

# BUILDING ENERGY TOOLS DIRECTORY

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## ABSTRACT

A directory of building energy software tools is now available on the web. The directory contains information on more than 100 tools ranging from research software to commercial products with thousands of users. The common thread for all the software is improving energy efficiency or incorporating renewable energy concepts in buildings.

## INTRODUCTION

The U.S. Department of Energy (DOE) has established a directory of building-related energy software tools on the web:

[www.eren.doe.gov/buildings/tools\\_directory/](http://www.eren.doe.gov/buildings/tools_directory/)

The directory provides information on more than 100 tools—from research grade software to commercial products with thousands of users. The common theme throughout the directory is providing information for sustainable design, improving energy efficiency or incorporating renewable energy concepts in buildings. The directory is intended to be an impartial clearinghouse—providing consistent information about a broad variety of building software available worldwide. We continue to expand the directory and welcome suggestions.

Many DOE buildings research programs develop software tools to help researchers, designers, architects, engineers, builders, code officials, and others involved in the building life cycle to evaluate and rank potential energy-efficiency technologies and renewable energy strategies in new or existing buildings. The original directory, in printed form, was intended to provide information to our customers about the range of tools available from DOE. Now the directory provides information on a broad range of software from a variety of sources throughout the world.

## STRUCTURE OF THE DIRECTORY

The energy tools in this directory include databases, spreadsheets, component and systems analyses, and

whole-building simulation programs. For each tool in the directory, a short description is provided along with information about expertise required, users, audience, input, output, computer platforms, programming language, strengths, weaknesses, technical contact, availability and cost.

The directory is organized in four major categories with subcategories:

- **Whole-Building Analysis** (Energy Simulation, Load Calculation, Renewable Energy, Retrofit Analysis)
- **Codes and Standards**
- **Materials, Components, Equipment, and Systems** (Envelope Systems, HVAC Equipment and Systems, Lighting Systems)
- **Other Applications** (Atmospheric Pollution, Energy Economics, Indoor Air Quality, Multibuilding Facilities, Solar/Climate Analysis, Utility Evaluation, Ventilation/Airflow, Water Conservation, Miscellaneous Applications)

When a user clicks on a category, a list of tools appears along with descriptive information for each such as applicability to building life-cycle phase, building type, system, equipment, or other important capabilities. Acronyms not defined in the tool descriptions are listed separately.

## EXAMPLE

An example from the directory for the BLAST simulation program (BSO 1992) is shown below. If you have recommendations for software that should be listed in the directory, please contact the author.

## REFERENCES

BLAST Support Office. 1992. *BLAST 3.0 Users Manual*. Urbana-Champaign, Illinois: BLAST Support Office, Department of Mechanical and Industrial Engineering, University of Illinois.

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# BLAST



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Performs hourly simulations of buildings, air handling systems and central plant equipment in order to provide mechanical, energy and architectural engineers with accurate estimates of a building's energy needs. The zone models of BLAST (Building Loads Analysis and System Thermodynamics), which are based on the fundamental heat balance method, are the industry standard for heating and cooling load calculations. BLAST output may be utilized in conjunction with the LCCID (Life Cycle Cost in Design) program to perform an economic analysis of the building/system/plant design.

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**Expertise Required:** High level of computer literacy not required; engineering background helpful for analysis of air handling systems.

**Users:** Over 500.

**Audience:** Mechanical, energy, and architectural engineers working for architect/engineer firms, consulting firms, utilities, federal agencies, research universities, and research laboratories.

**Input:** Building geometry, thermal characteristics, internal loads and schedules, heating and cooling equipment and system characteristics. Readable structured, input file may be generated by either the BTEXT program or the Drawing Navigator Program, which allows the user to generate a BLAST input file from AutoCad and Microstation building representations.

**Output:** More than 50 user-selected, formatted reports printed directly by BLAST; also the REPORT WRITER program can generate tables or spreadsheet-ready files for over one hundred BLAST variables.

**Computer Platform:** PC-compatible, 386 or higher; HP/Apollo. Source code is available and has been successfully compiled on most UNIX workstations.

**Programming Language:** FORTRAN

**Strengths:** PC format has structured interface; detailed heat balance algorithms allow for analysis of thermal comfort, passive solar structures, high and low intensity radiant heat, moisture, and variable heat transfer coefficients -- none of which can be analyzed in programs with less rigorous zone models; code modularity lends itself to research versions of the program, such as integrated BLAST (IBLAST) and integrated BLAST with modular systems (IBLAST-M).

**Weaknesses:** High level of expertise required to develop custom system and plant models.

**Contact:** BLAST Support Office  
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**Availability:** Software prices range from \$575 to \$950. Contact BLAST Support Office for special educational prices and additional information.