

Getting Excited about Science

Each year, pioneering ideas from the fields of mathematics, natural sciences and technology are honored in Siemens school competitions in the U.S. and Germany. The slogan for this year's German competition was "Climate Change."



The sea is a source of inspiration not only for poets and thinkers, but also for young inventors who have set their sights on sustainability. Take Aaron Goldin, for example. A Harvard student from California, Aaron has developed a buoy-based wave power plant that converts wave power into electrical energy using a gyroscope. This has several advantages: the system is watertight and mobile, and it does not contain environmentally harmful liquids. Three years ago, when Aaron was 17, he was honored for his invention with the top individual prize and \$100,000 in the Siemens Competition in Math, Science and Technology.

Ayon Sen, a 17-year-old regional finalist in last year's competition, also achieved success with a climate protection project. He used mathematical methods to investigate the boundary surface phenomena of ocean currents, which have a major effect on the climate. And two years ago a prize-winning team from Tennessee caused a stir with an information technology project for the cost-effective production of bio-ethanol.

The Siemens Competition in Math, Science and Technology will celebrate its 10th year in the U.S. and is well-established as a research competition that is reported on by the media. The number of participants increases with each award. Last year, over 1,600 students registered. U.S. governors and senators frequently pay tribute to the winners. Even First Lady Laura Bush recently honored the recent winners at the White House.

Since 2007, this successful concept has also been implemented by Siemens in Germany.



The 2008 German competition focused on climate change. The first place winners (above right) examined how solar energy could cut carbon dioxide emissions. Adjacent are the U.S. prize winners.

"Our goal is to get young people excited about technology and science, and to discover and promote talented individuals as early on as possible," says Christa Mühlbauer from Siemens Corporate Citizenship, who is the project manager for the competition. The shortage of engineers in Germany shows that action needs to be taken. Siemens believes that addressing this issue is a social challenge.

Climate Change. In contrast to the competition in the United States, German students in classes 11 to 13 are given a predefined research topic. Says Mühlbauer, "The slogan should be up-to-date and socially relevant, but it also should be relevant to the company." And this year's topic, which is "Climate Change," was a big hit. "The response has far exceeded our expectations," says Mühlbauer. Almost 800 students applied, both individually and in small teams. In all, around 400 topics were explored. In particular, many students addressed topics on the research areas hydrogen technology, biogas, solar energy, and carbon dioxide storage.

Many unusual topics can be found among those submitted. For example, one project investigates whether the energy generated by billions of pedestrians on sidewalks around the world can be made usable via piezoelectric generators.

Unusual approaches are actively encouraged, explains Christa Mühlbauer. After all, in the advertisement for the competition, students were asked to give free rein to their fantasy. The task of the contest's independent jury of experts is to select the cream of the climate protection ideas. Ten renowned scientists from Siemens partner universities, the Technical Universities (TU) of Munich and Berlin and Aachen University, have been involved in deciding which projects are worthy of a prize.

The winners were selected in April, 2008. They were Rosa Meyer and Christine Mauelshagen from Hollenberg High School in North Rhine-Westphalia, who examined how the use of solar energy could cut CO₂ emissions in their local area. Their award-winning study earned them €30,000 in prize money.

"We will be awarding a total of €111,000 in prize money, some of which will also go to the departments of the supervising teachers," reports Mühlbauer. The winning students can finance their studies with their prizes and also make a name for themselves in scientific circles before they even enter a university.

Hopefully, the prize-winners and their inventions will trigger a wave of enthusiasm in industry and business — and go on to prove their potential for climate protection in practice. ■ **Andrea Hoferichter**

Austria's Feldkirch hospital — as well as a clinic in Aalst, Belgium (inset) keep their CO₂ emissions to a minimum thanks to a package of energy-saving measures.



Buildings with Brains

High energy consumption in buildings is not only wasteful, but relatively easy to overcome. A growing focus on automation is helping to achieve substantial savings in new office high-rises, swimming pools, and schools.

Just about everyone's heard of bosses who turn down the heat and turn off lights. These days, however, energy conservation is more than just a question of pinching pennies; in view of climate change, it's become an urgent necessity. What's more, it also pays significant financial dividends. For the past 30 years or so, most big buildings have been equipped with automation systems for monitoring and regulating a variety of complex equipment, ranging from heating to fire alarms and elevators.

The potential for savings here is enormous, as buildings account for around 40 percent of total energy consumption and 21 percent of greenhouse gas emissions worldwide (see *Pictures of the Future*, Spring 2007, p. 83). So it's not surprising that the European Union has issued a directive governing overall energy efficiency in buildings (see box, p. 30). The energy conservation wave has also hit the U.S., where

Siemens Building Technologies (BT) is a member of the Clinton Climate Initiative (CCI). The initiative's Energy Efficiency Building Retrofit Program is designed to make private and public building owners more aware of the need to modernize their building systems. "With its global presence, broad range of environmentally friendly building systems technology, and extensive expertise, Siemens is ideally suited to support the CCI," says Bob Dixon, vice president of BT in the U.S., who is responsible for BT's worldwide energy and environment activities.

Minor Improvements, Major Savings. In recent years BT has modernized automation systems in approximately 1,500 buildings in the U.S. For example, in Cleveland, Ohio, Siemens has renovated more than 200 apartments and buildings belonging to the Cuyahoga Metropolitan Housing Authority (CMHA). Replacing win-

dows, plumbing fittings and lighting systems, and making use of building automation systems will save the CMHA around \$50 million over the next 12 years. Associated energy savings will add up to almost 8,400 tons of CO₂ and more than 250,000 barrels of crude oil.

Although regulatory requirements often set the stage for energy conservation, rising energy prices are the most fundamental trigger. Building managers today are truly amazed by how little it takes to reduce energy and operating costs by as much as 20 percent.

"Operators of big buildings generally don't realize how much energy they're wasting," says Thomas Baum, head of Energy Optimization Services at BT. "In order to understand, they need comparative data." Siemens develops this information with the help of a site visit and the public data on similar buildings. A Web-based energy management program is used to process the