

Life-cycle Assessment – The First Step Toward Sustainability

a report by

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Have you ever stopped to consider what exactly it is that you do? As the title ‘facility manager’ suggests, you manage the facility. Many within the industry see their responsibilities as those that ensure their building or buildings run properly and, while that is true, it is just the tip of the iceberg. As facility managers you have a direct impact on the health and wellbeing of every single person who walks through your front door. The decisions you make and the products you buy can improve or degrade the long-term health of your building and its occupants. They can also have a profound impact on the life-cycle costs of the building.

How do you select which products to buy and not to buy? When you consider that almost everyone within the walls of your facility is there for more than one-third of the day and that nearly 75% of corporate expenditure is on employee salaries and benefits, only then do you begin to fully understand the enormous impact that the decisions you make have on the financial success of your company. You can increase productivity, reduce absenteeism and improve the overall health of your building’s occupants just by making the right decisions every day. The big question is: where do you start?

Green products and even entire green buildings have slowly made their way into public awareness. Europe has been ahead of the curve in this arena and international organisations such as Forbo have benefited from it, but what makes a product green? Are there specific guidelines or standards? The answer is ‘not yet’ – they are coming soon, but not soon enough. There are several products available making claims that, while true, may be misleading.

This practice has led to the term ‘greenwash’. Greenwash is the tide of unsubstantiated green claims that are made by companies and brands that do little more than confuse their customers. It is the most dangerous obstacle that you as the facility manager will need to overcome in order to make the best informed decisions.

Sustainable products are those products providing environmental, social and economic benefits while protecting public health, welfare and environment over their full commercial cycle, from the extraction of raw materials to final disposition.

Society is becoming increasingly aware of the need for ‘sustainable development’ – a term first used in 1987 by the United Nations-chartered Brundtland Commission on Environment and Development.

- Agenda 21 was developed and approved by the United Nations Conferences on the Environment held in Stockholm in 1972, in Rio de Janeiro in 1992 and in Kyoto, Japan in 1997;
- special conferences on global warming were held in 2000 in The Hague and in 2001 in Berlin;
- ISO-14001 environmental management systems have been implemented;
- local government certifications of production facilities have been introduced;
- benchmarking by independent, peer-reviewed life-cycle assessment (LCA) studies;
- independent environmental certifications; and
- the recommendations of experts.

One of the truest measures of environmental performance is LCA, which helps to:

- establish leadership in a demanding, emerging framework for environmental policy;
- quantify environmental input to engineering, materials and product innovations;
- explore new advantages from evolving global environmental expectations; and
- create parallel information to cost of ownership analyses.

There are a number of reasons to initiate an LCA:

- response to sustainability metrics (rating or labelling systems);
- engineering process and product improvements;
- database; and
- positive, technical profile when meeting customer needs.

Life-cycle is a tool or technology such as six sigma or statistical quality control. LCAs are increasingly used to evaluate a variety of product, process and corporate issues in which environmental improvements are being made, often referred to as an advanced environmental framework and including:

- green purchasing;
- beneficial reuse options, both internally and externally;
- international labelling or US rating systems;
- demand for recyclable content from consumers;
- corporate sustainability policies;
- CO₂ (or other emissions) trading credits;
- challenges of landfill shortages over the longterm; and
- European and Japanese government initiatives to require full life-cycle responsibilities.

As in many organisations, including companies within the Alliance for Sustainable Built Environments, environmental responsibility is a core value of Forbo and has been for decades. We believe that being environmentally responsible is both the right thing to do as a corporate citizen and the right thing to do for our business. We do not look at investments in improving our environmental performance as a 'cost of doing business', but rather as an 'investment for our future'.

We commit ourselves to overall standards and targets agreed upon with the government, but are free to determine how best to achieve them. The results of our efforts are published annually in a corporate environmental report. These reports are overviews of our environmental impact.

The environmental impact of floor coverings can best be measured by carrying out an LCA. LCAs chart the environmental impacts of a product 'from cradle to grave' with equal weight given to all relevant issues. LCAs encompass all elements and environmental impacts that are legitimately measurable. Process elements include:

- raw material extraction and transport;
- pre-processing;
- production;
- distribution;
- installation;
- use;
- maintenance; and
- recycling and disposal.

We believe that an independent peer-reviewed LCA is the best benchmark for measuring attained goals and pinpointing focal areas to set new priorities. The science of performing LCAs has continually evolved

and we always integrate the most recent technology and knowledge into the assessment.

The first steps of any analysis are to define the system boundaries, the functional unit (this is your unit of comparison), data requirements and alternative products or services you may want to compare:

- What key assumptions are you making?
- What are the likely limitations?
- What benefits are anticipated?
- How will the results be used?
- Who will have access to the results?
- If you don't come up with the 'right' answer, what will you do?

This can be difficult, as it may be hard to get good, reliable data. You therefore need to carry out data quality assessments. It may be hard to get the information that you need from your competitors if you want to perform comparative studies.

Data Gaps

No process data were available for the following processes:

- the production and transportation of pesticides (use and emission of pesticides is included);
- the production and transportation of some raw materials needed for maintenance products (additives, thickeners and solvents) and almost all ingredients for those materials;
- the production and transportation of some raw materials needed for the production of materials used during laying (adhesives and materials used to seal the seams of professionally used linoleum floors); and
- the production and transportation of a catalyst needed in the 'esterification of tall oil'.

Results of life-cycle inventories are only as good as the data. Decide on the relative importance of environmental burdens and resource depletion. Environmental impacts include:

- global warming;
- embodied energy;
- eutrophication;
- natural resource depletion;
- solid waste;
- indoor air quality;
- acidification;
- ozone depletion;
- smog formation;
- ecological toxicity; and
- human toxicity.

The cumulative effect of these factors defines the

LCA for a product. It is important to note that LCA methods are product-specific, not generic for a product category. Exclusion of any of the process elements or the impact categories eliminates the validity of the results.

In 1993, researchers compared the environmental impacts of linoleum, vinyl, wool and synthetic carpets. Thanks to the use of natural raw materials, the researchers concluded that linoleum was clearly the most environmentally compatible floor covering and linoleum's long life offers an important additional advantage. Similar findings were reported in 1995.

Natural raw materials are only the start of our strong environmental performance. State-of-the-art processes ensure that each production stage causes minimum environmental impact. On average, 12% of our total capital investments are spent on measures designed to further improve environmental performance:

- we achieve maximum waste reduction by recycling all linoleum remnants back into the production process;
- at our plant in The Netherlands we expect to

reduce the specific energy used per kilogram of product by 15% within five years;

- we use no heavy metals or any other incompatible additives, positively impacting repairability;
- all of our adhesives are 100% solvent free and meet all low volatile organic compound (VOC) requirements, optimising the environmental performance of the entire system;
- we have developed a dry maintenance system, limiting chemical use and waste water disposal;
- our approach to waste is to recycle as much as possible and to design our processes so that there is less waste to start with; anything left is burned in an energy-recycling incineration plant or added to landfill refuse sites and allowed to fully biodegrade.

LCAs help you to do your job better. They help you to identify products that will positively and directly impact on the health and wellbeing of every single person who walks through your front door. As you've seen, selecting green products with documented life-cycle assessments can not only improve occupant health and facility-wide productivity, but can also offer significant cost reductions, particularly when considering the long-term life-cycle costs of doing business. ■