ESU-services
fair consulting in sustainability

AI in LCA Consulting Practice

Opportunities, Practical Applications and Risks

Niels Jungbluth, Angelo Stefanel, Christoph Meili, Maresa Bussa, Martin Ulrich

https://esu-services.ch
info@esu-services.ch

92nd Discussion Forum on LCA: “AI in LCA: Innovations, Applications, and Challenges”
Thursday, 26nd of February 2026, Zurich, Switzerland

We assist you




Niels Jungbluth

Angelo Stefanel

Christoph Meili

Maresa Bussa

Martin Ulrich

Clients from industry, NGOs, administration, universities

Company database with more than 10'000 datasets

25+ years and 450 projects experience in life cycle assessment

All economic sectors covered

Founded 1998 @ETHZ

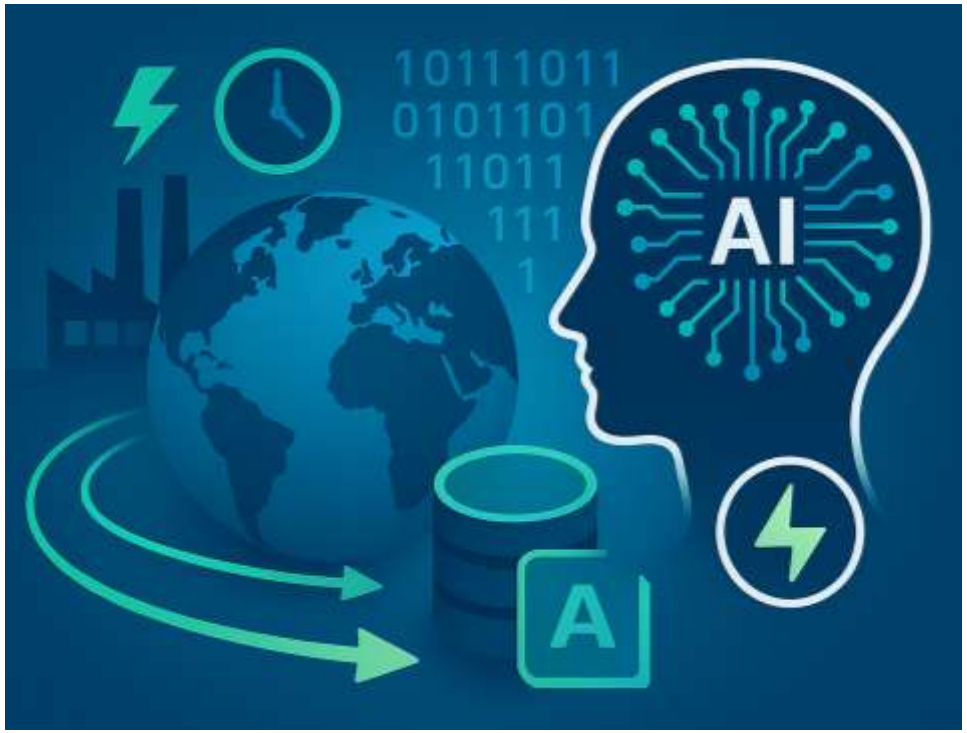
We provide…

- Consulting
  - Case studies on LCAs, OLCA, CF, EPD & PEF (compliant with different standards)
- Tools
  - LCA software SimaPro resale, automation, key parameter models
  - Databases and single datasets (data-on-demand)
- Expertise
  - Training & coaching
  - Critical peer reviews, verification & validation

Introduction: Why Now?

Context for the audience:

- AI is changing science and industry, LCA is affected
- More LCI data, complex models, and shorter project cycles increase pressure
- AI tools (ML, NLP, LLMs) can support LCI data handling, modelling, and reporting
- At the same time, they raise questions regarding transparency, traceability, and quality in line with ISO 14040/44



ESU-services' positioning:

- Focus on scientific quality, transparency, and reproducibility
- Use AI carefully without compromising core LCA principles

What we use

- Copilot
- Le Chat
- Perplexity
- Custom made AI matching tool

Practical Applications – Examples LCI modelling

Data Extraction & Harmonization

- Search for information under certain boundaries
- Automatic reading of PDFs/Excel sheets with material and energy data
- Translation and search in all languages, e.g. Chinese
- Identification of inventory gaps

Dataset Matching (LCI)

- AI suggests suitable background datasets for inventory lists (BOM)
- Matching of elementary flows in different nomenclatures

Practical Applications – Examples from LCIA and interpretation

Hotspot Analysis

- Rapid risk and sensitivity analyses in early project phases
- Idea what needs to be considered in an LCA model
- Support for prioritizing data collection efforts

Preparation of Reports, Summaries, Webpages

- LLMs draft abstracts, translations, method chapters, system boundaries, stakeholder texts
- Internal review of text and emails to ensures quality

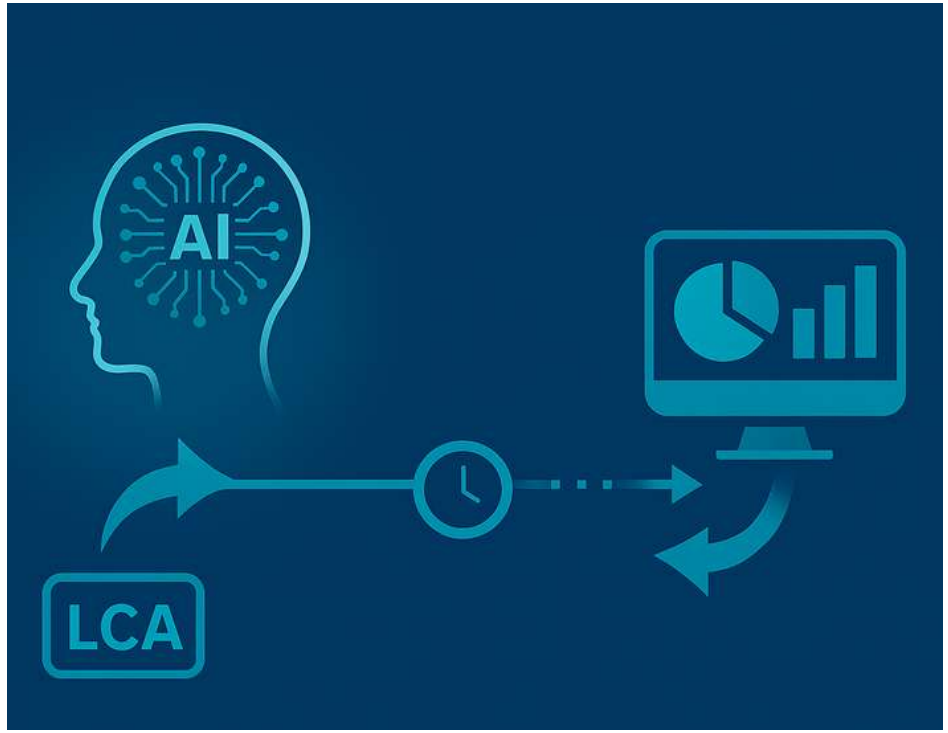
Practical Applications — Review, Verification, Quality checks

LCA Reviews and validation of data

- Early checks of assumptions
- Internal quality checks
- Benchmarking of LCA results even if different reference units are used
- Accelerates pre-reviews and critical reviews (ISO 14040/44)
- Supports EPD verification
- Work through checklists

Practical Applications — daily office work

- Contract negotiations
- Legal support and understanding of documents
- Explanation and understanding of out-of-subject information
- Programming of Macros
- IT Infrastructure operation and server setup
- Email communication



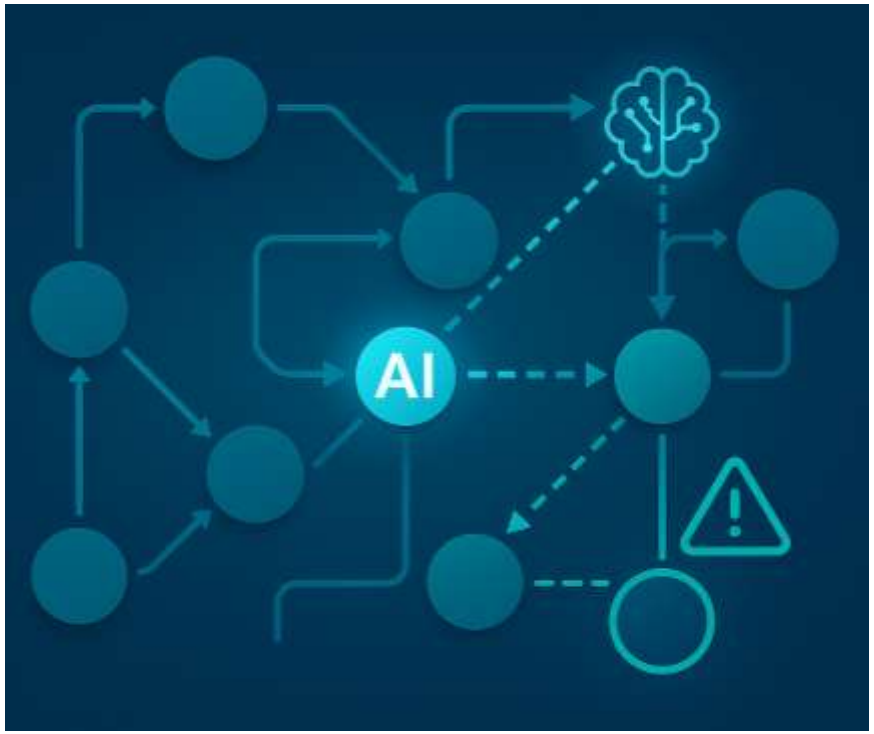
Risks & Challenges

Transparency & Traceability

- Many models (especially LLMs) are black boxes.
- Limited explainability → risk of silent errors.
- Hallucination and providing complete nonsense information

Data Quality & Bias

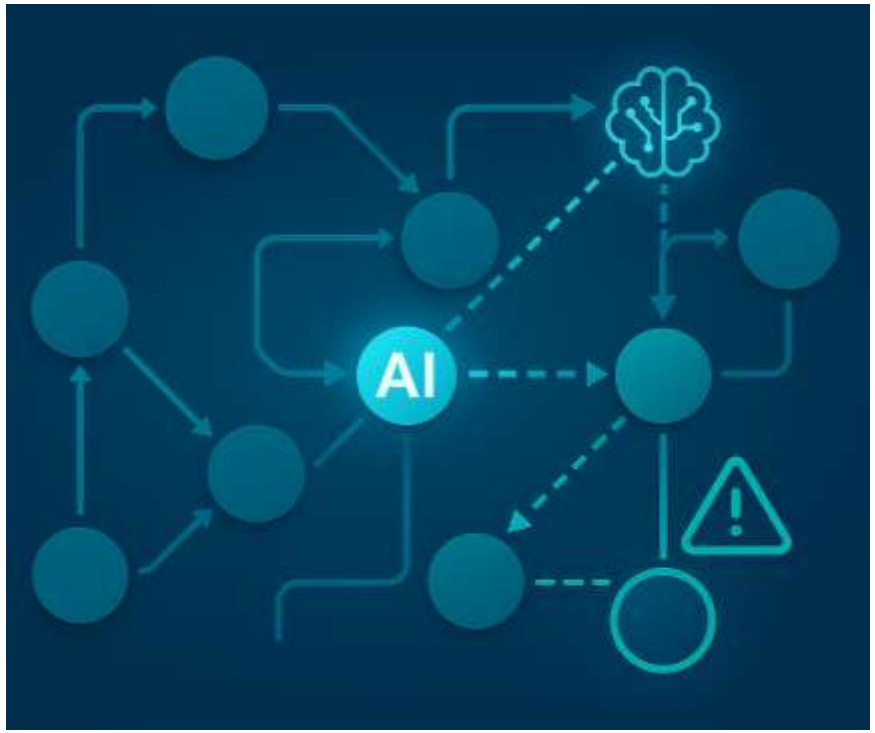
- AI can amplify errors or outdated information present in training data e.g. EPDs
- Quality varies by region/industry → risk of misinterpretation



Risks & Challenges

Reproducibility

- Many AI models are non-deterministic → challenges for review and revision
- LCA projects must remain fully reviewable
- Much higher efforts for quality control



Copyright & Data Security

- Unclear legal status of uploaded and provided information
- Sensitive client data must stay secure
- Use privacy-compliant platforms only
- Risk of own transparent webpage becoming a competition to own business, risk for open-source policy

Environmental impact and social issues

- Huge energy use. Will there be a real efficiency gain
- People get too lazy to think on their own

Where do we have main benefits today?

- Replacement of google search for more complex questions
- Quick checks, sum-up or benchmarking
- Verificaton/Review: Pre-checks for documentation and extension of feedback
- Discussion and understanding of legal documents with clear prompts for checking
- Matching of process names and elementary flows
- Help for programming of Macros/VBA code/IT setup
- Professional email communication on difficult issues

What does not work for us so far?

- Identifiying gaps, not documented in public information
- Risk of wrong contents or wording in texts, accepting haluzination
- More concentration and efforts necessary on re-checking the outcome wording and documentation (everything sounds nice)
- Risk to accept wrong recommendations
- Language is not concise and specific enough, to generic textes
- Custom-made development slower than progress in public models (difficult to plan investments)
- Communication based on AI, but diverging goals – AI talks to AI without solution
- Increased experience necessary to handle the complexity, overload for beginners

ESU-services' internal AI Guidelines for good LCA Practice

Safeguards

- Clear delineation and ongoing discussion at ESU:
  - -What may AI automate?
  - -What remains human expert work?

Transparency Principle

- Document every AI-assisted decision and information (similar to assumptions and sources)

Reproducibility & Reviewability

- AI outputs must be traceable. Ask for links or references
- New chats for each relevant discussion
- Save prompts for documentation and reuse

Human-in-the-Loop

- Prompts development ensuring critical discussion
- Expert validation remains mandatory
- AI is a tool, not a decision-maker

Copyright notice

In case of any questions, please contact:
Dr. Niels Jungbluth, CEO - Chief Executive Officer
ESU-services Ltd. - fair consulting in sustainability
Vorstadt 10
CH-8200 Schaffhausen
https://esu-services.ch
tel +41 44 940 61 32
jungbluth@esu-services.ch