Using BIM for Greener Designs

The cornerstone of building information modeling is the high-quality design information it provides. This paper delves into a practical example of one way that this information is being utilized – in this case allowing architects to perform faster and more accurate energy analysis on early stage building designs, thereby promoting the construction of “green buildings.”

Designing a Greener Building

The LEED® (Leadership in Energy and Environmental Design) Green Building Rating System is a national standard for developing resource-smart, sustainable buildings. As adoption of the standard grows, many owner/operators are requiring that their new building projects achieve LEED certification, which rates a project based on site design, indoor environmental quality, and efficient use of energy, materials, and water. A high LEED rating recognizes the quality of a green building design and also qualifies the project for an array of state and local government financial incentives – an important benefit for the building owner.

As you can imagine, complex engineering analysis of the design project is critical to achieving LEED certification. Many design firms typically outsource engineering analysis - as it is time-consuming and costly to do in-house. But now, building information modeling solutions such as the Revit® Architecture software provide robust design models containing the necessary level of detail for the analyses. Pertinent design data can be easily extracted from the building information model and input to various analysis programs. With the recent release of the Green Building Studio™ from GeoPraxis, Inc., this process has been streamlined to the point where architects can perform energy analysis in-house, reducing the overall cost of the design process.

Green Building Studio

GeoPraxis is an industry leader in the development and implementation of building energy analysis tools and web-based solutions. Their Green Building Studio web service and XML connectors integrate their analysis tools with major building information modeling solutions, including Revit Architecture, AutoCAD® Architecture, and AutoCAD® MEP. With this capability, architects can more effectively use the better information created in the building information model for testing building performance and validating design options over the Internet.

Autodesk®

"This is a huge break-through for green building design and LEED qualification," says John F. Kennedy, GeoPraxis' President and CTO. "The incorporation of our connectors by the major building information modeling and CAD vendors enables the Green Building Studio web service to use the wealth of information in the early design stage models. It creates a geometrically correct equivalent thermal energy model and provides almost immediate feedback on the energy implications of architectural design scenarios."

Running the Energy Analysis

Using traditional CAD solutions, energy analysis can be a painful process. If it's a 2D solution, either special 3D analysis models are created or manual plan take-offs from the floor plans are done. If it's a 3D solution, building data is extracted from disparate CAD files and then merged into a single input file. In most cases, the data must be massaged for analysis import and then the output has to be "translated" for the designer's consumption.

Now, with Revit Architecture and Green Building Studio, the process is simple. When you initially register for Green Building Studio web service, you download a small Green Building Studio client. Then each time you run an analysis, you simply make sure the rooms have a room number (the unique space ID used in the analysis programs) and the model has a defined project type and address (for building codes, local climate information, etc.). On the file menu, you click Export, select the file type and save the export file to your hard drive. Then launch Green Building Studio from your Internet browser and submit your saved file for energy analysis.

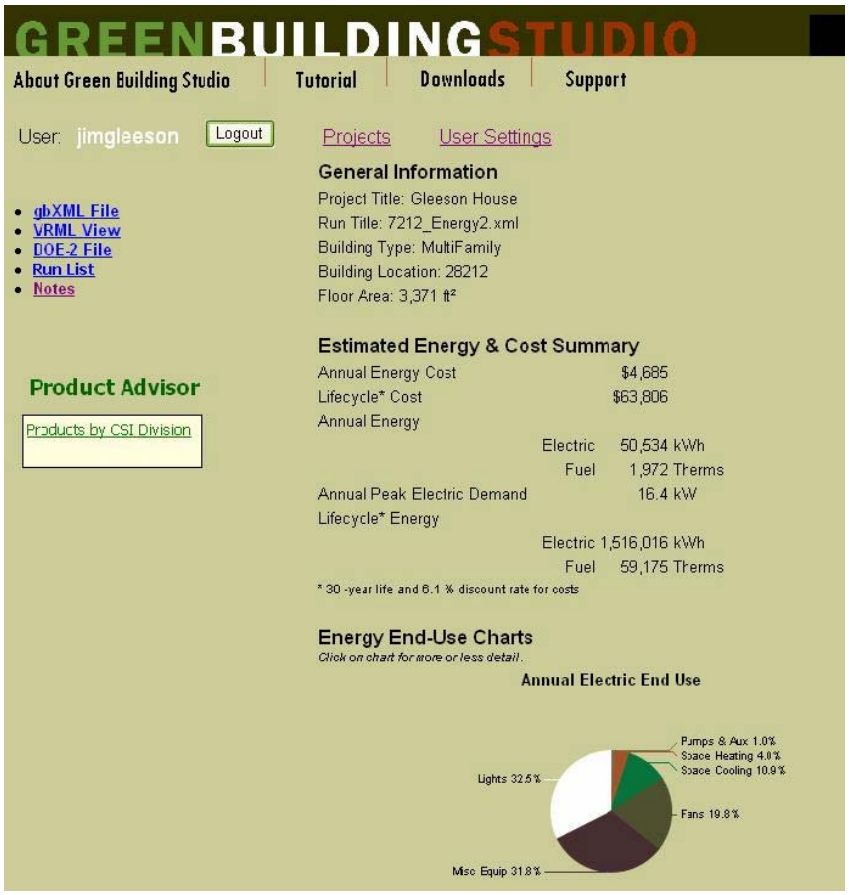

Figure 1

Green Building Studio web service utilizing better building information from Revit allows architects to perform faster and more accurate energy analysis on early stage building designs.

Within minutes you can view the results, which provide energy statistics for your project and recommendations to improve your design based on local standards for building type, climate, etc. You can then modify your building design and repeat the process to see what impact a design change has on the energy efficiency of the building.

This simple process belies enormous computational power. Behind the scenes, Green Building Studio relies on a large network of relational databases containing hourly weather data, design data, and regionally relevant libraries of default building characteristics with common energy code baselines. It will even make recommendations regarding building products appropriate to your building (greatly simplifying the early specification process).

Win-Win Results

With the Green Building Studio web service utilizing better information from building information modeling solutions, a significant cost barrier to designing green buildings is diminished. This combination provides more accurate energy analysis, leading to a more efficient building design and lower operating cost for the owner. And it lets architects perform these functions in-house, which makes sustainable design services more affordable for the client and increases profitability for the architectural firm – making building information modeling a win-win proposition for everyone.

About Revit

The Revit platform is Autodesk's purpose-built solution for building information modeling. Applications such as Revit Architecture, Revit® Structure, and Revit® MEP built on the Revit platform are complete, discipline-specific building design and documentation systems supporting all phases of design and construction documentation. From conceptual studies through the most detailed construction drawings and schedules, applications built on Revit help provide immediate competitive advantage, better coordination and quality, and can contribute to higher profitability for architects and the rest of the building team.

At the heart of the Revit platform is the Revit parametric change engine, which automatically coordinates changes made anywhere — in model views or drawing sheets, schedules, sections, plans… you name it.

For more information about building information modeling please visit us at *http://www.autodesk.com/bim*. For more information about Revit and the discipline-specific applications built on Revit please visit us at *http://www.autodesk.com/revit*.

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