



ATHENA® Impact Estimator for Buildings

In North America, the ATHENA® *Impact Estimator for Buildings* is the only software tool that evaluates whole buildings and assemblies based on internationally recognized life cycle assessment (LCA) methodology.

Using the *Estimator*, architects, engineers and others can easily assess and compare the environmental implications of industrial, institutional, commercial and residential designs—both for new buildings and major renovations. Where relevant, the software also distinguishes between owner-occupied and rental facilities.

The *Estimator* puts the environment on equal footing with other more traditional design criteria at the conceptual stage of a project. It incorporates Athena's own widely-acclaimed databases, which cover more than 90% of the structural and envelope systems typically used in residential and commercial buildings. It also simulates over 1,000 different assembly combinations and is capable of modeling 95% of the building stock in North America.

Life cycle assessment (LCA) is widely accepted as one of the best ways to compare the environmental impacts of materials, components and services. In the case of buildings, material manufacturing is the most important contributor of emissions to water and land, including toxic releases. For example, one study conducted in the US found that the construction industry produces more carbon dioxide emissions through the manufacture, transport and use of materials than any other sector. Another study, this time done in Canada, determined that the embodied energy in office buildings can be equivalent to more than 20 years of operating energy use, and that material selection or other design decisions can significantly reduce embodied energy. LCA is a way to document, understand and reduce such critical environmental effects.

The *Estimator* takes into account the environmental impacts of:

- Material manufacturing, including resource extraction and recycled content
- Related transportation
- On-site construction
- Regional variation in energy use, transportation and other factors
- Building type and assumed lifespan
- Maintenance, repair and replacement effects
- Demolition and disposal
- Operating energy emissions and pre-combustion effects

Although the *Estimator* doesn't include an operating energy simulation capability, it does allow users to enter the results of a simulation in order to compute the fuel cycle burdens and factor them into the overall results.

Complex Results in a User-friendly Format

Although LCA is a complex process, the *Estimator* has been designed for ease of use.

The first step is to enter required information such as geographic location (the system allows users to select from specific Canadian and US regions as well as a US national average), building life and occupancy/type, and, if desired, optional information such as annual operating energy values.

Pre-set dialogue boxes prompt users to describe the different assemblies—by requesting the width, span and live load of a floor assembly, for example—that together form a conceptual building design. The *Estimator* then instantly provides cradle-to-grave implications in terms of:

- Embodied primary energy use
- Global warming potential



- Solid waste emissions
- Pollutants to air
- Pollutants to water
- Weighted resource use

Simplified Tracking

As design data is entered for each assembly, the software builds a “tree” of information so that each individual assembly can be identified and viewed easily. The tree can also display, in value or percentage terms, the impact of each assembly in terms of a selected measure such as global warming potential. This allows users to track the effects of each assembly as it’s added, or to quickly pinpoint which one is causing a particular environmental effect.

Detailed LCA Results

Results from an individual design can be seen in summary tables and graphs by assembly group and life cycle stage. Detailed tables and graphs show individual energy use by type or form of energy, and emissions by individual substance.

Flexible Comparison of Alternate Building Designs

Accommodating up to five comparisons at once, the *Estimator* allows users to change the design, substitute materials, and make side-by-side comparisons for any one or all of the environmental impact indicators. It also lets users compare similar projects with different floor areas on a unit floor area basis.

System Requirements

The *Estimator* is a Visual C++ application. It is PC-compatible but can also be run on a Macintosh system with appropriate Windows capability.

Try the Estimator

To see how user-friendly the software really is, visit the Athena Web site at www.athenaSMI.ca and download the free *Estimator* demo.

To order a complete version, call 1-866-520-6792 or download the order form from the Athena Web site.

Also available is a companion CD featuring all of Athena’s database reports. In addition to its LCA databases, the Institute maintains databases for energy use and related air emissions for on-site construction of a building’s assemblies, for maintenance, repair and replacement effects through its operating life, and for demolition and disposal.

Note: The Estimator is not an engineering design tool. It is a tool that allows users to express a design in simple terms in order to assess the environmental implications of their choices.



The Athena Institute is a non-profit organization dedicated to the sustainability of the built environment—a goal that can only be achieved by meeting the building community’s need for better information and tools. Through offices in Canada and the United States, the Institute furthers the use and science of LCA through groundbreaking software, world class databases and customized consulting services, and by working collaboratively with the international research community.

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