

Perpetuating a positive life cycle

Deborah Singerman, December 2008.

You need consistent, credible measures over the life of the building. This includes the full supply chain, from raw materials onwards – harvest to delivery – and onto the processes and choices that go into design, construction, procurement and the operation of a building. This is before later on, or at least components, are hopefully recycled and reused rather than consigned to the grave.

But where to find information easily that you can trust among the research and brochures from manufacturers, third-party certifiers, national and international sources, case studies and all-too subjective professional anecdotes?

A new software tool, LCADesign, offers objective national environmental data with economic cost profiles. It draws on Australian environmental life cycle assessment (LCA) data from the public sector, corporate, Sydney Olympic Games databases, libraries, drawings, project and theoretical calculations, and consultations with product manufacturers. Australian content has also been audited against selected international datasets.

Users can measure and compare the environmental values and risks of materials in buildings and the cost results in real-time automated take-off from 3D CAD models. Or more precisely, building information models (BIMs) that generate and manage data over the life of a building and that, in turn, are generated by the 3D CAD.

“It is the first calculator that works directly from the building designer's model, allowing architects and engineers to optimise the best environmental outcome in real time or on the fly,” said the Hon Peter Garrett, Federal Minister for the Environment, Heritage and the Arts when he launched LCADesign at September's World Sustainable Building conference in Melbourne.

The LCADesign software has been developed over the past six years by a team led by the Co-operative Research Centre (CRC) for Construction Innovation, working with the Queensland University of Technology, Royal Melbourne Institute of Technology, Queensland Department of Public Works, CSIRO, NSW Public Works & Services and other leading research and industry partners.

“As global pressure mounts for greener buildings, this eco-efficiency tool provides the industry with vital information so design can be more ecologically and economically sustainable,” says Dr Keith Hampson, the CRC's chief executive. The automated environmental impact assessment design tool was also developed to audit and assess current and future building codes and standards and to harmonise with simpler checklists and other environmental rating tools.

LCADesign transfers data from the CAD models via Industry Foundation Classes, internationally recognised building classification and naming protocols, to the constantly updated life cycle inventory (LCI) of building products and materials. Users tag building elements such as inner and outer walls, beams, ceilings and select products and various LCI data to give them what they need.

Users can also change designs and relevant unit measurements – kilograms, mega joules, etc – quantities and dimensions, and within seconds, see how this affects inventory inputs (e.g. oil, coal, water and ores), outputs (e.g. carbon dioxide and waste), environmental impacts (carcinogens, respiratory organics, climate change and fossil fuels), damages (human health, ecosystem quality and resource depletion), energy, water and the dollar cost.

Ecoindicator 99, a widely used science-based impact assessment method for LCA, measures various environmental impacts and shows the final result in a single score. Users select what damages and impacts they want analysed from this one single ecopoint score.

"An eco-point is one person's annual environmental load," says Delwyn Jones, manager sustainability assessment at Ecquate, the start-up company drawn from LCADesign's developers to further develop, market, distribute and license LCADesign and provide teaching and technical support. Jones, a scientist, has been a member of CRC LCADesign project teams since 2001.

"Think of a tree. Inventory items are in the root, damage items in the trunk and impact items in the leaves. The single value is the apex, the metric that sets the height or the scale or the type which you can compare to others. So 110 points per metre square of net lettable area is a bigger burden than 60 points. You are going to want a small footprint."

Pressing calculate will generate profiles from different design choices, showing comparative numbers and graphs. "The innovation is in delivering users with fast, eco-profiling software that allows them to do in a day what used to be practically impossible within commercial timeframes," she says.

Like Jones, David Baggs, an architect and technical director of Ecospecifier, welcomes the software's speed, versatility and credibility. "I think it is the first time architects can really scenario-play built and fit out initiatives and have confidence that the choices are the best that can be done. It can also make it easy to get indicative cost comparisons of the scenarios," he says.

Although geared towards large commercial projects, with long-term contracts needing security of supply, LCADesign caters for projects with different emphases. "If you are building a nursery school, you're going to be interested in the human health impact," Jones says. "If you're building a hospital for flora and fauna in Kakadu state forest, you're looking at ecosystem protection, and if you're building a new power station, climate change is the issue."

LCADesign real-world examples from the CRC include a 35-year-old building analysis from Melbourne Council House showing that the recurrent replacement of a wool synthetic blend, hessian-backed 50 per cent natural, synthetic rubber air step underlay carpet over the life of the building more than offset the carbon footprint of the as-built base building.

LCADesign requires a high-end CAD version. Distribution, by license, will mainly be via the web. In Australia, the software is priced at less than \$5,000, with project licenses and licenses for students lower again. Customised products for corporate clients are likely.

Potential consumers include developers, building designers, architects, engineers, builders, manufacturers and government bodies, with building product and supply, procurement and design (expected to be the biggest segment) and facility fitout the main targets. Potential clients, taking advantage of LCADesign's IFC-based interoperability, include eco-rating vendors, supply and product assessors, and CAD and other software vendors. At the time of writing, the Green Building Council of Australia was to meet with Ecquate to learn more about the software.

Ecospecifier was the first Australian purchaser of LCADesign and is one of Ecquate's two agents. Ecquate and ecospecifier are also working together to develop and distribute LCADesign for ecospecifier, a brand-name, product-specific, LCA customised version. Ecospecifier would be the exclusive agent.

Baggs says: "Brand specific product BIMs, which will be a subset program of LCADesign, are the only way a building will be able to finesse the real impacts of the building and choose between different products at a detailed level."