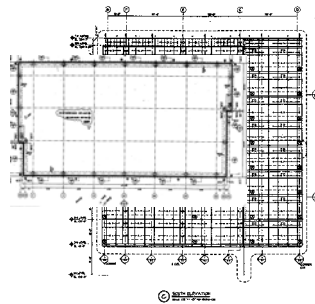




## ENERGY SIMULATION SERVICES

Carli Inc. provides innovative solutions to reduce the energy consumption and environmental impact of building designs. We use energy simulation tools to assess building performance and show compliance with energy codes and green building assessment of building designs. The goal of Carli, Inc. is to apply advanced computer modeling and simulation for building performance analysis and achieving energy efficient building design.

We simulate the energy use (heating, cooling, lighting, etc.) of buildings using the *DOE2* based computer software packages and *EnergyPlus*. This allows us to explore the costs and benefits of using different levels of insulation, different types of glazing and framing systems, different types of HVAC systems, etc. When the complexities and large input effort of creating a DOE-2 model are not warranted, we perform quick simulations like *Energy-10*.

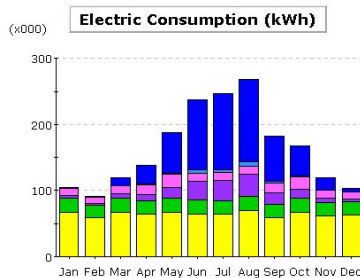
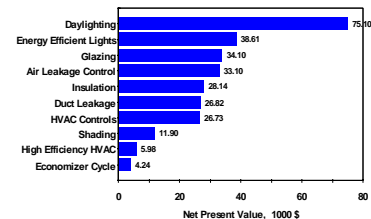


Carli, Inc works to optimize the energy efficiency of buildings by developing detailed computer models of the building (including its heating and cooling systems and all building components). Based on building architectural drawings we generate computer models of the new or existing buildings and perform hourly energy use calculations and simulate how the building will respond on an hour-by-hour basis to the local

climatic conditions. Various energy efficiency measures (EEMs) are analyzed for electricity and fuel use and based on the analyses cost-effective strategies are identified. The EEMs may include efficient lighting and daylighting, assemblies for roofs, walls, and windows, optimum features of HVAC systems, central plant optimization, cost-effective controls and passive solar strategies.

Choice of building simulation models is made depending on the size and complexity of the building and building systems. For smaller buildings, models like *Energy-10* are considered suitable, as it does not require a high level of effort for creating input data and analysis. The program analyzes energy performance of small commercial and residential buildings, provides quick strategies, and aids in exploring EEMs. The ranking of EEMs is sometimes very helpful in making the decision about the suitability of a particular energy efficient option.

RANKING OF ENERGY-EFFICIENT STRATEGIES

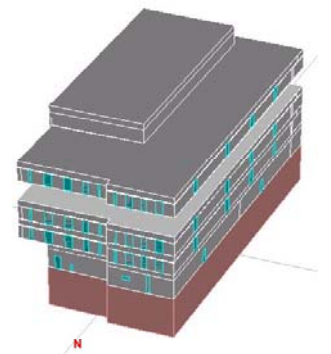


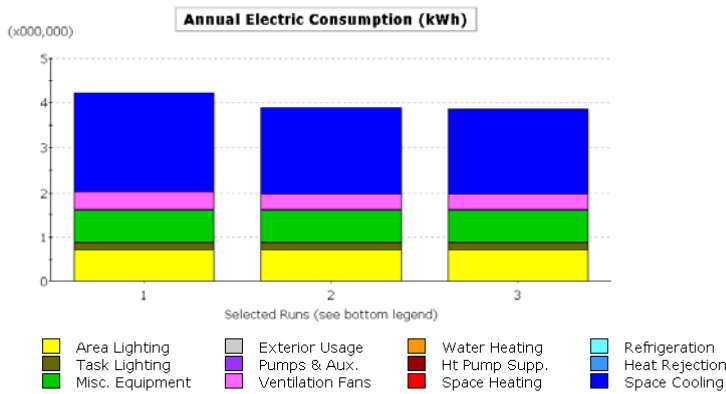
More sophisticated simulations are carried out using *DOE2* or *EnergyPlus* based simulation models. The tools that incorporate *DOE2* based models and are used by Carli, Inc. are *PowerDOE*, *eQuest*, and *BDA*. The tools that aid in preparing *EnergyPlus* models are *BSCOM Pro*.

Quick analysis of various energy saving options is carried out by *eQuest* or *BDA*. *eQUEST* is a sophisticated, yet easy to use building energy use analysis tool based on the *DOE2* simulation engine which provides professional-level results with an

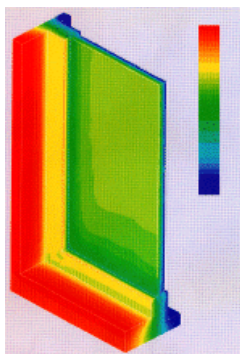
affordable level of effort.

For more detailed analysis *PowerDOE*, a powerful and flexible building energy use and cost estimation tool is used. *PowerDOE* includes a graphical user interface that provides 2-D and 3-D displays of building layouts including architectural and HVAC features as well as graphical modeling results. *PowerDOE* includes sophisticated life cycle cost analysis and provides graphical output of results.

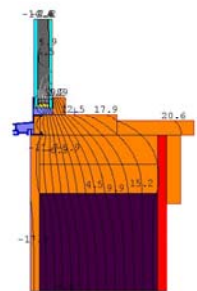




1. Existing Single Glazed, Aluminum Frame Windows (annual bill: \$329,597)
2. Replacement Windows with Clear Double Glazing (annual bill: \$265,253)
3. Replacement with Low-e/Argon (e=0.1) (annual bill: \$260,138)



For accuracy some individual building components require 2D or 3D heat flow calculations. *THERM* program is an example of 2-D computer tools that are used to analyze building constructions in more detail. In addition to more accurately modeling the thermal performance of a building component, this process also helps to reduce the risk of moisture condensation by indicating more accurate temperature fields on the surface of a material. For more sophisticated and demanding simulations, 3-D CFD tools are used. The example of simulations with such tools is the 3-D simulation of convective flow in a window.



CEN based calculations are available for compliance with European Union market

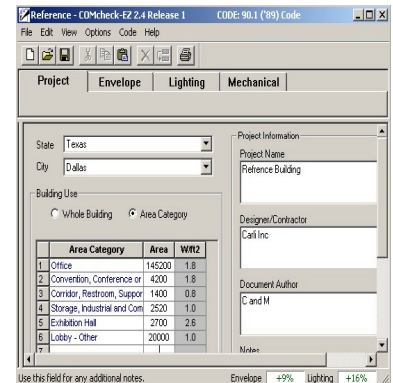
For daylighting simulation software packages like *RADIANCE*, a ray-tracing computer program developed at the Lawrence Berkeley National Laboratory to evaluate different electric lighting and daylighting strategies such as glare, lighting levels, optimum combination of lighting and daylighting etc.;

Code Compliance for various codes is performed at Carli, Inc. by using *COMcheck* and *MECcheck* programs. These programs are used to demonstrate whether your

Target Finder			
<b>1 Enter Data</b>			
Building Name:	Reference Building	State:	TX
City:	Dallas	Zip:	75201
Total Floorpace:	200,000 sf		
<b>2 Input Space Type Characteristics</b>			
Space Type:	Office	Floorpace:	200,000 sf
		Operating Hours/Week:	40
<b>3 Select Target</b>			
<b>4 Input Design Total Annual Energy Use</b>			
80	Energy	12,864,940 kWh	
<b>5 View Energy Performance Data</b>			
View Statement Of Design Intent			
	RESULTS	DESIGN	TARGET
Score	89	80	90
Site Energy Use (kBtu/yr)	63.0	53.4	42.6
Total Annual Energy Use (kBtu)	12,864,940.0	10,869,560.0	8,524,560.0

commercial, residential, or high-rise residential building designs comply with the 2000 Edition of the International Energy Conservation Code (IECC).

Besides the simulation and code compliances, the new buildings are checked for Green Building ratings by using the EPA's Target finder. The software provides the rating of buildings based on the energy use data and on the clients' desired target rating for Green Building status.



- Energy Simulation Services are provided either as a complete package, or as a consulting service charged on an hourly basis. The individual arrangements can vary and are negotiable.
- Discounts are available based on volume and overall cooperation between Carli, Inc. and the customer.
- Training services for energy simulation programs are also available and negotiable.

For more information, please inquire with Carli, Inc. at: [home@fenestration.com](mailto:home@fenestration.com), or at the telephone number provided above or visit our web site at: <http://www.fenestration.com/ensimservice.htm>. We would be happy to visit your facility and to present details about how our products and services can benefit your business.