



**TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT
REFRESHER TRAINING COURSE**

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**ENERGY MODELING & BUILDING SIMULATION
FOR BUILDING SCIENCE PROFESSIONALS**

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BUILDING SCIENCE SPECIALIST CURRICULUM





WHAT SHOULD YOU LEARN



- The Role of Energy Modeling in Sustainable Design**
- What Is Energy Modeling?**
- What Are The Benefits of Energy Modeling?**
- Benefits of Energy Modeling**
- How Energy Modeling Can Improve Design**
- Why Energy Modeling Matters?**



THE ROLE OF ENERGY MODELING IN SUSTAINABLE DESIGN



The building industry accounts for 42% of all energy-related carbon dioxide emissions. To reduce this number, there has been a push to produce sustainable properties. This can be done by reducing energy consumption and using recycled materials.

Lowering energy use is key in sustainable design. That's where energy modeling technology comes into play. Here is how energy modeling is vital in constructing eco-friendly properties.

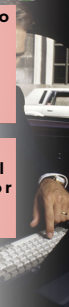


WHAT IS ENERGY MODELING?



Building energy modeling (BEM) allows engineers to simulate building energy systems. They learn important information about system feasibility, greenhouse gas emissions, and total costs. A designer can also input certain parameters, including building location and weather.

BEM is a type of software that helps with energy management and analysis. Contractors use this tool to model energy consumption in heating, cooling, or ventilation. With the software, total carbon emissions and construction time can be lowered.



WHAT ARE THE BENEFITS OF BEM?



With BEM software, architects can plan ahead and make better decisions. Here are some other ways this can improve sustainability.

1. Allows for a Holistic Approach Energy modeling allows contractors to see how the systems impact the building as a whole. Making design changes can alter energy use. Yet, BEM takes into account all factors and combines them. Engineers can use this information to determine which elements work well together. Then they can carry these lessons into their next project.

2. Helps Predict Energy Performance Estimating energy consumption is especially important in new construction. This allows for fewer design changes once the project is complete. As technology evolves, architects can test how new systems will impact energy performance.



BENEFITS OF BEM+

3. Provides Quantifiable Results Getting data helps contractors make smarter decisions. BEM helps them see how energy consumption changes with various conservation methods. Then, engineers can focus on design strategies with the highest cost savings.

4. Reduces Costs With careful planning, architects can find the most cost-effective strategies upfront. This can save both initial expenses and further expenses down the line. It prevents the need to switch out systems mid-construction. For example, it can cost between \$2,798 and \$6,744 to install a new furnace.

5. Provides Homeowners With More Comfort Systems that waste energy can create an uncomfortable home environment. However, using energy models, designers can predict occupant comfort based on meteorological data.



HOW TO IMPLEMENT BEM TODAY

Before implementing this strategy, ensure the software will help turn a profit. The cost to run BEM can be costly, so builders should consider the return on investment.

Here are a few popular ones to get started:

Trace 700
Carrier HAP
IES VE
DesignBuilder
eQuest

Besides energy predictions, look for other features as well, such as ambient daylight quality and thermal comfort control. These allow designers to make decisions that also satisfy their clients.

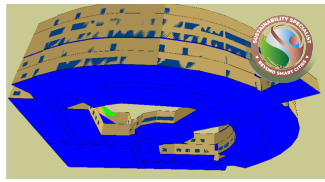


WHY ENERGY MODELING MATTERS?

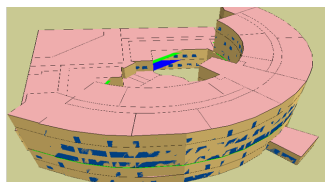
A common misconception regarding energy modeling is that energy models are used only by engineers as a means of viewing energy statistics and code compliance.

Prior to that, mechanical engineers use modeling techniques as a means of determining a building's performance characteristics as well as its cooling and heating loads. Nowadays, however, BEM tools are being used by architects as well. Instead of just focusing on HVAC systems, designers can use the tool for evaluating the various components of a building such as air conditioning usage, access to daylight, and more.





The model is also a powerful tool for determining the cost effectiveness of energy efficiency measures. From this analysis, we can determine if a measure is worth the investment and thus employ only the best ideas



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