Ecological Benchmarking on Company Level: Measuring the Ecological Efficiency of Sites or Companies

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Life Cycle Assessment (LCA) methods that have been developed in recent years allow for the comparison of ecological advantages and disadvantages of products and services. However, how can the ecological performance of entire production sites or companies be compared? In this case, it is difficult to define a functional unit as a standard of comparison: A site or company generally produce many products, so that working out complete LCAs for each of them would mean too much of an effort. Nevertheless, being able to compare different sites or companies is quite important, as on this level many significant decisions are made about ecological positioning within markets and society.

As the result of a research project funded by the German federal state of Baden-Wuerttemberg, a system of environmental performance indicators has been developed, trying to reach the following aims: The main intention was to measure environmental efficiency on a *company level*, not a product level. To achieve this, the resulting benefits needed to be confronted with the ecological damage of a site. The indicator system should therefore allow for the comparison of different production sites as well as of the same site over time, taking into account different and changing product portfolios and vertical ranges of manufacture. The second challenge was to consider a *comprehensive ecological responsibility* that a company bears beyond the ecological impact of the specific site. And thirdly, the effort to implement and utilize the indicator system should be minimized in order to make it *suitable for practical usage*. Therefore, managers should be able to calculate the indicator quite easily, preferably by using data provided by their accounting system or which can be obtained simply. This can be difficult, especially as value-added chains have become more and more globalized while vertical ranges of manufacture have become shorter. Thus, in some industries, getting information about the entire supply chain is rendered almost impossible.

The indicator system that the Institute of Applied Sciences in Pforzheim has succeeded in developing meets all of the three above-mentioned criteria. Representing environmental impacts of companies for the time being, the focus has been laid on climate impacts, measured by the global warming potential (GWP) of green house gas (GHG) emissions. In principle, it is also possible to chose and quantify other impacts such as toxicity, acidification or ozone depletion. The generated formula, allowing for an easy calculation of the climate efficiency of a production site or a company, takes into account extended *ecological responsibility* for GHG emissions in the following ways:

Firstly, it includes the climate efficiency of *suppliers* in a coherent and easy way, alleviating the problem of allocating GHG emissions to the various products that are produced by a specific site or company: It has become possible to avoid the effort of assigning a site's production processes to its specific products and of measuring their respective GHG emissions. Additionally, methodological problems of allocating emissions to products in the cases of joint-product production are solved by introducing a simple, yet stringent allocation system. Last but not least, the organizational effort of obtaining the data of the supply chain is minimal.

Secondly, *reduction processes* for the disposal of waste can be introduced into the indicator system as well. The fundamental idea of the indicator system and the type of extended responsibility it implicitly assigns to a company, is to confront a company's revenues with its expenses, interpreted both ecologically and economically. For this purpose, modern concepts of production theory are used. This allows for the coherent handling of waste and goods both as inputs and outputs of production and reduction processes from one link to the other along the entire product life cycle: from production through usage and on to waste disposal. As can be seen, there are some similarities to the Life Cycle Assessment of products, but also significant methodological differences. In this way, the indicator system can in principle be used to evaluate the ecological efficiency of every company within the *entire economy*, both production and reduction companies, in a coherent and easy way.

However, there is still another quite interesting aspect to the indicator system and its basic concept of revenues and expenses: It is also imaginable to apply it to the *evaluation of products or services*. In this case, the focus of attention is the user of a product or service. The benefit (revenue) of the user (e.g. mobility: driving from point A to point B) is compared to the direct GHG emissions during consumption (the combustion of gasoline during driving) as well as the indirect emissions caused by the expenses incurred with the benefit: the emissions along the supply and reduction chains of the products needed to create the benefit (the car and the gasoline). Thus, the entire direct and indirect expenses incurred by the benefit are considered.

All in all, the indicator system is able to assess the climate efficiency of companies or of specific sites. It can in principle be applied to the entire economy, i.e. both production and reduction companies. The indicator can be introduced and calculated quite easily, especially as problems concerning the allocation of emissions to specific products are alleviated and, to allow for the extended ecological responsibility of a company, it is only necessary to get the efficiency indicator from its preliminary suppliers within the supply chain as well as the waste disposal companies directly behind the company itself within the reduction chain. Last but not least, in addition to the evaluation of companies, it is also feasible to use the indicator system to assess the ecological efficiency of products: from production through consumption and on to reduction.