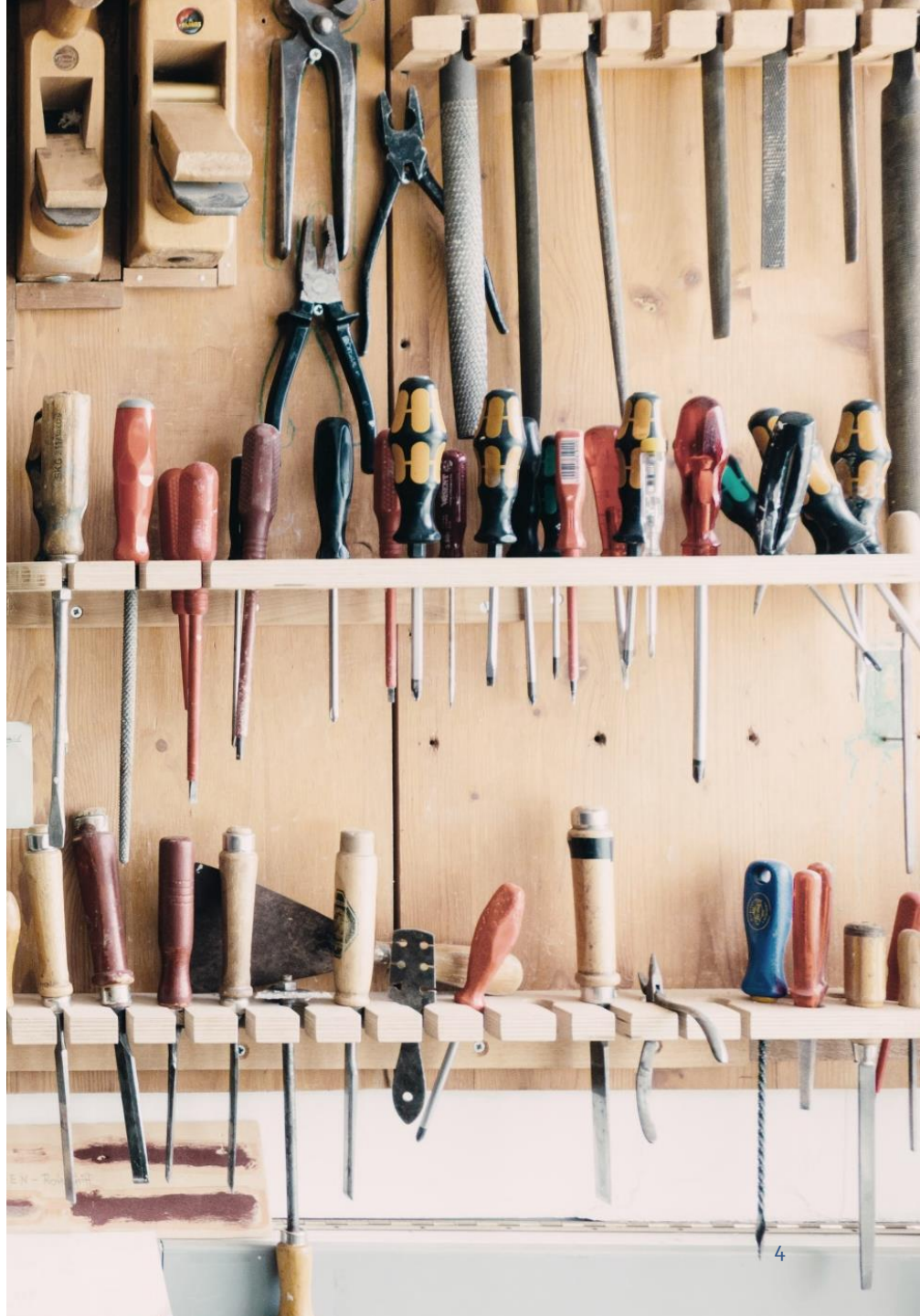
26.9.2024

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

Want to know more?

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

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

Overview of the BIM4LCA project and its results

Rita Lavikka/VTT Technical Research Centre of Finland

Main project goals

- Develop a generic process for BIM-based building LCA
- Create architectural, structural, HVAC and electrical BIM designs and their IFCs
- Create learning material guiding the calculation of BIM-based building LCA

Focus on normative building LCA

Conceptual design

LCA aim: Comparing LCA of alternatives

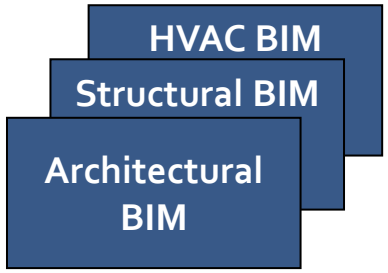
Data: emission data for structures and systems at rough estimate level of detail

Developed design (building permit LCA)

LCA aim: First estimation (*Proposed* normative LCA in *Estonia and Iceland*)

Data: Mainly general emission data

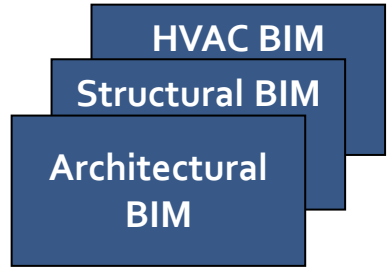
Technical design



LCA aim: More accurate LCA based on the quantity take-off

Data: General and specific (EPD) emission data

Construction and handover (as-built LCA)



LCA aim: As-built normative LCA (Denmark, *Finland*, *Iceland*, Norway, Sweden)

Data: General and specific (EPD) emission data

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

The Operating Environment of Building LCA and BIM in the Nordics and Estonia

— Report on the current building LCA and BIM practices, published 12.12.2023
  - Constraints and enablers for Nordic harmonization of building LCA
  - Enablers and hindrances for BIM-based building LCA
  - The basis for further project work providing guidance for BIM-based LCA and material declaration

The status of normative building LCA

Country	Normative building LCA	Limit values
Denmark	Since January 2023	Since January 2023
Estonia	Will be in force in 2025	Under discussion
Finland	Will be in force in 2026	Will be in force in 2026
Iceland	Proposed for 2025	Values to be set by 2028
Norway	Since July 2023	Maybe in +5 years
Sweden	Since January 2022	Proposed July 2025

Modules in the normative building LCA

X = included in the regulation, O = planned but not in force yet

Module	Denmark	Estonia	Finland	Iceland	Norway	Sweden
A1-A3 Product phase	X	O	O	O	X	X
A4 Transport	O	O	O	O	X	X
A5 Construction process	O	O	O	O	X*	X
B1 Use	-	-	-	-	-	-
B2 Maintenance	-	-	-	-	X	O
B3 Repair	-	-	-	-	-	-
B4 Replacement	X	O	O	O	X	O
B5 Refurbishment	-	-	-	-	-	-
B6 Operational energy use	X	O	O	O	-	O
C1 Deconstruction, demolition	-	O	O	O	-	O
C2 Transport	-	O	O	O	-	O
C3 Waste processing	X	O	O	O	-	O
C4 Disposal	X	O	O	O	-	O
D Re-use, recovery, recycling potential	X	O	O	O	-	-

The phase of normative building LCA reporting and accepted data sources

Country	Building life-cycle phase of the mandatory LCA	Floor area definition	Accepted emission data sources	Conservative emission factor for general data
Denmark	As-built	Reference area (embodied part), heated gross floor area (operational part)	Generic data from BR18 §297, EPDs	-
Estonia (Proposed)	Building permit	Heated net floor area	Estonian database, EPDs	1,2
Finland (Proposed)	As-built	Heated net floor area	National emission database (CO2data.fi), EPDs	1,2
Iceland (Proposed)	Building permit and as-built	Gross floor area, possibly later net floor area	Emission database, EPDs	1,25
Norway	Finished before the certificate of completion is issued	Gross floor area	EPDs	1,25
Sweden	As built	Gross floor area	Boverket database, EPDs	1,25

Constraints and Enablers for Nordic Harmonisation of Building LCA

- Constraints
  - Differences in what is included (modules, building parts)
  - Differences in handling biogenic carbon
  - Differences in accepted data sources and use of conservative values
- Enablers
  - Common standards as a starting point (EN15978 and EU Level(s))
  - Process for
    - unified calculation of the building parts
    - handling of the BIM material inventory lists
    - tracking of assumptions

BIM maturity

- All countries use BIM authoring tools for architectural and structural modelling
  - Allow the export of IFC (EN ISO 16739-1)
- Many countries have BIM guidelines and requirements, but rarely national or mandatory
  - Do not specifically support normative building LCA
- The naming conventions and classifications for materials and structures vary
  - They are also national, and their maturity and usage vary by country

Constraints and needs for using BIM for the building LCA

— Constraints
- The information content and identification of objects and materials in BIMs are not standardized
- Inaccuracy in quantity take-off
- The lack of interoperability between BIM and LCA software
- Modelling conventions regarding spaces in BIM are not harmonized
- Not all data comes from BIM (e.g. B6 and energy sources)

— Needs
- The general calculation rules for building LCA set requirements for the BIM modelling process
- The information content and identification of materials and structures in BIM should be standardized

Nordic Innovation

BIM for Building LCA

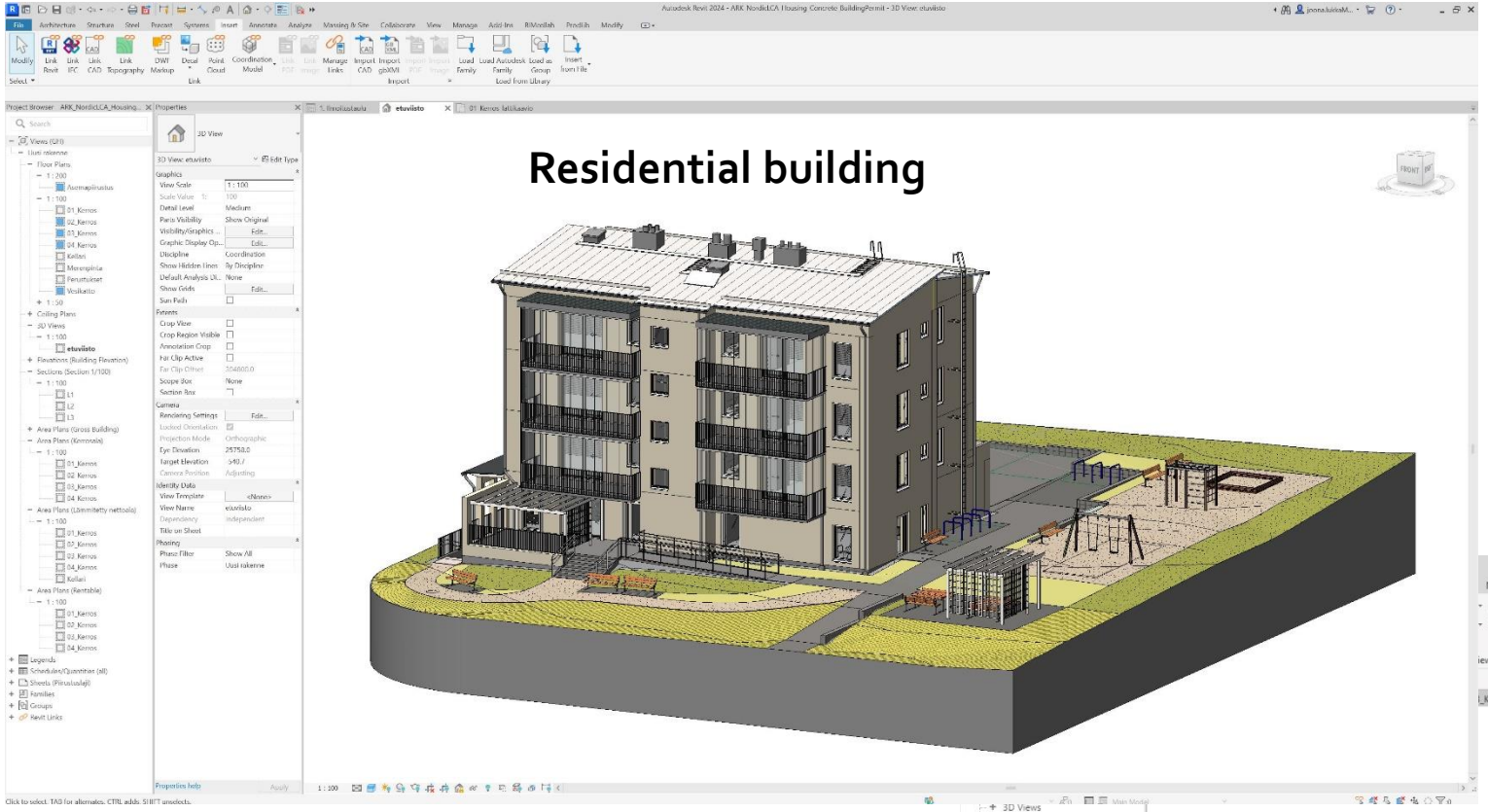
Enhancing Nordic Sustainable Construction through Digitalisation

Summary of results

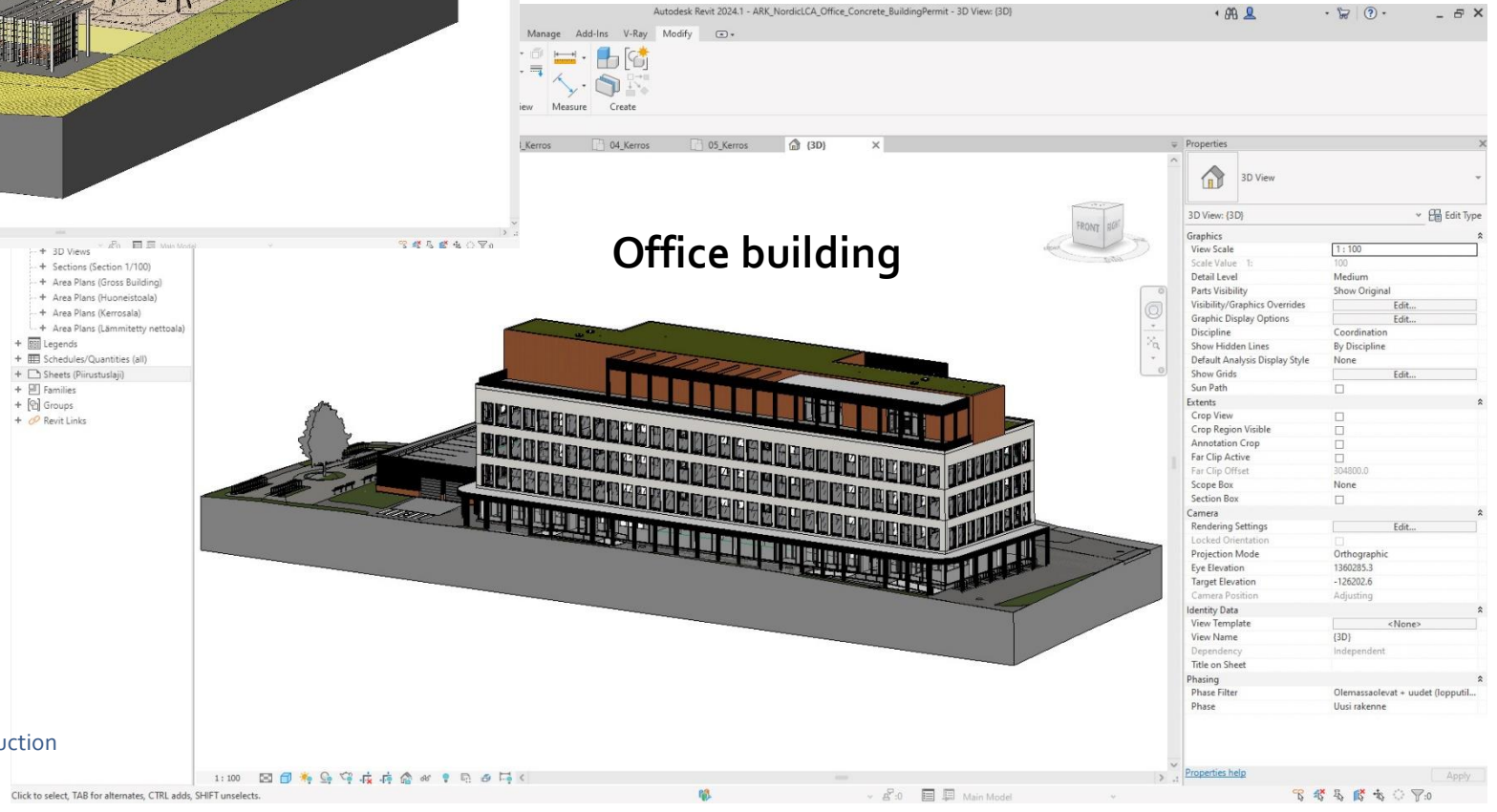
1. A generic description of the **BIM to LCA process**
   - supporting the calculation and reporting of normative LCA in building construction projects
2. Generic **guidelines for reliable BIM-based material inventory**
   - specifications for information needed for modelled building components, data transfer from BIM tools to LCA tools, and iterative design and analysis workflow between BIM and LCA tools
3. **A 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

BIM models for wooden and concrete residential & office example buildings

Residential building



Office building



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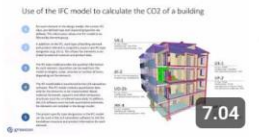
YouTube training videos

1. Introduction to the BIM4LCA project
2. BIM-based building LCA process and building LCA calculation principles
3. Architect's building permit and as-built phases: information content, IFC export
4. Structural designer: information content, IFC export, Excel import
5. HVAC designer: information content
6. HVAC designer: IFC export
7. LCA expert: IFC export, LCA software import, example on calculating the CO_2 of a wall structure

1 

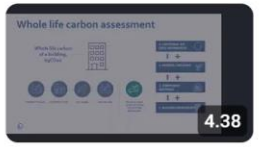
BIM4LCA introduction, Rita Lavikka
NordicSustainableConstruction •

2 

BIM4LCA architectural design Tomi Henttinen
NordicSustainableConstruction •

3 

BIM4LCA LCA calculation, Martin Excell
NordicSustainableConstruction •

4 

BIM4LCA LCA calculation 2 Tytti Bruce Hyrkäs
NordicSustainableConstruction •

5 

BIM4LCA MEP 1, Markus Järvenpää Tero Järvinen
NordicSustainableConstruction •

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BIM4LCA MEP 2, Markus Järvenpää Tero Järvinen
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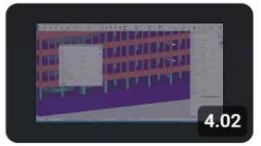
7 

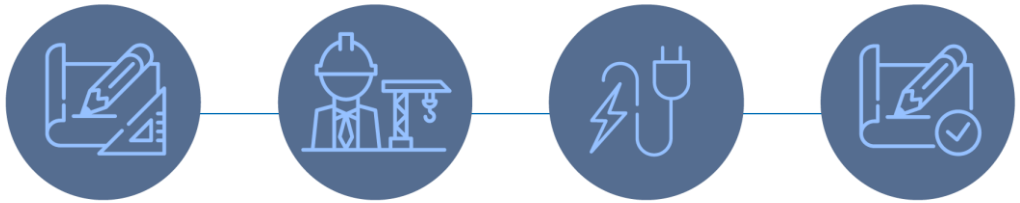
BIM4LCA structural design Minna Salonsaari
NordicSustainableConstruction •

Process for BIM-based building LCA and information requirements

Tytti Bruce-Hyrkäs/Granlund

Whole life carbon assessment

Whole life carbon of a building, kgCO2e

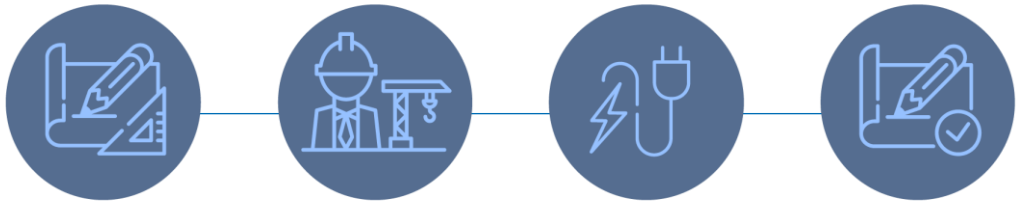


PRODUCT STAGE | CONSTRUCTION | USE STAGE | END OF LIFE

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY

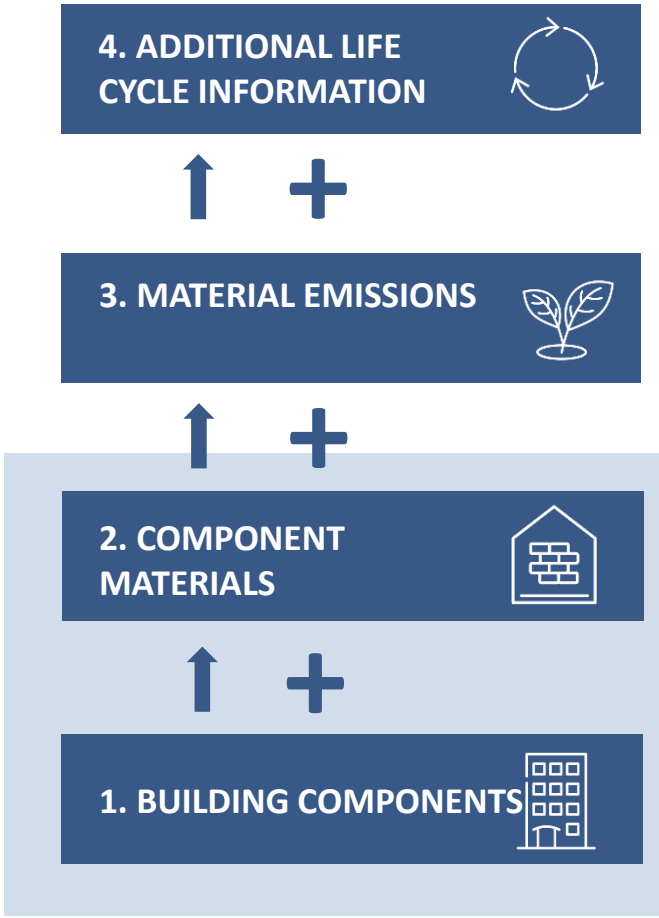
Whole life carbon assessment

Whole life carbon of a building, kgCO2e



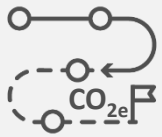
PRODUCT STAGE | CONSTRUCTION | USE STAGE | END OF LIFE

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY



Steering the emissions requires follow-up through the design process

1.
PRE-DEISGN / INITIALIZATION



Organization strategic targets

2.
CONCEPTUAL DESIGN

Setting target levels

3.
DETAILED DESING

Steering emissions in design

4.
TECHNICAL DESIGN

Choosing products

5.
CONSTRUCTION

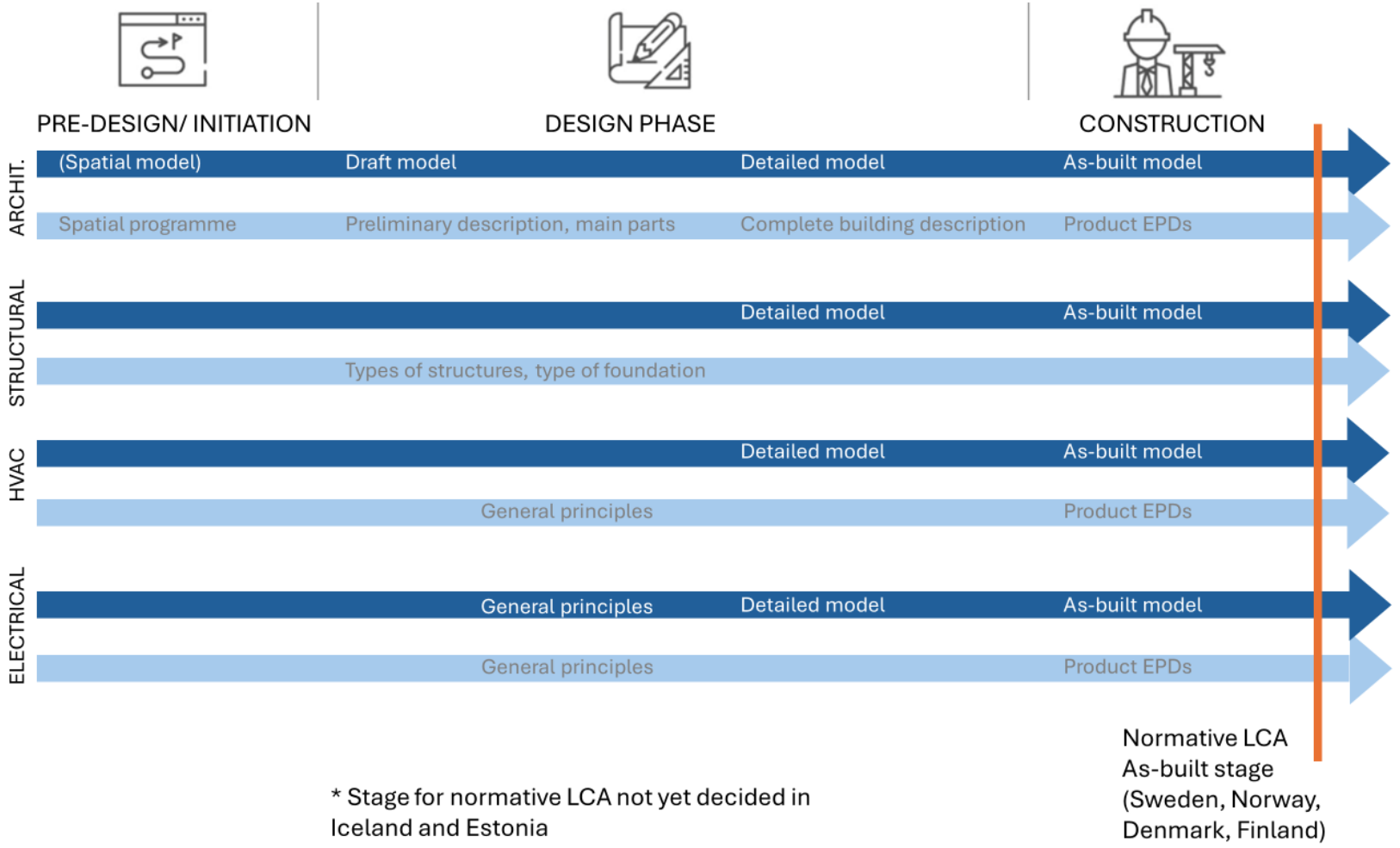
Construction site management

6.
HANDOVER AND USE

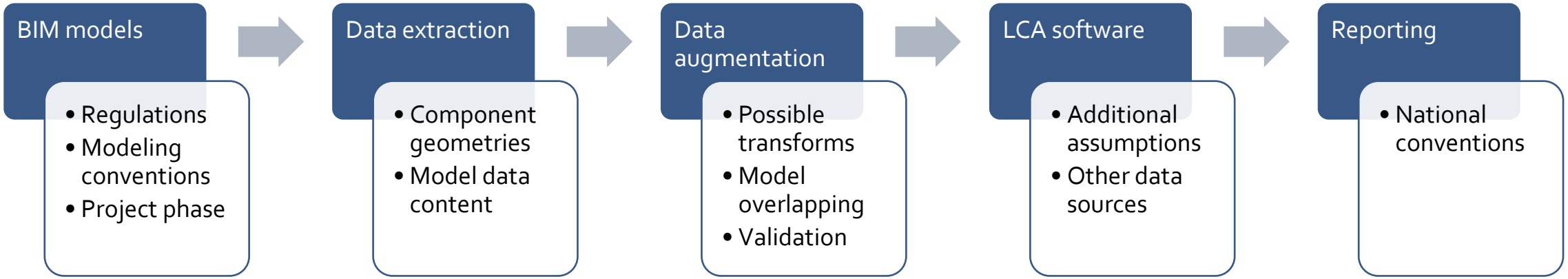
Maintenance sustainability

Availability and content of data and automation possibilities depend on the stage of design and purpose of LCA

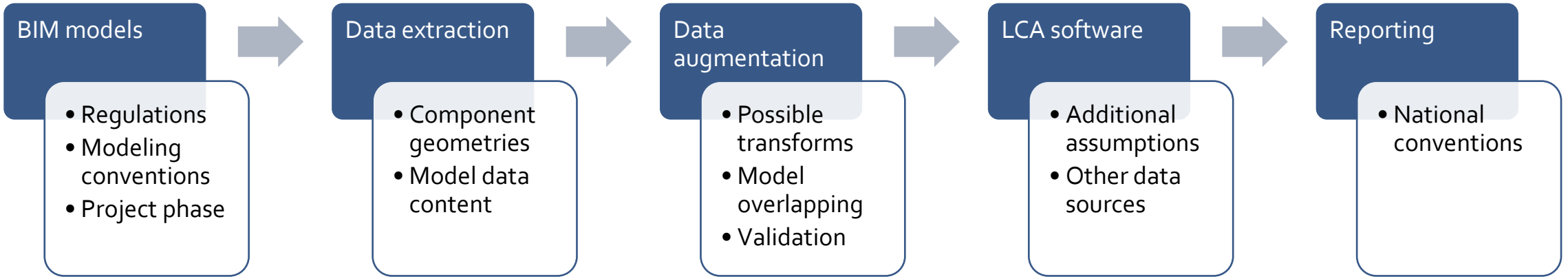
- Normative LCA requires combining information from several sources including some manual inputs
- In some fields, working automation workflows exist but do not extend to full LCA. Success requires strict modelling principles.



Data flow from BIM to LCA



Issues in the current BIM to LCA 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

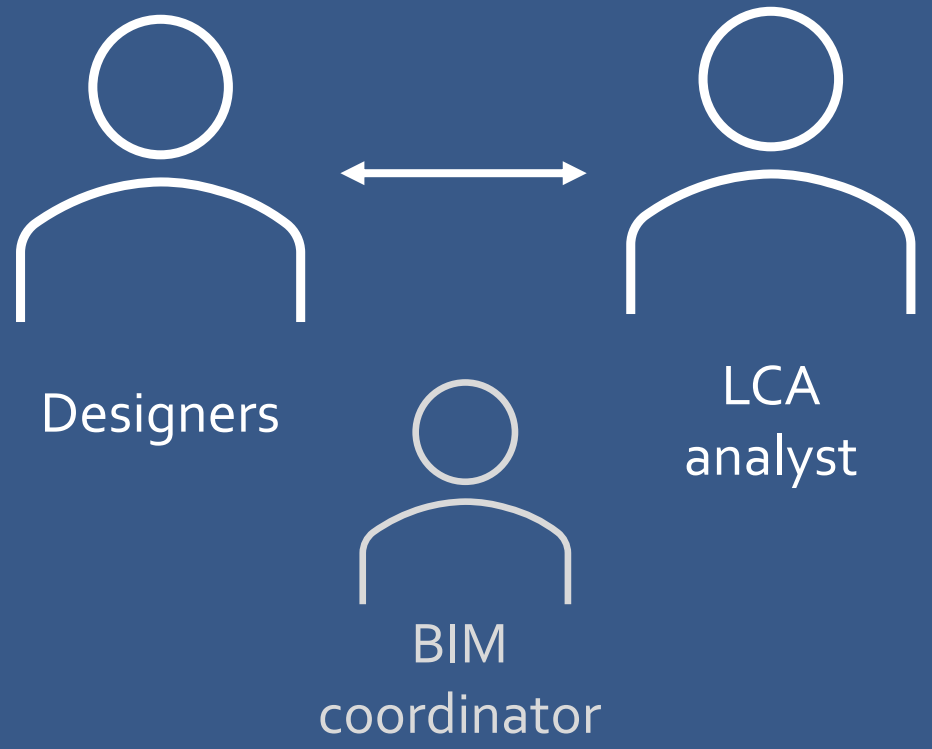
- No knowledge on missing information
- Difficult to solve overlapping between modeled domains
- Object types in BIM models not easily mappable with other documents

- 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

Common understanding is 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

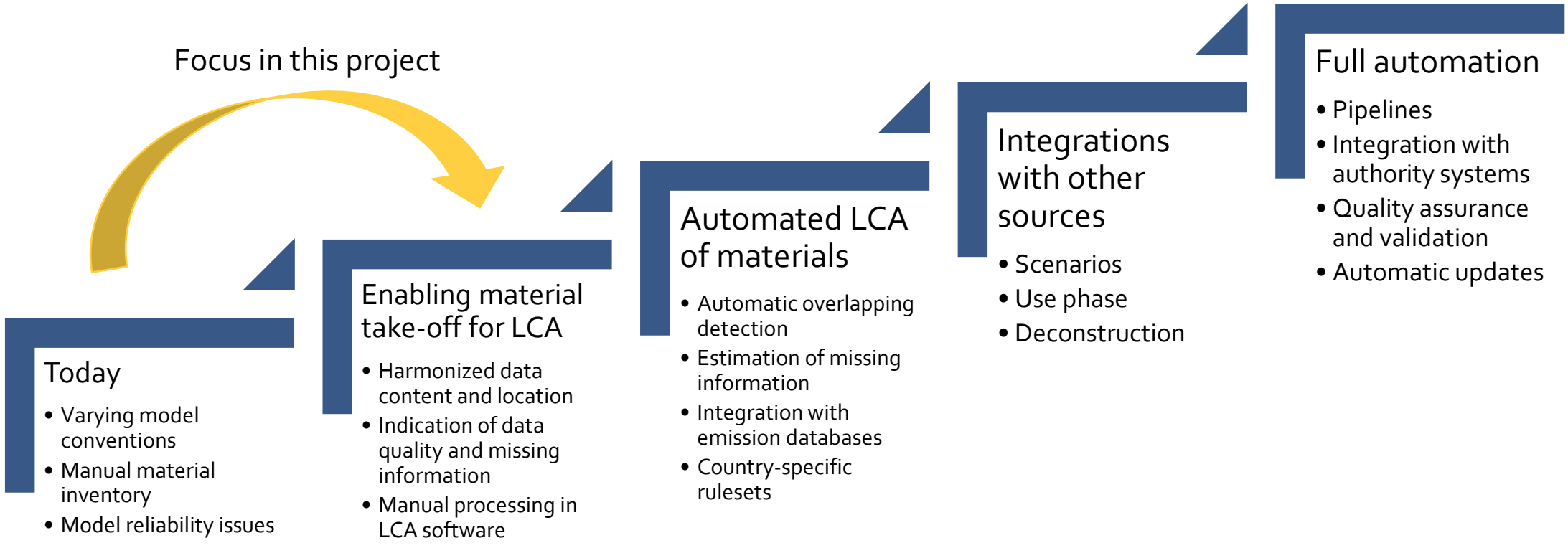


Solutions

In BIM4LCA project we:

- Described a process from BIM to LCA to help in communications and creating common understanding in projects
- Specified 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*

Steps towards automated LCA from BIM



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

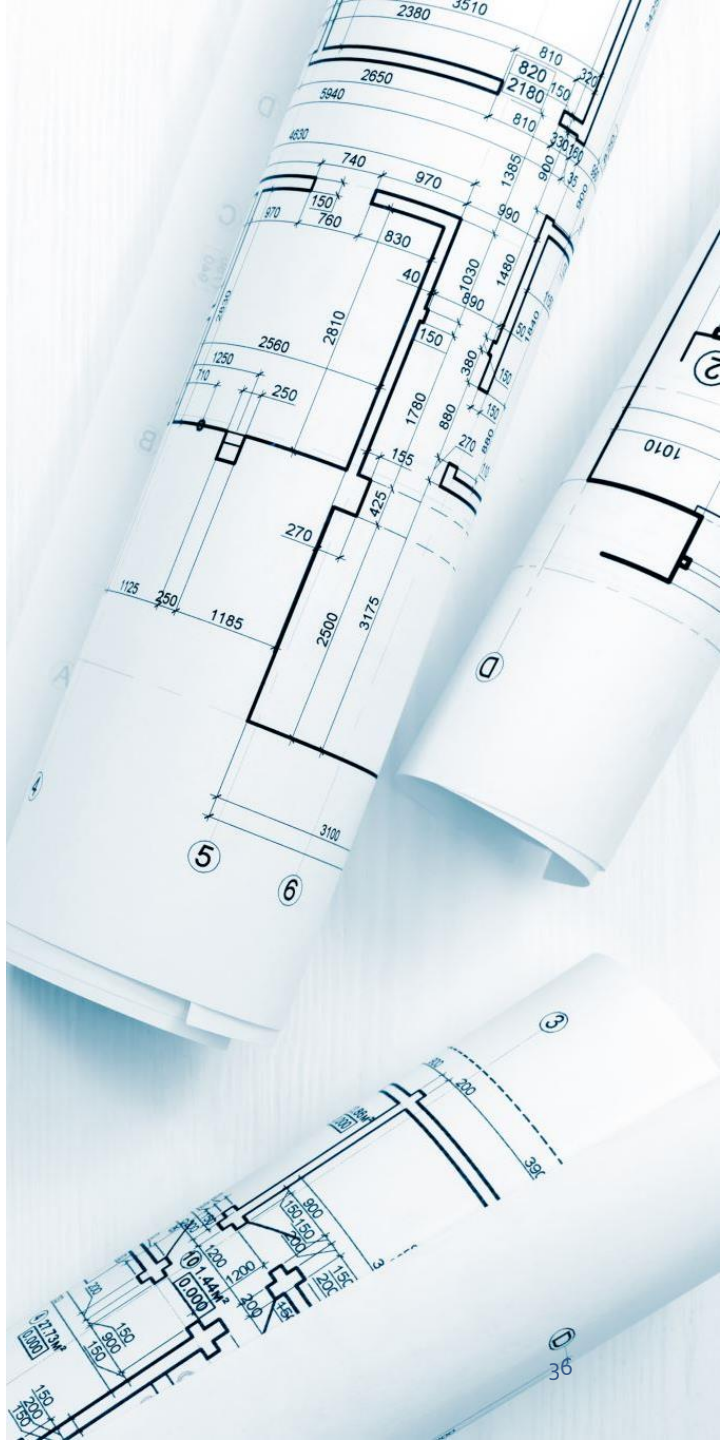
- IFC format as standardized exchange format
- Data specification in IFC property sets
- Export to material inventory lists with standardized fields

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



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

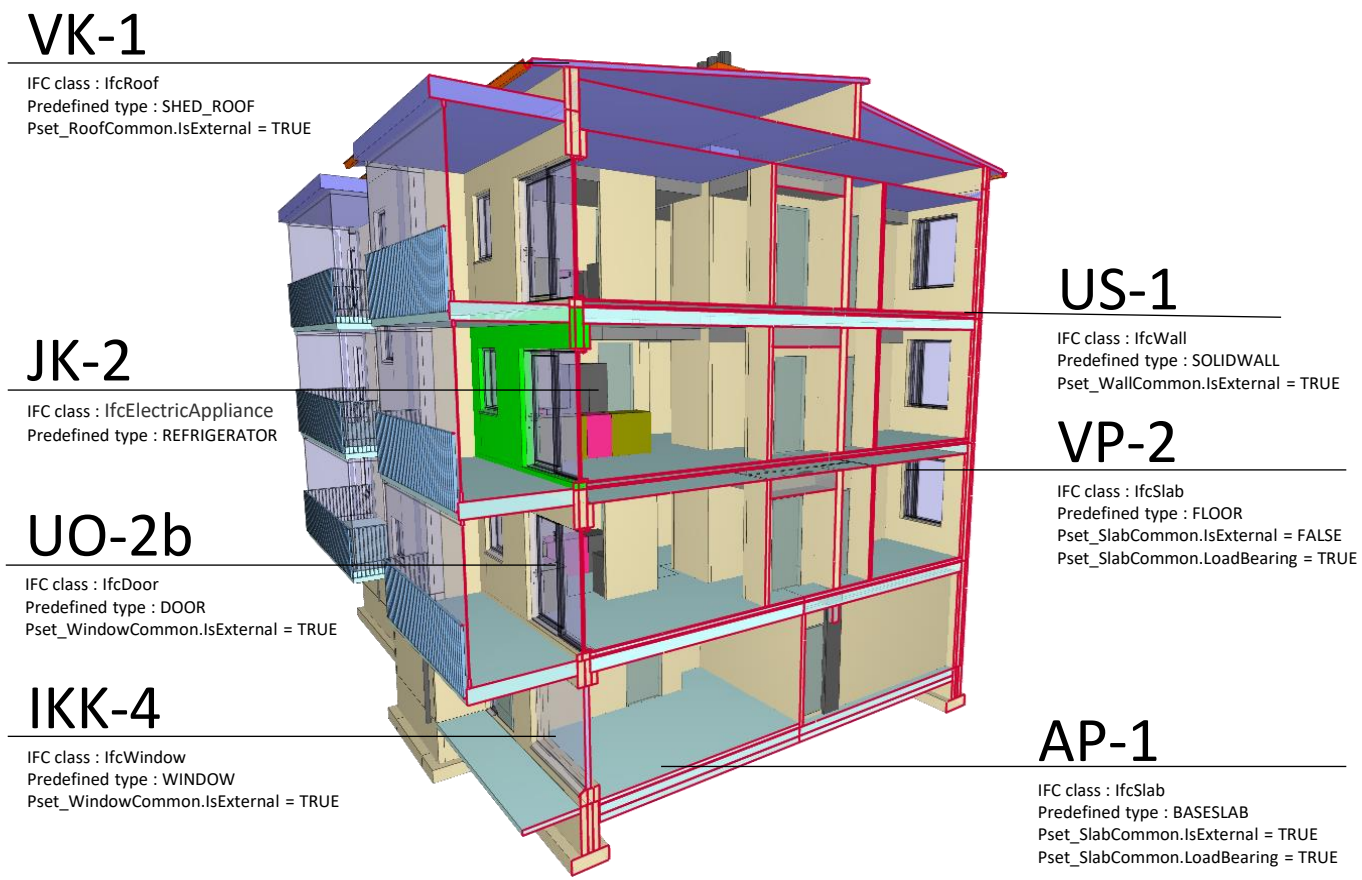
1. For each element in the design model, **the correct IFC class, pre-defined type and required properties** are defined. This information allows the IFC model to be filtered by element group.

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.



Minimum requirements models supporting LCA

Nordic Sustainable Construction

prEN 15978*			QTO	Lifecycle stage	
Building parts	Building elements and processes		QTO	Building permit	As-Built
Pre-construction works	Facilitating works	Temporary/Enabling works			
		Specialist groundworks			
	Work on the existing building	Demolition and alterations			
Substructure	Foundations		m³	Structural estimate	Structural BIM
	Piles		m	Structural estimate	Structural BIM
	Basement walls		m²	Arch BIM	Structural BIM
	Retaining walls		m²	Arch BIM	Structural BIM
	Waterproofing		m²	Arch BIM	Arch BIM
	Ground floor construction		m²	Arch BIM	Arch BIM
Super-structure	Frame	Columns	kg (steel structure), m³ (concrete, wood)	Arch BIM	Structural BIM
		Beams	kg (steel structure), m³ (concrete, wood)	Arch BIM	Structural BIM
		Shear walls	kg (steel structure), m³ (concrete, wood)	Arch BIM	Structural BIM
	Upper floors		m² (net area)	Arch BIM	Arch BIM
	Balconies		square meters, meters	Arch BIM	Structural BIM
	Roof	Roof structure	m²	Arch BIM	Arch BIM

Nordic Sustainable Construction

prEN 15978*			QTO	Lifecycle stage	
Building parts	Building elements and processes		QTO	Building permit	As-Built
		Internal walls – non-loadbearing	m² (net area)	Arch BIM	Arch BIM
		Internal doors	No. of units	Arch BIM	Arch BIM
Finishes	External finishes	Cladding	m²	Estimate, based on arch design	Arch BIM
		Coatings	m²	Estimate, based on arch design	Arch BIM
	Internal finishes	Wall finishes	m²	Estimate, based on arch design	Arch BIM, based on room geometry
		Raised floors	m²	Estimate, based on arch design	Arch BIM, based on room geometry
		Floor finishes	m²	Estimate, based on arch design	Arch BIM, based on room geometry
		Ceiling finishes	m²	Estimate, based on arch design	Arch BIM, based on room geometry
Building	Water systems	Hot water distribution	m (pipes, insulations), No. of units	Estimate, based on arch design	MEP BIM
		Cold water distribution	m (pipes, insulations), No. of units	Estimate, based on arch design	MEP BIM
		Water treatment systems	m (pipes, insulations), No. of units	Estimate, based on arch design	MEP BIM
		Rainwater systems	m (pipes, insulations), No. of units	Estimate, based on arch design	MEP BIM

Architectural BIM modelling for LCA; identification of building elements; data validation

Tomi Henttinen/Gravicon

Design team

- **Architectural design**
  - **Arkkitehtitoimisto Huvila Oy**
- Structural design
  - Gravicon Oy
- HVAC & electrical design
  - Granlund Oy
- BIM specifications and coordination
  - Gravicon Oy

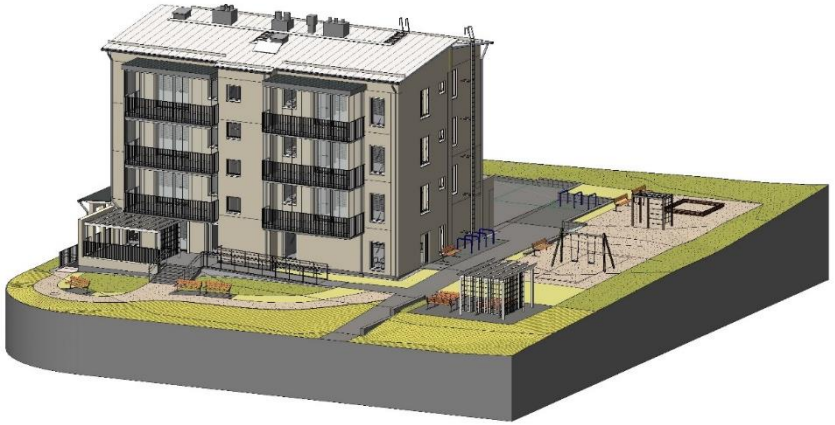
Design principles

- Real-life design objectives emphasise the life-cycle properties of buildings
  - Adaptability - allows for spatial changes during the life cycle
  - Multi-purpose usability
  - Access to natural light
  - Design work followed the Finnish Construction Act and building codes
- Simulated real-life building design process
  - Several design disciplines; typical designer roles
  - BIM-based collaboration
- Information content in the two phases of the project
  - Building permit
  - Handover (as-built)
- Two types of models
  - Design software's proprietary file formats (Revit & Archicad)
  - IFC4 as a primary output format

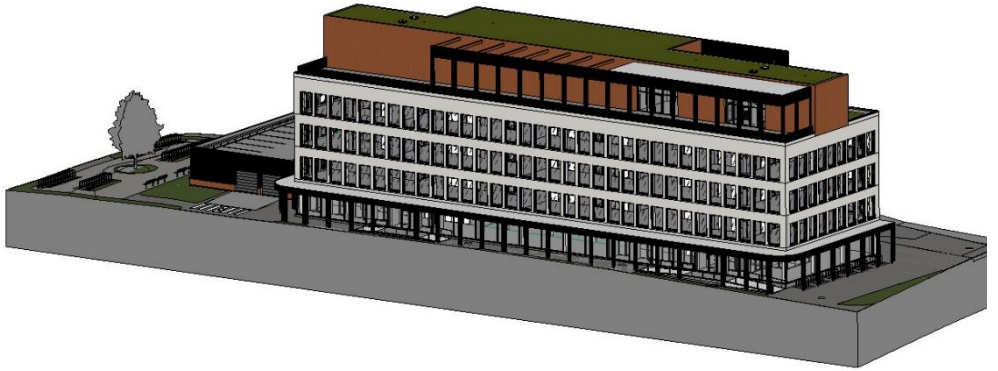
Two buildings

ARKKITEHTITOIMISTO HUVILA Oy

— Residential building
  - Ground floor with service spaces + 3 floors with apartments
  - A basement with storage spaces
  - A garage
  - One staircase with a lift
  - Apartment-specific ventilation system



— Office building
  - Ground floor with restaurant /other public functions + 3 floors with office space
  - A basement with a civil defence shelter, employee facilities and storage space
  - An Integrated garage building
  - Two staircases with lifts
  - The top floor facilitates a semi-public sauna, a roof terrace and a technical room for ventilation machines.

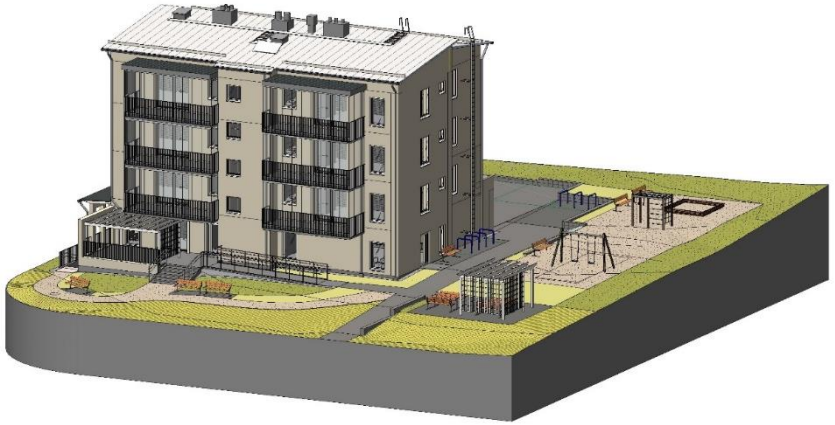


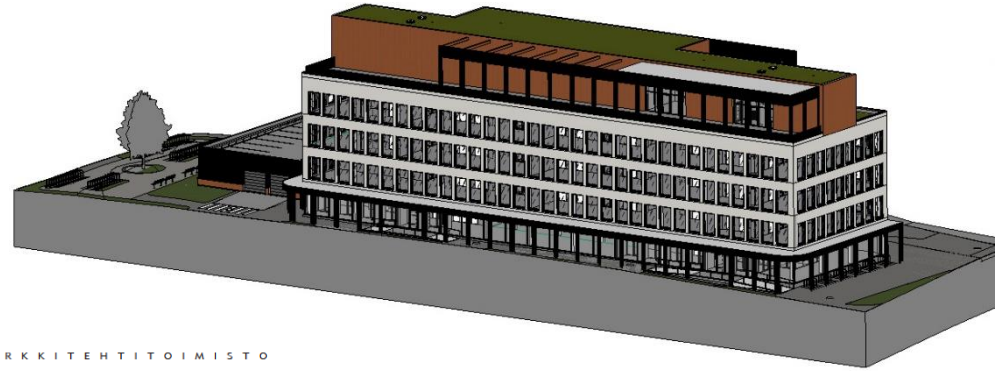
Two material solutions for the frame

— Residential building
- Wooden: Load-bearing timber-framed walls with wood-panelled facades
- Concrete: Load-bearing concrete walls with brickwork facades

— Office building
- Wooden: Wooden column and beam structure, wooden-panelled facades
- Concrete: Concrete column and beam structure, siding panel facades

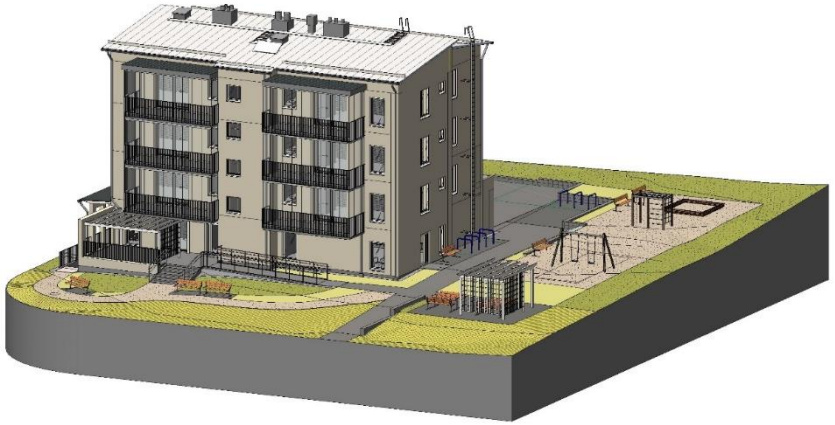
- The material of the frame influenced the distances between the floors and the dimensions of the structures.
- The material options were designed taking into account, among other things, the differences in sound and fire performance of the different materials.

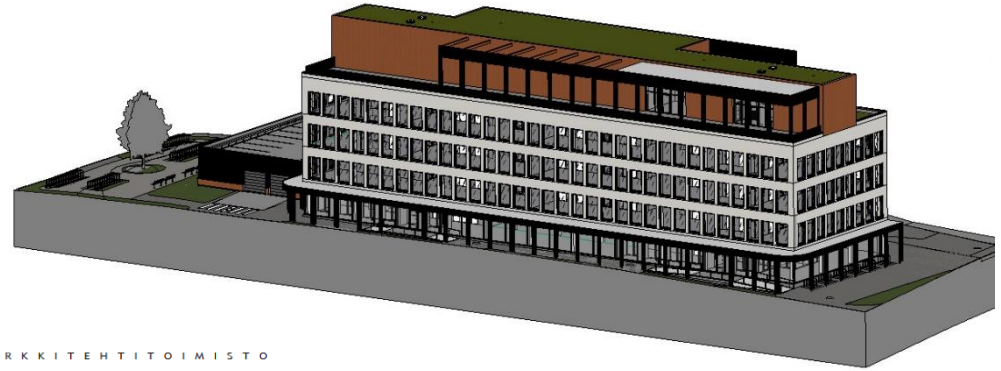




Two phases

- Building Permit
  - General types of materials and products were presented, defining the requirements for materials and products for the implementation phase.
- Handover (as-built)
  - The types specified in the permit phase were updated with selected products and materials.
  - The geometry and information content of the models did not need to be changed, except for design changes caused by other design disciplines.





Design models (native BIM models and IFC)

Group	Wooden		Concrete		Site models	IFC files
Architectural **building permit** models	Residential building in Revit and Archicad	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	Office building in Revit	Residential building in Revit	Office building in Revit and ArchiCAD	Residential building site in Archicad	= 6 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

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

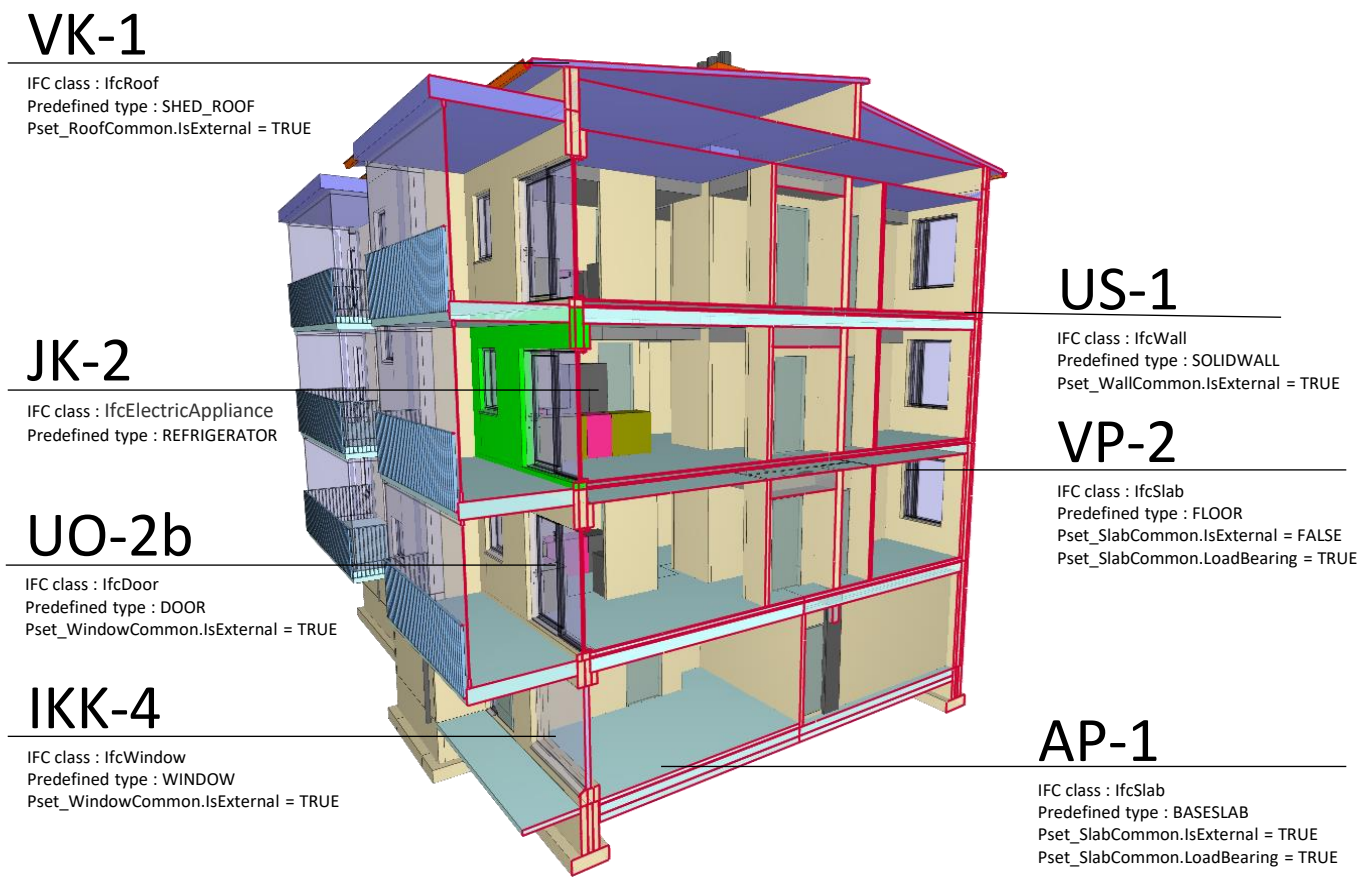
1. For each element in the design model, the correct IFC class, pre-defined type and required properties are defined. This information allows the IFC model to be filtered by element group.

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.



Mapping EN 15978 to IFC 4.3 (ISO 16739-1:2024)

*Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method.

prEN 15978*			IFC 4.3 (ISO 16739-1:2024)		
Building parts	**Building elements and processes**		**IFC Entity**	**IFC PredefinedType**	**IFC Properties**
Pre-construction works	Facilitating works	Temporary/Enabling works	IfcTask 2)	STARTUP	
		Specialist groundworks	IfcTask 2)	CONSTRUCTION	
	Work on existing building	Demolition and alterations	IfcTask 2) IfcTask 2)	DEMOLITION ADJUSTMENT	
Sub-structure	Foundations		IfcFooting	FOOTING_BEAM, PAD_FOOTING, PILE_CAP, STRIP_FOOTING	
	Piles		IfcPile	BORED, COHESION, DRIVEN, FRICTION, JETGROUTING, SUPPORT	
	Basement walls		IfcWall	SOLIDWALL	
	Retaining walls		IfcWall	RETAININGWALL	
	Waterproofing		IfcCovering	MEMBRANE	
	Ground floor construction		IfcSlab	BASESLAB	Pset_SlabCommon.-LoadBearing = TRUE
Super-structure	Frame	Columns	IfcColumn	COLUMN	Pset_ColumnCommon.-LoadBearing = TRUE
		Beams	IfcBeam	BEAM	Pset_BeamCommon.-LoadBearing = TRUE
		Shear walls	IfcWall	SHEAR	Pset_WallCommon.-LoadBearing = TRUE
	Upper floors		IfcSlab IfcBeam	FLOOR HOLLOWCORE	Pset_SlabCommon.-LoadBearing = TRUE Pset_BeamCommon.-LoadBearing = TRUE

Mapping EN 15978 to classification systems

prEN 15978*			IEC/ISO 81346-12		CoClass		Talo2000**		ICMS***	
Building parts	**Building elements and processes**		**Code**	**Description**	**Code**	**Description**	**Code**	**Description**	**Code**	**Description**
Pre-construction works	Facilitating works	Temporary/-Enabling works	-	-			NA	NA	2.01.	Demolition, site preparation and formation
		Specialist groundworks	-	-			NA	NA	2.01.	Demolition, site preparation and formation
	Work to existing building	Demolition and alterations	-	-			NA	NA	2.01.	Demolition, site preparation and formation
Sub-structure	Foundations		A	Ground system	A20	Foundation	121 1121	Foundations Piles	2.02.	Sub-structure
	Piles		B	Wall system	B31	Cellar wall system	121 1121	Foundations Piles	2.02.	Sub-structure
	Basement walls		B	Wall system	B32	Retaining wall system	1212	Enclosure walls	2.02.	Sub-structure
	Retaining walls		FSG	Protective seal	FSG10	Water-proofing	1153	Retaining walls	2.02.	Sub-structure
	Waterproofing		C	Slab system	C10	Bottom slab system	12124	Thermal insulation	2.02.	Sub-structure

BIM specification documents, initial data for validation

BIM SPECIFICATION 1 (3)

Illustration image	
Object	
Intended use	
Design phase	building permit
Revision date	
Organisation	Gravicon Oy
BIM contact person	
Contact email address	
Contact telephone number	
Principal designer	
Project manager	Rita Lavikka
Software and versions used	Tekla Structures 2023
Separate models and documents related to this model	STRUC_NordicLCA_Housin Structures native model
Additional information and comments	It should be noted that thi according to the principles to verify the principles of t have not been thoroughly nor, for example, have the otherwise structurally dime All structures are given as reservations) have not bee structures. Every IfcElementAssembly Pset_ElementAssemblyCor mark is replaced at produc

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BIM SPECIFICATION

BIM Specification

ARK_NordicLCA_Office_Concrete_BuildingPermit.ifc

DISCIPLINE	ARCH
Illustration image	
Object	
Intended use	
Design phase	building permit
Revision date	
Organisation	Arkkitehtitoimisto Huvila
BIM contact person	
Contact email address	
Contact telephone number	
Principal designer	
Project manager	Rita Lavikka
Software and versions used	Revit 2024
Separate IFC or native models related to this model	ARK_NordicLCA_Office_Concrete_BuildingPermi ARK_NordicLCA_Office_Terrain_Concrete_Buildi ARK_NordicLCA_Office_Terrain_Concrete_Buildi ARK_NordicLCA_Office_Concrete_BuildingPermi ts.xlsx
Additional information and comments	

GENERAL MODELLING PRINCIPLES	
Classification systems used	Talo2000
Layer systems used	Talo2000
Naming of building elements	http://uri.suomi.fi/codelist/rakrek/raktkk_builtsy
Unit system	Metric
Coordinate system	ETRS-GK 25 planar coordinates N2000 elevation system
Origin location (x,y,z)	X = E = I Y = N = I Origin 25505183.456 6706938.96 Models are not rotated in the project coordinat placed in a true-north position.

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BIM SPECIFICATION

BIM Specification

ARK_NordicLCA_Housing_Timber_BuildingPe

DISCIPLINE	Architecture
Illustration image	
Object	
Intended use	
Design phase	building permit
Revision date	
Organisation	Arkkitehtitoimisto Huvila
BIM contact person	
Contact email address	
Contact telephone number	
Principal designer	
Project manager	Rita Lavikka
Software and versions used	Revit 2024
Separate models and documents related to this model	ARK_NordicLCA_Housing_Timber_Bui ARK_NordicLCA_Terrain_Timber_Build ARK_NordicLCA_Terrain_ Timber_Buil ARK_NordicLCA_Housing_Timber_Bui ts.xlsx
Additional information and comments	

GENERAL MODELLING PRINCIPLES	
Classification systems used	Talo2000
Layer systems used	Talo2000
Naming of building elements	http://uri.suomi.fi/codelist/rakrek/rak
Unit system	Metric
Coordinate system	ETRS-GK 25 planar coordinates N2000 elevation system
Origin location (x,y,z)	X = E = I Origin 25505171,787

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BIM SPECIFICATION 1 (2)

2024-06-14

BIM Specification

ARK_NordicLCA_Office_Timber_AsBuilt.ifc

DISCIPLINE	Architecture
Illustration image	
Object	
Intended use	
Design phase	As built
Revision date	
Organisation	Arkkitehtitoimisto Huvila
BIM contact person	
Contact email address	
Contact telephone number	
Principal designer	
Project manager	Rita Lavikka
Software and versions used	Revit 2024
Separate IFC or native models related to this model	ARK_NordicLCA_Office_Timber_As-Built.rvt ARK_NordicLCA_Office_Terrain_Timber_BuildingPermit.ifc ARK_NordicLCA_Office_Terrain_Timber_BuildingPermit.rvt ARK_NordicLCA_Office_Timber_As-Built_Materials_and_Products.xlsx
Additional information and comments	

GENERAL MODELLING PRINCIPLES	
Classification systems used	Talo2000
Layer systems used	Talo2000
Naming of building elements	http://uri.suomi.fi/codelist/rakrek/raktkk_builtsystem_1_0
Unit system	Metric
Coordinate system	ETRS-GK 25 planar coordinates N2000 elevation system
Origin location (x,y,z)	X = E = I Y = N = P Z Origin 25505183.456 6706938.966 0,000 Models are not rotated in the project coordinate system; all models are placed in a true-north position.

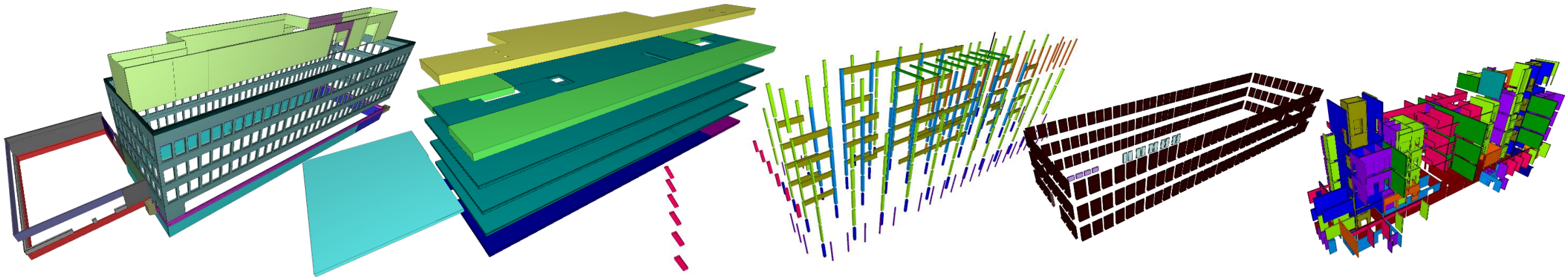
Data validation

- Working methods : Modelling standards
  - Compliance with BIM requirements (e.g. COBIM2012)
  - Correct use of entities (e.g. wall should be modelled as IfcWall)
  - Possibility to group the entities in the model according to EN 15978

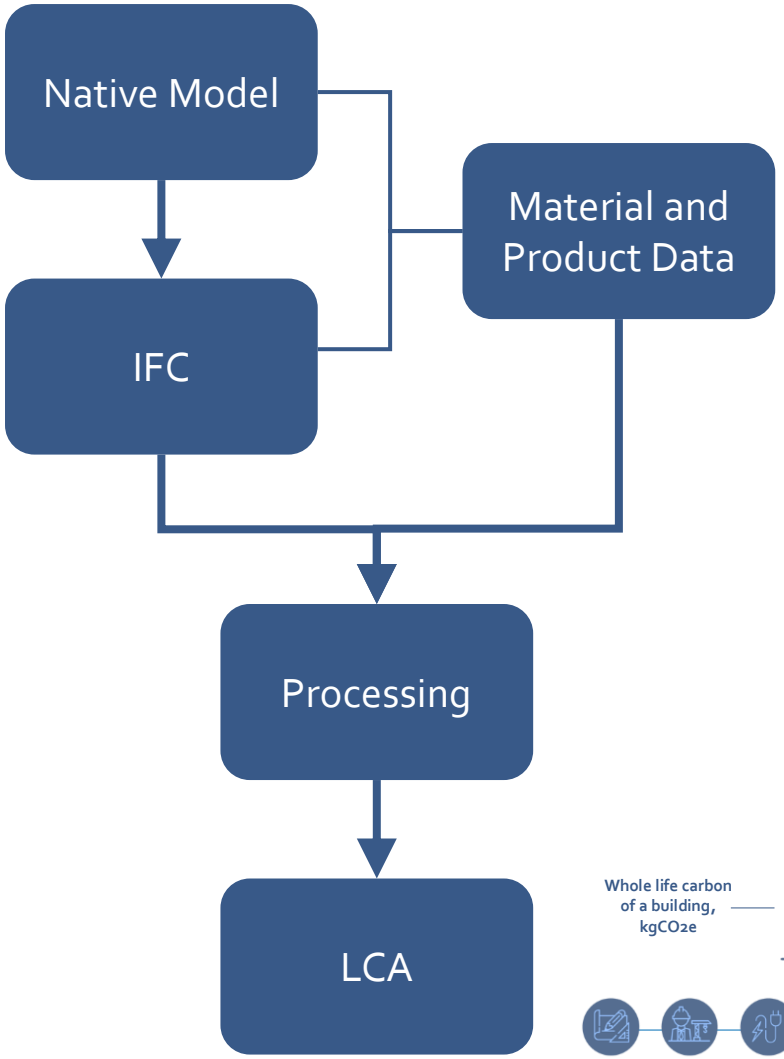
- Technical correctness : Proper use of IFC
  - IFC type entities (e.g. IfcWallType for IfcWall)
  - Predefined types (e.g. IfcWall PARTITIONING for walls that are separating spaces)
  - Standard IFC property sets and properties

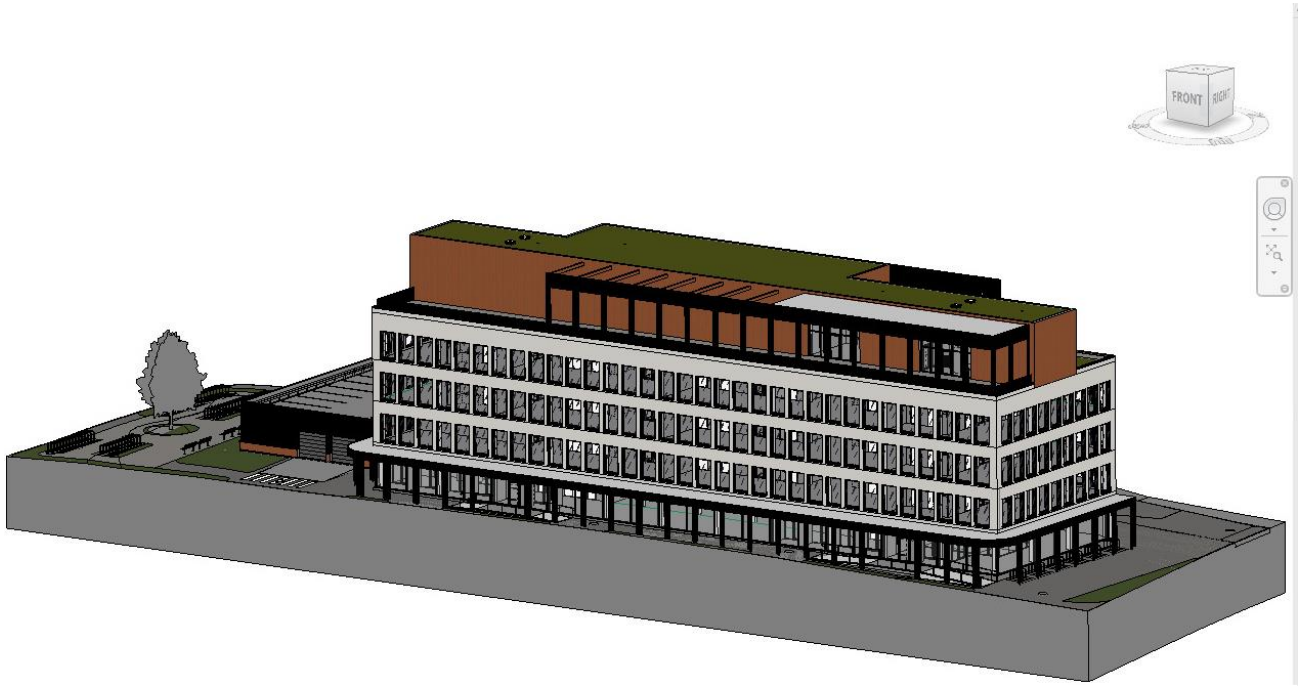
Use of IFC models to calculate the CO_2 of a building

- Based on correctly constructed models
  - IFC geometry, IFC class & predefined types, project-designated types
  - Contains only the information about designed entities; excludes waste, temporary structures etc.
- Material and product data provided by the architect and the contractor
  - Based on the project-designated types that are used in the IFC model
  - The information should be in machine-readable format, but not necessarily within the IFC model
- IFC enables a standardised data collection process
  - Same data format regardless of the design software used
  - Data transfer processes can be automated when the source data is always in the same format



BIM-based building LCA process





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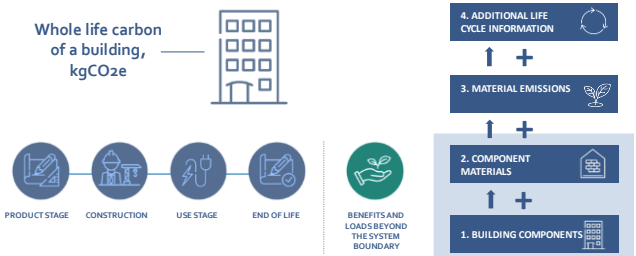

Questions and answers

— https://miro.com/app/board/uXjVLdXzr20=/?share_link_id=487683046189

Thank you!