

Abstract for 2009 ESF Green Building Conference

By: The Advanced Building Studio at Ashley McGraw Architects
Peter Larson, AIA, LEED AP, Principal
Brandon Burd

Title: Zero Non Renewable Energy Building Design

Using multiple examples, including the Liberty CSD Library addition and Liverpool CSD additions and renovations that Ashley McGraw is designing, the ABS Studio will demonstrate unique approaches to the design of net zero non renewable energy use buildings, using the following design philosophy:

Buildings are the largest consumers of the world's fossil fuel resources, and therefore are one of the primary generators of the CO₂ emissions that contribute to global warming. Fundamentally rethinking the process by which buildings are designed to minimize construction and operational fossil fuel energy usage must be a priority for the building design professions. This is important not only from a global warming standpoint, but also from a national energy security and economic (cost of energy) perspective.

The Advanced Building Studio at Ashley McGraw is practicing a unique approach to reducing building fossil fuel usage called "performitecture". This approach uses holistic thinking about form and performance issues with an emphasis on the importance of architecture in reducing fossil fuel energy consumption. Under this approach, building form is directly tied to performance. Through our exploration of "performitecture", we have found that the manipulation of architectural form has astounding implications on energy performance. We work with the following primary factors to maximize architectural energy performance. Note that many of these factors pertain to the building's relationship to the sun, the primary source of non-fossil fuel energy.

- Massing
- Orientation
- Location, extent, and composition of glazing
- Envelope composition and its response to program and climate
- Control of natural infiltration
- Utilization of site resources (wind, topography, etc.)
- Integration of renewable energy into building form
- Incorporation of passive solar heating strategies

Intelligent manipulation of form using these factors creates substantial savings in energy use without reliance on costly high-performance mechanical and electrical systems. When this thinking is combined with high performance mechanical and electrical systems and onsite generated renewable energy, net zero fossil fuel buildings are the result.

Critical to our performitecture approach is the true integration of quantitative design performance feedback using energy modeling, daylight modeling, and computational fluid dynamics software. These tools must be used in the early phases of design as part of an iterative design process. To achieve this goal, the ABS embeds itself within design teams to integrate modeling feedback within the early phase design process, and utilizes software modeling tools that are designed for rapid analysis and comparison of multiple design iterations.