

# Innovative Design

Innovative Design would like to take this opportunity to introduce our firm to you and outline several opportunities through which we can work together to advance sustainable school design in your state.

## Advancing Sustainable School Design in Your State



Innovative Design was formed 32 years ago with the goal of advancing energy-efficient, environmentally sound design. Since our formation we have designed thousands of sustainable buildings and more green schools than any other architectural firm in the country.

To help advance sustainable practices within the architectural and construction community, members of our firm have helped to organize or been asked to speak on sustainable design at over 300 conferences and workshops in 32 states and 27 countries. In just the last three years, as sustainability has become more embraced by the design profession, we have conducted or were a major speaker at 47 workshops on green school design.

Because of our expertise and long history of designing high performance schools that are not only very green but also under budget, we have been asked to spearhead numerous national, state and local educational initiatives to advance the level of understanding and skills of those engaged in school design.

These green initiatives have included:

- Workshops on whole-building, whole-site approaches as well as individual technologies such as daylighting, rainwater harvesting, solar water heating and plug load issues;
- General sustainable design guidelines;
- Design tools (including site-specific sizing, systems schematics and specifications for daylighting, rainwater harvesting and solar water heating systems);
- Localized, green architectural and engineering specifications;
- One-on-one review of plans at schematic design and design development; and
- Assistance in greening current state and local school design guidelines.



We look forward to working with you in creating buildings that are healthier, more-productive learning environments; facilities that are both energy- and water-efficient and work with nature; and schools that incorporate sustainable design features that not only foster experiential learning, but an appreciation for the importance of sustainable design.

## Innovative Design Experience - Current Green School Initiatives for States

### Ohio Initiative :

In order to support the Ohio School Facilities Commission's (OSFC) efforts to advance green school design, Innovative Design was contracted to assist the OSFC in implementing a multi-year effort to increase designer awareness and skills associated with incorporating the most advantageous green technologies into Ohio schools.



To date, Innovative Design has:

- Evaluated current school construction standards and analyzed all design opportunities that could improve the energy and water performance in Ohio's different climatic regions.
- From a cost-benefit analysis, prioritized the measures that should be encouraged.
- Compared the cost-effective savings generated from the recommended measures to LEED rating levels. (This analysis later served as the rationale for a LEED silver requirement in all new school designs.)
- Developed workshops and design tools on daylighting, rainwater harvesting, solar water heating, and plug load management. We developed green specifications that address hundreds of product types and systems appropriate for sustainable school construction in Ohio.
- Conducted seven local workshops throughout Ohio, specifically geared to the architects and engineers. The first year the workshops focused on daylighting and plug load management. The next year the workshops were extended to additionally address rainwater harvesting and solar water heating.
- Conducted over twenty one-on-one plan review sessions where designers submitted schematic and design development plans to us in advance and, after reviewing the plans prior to our meeting, we advised each firm on their specific project.
- Worked with OSFC to modify their design and construction standards to the higher level of green design desired in Ohio.

### New York Initiative :

Working with TRC and the New York State Energy Research and Development Authority (NYSERDA) in 2009, we have developed a similar daylighting design tool as we did in Ohio, but with regionalized rules-of-thumb on sizing daylighting apertures appropriate for New York's various climate zones. We are currently developing design tools on rainwater and solar water heating, green specifications for New York, and an enhanced guide addressing the potential of retrofitting windows to improve energy-efficiency and daylight quality.

We have, to date, conducted three separate workshops mainly focusing on daylighting design, presented to individual design firms in New York that focus on school buildings. Similar to the Ohio project, these workshops are followed by optional individual project plan review sessions. In evaluating these efforts, attendees have rated the workshops as "excellent" and the material presented to the firms as "extremely useful."

### Sustainable School Guidelines:

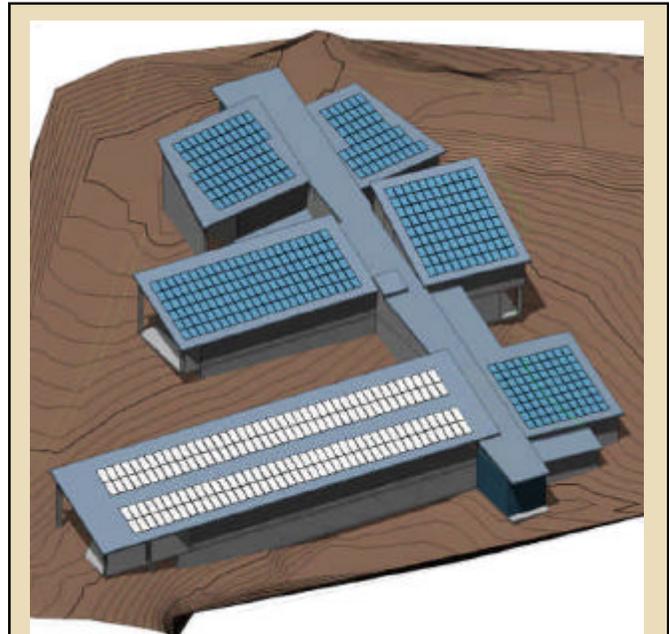
Innovative Design has been asked to develop national, state and local green school guidelines, including:

- Energy Design Guidelines for High Performance Schools, USDOE and National Renewable Energy Lab
- Texas Sustainable School Design Guidelines , State of Texas
- Guidelines for the Design and Construction of Energy-Efficient County Facilities, Wake County, NC
- Greenville Green Design Evaluation Checklist, Greenville School District, SC
- Guidelines for Energy-Efficient Sustainable Schools, Clark County School District, NV
- G-3 Guilford County Green Guidelines, Guilford County Schools, NC

## REPS, RECs and CO2e – New Opportunities for Improving a School System’s Bottom Line

Many states have already adopted Renewable Energy and Energy-Efficiency Portfolio Standards (REPS) where the utilities are required to meet an increasing amount of their loads with renewables and energy-efficiency. Other states are considering their own plans and Congress is now debating whether or not to require a national standard. The environmental attributes of this green power, which values the difference between green strategies like solar and efficiency and conventional sources of energy production, are quantified as Renewable Energy Certificates (RECs). For a utility to meet its obligation to utilize a certain amount of renewable energy, it can either implement its own renewable solutions or encourage others to implement them. If it buys from others, then the proof is in the documented RECs. Across the country the value of just the RECs is often close to twice the utility’s cost of production. This, in effect, triples the rate at which utilities will buy renewable energy. Maybe you thought solar energy was too expensive to implement. Think again. Solar, implemented on your own schools, has the potential to be one of the best investments you make.

Additionally, there is another factor worth considering. European countries, in an effort to mitigate climate change, have capped carbon releases and developed a trading market for carbon that has helped to move these countries to a greener path. The US’s voluntary system, which lacks mandatory caps on carbon emissions, is having only a fraction of the impact of Europe’s. However, since 2003 the Chicago Climate Exchange and various NGOs have been laying the ground work for carbon cap-and-trade and, because of our country’s growing concern over climate change, we are now poised to see legislation that will establish limits on greenhouse gas emissions. If enacted, the implication is that the value of carbon offsets would likely grow from a fraction of a cent per kilowatt-hour to perhaps 2 cents per kilowatt-hour or more, putting the premium more in line with European amounts. The key to capturing these savings is in the monitoring. Are your schools monitoring their energy saving systems?



A current Innovative Design project in North Carolina has 168 solar thermal collectors and 446 photovoltaic panels integrated into the roof. The system will produce enough renewable energy to offset the buildings’ total demand, or it could be sold to the local utility to meet the utility’s obligations to increase renewable energy use.



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In the schools that we design, we are monitoring the solar water heating systems, photovoltaic systems, daylighting and even our rainwater savings (savings being equivalent to the energy required to move and treat water). Aggregating these savings and selling the carbon savings is possible today. The benefits, both environmentally and financially, will only grow. Plus, the real-time monitoring of the systems greatly enhances the educational opportunities for students.

A final point also merits your attention. To encourage the use of renewable energy, many states as well as the federal government have enacted tax credits and other incentives to individuals and companies that implement them. Up until now, there has been limited success in public facilities being able to take advantage of these incentives. This is also changing.

We are currently assisting the City of Raleigh, NC in soliciting proposals from private solar developers in which the solar developers will put up all the money for the installation of a one megawatt photovoltaic system and then construct and operate the system. After 6 to 10 years, once the investors with the solar developer have capitalized on the tax advantages, recouped all their original investment and made a profit, the system will be turned over to the City. This investment in solar energy is made so attractive because in North Carolina (like in other states) there is a REPS standard and to meet their obligation, the local utility is, in turn, soliciting 20 year green power purchase agreements. Once the solar developer transfers the solar system to the City, the money generated from both the power produced and the RECs will go to the City of Raleigh.

These changes will have an impact on you. We can help you in making it be a positive one.



#### Nevada Solar One

This 64 megawatt solar thermal power plant was completed in 2007, and meets the energy demands of 40,000 U.S households. Innovative Design was the facility architect and an integral part of the design team on this project.

### **Stimulus Funding Opportunities**

On February 17th, the American Recovery and Reinvestment Act of 2009 was signed into law. Part of this recovery plan specifically addresses schools. \$14 billion is to go to school retrofit and energy-efficiency improvements.

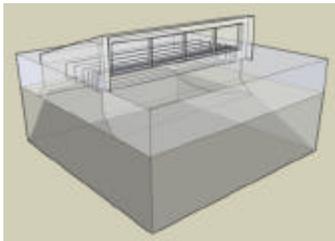
Like our window retrofit initiative for New York (that will allow school systems and designers to very quickly evaluate, regardless of building orientation, numerous window retrofit options and provide comparative construction costs and projected savings) we could also provide your state or region with similar programs that could have immediate impact on your opportunity to obtain meaningful stimulus funding that will produce immediate jobs and long-term savings.

As you begin to evaluate the best strategies to use your stimulus funding, I hope you will consider how Innovative Design can help you.

## Innovative Design's Expertise – Skills That Can Help You

For over three decades, Innovative Design has focused on sustainable design. Because of our expertise, we are now considered by many to be the country's leading firm in green school design. Our successful track record of implementing (under budget) numerous green strategies in over a billion dollars in school construction is unmatched. We have a particularly high level of expertise in both daylighting and rainwater harvesting.

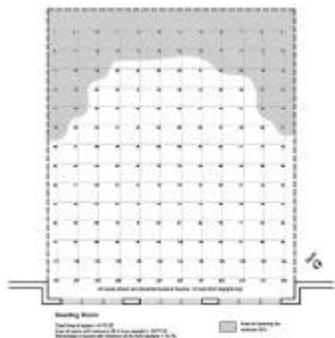
Key to our success is our in-house energy modeling capability. Unlike most other architectural firms, we conduct our own DOE 2 energy simulations, daylighting analysis, and rainwater harvesting optimization. We feel that this has provided us with a significant advantage in selecting the best energy and water saving options. To insure cost-effectiveness, we start our detailed computer analysis early in schematic design, when changes are easy and impacts are big.



### Daylighting Analysis : DAYSIM

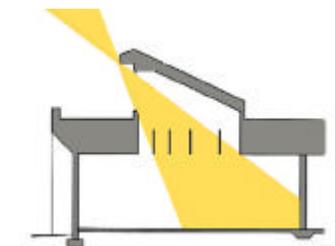
Because of the energy, performance and health benefits associated with daylighting, this strategy is a very high priority for both our clients and us. Having implemented daylighting strategies in all our new school designs and many renovation projects, we have had the opportunity to try daylighting analytical tools used throughout the world. The program that provides simulation results most useful for designing a school, that we feel produces the best correlation between simulated results and actual performance, is the program DAYSIM.

This program is capable of analyzing multiple points in a space, for every daylit hour throughout the year. After optimizing glazing amounts, types and placement to eliminate glare, balance light levels, and achieve superior lighting for over two-thirds of the school day, we use this hourly information (in each space) as input into our building energy simulation.



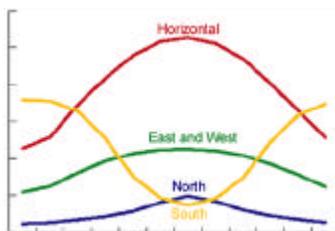
### Energy Modeling : eQUEST

Utilizing eQUEST, we model the overall building performance to determine the impact of numerous design options including the building shell's mass, insulation levels, color of surfaces, different lighting strategies, and mechanical system options. All of these elements are strongly impacted by how successful the designer is at implementing daylighting – the major energy saving opportunity in almost all schools. The strength of eQUEST is the manner in which it dynamically accounts for all the interactions between the different building systems and climatic occurrences throughout the year.



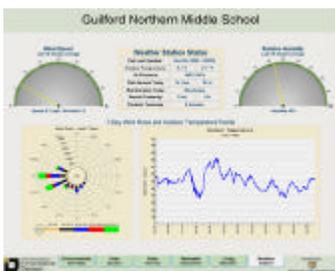
### Rainwater Harvesting : RainCatcher

Developed by Innovative Design for the NC Energy Office, the RainCatcher design tool was created to help designers properly size rainwater harvesting systems across the country. Utilizing rainfall averages and extremes, the program optimizes the tank size and collection area relative to student size, use patterns and irrigation demands.



### Solar Thermal : RETScreen

Our firm has extensive experience in solar thermal system design, with hundreds of projects incorporating solar water heating, space heating systems, and solar driven absorption cooling systems. We are currently implementing a solar thermal driven desiccant cooling system in a university facility. To properly size our systems and determine output, we utilize the industry standard RETScreen software. Developed by Natural Resources Canada, the program accounts for facility-specific loads, collector efficiency, hydrology and climatic differences, as well as collector tilts and orientations.



### Carbon Footprinting

Innovative Design offers industry-leading services in carbon footprinting for new building and renovation work. We are able to calculate the life-cycle carbon footprint of a project, including construction and operational processes. We use the Athena Impact Estimator program to assess the environmental costs of material and assembly decisions, and allow for us to make comparisons between design choices. The software incorporates the most comprehensive life-cycle inventory database available. Our own energy and water modeling data completes the necessary input, and provides a detailed analysis of projected carbon footprint.

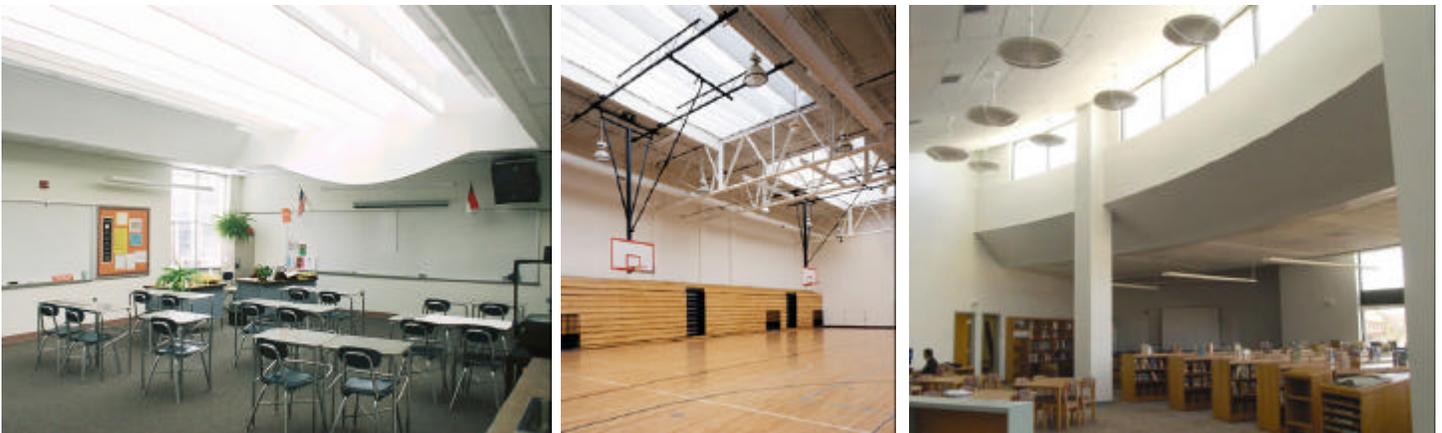
## About Innovative Design

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Since 1977 Innovative Design's mission has been to be the leader in energy-efficient, environmentally sound design, and to utilize that status to direct consumers and the architectural/engineering community to more sustainable solutions. For 32 years, Innovative Design has incorporated sustainable building practices into all of its work. Each of the firm's 4,755 energy-efficient buildings utilizes at least one strategy for utilizing solar energy and employs many different types of environmentally friendly materials and systems.

Cumulative peak energy savings for the firm's designs now exceed 42.5 megawatts (115 megawatts of primary energy). Since 2000, our twenty rainwater harvesting systems have saved over 156 million gallons of municipal water consumption. In addition, our projects' energy saving features have decreased carbon dioxide emissions by 822,000 tons. These energy savings have reduced client energy bills by \$7.4 million annually, and \$104 million to date.

While our firm designs many types of buildings, it specializes in educational facilities. Innovative Design has been involved in the design of more green educational facilities than any other firm in the country—112 facilities totaling over \$1 billion in construction value. Energy savings from these projects have resulted in financial savings for our clients that total \$4.5 million annually and \$52 million to date. In addition, Innovative Design completes its projects at an average of 5% below the construction budget, resulting in additional savings for its clients.



## Innovative Design's Awards & Honors

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Both Durant Road Middle School (Raleigh, NC) and Roy Lee Walker Elementary School (McKinney, TX) were placed on the AIA Committee on the Environment's annual **Top Ten Most Environmentally Sensitive Buildings in the Country** list.

In 2005 Heritage Middle School was awarded the Sustainable Buildings Industry Council's **Beyond Green Award for the Nation's Top Exemplary Sustainable Building**. In 2007, Northern Guilford Middle School won the **Beyond Green Award for Best Sustainable School in the Country**.

In 2005 the North Carolina State Energy Office named Innovative Design a **Sustainable Energy Champion**—North Carolina's top award for promoting energy efficiency.

In 2006, ENERGY STAR® awarded Innovative Design a special recognition for **Excellence in Promoting Superior Energy Performance in Building Design**. This was the first time an architectural firm received this honor. We won the same award in 2007.

The Illuminating Engineering Society of North America awarded Innovative Design its **2006 International Illumination Design Award of Merit**.

In 2008, the City of Raleigh awarded Innovative Design the first annual **Environmental Award for Pioneering Efforts**.

In 2008, Innovative Design was inducted into the **National Environmental Hall of Fame** for its sustainable school design.



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