Athena Institute

ATHENA® Impact Estimator for Buildings

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

Using the *Impact 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 *Impact Estimator* puts the environment on equal footing with other more traditional design criteria at the conceptual stage of a project. It is capable of modeling 95% of the building stock in North America, using the best available data.

The *Impact 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 lifespan
- Maintenance and replacement effects
- Demolition and disposal

Although the *Impact 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, including pre-combustion effects, and factors them into the overall results.

Complex Results in a User-friendly Format

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

The first step is to enter required information such as geographic location (the user selects the most representative North American city), building life and occupancy/type, and, if desired, annual operating energy values by energy form.

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 *Impact Estimator* then instantly provides cradle-to-grave implications in terms of:

- Primary Energy Consumption
- Acidification Potential
- Global Warming Potential
- Human Health Respiratory Effects Potential
- Ozone Depletion Potential
- Photochemical Smog Potential
- Eutrophication Potential
- Weighted Raw Resource Use

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. LCA is a way to document, understand and reduce critical environmental effects.



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, as a value or percentage, 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 what 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 multiple comparisons at once, the *Impact 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 *Impact Estimator* is a Visual C# (C-Sharp) application. It is PC-compatible but can also be run on a Mac system with appropriate Windows capability.

'Inner Workings' of the Software

Provided on our website in the interests of transparency, the Inner Workings document presents an overview of the *Impact Estimator*, illustrating what it does and how it does it. The software's embedded databases are also explained, highlighting their use within the tool. View or download the document at http://www.athenasmi.org/tools/impactEstimator/innerWorkings.html.

Free Trial Version

Morrison Hershfield has collaborated with the Athena Institute in the development of Version 4 of the *Impact Estimator for Buildings*, and is also the software distributor. To download a free trial copy of the *Impact Estimator* or to order the full version, please visit the following url: http://www.morrisonhershfield.com/sustainability/OurPartnerAthena.

Note: The Impact 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.

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for buildings

The Athena Institute is a non-profit organization dedicated to 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, worldclass databases and customized consulting services, and by working collaboratively with the international research community.

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