

Comparison of Life Cycle Measures of Sustainability

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The large variety of existing environmental assessment methods has given rise to the concern that, depending on the method used, diverging results could be obtained depending on the impact assessment method used. Such inconsistency in results would create difficulties for companies or authorities using these methods.

In this paper, seven fundamentally different methods are compared, including environmental shortcut indicators, such as ecological footprint and MIPS as well as aggregating LCIA methods. Statistical analyses of the results for more than 1000 product systems from the Swissecoinvent database were performed. The results show that, in spite of the different philosophies behind these impact assessment methods, they tend to provide converging results. In particular, there is a strong correlation with energy and exergy demand regarding material and transport systems, while the results for different types of energy generation are poorly correlated.

The reliability of environmental assessment methods is, as a whole, good, although for single product-comparison it will sometimes be possible to obtain diverging results using different impact assessment methods.

These results imply that, in many cases, a rather crude level of detail in environmental studies may be sufficient to support decision making. The strong correlation with energy demand can be seen as a confirmation of scientific studies that have spotted energy use as a key environmental problem. However, they can also be interpreted in another way, namely that current state-of-the-art LCIA methods may have severe shortcomings with regard to impacts that do not relate to energy use.