



 Up-to-the-minute Green
Metal Roofing Resource!

PAC Green Info: Life Cycle Assessment

The use of an analysis of a product's impact on the environment is nothing new. The electronic and packaging industries have been doing this for over 30 years. But the use of this tool, called a Life Cycle Assessment, is relatively new to the building construction industry.

A Life Cycle Assessment of a product is typically done by analyzing the environmental impact of the product from the extraction of the raw materials all the way through the product's life cycle to eventual recycling of the product or disposal to the solid waste stream. The assessment can also be done in stages. For example, a "cradle to gate" analysis would look at the raw material extraction through some processing of that material into a deliverable feedstock out of the "gate" of the manufacturing plant. An LCA can also be performed on a product within a "gate to gate" assessment where the environmental impact is confined to the processing of the substrate from the entrance gate through the exit gate of the processing facility. In the best case scenario, a product can even be assessed for its environmental impact from "cradle to cradle" where the entire life cycle is used from raw material extraction and reusing the material as industrial nourishment so that nothing is wasted.

ISO Standards in the 14000 family address the methodology of a life cycle assessment. With any LCA, the boundary conditions, scope, and other assumptions can be used, provided they are made transparent to a viewer. Any LCA also requires that a third party or peer review take place to validate the protocol or methodology used for the LCA. Many times, an LCA is done to compare a product to other competitive products.

There are several software packages available that calculate LCA of products. One of them is the ATHENA Institute's EcoCalculator and Environmental Impact Estimator. This LCA tool is recognized by the Green Building Institute in their Green Globes program. The US Green Building Council is also reporting that they will introduce the ATHENA EcoCalculator LCA tool as an alternative path pilot project in the upcoming LEED 2009 program.

It is important to note that an LCA is not a life cycle cost analysis. An LCC is an analysis of the installed cost, maintenance and replacement costs, taking into account inflation. A Life Cycle Assessment can, however, include a cost component in the analysis.

LCA identifies the inputs and outputs for each step of a product's process or component of assembly. For example, typical steps include harvest or extraction of raw materials, processing of the raw materials, manufacturing of the product, transportation, erection, use or re-use, and recycling or waste. The environmental impacts of each step are then analyzed using established impact categories. For example, the EPA's Tool for the Reduction and Assessment of Chemical and other environmental Impacts (TRACI) is a program that identifies the following impact categories:

- Ozone Depletion
- Global Warming
- Acidification
- Cancer
- Eutrophication
- Smog Formation
- Ecotoxicity
- Fossil Fuel Use

- Land Use
- Water Use

Within each of these types of impact categories, the measureable components are then identified and analyzed for the product in question. These could be specific gases emitted, water pollutants, or waste materials. The result is an inventory of the measured environmental impacts from the entire process.

The data then needs to be weighted based on their relevance, impact, and societal issues. With that weighting in place, the calculation can then be made taking into account all inputs, criteria and the weight placed on each to determine the total environmental impact of that product's life cycle.

The metal industry is working hard to see that the proper metal roof and wall assemblies are included in the ATHENA LCA calculator tool. They are also investigating the databases and calculations that are applied by ATHENA to the assemblies for validity and accuracy. This is a widespread effort by the various metal trade associations.