New ANEC study

Environmental product indicators and benchmarks in the context of environmental labels and declarations

A new ANEC study shows that indicators based on Life Cycle Assessment (LCA) methodology may not be the best option to suitably characterise and declare the environmental performance of a product. ANEC has for long questioned the usefulness of so-called Environmental Product Declarations[1] in facilitating purchasing decisions and has therefore developed alternative concepts. The new study – carried out by Öko-Institut in co-operation with Ökopol (Germany) – considered the issues further by investigating the methodological limitations of LCA in the context of labelling, including carbon footprint labels.

LCA methodology offers unique advantages such as comparisons of system alternatives or providing orientation. However, it also suffers from serious limitations including omissions of many relevant environmental aspects (e.g. site-specific emissions such as noise, or non-quantifiable impacts such as biodiversity) and low accuracy and reliability of data. Hence, in many cases significant production or use phase indicators (e.g. energy efficiency, indoor emissions) derived from a variety of tools (e.g. chemical risk assessment) are a better choice for product labelling as these allow for differentiation of similar products compared to LCA indicators. A process for the identification of all relevant environmental aspects on a product by product basis, and involving all relevant stakeholders, is proposed.

Finally, the study draws attention to the particular challenges posed by carbon footprints[2], including overlooking efficiency, disregarding other environmental aspects, or overlooking the various energy mixes. ANEC has commissioned an in-depth follow-up study on product carbon footprints in 2009.

BACKGROUND

ANEC has for long criticised LCA based and business-driven Type III environmental declarations due to their one-sidedness (only a small number of indicators are covered) and their lack of orientation for the purchaser, in particular the private consumer, in that benchmarks and easy-to-

[1] Also referred to as EPDs or Type III Environmental Declarations

[2] These are, in fact, single indicator LCAs or EPDs

understand graded scales are missing. Declarations suggesting environmental superiority where in fact only data are presented may serve marketing purposes but are of limited use from a sustainability perspective[3].

An earlier study, commissioned by ANEC[4], showed "Environmental Data Sheets (EDS)" as alternatives to conventional EPDs. In this study LCA indicators – normalised to the impacts caused by an average citizen – were used to compare different types of products using a graded, colour band scale similar to the EU Energy Label. This format allows rough rankings of product categories and thus helps the consumer to focus on the "important" products. The scale is, however, not designed to identify small differences between similar products. The above was then combined with additional elements from energy and traditional ('Type I') eco-label schemes, as well as with ranking systems for chemical content and emissions. Examples for eight products were provided.

The goal of the present study was to investigate LCA methodology more thoroughly with respect to its suitability for labelling, product differentiation and benchmarking, and to give proposals as to how its inherent shortcomings could be solved. Further, the study looked at the basic problems related to carbon footprinting.

MAJOR FINDINGS OF THE STUDY

LCA for labelling purposes

The undisputed benefit of LCA is – as the name suggests – to provide for a complete coverage of environmental impacts throughout the life cycle "from cradle to grave". Thereby LCA allows for comparisons of different technologies delivering similar functions (e.g. different types of fuels).

Incompleteness of LCA: The above holds true only for those environmental aspects which are actually covered by an LCA and which can be quantified and summarised (aggregated), such as energy consumption or greenhouse gases. Unfortunately many important aspects do not fall in this category and in a number of cases quantification is not possible. Examples are impacts from agricultural land use such as soil erosion, conservation of soil organic matter, or biodiversity. In some cases potential impacts are unknown but should be avoided following the precautionary principle (e.g. persistent organic chemicals - POPs). Furthermore, many impacts cannot be aggregated as they are site-specific and depend on local concentrations of pollutants rather than

[3] A more detailed critical review of the LCA/EPD approach and corresponding standards is given in the Joint ANEC / ECOS comments on the ISO 14000 series review, http://www.anec.eu/attachments/ANEC-ENV-2007-G-030final.pdf

[4] Benchmarking and additional environmental information in the context of Type III environmental declarations, Force Technology, December 2007, http://www.anec.eu/attachments/ANEC-R&T-2007-ENV-004final.pdf

on total life cycle releases (e.g. noise, dust, or indoor air pollution). Finally, the impacts may also depend on local conditions (e.g. water consumption in dry areas versus wet areas). Hence, LCA methodology based on a functional unit approach does not and cannot provide for comprehensive environmental assessments.

Limited accuracy of LCA restricts product comparisons: The precision of LCA results is limited by available ressources, data gaps and data quality constraints (e.g. temporal and geographical coverage, need to use generic data rather than site-specific data, complex and changing logistics and supply chains). The error margin of an LCA will differ widely and will - in particular for complex products - easily exceed 10% for energy and greenhouse gases and 20% for other impact categories (ideal values which are sometimes mentioned in literature). As a result of the lack of accuracy LCA does not appear well suited for comparisons of similar products and will typically not allow for product differentiation. Even if only primary data are used (rather than data from generic databases), the physical nature of these production processes makes it likely that the data are so similar that the identified differences are smaller than the error margin. Hence, any labelling scheme will have to focus on issues such as material content or energy consumption in the use phase, meaning that LCA would not give any added value compared to current eco-labelling practices, but would simply require unnecessary efforts for data collection and compilation.

Further complications are related to different methodological choices and data selections by different LCA practitioners, with industry potentially being tempted to 'embellish' data. Hence, methodological conventions, going beyond standards such as ISO 14040/44, as well as a common database would have to be approved by the labelling or criteria-setting institution.

Identification of all significant environmental aspects: LCA needs to be complemented by other assessment tools - referred to as "additional environmental information" in ISO 14025 on EPDs. The selection of product categories, their significant environmental aspects, relevant life cycle phases, and the assessment tools and methodological conventions, mentioned above, should be regulated at the political level and should involve relevant stakeholders including consumer and environmental organisations. The current procedure under the Eco-design Directive (2005/32/EC) can be seen as a positive development in that it aims to integrate both scientific input and stakeholder perspectives. A process for a more inclusive environmental assessment of products is suggested in the new study, including the determination of "significant" environmental aspects by means of a hot spot analysis (ABC analysis).

LCA for orientation and coarse assessments: Comparisons between different product categories are less demanding in terms of accuracy and can be made on the basis of (agreed) generic data. In such cases product differences are much bigger compared to a narrowly defined product family. The new study evaluated the "Environmental Data Sheet (EDS)" approach suggested by a previous ANEC study[5] and confirmed the approach as sound and feasible.

[5] Ibid.

In conclusion, LCA appears much better suited for orientation purposes in the initial phase of environmental product labelling (as is current practice in eco-labelling) than as a suitable basis for product criteria setting or labelling, particularly for similar products with reasonably small environmental performance differences.

The pros and cons of different methodologies to aggregate impact indicator results (EcoGrade, Eco-indicator) were also considered in the present study.

Carbon footprint labels

Carbon footprint schemes – such as the ones produced by Carbon Trust on behalf of the UK chain Tesco - also raise far-reaching methodological questions in addition to those identified as applicable for LCA in general (e.g. regarding product differentiation). The use of CO_2 equivalents (greenhouse gas emissions) as a key indicator is an alternative to the use of an energy indicator which sums up the amount of primary energy used within the life cycle of a product. Both options have their pros and cons, as explained below.

Benefits of life cycle CO_2 indicator: Global warming is subject of strong public concern and debate. A CO_2 indicator would therefore meet a high level of public awareness. A carbon footprint is more straightforward compared to energy consumption figures which use quite different units such as Joules, kWh or litres petrol per 100 km. CO_2 equivalents, on the other hand, are counted in grams, kilograms or tons which are more familiar measurements for consumers. The CO_2 based emission trading system under the Kyoto Protocol[6] and carbon taxes introduced by several countries are related to CO_2 figures, thus enhancing the importance of such indicators. In contrast to energy consumption figures CO_2 indicators represent environmental impacts directly. Thus, such indicators can differentiate more sustainable forms of (renewable) energy from other forms of energy. Further, with the well-established method from LCA also greenhouse gas emissions not connected to energy generation can be integrated (e.g. methane emissions in cattle breeding).

Drawbacks of life cycle CO_2 indicator: By contrast, a strong CO_2 focus leaves out other environmental impacts of energy generation and may favour e.g. nuclear power or large-scale hydrodams. In addition, data availability for energy indicators is currently significantly better than for CO_2 indicators. The main problem associated with CO_2 indicators is the possible negligence of efficiency (which is more important than using scarce renewable energy sources), as the total product carbon footprint can be reduced to almost 0 (e.g. by using “green” electricity) whilst

[6] The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change, produced at the UN Conference on Environment and Development, held in Rio de Janeiro, Brazil in 1992. The Kyoto Protocol establishes legally binding commitments for the reduction of four greenhouse gases (carbon dioxide, methane, nitrous oxide, sulphur hexafluoride), and two groups of gases (hydrofluorocarbons and perfluorocarbons), as well as general commitments.

significant amounts of energy are actually wasted. Another difficulty is that the carbon footprints for the same electricity-using product would differ from country to country as a result of their different energy mixes.

Problems with both life cycle energy and CO_2 indicators: The most fundamental problem of both types of indicators is that a pure focus on energy or on CO_2 disregards other important environmental impacts including toxicity, eco-toxicity or biodiversity. As pointed out in the previous section on LCA, product differentiation might be difficult, in particular for similar products, as a result of the lack of accuracy of LCA methodology. Moreover, life cycle energy and CO_2 indicators are based on assumptions on user behaviour which may not correspond to reality and may miss the important aspect of consumer education or guidance. To support environmentally sound behaviour, it is important to inform consumers on e.g. energy use (or alternatively on CO_2 emissions) per unit of the delivered function and on any alternative modes of operation to reduce energy consumption. The discrepancy between life cycle approaches and user focus on current energy labelling schemes might also create confusion amongst consumers. Finally, regular updates of both indicators would be needed because of constantly changing energy mixes.

ANEC CONCLUSIONS FROM STUDIES COMMISSIONED

ANEC concludes from this study and other work undertaken in the field of environmental product information that:

- LCA is an excellent tool for orientation purposes in the initial phase of environmental product labelling (or criteria setting) and for comparing system alternatives, but only with respect to those aspects covered by LCA (e.g. global warming, total energy consumption).
- LCA allows comparisons between different products provided that the product differences are big enough (at least 30-50%) compared to the precision of the LCA. Normally this will not be the case for similar products but may be useful for comparisons of different product families.
- A graded coloured scale, as in case of the EU Energy Label, using an appropriate normalisation (e.g. the annual burden per citizen) should be used to display LCA indicator results.
- Due to the inherent shortcomings of life cycle assessment methodologies - omission of non-quantifiable (biodiversity) or non-aggregatable (noise, local emissions) impacts - LCA derived indicators cannot reflect all relevant environmental burdens of a product. Hence, other complementary tools such as human health or environmental risk assessment must be used.

- Environmental indicators and benchmarks used in the traditional (Type I) eco-label schemes or in Best Available Technique Reference (BREF) documents for specific life cycle phases will in many cases be superior to LCA indicators – both in terms of coverage, data availability, and precision. For similar products LCA indicators normally will not offer a benefit. This holds even more true when a large proportion of a burden occurs in one phase of the life cycle.

- The Environmental Data Sheet concept, combining a product-specific selection of LCA indicators (for comparing different product categories) and indicators from other assessment tools in line with current eco-labelling practices, confirmed by this study, should be seen as the way forward and developed further.

- The relevant environmental burdens and the associated indicators including methodological choices need to be determined on a product-by-product basis and can only be determined in a democratic process involving all stakeholders. As the decisions involve value choices the questions are inherently political and should therefore not be deferred to LCA practitioners, industry, or standardisation bodies. Policy-makers have an important responsibility in ensuring a democratic discourse and decision-making process. The Eco-design process is to be seen as a step in the right direction.

- The definition of the significant environmental aspects of a product should, as far as possible, make use of synergies through co-ordinated approaches involving the setting of minimum performance levels in legislation, and the deveopment of corresponding energy and eco-label requirements. This should be linked to the development of BREF documents and the future sectoral reference documents under EMAS[7].

- Existing standards for LCA (ISO 14040 series) and Environmental Product Declarations (ISO 14025 and derived standards) should be revised to remove the inherent bias towards aggregatable and quantifiable life cycle indicators, and to strengthen the weight of other instruments such as human and environmental risk assessment (so-called “additional environmental information”). Alternatively, additional standards could be prepared combining various instruments and traditional LCA for a comprehensive environmental assessment resulting in an Environmental Data Sheet.

- Current methodologies for aggregating impact indicator results (such as EcoGrade or Eco-indicator) are not convincing and should be avoided.

- Whilst carbon footprinting offers some new opportunities for product labelling and criteria setting linking one of the most fundamental environmental problems – global warming – to purchasing decisions and legal requirements for products, many methodological issues

[7] Community Eco-Management and Audit Scheme (EMAS)

remain unsolved. The question remains for which products and under which conditions (e.g. which life cycle phases) such labels make sense bearing in mind the difficulties encountered and the conclusions on LCA based indicators. A broad political debate is necessary involving all interests parties.

- A stand-alone product carbon footprint will in most cases not be useful. A reasonable environmental information system for products must cover all significant environmental aspects.
- Due care should be taken to provide meaningful CO_2 information to the consumer allowing for an easy identification of superior environmental products by using appropriate bechmarks and scales. The provision of numerical values alone is of little benefit.
- Methodological conventions (e.g. which energy mix to be used) must be established at the regulatory level in Europe. Standardisation should not be considered as sufficient to this end.
- Additional work is needed to solve the numerous problems with product carbon footprinting, involving also the question of carbon offsetting. ANEC has commissioned a follow-up study dealing with these issues with a view to helping the organisation to provide substantive input to the relevant regulatory and standardisation efforts.

ANEC in brief

ANEC is the European consumer voice in standardisation, representing and defending consumer interests in the process of standardisation and certification, also in policy and legislation related to standardisation. Our aim is a high level of consumer protection. ANEC was set up in 1995 as an international non-profit association under Belgian law. We represent consumer organisations from the European Union Member States and EFTA countries. The European Commission and EFTA fund ANEC, while national consumer organisations contribute in kind. The ANEC Secretariat is based in Brussels.

The full study is available at: http://www.anec.eu/attachments/ANEC-R&T-2008-ENV-005final.pdf

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