

# *Life Cycle Assessment of the PV Power Production Using the Hybrid Approach*

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Hybrid methodology links normal process chain analysis (PCA) with economic input output (I/O) analysis. Compared to the PCA, hybrid LCA allows to analyze the complete life cycle from cradle to grave without defining distinct system boundaries. In addition to this, the hybrid approach could be a time efficient way of LCA as it helps to avoid a too thorough assessment of parts of the life cycle of only minor importance.

This methodology has been used to assess the production of electricity with photovoltaic systems. The system analyzed is a grid-connected 5 kW rooftop PV system based on polycrystalline silicon cells. As far as possible actual production data have been used representing the current state of the art. The hybrid approach is based on the method described by /Marheineke et al. 1999/ and /Marheineke 2002/.

The presentation will show the results of the LCA using the hybrid approach and will compare them with those obtained by PCA.

The results, analyzed for the impact factors "Greenhouse Effect", "Acidification of Eco-Systems", "Nutrification of Eco-Systems" and "Primary Energy Consumption", based on the hybrid LCA exceed those using PCA by about 40 %. These differences between the two methodological approaches are caused in the PV power production and here mainly due to services and depreciation of machines and buildings which are not quantified in the PCA approach. Therefore normal process chain analysis could strongly underestimate the burdens associated with the production of power in photovoltaic systems.

## Literature:

Marheineke, T.; Friedrich, R.; Krewitt, W.: Application of a Hybrid-Approach to the Life Cycle Inventory Analysis of a Freight Transport Task. Society of Automotive Engineers SEA 1998 Transactions- Journal of Passenger Cars. Warrendale PA. USA 1999

Marheineke, T: Ganzheitliche Bilanzierung der Energie- und Stoffströme von Stromerzeugungstechniken. PhD-thesis in preparation. University of Stuttgart 2002