

Efficient building technologies save money and reduce the burden on the environment. In London, such technologies reduce the amount of CO₂ emitted annually by millions of tons.



and, for the most part they are already available on the market (see *Pictures of the Future*, Spring 2007, p. 86). Simple measures such as effective insulation and electricity-saving lighting based on energy-saving lamps or LEDs can dramatically increase building efficiency. Other measures include equipment for combined heat and power (see p. 78) that generates electricity and heat on site, as well as solutions that utilize sensors and building management systems, for instance, to ensure optimal air and light conditions automatically (see p. 60).

Big Savings. How effective can the installation of energy-saving technologies be for a major city? In London, for instance, buildings account for two thirds of the city's total CO₂ emissions. But by 2025 the British capital could cut its CO₂ emissions by ten million tons by implementing currently-available technologies. Associated energy savings alone would be sufficient to pay for nearly 90 percent of the solutions used (see p. 58).

In Sydney, Australia, the office complex at 30 The Bond, illustrates the extent to which emissions can be decreased using a combination of energy-saving measures. Optimal air conditioning inside the office complex is achieved through integrated building management systems and a specialized cooling system that works with cold water instead of an air

Simple Steps that Save a Bundle

Buildings account for about 40 percent of energy consumption worldwide, and approximately 21 percent of all greenhouse gas emissions. However, the implementation of a number of simple measures can make it relatively easy to save at least a quarter of energy in most buildings.

Many a reader may have been astonished by an article about the future of construction in a July 2008 issue of the German current affairs magazine *Der Spiegel*. It claimed that "buildings are climate killer Number One, worse even than the huge fleet of cars on the road worldwide." To laymen this might seem to be a bold theory, as up to now cars and factories have been branded as the main energy gobblers. The facts, however, tell a different story. High-rises, residential buildings, old buildings, office buildings and the like burn up around 40 percent of the total primary energy supply, while industry and transport account for approximately 30 percent. The corresponding figures for greenhouse gas emissions in buildings, industry, and transport were 21, 34, and 14 percent respectively. The rest was due to agriculture and forestry (see *Pictures of the Future*, Spring 2007, p. 83).

The good news is this: Buildings have the greatest energy-saving potential. The 2007 re-

port of the Intergovernmental Panel on Climate Change (IPCC) estimates that more efficient technologies could reduce CO₂ emissions from houses by up to 40 percent by 2030. "However, many building owners are concerned by the initial investment for installing efficient solutions. They often prefer less expensive technologies that consume more energy," explains Ulrich Brickmann, an expert on energy efficiency solutions for buildings who works at the Siemens Building Technologies (BT) division in Frankfurt am Main, Germany. With regard to residential buildings, an additional factor is that the person who usually has to make the investment — the landlord — is not the one who will benefit from reduced additional costs, i.e. the tenant. "These circumstances tend to limit buildings from achieving maximum energy efficiency. That has to change," says Brickmann.

Electricity-saving technologies and equipment with quick amortization due to low operating expenses have already been developed,

conditioning unit. The complex produces around 30 percent less greenhouse emissions than conventional office buildings of a similar size and has correspondingly lower energy costs (see p. 53).

Abu Dhabi would like to prove that it is possible to save even more. In 2016 solar sails with solar panels will provide shade and generate electricity at the same time for the newly established Masdar City, which will boast a population of 50,000. Narrow shaded alleys will provide natural cooling, and electric trains will almost make cars unnecessary. The Emirates' ambitious target is to create a CO₂-neutral city (see p. 76).

These examples illustrate the growing awareness of buildings' potential for cutting energy costs and protecting the environment — not least because efficient solutions are experiencing increased demand due to rising prices for raw materials. Political decision-makers are also backing legislation that promotes

the efficient use of energy. For instance, from 2009 on, all houses in Germany will require an Energy Performance Certificate that documents their energy consumption. This, in turn, is expected to put pressure on building owners whose prospective tenants will be comparing the energy costs of different properties.

In January 2008 the European Union (EU) also put forward a package of laws in its "20-20-20 to 2020," legislation according to which the EU should reduce greenhouse gas emissions by 20 percent by 2020. At the same time, the total proportion of renewable energy should increase to 20 percent and energy efficiency should rise by 20 percent.

In Brickmann's opinion, however, such political leverage is not enough to introduce efficiency solutions in buildings. "Saving energy through technologies that require a high initial investment is often a real dilemma for the managers of public buildings. They need new

the public. One platform that the company is already involved in is the EU's Green Building Program, which has been in operation since 2005. Through the program, the European Commission gives advice on energy efficiency to the owners of commercial premises all over Europe and works with them to develop action plans for greater energy efficiency (see p. 68). The aim is to reduce their use of primary energy by at least 25 percent. If a participant reaches this target, it is awarded the status of a Green Building Partner, which it can use in its own advertising. By now, more than 70 European companies and institutions have joined the program as building owners.

As one of more than 30 "backers of technology" for the Program, Siemens has committed itself to supporting a plan for promoting the Green Building Program. Siemens informs building owners about the program and helps participants to successfully implement their ac-

ready been certified," says Rainer Kohns, who is responsible for the Green Building Initiative at SRE. For building owners within Siemens, however, certification is only the tip of the efficiency plan iceberg. "Over time, we want to make our most important sites and buildings at least 20 percent more efficient. We have over 3,000 facilities and buildings worldwide, and around half of them are candidates for the efficiency upgrade," says Kohns. He and his colleagues have developed a comprehensive action plan to achieve this ambitious aim. The plan aims to optimize energy efficiency in any type of building, no matter what its condition.

Special tools help experts to implement these measures effectively. They include a sustainability book that gives building planners tips on efficiency ranging from the outer shell to room comfort and building services engineering, and software for analyzing the investment and follow-up costs for efficient tech-



Low energy consumption can be achieved by all, regardless of age, whether at the Berlin University of the Arts (left), Masdar City in Abu Dhabi, or 30 The Bond, in Sydney (right).

system solutions to cut their electricity bills and to take pressure off of their budgets, but in many cases they can't get over the investment hurdle," he says.

Selling Efficiency. An answer to the energy-investment challenge is Siemens' combination of consulting, installation service, and financing models. Here, the customer does not need to make any preliminary investment. In stead, it pays for improvements over a contracted period based exclusively on energy savings. By way of such so-called Energy Saving Contracts, Siemens has renovated over 1,600 buildings to date in Germany alone. According to Brickmann, this has been a huge success. "We have invested in efficient technologies with a contract value of around €120 million in total, thus saving over €160 million in energy costs," he says.

With this success in the bag, Siemens is looking for partners and platforms with which it can continue to promote energy efficiency to

tion plans with the aid of technologies and Energy Saving Contracts. "The program allows us to kill two birds with one stone," says Brickmann. "For one thing, our Energy Saving Contracts generally allow us to fulfill the Green Building Initiative's energy-saving criteria from the outset. For another, the EU is offering our partners an incentive — their environmental activities can be publicized with the help of the Green Building Certificate." The Berlin University of the Arts and Italian banking giant UniCredit are two of the most prominent partners to hold the certificate thanks to Siemens. After a comprehensive "technology facelift," the bank's headquarters in Milan today uses up to 32 percent less electrical energy per year.

Sustained Success. Siemens Real Estate (SRE) has also pledged itself as a Green Building Partner (see p. 69). "Seven SRE buildings have al-

nologies. "With this model we want to maximize the energy-saving capabilities of each type of building, regardless of its structural design or whether it's a new or existing site. This is the only way we can achieve the aim of reducing energy consumption for all Siemens factories and sites by 20 percent by 2011," concludes Kohns.

Looking to the future, Kohns adds that at the top of the agenda is a zero-energy house. Its energy requirements will be covered by renewable sources. Any electricity that is taken from the public electric grid will be balanced out by the surplus energy it produces.

"To implement this project, the building's overall environment will have to fulfill certain criteria," says Kohns. "For example, the house must be well insulated so that it requires little energy for heating and cooling. At the same time, a sufficient amount of renewable energy must be available. Once these conditions are satisfied, the zero-energy house will soon become a reality," he says. ■ *Sebastian Webel*