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## Solar Synergy

### Students build a home 'run by the sun' in the international Solar Decathlon competition

- By Angela Marshall



It began with a dream – the brainchild of three architecture students dedicated to challenging themselves, to bettering their world, to designing the perfect solar house. It became a calling, a philosophy and, now, almost two years later, a reality.

Heather Korb, part of that original dream team, looks about in wonder each day as the sketch she began scribbling so many months ago becomes steel, paint, windows, doors, walls and ceilings. She has a smile that cannot be contained – the twinkle in her eyes as bright as the sun she and her fellow students hope to harness.

The house is NYIT's entry in the 2005 Solar Decathlon competition, sponsored by the U.S. Department of Energy.

NYIT is one of 19 colleges internationally – and the only school in the New York metropolitan area – selected as a finalist in a contest that challenges students to design, build and operate the most attractive, effective and energy-efficient solar-powered house.

Korb and her classmates, more than four dozen students from many of NYIT's schools of study, began construction of NYIT's solar house in April and have until the fall to complete it. That means all spring and summer before classes, between classes, heck, during classes, a prime spot on the Old Westbury campus will be filled with the sounds of hammers, saws and chattering students as the house begins to take shape.

In late September, NYIT's solar house, Green Machine/Blue Space, will be loaded onto flatbed trucks and transported to Washington, D.C., for the two-week competition. During that time, the National Mall will become a solar neighborhood, dependent on the energy supplied by the sun. Organizers are so committed to demonstrating the power of alternative energy that only electric cars will be permitted in the area.

"I'm so proud of our students," says Dr. Alexandra Logue, vice president for academic affairs and provost. "The work they are doing is incredible. This is a shining example of how our students can take what they've learned in the classroom and apply it in real-world situations."

### Outshining the Competition

The dream of competing in the Solar Decathlon actually began with NYIT's professors. When they learned about the success of the 2002 competition, they knew their students were just as capable and creative as those who had participated in the inaugural event.

Professors like Michele Bertomen (architecture), Paul Koch (engineering), Paul Lipsky (communications) and Martha Siegel (interior design) became determined to make NYIT part of the 2005 competition. Each challenged their students to begin exploring design and construction ideas. During a design charrette in January 2004, the professors learned just how right they were to believe in their students' abilities.

"I was tremendously impressed with the effort and innovation put into all the designs," says Bertomen. "The hours of research the students did really paid off, resulting in wonderful, thought-provoking presentations."

One stood out from the rest – the design by Korb and her partners, Heather Castelli and Jason Dames. These students took the original intent of the competition a step further, incorporating recycling and globalization into their work.

"We wanted to find a way to reuse some of the discarded waste cluttering up our planet," says Korb. "We wanted to make a statement with something big – something that could be found anywhere. That's when we latched on to the shipping crate idea."

A salvaged shipping container – one of thousands that can be found in any corner of the world – is being used as a large portion of the house. It is the Green Machine, where



NYIT student Richard Merlau created this computer rendering of Green Machine/Blue Space as it will look when completed this fall. NYIT is one of 19 colleges internationally – and the only school in the New York metropolitan area – selected as a finalist in the 2005 Solar Decathlon competition.



Green Machine team

all of the home's mechanical operations – including the kitchen and bathroom – will be located.

"Our design separates the mechanics of life from leisure space," says Korb. "Green Machine contains all of the elements necessary for survival, while Blue Space provides an area for people to live. A breezeway bridges these two ideologies."

**leader Michael Catalano and architectural team leader Heather Korb examine the salvaged shipping container that will contain all of the house's mechanical operations.**

## **Creating a Buzz**

Innovation proved to be the team's watchword once again when it came to deciding how best to harness and store the sun's power. The students knew they could play it safe by using batteries just as all the 2002 Solar Decathlon teams did, or they could take a bold risk and try something new.

In the end, the choice was clear – to make a difference they would have to be different. As a result, NYIT's home will use a regenerative hydrogen fuel cell energy storage system.

"Hydrogen has the potential to replace oil as an energy source, but it will require significant research and development," says student David G. Schieren, energy management and engineering team leader. "The NYIT team made the ambitious decision to implement a regenerative hydrogen energy storage system in order to move this vital research forward. No other team plans to use such a system. The NYIT home will be truly revolutionary, and it will illustrate the promise of energy independence and environmental stewardship."

The main benefit of using a hydrogen fuel cell system, according to Schieren, is that it is a clean, renewable source of power. When used in a home, the energy balance is smoothed out – excess hydrogen produced on exceptionally sunny days can be stored and used on less optimal days. On an annualized basis, the robust summer hydrogen production can be stored for months and used during the lean winter days.

The Long Island Power Authority (LIPA) of Uniondale, N.Y., one of the team's largest sponsors, has worked with the college on several solar power initiatives over the years and was eager to support this project as well.

"We believe that Long Island's long-term energy future is in the hands of today's students," says LIPA Chairman Richard Kessel. "This national contest is a wonderful way to showcase how far efficiency and renewable technologies have come. LIPA fully supports the NYIT team of students as they prepare for victory."

## **What's Inside?**

While student architects were concerned about overall design and engineers were nailing down energy concerns, interior designers were busy with plans of their own.

The only requirement for furniture design is that it be made of sustainable materials, but team members wanted to do more. They felt that furniture should be part of the overall goal toward self-sufficiency. Therefore, they designed micro-environments that could theoretically provide whatever light or temperature adjustments a user could want.

Many pieces of furniture are fitted with their own photovoltaic panels to collect the power of the sun. This can be used to heat or cool the user, providing a comfortable environment. Lights are also placed on all major pieces of furniture so that overhead lighting will rarely be necessary.

Special fabrics of woven filaments designed in the Netherlands are being used to cover the furniture. Innovative wall coverings and padding-free carpeting are also part of the plan. In addition, special wood similar to that used in air hockey tables will allow ventilation for temperature adjustment in the furniture.

The size of the house – only 800 square feet – provided some interesting challenges, according to interior design professor Robert Allen. “Team members had to look at every area of the house and uncover ways to compact all the living arrangements you would expect to find in a normal-sized house.

One way to lessen the need for space was to make multifunctional furniture whenever possible. One example of this is the kitchen table. When not in use, the table looks like a piece of artwork – a giant drum. But when it is time to eat, the top is taken off, revealing chairs that pull out and an eating surface. In addition, the bottoms of the chairs provide extra storage space.

Allen says the project opened students’ eyes to the idea that the American family can live comfortably without relying on the vast amounts of space now found in a typical house.



**Men at work: Architectural team leader Bill Brady, project manager Gerald Stramowsky and Green Machine team leader Michael Catalano.**

### **Sidebar: Dinner is on the House**

### **Getting the Word Out**

Communications students are playing a large role in the competition as well, creating a media campaign, Web site and high-tech presentations to explain what makes the NYIT solar house so great.

Using pioneering technology, Assistant Professor Paul Lipsky and his students created a program to help deliver the team’s message by making the house “talk.”

Each team is permitted to hand out a page to visitors during the competition in Washington, D.C. But with more than 300,000 spectators expected, NYIT’s innovative program provides a more environmentally friendly way to share information.

When entering the house, visitors will be handed a pocket computer with a bar code scanner, which was donated by international mobile technology company Symbol Technologies. At each area of interest, visitors can scan the bar code on a particular item. This will activate a media presentation designed by graduate students that explains the unique aspects of that object.

Also, if visitors want more information, they can enter their e-mail or home addresses into the hand-held PCs.

"This competition has really challenged students to get creative in ways they never dreamed of," says Lipsky. "They eat, sleep and breathe it. I can't wait to hear what new ideas they've come up with each day."

Last year, graduate communication arts students developed a production company with the NYIT Solar Decathlon team as its client. Every student created a presentation board that included a mission statement, logo design and touch points. The team chose Robert Terlizzi's logo design as the winner. It is being used on the Solar Decathlon Web site, T-shirts and all other printed materials.

Communication arts students are also putting their skills to the test by documenting the project. Each time a new piece arrives – from the washer and dryer to the walls made of compressed wheat straw – student photographers and videographers are capturing it all.

## **Sidebar: Powerful Partners**

### **Help From Friends**

To alumni like renowned architect Ted Moudis (B.S. '80) of Ted Moudis Associates in Manhattan, the Solar Decathlon project is fascinating. "When the students came to present their ideas, I was overwhelmed by their passion and the amount of work they had already put into the house," he says. "I'm really happy to be part of it and to help support their goals."

The students are working hard to raise the necessary funds – roughly \$500,000 – to build their house. That means putting together presentations and talking before large groups, convincing businesspeople that this project is worth their investment. They've been getting lots of guidance from NYIT Director of Development Pam Bottge, who helps to coordinate the meetings.

In addition to donations of money and products, the students have been more than happy to receive technical advice from alumni. Paul Gartelmann (B.S. '82) of the architectural firm William F. Collins in Setauket, N.Y., was happy to lend his expertise. "There were a lot of challenges that needed technical solutions, which I've been delighted to help provide," he says. "The students are so enthusiastic that it's a pleasure to work with them."

Many of our Solar Decathlon students are already employed by leading companies. Bill

Brady, Blue Space team leader, works with Gartelmann at William F. Collins. "Without a doubt, support from NYIT's alumni and other businesses have made this experience possible," Brady says. "Every person, every company has proved an invaluable resource."

## Amazing Experience

"Win or lose, this has been an amazing experience," says Michael Catalano, Green Machine team leader. "I've learned so much about team work, deadlines and communicating. When the competition is over, we will have designed and built an amazing house that demonstrates a sustainable future, one that will change the way all Americans live. They'll be talking about it for years to come at NYIT. I am thankful to have been a part of it."

## Dinner is on the House

A fiesta of vegetation will partially cover the roof of NYIT's solar house. The colorful array of flowers, vegetables, grasses and herbs will provide more than a small sanctuary; it will help prove that self-sufficiency is possible, according to members of NYIT's Solar Decathlon team.

Anca Tusinean, an architecture student, is project manager for the garden. Over the last year, she has taken a crash course in landscape architecture, doing hours of research and talking with specialists about the best possible vegetation to grow.

Because the Solar Decathlon competition takes place in October, she was limited to plants that would bloom then. "It was tricky, but I've come up with hearty plants that will make a beautiful display," she says.

While the students are limited in what they can plant for the contest because of the time of year, they say that the roof garden will be a wonderful place for growing vegetables during the spring and summer to feed the eventual homeowners.

Tusinean loves to nurture plant life and took on the roof garden to help decide whether to explore a career in landscape architecture. "It's more than just saying, 'I think this will look great here,'" she says. "There is so much to consider – variety, color, height and texture. It all has to blend into one powerful presentation."

As its name suggests, NYIT's house is divided into two parts: Green Machine and Blue Space. The garden is located on the Green Machine roof, further exemplifying the idea that this area provides all the tools necessary for sustaining life.

In addition to the roof, a series of planters and trellises filled with vines will surround Green Machine.

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## Powerful Partners

From clothes dryers to hybrid cars, the Long Island Power Authority (LIPA) has reached out to NYIT for help with several energy-saving projects over the years.

In fact, the power company first asked NYIT students to create a solar house years ago. Of course, that one was just a tad smaller and less complex. LIPA officials had called on students to build a model house with solar panels that it could use at home shows.

"Working with NYIT is a win, win, win situation," says LIPA Chairman Richard M. Kessel. "It's a great learning experience for the students; LIPA gets some great results; and, in the end, all of Long Island benefits from these projects."

In 1999, LIPA installed solar panels on the roof of Anna Rubin Hall at the Old Westbury campus to demonstrate just how powerful the sun can be in reducing electric bills and providing a cleaner environment.

Dr. Herbert Fox, a mechanical engineering professor, and his students monitor the solar panels, watching energy production as it correlates to temperature and wind conditions via a weather station also atop Anna Rubin Hall. The energy is metered and passed through an inverter system, which converts the direct current to an alternating current (AC), making it compatible with the LIPA system.

Part of the solar panel project was to determine how much electricity can be produced annually, as well as the savings in both dollars and displaced electric generation. The system produces 15.5 kW of AC power at its peak, which is more than enough to power the building.

A project that really got NYIT students excited, Dr. Fox says, involved changing one of LIPA's gasoline cars into a hybrid vehicle run by natural gas and electricity.

"It was a long-term project that forced students to test their skills," says Fox. "They understood how the adjustments they made maximized the car's performance and efficiency."

Also on the laundry list of projects NYIT students have performed for LIPA was the testing of an energy-efficient clothes dryer. The power authority was looking for a product it could recommend to energy-conscious consumers and asked Fox and his students to take the dryers for a test spin.

"The students learned how to perform quality control tests," says Fox. "They measured energy and power consumption as well as time, all the while keeping in mind other factors like load capacity."

What's next, LIPA?

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### **Drop in for a Visit**

The Solar Village on the National Mall in Washington, D.C., will be open to the public from Oct. 7 - 16. You can visit NYIT's Green Machine/Blue Space from 11 a.m. - 4 p.m. weekdays and 9 a.m. - 6 p.m. on weekends. The house will be closed on Oct. 12 and at other times during that week for judging.

Send feedback and story ideas to [alumni@nyit.edu](mailto:alumni@nyit.edu).

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