

LCA of Cognitive Manufacturing applied to energy intensive industries



SCAN ME

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Introduction

The HyperCOG project is implementing *Cognitive Manufacturing* for decision support in the industrial environment. Cognitive manufacturing leverages the insights of artificial intelligence algorithms fed with data from a wide range of interconnected sensors. The digitalisation is expected to increase efficiency, quality and reliability of factories. Three energy intensive industries serve as case studies: steel making, cement production and rare-earth separation. *Decarbonising* these industries is vital for climate change mitigation.

Methods

Life Cycle Sustainability Assessment (LCSA) is used to assess the effects of cognitive manufacturing.

Inventories are dynamically updated with sensor data (time series) from factories, producing a time-series of LCA indicators. This feature provides quick feedback for better planning.

LCC and SLCA are calculated based on value added and employment data from exiobase and case studies.

Database: Exiobase 3.3.16
Syst. Model : consequential
LCA Software: Brightway

Expected outcome

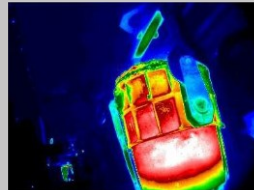
Achieve planned improvements on sustainability indicators.

The proof of concept of a dynamic LCA tool, capable of providing continuously updated sustainability indicators for digitalised industries.

Case study : steel production

The steelmaking factory of Sidenor has to plan every week the types and amounts of steel products to be produced and maintenance. Planning has to balance trade-offs, between e.g. the amount of scrapped metal at the end of production line, and the consumption of refractories. Thermographic cameras will be used for predictive maintenance. Optimisation algorithms will be used to improve existing planning (until now based on heuristics).

Ladle thermographic image

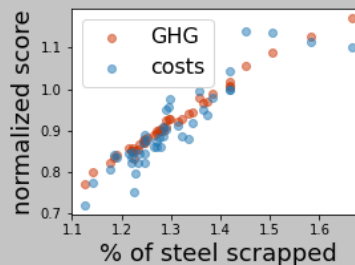
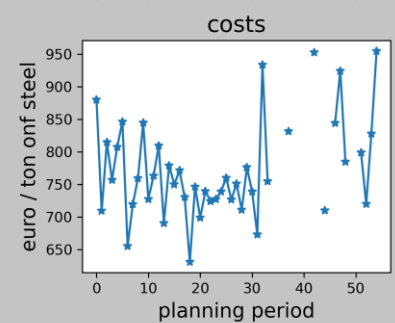
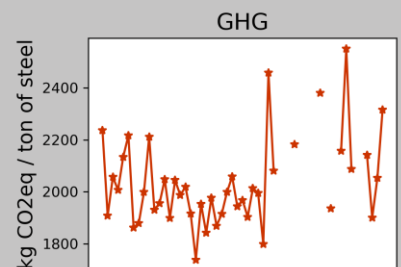


Molten steel in the ladle



Greenhouse gas (GHG) emissions and life cycle costs per planning *before* cognitive manuf. solutions.

These results will be compared with results after implementation.



Early results suggest that the % of final product scrapped has a strong impact on LCSA indicators.