Taminco Green Footsteps
Antwerpen, September 1st, 2014

LET'S GET TALKING ABOUT:
• Catalytic or fermentative conversions • Alternative separation techniques • New reactor types • Simulation techniques • High throughput testing

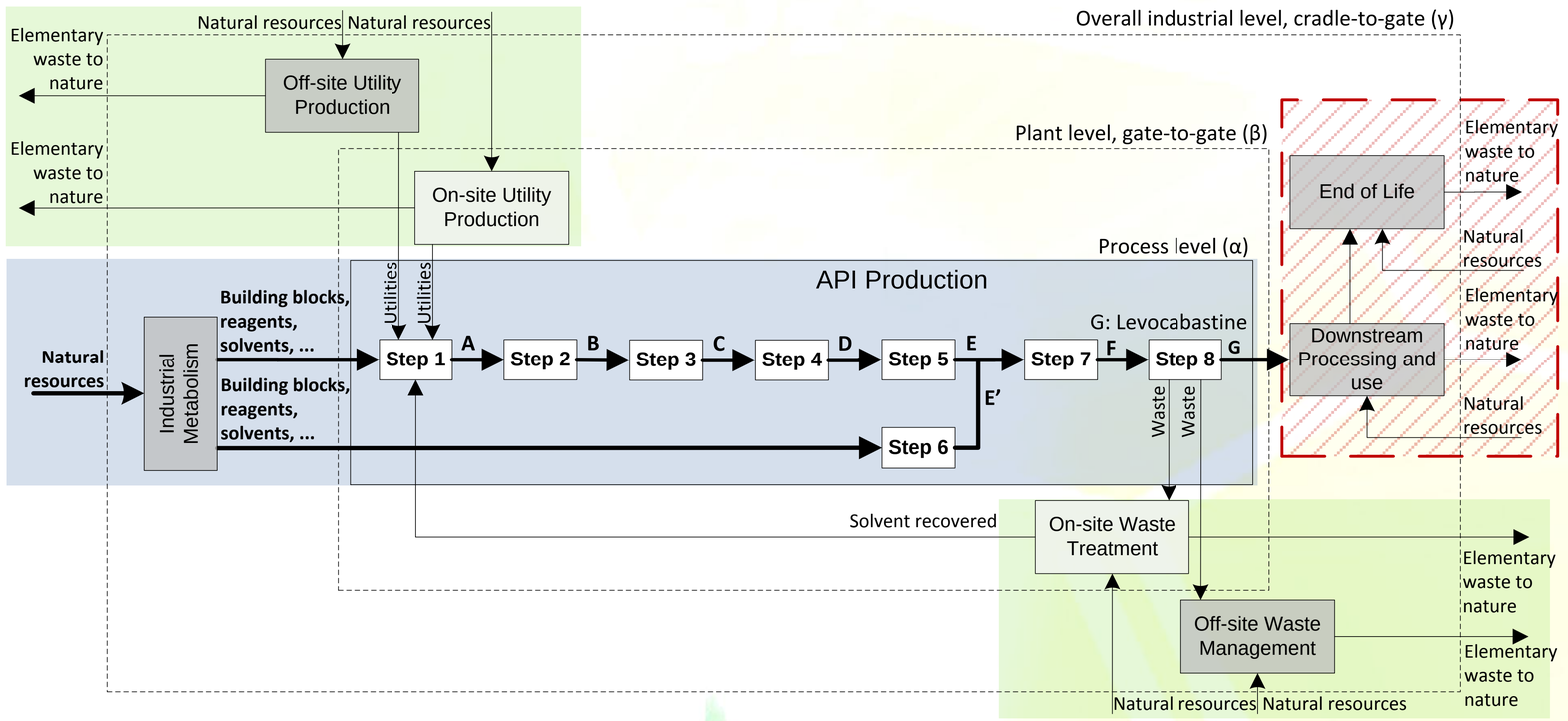
The Use of Life Cycle Assessment as an early R&D Decision Tool: Bottlenecks and potential Solutions

Introduction:

Forecasting environmental sustainability of manufacturing in early development stages? Taking into account life cycle impact indicators in R&D decision trees? Two major bottlenecks are reported in state of the art scientific literature:

1. **Lack of sufficient process data** in early development phases
2. **Lack of knowledge on up-scaling and learning effects of technologies**

How to tackle these bottlenecks?



Methodology:

1. **Multiple linear regression modeling** with backwards stepwise process parameter selection as predictors for the environmental sustainability of processes
2. **Experience curves** (effect of scale and learning) for **established technologies, unit process modeling through engineering modules** for **prospective technologies**

The construction of experience curves in environmental sustainability performance of established technologies enables including eco indicators as criteria in early stage R&D decision trees, even in case of low data availability. Decision makers are able to act proactively on environmental burden of full scale manufacturing of products through the forecasting perspective.

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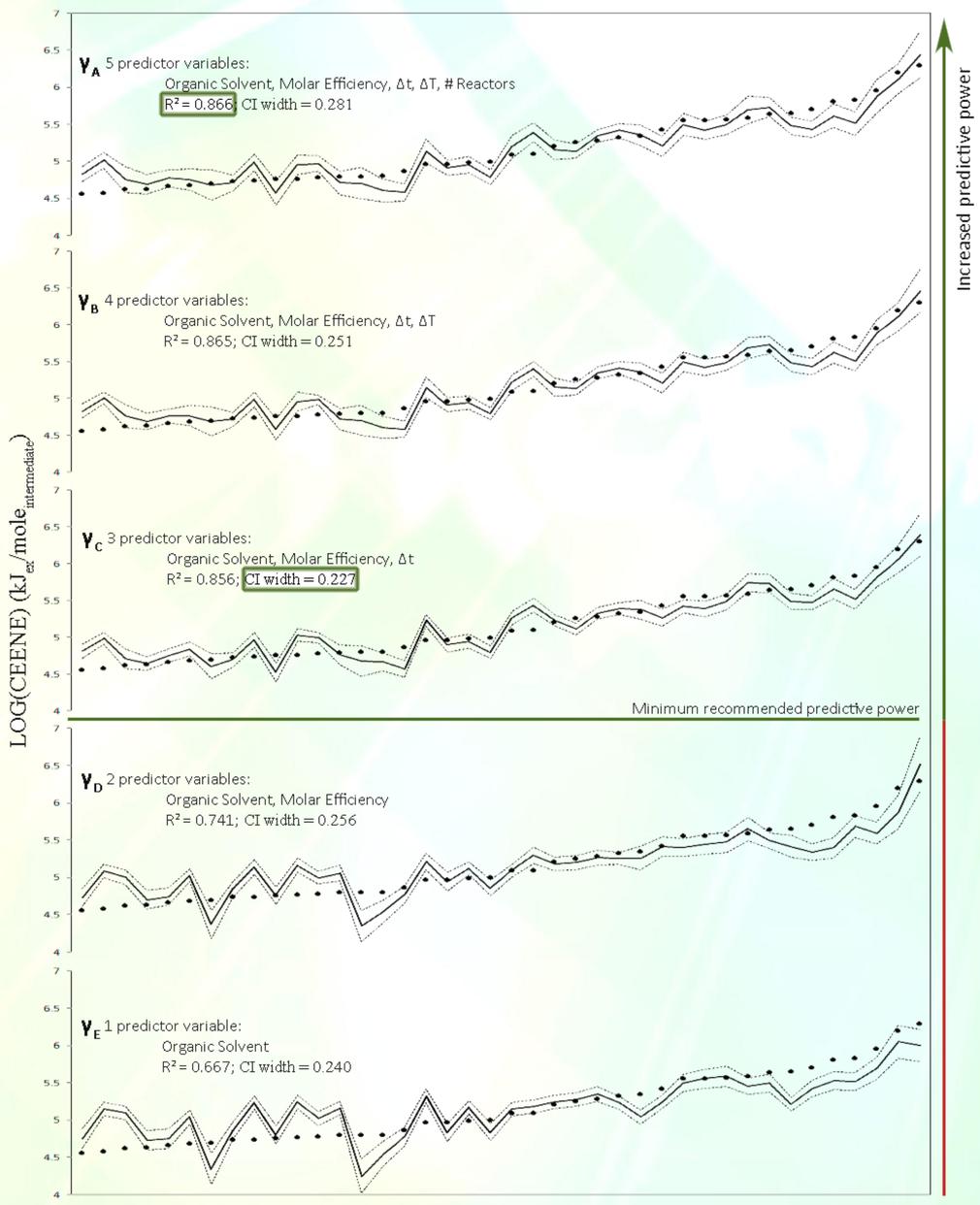
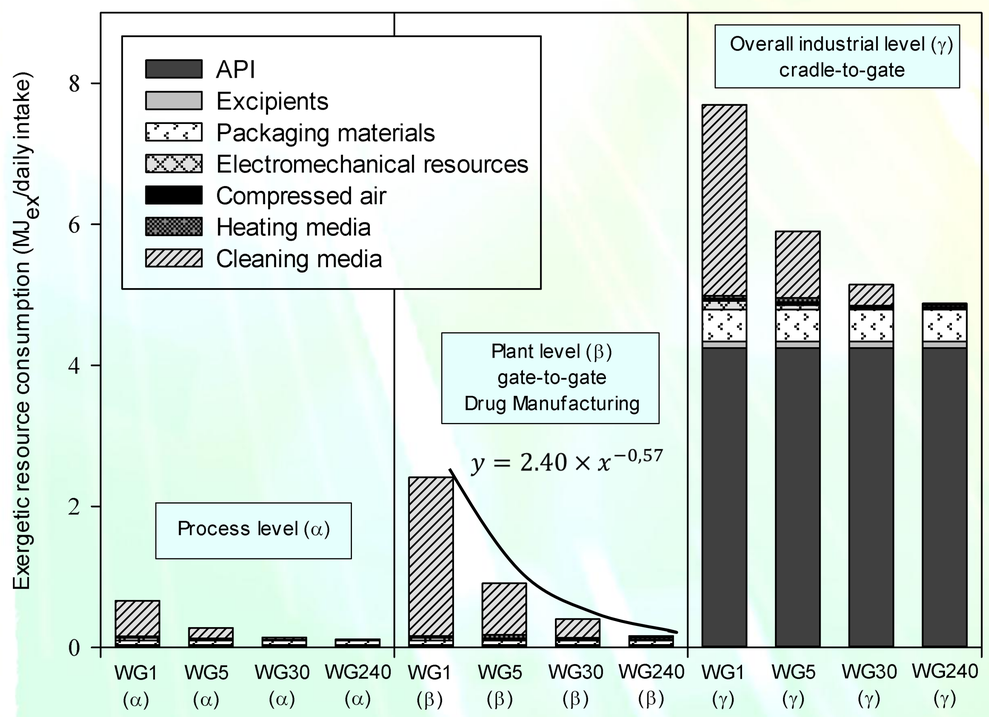


Results & Discussion:

- With **just 3-5 predictor variables** (e.g. solvent use, Δt), a **forecasting LCA** could be performed instead of a conventional time-consuming and exhaustive LCA with fair correlations and uncertainty.
- For established technologies (e.g. top spray fluid bed granulation), **experience curves** could be derived to **forecast environmental sustainability** of full scale manufacturing in **early development phases of new products**.



- **Future outlook towards Sustainable Supply Chain Management** (SSCM) since it makes little sense to optimise in-house production without a proper procurement policy → Coupling **ERP systems**

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