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November 2008

Life Cycle Assessment: applications and implications for the greening of the South African Construction Sector

Presentation by N.L. Ampofo-Anti

Researcher

CSIR Built Environment (Construction)

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Outline

- Introduction
- LCA in a nutshell
- Life Cycle Approaches
- Construction LCA applications
- LCA in South Africa
- Lessons learnt
- LCA-based action agenda for SA construction

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Introduction

Construction products have both positive and negative influences on society and the environment

The positives (very obvious)

- Buildings and other physical infrastructure

The negatives (not so obvious)

Resource depletion

- Raw materials use: 50%
- Non renewable energy use: 50%
- Freshwater use: 40%

Pollution

- Solid waste generation: 50%
- Air pollution (GHG): 40%
- Water pollution

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Life Cycle Assessment (LCA) in a nutshell

Why LCA?

- Balance production and consumption patterns to support Sustainable Development

What is LCA?

- Environmental decision support tool
- International standard

LCA principles

- Science-based approach
- Life cycle perspective
- Environmental focus
- Comprehensive

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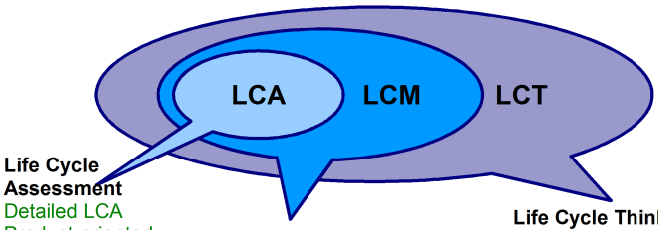
Life Cycle Approaches

The world needs a "life cycle economy" premised on LCA-based tools and policies (WSSD, 2002)

Life Cycle Approaches can be applied at three levels of detail in support of the "life cycle economy" (UNEP/SETAC, 2002).



Life Cycle Assessment
Detailed LCA
Product-oriented decision support

Life Cycle Management
Simple LCA
Product-oriented policy

Life Cycle Thinking
Conceptual LCA
Product-oriented regulation

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Life Cycle Approaches

LCT applications

Integrated Product Policy: European Union

Combines Extended Producer Responsibility, green procurement, eco-labelling and DfE and CP standards and guidelines.

LCM applications

- Design for Environment: European Union
- Cleaner Production: European Union

LCA applications

- Environmental Product Declarations: European Union
- Green marketing: Good Environmental Choice, Australia
- Green procurement: Environmentally Preferable Purchasing, USA

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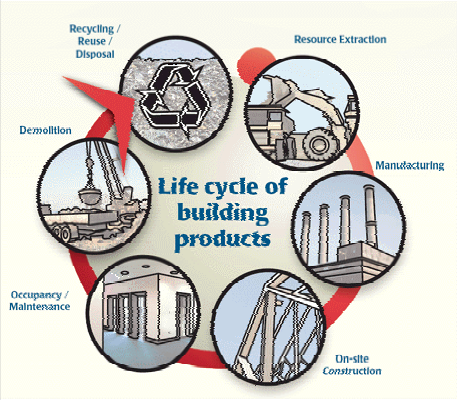
LCA applications in construction



Whole building applications

- Design application
- Considers all life cycle stages

Construction component and material applications

- Specification application
- Does not consider all life cycle stages

Construction-specific LCA tools

- Whole building tools
- Material and component tools
- Building rating and certification systems

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LCA in South Africa: policy background

Environmental legislation

- Provides an enabling environment for science-based approaches.
- LCA standard: accepted since 1998.

Responses to environmental issues

- Ratification of the Kyoto Protocol
- Energy efficiency strategy
- Long Term Mitigation Scenario (LMTS)
- Carbon taxes

Key environmental issues

- Significant rates of air pollution by industry.
- Vulnerability to predicted impacts of Climate Change.

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LCA in South Africa: users and applications

Types of users

- Limited applications: research institutions, academia and some industry sectors.
- Rare applications: construction
- No applications: government

LCA applications

- Main application:environmental data on exported products
- Textile industry: DANIDA Cleaner Production initiative
- Water industry: selection of best available technology
- Mondi Ltd: product or process improvement initiatives

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LCA in South Africa: constraints to construction applications

Supply-side constraints

- Methodological issues
- Accessibility and availability of inventory data.
- Lack of simplified tools for non-LCA experts
- Dominance of prescriptive and fragmented approaches

Demand-side constraints

- Outdated building regulations and by-laws
- Dominance of socio-economic issues

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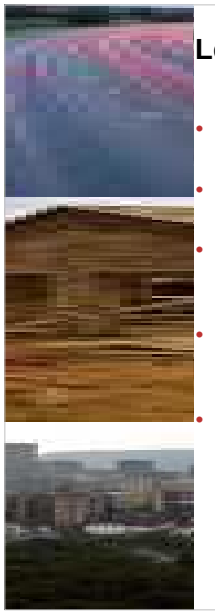

Lessons learnt

- An enabling environment is needed
- Mindsets need to change from prescriptive to science-based
- Approaches need to change from fragmented efforts to shared responsibility
- South African Constitution and policy - conducive to Life Cycle Approaches
- Key operational constraints – methodological issues, inventory data issues and lack of tools.

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LCA-based action agenda for construction: the basis

Going green is a process not an event !

Strategic considerations

- LCT-based policy strategy for entire construction sector.

Practical considerations

- LCM strategies and techniques for each sub-sector

Operational considerations

- LCA-based decision support tools
- SA-specific LCA methods

Key areas for policy and strategy shifts

- Regulation
- Education
- Procurement
- Marketing

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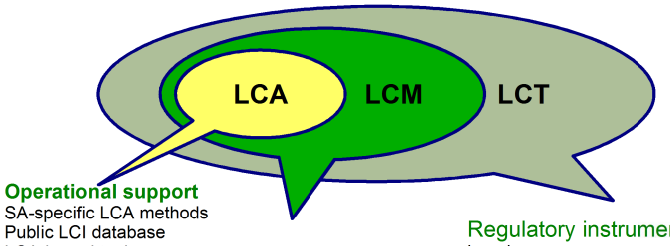
LCA-based action agenda for the South African construction sector



Operational support
SA-specific LCA methods
Public LCI database
LCA-based tools

Management policy
Design for Environment
Cleaner Production
Green procurement
Green marketing

Regulatory instruments
Legal
Financial
Communication
Structural
Voluntary

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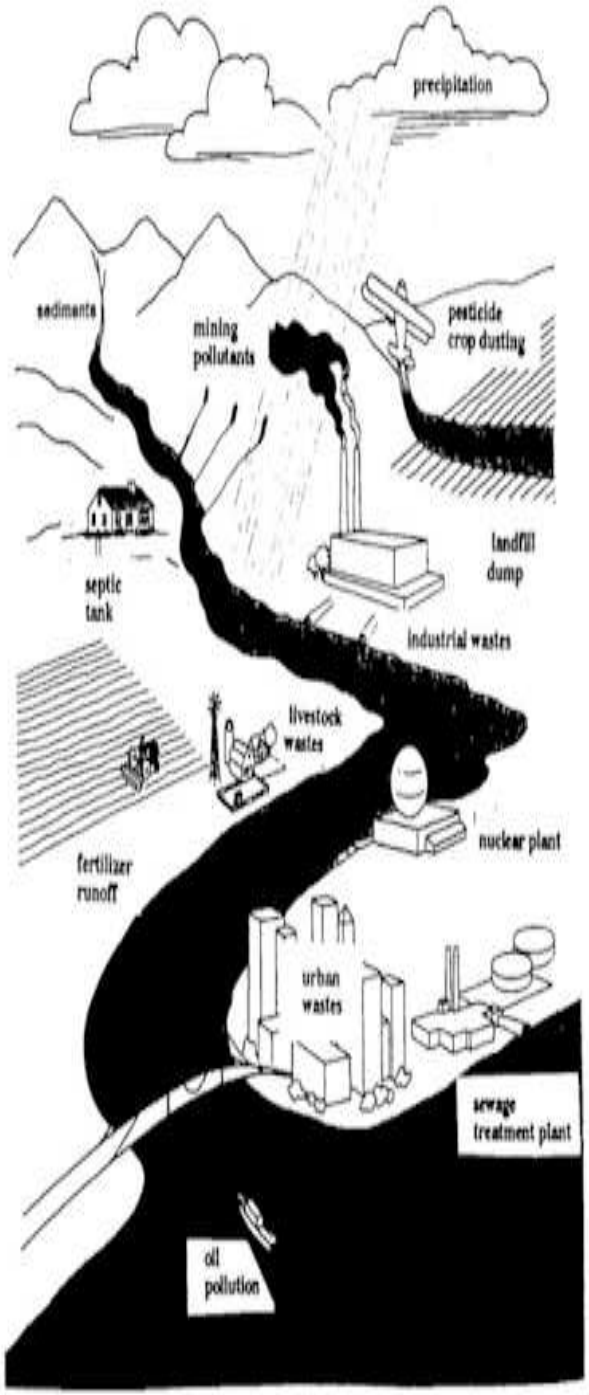

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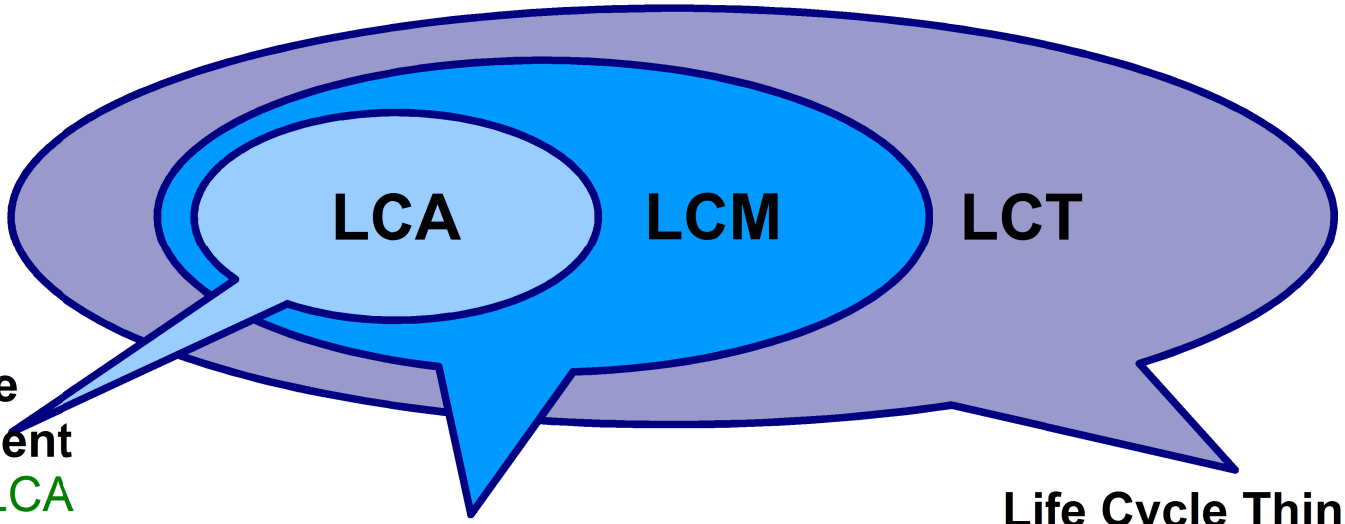

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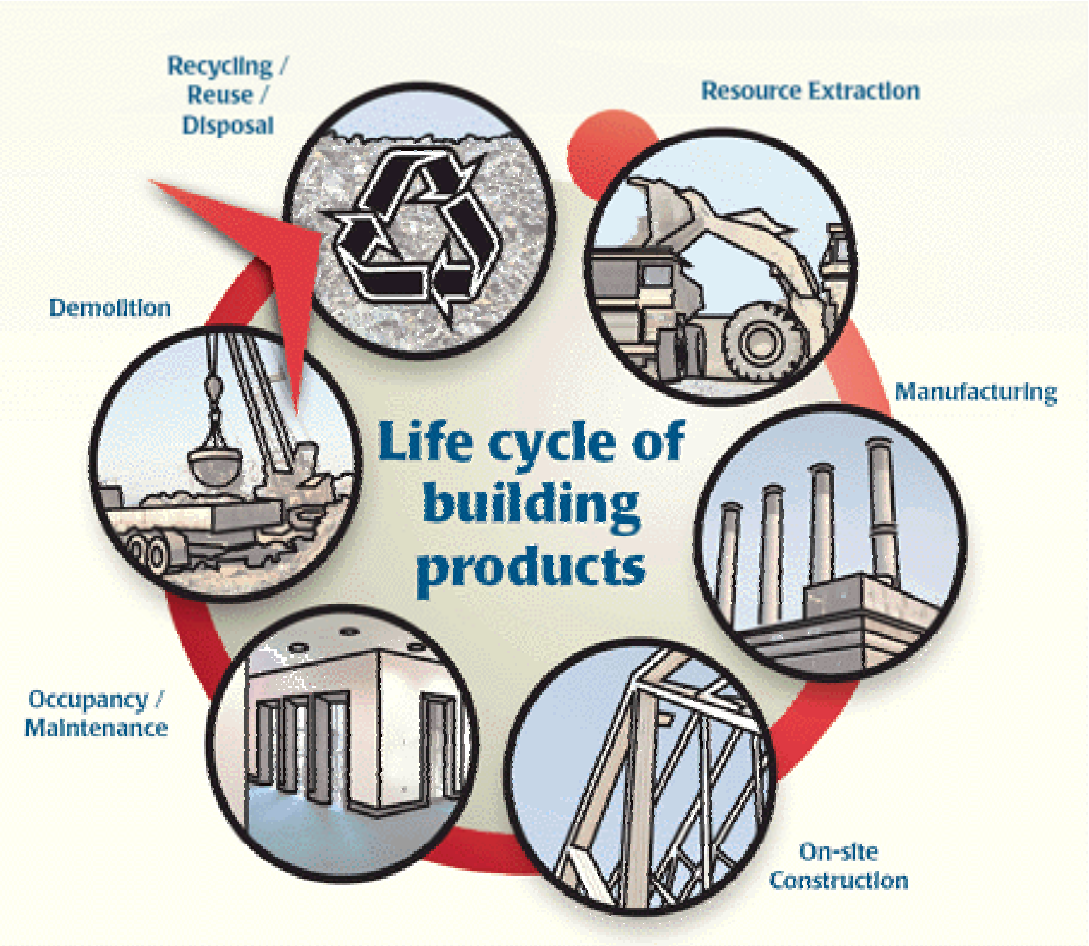

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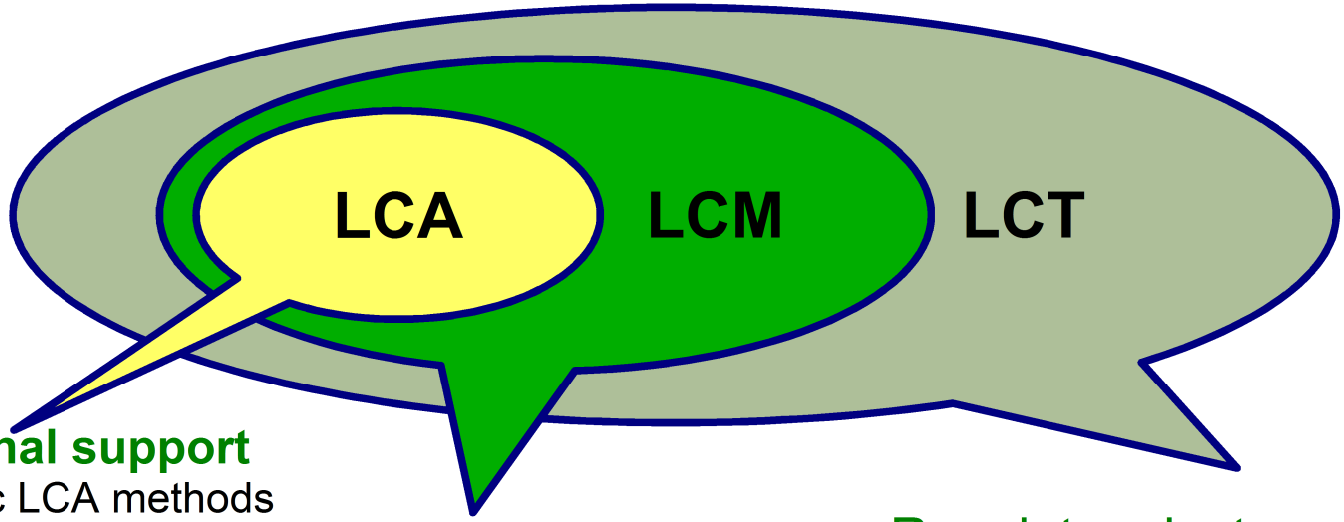

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