Low-carbon construction in Finland

Good practices in the climate work of municipalities and regions -seminar 25.5.

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About me

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AINS Group – your team for better & bolder construction

One of Finland's leading design and engineering companies

Expert in low-carbon construction & sustainable construction management

NPS
48

Global projects in
70
countries

Turnover 2022
118 M€

6 000
Projects per year

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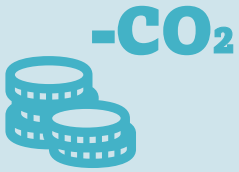
Development in legislation

Finnish Government’s goals



Finland is carbon neutral and Finland’s economy is based on circular economy by 2035

Construction will be based on solutions in accordance with the circular economy, and the goal is to accelerate for example modular construction

Make more efficient use of the facilities and reduce their underutilization

Finnish Government’s goals

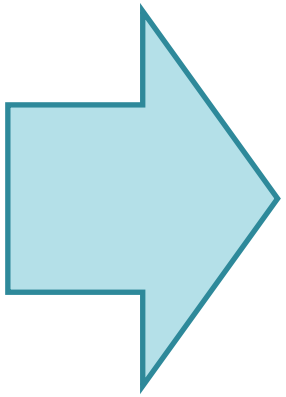
Most of Finland's buildings, infrastructure and construction products should be made from recycled, renewable or low-carbon raw material by 2035

Control the carbon footprint of the building during its life cycle by legislation by 2025

45% of all public construction should be made from wood in 2025 (from educational buildings the goal is 65 % by 2025). Wooden building = > 50 % of the load-bearing frame is made from wood

New Building Act will enter into force in 2025

- Tools to mitigate climate change
  - Carbon footprint calculations
    - The calculation method has been tested since 2019
    - The limit values will be set
  - Life cycle properties as quality values for building
    - Adaptability
    - Durability
    - Reusability
  - Recycling at the level of 70 % (both construction sites and demolition)
- Digitalisation in the industry
- Material declaration (Finnish Material passport, BOM)



Clarifying decrees haven’t yet been formatted.

What happens next in Finnish legislation regarding carbon footprint?

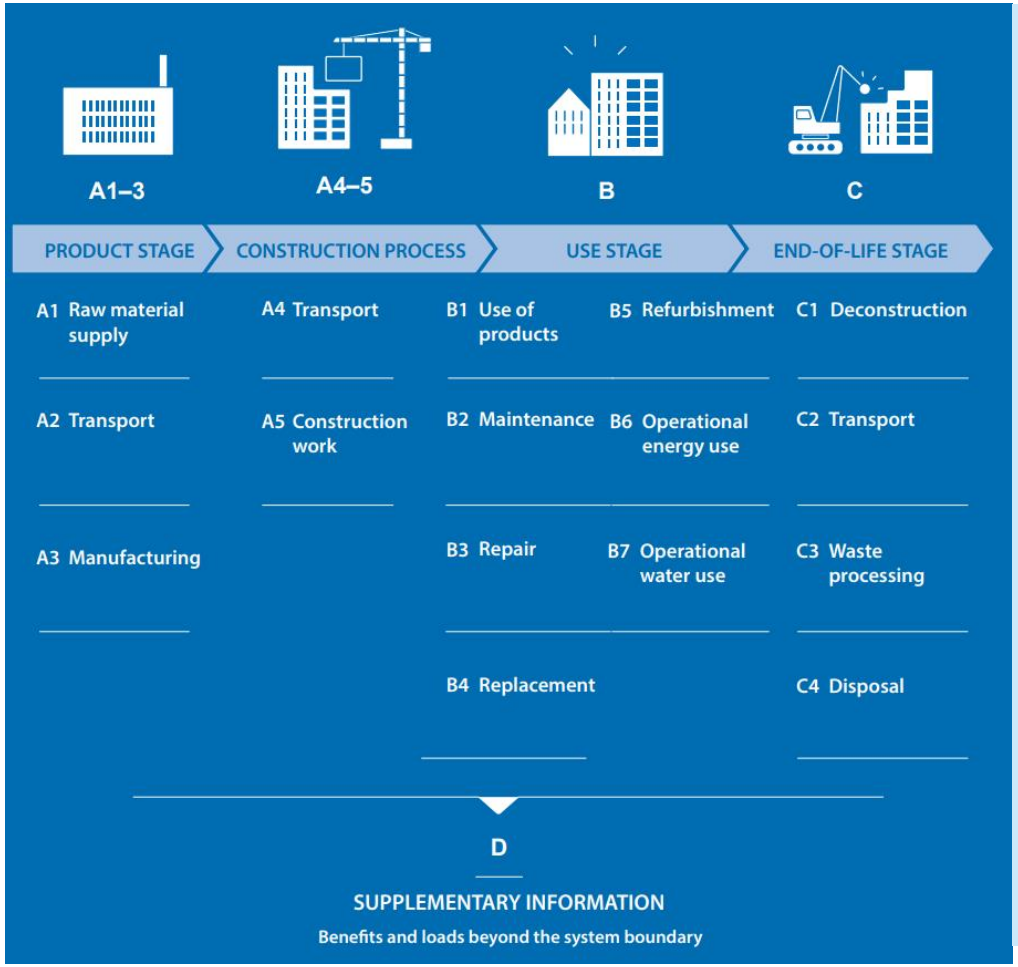
2023
- Finnishing clarifying decrees
- New guidance

2024
- Proposal of the decree of limit values for carbon footprint
- Estimation of the impacts

2025
- New Building act and decrees will enter into force 1.1.2025

Finnish Carbon Footprint calculation

according to the calculation method from the Ministry of the Environment



What life cycle stage to include?

Country	Denmark	Finland	Island	Norway	Sweden	Level(s)	Level(s) Simplified reporting option 1	Level(s) Simplified reporting option 2
Included life cycle stages								
A1-A3	x	x		x	x	x	x	x
A4 Transport to site	-	x		-	x	x		
A5 Construction works	-	x		-	x	x		
B1 Use in building	-	-		-	-	x		
B2 Maintenance	-	-		-	-	x		
B3 Repairs	-	-		-	-	x		
B4 Replacements	x	x		x	-	x	x	x
B5 Refurbishment	-	-		x	-	x	x	
B6 Operational energy use	x	x		-	-	x	x	x
B7 Operational water use	-	-		-	-	x		
B8 Operational use	-	-		-	-	x		
C1 Demolition works	-	x		-	-	x		
C2 Transport	-	x		-	-	x		
C3 Waste management	x	x		-	-	x		x
C4 Final disposal	x	x		-	-	x		x
D Benefits/loads beyond system	x	x		-	-	x		x

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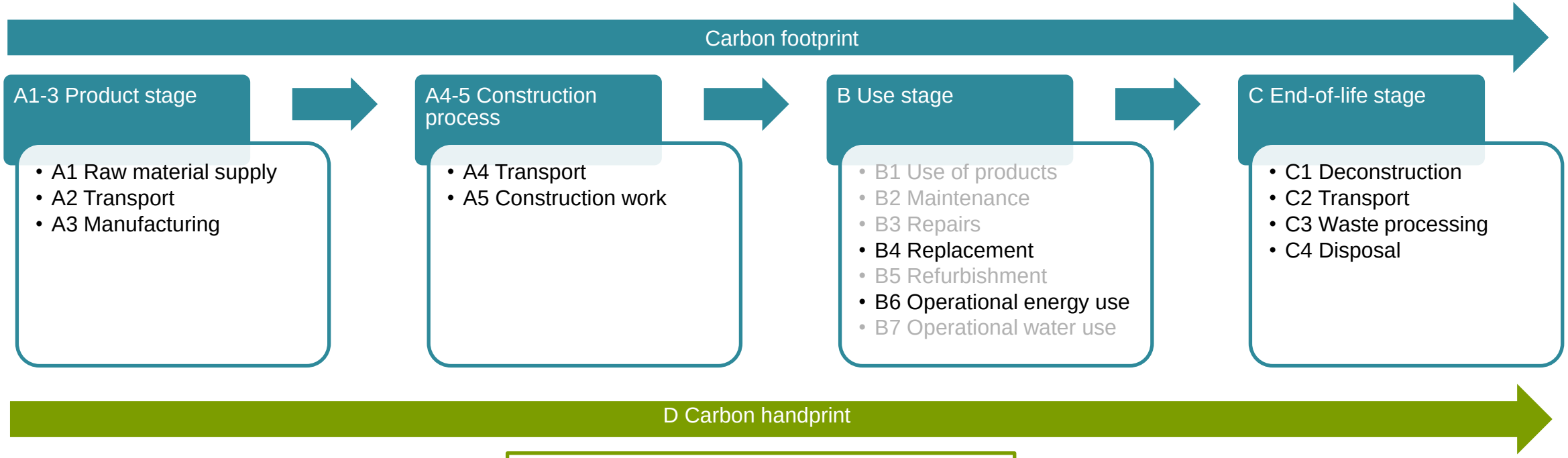
(info from 2022)

Finnish Carbon Footprint calculation

according to the calculation method from the Ministry of the Environment

Time period
50 years



Reuse and recycling
Long term carbon-storages
Carbonation of cement-based product
Leftover renewable energy
Energy recovery

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Finnish Carbon Footprint calculation

according to the calculation method from the Ministry of the Environment

- ✓ Carbon footprint and – handprint will be reported individually on the building and the building site
- ✓ Limit values will be only set for the building

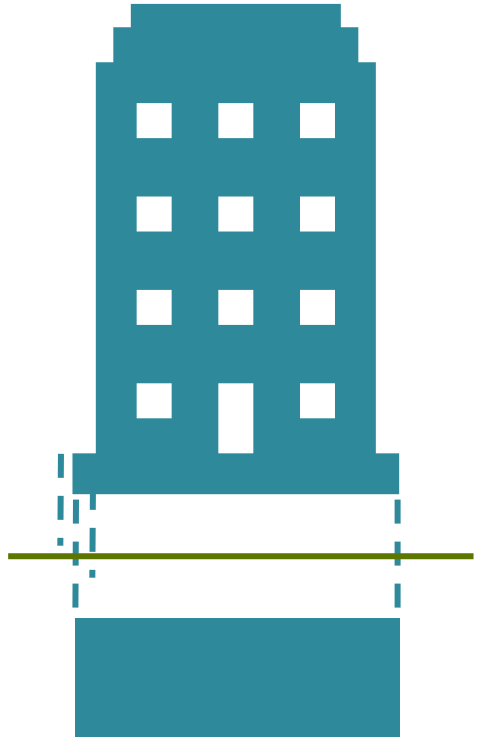
Carbon handprint won't be reduced from the carbon footprint!

Limit values only for the building

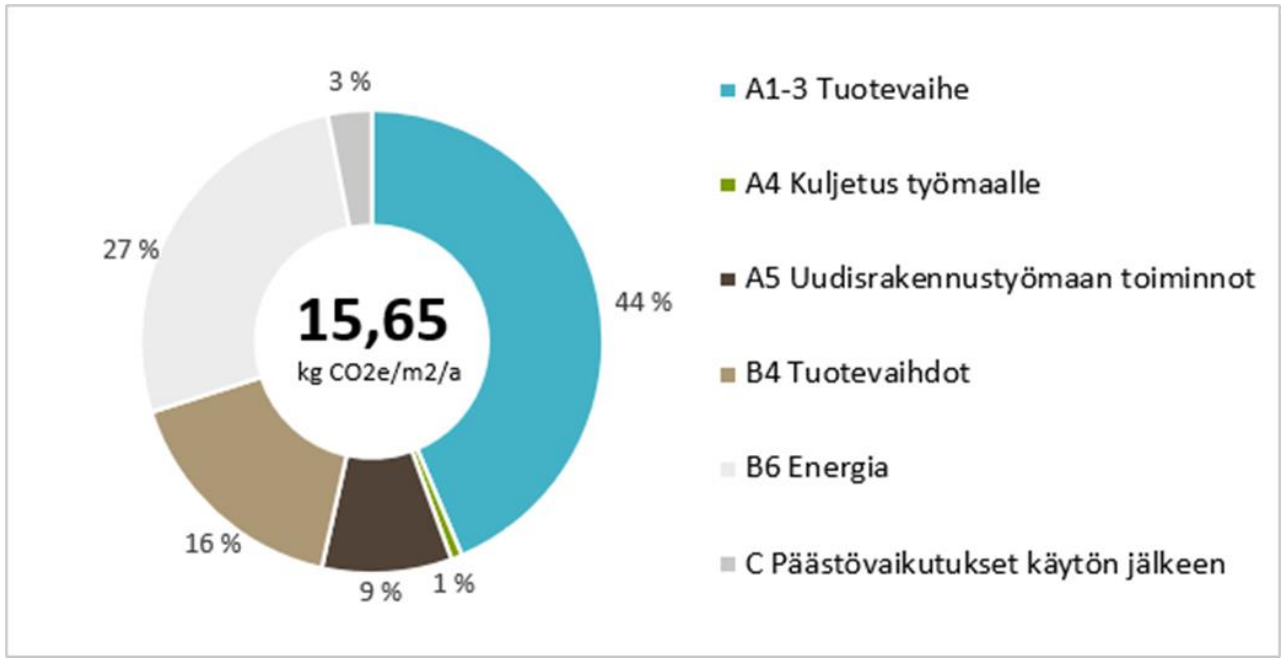
Results will be documented separately

Building
- Load bearing structures
- Additional parts
- Building service technology

Building site
- Structures on site
- Underground structures
- Founding, piles and stabilitation



Example of documentation



Hiilijalanjälki	Rakennus	Rakennuspaikka
A1-A3 Materiaalien valmistus	6,83 kg CO2e/m2/a	0,15 kg CO2e/m2/a
A4 Kuljetus työmaalle	0,12 kg CO2e/m2/a	0,07 kg CO2e/m2/a
A5 Uudisrakennustyömaan toiminnot	1,42 kg CO2e/m2/a	0,14 kg CO2e/m2/a
B4 Tuotevaihdot	2,60 kg CO2e/m2/a	0,03 kg CO2e/m2/a
B6 Energian käyttö	4,20 kg CO2e/m2/a	0,00 kg CO2e/m2/a
C1-4 Päästövaikutukset käytön jälkeen	0,48 kg $CO_2e/m^2/a$	0,02 kg $CO_2e/m^2/a$
A-C Hiilijalanjälki	15,65 kg $CO_2e/m^2/a$	0,41 kg $CO_2e/m^2/a$
A-C Kokonaishiilijalanjälki	901 t CO_2e	221 t CO_2e
Rakennuksen hiilikädenjälki		
D1+D2 Hyödyt uudelleenkäytöstä ja kierrätyksi	-2,60 kg CO2e/m2/a	-0,04 kg CO2e/m2/a
D3 Ylijäävä energia	0,00 kg CO2e/m2/a	0,00 kg CO2e/m2/a
D4 Hiilivarasto, biogeeninen	-5,21 kg CO2e/m2/a	0,00 kg CO2e/m2/a
D5 Sementtipohjaisten tuotteiden hiilinielut	0,00 kg CO2e/m2/a	0,00 kg CO2e/m2/a
D1-D5 Hiilikädenjälki	-7,81 kg CO2e/m2/a	-0,04 kg CO2e/m2/a
D1-D5 Kokonaishiilikädenjälki	-450 tCO2e	-22 tCO2e

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Low-carbon classification of concrete in Finland

- Classification was published in 2022
- The target was to create a transparent, open system to classify concretes based on CO_2-emissions
- Emissions are compared to a reference-level of 2021 average

→ GWP.85 has 85 % of emissions compared to that level

Type of concrete	GWP.REF	GWP.85	GWP.70	GWP.55	GWP.40
C20/25	210	180	145	115	85
C25/30	230	195	160	125	90
C30/37	255	215	180	140	100
C35/45	285	240	200	155	115
C45/55	320	270	225	175	130
C50/60	340	290	240	185	135
C30/37 – Air-entrained	290	245	205	160	115
C35/45 – Air-entrained	330	280	230	180	130
C45/55 – Air-entrained	375	320	265	205	150
C50/60 – Air-entrained	395	335	275	215	160
C30/37 P0	270	230	190	150	110
C30/37 P30	300	255	210	165	120
C35/45 P0	300	255	210	165	120
C35/45 P30	330	280	230	180	130
C35/45 P50	340	290	240	185	135
C45/55 P50	375	320	265	205	150

P0, P30 and P50 are salt-frost resistant concretes used in the concrete infrastructure

How it looks as a designer?

- The industry have been engaged in the preparation work of the acts
- Customers have started to ask about low-carbon solutions and life cycle properties

→ Designers are asking these properties from the product manufacturers

- Carbon footprint calculations and comparisons have become a norm

How it looks as a designer?

- Investigating life cycle properties is a new thing
  - There’s a lot of interest in the industry but not that many examples yet
  - It’s not clear how life cycle properties have to be documented in the future
- There’s multiple test projects going
  - ReCreate (Reusing concrete elements)
  - Case Vattuniemi (Handling material streams, reuse and recycle)
  - A lot of bigger and smaller projects on private and public sector

ReCreate
Reusing precast concrete for a circular economy

Case Vattuniemi

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Questions or comments?

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