Two New Software Gems

by Bion D. Howard

A couple of new energy design software products are easier than their predecessors to use, thanks to the graphical user interfaces they feature. Try these tools on different types of projects—or use them in tandem for maximum results.

Since I last wrote in *Home Energy* about software (see "Putting the Byte into Your Analysis Toolkit," *HE* Sept/Oct '98, p. 25), some new developments have taken place in energy design software tools. The two products I discuss here are unique and represent significant advancements in energy analysis and green design tools, respectively. They both apply recent advances in computer-user interface techniques to make the user more comfortable, which in turn reduces the likelihood of errors.

PowerDOE is a fully developed annual simulation tool (that is, one that models in hourly time steps). It revolutionizes the user interface of a traditionally difficult-to-use program (DOE-2). Green Building Advisor (GBA) provides an expert system on CD-ROM. While Power DOE will be used more often by engineers and designers, GBA can help nearly anyone to learn more about reducing the environmental impacts of development.

PowerDOE is one of several Windows-based variations of DOE-2; as with those, the important thing is to become well practiced with the software in order to avoid problems and errors. Personal preference and experience may play a large role in selecting which one to use. GBA, however, is truly unique in that it combines so many useful elements into a single general package. It is currently a good choice for any user, because there simply isn't any other tool like it.

PowerDOE

The early editions of the DOE-2 program were user hostile, while current-version DOE-2.1E, and DOE-2.2 (scheduled for release in late 1999), are oriented for engineers and other advanced users and have steep learning curves. PowerDOE (as well as the other Windows-based versions, such as Visual-DOE) is much easier to work with, due to its graphics-based Windows interface.

The Electric Power Research Institute (EPRI) and the U.S. Department

When you are ready to produce results for the building being designed, PowerDOE offers several report formats.

of Energy largely sponsored the development of PowerDOE, and considerable input from a team of building experts was accommodated during review. The program employs the new, more powerful DOE-2.2 simulation engine for all its energy and cost calculations. This means that while Power-DOE is a more flexible energy use and cost estimation tool, it retains all the power and all the large-building simulation capabilities of its predecessors.

PowerDOE has several new interactive features for dynamic recalculation of results during use that were unavailable in DOE-2. For example, if there is a change in 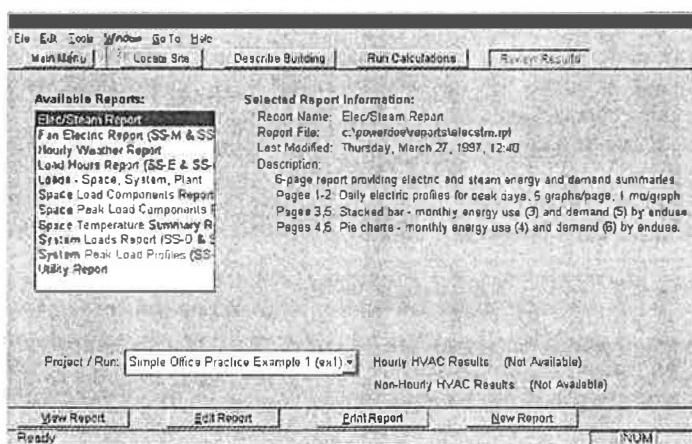thermal envelope design, the program helps users by quickly recalculating loads and HVAC results. A single Microsoft Windows user interface manages all the input, output, weather processing, building component libraries, and other functions in an integrated fashion. PowerDOE provides both two- and three-dimensional graphic displays of building geometry and HVAC equipment layout. The user can select specific architectural and HVAC features to include, and can choose from a menu of graphic presentations of the results. It features relatively intuitive access, via input screens, for editing input parameters and selecting and managing data reports.

When the user begins to describe the building, the screen instantly reflects changes in shading, windows, wall areas, and so forth. From the "Building Description" screen, you can select from several pages of input—including the building view; floor view (wire frame floor plans); zone energy loads (these run later as the building description is completed with error-trapping displays); and mechanical systems and utilities.

Within every screen's window, results can be reviewed and changes can be made to the design. Also, from each window, the same buttons can call up other windows, making it pretty easy to navigate. However, if you make an error in one location, it may not be evident which other factors are affected unless you have moved through all the screens.

I found the error trapping function to be somewhat difficult to use, since not enough detail is accessible to

enable the user to consider corrective options. However, after some practice I was able to avoid errors much more easily than I could in previous versions.

When it is time to do a final run and produce results for the building being designed, you can call up a window that allows you to choose among various report formats. Each run can have its own unique list of reports; this helps to cut analysis time, since you can choose to create only those reports that are needed for a specific run.

Once the reports are selected, the results can be displayed on screen, or printed out directly from the program. The results I found most useful when evaluating the software were the graphic data plots, where performance information did not have to be sifted from vast tables of numbers.

PowerDOE is still technically in the prerelease phase (final beta testing); commercial release is expected soon. A PowerDOE beta version (or future release) is available to anyone for 90-day evaluation licensing at no cost. The program is expected to cost $300 or less when released.

Green Building Advisor 1.0

GBA is a very useful tool, one that should prove valuable both to entry-level persons wanting to learn quickly about green building and to more experienced designers who have to contend with a growing welter of detailed information on which to base project decisions. The program is best used for consideration of green building options early on in the process of a new building or rehab project. It is not intended to produce a detailed set of analytical results or an economics analysis. If you are performing a detailed review and energy analysis of building plans, turn to PowerDOE or one of the other programs I discussed in my earlier article.

The technical advisory content of GBA was developed by a team of experts managed by

Environmental Building News, and the CD-ROM was put together by the multimedia software gurus of the Center for Renewable Energy and Sustainable Technology (CREST). The purpose of GBA is to provide a simplified interface for designers, architects, engineers, builders, remodelers, and perhaps even code officials—one that lets them rapidly obtain useful advice for green building projects.

A tool like GBA is most helpful when it is used as early in the design process as possible; it is meant to provide more general information than the very specific information provided by an energy simulation program. I believe it should be used in conjunction with other support tools and manuals that can provide more details—such as an energy tool, a building scheduling program, or a CAD system.

The program lets you click a location dot that represents a city on a map, and then either use the local data or edit them, according to what you know about the project. In every card tab in the user interface, there are several opportunities either to replace default values with known values or to accept the defaults.

After selecting the project's location, you can begin to mine the extensive screens of recommendations produced by GBA based on the inputs (and default assumptions) provided in the setup screens. Recommended Strate-

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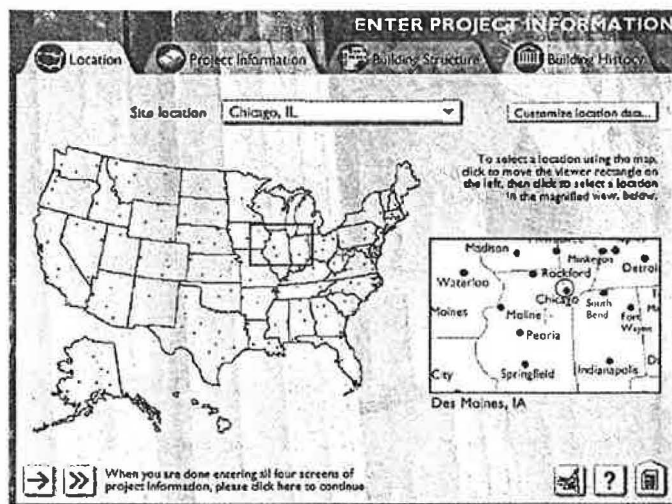
gies are listed on card tabs headed "Site and Ecosystem," "Energy Use," "Water Use," "Resources and Materials," and "Indoor Environment." Under each of these headings are listed more specific categories for consideration. Under "Site and Ecosystem," for example, you can review recommendations for site selection, land development, storm water management, landscaping, and regional integration (infrastructure issues).

You then read from each card tab specific measures that can produce a greener building project. Clicking on each entry produces a more detailed explanation. This helps the entry level environmental designer or builder to quickly learn about the recommended features. In each category, these features are graded as "moderately" or "strongly" recommended. Once information is input onto the screens, GBA retains the entries and permits you to save information (by project name) for future reference. As a project evolves, you can go back and add or change information, then reexamine the results.

The concept of filtering may be one of the coolest operators in GBA. I hope future versions will keep this function and expand on its ability to produce more easily understandable results. It allows the user to select from among five filters ranging from "very low" to "very high," pertaining to the issues of building phase, cost, and difficulty. Using the filters can reduce the number of answers provided, as in the case, for example, where a user might be working with a client who is cost constrained. The filters also help if a green building consultant gets involved in a project late in the game, when fewer practical options may exist for changing the building.

The GBA interface also permits the user to examine the logical formulas behind every selection, and provides copious reference materials on each option and recommendation. This

material can be copied electronically from the GBA screen and used in reports with proper attribution.

Finally, there are numerous fully illustrated and fairly detailed case studies; in some cases these are linked to some of the recommendations that pop up while the program is being used. Many of the case studies are for well-known projects by recognized green architects, and build on the growing number of exemplary green buildings already constructed. In this version, GBA emphasizes commercial projects, but more residential (and commercial) case studies are planned for future versions. In each case study, more card tabs are provided to organize the materials into cascading levels of detail. Users may then peruse as far down as they want into the case study materials and still stay rooted in the card file organizational structure.

The CD-ROM also contains a detailed user manual (in Adobe Acrobat format). An on-line tour of the GBA is available on the CREST server at www.crest.org/software-central, and the CD-ROM may be purchased on-line through the *Environmental Building News* publications Web site at www.ebuild.com. Cost is $129 for *EBN* subscribers and $179 for others, plus shipping and handling.

Trying Them Out

If you're starting a new project and want to use these two software products, I recommend starting out with GBA as early in the design process as possible. Then, once an initial schematic design is available and the project team is ready for specifics, conduct a more detailed analysis of energy efficiency options with PowerDOE. This will allow you to make sure the energy efficiency levels are improved to the maximum extent permitted in the budget.

Doing this kind of sophisticated analysis offers a great opportunity to uncover money-saving options that free capital for use elsewhere. For example, by improving the building shell, first costs for HVAC and ducts are greatly reduced. This frees money for slightly more costly green building components. A win-win outcome. ⬤

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