Life Cycle Assessments In The Built Environment

CIRCULAR AND INNOVATIVE CONSTRUCTION PROCUREMENTS

International Workshop

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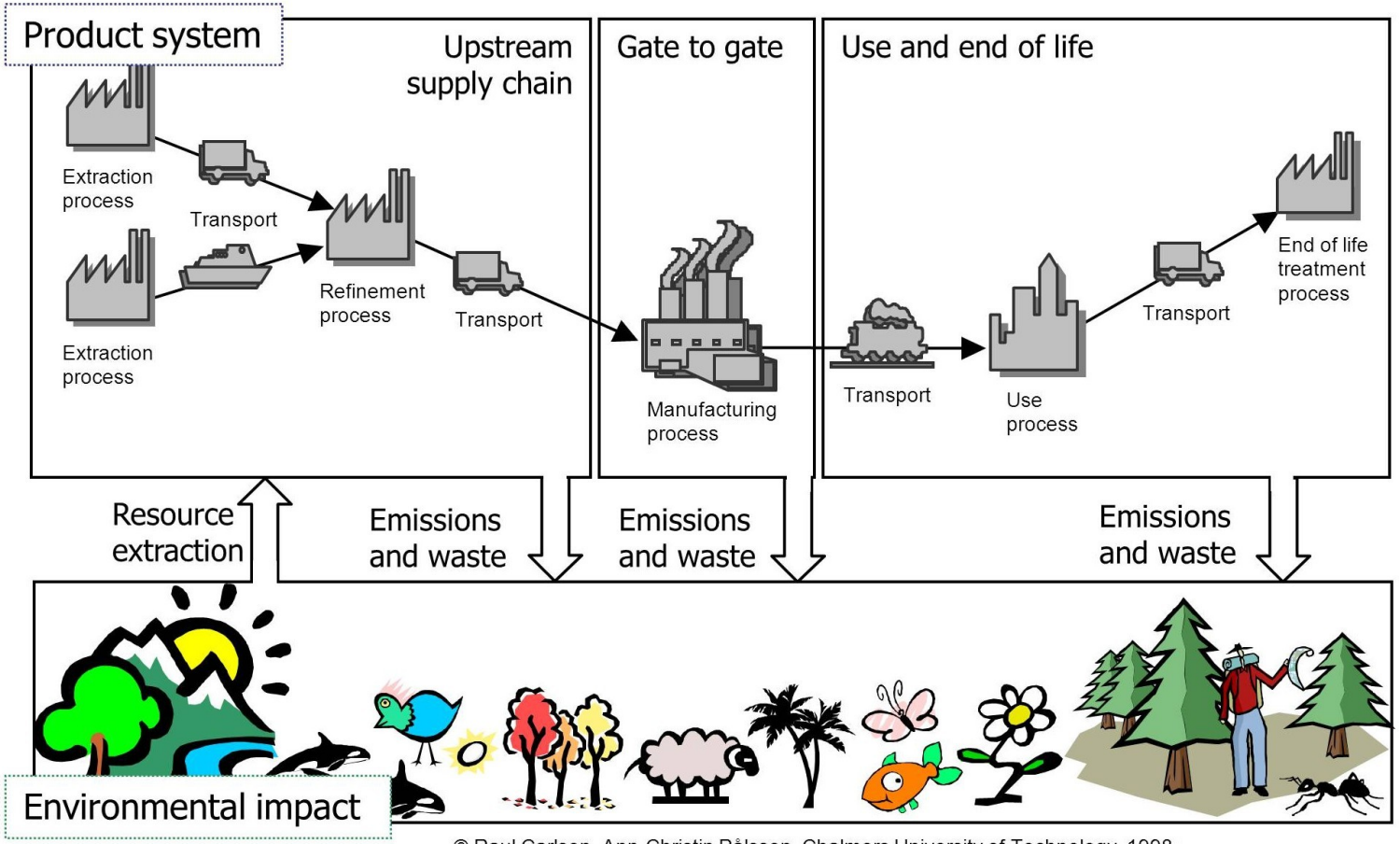
Agenda

- Introduction to LCA
- LCA for the Built Environment
- Building LCA regulations in the EU

Introduction to LCA



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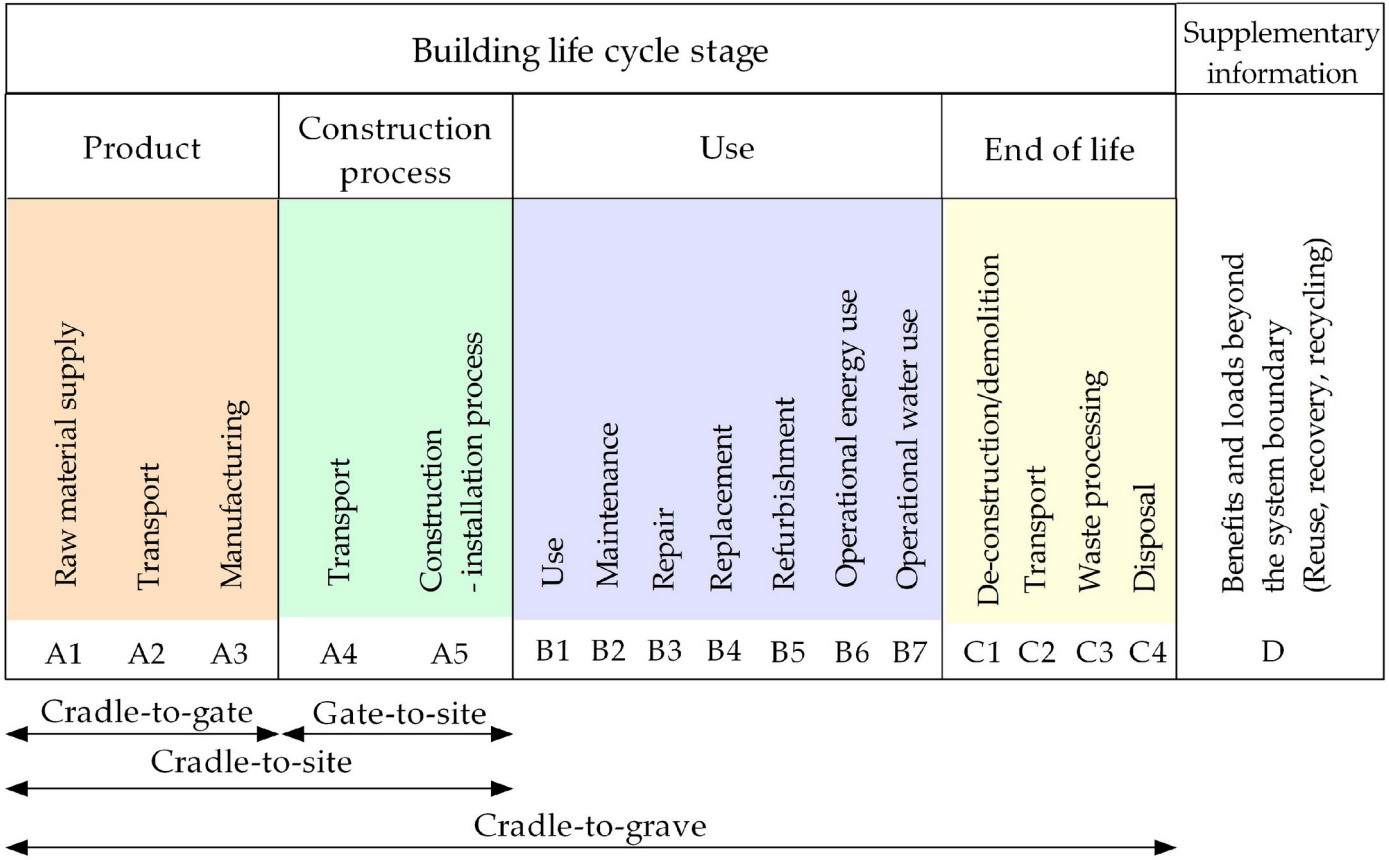
LCA for Buildings



Song, X.; Carlsson, C.; Kiilsgaard, R.; Bendz, D.; Kennedy, H. Life Cycle Assessment of Geotechnical Works in Building Construction: A Review and Recommendations. Sustainability 2020, 12, 8442. https://doi.org/10.3390/su12208442

ISO 14040 & ISO 14044
General guidelines for LCA
ISO 14025
Guidelines for EPDs
EN 15804
Guidelines for construction product LCAs
EN 15978 & ISO 21931
Guidelines for building level LCAs

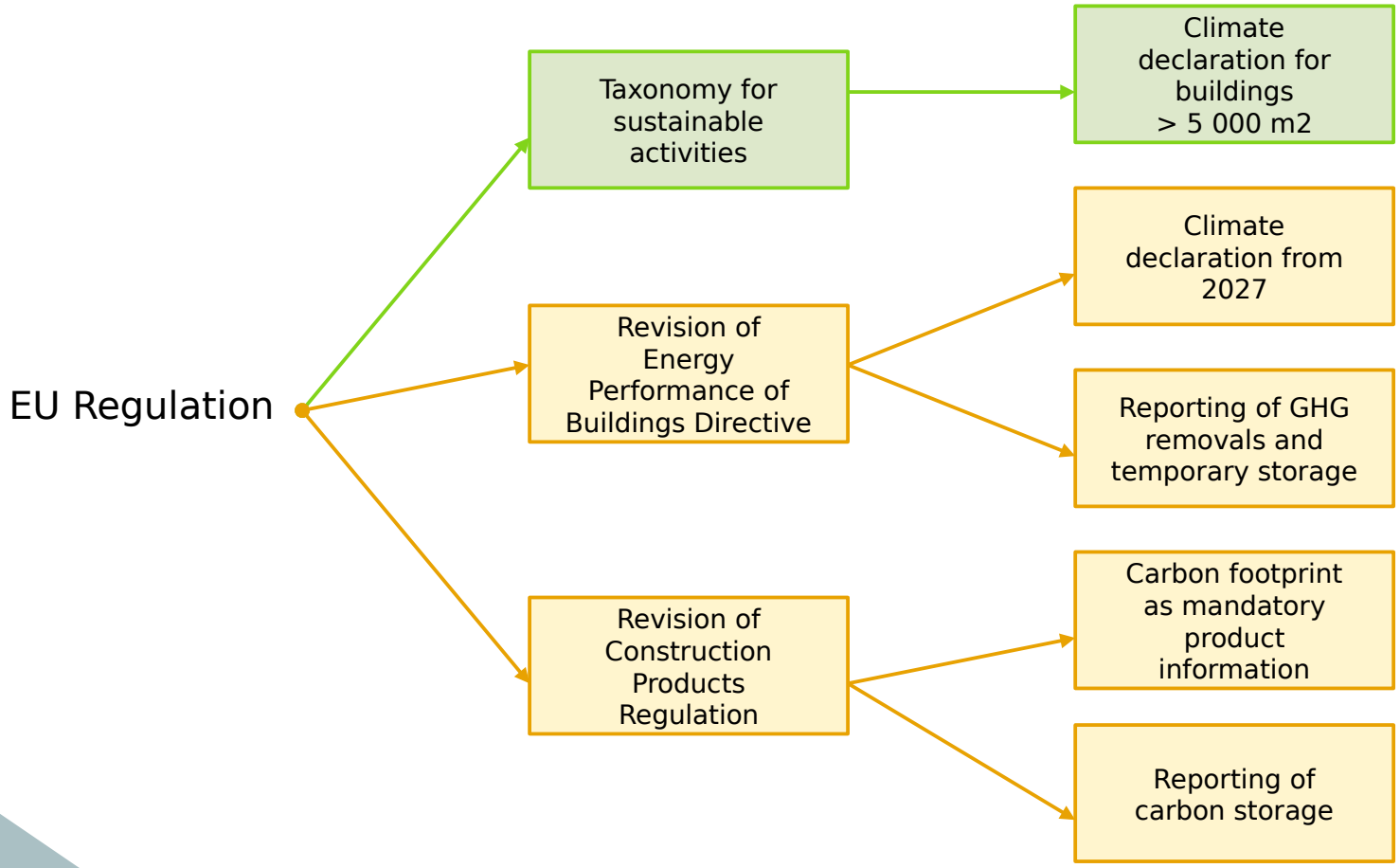
Building LCA regulation in the EU

Country	Methodology	In force	Applies to renovations	Timing of assessment	Applicable buildings	Acceptable data	Preference of EPDs	Compliance type
Denmark	Bygningsreglement	2023	No	Single assessment – Post construction	All	EN 15804[16]	Yes	Limit value
Finland	Finnish method / RakL	2024 Expected	Yes	Single assessment – Planning Stage (Building permit)	All Buildings requiring an energy declaration	EN 15804+A2, CO2data	Yes	Limit value
France	RE2020	2022	No	Multiple assessments (Building permit & Post construction)	Residential Offices Education	INIES database	Yes	Limit value
Netherlands	MPG	2013	No	Single assessment – Planning Stage (Building permit)	Offices and residential	NMD only	Yes	Limit value
Norway	NS 3720 / TEK 17	2022	Yes	Single assessment – Planning Stage (Building permit)	Residential and commercial buildings	EN 15804	Yes	Declaration
Sweden	Klimatdeklaration av byggnader	2022	No	Single assessment – Post construction	>100 m2[17]	EN 15804, Boverket	Yes	Declaration
UK	London Plan / Part Z [18]	In force / Proposed	Yes	Multiple assessments (Prior and post construction)	>1000m2 Or >10 dwellings	EN 15804 and other standards	Yes	Declaration[19]
EU	Level(s) via EPBD	2027/2030 Proposed	Yes	Multiple assessments (Conceptual / detailed / as-built)	All	EN 15804	Yes	Declaration

Comparison of methods and scopes

Included life cycle stages		Denmark	Estonia	Finland	Norway	Sweden	Level(s)
A	A1-A3	✓	✓	✓	✓	✓	✓
	A4 Transport to site		✓	✓	✓	✓	✓
	A5 Construction		✓	✓		✓	✓
B	B1 Use in building						✓
	B2 Maintenance				✓		✓
	B4 Replacements	✓	✓	✓	✓	✓	✓
	B5 Refurbishment						✓
	B6 Energy	✓	✓	✓		✓	✓
	B7 Water						✓
C	C1 Demolition works		✓	✓		✓	✓
	C2 Transport		✓	✓		✓	✓
	C3 Waste management	✓	✓	✓		✓	✓
	C4 Final disposal	✓	✓	✓		✓	✓
D	Additional	✓	✓	✓		✓	✓
Reference study period		50	50	50	50	50	50

EU regulation



Energy Performance of Buildings Directive (proposed amendments by the European Parliament)

Article 7.2:

- Climate declaration for all new buildings 2027

Amendment 2a:

- By 31 December 2025, the Commission shall adopt a delegated act ...by setting out a harmonised EU framework for the calculation of life-cycle Global Warming Potential, developed in an inclusive stakeholder process and building on the LEVELs framework and standard EN 15978.

Amendment 2b:

- Member States shall publish a roadmap detailing the introduction of limit values on the total cumulative lifecycle GWP of all new buildings no later than 1 January 2027 and set targets for new buildings from 2030, considering a progressive downward trend, as well as maximum requirements, detailed for different climatic zones and building typologies.

Energy Performance of Buildings Directive (proposed amendments by the European Parliament)

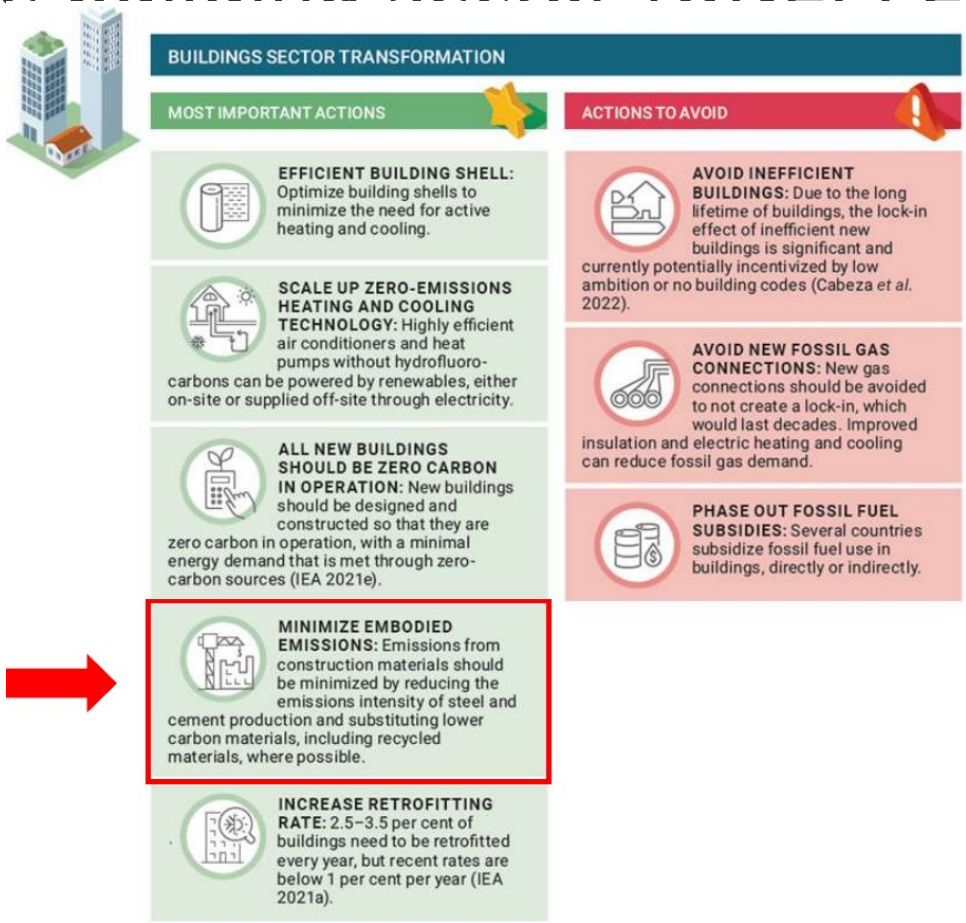
Annex II TEMPLATE FOR THE NATIONAL BUILDING RENOVATION PLANS

- Targets for expected whole lifecycle greenhouse gas emission (kgCO2eq/(m2.y) with five year milestones per building type
- Targets for expected whole lifecycle greenhouse gas emission reduction (%) with five year milestones per building type
- Targets for circular use of materials, recycled contents and secondary materials, and sufficiency with five year milestones, if any;
- Targets to increase carbon removals associated to the temporary storage of carbon in or on buildings

CPR – facilitating circularity

Used or remanufactured construction products	Clarify + establish conditions for marketing	Art. 10(2) and (3), and 12
	Protocol on dismantled construction products (safe re-use / remanufacturing)	Art. 29
	Information on reparability, re-use, remanufacturing + recyclability	Art. 22(2) and Annex I Part D
	Maximum flexibility: • Unchanged used products on the EU market excluded • Voluntary assessment • Member States may exempt certain used products if they circulate only in their territory	Art. 2 (2), 10, 12, and 22
Surplus products	Permitting a second life	Art. 12
Closed material circles	Member States: may establish mandatory deposit-refund systems + ban destruction of products	Art. 7 (7) and (8)

Recommendations for emission reductions for the building sector (UNEP, 2022)



Summary

- LCA getting into building regulations relatively rapidly
- Methodological background: Level(s), which is based on EN 15978
- System boundaries appear rather ambitious
- Scenarios allow decarbonization of energy, but unclear about future technologies
- Whole life carbon limits and roadmap for decarbonization of buildings ahead

Thank you for listening!