

Master thesis:

Future background Life Cycle Inventory data – do they make a difference?

Supervisors: Christian Bauer, Chris Mutel

christian.bauer@psi.ch; chris.mutel@psi.ch

Technology Assessment group, Paul Scherrer Institut, <http://www.psi.ch/ta/>

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Description of work (draft, 4.3.2016)

Recent LCA research has evaluated the environmental performance of future energy and mobility technologies (Simons and Bauer 2012, Volkart, Bauer et al. 2013, Bauer, Hofer et al. 2015, Miotti, Hofer et al. 2015) and/or the environmental consequences of possible future developments (scenarios) of the energy systems (Hertwich, Gibon et al. 2015, Berill, Arvesen et al. 2016).

While foreground Life Cycle Inventory (LCI) data reflect expected technology development, most of the background datasets¹ used in these studies remained unchanged, therefore representing current or past conditions and introducing inconsistencies. Previous research has shown that modifying future background processes can have a substantial impact on the LCA results of future technologies (Frischknecht, Büsser et al. 2009), and hence also on the LCA results for energy system scenarios. However, these effects have not been addressed in a systematic way so far.

This master thesis aims at a thorough analysis of this topic and will build upon previous and ongoing research at PSI.

The work to be carried out includes:

- Identification of the most relevant² unit process data in the ecoinvent database.
- Compilation of future LCI data for these processes for 2030 and 2050 considering expected technology and market developments based on technology forecasts prepared by industry groups or governments for specific industrial areas (possibly according to different scenarios).
- Evaluating the effects of general improvements in specific economic sectors (e.g., 1% improvement in energy efficiency per year of industry X).
- Evaluation of the effects of modified background data on LCA results of future energy and mobility technologies.

Schedule and deliverables

The work will be carried out between XX.YY.2016 and WW.ZZ.2016. Final deliverables will be a) a master thesis report with complete documentation of data sources and assumptions; and b) future inventory data in appropriate formats³ for further use within PSI (and potentially within ecoinvent, or as open-access data).

¹ In research, ecoinvent (www.ecoinvent.org) is most often used as LCI background database.

² „Relevant“ from several perspectives: a) regarding technologies in the energy and mobility sector, b) in terms of contribution to overall LCIA scores, c) with respect to expected large changes in future LCI data, and d) regarding expected large changes in future market shares.

³ To be defined.

References

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