Position Paper

ANEC position paper:
Sustainable construction – a building site without end
Alternatives to flawed standards

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Summary

Many initiatives have been launched to address sustainability issues in the field of construction but their development was made in an uncoordinated manner following different - and sometimes even contradictory – approaches. Of particular concern to ANEC is the preparation of European standards by CEN Technical Committee 350 "Sustainability of construction works".

This ANEC paper is a critical review which focuses on the environmental dimension of the European standardisation work and some human health related aspects. In particular, it is shown that the normative provisions and underlying concepts are questionable in many ways – they are not focused on the essentials, they contradict established building schemes and they are very cost-intensive.

A study[1] commissioned by ANEC and carried out by the Austrian Institute of Healthy and Ecological Buildings (IBO) shows that there are better ways to establish environmental and human health related criteria for buildings. Such approaches are more to the point, more reliable, more demanding although not requiring as many efforts as the European standards under preparation.

ANEC urgently calls for decision makers to initiate a broad debate including all interested parties in order to work together and develop a stringent European concept for sustainability issues in the construction area. A European Green Paper from the Commission could be a good first step.

[1] ANEC Study "Environmental and health related criteria for buildings" by IBO (http://www.anec.eu/attachments/ANEC-R&T-2011-ENV-001Final.pdf)

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Background

Based on a mandate of the Commission the European standardisation committee CEN/TC 350 "Sustainability of construction works" is developing standards for the environmental assessment of building products and buildings[2]. In parallel, European Ecolabel criteria are being prepared by the Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS)[3]. Yet another set of criteria for buildings was developed in the context of the European Green Public Procurement (GPP) initiative. Unfortunately, these three initiatives fall short of consumer expectations. They clearly lack ambition and/or use methodologies which are questionable in many ways.

Furthermore, several other regulatory activities relate to green buildings or building products such as the recently revised Energy Performance of Buildings Directive (EPBD), the newly adopted Construction Products Regulation (CPR)[4], the recast Directive on Ecodesign of Energy-related Products (ERP)[5] and the recast Energy Labelling Directive.

There are many other initiatives touching upon sustainable construction both at the European level – such as the Lead Market Initiative (LMI) or the upcoming Energy Efficiency Plan 2011 – and at the national level including criteria catalogues and certification schemes.

Unfortunately, there is no accepted overarching EU policy concept or master plan for sustainable construction. All the activities are thus being developed in an uncoordinated and even contradictory manner. This may stimulate discussion and further development but it also leads to a waste of valuable resources and inconsistencies. ANEC therefore calls for a European roundtable discussion involving all relevant Commission departments and stakeholders in order to elaborate a consistent European policy in this area.

In the last years, ANEC has commissioned several research projects highlighting the major consumer concerns with respect to environmental and human health product information and environmental indicators[6] and, more generally, environmental criteria setting for products. It became more and more clear that indicator results based on life cycle assessment (LCA) methodology are indispensable for orientation in the initial phase of an activity to derive Ecolabel

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[2] Other standards address the social and economic dimensions of sustainability.

[3] The work was originally carried out under the lead of the Italian Competent Body (ISPRA) but subsequently taken over by the JRC-IPTS.

[4] Arising from the former Construction Products Directive (CPD)

[5] Formerly Energy-using Products (EUP) Directive

[6] Including comprehensibility, comparability, reliability, precision, transparency, completeness, benchmarking and enforcement

criteria or environmental product requirements. However – as a result of many limitations of the LCA approach - they may not be the best option to suitably characterize and declare the environmental performance of a product[7].

Most recently, ANEC commissioned a study "Environmental and health related criteria for buildings" to the Austrian Institute for Healthy and Ecological Buildings (IBO)[8]. The study aimed to elaborate on a selected number of key indicators of utmost importance from a consumer perspective including:

- Life cycle assessment (LCA) with focus on building material
- Energy demand and CO_2 emissions with focus on operation phase
- Daylighting
- Emissions on construction site
- Chemicals in building materials / indoor air

A summary of this study is given in the Annex.

Against this background ANEC developed the present position paper.

[7] See ANEC study "Environmental product indicators and benchmarks in the context of environmental labels and declarations", carried out by Öko-Institut, May 2008. The full study is available at: http://www.anec.eu/attachments/ANEC-R&T-2008-ENV-005final.pdf

[8] The full study is available at ((http://www.anec.eu/attachments/ANEC-R&T-2011-ENV-001Final.pdf)

The CEN approach – an example of how things should not be done

The work of CEN TC 350 "Sustainability of construction works" is based on a mandate by the Commission (M/350)[9]. This mandate asks "to provide a method for the voluntary delivery of environmental information that supports the construction of sustainable works including new and existing buildings" based on international standards for Life Cycle Assessment (LCA)[10] and for LCA-based Environmental Product Declarations (EPDs)[11]. This mandate (mis)led CEN in the wrong direction from the onset as most of the existing schemes for buildings and building products including the EU GPP toolbox and the emerging EU Ecolabel use LCA indicators in a very limited way, e.g. cradle-to-gate indicators for construction products. However, the choice of indicators may have been inspired by LCA results. Hence, the mandate had a potential to push aside many existing national schemes without a broader discussion on the benefits/drawbacks of such an approach.

Even on the basis of the mandate, CEN could have tried to incorporate current national approaches which have shown their usefulness in practice – the genuine task of European harmonisation. Thus LCA methodology could have been used – together with other instruments – to carry out a comprehensive analysis of all relevant environmental aspects and, based on that, to select (or guide the selection of) the most appropriate indicators[12] taking into account all stakeholder perspectives in a balanced way. In fact, CEN has not made the least effort to do so and opted for a very narrow approach prescribing a number of questionable indicators for all kinds of construction products. The consumer views were ignored to a large extent. Obviously the business circles involved (manufacturers, consultants, database providers) had other priorities.

As regards the environmental dimension CEN prepared 5 standards:

- EN 15643-1: Sustainability of construction works - Sustainability assessment of buildings - Part 1: General framework (September 2010)
- EN 15643-2: Sustainability of construction works - Assessment of buildings - Part 2: Framework for the assessment of environmental performance (March 2011)
- FprEN 15804: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products (sent to UAP ballot with deadline 12. October 2011)

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[9] Commission Mandate "Development of horizontal standardised methods for the assessment of the integrated environmental performance of buildings", March 2004

[10] i.e. ISO 14040 and ISO 14044

[11] Most notably ISO 14025 and ISO 21930

[12] e.g. energy consumption of a building and indoor emissions

- FprEN 15942: "Sustainability of construction works – Environmental product declarations - Communication format business-to-business" (approved during formal vote July 2011, publication pending)
- FprEN 15978: Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method (approved during formal vote July 2011, publication pending)

The main criticism from a consumer perspective is summarized below.

1. LCA – benefits and limitations in general

The undisputed benefit of LCA – as the name suggests – is to provide a complete coverage of (certain) environmental aspects and 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). LCA also offers the opportunity to identify the most relevant stages of the life cycle with respect to environmental burdens (e.g. that the use stage is the most relevant one with respect to energy and related impacts for energy consuming appliances).

Conversely, LCA shows many weaknesses which limit its use for setting environmental indicators or environmental product criteria for regulatory or labelling purposes. For instance, many important environmental impacts do not allow quantification (e.g. biodiversity) or potential impacts are (yet) unknown but should be avoided following the precautionary principle (e.g. persistent organic chemicals - POPs). Another issue is that some of the impacts cannot be aggregated[13]. Hence, LCA methodology based on a functional unit approach does not and cannot provide for comprehensive environmental assessments.

Second, the precision of LCA results is limited by available resources, data gaps and data quality constraints. Further complications are related to different methodological choices (e.g. scenarios for transport or user behaviour, assumptions regarding service life, etc.) and data selections by different LCA practitioners, with industry potentially being tempted to 'embellish' data. The LCA results depend to a large extent on the choices made and the error margin differs widely. The consequence is that LCA studies are often challenged by competing industries. Current discussions about the benefits of biofuels are a good illustration for the dilemma. For some they constitute a significant step forward – for others the opposite is the case. This depends on which LCA study one takes into consideration. Standardisation can reduce but not eliminate these problems.

[13] Because either 1) they are site-specific and depend on local concentrations of pollutants rather than on total life cycle releases (e.g. noise, dust, or indoor air pollution) 2) they do not share a common mechanism (e.g. toxic effects of chemicals) 3) they cannot be reliably modelled (e.g. the DALY concept – Disability Adjusted Life Years) 4) they depend on local conditions (e.g. water consumption in dry areas versus wet areas) or existing background concentration of certain pollutants

From this follows that LCA is an excellent tool for (rough) orientation purposes in the initial phase of environmental product labelling or criteria setting and for comparing system alternatives, but only with respect to those (few) aspects adequately covered by LCA, i.e. those which are quantifiable, aggregatable and can be reliably modelled in a sound scientific manner (e.g. global warming, total energy consumption). A comprehensive and meaningful environmental assessment requires the use of a broad range of environmental instruments (e.g. chemical risk assessment, sustainable agricultural practices, noise measurements, etc.) to be determined in a multistakeholder experts discussion. Given the huge uncertainties of LCA results it appears to be preferable to use a selection of relevant and precisely defined indicators related to certain stages of the life cycle[14]. The indicators should not only be sufficiently precise to differentiate products – there must be also a significant difference between the products on the market and a significant improvement potential – otherwise the indicator is pointless and becomes a purpose in itself.

These aspects are further detailed in the summaries of the ANEC studies "Environmental product indicators and benchmarks in the context of environmental labels and declarations", Öko-Institut, December 2008 (LINK to be inserted) and "Requirements on Consumer Information about Product Carbon Footprint", Öko-Institut, February 2010 (LINK to be inserted).

2. LCA – a useful methodology to derive environmental indicators for buildings?

The CEN approach aims at assessing the environmental aspects and impacts of a building based on quantitative indicators (only) using LCA methodology in accordance with ISO 14040 & 14044 and additional environmental information. Excluded are impacts and aspects of the appliances and furniture, fixtures and fittings that are not building-related as well as impacts and aspects beyond the area of the building site, and environmental impacts and aspects resulting from transportation of the users of the building. The standard[15] states the following: *"Within this environmental framework the building life cycle starts with the acquisition of raw materials. It proceeds through the manufacture of products, construction work processes, actual use including maintenance, refurbishment and operation of the building, and finally at the end of life, deconstruction or demolition, waste processing in preparation for reuse, recycling and energy recovery and other recovery operations, and disposal of construction materials. Information from these activities is needed to assess the environmental impacts and aspects of the building"*.

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[14] e.g. low noise and emission trucks/construction machines, energy content of building materials, energy use of the building, VOC emissions of construction products, recyclability, etc.

[15] EN 15643-2, 5.4.1, pg. 20

The title of the CEN standards (i.e. "Assessment of environmental performance of buildings") is misleading as no comprehensive assessment methodology is offered. At best some quantitative parameters for such assessment are provided disregarding qualitative indicators (e.g. construction products conforming to Ecolabel criteria or criteria for noise, dust or waste management during construction or demolition). Furthermore, the standards do not address the evaluation step of the assessment and the establishment of criteria. Irrespective of this the first important question is whether life cycle indicators are indeed useful instruments for labelling or requirement setting of a building.

It is a well-known fact that the energy consumption in the use stage of a building outperforms by far the energy consumption in all other life cycle stages. This also applies to other related environmental impacts. The so-called IMPRO-Building study - Environmental Improvement Potentials of Residential Buildings (JRC, 2008) - came, for instance, to the conclusion that the primary energy demand related to the use stage amounts to about 80% of the total energy consumption of new European buildings[16]. It should be noted, however, that the use stage was assumed to be just 40 years in this study. This means that the share of the use stage could be even higher when more realistic service life times are assumed. From this follows that the energy efficiency of the use stage is of primary importance. Construction and end of life treatment are of low importance for the total energy balance (materials see below).

This applies even more to the existing building stock having thermal insulation which is typically much worse than that of new buildings conforming to new building regulations. An LCA approach for existing buildings would make limited sense because the environmental burdens associated with manufacturing of building products and construction are unknown. Beyond that such burdens are irrelevant because they have occurred in the past and cannot be influenced anyway.

In addition, the improvement potential can be assumed to be the highest in the use stage – both for new and old buildings. A meaningful approach in the field of environmental indicators must take into account the options for improvement. If significant efficiency gains are not feasible, indicators are pointless.

Finally, it should be noted that the life cycle energy consumption is rather irrelevant for the user of the building who is mainly interested in the energy bill.

From this follows that – at least as far as energy and related impacts are concerned – the use stage indicator is the relevant one to be employed both in a regulatory context as well as in voluntary schemes (for other impacts see below). Generic LCA model studies are highly important e.g. to identify the relevant stages in the life cycle of a product. But there is little, if any, benefit to use life cycle indicators for labelling, certification or law making. On the contrary, this would introduce only

[16] IMPRO-Buildings, 5.3.1, fig. 5.11, pg. 60

additional costs and increasing uncertainty of results, for instance, because of highly subjective choices for establishing scenarios such as service life time of building and construction products, waste management options, etc. It should be noted that the service life time of a house is not known. Whatever number is chosen – 40 years, 60 years, 80 years, 100 years is an arbitrary choice (the same applies to the service life time of its components).

3. Relevant LCA impacts of building products/buildings

The CEN standards use the following life cycle impact categories: global warming; ozone depletion; acidification of land and water; eutrophication; photochemical ozone creation; depletion of abiotic resources (elements); depletion of abiotic resources (fossil).

In addition, the following environmental resource indicators are required: use of renewable / non-renewable primary energy excluding renewable / non-renewable primary energy resources used as raw materials; use of renewable / non-renewable primary energy resources used as raw materials; total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); use of secondary material; use of renewable secondary fuels; use of non-renewable secondary fuels; use of net fresh water.

Other environmental information includes: hazardous / non-hazardous / radioactive waste disposed; output flows including components for re-use; materials for recycling; materials for energy recovery and exported energy.

The IMPRO-Building study showed that there was a good correlation between primary energy consumption and the values for the impact categories global warming, ozone depletion, acidification, eutrophication and photochemical ozone creation. Hence, the authors stated[17]:

"A first finding from the life cycle assessment as implemented to the different building models is the similarity of trends shown over the different impact categories when the different building types according to zones are compared. This reflects the important role of energy use in most of the environmental impacts quantified, first as a result of fuel combustion for space heating, and, second, as a result of the industry processes involved in the manufacturing of building products. Consequently, both primary energy use and greenhouse gas (GHG) emissions are good proxy indicators to assess the environmental performance of the buildings".

Therefore, the other environmental impact indicators – ozone depletion, acidification, eutrophication, photochemical ozone creation - do not provide any substantive additional information. One could say that they just express energy consumption using different headings. The environmental relevance of the indicators given developed in the late eighties and early nineties can be also

[17] IMPRO-Buildings, Executive summary, xvii

questioned. For instance, the problem of ozone depletion can be regarded as settled under the Montreal Protocol – the relevant substances have been banned. Acid rain resulting in dying of forests was a highly important subject in the eighties of the last century but is no longer important nowadays.

One serious disadvantage of these indicators is that they nebulise the origin and contribution of individual compounds to the indicator results – e.g. that NOx from combustion of fuels is a major element for acidification, eutrophication and photochemical ozone creation – leading to a distraction of improvement options. For instance, one can go for low NOx burners to reduce combustion related impacts - but not for "low acidification boilers".

There is no point in defining a resource depletion indicator for energy. It is sufficient to establish an energy consumption criterion. Resource depletion other than energy is normally not a serious issue in a building context. If so, one should focus on those materials which are of real concern.

Calculations related to end-of-life operations remain highly hypothetical given that the demolition of the new building will happen decades from now using unknown waste management techniques. Quantitative figures are, therefore, misleading as they suggest a precision which the method cannot deliver. A qualitative or semi-quantitative approach for recyclability seems here more appropriate.

Toxic wastes should be prevented at the input side by avoiding the use of products containing toxic substances. It is very strange that chemicals in construction materials are disregarded in the building assessment.

Finally, it is revealing that the questionable CEN approach completely ignores building site specific environmental burdens resulting from construction activities (noise, particles, dust). The energy consumption related to these activities - which is accounted for - is rather negligible.

4. Construction products

CEN applies a one-size-fits-all approach for construction products using the same quantitative indicators as indicated above for buildings. The basic philosophy is that the results of the cradle-to-gate LCAs for all products are summed up and are combined with other "modules" to derive overall life cycle results for the given indicators.

As pointed out above the usefulness of a number of these indicators is questionable. But apart from that – and following CEN's logic – is it really necessary to include all products in the assessment of a building? Only few products contribute to the large proportion of energy embedded in building products: essentially basement, walls, floors/ceilings, and perhaps to a lesser extent windows and roofs. This suggests that embedded energy rather than all impact indicators (see reasoning above) should be addressed only for a limited number of construction products or structural elements rather than prescribing this for all products.

The (not yet published) CEN standard EN 15804 on environmental product declarations for construction products shows – apart from the above – many other serious deficiencies. Qualitative indicators (e.g. compliance with Ecolabel or sustainable forestry management criteria) or semi-quantitative indicators (e.g. covering recyclability) are completely ignored. This goes against many established schemes for buildings which typically rely on and award compliance with ecolabelled products.

The introduction of EN 15804 states that *"the standardisation process has taken place in accordance with EN ISO 14025*[18] and provides – according to the scope – *"core product category rules (PCR) for Type III environmental declarations for any construction product and construction service"*. However, this runs counter to the basic concept of PCRs as defined in ISO 14025 – to establish rules for specific products characterized by functional equivalence[19]. This includes, among others, the definition of a 'functional unit' (and many other provisions) which cannot be done for a broad range of products like construction products (and services likewise). In other words, the concept of a generic PCR does not exist in ISO 14025. On the contrary, such approach is in clear contradiction with ISO 14025. At best EN 15804 can be regarded as a standard for the development of PCRs but does not constitute a PCR by itself the development of which is, by the way, according to ISO 14025, the duty of a programme operator involving a number of obligations, not a standards body.

The chemical dimension is widely ignored. Provisions for the content of the environmental product declaration (EPD) includes[20]: "*the declaration of material content of the product shall list as a minimum substances contained in the product that are listed in the "Candidate List of Substances of Very High Concern for authorisation" when their content exceeds the limits for registration with the European Chemicals Agency*". Substances listed in the candidate list (54 in August 2011) are just a miniscule fraction of all SVHC substances (estimated to be at least 1500) and there are many more dangerous substances. In our view, this provision is unacceptable ridiculous for several reasons:

- It is the mere legal minimum required by REACH and the new Construction Products Regulation for articles (put aside the wrong wording which confuses content limits with thresholds for registration; article 33 of REACH requires that suppliers of articles declare at a minimum the substances which have been included listed in the candidate list exceeding 0,1%).

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[18] Environmental labels and declarations – Type III environmental declarations - Principles and procedures

[19] ISO 14025 defines 'product category' as group of products that can fulfil equivalent functions).

[20] See EN 15804, 7.1 k, pg. 30

- It ignores that many construction products are not articles but preparations for which REACH (article 31) and the new Construction Products Regulation has established more information requirements, i.e. also for SVHCs not yet included in the candidate list and other dangerous substances.
- A voluntary instrument which does not set requirements which are more ambitious than the legal minimum is superfluous.

We also consider unacceptable the following provisions relating to indoor air emissions:

"The following information shall be provided for products exposed to indoor air after their installation in buildings during the use stage in order to support use stage scenarios with respect to health at the building level:

– *Emissions to indoor air, according to the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised testing methods according to the provisions of the respective Technical Committees for European product standards, when available.*

NOTE If the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available, the EPD can lack this information" (EN 15804, 7.4.1, page 40)*.*

This is absolutely inadequate for 3 reasons:

- The requirement applies only in case a use scenario is created. However, this is not obligatory. "*Only the declaration of the product stage modules, A1-A3, is required for compliance with this standard*" (EN 15804, 6.2.1, page 15). This makes indoor air related provisions optional although this is somewhat hidden in the text.
- The harmonised testing standards AND provisions of the relevant CEN product committees will not be available soon. In fact, it may take many years. Until then even the optional requirements are void.
- The mandated work on emission testing is linked to regulatory provisions in Member States. From this follows that the scope of the tests will be rather limited.

This is in stark contradiction with ISO 14025 which requires to incorporate "additional environmental information": "*A Type III environmental declaration shall include, where relevant, additional information related to environmental issues, other than the environmental information derived from LCA, LCI or information modules*" (ISO 14025, 7.2.3, page 15) and refers, among other, to toxicity related to human health. One can hardly argue that indoor emissions are not relevant. It seems as if the CEN provisions were written from the perspective to prevent to the largest possible extent useful health and environmental information requirements.

Finally, ANEC has repeatedly pointed out that type III environmental product declarations (EPDs) following the principles of ISO 14025 are an inadequate instrument for consumer information and possibly also unsuitable to assist purchasing decisions of other stakeholders in a similar situation (e.g. public procurement). These kinds of EPDs do not allow for the identification of environmentally superior products. The use of benchmarks and graded scales is of crucial importance. Type I labels and energy labelling schemes remain the reference in a consumer context and are likely to also be most relevant for other groups. Given the uncertainties of LCA as described above, ANEC considers life cycle indicators suitable to compare different types of products (with big environmental performance differences) rather than to compare products within the same product family.

5. Calculation methods, scenarii and comparability

EN 15978 defines life cycle stages and related modules, i.e. product stage (A1-3), construction process (A4-5), use stage (B1-7) and end of life stage (C1-4), as well as the processes included in the various modules and gives some rules on scenarios to be used. However, it remains widely unclear how the calculations should be carried out in detail.

The calculation of operational energy may serve as an example here. EN 15978 refers to the Energy Performance of Buildings Directive and to the umbrella standard EN 15603 "Energy performance of buildings — Overall energy use and definition of energy ratings": *"The scenarios for energy use shall include (but not be limited to) energy consumed by use of the following systems, as defined in the Energy Performance of Buildings Directive: heating, cooling, ventilation, domestic hot water, lighting and control. For this, default scenarios for the energy use shall be obtained from EN 15603"*[21].

However, neither the directive nor the associated (mandated) standards provide for detailed calculation rules which are left to the discretion of the Member States. They constitute just a framework including some basic concepts to determine the energy performance of buildings. This aspect was highlighted by the CENSE project – a project to support the EU Member States and other target groups in achieving better awareness and more effective use of the European (CEN) standards that are related to the Energy Performance of Buildings Directive: "*Due to the variety and partly uncertainty of the initial wishes from the Member States, most of the CEN-EPBD standards contain loosely formulated procedures, open for choice at national or regional levels*". The consequence is: *"This results in large differences in the final*

[21] EN 15978, 8.6.5, pg. 34

energy performance of buildings calculation procedures across countries" (Set of recommendations: Towards a second generation of CEN standards related to the Energy Performance of Buildings Directive (EPBD), van Dijk, May 2010, 6.1 and 7.1, page 13). And that's not all: EN 15978 even allows disregarding all the provisions of the CEN standards related to the EPBD: "*The assessment of energy use may be based on alternative methods for energy modelling and scenarios for the pattern of use, which shall be described and documented*"(EN 15978, 8.6.5, page 34). In other words: anything goes! In the LCA world all the complexities of energy performance calculations find easy answers – do what you like and document.

Another impressing example are the life cycle impact assessment categories listed both in EN 15978 and in EN 15804 – without providing any details about the calculation procedures to be employed and characterisation factors to be used. But there is not just one method available to determine these impact indicator results. A quick glance at the LCA impact assessment parts of the International Reference Life Cycle Data System (ILCD) Handbook (http://lct.jrc.ec.europa.eu/assessment/projects#d) tells us that several methods are available for each impact category. What the appropriate methods are is still subject of discussion. Even within one method choices are possible. For example, one can calculate Global Warming Potentials (GWPs) using a time frame of 20, 100 or 500 years, one may use GWPs from the Intergovernmental Panel on Climate Change (IPCC) or from other institutions, latest ones or previous editions and so forth. Again a user has a broad range of options.

Similarly, scenarios can be modelled in quite different ways. One can, for example, make different assumptions regarding the service life time of a construction product or the entire building. It is most unlikely that different users of the standard will make these choices uniformly. Hence, comparability is typically not at all assured. EN 15804 requires as part of the environmental declaration "*a statement that EPD of construction products may not be comparable if they do not comply with this standard*"[22]. This is wishful thinking and grossly misleading. The corresponding line in ISO 14025 reads differently for good reasons: "statement that environmental declarations from different programmes may not be comparable" (ISO 14025, 7.2.1 k, page 13). The same holds true in our opinion for EPDs in accordance with EN 15804.

6. The way forward – ANEC study "Environmental and health related criteria for buildings"

Against the background of the highly unsatisfactory developments in the field of environment and construction, ANEC commissioned a study to the Austrian Institute of Healthy and Ecological Building-IBO[23]. The aim of the study was to

[22] EN 15804, 7.1 h, pg. 29

[23] Österreichisches Institut für Baubiologie und Bauökologie

elaborate on some of the basic concepts useful for building labels and certificates based on a review of existing building schemes and to assist ANEC in developing its positions on the subject. The major findings of the study were the followings:

- Energy indicators for building should focus on operational energy and embedded energy in construction products. Other life cycle stages can be neglected.
- Primary energy use and greenhouse gas (GHG) emissions are good proxy indicators to assess the environmental performance of the buildings - the information gain from taking other LCA-indicators into account is questionable.
- Operational energy should be addressed by an indicator for heating/cooling respectively and delivered energy and primary energy complemented by associated indicators for CO_2 emissions and pollutants (NOx, particulate matter).
- Whilst calculation procedures for energy consumption are precisely defined at the national level (in most member states) European rules need to be defined for establishing EU-wide Ecolabel criteria based on e.g. EN ISO 13790 or the guidelines of the Passive House Institute Darmstadt ensuring uniform calculations with certain national input parameters (e.g. regarding climate data).
- It is strongly recommended to focus on different instruments, such as environmental impact assessment, chemical risk assessment etc. for measuring a broad range of relevant non-energy related environmental and human health issues.
- Environmental impacts on site can be more effectively addressed by qualitative indicators referring to proper construction site management rather than by using LCA-indicators. Construction site management operations should be target-oriented rather than process-oriented. Indicators describing e.g. the use of low-emitting and low-noise vehicles and construction machines with low diesel consumption, dust attenuating measures or waste management instructions etc. can be used.
- Qualitative indicators should be used for end-of-life operations.
- Chemical requirements of different rigour – for baseline or excellence levels - should aim at eliminating hazardous substances and include generic bans for certain categories of substances or for specific compounds as well as score systems.
- An evaluation scheme for the emissions from building materials into indoor air based on the "European Collaborative Action - Urban Air, Indoor Environment and Human Exposure: Harmonisation framework for indoor

material labelling schemes in the EU. Report No 27" is suggested. Different requirement levels for baseline and excellence criteria are included.

A summary of this study is given in the annex.

7. ANEC conclusions

Concerning construction and construction products

- Current developments in the field of assessment of sustainable construction raise considerable concern. In particular, this holds true for the standards prepared by CEN TC 350 based on Life Cycle Assessment (LCA).

- These standards are not only highly questionable from a methodological perspective – it is difficult to see their added value compared to well-established national building schemes which have shown their usefulness in practice for many years. This includes also European tools such as the Green Public procurement (GPP) Product Sheet Construction.

- LCA is an excellent tool for orientation purposes in the initial phase of environmental product labelling and for comparing system alternatives, but only with respect to those (few) aspects covered and which can be adequately modelled by LCA (e.g. global warming, total energy consumption).

- Limitations of LCA include incompleteness (e.g. disregard of issues which are difficult to quantify such as biodiversity or local effects including noise, dust and indoor pollution), limited accuracy (e.g. as a result of limited data availability and subjective methodological choices) and limited comparability of products (in particular, when product differences are small).

- Model LCAs are clearly beneficial to show orders of magnitude of certain environmental burdens and their distribution along the life cycle – also in the construction sector.

- The IMPRO-Building study has clearly demonstrated that the largest proportion of energy and associated impacts are related to the operational stage (around 80%) with a minor contribution of building products. Contributions of the construction and demolition stages are not relevant. From this follows that use stage energy and embedded energy in certain construction products must be at the centre of any meaningful environmental indicator scheme for buildings. An expansion to cover the complete life cycle adds only costs but no benefit.

- In addition, the IMPRO-Building study has demonstrated that primary energy use and greenhouse gas (GHG) emissions are good proxy indicators to assess the environmental performance of buildings. The use of indicators addressing acidification, eutrophication and photochemical ozone creation does not mean a more complete assessment but just express energy consumption in different ways. Several other CEN indicators are either questionable or redundant or simply superfluous (such as ozone depletion).

- Precise rules are needed to calculate environmental indicators for buildings and building products. CEN fails to provide such rules. Not even clear-cut rules for operational energy are offered. The principle is that anyone can do the calculations as he wants. Scenarii can be modelled in many different ways. Comparability is not given.

- The CEN approach for construction products contradicts the provisions of ISO 14025 on type III declarations. The basic concept of ISO is that product category rules are specific rules for products with equivalent functions. Construction products include a broad range of items with totally different functions.

- Type III environmental product declarations (EPDs) are an inadequate instrument for consumer information and possibly also unsuitable to assist purchasing decisions of other stakeholders in a similar situation (e.g. public procurement), as these kinds of EPDs do not allow for the identification of environmentally superior products lacking benchmarks, scales and letter/colour codes.

- Provisions for chemicals are entirely inadequate. Information obligations are even less demanding compared to REACH requirements. Indoor air emission information is purely optional and not even defined.

- The focus on quantitative indicators distracts from the fact that semi-quantitative and qualitative indicators are often a better choice – e.g. to address noise and dust emissions of construction sites and end-of-life treatment.

- ANEC calls upon the Commission not to recognize the CEN standards by any means, not to financially support their elaboration and not to commission further work in this regard.

- The work on ecolabels for buildings or any other European building related specifications should not follow the flawed CEN approach but establish criteria based on the main approaches followed by the GPP Toolbox Construction and on national building assessment tools.

- Further harmonisation is required for the calculation of energy performance of buildings. As a first step a European method should be developed for the purpose of ecolabelling (for buildings, but also for other labels which make use of building related requirements such as tourism) as well as for other rulemaking such as the Ecodesign Directive or EMAS sector reference documents.

- ANEC reiterates its call for a European Green Paper on sustainable construction and a debate on sustainability concepts involving a broad range of actors with the aim to establish a substantive approach and to align different activities in this area.
- The study of IBO commissioned by ANEC should be one of the basic documents for a European discussion.

Concerning LCA, EPD, Carbon Footprint and EU environmental product policy

We refer to the conclusions included in our summaries of the studies:

"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-2008-ENV-003final.pdf);

"Environmental product indicators and benchmarks in the context of environmental labels and declarations", Öko-Institut, December 2008 (http://www.anec.eu/attachments/ANEC-R&T-2009-ENV-002final.pdf) and

"Requirements on Consumer Information about Product Carbon Footprint", Öko-Institut, February 2010 (http://www.anec.eu/attachments/ANEC-R&T-2010-ENV-003final.pdf).

ANNEX Summary of ANEC study "Environmental and health related criteria for buildings[24]" by IBO

In order to be in a position to provide substantiated contributions in the on-going discussions on a comprehensive system for assessing the environmental and health related impacts of buildings, ANEC commissioned this study to the Austrian Institute of Healthy and Ecological Building (Österreichisches Institut für Baubiologie und Bauökologie, IBO). The study was completed in March 2011. Major goal was a solution for a useful concept from a consumers' perspective taking all relevant requirements into account using familiar information (e.g. NOx emission rather than acidification indicator for central heating burner). The existing initiatives and assessment methods were analysed, their advantages and disadvantages described and respective conclusions drawn. Moreover, a meaningful and Europe-wide applicable approach for addressing energy and CO_2 emissions and dangerous substances was proposed, the latter leading to an ambitious assessment scheme for indoor air quality.

Major findings of the study

Following a selection process indicators were chosen by the contractor that led to the following categories for which an in-depth analysis was carried out:

<u>Energy and CO_2 Emissions with focus on the operation phase</u>

Highly aggregated results such as CO_2 emissions or primary energy demand – especially when summarized over the whole life cycle may lead to losses of important interim results and optimisation steps which are more relevant to target groups of building rating systems. Therefore, the following bottom-up approach is recommended:

a) Heating or – if more applicable for southern latitudes – cooling and heating energy demand

Rating of individual measures (like "reduction of heat loss parameters") shall be avoided due to the complexity of regional and local specifics and market availability of components. The heating and cooling energy demand of the building should be considered as one of the relevant assessment parameters instead.

Because of the variety of calculation methods within the EU member states and the various main indicators used for energy performance certificates, a more consistent method is required for an EU Eco-label of buildings. Two options are suggested:

- referring either to EN ISO 13790 (in this case uniform calculation parameters have to be defined where national adaptations are allowed in principle to

[24] The full study can be accessed on the ANEC website : http://www.anec.eu/attachments/ANEC-R&T-2011-ENV-001Final.pdf

guarantee the comparability of calculated figures for an EU-wide labelling of buildings) or

- referring to the PHPP calculation method (Passive House Planning Package 2007) following the guidelines of the Passive House Institute Darmstadt.

Defining benchmarks for rating, an EU-wide Eco-label must not neglect regional climate conditions (heating/cooling degree days, solar radiation, etc.). A differentiation into at least three zones (cold, moderate and warm climate zones) within Europe is recommended.

b) Delivered energy (including efficiency of HVAC systems)

The delivered energy for each energy carrier should be part of any consumer-oriented assessment system (rated in both absolute figures and in comparison to similar building services to be able to assess the energy efficiency of the system(s) installed). The delivered energy (defined as the final energy demand lowered by the gains of (solar) plants on the building site) is of significant relevance for the prospective buyer or tenant of a building or building unit. Energy costs are based on the delivered energy (to the building or building unit) including losses and gains of all HVAC systems installed (calculation is based on standardised conditions for user behaviour and climate and usually includes all energy services).

c) Primary energy demand

Delivered energy is an appropriate informative parameter for consumers but not sufficient as ecological key indicator for the whole energy consumption of the building sector. Important relevant energy generation processes are excluded from consideration. Energy scarcity and the upstream processes to generate energy delivered to the final consumer cannot be neglected. Therefore, it is necessary to include primary energy into a comprehensive building assessment method. Additionally, the authors recommend to rate renewable and non-renewable energy consumption separately, since availability and renewability of resources is an important ecological aspect. This can be done by rating the primary energy demand of non-renewable resources or by assessing both the total primary energy demand and the share of renewable resources.

d) CO_2 Emissions (restricted to the operational phase)

Apart from causing emissions of pollutants such as SOx, NOx and particulate matter, energy generation and supply is one of the main sources of carbon-dioxide emissions thus contributing to man-induced greenhouse effect. Apart from industry production processes and transport, buildings are the main consumers of energy. CO_2 based assessments of buildings will be inevitable in future taking into consideration the European environmental policy.

Not all member states have already implemented a CO_2 calculation method. In this case the primary energy demand is acceptable as key indicator in order not to cause extra calculation expense. Where CO2 indicators are already implemented it is recommended to add a rating for the CO_2 emissions for assessing the efficiency of climate protection measures in the building sector.

e) NOx emissions, Particulate Matter (restricted to the operational phase)

Minimum requirements for the NOx and Particulate Matter emissions of the heating systems in regular operation shall be given in an EU-wide Eco-label for buildings.

<u>Recommendations for the use of LCA in building assessment systems</u>

Based on results of recent studies, such as IMPRO, the contractor recommends the following implementation of LCA in building assessment tools:

Primary energy use and greenhouse gas (GHG) emissions are good proxy indicators to assess the environmental performance of the buildings. The gain in information by taking other LCA-indicators in account is questionable, whereas leaving them out saves oneself the question of weighting the indicators.

It is recommended considering the use phase and the manufacturing of the construction materials (cradle to gate). The construction operation can be neglected. Traffic-related energy consumption to and from site can be more effectively optimised by qualitative indicators (e.g. requiring the use of low-emitting vehicles with efficient diesel consumption). The improvement options for disposal processes could be expressed much better with the help of qualitative indicators. All considered life-cycle stages of the building should be regarded separately.

The replacement of materials within the building life cycle should be taken into account.

The following constructions shall be taken into account: exterior walls, the basement, floors/ceilings, interior walls, roof and windows. Interior and exterior doors, paintings, adhesives, screws and other auxiliary materials can be neglected or roughly estimated.

Calculations can be made on the basis of (agreed) generic data. 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.

It is strongly recommended to focus on different instruments, such as environmental impact assessment, chemical risk assessment etc. for measuring the non-LCA-indicators. There is no need to restrict the environmental assessment to mathematical operationalisation of environmental mechanism as it is practised by CEN/TC 350 at the moment.

Benchmarks could be set on national level e.g. based on a range of assessed buildings or on political targets.

<u>Daylighting</u>

Daylighting and lighting related issues are recognized as relevant comfort and health topics in most of the analysed building assessment systems for residential buildings.

Daylight factor is the only indicator common to almost all systems and requirements can be defined either as point or average daylight factor(s) (for relevant rooms of dwellings) or averaged over the whole (or a defined percentage of the) net floor area of a building. Optimisation strategies are more effective if rooms/dwelling units are considered separately and the overall rating is based on an arithmetical mean value of single scores of all dwelling units. Net floor area based ratings consider all rooms independently of their functions and daylight requirements ignoring the fact that darker zones are acceptable for retreat areas, corridors, bathrooms, etc.

Daylight has to be complemented by an indicator assessing the daylight availability on site considering latitude, orientation and access to direct sunlight. Sun-drenched rooms are one of the most important purchasing criteria for consumers. Access to direct sunlight in dwelling units can be evaluated by parameters such as sun hours per day especially in wintertime (at low positions of the sun). By this means, criteria like "views out" and "direct sky light" are automatically fulfilled.

As for northern latitudes the optimization potential for winter sun is limited, it is recommended to define regional benchmarks adapted to country-specific conditions.

Glare control (for balanced luminance distribution in the visual field) is of greater significance for office buildings, rooms with workstations, schools, etc. and need not generally to be integrated in an indicator-catalogue tailored for residential buildings (apart from mixed use or southern European countries with higher solar radiation).

Lighting control is not considered to be an important indicator for residential buildings.

<u>Construction Site Management</u>

Construction site activities are responsible for environmental impacts especially at a local level (e.g. soil erosion, soil contamination, loss of biodiversity, air pollution, waste) and nuisances such as dust and noise (caused by traffic from and to the building site, construction machines, etc.).

The analysis of different building assessment systems shows two different approaches in defining criteria to minimise these effects:

- Process-oriented ratings (i. e. existence of Quality Management Systems, experience of designers in waste reduction, implementation of Environmental Management Systems or other certification schemes by constructors). These criteria aim at a continuous improvement of processes on the construction site, but do not guarantee the fulfilment of definite objectives.

- Target-oriented ratings: require specific measures to be set on construction site and provide detailed information to achieve defined target values or levels of quality.

The authors recommend preferring target values which allow clear benchmarks and comparison of rating results achieved in different projects.

Chemicals in Building Materials and Indoor Air

Neither REACH nor the Construction Products Directive nor any other European Legislation or Standardisation are sufficient instruments to guarantee the absence of hazardous ingredients in or emissions from building materials into indoor air.

The existing building assessment systems go beyond legislation but cover the use of chemicals in a very different manner: in a range from the ban of certain chemicals or categories of chemicals to strict limits for VOC-emissions of building materials.

The current harmonisation work on testing methods concerning the VOC-emissions from building materials and the mandatory labelling in Germany and France will have a positive effect on the availability of tested products. While it is still cumbersome to prescribe low-emitting products because of missing data, it will become much easier in some years. Until harmonised horizontal testing methods are available the ECA-EAQ scheme could be used as a basis for assessment.

In order to allow different target values set e.g. in mandatory versus voluntary labelling systems, a shared data handling and reporting tool as suggested by ECA-IAQ (2010) is of importance for communicating emissions to indoor air from building products.

For the assessment of chemicals in building products the authors differentiate between a minimum level and excellent level for substances/groups of substances to be avoided or even banned.

END.

APPENDIX – About ANEC

ANEC is the European consumer voice in standardisation, defending consumer interests in the processes of technical standardisation and conformity assessment as well as related legislation and public policies. ANEC was established in 1995 as an international non-profit association under Belgian law and represents consumer organisations from 31 European countries. ANEC is funded by the European Union and EFTA, with national consumer organisations contributing in kind. Its Secretariat is based in Brussels.