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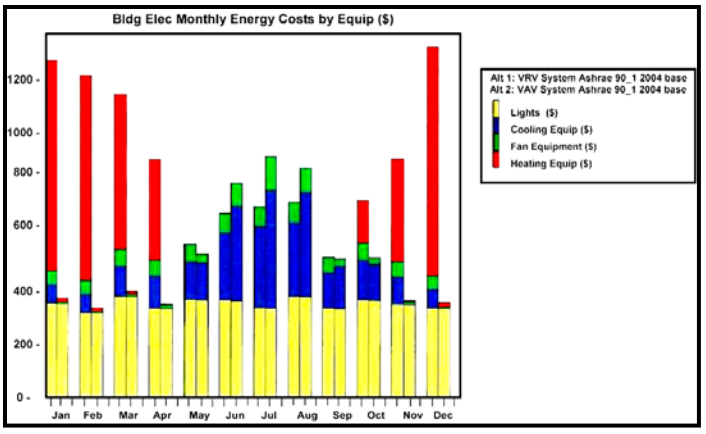
Understanding the Energy Modeling Process



Energy modeling uses computer based tools to simulate the energy use of a building throughout a discreet period of operation, usually a year. It can be a powerful tool in an integrated design process as one can test the effects of site location, building massing, multiple fuels, equipment efficiencies and building orientation to compare various design options.

Energy modeling can evaluate the energy use of building HVAC, water heating, and lighting use; plug-in equipment loads are typically not included. The model, however, will not predict the exact total energy use of the building as there are too many variables to control. The value of the energy model is its ability to compare alternate schemes and assess their impact on energy usage. Seeing how the energy consumption of a building breaks down by fuel type, task, and building component allows the design team to focus on the major drivers of energy use.

Energy modeling also has its place in analysis of existing buildings where the goal is to understand and optimize the systems in place. Most facilities are not operating as efficiently as they could be and are plagued by antiquated equipment and systems that waste energy, cause discomfort and lead to staff and client complaints. An energy model, in this case, can identify specific projects or equipment upgrades that can be prioritized given the available financial resources of the institution. Anticipated paybacks are often included as part of the financial assessment.

Fitzemeyer & Tocci provides energy modeling and energy optimization consulting services to healthcare, academic and corporate clients. We welcome the opportunity to discuss how we may assist you in developing potential energy saving strategies at your facility for both new construction and existing systems.

Brattleboro Memorial Hospital
Facility Master Plan
Brattleboro, Vermont

Architect: Lavallee Brensinger Architects

The **scope** of this project was to evaluate the HVAC, plumbing, fire protection and electrical systems infrastructure for a 176,000 sf community hospital that provides acute medical care services to the community.

Our **solution** included reviewing all engineering systems; mechanical, electrical, plumbing and fire protection. The work began with an identification of primary systems to be evaluated. This effort included gathering of all available system drawings, schematics, and reports, interviews with facility staff and personnel, and thorough site visits and walkthroughs. This large volume of information was compiled into several abbreviated drawings, schematics and charts to summarize the systems to be evaluated. The report included an executive summary with recommended projects. The recommendations were organized by building for prioritization as the Facility Master Plan is further developed.

A five year master plan is typically incorporated into the infrastructure assessment results as an aid to planning and budgeting. Knowing that certain system deficiencies will exist for a year or two, but will be eliminated with a project in year three, helps the staff plan and efficiently utilize facility resources.

A full evaluation of a hospital's infrastructure systems gives a facility an unmatched understanding of current operations. This understanding can be used by the health care system to more efficiently plan, train and budget. This improved efficiency equates directly into dollar savings and lower operating costs.

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Suffolk University - Summer Projects 2008
Boston, Massachusetts

Architect: Knight, Bagge & Anderson, Inc.

The **scope** of this project was to design HVAC, plumbing, fire protection and electrical systems for several interior renovation projects at the Suffolk University Law School.

The **design challenge** was to design and complete construction during a 2-month period that required the spaces to be ready for student occupancy in the fall semester.

Our **solution** included a full survey and documentation of the existing systems and meeting with building personal to understand the building infrastructure prior to receiving architectural backgrounds.

HVAC design included providing new diffusers and controls for the repartitioned spaces. Duct work was reconfigured within the renovated spaces to provide fresh air, heating and cooling to the new spaces. The existing mechanical equipment had adequate capacity to serve the new spaces and required rebalancing of the system only.

Electrical design included new branch circuiting utilizing the existing electric panel and breakers. New lighting, exit signs, emergency lighting and fire alarm devices were implemented as part of the new design.

Fire protection design included reconfiguring existing sprinkler heads and extending piping to accommodate repartitioning of the spaces and creation of a new reflected ceiling plan.

TOTO Showroom - Retail Renovation
Boston, Massachusetts

Architect: Bergmeyer Associates, Inc.

The **scope** of this project was to design HVAC, plumbing, fire protection and electrical systems for a 5100 sf renovation of existing retail space into a fully functional bathroom fixture showroom.

The **design challenge** was to provide cost effective HVAC, plumbing, electrical and fire protection systems with an aggressive design and construction schedule, while keeping an exposed structure not cluttered with mechanical piping and ductwork and dealing with limited ceiling heights on the lower level.

Our **solution** included a full survey and documentation of the existing systems and meeting with building personal to understand the building infrastructure prior to receiving architectural backgrounds. Working with the architect on careful placement of plumbing displays, allowed piping to be concealed within wood joists and extensive internal coordination to keep systems from crossing and creating low points or clusters of mechanical systems that would be unappealing and or obstructive to ceiling heights.

HVAC design included reuse of an existing AHU to keep cost at a minimum. The existing HVAC system provided no outdoor air to the space, so a new fresh air louver was ducted to the return on the existing unit. The main exposed, spiral duct was relocated to accommodate the architects feature wall for the space. New supplemental split units were installed to provide cooling for the lower level which was previously only equipped with baseboard heat.

Electrical design included new branch circuiting utilizing the existing electric panel and breakers. New lighting, exit signs, emergency lighting and fire alarm devices were implemented as part of the new design. Power was provided to display toilets for motion activated toilet seats.

Plumbing design included a full wall functional faucet display, a functional toilet line display and functional multiple shower head display. The feature display is a functioning hot tub/whirlpool at the front of the store. The whirlpool is stand alone so all plumbing had to be fed from below.

Sprinkler design included relocation of sprinkler heads to accommodate the new architectural partition layout and reflected ceiling plan.

As always, we welcome your questions and comments. If you would like further information, please feel free to contact Stephen J. Montibello, PE.

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