Live LCA: How Industry 4.0 Changes the Way We Perform Life Cycle Assessment

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In cooperation with iPoint-systems gmbh | www.ipoint-systems.com
Industry 4.0 – Digitalisation of Industry

Digital Twin
The key to the Integrated Value Chain

Merging Real and Virtual Worlds with a Digital Twin

Which one is real..?
Product Vision „Live LCA“

Climate: 8.6 t\-CO\(_2\)
Energy: 35.344 kWh
Saving potential: 488 €

Climate: 8.8 t\-CO\(_2\)
Energy: 46.361 kWh
312 € saving potential

Climate: 8.7 t\-CO\(_2\)
Energy: 39.765 kWh
309 € saving potential

Climate: 9.2 t\-CO\(_2\)
Energy: 46.361 kWh
Saving potential: 488 €

Funded by

ifu hamburg

Productivity meets Sustainability.

iPoint

dormakaba

HOBAS®

InnoEnergy
Knowledge Innovation Community
AGENDA

• Introduction
  • Market Needs
  • Challenges

• Goal and Scope
  • Project description “Live LCA”
  • Partners
  • Funding

• Combining Perspectives
  • MFCA
  • LCA

• Resumé
What are the Market Needs?

Digitalization (IoT, Industry 4.0) drives the need for product specific energy and environmental information.

- **CEO**
  - Secure company brand value towards a sustainable future

- **Plant Manager**
  - Understand the real saving potential of reducing waste and defective parts

- **Product designer**
  - Should know the impacts of product design to total life cycle

- **Sales officer**
  - Need to know which burdens are linked to my products
Problems/Challenges

• Complex products have up to 20,000 part/material combinations
  • High manual effort - 1-3 persons working over several months
  • Not possible to do for all products and variants of the product
• Data gaps and generic data
• Lack of detailed information on how costs are distributed between production processes or products

How to get accurate sustainable data for the whole range of products and processes in an cost effective way to achieve energy saving?
Life Cycle Assessment (LCA) addresses the environmental aspects, including energy consumption, throughout a product's life cycle.

**Company data sources**
- IMDS
- Energy Management, ERP Systems, ...

**External data sources**
- Supplier data
- LCA & Energy Data

**Product Life Cycle**
- Raw Material
- Production
- Usage
- Recycling
- Disposal

**Innovation**
- Innovative software solution for automated LCA
  - Risk reduction
  - Know-how stays within the company
- Provide highly specific information about environmental impacts
  - Consulting costs to produce a LCA study are economized
  - EPD costs go down to 10%
- Establish a new cost assessment perspective
  - Saving potential is up to 20% of the material and energy cost

**Live LCA Application**
- Supplier data
- LCA & Energy Data
Different views for different User Roles

- CEO High level KPI
- Product developer details for decision support
- Expert for full transparency
Before | After the Project

Unconnected expert tools

- iPoint
- iPCA
- RR
- LCA

Cloud solution hosted in SustainHub

- SH
- LCA
- iPCA
- RR
- umberto®
- e/sankey®

We will develop a cloud software bringing together successful solutions of iPoint and IFU to a new level.
Solutions for the Entire Product Lifecycle – Circular Economy

- Design For Environment
- ELV (IMDS, CAMDS)
- RoHS 2, CE, WEEE
- REACH (CLP, GHS, eSDS)
- TSCA
- Conflict Minerals
- Cal. Prop. 65
- Slavery, Human Trafficking
- Environmental Mgmt.
- Plant Safety
- EHS
- Occupational Safety
- Alternatives Analysis
- Life Cycle Assessment
- DIGITAL TWIN
- PLATFORMIZATION
- PREDICTION
Partners & their Specialization

Requirements
- Data integration experience
- LCA know-how
- MFCA know-how
- Energy raw data aggregation experience
- User requirements / Test possibility

Partner
- iPoint
- IFU Hamburg
- TU Braunschweig
- dormakaba
- Hobas
- Industry Interest Group (e.g. Festo, Ronal, Volvo)

Role in the project
- Developer, Content Knowledge, Point of Sales to Customers
- Developer, Content Knowledge
- Know-how, field test
- Industry partner, Customer, field test
- Customer
Industrial Interest Group

Companies with signed LOI

- dormakaba
- DUPONT
- FESTO
- HOBAS®
- ACLCA
- RONAL GROUP
- EGGER
- Ford
- GE

5 more companies from automotive industry (OEM & 1st Tier supplier)

2 more companies from other industries
Financing Partner

• InnoEnergy and EIT: European Institute of Innovation & Technology

KIC InnoEnergy: Innovation Projects

• InnoEnergy provides support for finalising and commercialising technological innovations that lead to new products and services.
• We invest in businesses and help develop innovative products, services, and solutions that have high commercial potential.

InnoEnergy, IFU and iPoint are going to invest over the next 3 years
• First results for Umberto Users will be available in 2018!
New in Live LCA

- Material and energy flows for Material Flow Cost Accounting derived from company’s data system (ERP, MES etc.)
- Daily analysis of Material and energy efficiency of the production through connection to Live data
- Fast interference through early detection of inefficiencies
- Long-term observation of the course of material and energy efficiency in regard to production and products

Establishing resource efficiency as a permanent indicator for production
Basic Concept MFCA

Material flow cost accounting: Allocate all cost types also to losses

- Disposal costs
- Hidden costs:
  - Material costs
  - Logistics costs
  - Production costs
  - Labour costs
  - Investment costs
  - Energy costs
  - ………
Traditional Cost Accounting vs. MFCA

Mass and Energy Flows

Traditional Cost Accounting

Material Flow Cost Accounting
MFCA in „Live LCA“

Establishing a new cost accounting perspective
Saving potential up to 20% of material and energy costs
Life Cycle Assessment (LCA) addresses the environmental aspects, including energy consumption, throughout a product's life cycle.

**Company data sources**
- Material Management
- IMDS
- Energy Management, ERP Systems, ...

**External data sources**
- Supplier data

**Live LCA Application**
- Raw Material
- Production
- Usage
- Recycling
- Disposal

**Innovation**

Efforts made for optimizing efficiency will directly create benefits for Life Cycle Assessment.

Provide highly specific information about environmental impacts.

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**Life Cycle Assessment (LCA)** addresses the environmental aspects, including energy consumption, throughout a product’s life cycle.

**Company data sources** include IMDS, Energy Management, ERP Systems, and others.

**External data sources** are Supplier data and LCA & Energy Data.

**Product Life Cycle** includes Raw Material, Production, Usage, Recycling, and Disposal.

**Innovation**

- Innovative software solution for automated LCA
  - Risk reduction
  - Know-how stays within the company

- Provide highly specific information about environmental impacts
  - Consulting costs to produce a LCA study are economized
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**Live LCA Application**

- Material Management
- Energy Management, ERP Systems
- Supplier data
- LCA & Energy Data

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Resumé

• Merging and switching between product and process view
  • Combined handling of production and product requirements

• Reduced costs for scaled up LCA and EPD product assessments

• Connection to company data may allows “specific products assessment”
  • Digital Twin

• Holistic approach for comprehensive assessment
Thanks for your attention!

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