Life Cycle Assessment and the Austrian Building Sector

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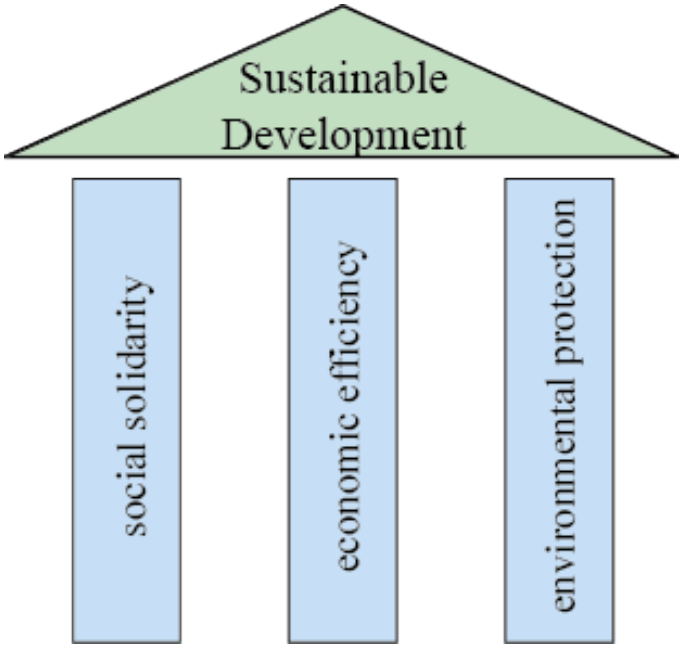
Sustainable Development

"To meet the needs of the present generation without compromising the ability of future generations to meet their own needs"
(Brundtland Report, 1987)

Three target dimensions of sustainability – columns with equal loads



Construction Product Regulation

Regulation (EU) 305/2011

- In effect in all EU member states since July 2013
- Sustainable use of natural resources is now a new basic requirement for construction works
- Idea of sustainability has to be considered in all phases of construction works
- Ecological assessments (e.g. Life Cycle Assessment – LCA) of construction works will gain higher importance

LCA Methodology – ISO 14040

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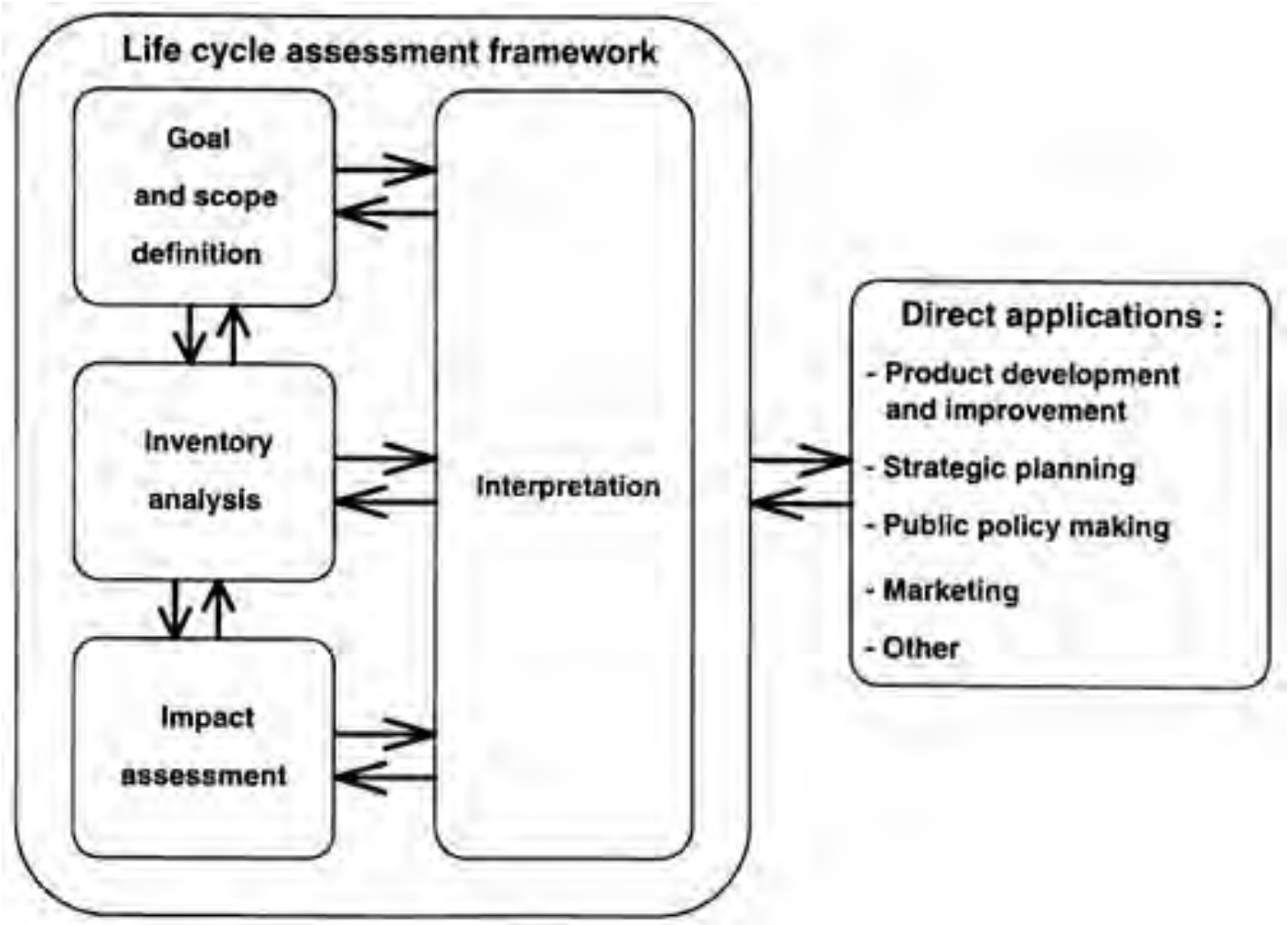

LCAs in the Construction Sector

Characteristics of construction LCAs

- High individuality of construction works – no mass production
- High effort for LCA of “end product”
- “Several-stage-assessment” for structures and buildings

LCAs in the Construction Sector

Environmental Product Declarations (1/4)

- According to ISO 14025 and EN 15804
- Assessment of single construction products
- From beginning of production chain (cements, aggregates, etc.) to pre fabricated elements
- Important components for assessments of structures and buildings
- Based on LCI databases (e.g. ecoinvent, GaBi, etc.)
- Verified by independent experts

LCAs in the Construction Sector

Environmental Product Declarations (2/4)

- Criticism: difficult to compare due to different background databases, allocations, moments of elaboration, etc.

- So why develop an EPD?

  - Producers competition

  - Use for comparison of structures and buildings in planning phase

  - More data (EPDs) available – improvement of level of detail of the comparison

  - Sustainability and ecological performance of building products will be generally be of more importance in the near future

LCAs in the Construction Sector

Environmental Product Declarations (3/4)

- Existing EPD Programs in Europe

LCAs in the Austrian Construction Sector

Environmental Product Declarations (4/4)

Bau-EPD
Baustoffe mit Transparenz

Shareholders:

ÖGNB
Österreichische Gesellschaft für Nachhaltiges Bauen

ÖGNI
AUSTRIAN SUSTAINABLE BUILDING COUNCIL

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www.bau-epd.at (under construction)

LCAs in the Construction Sector

Building Certifications (1/3)

- Examples for international building certification systems

DGNB

MINERGIE®

U.S. GREEN BUILDING COUNCIL LEED USGBC

iiSBE

SBTool

breeam

LCAs in the Austrian Construction Sector

Building Certifications (2/3)

- Austrian building certification systems – application of LCA

klima:aktiv	ÖGNB Österreichische Gesellschaft für Nachhaltiges Bauen	ÖGNI Austrian Sustainable Building Council
•For new construction of office buildings **•Two LCA options** •Whole building •Building envelope **•Indicators** •GWP, AP, nr-CED •Aggregated to OI3-Indicator **•Energy demand of use phase is not included** **•Max. achievement by LCA 350 points of 1000 (35%)** **•Database: baubook**	**•For all kinds of buildings** **•LCA considers all LC-phases** •Before-use phase •Use phase •End-of-life phase **•Indicators** •GWP, AP, nr-CED •Aggregated to OI3-Indicator **•Technical equipment is not considered** **•Max. achievement by LCA 60 points of 1000 (6%)** **•Database: baubook**	**•Adoption of DGNB for Austria** **•LCA considers all LC-phases** •Before-use phase •Use phase •End-of-life phase **•Variety of indicators** **•Comparison of results with defined benchmark** **•Max. achievement by LCA (ecological quality) 22,5%** **•Database: oekobau.dat**

LCAs in the Austrian Construction Sector

Building Certifications (3/3)

- Austrian building certification systems – applied databases for LCAs

klima:aktiv ÖGNB Österreichische Gesellschaft für Nachhaltiges Bauen **•Database: baubook** **•All currently available validated software-products for calculating energy passes and construction physics in Austria are also connected with baubook datasets**	ÖGNI Austrian Sustainable Building Council **•Database: oekobau.dat** **•Third party verified Data like EPDs are accepted and preferred**
• **EPDs of Bau-EPD GmbH shall be transferred to baubook and oekobau.dat** Bau-EPD Baustoffe mit Transparenz	

LCAs in the Construction Sector

Built Infrastructure (1/4)

- Characteristics and problems:
  - Mainly dominated by public contracting authorities
  - So far no (main) focus on environmental aspects
  - Main aspects: costs, availability and safety concerns
  - Difference to buildings: high life expectancy, high consumption of raw materials, high impact of use phase, wrong construction system causes not only costs for owner – has also effect for public, …
  - How can an environmental impact be set in equation with public availability?
  - Sustainability assessment far less in use as for buildings

LCAs in the Construction Sector

Built Infrastructure (2/4)

- Road infrastructure:
  - Several (combined) LCA studies in last few years (e.g. Germany, Switzerland, USA)
  - Reduction of environmental impact of construction and maintenance by optimizing production of construction materials
  - High influence of lifetimes and maintenance frequency of pavement layers
  - High influence of transport distances
  - Impact of traffic is up to 100 times higher than impact of construction and maintenance
  - Influence of side effects (fuel consumption due to stiffness of road surface, albedo/ heat island effect, road cleaning, lightning, …)???

LCAs in the Construction Sector

Built Infrastructure (3/4)

- Examples for international assessment tools for road infrastructure:
  - NISTRA (Switzerland) – Sustainability Indicators for Road Infrastructure Projects (only new construction)
  - NATA Approach (UK)
  - GreenLITES (US)
  - Greenroads (US) – detailed LCA and LCCA over complete life cycle including maintenance and use phase

LCAs in the Austrian Construction Sector

Built Infrastructure (4/4)

- LCA studies of built infrastructure in Austria:
  - Some projects in discussion

- But so far nothing mentionable!!!

Conclusions

What to do?

- Stable background data for LCAs of building components, buildings and built infrastructure
- Force industry to perform EPDs (at Bau EPD GmbH)
- Research focus on essential products and processes of productions
- Studies analysing built infrastructure
  - Focus on long life times, high consumption of raw materials, impact of use phase, maintenance strategies, social and macro-economic side effects
  - Assessment tool for (road) infrastructure
  - Assessment of further civil engineering structures

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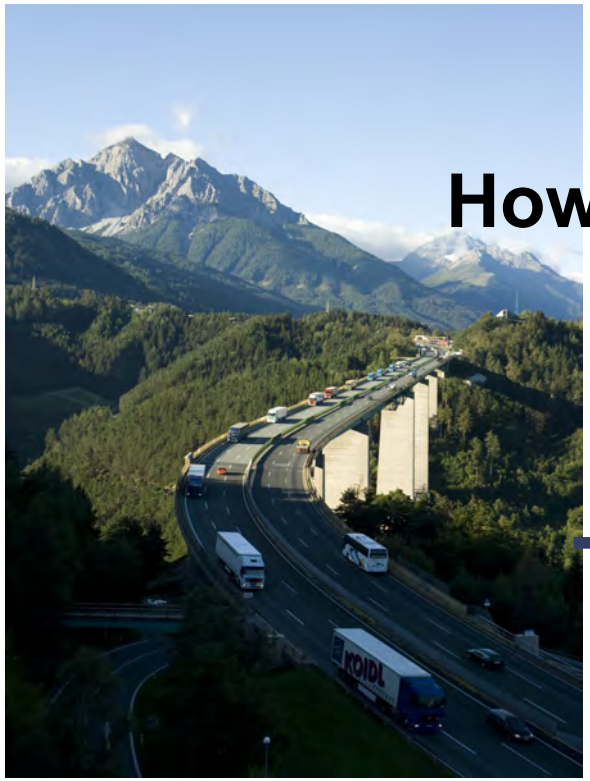


How is the situation in your country?

Let's work together!

Thanks for your attention!

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