

International Green Building Conference & Exhibition – Environmental labelling of buildings and construction products: lessons for South Africa from global trends

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Abstract

Environmental labelling enables consumers to use their purchasing choices to protect the environment. The concluding declarations of the first three Earth Summits however caution that to truly serve this purpose, environmental labelling should be informed by life cycle considerations. Environmental labelling in construction takes the form of whole building rating systems and construction product certification programmes. The First Generation building rating systems have to date experienced much success in certifying green buildings. However, their future is at risk because the prescriptive standards they rely on need updating to address a number of shortcomings and limitations. These include the inability to assess the absolute environmental burdens of a building. The voluntary, market-based approach also prevents green buildings from garnering the critical mass necessary to contribute to national sustainable development targets. Second Generation building rating systems are leveraging LCA principles to move from prescriptive towards performance-based standards. This new approach responds to and complements emerging policy trends towards “green” building regulations and mandatory energy labelling of buildings. Construction product certification aims to minimise the outdoor environmental effects of buildings; and create a healthier indoor environment for building occupants. Under regulatory pressure, both the ISO 14020 and IAQ performance certification programmes are shifting from voluntary towards mandatory, minimum requirement. Post-1994 environmental policy presupposes that South African industry will leverage voluntary, LCA-based environmental labelling standards to assume greater responsibility for environmental protection. However, the construction industry response is largely rooted in prescriptive standards. As a performance-based standard which will soon be subject to mandatory implementation, SANS 204 Energy Efficiency in Buildings does not constitute a sufficient basis for sustainable building. Other, enforceable measures would be needed to consolidate the gains already made – these should be informed by life cycle considerations and must include environmental labelling regulations, sustainable building standards, IAQ performance standards and a construction-specific chemicals policy.

Introduction

Environmental labelling serves as a means for producers¹ to communicate the environmental consequences of consumption choices to consumers² so as to encourage the demand for environmentally sound products³. Using environmental labelling in this way to protect the environment was endorsed by all three previous Earth Summits as indispensable to sustainable development.

The *Declaration of the United Nations Conference on the Human Environment* (1972) points out that defending and improving the human environment for the benefit of present and future generations will require fuller knowledge of the environmental consequences of human actions; and the participation of all of mankind⁴ (consumers). *Agenda 21* (1992) urges government, business and industry to develop consumer legislation and environmental labelling in consideration of the full life cycle environmental consequences of products⁵. To accelerate the global shift towards sustainable development, the *Johannesburg Plan of Implementation* (JPOI) of the 2002 World Summit on Sustainable Development (WSSD) calls for a number of critical actions. These include the development of tools and policies founded on “Life-Cycle Analysis”; and the adoption, where appropriate, of environmental labelling to disseminate information on sustainable consumption, in particular, the human health and safety aspects⁶.

Environmental labelling has evolved at two distinctive levels in the construction industry sector – whole building environmental assessment and rating systems and construction product certification programmes. This paper reviews the international state-of-the-art and suggests ways in which South African could benefit from the lessons learnt. The role of the LCA concept in the development of internationally recognised environmental labelling standards is briefly presented. International and South African trends in the environmental labelling of buildings and construction products are identified and analysed to highlight the opportunities for South Africa to learn from current best practices.

The role of LCA in environmental labelling

The Life Cycle Assessment (LCA) concept, previously known as Life Cycle Analysis, is a science-based tool for measuring the environmental performance of a product over its full life cycle (Figure 1). Where the extent of the inquiry ends with transportation of the product to the point of disposal, it is a cradle-to-grave analysis. If it includes the recycling potential, it is deemed a cradle-to-cradle analysis. Environmental performance is measured in terms of the potential resource inputs (energy, materials, land and water) and environmental emissions (to air, land and water) that can result from the manufacture, use and disposal of a product.

Environmental labels and claims such as “recyclable” and “low energy” emerged in the 1980s in response to the growing global concern for environmental protection and conservation. To reduce confusion in the market place, the International Organisation for Standardisation (ISO) developed its 14020 series of standards, *Environmental Labels and Declarations* for which LCA is the main analysis method. In the context of the built environment, LCA is suitable for measuring the *potential*

¹ Industry and business

² Used broadly to denote social actors, e.g. government, organisations or the individual

³ Used broadly – includes buildings and services

⁴ Paragraphs 6 and 7

⁵ Section 1, Chapter 4: Changing consumption patterns, paragraphs 4.2-4.22

⁶ Chapter III: Changing unsustainable patterns of consumption and production, paragraphs 15(a), 15(c), 15(d) and 15(e)

environmental effects of a product on the outdoor environment, but not the *environmental risks* associated with the use of that product in the indoor environment. Therefore, appropriate indoor air quality (IAQ) performance assessment standards are used in conjunction with the LCA-based standards when assessing the environmental performance of products destined for indoor use.

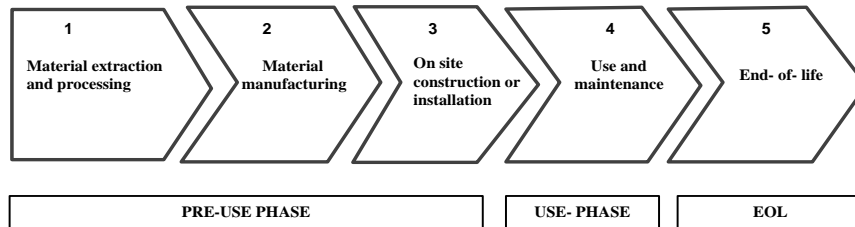


Figure 1: Generic Lifecycle Stages of Construction Product

Environmental labelling of buildings

1.1 Building rating systems

The aim of building environmental assessment and rating systems is to foster sustainable construction which is the creation and operation of a healthy built environment based on ecological principles and resource efficiency [1]. A large number of these tools have been launched around the world in the past two decades. They include the UK's BREEAM, 1991 (Building Research Establishment Environmental Assessment Method), the USA's LEED, 1997 (Leadership in Energy and Environmental Design) and Australia's Green Star, 2002. Building rating systems develop voluntary standards, linked to credits, against which the environmental performance of candidate buildings can be assessed. Typically, both indoor/outdoor environmental aspects are assessed. The notion of rating⁷ is used together with the assessment as a logical outcome. For example BREEAM (UK) applies a rating scale ranging from "Excellent" to "Fair".

There are two categories of building rating systems. The first generation building rating systems measure environmental performance improvement relative to current building practice. This approach is subject to a number of shortcomings and limitations that constrain their future effectiveness as frameworks for sustainable construction. Performance assessments do not consider all three dimensions of sustainability. Even if the assessment is kept within the existing confines of environmental sustainability, performance would need to be assessed against the *absolute* impact or burden that a building system exerts on the environment. However, the assessment is based on qualitative criteria; and not all life cycle steps are considered. Furthermore, their voluntary nature has created a niche market for "green" buildings whereas building "green" needs to be mainstreamed if the building sector is to truly contribute to sustainable development.

By contrast, second generation building rating systems use a technical scale to assess environmental performance. The second generation building rating systems are also starting to address the aspects of sustainable building which were previously overlooked or poorly defined by their first generation counterparts:

- The Sustainable Building Alliance (SB Alliance) promotes internationally shared methods of building performance assessment and rating [2]. From 2009, SB Alliance members started to gradually phase a core set of six quantitative performance indicators (figure 2) into new versions of their building rating tools. The additional indicators under discussion include economic

⁷ Rating is used interchangeably with labelling

performance. The harmonised methodology takes the entire building life cycle into consideration; and factors in the potential for deconstruction in lieu of demolition in the End-of-life (EOL) Phase. SB Alliance members include the United States Green Building Council (USGBC); and the British Research Establishment (BRE), developers of LEED and BREEAM respectively.

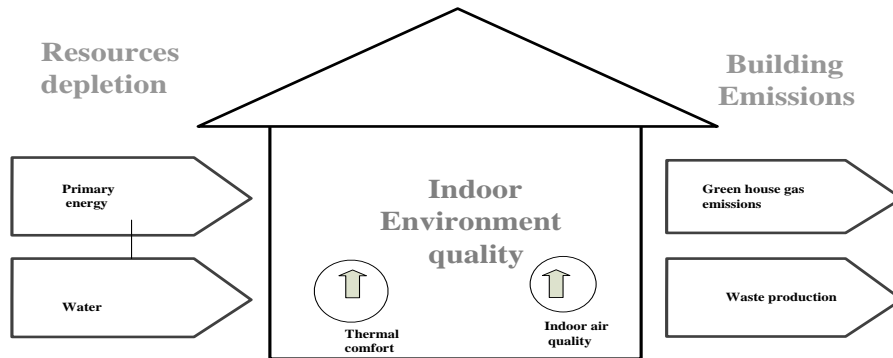


Figure 2: Six Indicators of sustainability, adapted from SBA 2009

- In 2004, the European Commission (EC) initiated a project to develop harmonised, horizontal⁸ European standards for the environmental assessment of buildings and construction products. When regulating, EU Member States are required to prioritise the harmonised standards over any existing green standard. The harmonised standards are founded on LCA principles [3]. There is a process underway to develop a broad range of environmental, economic and social performance indicators for the harmonised standards.
- The International Green Construction Code (IgCC) is set to mainstream “green” building in the United States (US). The historic model code stipulates enforceable minimum “green” requirements to be met by all buildings in respect of site development, materials use, energy and water efficiency, indoor air quality (IAQ) and commissioning [4].

1.2 Energy labelling of buildings

Programmes for the energy labelling of buildings, which rely on quantitative data, are emerging side by side with, and complementing the improvements to performance assessment made possible by the second generation building rating systems. While the developers do not present them as rating tools, energy labelling programmes give the sector which uses 40% of the world’s primary energy and contributes 33% of greenhouse gas (GHG) emissions a means to measure, report and verify reductions in a consistent and comparable way. They are increasingly being used to support energy policy development and industry initiatives around the world:

- The Common Carbon Metric (CCM) for buildings measures energy consumption and reports GHG emissions from the Use Phase of existing buildings. The reporting is done in carbon dioxide equivalents (kgCO₂e) emitted per square metre per year in consideration of the building type and climatic region [5].
- The Energy Performance of Buildings Directive (EPBD) was adopted in 2005 to contribute to Europe’s Kyoto commitment, security of energy supply and competitiveness. The EPBD requires EU Member States to implement mandatory energy certification of all building types at the time of construction, sale or rent [6]. As at 2009, the majority of EU Member States had EPBD certification schemes in place.

⁸ Harmonised means applicable to all building types and construction products

- ASHRAE's⁹ Building Energy Quotient (bEQ) programme primarily supports mandatory disclosure of building energy performance, an emerging policy already implemented in nine American States [7]. It is applicable to both new and existing buildings including residential buildings higher than three storeys.

Construction product certification programmes

The purpose of construction product certification is to minimise the outdoor environmental effects of buildings and create a healthier indoor environment for building occupants. Two principal types of construction product certification programmes have therefore emerged: ISO 14020 certification programmes and Indoor Air Quality (IAQ) certification programmes.

1.3 ISO 14020 certification programmes

ISO 14020: 1999, *Environmental Labels and Declarations* is a three-in-one standard comprising ISO 14021: 1999, *Type II Self-declared Environmental Claims*; ISO 14024: 1999, *Type I Environmental Labelling*; and ISO 14025: 2006, *Type III Environmental Declarations*. These three standards are supported by a fourth standard: ISO 14020: 2000, *General Principles*. The overall objective of this series of standards, internationally accepted as best practice on environmental labelling is to [8]:

- Communication verifiable and accurate information - which is not misleading in anyway - on the environmental aspects of products and services;
- Encourage the demand and supply of those products and services that cause less stress on the environment: and
- Stimulate the potential for market-driven continuous environmental improvement.

The ISO 14021: 1999 standard for Type II labelling is intended to be used for first-party claims. Type II labels are typically marketed on the basis of only one environmental attribute, for example, energy efficiency, with a risk that possibly adverse environmental impacts are not made known to the consumer. For ease of verification, the methodology underpinning a Type II label needs to be scientifically sound [9]. There is however no requirement to use LCA in any of its forms, or involve stakeholders in the criteria setting, product assessment and verification and certification protocols. This label type is the most frequently dogged by concerns of “green washing”¹⁰ – therefore manufacturers are increasingly turning to second¹¹ or third¹² party certification to boost the public image of Type II labelled products.

The ISO 14024: 1999 standard for Type I labelling is commonly known as an ecolabel. It identifies the overall environmental preference of a product within a specific product category. For example, an ecolabel serves to distinguish between an environmentally preferable or “green” carpet, and a conventional carpet, but not other floor coverings. The labelling criteria need to be selected in consideration of the life cycle of the product in question, such as its function, life cycle stages¹³ and embodied effects¹⁴. The standard development process is subject to thorough consultation and participation of stakeholders [10]. An ecolabel is awarded by an impartial third-party who operates an

⁹ American Society of Heating, Refrigeration and Air-Conditioning Engineers

¹⁰ To “green-wash” means to mislead consumers regarding the environmental practices of a company or the environmental benefits of a product or service (available at <http://sinsofgreenwashing.org/>)

¹¹ Second-party certification implies that an interest group that stands to gain in some way from the increased market share of the product, has critical involvement in the certification process, either through administration of the programme, verification of claims or creation of standards and methods

¹² Third-party certification refers to certification programmes in which all aspects of the programme are administered by an independent body whose only ties to product manufacturers are fees for assessment services.

¹³ Extraction of raw materials, manufacture, distribution, use and disposal

¹⁴ Input of key resource (energy, materials, water), release of pollutants (to air, water and soil) and contribution to environmental problems (human and ecological health and natural resource depletion)

ecolabelling programme¹⁵ which sanctions the use of the label. The Global Ecolabelling Network (GEN) currently has twenty-seven members operating ecolabelling programmes around the world. The GEN members who carry construction product labels include the Nordic Swan (Nordic countries), Blue Angel (Germany) and Good Environmental Choice (Australia).

The ISO 14025: 2006 standard for Type III labelling is commonly known as an Environmental Product Declaration (EPD). As a declaration, an EPD simply discloses the environmental performance of products and expects the consumer to judge which product is best in an environmental sense. An EPD needs to be developed in conformance with Product Category Rules (PCRs), that is, highly standardised procedures for conducting quantitative LCA¹⁶. The development process of an EPD entails thorough stakeholder consultation and participation [11]. An EPD is certified by a third-party, resulting in the issuing of a report card providing detailed product environmental information, akin to the nutritional label on food products. Internationally, EPD programmes are represented by the Global Environmental Declarations Network (GEDnet).

Ongoing developments which point to an increasing role for the EPDs standard as a fundamental tool for sustainable building include:

- A more rapid development of building sector-specific EPD (Type III) programmes as compared to the limited number of cross-sectoral Type I programmes which carry building product labels. At least ten of such programmes have been launched in Europe and North America since the late 1990s [12].
- An EPD standard for building products, which is currently under development, and is likely to become a US national standard, subordinating existing Types I and II labels [13].
- Development of a harmonised, European EPD standard for construction products to be published in 2012 [14]
- Obligatory EPDs for construction products as required under France's *Le Grenelle de L'Environnement* which came into effect in early 2011 [15].

1.4 Indoor air quality performance labelling programmes

A growing body of scientific evidence suggests that the air within buildings can be more seriously polluted than the outdoor air [16] The key chemicals of concern are Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) used in the manufacture of a broad range of construction products found in the indoor environment. The construction products which occupy large surface areas – floors, walls and ceilings represent the most important potential exposure in respect of human health [17]. The purpose of indoor air quality (IAQ) performance labelling is to foster the development and use of low-emitting construction products which have been shown to improve IAQ without a need to increase ventilation rates. Labelling is preceded by the development of emissions standards which meet or exceed nationally regulated exposure limits to the chemicals of concern. Certification results in the disclosure of environmental performance without claims of environmental superiority. IAQ labels are characterised by statements such as “very low emissions PLUS” and “Formaldehyde free”.

A major challenge for more widespread use of IAQ performance labelling to enhance indoor environmental quality is that currently, most nations do not have the regulations to limit or prevent

¹⁵ Programme and scheme are used interchangeably in the literature

¹⁶ The LCA behind an EPD must comply with the ISO 14040 Series of standards: *Environmental Management – Life Cycle Assessment*

exposure to indoor air contaminants. There are however emerging regulatory activities which hold promise for the future of IAQ performance labelling of construction products:

- The European Union's Construction Product Directive (CPD) and Construction Product Regulation (CPR) both require that no construction product should cause harm to occupants of buildings. To satisfy this requirement, the EC is developing harmonised test standards for the emissions of regulated dangerous substances into indoor air from construction products and furniture [18].
- EU Member States are taking action to meet the requirements of the CPD and CPR. A German standard for mandatory testing of VOC emissions from floor coverings and their adhesives has been in use since 2004 [17]. In January 2012, France published mandatory labelling requirements for construction products installed indoors [19].
- In February 2011, The European REACH¹⁷ policy imposed a ban on five chemicals used in the formulation of construction products. The ban impacts on the supply chains of some common construction products including PVC, foam insulation, carpet backing, adhesives and composite wood products [20].
- The Building Standards Law of Japan requires mandatory testing of all construction materials against a standard for emissions rates of VOCs into the indoor environment [17]. The Japanese standard currently covers construction products such as building boards, floor coverings, adhesives and decorative paint.

Status of environmental labelling in the South African construction sector

The use of environmental labelling as an instrument for sustainable development is not new in South Africa. The Constitution, Act 108 of 1996 makes provision for an Environmental Right¹⁸; and also guarantees access to the environmental information¹⁹ required to protect that right. *The White Paper on environmental management policy for South Africa (1998)* makes specific reference to ecolabelling²⁰ as a means for industry to take greater responsibility for environmental protection²¹; and for the consumer public to gain access to environmental information²². This policy position has been transcribed into key items of consumer and environmental legislation. However, in practice, the degree of environmental awareness of the consumers in a particular country will determine whether a "green" construction market is initiated and sustained. In the South Africa context, energy security is the key environmental issue serving to create the necessary momentum for the demand and supply of environmentally sound buildings and construction products.

The notion of rating and certifying South African buildings as "green" first came into prominence when the Green Building Council of South Africa (GBCSA) launched its first Green Star SA tool in November 2008. To date, four rating tools for office, retail, multi unit residential and public and education buildings have been published. As building rating system, Green Star SA awards credits for the choice of environmentally sound construction products but cannot in any way test, verify or certify the environmental performance of such products.

¹⁷ Registration, Evaluation and Authorisation of Chemicals (REACH) is the regulation that governs the management of chemicals in the European Union

¹⁸ Section 24 of the Constitutional Bill of Rights

¹⁹ Section 32 of the Constitutional Bill of Rights

²⁰ Government Gazette dated 15 May 1998 - Chapter 5: Governance – indirect measures, page 54.

²¹ Government Gazette dated 15 May 1998 – Chapter 4: Strategic goals and objectives, page 31.

²² Government Gazette dated 15 May 1998 – Chapter 3: Principles, page 24.

A number of environmental standards and initiatives have been developed or are emerging in response to the “green” marketing opportunity created by Green Star SA:

- EcoStandard South Africa aims to provide third-party, voluntary environmental certification services for construction products. The basis for environmental performance assessment and labelling will be EcoProduct, a tool founded on the Type I ecolabel standard. EcoStandard launched its construction product certification programme in January 2012.
- SANS 204 *Energy Efficiency in Buildings*, published 2011, is a national standard for energy labelling of buildings. It specifies minimum energy usage requirements to be met by all building types. It also requires an energy audit to be conducted twelve months after completion of a new building as proof of compliance with the benchmark set for the building type. At present, the use of SANS 204 is voluntary. However, a process is underway to translate this standard into mandatory provisions under the National Building Regulations (NBR).
- The goal of the South African National Ecolabelling Scheme (SANES), funded by government, is to create an enabling environment for industry to use voluntary ecolabelling as a self-regulatory measure. SANES provides third-party certification of environmental claims in accordance with the Type I ecolabel standard. There is currently a process underway to develop SANES ecolabels for construction products.

Green marketing is well established and growing in the South African construction material manufacturing sector. About 43% of the major construction material groups already feature a “green” brand. There is however a strong trend in ISO Type II Self-declared claims. Furthermore, about 50% of the major construction material groups are interior finishing products and should therefore be labelled with IAQ performance in mind [21]. However, with the exception of one floor covering brand, all other “green” claims in respect of interior finishes are concerned with energy efficiency and GHG emissions, both of which are outdoor environmental effects.

Lessons learnt

Environmental labelling of products enables consumers to use their purchasing choices to protect the environment. The concluding declarations of the first three Earth Summits however caution that to truly serve this purpose, environmental labelling should be informed by the full life cycle environmental consequences of the products.

Environmental labelling has evolved at two distinctive levels in the construction industry sector – whole building rating systems and construction product certification programmes. The first generation building rating systems have played a leading role in the green building movement. However, they rely on prescriptive standards that are subject to a number of deficiencies. For example, the entire relationship between a building and the environment cannot be assessed; and criteria for assessing the economic and social aspects of sustainability are lacking. Furthermore, two decades of voluntary rating and certification has failed to mainstream green building. The Second generation building rating systems, which are still evolving, are beginning to address these concerns. They are leveraging the life cycle assessment concept to shift the building sector’s approach from sustainable construction to sustainable building. Mounting policy pressure is also driving the parallel development of “green” building regulations and mandatory energy labelling programmes for buildings.

Two main types of construction product certification programmes have emerged. Of the three environmental labelling choices made possible by ISO 14020, Type III EPD, which has the closest link to quantitative LCA, is increasingly forming the basis for building-related environmental standards and policy. To protect public health and safety, mandatory IAQ labelling of construction products installed indoors is an established practice in many EU member states and Japan. A major challenge

for international adoption of this approach is that most nations lack the human health effects data; and do not have the regulations to limit or prevent exposure to indoor air contaminants.

In the South African context, construction industry's efforts to develop voluntary environmental standards for buildings and construction products respond to the environmental policy expectation that business and industry will take greater environmental responsibility through self-regulation. However, the international state-of-the-art suggests that at present, a more mandatory approach would be necessary to garner the critical mass which meets such national policy expectations.

Bearing in mind the key components of the emerging South African framework for environmental labelling, the following complementary measures, informed by a life cycle perspective, would at a minimum be needed to consolidate the gains already made, namely, environmental labelling regulations, sustainable building standards, IAQ performance standards and a construction-specific chemicals policy.

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