

Life cycle assessment during early-stage technology development: A focus on carbon utilisation

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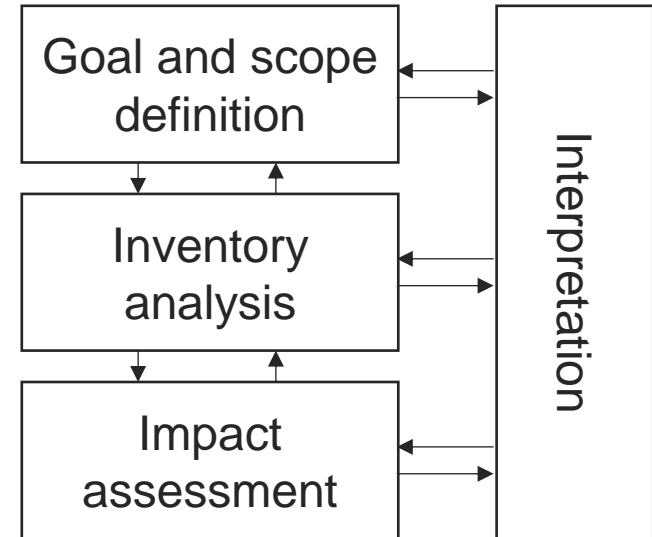
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Introduction

- LCA is often used in technology development
- Challenges with LCA in the early stages of technology development
- Technology development is complex, long and there are different needs
- Method choices in LCA depend on the goal of the study
- Many questions about emerging technologies make the goals even more important

LCA methodology



Goal definition

- Purpose of the assessment
- Intended application
- Intended audience
- Whether the results are for public comparisons

Scope definition

- The studied product system(s)
- The studied system's function
- Choice of impact categories and impact assessment method
- Interpretation to be used
- Type of LCA
- System boundaries (geographical, technical, natural, capital goods)
- Time horizon
- Allocation procedures
- Data quality requirements
- Assumptions
- Limitations
- Type of critical review
- Type of reporting

Review of LCA of CCU - goals

106 articles reviewed

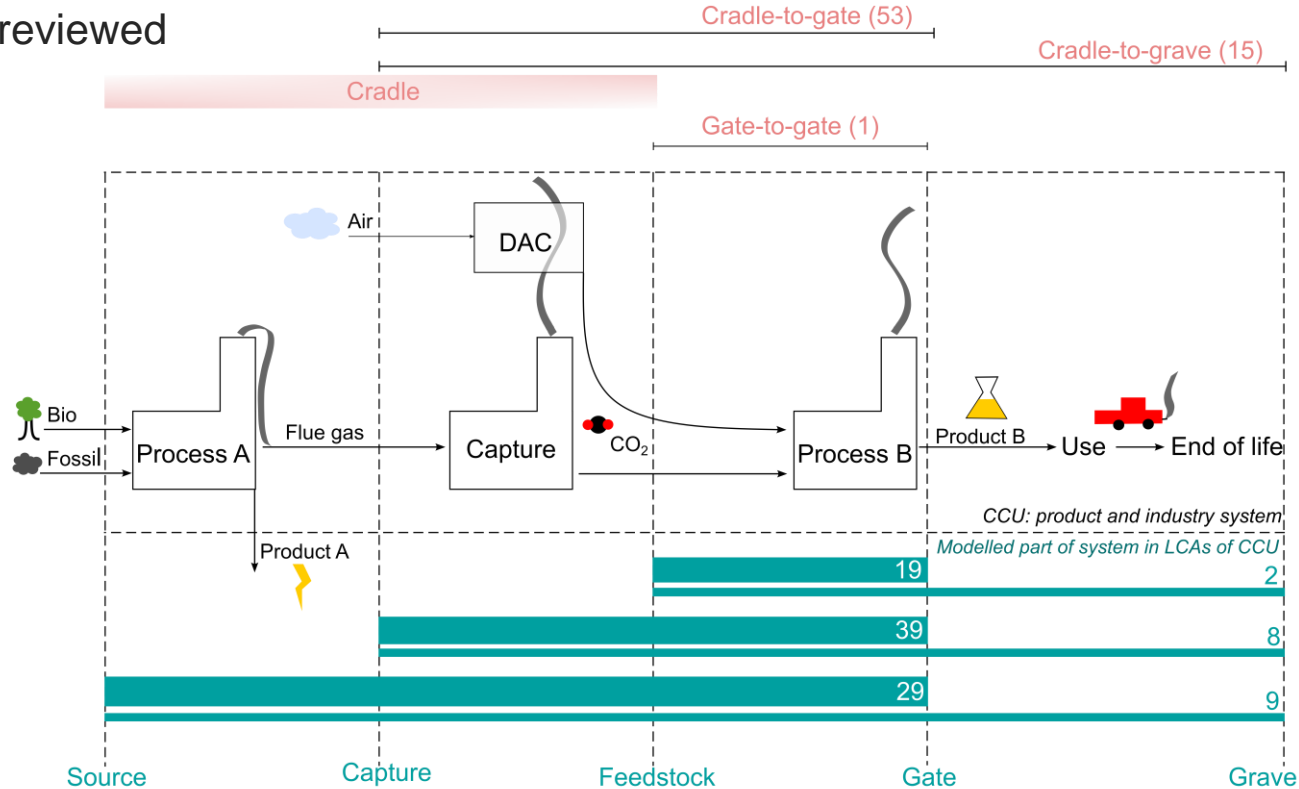
No goal reported in 54 studies

Vague in the remaining:

1. Determine the environmental impacts
2. Compare the impacts to alternatives
3. Compare different design choices
4. Find hotspots
5. Other (4 studies)

Review of LCA of CCU- scopes

106 articles reviewed



Case studies: Two carbon capture projects

DECREASE

- Utilization of industrial byproducts
- Create carbonate minerals or organic carbonates
- Technology Readiness Level 3-4

PYROCO₂

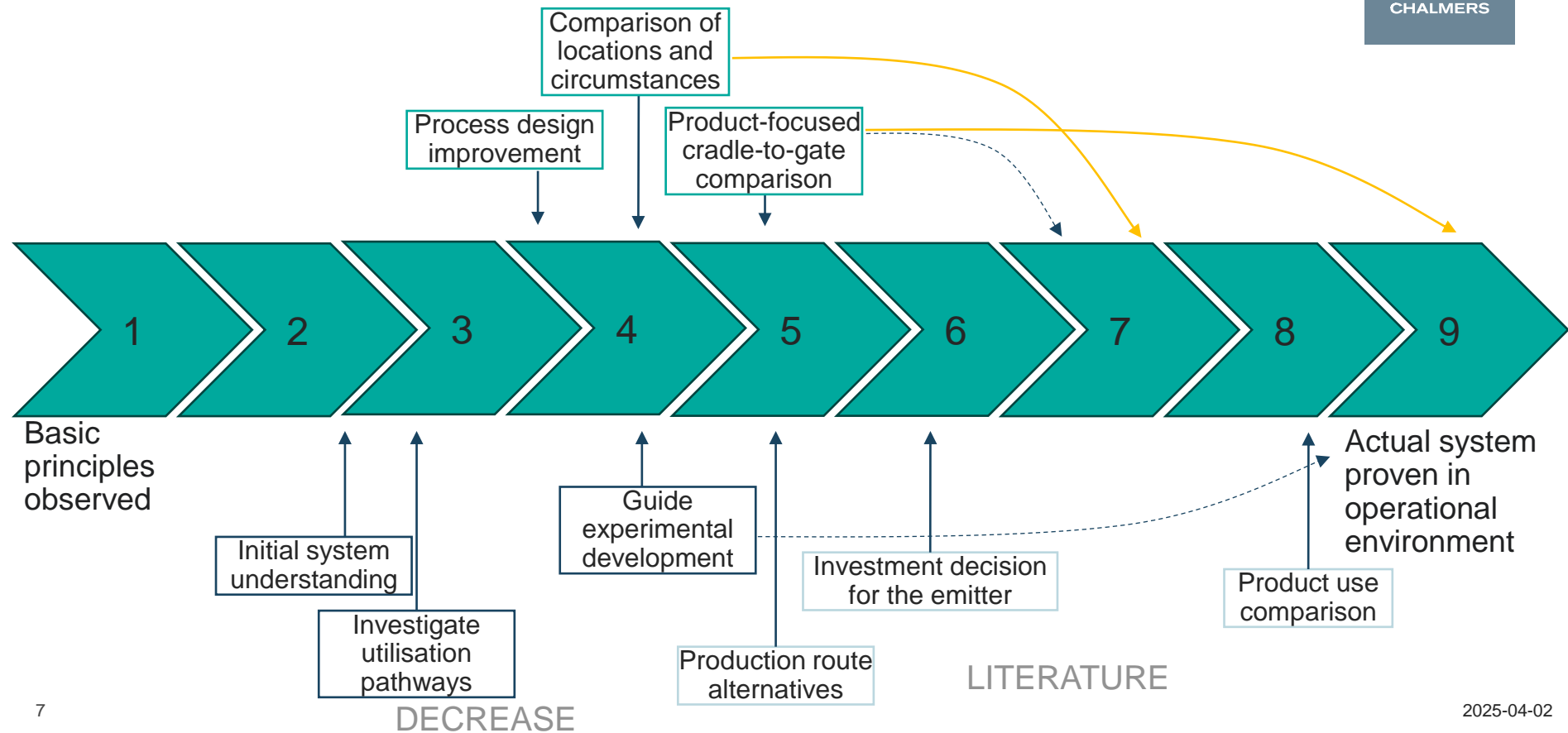
- Utilization of CO₂ and H₂
- Create acetone and further chemicals and materials
- Technology Readiness Level 4-5



PYROCO₂

TRLs

PYROCO₂



Conclusions and recommendations

- Importance of clear goal and scope definitions
- A need for guidance on translating one type of LCA (or one goal) into a scope
- Importance of clearly defining the goals to address knowledge needs
- Separate the goal from the scope and report both clearly
- Conduct several LCA studies with various goals in a technology development project

Thank you for listening

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