Our manufacturing facility in Bangkok has made saving energy one of its highest priorities, and has already produced significant results – achieving a 7% relative reduction in energy use compared to the base year of 2006.

Making a difference

Saving energy is a team effort in Bangkok

Tanongsak Buachai* | *Facilities Manager, NXP Bangkok, Thailand

Tanongsak Buachai, facilities manager for the site, says, "We have continuously looked for opportunities to reduce energy consumption and improve energy efficiency throughout our systems."

In 2007, the facility implemented 17 energy-related projects and saved a total of more than 1 million kilowatt hours (kWh). Cross-functional cooperation was an important part of their success, and, in some cases, outside experts were brought in to evaluate conditions and suggest ways to save even more. In each case, any changes to the manufacturing environment were studied closely before they were put in place, and were then monitored carefully to avoid any impact on production quality or capacity.

In one project, they raised the minimum relative humidity (RH) requirement and raised the temperature of chilled water by 1 °C. In combination, these changes saved 405 thousand kWh a year. In another project, they raised the temperature set point of certain production processes by 1 °C and saved 360 thousand kWh a year. They reduced air-conditioning leaks by sealing off or closing certain doors, ceilings, and walls, for a savings of 139 thousand kWh a year. Also, by replacing a reverse-osmosis pump with a newer model that had 30% better efficiency ratings, they saved 30 thousand kWh a year.

In 2008, the energy-saving efforts will be managed by the Facility Savings Team, a new group that brings together people from every part of the business. The team assigns project champions, meets weekly to track progress, and makes regular reports to management. As much as 60 to 70% of the facility's overall savings are expected to come from roughly 20 energy-saving programs. From Tanongsak's point of view, the new team's work is vital and enables "real, sustainable energy savings, not just this year but in the long run."

Internships have always been a great way to bring bright, enthusiastic people into the organization, but at our industrial site in Fishkill, a new program is doing more than attracting talent – it's helping find creative ways to conserve natural resources and reduce our impact on the environment.

Making a difference

"Green" interns bring new ideas on conservation

Dinesh Selvaraj | CMP Process Engineer, NXP Fishkill, United States

It started in 2006, when Dinesh Selvaraj became the first student to participate in New York State's Green Engineering Internship Program, a cooperative effort between the New York State Department of Environmental Conservation, Clarkson University, and NXP's Environmental Health & Safety (EHS) and Engineering departments. "The idea was to place interns in positions where they could address issues of pollution and conservation," explains Dinesh, "and I was the guinea pig."

As a PhD candidate, Dinesh had been working on process engineering with an emphasis on energy conservation. Arriving at the Fishkill facility, he opted to study the use of de-ionized (DI) water in the manufacturing step called Chemical Mechanical Planarization (CMP). "When I learned that a third of the site's DI water is used in CMP, I figured it was a good place to start looking for ways to conserve."

CMP is an abrasive process that uses a chemical slurry to smooth the surface of the silicon wafer before more circuitry is added. The wafers are kept wet before and after polishing, and any excess DI water with unused slurry in it has to be treated before being discharged.

There are dozens of CMP machines in use at the site, and Dinesh found remarkable variations in the amount of water used in each. He proposed installing a control system that would regulate the flow of DI water, giving each machine a consistent, predictable supply.

NXP acted on his proposal and anticipates that the new control system will deliver stellar results: 27 million liters of DI water saved each year, significant reductions in the amount of slurry waste, and a total annual savings of nearly $200,000. "Not bad for a guinea pig," he says with a smile.

Dinesh has since finished his PhD and joined NXP as a full-time CMP engineer. "When NXP made the offer, I took it immediately. I loved my internship – the people were great and I looked forward to going to work each day. I received great mentoring and discovered that CMP is a field with lots of opportunities to grow."

The Green Internship program has since been expanded and now places interns statewide. NXP has also continued its participation, and currently has an intern looking at ways to recycle DI water.

2007 was a remarkable year for our manufacturing facility in Guangdong – compared to 2006, they increased production by 20%, yet managed to use 13% less electricity and 21% less water on a per-product basis.

Making a difference

Big, big savings

Johnny Lu | *Facilities Manager, NXP Guangdong, China*

The savings came from a combination of projects, big and small, and a site-wide commitment to conservation. "There's a worldwide shortage of resources," says Johnny Lu, Facilities Manager for the site. "Saving water and electricity helps us cut costs and stay competitive, but it also helps us create a better world for everyone."

The bigger projects involved improving the efficiency of specialized systems. In one effort, they installed a reverse-osmosis system to recycle waste water from the plating step in manufacturing, saving 220 m^3 of water per day. In another, they added a variable-speed driver (VSD) to their air-conditioning system so the water pumps could use less electricity during cooler days and at night, when temperatures are lower. The results were "even better than predicted," saving 25 thousand kWh per month

In a third project, they balanced the capacity of the site's compressed dry air (CDA) system by installing a pipe that connected the building's compressors. They were able to make full use of one building's high-efficiency, high-capacity machines while retiring several low-efficiency, low-capacity machines in another, saving 50 thousand kWh per month and reducing repair and maintenance fees on the retired machines.

The smaller projects looked at possibilities for saving in everyday ways. In the warehouse and production workshop, for example, they measured lighting levels and found that the areas were brighter than industry guidelines recommended. They installed light-reflecting lampshades to distribute light more effectively in certain areas, and experimented with combinations of fewer lights in others. In the end, they eliminated more than 1400 lamps site-wide, while keeping brightness levels well within the recommended range. The site also uses the remaining lights less than before, shutting them off at noon, when nobody is in the office.

Johnny's team did other things, too, guided by the idea that little things add up, and that "conservation doesn't always need a high-tech solution." The site now has stickers on computer monitors and light switches reminding people to turn them off when not in use, and there are posters with helpful hints on how to conserve energy and water. "We need everyone to contribute," says Johnny, "since conservation is everyone's concern. We're all responsible for the earth."

Careful planning, a bit of detective work, and some serious ingenuity – that's how Rob de Heus and his colleagues in materials management succeeded in raising the bar for environmental friendliness, with a new series of products called "Dark Green."

Making a difference

Taking green to the next level

***Rob de Heus** | Materials Development Manager, NXP Nijmegen, The Netherlands*

It started with a request from some of our leading customers in the mobile-phone segment. Concerned about the disposability of their products, they were looking to replace two of the flame retardants used in IC packaging, halogen and antimony oxide.

Rob's group took the challenge and began collaborating with all the parties involved. "We worked very closely with our customers, our suppliers, our industrial sites, and our marketing teams to find a better alternative," says Rob.

Changing the chemical formula in a semiconductor product is no easy task. The manufacturing process is extremely delicate and complex, so making even a minor change can have a serious impact. Once Rob's group had a candidate for the replacement compound, there was still plenty of work ahead. The test and qualification process can take up to two years to complete, since the new substance "has to work with our existing machinery and has to meet our high standards for quality and reliability."

In the end, Rob's group delivered a new kind of packaging, called Dark Green, that doesn't use halogen or antimony oxide and, as an added bonus, is more resistant to moisture. It doesn't require dry-pack processing, which involves drying the package and sealing it in plastic, so that delivers an added saving on energy and resources.

Taking the challenge a step further, Rob's group continued to work with suppliers and internal NXP groups to lower the cost of the new packaging. The latest Dark Green products use smaller ICs, so they can be housed in smaller packages, and semiconductor manufacturers don't have to pay a cost penalty for greener products. "Miniaturization is truly a team effort," says Rob, and "key to our success, since less silicon means lower cost, fewer materials, lower power consumption, and, best of all, less impact on the environment."

Formal legislation restricting halogen and antimony oxide is now under discussion and NXP, as a leader in the field, is providing technical expertise that will help legislators make informed decisions.

How do you make sure everyone's thinking about environment, health, and safety (EHS) issues and, at the same time, re-energize your workforce? For the industrial site at Kaohsiung, Taiwan, the answer is clear: make EHS a top priority, get everyone involved, and, most important, have some fun.

Making a difference

Taking a fun, creative approach to EHS awareness

N. J. Shih* | *Plant Engineering Manager, NXP Kaohsiung, Taiwan

Every two years, the Kaohsiung site sets aside an entire week dedicated to EHS. Each morning there is a company-wide email that announces the day's events and gives highlights of the previous day's activities. It's a busy week, and all of the site's 2,300 employees are encouraged to take part in some way. There are training sessions that teach new skills and refresh old ones, internal audits and emergency evacuation drills that test employee preparedness, and entertaining competitions that tap into employee creativity.

N. J. Shih, facility manager and member of the event planning team, says his favorite activity of the week is the slogan competition, because it shows how much literary talent there is at the site. Employees are invited to submit short, poetic phrases that inspire people to focus on EHS. The winning 2007 slogan, selected from a pool of roughly 200 entries, addressed the importance of passing the upcoming OHSAS 18001 audit and was made into a colorful banner that still hangs in the company cafeteria.

N. J. is also enthusiastic about the competition that selects the best employee suggestion, since, again, it encourages people to think creatively and tests their ingenuity. The 2007 award was given to an idea for "installing a water-recycling system in one of our manufacturing processes that could save 80 tons of water per day, which is very, very valuable."

N. J. also likes the class that teaches people how to escape from a tall building using ropes and a descender device. "That's a very useful skill, even outside of work," says N. J., "since there are so many people living in tall apartment buildings here in Taiwan."

The EHS week takes a lot of careful planning, but N. J. thinks it's definitely worth the extra effort. "It brings together everyone in the organization and emphasizes that EHS is a daily routine. It helps people make EHS a normal part of everyday life."

NXP Southampton is using a new planning tool to guide the next generation of technologists and engineers, and more employees are getting involved than ever before.

Making a difference
Steering students toward technology

Steve Delaney | *Site Services & Quality Manager, NXP Southampton, United Kingdom*

When Steve Delaney joined the United Kingdom team in Southampton, he found an organization that was already involved in a range of educational programs at local schools, colleges, and universities. Good things were happening, but the activities were fragmented, and there was no way to evaluate proposals for new programs or track the progress of existing ones.

Steve saw an opportunity to add a framework and, as he puts it, "make our efforts more meaningful and more valuable." His team developed a tracking tool, called the Student Technology Education and Engagement Roadmap (STEER), that monitors the activities and stimulates ideas for new initiatives. The tool identifies student groups by their stage of education, from early secondary school to university post-graduates, along with their topics of interest. It then matches those categories with various activities. NXP gets a clear view of who's doing what, and every category of student benefits.

Wherever possible, Steve encourages staff involvement. "Simply writing a check might be easy," says Steve, "but it's a faceless, nameless way to do things. We're taking the time to build personal relationships, and we're already seeing the positive results."

In 2007, more than 11% of the onsite staff participated in a face-to-face program. More than 500 students attended NXP presentations at universities and schools, 220 students participated in challenges organized or sponsored by NXP, and more than 1,000 students attended NXP career days. Also, nine students worked on NXP-specific projects, and NXP sponsored two University research programs.

When Jean-Jacques Guillard, an IT Service Desk Manager in NXP France, saw aging computer equipment that most people would have considered ready for the recycle bin, he saw a way to help young patients in the long-term stay ward of a local hospital.

Making a difference

Finding a new use for old computer equipment

Jean-Jacques Guillard | IT Service Desk Manager, NXP France

The Suresnes location, a small office with only about 80 people at the time, was facing an issue that many NXP sites have to deal with. The computer equipment they owned was becoming obsolete. It was too old for business use, but not so old as to be entirely useless. So what should they do with it?

Jean-Jacques had seen an article in a local newspaper about an association, called Docteur Souris (Doctor Mouse), that provides IT solutions to local hospitals that have children as long-term patients. When Jean-Jacques contacted the people at Docteur Souris, he learned that they were looking for equipment that was more modern than what he had on hand – Docteur Souris usually donated newer items like laptops and Wi-Fi connections so the kids could have a convenient way to stay in touch with families and friends while in the hospital.

That's when Jean-Jacque and his colleagues really got creative. They erased any business-sensitive data from the old NXP machines, loaded them with open-source software, and organized a sale that gave employees the option to buy the used equipment. Then, having sold the old equipment, they negotiated with Philips Consumer Electronics and used the proceeds to get new equipment at a discounted price.

The Suresnes team held a ceremony in which they presented Docteur Souris with their donation of new wireless adaptors and memory sticks. Docteur Souris then installed everything at the children's house at Kremlin-Bicetre hospital.

Jean-Jacques recently moved from Suresnes to Caen, where they made the switch from leasing to ownership a few years ago. "The Caen site will be facing a similar situation soon," says Jean-Jacques. The Caen site is much bigger, with 1,200 employees and 1,600 computer stations. For Jean-Jacques, those extra seats represent bigger opportunities for donation, since there will be more funds to work with. His team will have more choices, such as contributing to a variety of organizations or making a more sizable donation to just one. "Those extra seats mean we'll be able to do greater things."