How can we meet the world’s environmental challenges and ensure economic prosperity?

With innovative, resource-efficient technologies.

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Answers for the environment.
Answers for the environment. Innovation from Siemens available NOW.

The question of how to balance economic growth with improved care for the environment largely revolves around energy. It is a complicated yet vital challenge that America, and the world community, must address — quickly. As the U.S. population grows and when the economy rebounds, electricity demand is expected to increase by approximately one-third in the next 12 years. Worldwide, the demand for energy is expected to double by 2030. Meanwhile, businesses large and small face the challenge of meeting rising energy needs in ways that are cost-efficient, sustainable and environmentally compatible.

At Siemens, we consider ourselves an integral part of the solution to these challenges.

We were ahead of the curve in terms of investing in our environmental portfolio – energy-efficient technologies, renewable energy, automation, smart buildings, environmentally responsible lighting and more.

Our broad range of products and solutions enables our customers to become more energy efficient, environmentally friendly and competitive. For example, we estimate that our environmental portfolio helped our customers save approximately 148 million tons of carbon dioxide emissions in 2008.

To complement our highly efficient gas turbines, we’ve invested in a wide range of alternatives for generating power, from wind and geothermal to coal gasification. For energy consumers, we offer a robust selection of environmentally friendly solutions, from efficient
lighting and climate controls for buildings, to solutions for traffic management and mass transit systems, pollution control and water treatment.

Being part of the solution also means that we live these important sustainability values as a company. We were part of the industry coalition that spearheaded the recent phase-out of energy-wasting incandescent bulbs. We work closely with major environmental stakeholder groups such as the Clinton Climate Initiative and the U.S. Climate Action Partnership. Companywide, we’ve committed ourselves to reducing our energy consumption and water usage by 20%, as well as to cutting waste production by 15% by 2012.* Recognition for our environmental and other efforts has led to Siemens’ listing on the Dow Jones Sustainability Index nine times since 1999 — a prestigious honor we’re all very proud of.

Siemens is helping America meet its growing energy needs in efficient ways that lower costs for our customers and take better care of the environment.

This interactive brochure highlights some of the world’s most innovative and unique breakthroughs in the fields of energy and the environment. I invite you to see for yourself the many answers Siemens has for addressing one of the greatest challenges facing America and the world.

George Nolen
President & Chief Executive Officer
Siemens Corporation

*Figures every year are relative to sales.
Efficient Energy Supply
Truly sustainable power solutions must encompass both energy generation and distribution. Technologies are available today that can make traditional coal- and gas-fired plants cleaner and more productive, while new, current-generation plants have a smaller carbon footprint with highly efficient generators. Siemens works hard to bring innovative and affordable power-delivery options to the electric, oil and gas industries. For instance, our Smart Grid technologies enable automated control systems to constantly update utilities and other large-scale customers on the soundness of their systems. Monitoring and measuring distribution this way ensures problems are more immediately averted and energy keeps flowing more efficiently.

Green Mobility
Reducing energy consumption is a priority for our transportation solutions. As a result, we’ve created energy storage systems to capture the power a train loses during braking for reuse during acceleration. We’ve pioneered traffic-control systems to cut down on roadway congestion. These are just a few examples of how committed we are to improving travel time, increasing traffic flow and reducing pollution across the country.

Building Green
Whether it’s a 100-story building, a manufacturing plant, or a small-town university, Siemens is helping established and recently constructed buildings function with greater energy efficiency, lower cost and increased comfort. By bringing our environmental expertise to the areas of planning, construction and maintenance, we help identify and eliminate sources of energy loss, so buildings run at peak efficiency and are in harmony with the environment.
Environmentally Responsible Lighting

Innovative design and energy-saving technology are what make Siemens’ lighting unit, SYLVANIA, an industry leader. Our specialty products and solutions are specifically engineered to last longer and produce less waste than standard lighting products used in residential, commercial and automotive applications. When you look at it like that, it’s a brighter future for everyone.

Environmental Manufacturing

Increasing efficiency through product cycle times while protecting the environment is a top concern for manufacturers today. Siemens helps companies meet environmental compliance mandates while supporting green business practices by giving them the power to design and manufacture with environmental care in mind. Our software integrates environmental compliance directly into the product lifecycle process, ensuring that all regulations are followed and compliance risk is reduced without compromising innovation or speed to market.

Clean Water Supply

As a leader in balancing energy needs with environmental concerns, Siemens is creating custom water-purification systems for industrial manufacturing and utilities to help trim their energy consumption. Through the use of advanced filtration systems and breakthroughs in purification technologies, we treat hazardous liquids and safely recycle spent materials to keep them out of the nation’s water supply.

Sustainable IT

Environmentally friendly information technology has become a critical area for companies seeking to reduce the huge amounts of energy wasted with oversized IT infrastructures. Siemens takes a holistic approach to IT operations by applying energy efficiency to all aspects of data center operations, from power consumption and system consolidation to the construction of green data centers.
How can you power the world without overpowering the environment?

With sustainable energy solutions.

siemens.com/answers

Answers for the environment.

The population in the United States is growing, and so is its demand for energy. Creating truly sustainable power solutions requires an equal concern for both generation and delivery. Challenges today include finding new and innovative ways to incorporate a broad mix of clean and renewable power sources, while ensuring the power grid does not lose its reliability as it moves energy from source to consumer. A system that falters or pollutes along the way isn’t efficient, effective or smart.

As a company whose systems help generate more than one-third of the nation’s electricity, Siemens has one of the world’s most diverse offerings of sustainable power solutions. We’re also hard at work bringing affordable and sustainable power-delivery options to regions all across the country. In fact, we are a proven innovator in all aspects of power generation and distribution.

We maximize green energy production wherever possible. This includes improving the efficiency of existing power plants to generate more electricity and fewer emissions, as well as the promotion of renewable energy sources, such as wind. And our technologies are already helping to transform the country’s power grids into “self-healing” systems capable of correcting power imbalances and managing changes in flow and demand. So whether it’s sending electricity from power plant to wall socket, oil from tanker to mainland, or natural gas from well to furnace, we are addressing the need for sustainable power and delivery solutions on all fronts.

Efficient Energy Supply

In the U.S., demand for electricity is expected to increase 33% by 2020.

Fossil fuels still supply the bulk of America’s power production — and they will continue to be a significant resource for meeting tomorrow’s growing energy needs. The most widely used fuel in the U.S., by far, is coal. Most experts agree that there are sufficient domestic reserves to meet our energy needs for the next 200 years. Still, using coal for power requires extensive environmental controls to meet stringent regulatory requirements.

At Siemens, our capabilities and expertise enable us to answer those demands. We produce highly efficient equipment for both coal- and gas-fired power plants to help our customers get the power they need while significantly reducing emissions. We’re also helping to improve the environmental performance of these plants by providing an array of environmental control technologies that yield substantial emission reductions. We can provide modernization and upgrade solutions that will help improve the lifecycle performance of your existing plant.

We are also a leader in the latest and most innovative gasification technologies. These solutions allow customers to gasify low-quality fuels, which are then used to produce electricity through the most efficient gas turbines available. In a setting where climate change and environmental care are important issues, our new, highly efficient SGT5-8000H series gas turbines can help meet rising energy demands while protecting our planet.

Alternative and renewable power.

Even with improved efficiency in existing plants, the U.S. still needs significant additional power-generation capacity. Some of it will come from nonconventional or alternative energy sources, including renewable sources. For example, the U.S. Department
of Energy has set a goal of tripling the amount of electricity from wind-generation sources by 2020.

Siemens is a world-class innovator in the field of alternative power sources. Our wind turbine business is helping to generate emission-free electricity through a full range of wind-driven generators. In fact, we can plan, build, operate and maintain wind-power farms — both on- and offshore. (See the case study on the last page of this section.)

Siemens also provides high-efficiency steam turbines for use in solar-thermal plants and has developed modernization technology to substantially increase the energy output and extend the life of nuclear power plants, two additional emission-free sources of power.

**Innovations on the horizon.**

In today’s energy markets, increased demand and environmental concerns make innovation imperative. Siemens is fully invested in meeting the increasing need for energy through a variety of environmentally friendly sources — for example:

- **Ethanol.** Nearly 70% of new ethanol plants being constructed in the U.S. today use automation products, services and support from Siemens. It is an important, renewable fuel, and a critical area of focus for Siemens.

Moving forward, Siemens will continue to invest heavily in R&D. Our goal is to develop even more advanced technologies for our diverse portfolio of sustainable resources, aimed at keeping our power needs and our concern for the environment in harmony for generations to come.
Siemens Case Study: The Wildorado Wind Ranch™

With approximately 25% of the total installed wind energy capacity in the nation, Texas produces the most wind power of any U.S. state. Wind energy accounts for 3.3% of all the energy used in the state and is growing. Despite the state's leading position, the dust, sand and heat in some regions of Texas make building and maintaining wind farms a challenge. But there are technological solutions to ensure that the wind turbines are able to withstand the environmental challenges inherent in these challenging conditions.

That's why Cielo Wind Power selected Siemens to build 70 specially designed turbines for the Wildorado Wind Ranch near Amarillo, Texas. Completed in 2007, the Wildorado Wind Ranch is the largest single wind power facility in the Southwest Power Pool, serving parts of Texas, New Mexico, Oklahoma, Colorado, Kansas, Arkansas and Louisiana.

The custom turbines stand 1,450 feet above ground—almost as tall as the Empire State Building in New York City. Each turbine was constructed with additional cooling and other protectants to withstand the challenging weather conditions in Texas. Together, the 70 turbines generate enough electricity to power more than 50,000 homes.

By 2020, wind power could be helping to reduce global annual carbon dioxide emissions by as much as 700 million tons— that’s about five percent of the total annual output of CO₂ from all power generators today.
Keeping up to speed with electrical power.
Demand for electricity continues to outpace investment in new power sources and transmission technology. Over the past decade, electricity demand grew by roughly 30%. At the same time, transmission capacity has grown by only half that amount. The result is a growing geographical disparity between power generators and consumers. Meeting the needs of the nation’s complex power distribution challenge is pivotal. Siemens has a broad portfolio of innovative solutions that, used individually and in combination, are improving the quality and availability of electrical power for all Americans.

Anaheim Underground: The first completely underground gas-insulated switchgear (GIS) substation in the U.S. lies beneath Roosevelt Park in this Orange Country community. Siemens created the equipment that made it possible, including a GIS that doesn’t need as much space as conventional components.
Siemens’ energy management and network control systems are helping accelerate the modernization of our nation’s three power grids, especially in those energy corridors where congestion and demand are highest. This includes making the grids “intelligent” and “self-healing” so energy can reliably get to where it’s most needed. We accomplish this through our Smart Grid solutions. Smart Grids fully integrate the operational environment of a power grid and help maintain a stable and healthy energy delivery network. This innovation provides system operators with the kind of timely information they need to respond to system events in order to avoid or mitigate outages and blackouts. So when problems arise, corrective action is automatically taken, and operators are more immediately alerted.

Another area of distribution where we’re hard at work is renewing the nation’s electrical infrastructure with high-voltage transmission technology. Innovations in this area have enabled us to increase the amount of power transported on existing lines by more than 30%. With these advancements, emissions do not increase and can actually be reduced, making the entire process more environmentally friendly.

**Oil and gas are on the move.**

Siemens’ engineering and technology expertise is a key player in the exploration, production, transportation, storage and refining of oil and gas. Our electrical automation and process technologies help oil and gas companies explore in adverse environments, extreme climates and remote spaces. It’s this technology that also helps operate and maintain an extensive infrastructure for the transportation and distribution of crude oil and natural gas through thousands of miles of pipelines, vast tank farms and subterranean caverns.
Our company’s commitment to reducing emissions and improving energy efficiency is reflected in our portfolio of field-proven gas turbines, electric motors and compressors for virtually all production, transport and process applications in the upstream, midstream and downstream sectors of the oil and gas industry. We’re even collaborating with pipeline customers to retrofit gas turbines with more environmentally sound electric drives. All of our services and solutions, whether for electricity or oil and gas, are part of our fundamental mission to seamlessly integrate sustainable power generation with a network that can best deliver that energy safely and efficiently.

**Siemens Case Study: Power for Long Island.**

Siemens has played a key role in building power generation equipment for New York State’s utilities. For example, on Long Island, where per capita demand for power is one of the highest in the nation, we’re providing solutions that ensure the availability of power to customers where new plants cannot readily be constructed.

For years, millions of residents and thousands of businesses on Long Island have suffered from high-priced, sometimes erratic power. The 120-mile-long island is poorly connected to mainland power grids, and most of its power is purchased from suppliers to the north.

Siemens is helping to make more energy accessible to Long Island in a big way. The company engineered a high-voltage system
capable of transmitting power along an undersea cable stretching nearly 70 miles between Long Island and New Jersey. This connection will allow Long Island to purchase power from mid-Atlantic states, where power-generation costs are lower.

Called the Neptune Project, this system can carry 660 megawatts of power — enough to power 600,000 homes — resulting in more sources of power and potentially lower costs for residents. Officials at Long Island Power Authority are calling Neptune “one of the most important energy projects ever developed for Long Island.”

This new undersea high-voltage direct current transmission system transmits energy and capacity from PJM Interconnection — the world’s largest wholesale electricity market—to help meet the growing demand for electricity on Long Island, New York.
Efficient Energy Supply — Powering.
• Combined-cycle power plants
• Clean coal, including Integrated Gasification Combined Cycle (IGCC)
• Upgrading/modernization of conventional and nuclear power plants
• Electricity generation from renewable sources
• Environmental-control technology
• Solar-thermal
• High-efficiency gas and steam turbines

Efficient Energy Supply — Distributing.
• Process automation and controls
• Energy-efficient motors and drives
• High-efficiency transformers
• Totally Integrated Power
• Smart Grid technologies
• High-voltage direct current systems
• Gas-insulated lines
• Energy management and information systems
• Alternative energy distribution system – solar and wind
• Gas-insulated switchgear (GIS)
• Flexible AC transmission systems (FACTS)
How can we meet our growing need for mobility and also protect the environment?

With complete mobility solutions.

siemens.com/answers

Answers for the environment.
Idling engines cost Americans more than $60 billion a year in wasted fuel.

**The Needs of a Nation on the Move.**

Cost-efficient transportation is a key component of our economic growth. But it’s also a source of stress on the environment. Gridlocked highways and aging infrastructure result in wasted energy, longer commutes and increased pollution. For businesses, moving goods through an overburdened transportation network also creates logistical, financial and environmental challenges.

Siemens is directly addressing these issues and their impact on the environment in a variety of areas: intelligent traffic systems for roads and railways, tolling systems to reduce urban congestion and solutions to improve the flow of people and goods in airports. These are a few examples of how our innovation enhances the mobility of our growing population while reducing our impact on the environment.
On the road. Riding the rails.

According to the Texas Transportation Institute, idling engines waste billions of gallons of gas per year, costing Americans more than $60 billion – that's $200 for every American annually. This underscores the importance of improving our nation’s travel times and traffic flows. Siemens’ “telematic” systems can help. When traffic backs up, these systems chart the fastest routes for drivers and provide alternative routes so that road congestion and pollution can be reduced. It is a particularly useful technology in trucking and other industries operating large fleets.

What about the fuel that drives these engines? We’re already working on the answer, by providing sustainable fuel production and effective control systems to more than two-thirds of the plants in this country currently producing clean-burning ethanol.

Strengthening America’s mass-transit systems is another example of how we are using our expertise. One in every three light-rail vehicles in the U.S. is supplied by Siemens. Our systems move people safely, while helping to revitalize urban centers such as Portland, St. Louis, Salt Lake City, Houston and Denver.

One in three light-rail vehicles in the U.S. is supplied by Siemens.

Made in the U.S.A.: The S70 light-rail train in San Diego is manufactured by Siemens in Sacramento. San Diego is one of 13 cities in the U.S. and Canada that use light-rail systems from Siemens to create reliable, sustainable transportation networks.
We’ve also created the integrated mobility solutions that improve the performance of transit systems across the country. This includes rail infrastructure, rolling stock, rail components and maintenance services that keep trains on time and operating with optimal energy efficiency. In another notable innovation, Siemens produces energy storage and energy management systems that can feed the energy from a train’s brakes back into the power grid for reuse.

We can also optimize railway systems and their subsystems. For example, with signaling equipment, we integrated solar power with sophisticated, energy-saving LEDs to develop environmentally friendly LED signal lights. It’s an improvement that inspired one of our customers to replace 12,000 of their mechanical traffic signals with these new LED lights. Traffic signals like these do not need a separate power supply cable, and the propane gas supply previously required for repair service is also no longer needed. This increased reliability and improved durability have enabled operators to extend their maintenance intervals to 10 years. Operators and the environment both benefit.

**Through the airport. Across the seas.**

Around the world, airports use our components to get travelers from terminals to their flights more quickly. We have improved the flow of people and goods through crowded airports by providing modern baggage handling systems, as well as by maintaining high-tech security equipment.
Across the oceans, seagoing traffic presents ample opportunity for energy conservation and innovation. Siemens manufactures electric booster drives for commercial and passenger ships that cut diesel fuel consumption by as much as 10%. The best of these drives also incorporate generators that capture waste heat from fuel exhaust to generate additional electric power.

**Moving more people. More reliably.**

By all projections, the pressures on America’s transportation network will increase dramatically in the coming years. By continuing to create new systems and solutions, Siemens is working to ensure that the environmental impact of all types of transportation remains at acceptable levels. The end goal is to create a better mix of mobility solutions to efficiently manage traffic flow while reducing harmful emissions.

**Siemens Case Study: NYC’s Subway System.**

New York City's subway is one of the biggest and most complex urban transportation systems in the world: Every weekday, more than five million riders climb aboard at one of nearly 500 stations within the city’s five boroughs, riding trains that collectively cover nearly 700 miles – almost the equivalent of the distance between Chicago and Washington, D.C.

Improving service in America’s largest city is a daunting — but necessary — assignment. Most train lines there operate 24/7, 365 days a year, and there isn’t much room for expansion.

Since 1999, Siemens has been helping New York City’s transit department apply technology to upgrade the subway system.
so the city can move more people, more reliably. We are also providing hardware and IT systems that will increase security and safety.

We have modernized the rail control center and are linking it to all the stations with fiber-optic communications so subway operations can be optimized.

Our communications-based train-control system also allows more trains to operate on existing tracks — reducing congestion by increasing the frequency of passenger service.

It’s all part of the expertise and technology that go into powering the city that never sleeps.

**Green mobility.**

- Telematics — intelligent traffic systems
- SITRAS SES — energy storage system and voltage stabilizer
- Electrified rail
- Communications-based train-control system
- Solar LED rail signaling
- City tolling (congestion pricing)
- Freight transport and cargo management
How can your building leave a smaller environmental footprint?

With green building solutions.

siemens.com/answers

Answers for the environment.
Building Green

Buildings account for one-third of our overall energy consumption.

Building on an Environmentally Friendly Foundation.

From the factories where goods are produced and the schools our children attend to the homes and offices where we live and work, buildings are integral to our lives. Buildings now account for one-third of all energy consumption worldwide, which has a definite impact on the environment.

As pressure increases to be more environmentally responsible, companies are looking to upgrade or replace aging, inefficient facilities. Business leaders need a strategic partner and plan to ensure a stable, long-term energy foundation. Achieving energy efficiency in buildings is the quickest, most cost-effective and environmentally friendly way to extend energy supplies and manage energy use.

Siemens has answers that add value at every stage of a building’s lifecycle — whether it’s by helping customers renovate an existing facility or consulting on new construction. We help our customers define their objectives, implement green and energy-saving strategies and maintain efficient, sustainable operations. Siemens can help better manage a facility’s energy expenses and protect the environment, easing the impact on the world around us.
At Siemens, innovative energy-saving equipment and technologies are under constant development. We strive to make our customers’ buildings comfortable, safe, productive and less costly to operate. Siemens experts are well versed in energy-saving facility retrofits and system improvements. We know how to apply them to your organization to maximize economic and environmental performance.

The benefits of green building range from increasing the operating efficiency in facilities and enhancing property values to improving employee health and productivity while generating good community and shareholder relations.

The challenges and benefits of green building aren’t limited to commercial buildings and factories. A study from the U.S. Environmental Protection Agency found that one in five U.S. schools have poor indoor air quality. Siemens’ environmental diagnostics and remediation services can transform a “sick building” into a comfortable, safe environment and maintain that environment with ongoing monitoring and staff education.

The U.S. Green Building Council, a nonprofit organization, has created a system for determining which buildings best bring together all the elements of superior design. This certification is known as Leadership in Energy and Environmental Design (LEED®). Our customers and the people in their facilities enjoy the
benefits of LEED certification, including sustainable site planning, water and energy efficiency, safe materials and superior indoor air quality. (See the case study on the last page of this section.)

Siemens is at the forefront of green technologies and consistently delivers high-performance buildings with established green practices. Each day, green buildings are being designed, constructed and certified. Corporations and business owners are developing environmental strategies for their building portfolios. And governmental leaders are evaluating and enacting legislation designed to reduce building footprints across our communities. Siemens’ holistic approach delivers the promise of green buildings by working with you to define your green objectives, implement your strategy, and maintain your organization’s green operations throughout your facility’s lifecycle.

**Automating your building systems.**

Our APOGEE® Building Automation System is a facility-management solution that allows building owners and managers to achieve the highest levels of energy and operational efficiency through integration. Siemens’ comprehensive solution enables your company to integrate multiple building systems, regardless of the manufacturer. For example, you can integrate systems that control water flow, operable windows, indoor air quality measurement and CO₂ sensors. This allows companies to build upon past investments, meet today’s needs and take advantage of emerging technologies.

With Totally Integrated Power, Siemens provides integrated solutions for the electrical power distribution in commercial, institutional and industrial buildings, ranging from medium voltage systems to wall outlets.
Siemens is helping to advance one of the nation’s most promising alternatives to oil. Siemens computer systems and electrical and process-control equipment can be found in more than half of the nation’s 100-plus ethanol plants. Our products are helping ethanol producers reduce project risk, installation cost, time-to-market and long-term maintenance costs — all which will help spur investment in facility upgrades and make ethanol cheaper and more energy efficient to produce.
Safe and reliable power supply.

In today’s demanding marketplace, companies are expected to identify new ways of improving operational efficiencies — especially when dealing with electrical power. At Siemens, we provide electric motors, pumps and fans that consume less energy. We also offer facilities a Totally Integrated Power system that takes into consideration all stages of electrical power distribution, from investment decisions to planning and installation. This assures that power integration is a proven strategy with many benefits for building owners, consulting engineers and contractors.

In fact, Siemens can help building managers identify where their facilities are losing energy — be it electricity, natural gas, steam or compressed air — and then take the necessary steps toward increased efficiency.

Taking advantage of natural water.

In many regions, rain is an important natural source of water that is often ignored and wasted. Through the rainwater harvesting system, Siemens allows companies to take advantage of natural water. The system captures and treats natural water, which can be used for toilets. As a result, facilities can reduce their need for fresh potable water.
Siemens controls geothermal water from two separate aquifers, which heats and cools a building at PSU.

**Siemens Case Study: Portland State University.**

Portland State University (PSU) is a green-building leader in the world of academia — thanks to an ongoing partnership with Siemens. The U.S. Green Building Council rated the university’s Maseeh College of Engineering and Computer Science building as LEED Gold-certified. Siemens was on the project team for the building and contributed designs, products and services to the building’s construction.

Siemens controls geothermal water from two separate aquifers, which heats and cools the building. Siemens’ APOGEE building-management system controls the rainwater that flushes through Maseeh’s toilets and is stored and purified with Siemens technology. APOGEE also monitors indoor air quality and automatically operates windows to make the best use of natural ventilation.

PSU is home to three other LEED-certified buildings, and Siemens provides building-control services for all three.
Building Green.

- Facility improvement measure, identification and implementation
- Remote monitoring and reporting
- Recommissioning building systems
- Performance measurements
- Enhanced indoor environmental quality

- Performance contracting
- Building automation
- Rainwater harvesting
- Totally Integrated Power
How can a lighting company create a brighter future for the environment?

With innovative lighting products and services.

siemens.com/answers

Answers for the environment.
See the World in a New Light.

Lighting is part of everything we do. It’s a basic necessity that makes us feel safer and more comfortable at work, at home and on the road. The demand for light is greater today than ever before. In fact, lighting consumes about 20% of the electricity produced in the U.S. As the Siemens lighting unit, SYLVANIA meets the growing needs for illumination with innovative products and services.

Our goal is always to create lighting systems for homes, businesses and vehicles that use less energy, last longer and produce less waste than standard products. At SYLVANIA, we’re committed to providing sustainable solutions that light your space, protect your wallet and help preserve our planet. We apply the same environmental principles to our business as we do to our products. SYLVANIA manufacturing facilities feature robust recycling systems and aggressive energy-efficiency programs.

Our environmental commitment has earned the respect of our customers — and the ENERGY STAR® program. We are proud that SYLVANIA has received more ENERGY STAR Awards from the U.S. Environmental Protection Agency and the U.S. Department of Energy than any other lighting manufacturer.
Turning the spotlight on manufacturing.

Lighting products that last a long time are great. But longevity is just a part of what we can do. At SYLVANIA we’re advancing the positive impact of sustainable lighting by developing answers in the research lab and on the factory floor.

Heavy metals, such as lead and mercury, are used in the manufacturing of lighting products. But they can pose risks should they enter the environment. We addressed this challenge by pioneering the use of lead-free glass and lead-free welding solder. Mercury is still required in fluorescent lamps, but we have reduced the mercury content in our top fluorescent lighting by more than 92%, and we continue to lower it. In total, SYLVANIA has greatly reduced and, in many cases, even eliminated these heavy metals from its products. This effort is just one part of our Global Care Initiative that commits us to environmental responsibility, from sourcing and design to manufacturing, packaging, transportation and reuse.

Just as important, we strongly support lamp recycling and help our customers recycle spent lamps, a process that helps keep mercury from entering the environment. And we use recycled mercury in manufacturing new fluorescent and high-intensity discharge (HID) lamps. SYLVANIA’s lamps designated as ECOLOGIC® pass the U.S. EPA’s test for hazardous waste determination. Close to 1,000 lamps carry the ECOLOGIC designation.

The Victory Junction Gang Camp in Randleman, NC, enriches the lives of thousands of seriously ill children who each year camp at the 70-acre racing-themed facility founded by the Petty family of NASCAR fame.
Of course the best lights also last longer. Our compact fluorescent lamps (CFLs) for home or business use can last 10 times as long as some traditional bulbs. But they burn only a fraction of the watts per hour consumed by standard

Mervyns partnered with SYLVANIA to replace their aging lighting system with a more energy-efficient design technology. Using high-performance, long-life SYLVANIA FO32/XPS OCTRON® lamps, SYLVANIA QUICKTRONIC® High Efficiency QHE electronic ballasts, WattStopper light control sensors and other innovations, Mervyns lowered its energy use by 28,995,471 kWh a year, equaling a projected $4.3 million in savings. Utility rebates were an estimated $1.2 million in savings, with a projected annual maintenance savings of $1.7 million.

Reduced energy usage also allowed Mervyns to take advantage of the Energy Policy Act of 2005 tax benefit, for an estimated tax savings of over $2.9 million. The environmental benefits included 73,200 fewer lamps in stores, resulting in 2.2 million linear feet worth of fluorescent lamps being kept out of landfills. Additionally, 65 million pounds of CO₂ and 1.8 million milligrams of airborne mercury emissions were eliminated from power plants.
SYLVANIA’s ongoing innovations are setting the scene for notable improvements in the future of lighting.

incandescent bulbs. SYLVANIA CFL packaging is also designed to take up less space in transportation, which means fewer shipping trucks on the road and less diesel fuel burned.

**Brighter ideas for businesses.**

SYLVANIA’s ongoing innovations are setting the scene for notable improvements in the future of lighting. We are the world’s second-largest producer of light-emitting diodes (LEDs), tiny semiconductor chips that convert electricity into light. LEDs consume up to 80% less energy than standard fluorescent lighting. Businesses that already employ these lights have become green leaders in their respective industries.

In addition to lighting products, many businesses and institutions look to us for energy-efficient lighting systems and services. Compatible with daylight harvesting and other control technologies, our optimally designed systems have helped theaters, cinemas, hospitals, retailers and restaurants, as well as government offices and schools, maximize their energy savings. We’ve also designed and implemented lighting plans that have enabled customers to obtain optimal lighting solutions that then earn them green building ENERGY STAR ratings, and Leadership in Energy and Environmental Design (LEED®) certifications from the U.S. Green Building Council.

Overall, SYLVANIA’s advances in lighting technology have improved the energy efficiency of lighting and lamp life by 30% to 60%, underscoring our commitment to cutting energy and maintenance costs and reducing environmental impact.
SYLVANIA has also strengthened its lighting services business with the acquisition, in the fall of 2008, of Amtech Lighting Services. SYLVANIA Lighting Services is now the largest lighting service organization in the country, providing businesses in every sector with lighting solutions and maintenance programs that save money and energy and help protect the environment.

**On the road.**

For the automobile industry, SYLVANIA has also developed lighting systems that optimize energy savings without compromising performance. Our HID lighting systems last three times longer than conventional halogen lights, approaching the life of the vehicle. The glass bulbs contain no cadmium or lead and use only 41 watts of power, a 25% to 35% reduction in electrical power. More efficient at converting electrical energy into light, they produce three times more light than traditional lamps, and use less power while producing less heat. This gives automobile designers greater freedom to explore the frontiers of front-end design. By creating more-compact headlights to fit smaller spaces, better aerodynamics are possible.

**Siemens Case Study: The Thomas Jefferson Memorial.**

The Thomas Jefferson Memorial has been one of America’s most recognizable structures since it was completed in 1943. But the memorial hadn’t been seen in its best light until SYLVANIA partnered with the National Park Service and National Park Foundation.
A new design was sought, and the Jefferson Memorial was re-equipped in October 2001 with the latest lamp technologies: 17,000 SYLVANIA light-emitting diodes that run on 78% less energy than before and yet illuminate much more of this tribute to the nation's third president.

Ever since, anyone looking at the memorial from across the Tidal Basin at night has been able to see the stairs, pediment, interior dome and dome frieze — about one-third more of the memorial than night viewing allowed before. SYLVANIA, a Siemens company, donated the entire cost of the new lights and installation through SYLVANIA Lighting Services (SLS).
Environmentally Responsible Lighting.

- Automotive lighting systems
- Business lighting systems
- ENERGY STAR® compact fluorescent lamps
- Environmentally preferable lamps
- Light-emitting diode systems
- SYLVANIA Lighting Services (SLS)
How can we create better products faster without harming the environment?

With environmental manufacturing.

usa.siemens.com

Answers for the environment.
Environmental Manufacturing

Manufacturing produces more than a quarter of the total U.S. energy-related carbon emissions.

Meeting Demand the Responsible Way.
Improving product quality, reducing production costs, being “first to market” and responding quickly to customer needs are critical to competitiveness and success. Every company’s ability to innovate and be flexible is vital to its profitability.

Environmental responsibility is now a mainstream expectation that consumers, governments and stockholders have of a manufacturer. Manufacturers of consumer packaged goods are expected to minimize or eliminate waste generation and energy consumption from product design through production, use and disposal.
By developing products with earth-friendly components, right-sized packaging, traceability of raw materials and efficient disposal design, manufacturers can satisfy their “green” requirements. Manufacturers in the process industries, such as glass, cement and chemicals, for example, are expected to reduce energy use through waste-heat recovery systems and regenerative drives. Siemens helps all of these industries meet their environmental goals while also meeting their business objectives. We work with manufacturers all over the world in all industries to ensure that their production and manufacturing processes are green by design.
Starting with the end in mind.
Why do products end up in the landfill, unable to be recycled? For many, the reason is a simple one: a product’s disposal is not built into its design. With Siemens’ Product Lifecycle Management (PLM) software, design engineers can impact a product’s disposal in the design phase by choosing the right materials, substances, components and packaging options.

It may be hard to think of the product’s end when you’ve only just begun to think of all of its useful possibilities. But by making efficient “end-of-life recovery and recycling” a design requirement, we can significantly reduce the amount of harmful materials that end up in our environment.

Another way to optimize the product development lifecycle is to create a virtual environment where teams can simulate, test and validate the product digitally. By utilizing our 3-D visualization software, engineers can reduce their reliance on physical prototypes that often end up being discarded.

Managing a sustainability strategy and execution.
Siemens is helping companies take a lifecycle approach to their environmental care policies. This greater environmental strategy goes beyond just eliminating lead and other hazardous substances in products to include management of energy and natural resources used in manufacturing. Not only are many companies beginning to design eco-friendly products, they are finding that being friendly to the environment can also prove to be a competitive advantage by opening up new markets or preventing removal from existing ones.

Siemens is helping companies take a lifecycle approach to their environmental care policies.
Driving energy efficiency.

Electrical power is the most valuable resource for manufacturers because it enables motors, machines and factories to operate. But such extensive reliance carries a price tag. Industry is responsible for 40% of all power consumption, with electrical motor systems accounting for two-thirds of that use. For example, mechanically controlled pumps, fans and compressors are often in constant operation, resulting in inefficient power use.

Siemens offers the latest in optimized drive technology for energy efficiency. Our variable-speed drives adapt the flow rate directly to actual need so energy is not lost. In conventional drive systems, the braking energy generated is lost. We developed drives that feed the braking energy of the motor back into the network instead of burning it up in brake resistors.

Within the nation’s most energy-intensive industries, motor systems consume approximately 290 billion kWh per year. Siemens’ motors are available in either high-efficiency or NEMA (National Electrical Manufacturers Association) Premium “ultra”-efficient designs, offering ratings up to 10% higher than NEMA Premium standards. This helps our customers significantly reduce facility energy costs. For example, a 5% efficiency gain over a 20-horsepower motor’s 20-year life can yield $12,500 in energy savings. With tens to hundreds of motors in a single plant, the savings realized through added motor efficiency can have a significant impact on a company’s profitability.
Environmental Manufacturing.
• Product Lifecycle Management (PLM) software
• Variable-speed drives
• Frequency drives with regenerative feedback capability
• Energy-efficient motors
How can we ensure a sufficient supply of clean water for U.S. cities and towns?

With microfiltration and ultrafiltration systems.

usa.siemens.com

Answers for the environment.
Our Most Precious Resource.

Only one percent of the world’s water is available for human use, and one in every five people worldwide has no access to clean water. Even in economically advanced countries, water availability and sustainability are a concern: nearly two percent of U.S. homes have no running water, and vast amounts of the water consumed by industry and agriculture in this country aren’t available for reuse.

Infrastructure to support the growing demand for clean water is not being built fast enough — if it is being built at all. Moreover, the commercial consumption of water continues to rise at a staggering rate. At Siemens, we’ve taken an industry-leading leap in creating and producing advanced filtration systems that keep clean water flowing day in and day out. By remaining committed to innovation, we can keep the world’s resource needs in harmony with its resource usage.
Innovations for cleaner water.

A critical factor for achieving a sustainable water supply is continuous innovation. At Siemens, we specialize in helping customers like pharmaceutical plants and manufacturers keep water flowing through their facilities, thanks to our steady stream of innovative products and systems.

With our broad range of technologies, we can meet the demands of water reuse, enhanced nutrient removal, biosolids reduction and UV technologies. Our featured technologies include electrode ionization systems. In these cases, electronically charged ions are drawn through membranes to remove impurities such as boron, carbon dioxide, salt, silica and solids, and organic compounds.

Water reuse technologies, especially membrane products, continue to gain momentum in the marketplace. Our Memcor® brand ultrafiltration system removes pathogens and harmful solids from drinking water. Memcor membranes offer significant performance and cost advantages over most conventional filtration by reducing the need for chemicals in the process and by providing a physical barrier against harmful agents, to ensure safe, reliable water.

The huge amount of sewage sludge these treatments normally produce is one of the most vexing problems in wastewater treatment. But thanks to a recent innovation, Siemens significantly reduces that solid waste by introducing an additional bacterium to reconfigure the traditional "activated-sludge" treatment systems. (See case study in this section.)
Manufacturing plants are not the only ones benefiting from our technologies. Cities around the country come to us to resolve water challenges that go beyond filtering and waste treatment. In these partnerships, Siemens cleans up contaminated ground water and controls odors at municipal plants, to give just two examples. These solutions always aim to stay ahead of current regulatory standards and, along the way, to position Siemens’ customers as environmental leaders.

**Water is not the only liquid.**

Sustainable stewardship of the earth’s water requires more than just the purification of water. Our industrial and commercial customers rely on us to help them recycle over 90 million gallons of spent lubricants each year. The environmental upside of this is the fact that many fewer contaminants make their way into our water supply.

We also provide and support a wide variety of tools for treating hazardous waste — Siemens has often been called upon for solutions to minimize the generation of harmful materials. For example, the U.S. Army is using our Zimpro® Wet Air Oxidation system to safely dispose of the nation’s store of chemical weapons. Zimpro® technology breaks down difficult-to-treat chemicals before the contaminated water goes to conventional treatment. Other customers here and abroad use this technology to treat a wide range of industrial waste streams.

Siemens is also developing an innovative seawater desalination technology that could cut energy consumption by at least 50%
Orange County Water District used Siemens technology to implement a groundwater replenishment project to reclaim secondary water. Compared to existing processes, Siemens is researching the technology at its global water R&D center in Singapore, with the help of a local government grant. A reduction in power usage is critical to the greater application of seawater desalination systems worldwide.

As a world leader in water technologies, Siemens remains committed to finding natural harmonies between good business practices and environmental sustainability.

**Siemens Case Study: Orange County Water District.**

Many counties in the U.S. face the challenge of ensuring a sustainable supply of water. The Orange County Water District of Fountain Valley, California, was one of them.

The district needed to increase its supply of water to meet future demands for residential and industrial use. To solve this problem, it implemented a groundwater replenishment project to reclaim secondary wastewater; this reduced the amount of wastewater discharged into the ocean and provided a new local source of water.

The district’s facility uses Siemens’ Memcor® membrane system, which provides more than five times the treatment capacity of a conventional clarification system housed in the same area. The secondary wastewater, formerly discharged into the ocean, is now treated to remove all suspended solids, bacteria and other harmful contaminants. The water is pumped into recharge basins (or barrier wells), where it is blended with other groundwater. It then travels through the soil, which provides for additional natural treatment.
the water. Chemical pretreatment, except for prechlorination, is not required, and less maintenance and operator intervention is needed.

As a result, the Orange County Water District reuses 75 million gallons of water per day for industrial, agricultural and other purposes. This ensures a sustainable water supply for decades to come.

**Clean Water Supply.**

- Membrane and other filtration systems for water reuse and reducing water consumption
- Pollution prevention
- Alternate disinfection systems
- Energy-saving technology for water utilities
- Desalination technologies
- Waste reduction
- Groundwater remediation
How can we keep our power demands down, even as we demand more from our data centers?

With the Transformational Data Center.

siemens.com/answers

Answers for the environment.
By 2010, CO₂ output is forecast to exceed eight million tons for data centers alone.

The Evolution of the Data Center.
In the next few years, IT infrastructures will be facing a number of challenges, most of them revolving around power. Energy costs for data centers will more than double in two to three years. Anticipated power failures and limits on the availability of power will affect data centers at more than 90% of all companies within five years, and 1 in 4 will experience service disruptions.

At the same time, social, economic and governmental pressures are converging, forcing companies to develop environmentally conscious “green data centers.” However, investment in data center facilities and technology in this decade has fallen behind the needs of businesses faced with massive volumes of data and tremendous demand on their systems. Under these performance pressures, environmental considerations are often low on the list of critical concerns, made more critical by diminishing financial resources.
Customers who are currently investing will use Grid computing and virtualization, and as a result will drive up demands for space, power, cooling, and network bandwidth. By the year 2010, more than half of all data centers will have to relocate to new facilities or outsource applications. They will face compliance and regulatory pressures, which have increased security and audit requirements for physical structures, as well as data and applications.

In this complicated environment, solutions cannot simply focus on hardware. Several groups within Siemens, including Siemens Building Technologies and Siemens Automation and Drives, have cooperated with Siemens IT Solutions and Services to form the “Transformational Data Center.” The idea behind the center is that going green is not enough. Truly sustainable IT solutions involve a convergence of every factor of IT operations, from the selection of the site to the management of energy usage. Siemens is uniquely capable to address the full scope of sustainable IT, with expertise in software solutions and IT processes, infrastructure outsourcing, and power and building technologies, all under one roof.
Building sustainability from the ground up.
It starts with the most energy efficient design possible, starting with "green" building materials, use of LED lighting, effective power supply and cooling systems, alternative energy sources such as heat pumps, evaporation coolers, wind and solar power, and decentralized power supplies. Siemens utilizes a higher packing density to make better use of datacenter square footage and even reduce space requirements. Our comprehensive energy-efficient design already exceeds current occupational and environmental safety regulations, essentially future-proofing your datacenter against the tougher requirements that are certainly to come. These include legislative requirements such as life-cycle management, heat emissions, recycling, physical and data security, and energy efficiency.

Virtualization is a dramatic advancement not only in energy efficiency, but a solution to the problem of data center sprawl. By replacing a large diversity of servers from many different manufacturers with fewer but more powerful servers from one or a few manufacturers, power consumption goes down and cost savings rise. In addition, server management, administration and maintenance are simplified. Because IT operating costs dwarf the costs of power consumption, server consolidation provides substantial administrative savings beyond the reduction of energy costs.

Outsourcing — the power of scale.
Siemens is also reducing operating costs and improving IT sustainability in the area of infrastructure outsourcing. Currently, Siemens operates 72 data centers and provides...
Computers and advanced IT solutions have a key role to play in enabling other industries to become more energy efficient and combat the challenge of climate change: From videoconferencing that reduces travel, to enhanced logistics, smart buildings and intelligent energy grids, technology lies at the center of the sustainable solution.

2,000 terabytes of online storage through a holistic approach called the SieQuence solution. By providing continuous innovation and economies of scale while avoiding further capital investments, SieQuence offers companies an alternative to spending an estimated 70-75% of their IT budgets merely maintaining current operations. Significant business benefits are possible when an external provider can supply the comprehensive skill set that can free up considerable resources better used elsewhere.

**Cost savings through energy management.**

Active energy management comes into play once the data center is operational, and ensures maximum efficiency in every aspect of the data center’s functions. By ensuring that only the amount of energy that is actually needed is used, operators see a dual benefit: first, protection of the environment through reduced energy demand, and second, a reduction of costs through the “pay-per-use” model.

As business risks such as power interruptions, skyrocketing data center costs, delayed technology adoption, and technical labor shortages become more common, investment in sustainable IT makes more sense than ever before. Future data centers will be required to use power more efficiently, which can vastly change the impact they will have on the environment. Siemens possesses global experience and sector-specific expertise, which gives us the knowledge, the resources and the proven track record to deliver the operational efficiencies and overall cost reductions possible through sustainable IT solutions.
Siemens Energy Efficiency in Data Centers survey.

In October and November 2008, the Siemens Corporation and KRC Research commissioned a survey of top-, high-, and mid-level executives of Fortune 2000 companies that are in some way involved in making decisions about their companies’ data centers. Because Fortune magazine does not publish a list of the top 2000 companies, the sample was created by extending the Fortune criteria: the 2000 largest American companies, ranked by annual revenue.

The survey had three objectives: to obtain insight into general IT energy efficiency attitudes and practices among large companies; to understand energy efficiency practices, drivers, and barriers in relation to data centers specifically; and to position Siemens as a thought leader in the Green IT space, particularly in regard to data center efficiency.

The survey uncovered a number of important insights by examining general IT efficiency attitudes and practices. First of all, it revealed that nearly three quarters of Fortune 2000 companies (87%) believe it is important to pursue overall energy efficient practices. However, only 48% have a stated goal to reduce their carbon footprint, and even less have begun to take action.

In addition, the survey suggests that while there may be some efforts underway to improve data center energy efficiency, there is low awareness that the Environmental Protection Agency (EPA) is developing an Energy Star Data
Center Infrastructure Rating system, with a mere 24% of those surveyed aware of the initiative, further illustrating the need for companies to take action.

Data centers alone account for 2.5% of the world’s energy use, which is expected to grow by an astonishing 12% a year. According to the survey, a majority (65%) of Fortune 2000 companies recently reported that the costs of running their data centers have increased over the last few years, which is certainly no surprise given the growing number of data centers across the U.S. Moreover, 72% of those surveyed said the size of the investment was the primary barrier to improving their data center energy efficiency, followed by lack of specific information on the return of the investment for making changes (38%), server down time required to implement changes (38%), and concerns about running legacy software on new systems (34%).

Beyond the worry of increasing energy costs, companies are also concerned about their data centers exceeding processing capacity and the risk of losing their data. One-quarter (27%) worry a “brownout” or exceeding process capacity will affect their data centers, while 27% are worried about losing data, 15% worry about aging facilities, and 10% expressed concern about high energy costs. These fears are very real; if companies do not start greening their data centers now, 70% will have tangible system disruptions by 2011 and systems will experience world-wide brownouts over the course of the next five years.
Weighing the urgency of today’s energy, environmental and economic situations, this survey reveals an escalating need for data centers to become more efficient. Siemens is prepared to help forward-thinking companies move forward, in the direction of a clean energy future.

**Sustainable IT**

- Going green is not enough
- Transformational Data Centers
- Server consolidation
- Future proofing
- Infrastructure outsourcing
- The SieQuence solution