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Life Cycle Thinking in Sustainable Design

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Life Cycle Thinking =

- No trade-offs in life cycles
  - It is not only design and construct, it is operations too
  - Where does it come from and where does it end up
- No trade-offs in different aspects of Sustainability
  - One-issue thinking forgets other issues

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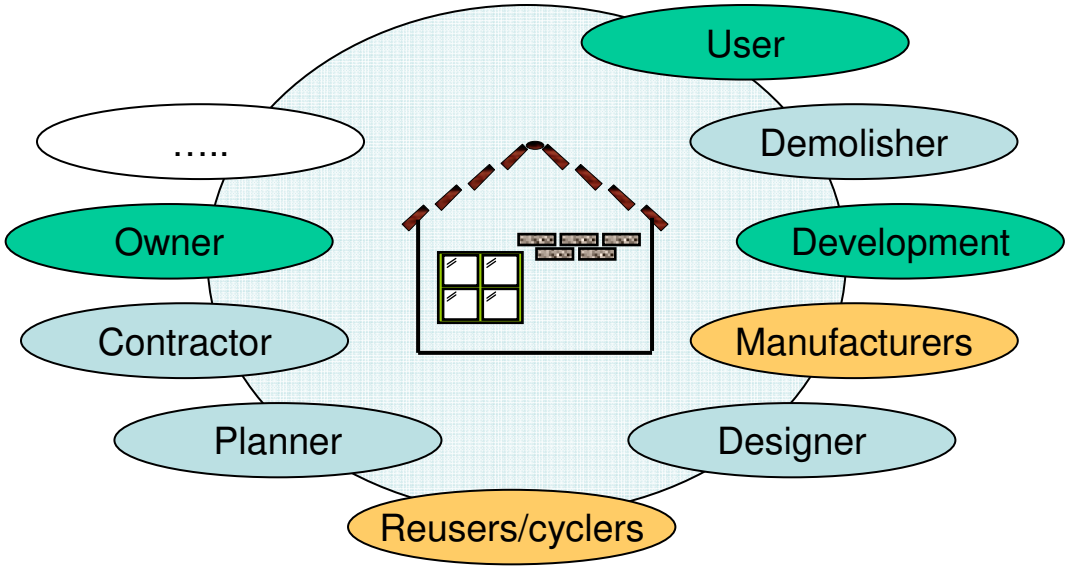
Life Cycle Thinking =

Making informed decisions

By everybody involved



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Questions

How can we make everybody communicate?

What should be the goal?

How do we know we achieve the goal?

We need goals that are tangible, that everybody understands, that can be verified, that are a simplification of the complexity below

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Sustainable Design =

First take care of

Enhancing social sustainability

Producing natural capital

Economy

will follow

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Sustainable Design =

Enhancing social sustainability

- Comfort-ability
- Health-ability
- Walk-ability
- Mixed housing / mixed functions …

Producing natural capital

- (Neighborhood) Energy production
- Water cleaning and production
- Used renewable materials feed new growth
- …..

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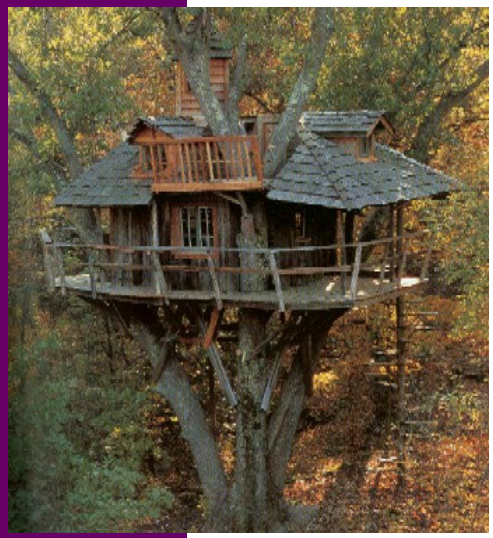
Sustainable Design =

Producing multifunctional benefits

Like a tree ….



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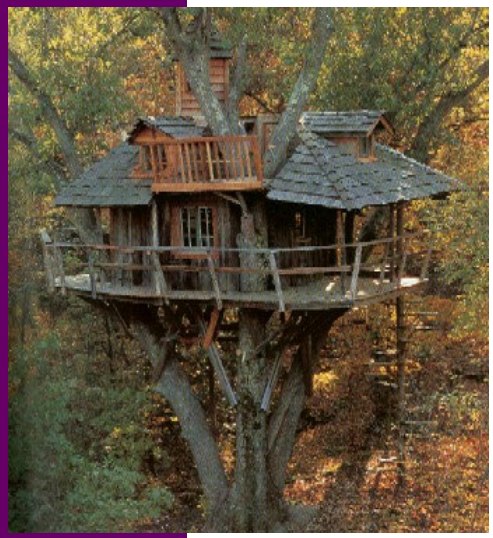
Sustainable Design =

Producing multifunctional benefits

Like a tree provides a house, cleaning air, produces oxygen, retains water, provides shade, captures solar energy, bears fruit……



It feeds on the natural capital and enhances it at the same time

What all can a house do?

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Austin Climate Protection Plan

Weight Watchers

CO_2 the New Carb

EPA CO2 DOE

The plan

- Make all new single-family homes zero net-energy capable by 2015. Increase energy efficiency in all other new construction by 75% by 2015.
- Require disclosure of historic energy use, facilitate and require energy efficiency improvements in existing homes and buildings at point of sale.
- Enhance incentives and requirements for Green Building program develop “carbon neutral” certification.

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Austin Climate Protection Plan

Life Cycle Thinking considerations

- Are there trade-offs to other environmental impacts?
- What life cycle phases are included in 'Carbon Neutrality'?
- What about the existing stock?
- What about sustainable design vs life style?

Fact *in the Netherlands 40% of the environmental load related to a residential building comes from energy, 60% is material related*

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Questions

If we go for one-issue optimization, what should we at least try to assess in a qualitative manner?

What framework do we need to make it more than one-issue optimization?

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How to move forward?

My contribution:

To provide insight in the impact on the natural capital of service, products and governance

Based on environmental Life Cycle Assessment

Trying to get clients to see beyond there one-issue and their part of the life cycle

As far as science takes us, and clients let me

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Colloquium Goals

- Introduce Life Cycle Assessment (LCA)
- Show LCA-software
- Tell you about projects I have been involved with
- Tell you what I want to do in Austin-TX-U.S.

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About LCA

Further reading

ISO 14040 series on Life Cycle Assessment

ISO 14020 series on Environmental labeling

http://therightenvironment.net/LCA.htm >>

UNEP: why take a life cycle approach?

http://therightenvironment.net/UNEPLCAapproach.pdf

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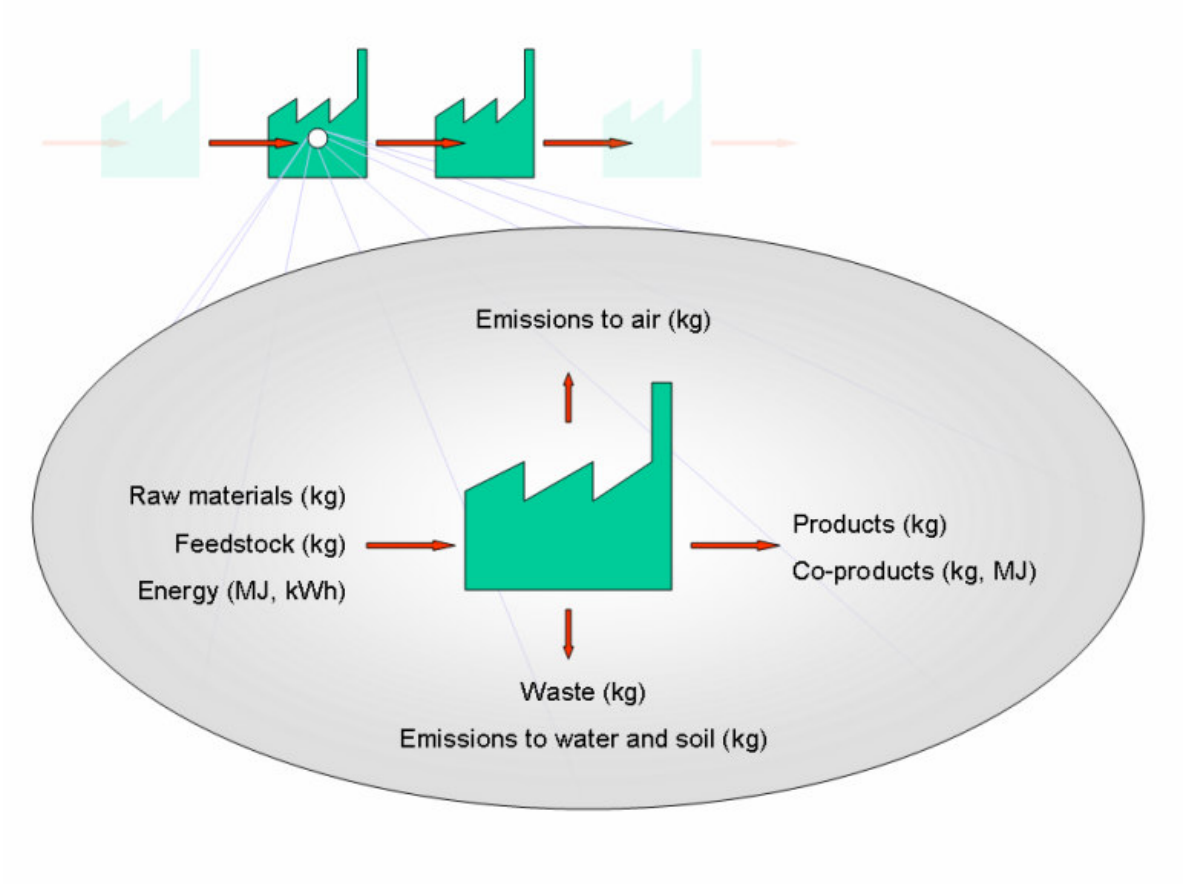
Life Cycle Assessment (LCA)



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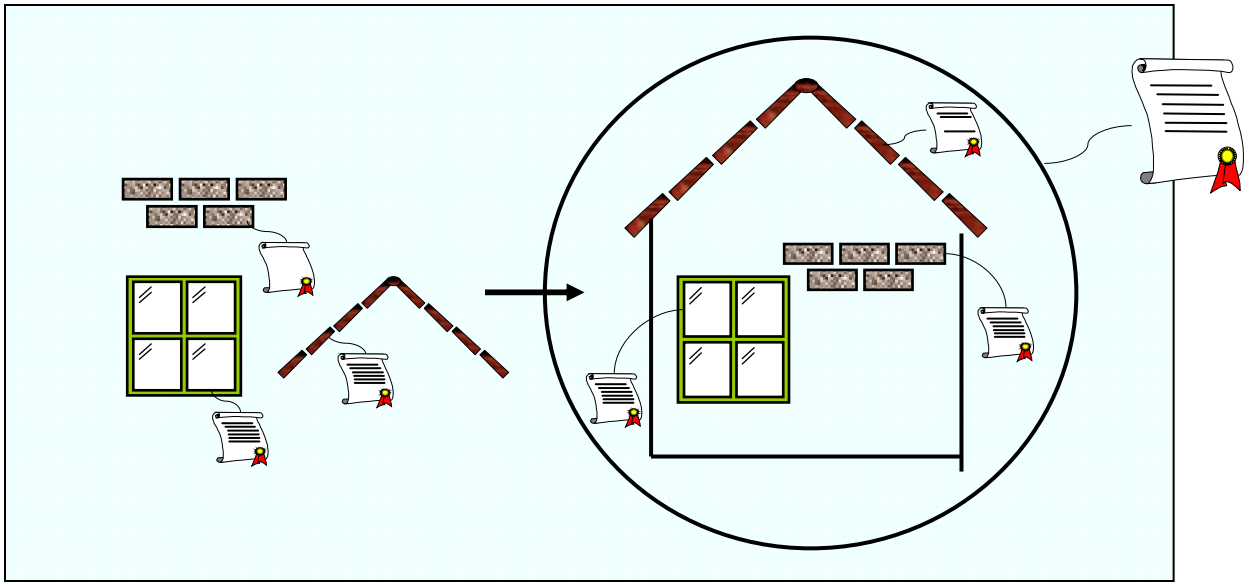
Modular Sustainability



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About LCA tools

World leaders

SimaPro

http://www.pre.nl/download/manuals/SimaPro7IntroductionToLCA.pdf

Gabi

GaBi Software
PRODUCT SUSTAINABILITY

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Read the disclaimer

Read any LCA report carefully with this in mind:

What is it all about
- What is the question being answered?
- What is the functional unit?

What was left out
- Which life cycle phases are not included?
- Which impact categories are not included?
- Who is not involved?

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My world in Europe

1980's Preference lists

1990's Type III labeling over the last 10 years

2000 First LCA based Building model : EcoQuantum

2004 CEN Mandate 350 Sustainable Construction

2005 NL and French standards

2006 LCA tool for Dutch DOT: DuboCalc

2009 EU EPD standards for building products

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LCA for Design = ask yourself

How to include life cycle considerations into your daily practice?

- What environmental topics?
- What life cycle phases?
- At which stage of the design process?
- To arrive to…?
- Need for a tool…
- Need for a knowledge base…

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What do we need?

- Accepted framework for decision making
- Modules per stakeholder
- Primary database from stakeholders
- Materials and operations
- Building model with reference buildings
- For different design stages, focus on improvements
- Benchmark for performance based credits
- Relevance to existing programs, such as the USGBC LEED and the Austin Climate Protection Plan

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About existing building models

Most constructional and money based
Limited LCA-based

No nationwide accepted one
None of them filled with primary data
Runners up are

- BREAM (UK)
- EcoQuantum (NL)

Necessity to reflect local variations

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Triple bottom line

The Costs and Financial Benefits of Green Buildings, A Report to California's Sustainable Building Task Force. October 2003

This study, The Costs and Financial Benefits of Green Building, represents the most definitive cost benefit analysis of green building ever conducted. It demonstrates conclusively that sustainable building is a cost-effective investment, and its findings should encourage communities across the country to "build green."

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What do I want to work on

- Accepted US/TX database
- Building model with US/Austin reference buildings
- Architects that want to develop a building model and run pilots
- University program and/or students that want to contribute to the bigger picture of the Sustainability framework by getting grip on parts?

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Discussion

What … UTCSD and you do?

- *…can*
- *…will*
- *…should*
- *…want to*

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Quizzed – which one is true?

Cheeseburger

- A cow metabolized 15 lb of corn into muscle for a 1/4 lb burger
- The growing of feed for beef cattle accounts for 10% of the world's pesticide use
- A cheeseburger can take 700 gallons of water to make
- I'm not sure that a cheeseburger even contains beef from a cow

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