



Sustainable Cities

Sustainable Development for Urban Infrastructures

SIEMENS



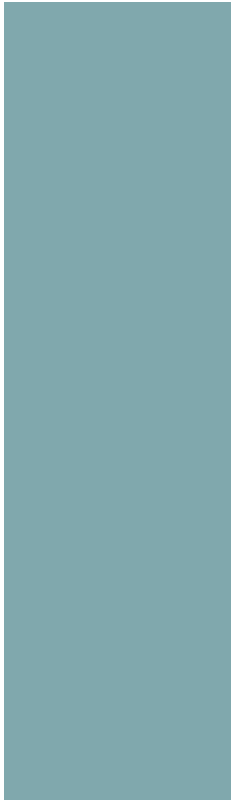


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» Cities are the growth drivers of the future, yet also account for the biggest share of CO₂ emissions. Worldwide, cities are the decisive factor for our climate. Our unique environmental portfolio makes Siemens the perfect partner for sustainable urban development. «

Peter Löscher, President and CEO of Siemens AG

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São Paulo



Negev Desert

Sustainable Cities

Ecological harmony and quality of life – the key to success

Cities are the living space for the 21st century and beyond.

People in your city – with their aspirations, needs and visions – rely on you to make the right decisions to make their city competitive and a good place to live. People turn cities into living organisms; to thrive, these organisms require a healthy balance. And that's best expressed by one word: sustainability.

It has been estimated that redesigning cities could positively influence up to 70 percent of humanity's ecological footprint (EF)¹. The EF is calculated by comparing our consumption of resources and generation of waste with nature's capacity to generate new resources and absorb our waste. The EF is often expressed in Earths Consumed (EC). In 2005, humanity's ecological debit stood at 30 percent, meaning that we were really consuming as many resources and producing as much waste as if we had 1.3 earths at our disposal.

Cities are responsible for 75% of the world's energy use and produce more than 80% of all greenhouse gas emissions, mostly CO₂.

Both London's² and Vancouver's³ EF equals 3.05 planets. London's 7.6 million inhabitants, for example, burn up 19.7 million global hectares; that's 125 times its geographic area. In 2000, Berlin⁴ consumed 82 times its geographic area.* Figures like this make it very clear that cities will determine whether the shift to sustainability succeeds – or fails. That's why it's so critical for city stakeholders to make the right investment decisions today. Sustainable urban infrastructures can reduce a city's EF and also save costs and improve quality of life.



New York



Erlangen

A fundamental change is sweeping the global economy today, a change the communiqué issued by the G20 countries at their April 2009 summit describes as “the transition toward clean, innovative, resource-efficient, low-carbon technologies and infrastructure.” Two factors are driving this “shift to sustainability.”

First, climate change. There’s no doubt that human activity is causing global warming, and there is evidence that this may be happening at a much faster rate than expected. According to researchers at M.I.T., we must now expect a temperature rise of more than 9 degrees by the end of this century. Clearly, collective global action must be taken to avoid catastrophic consequences.

Second, the economic crisis: It has intensified and accelerated this debate. In effect, it has led to a new global consensus that sustainability is not just an ecological, but equally an economic and social issue.

Sustainability rests on four pillars: competitiveness, environment, quality of life, and good governance as an overarching principle.

To attract investments, to be competitive, cities need modern, efficient infrastructures, abundant skilled labor, modern IT and communications technologies, access to quality housing, education as well as basic services such as water and electricity.

Metropolitan areas are facing a host of environmental problems, from air pollution

to wastewater management and green space degradation. Sustainable urban development promotes greater use of alternative energy sources and more energy-efficient buildings and transport, measures that reduce congestion and CO₂ emissions, recycling of water and waste and the use of vegetation to filter pollution and capture carbon dioxide.

While the technologies to combat climate change may be ready for implementation, the magnitude and long-term impact of the necessary investments are accompanied by high risk and uncertainties. Things, however, are not as difficult as they may seem. For London⁵, it was shown that the total investment needed to achieve significant sustainability targets was less than 1 percent of the city’s

Harmonious Cities

In its “State of the World’s Cities 2008/2009” report, UN-HABITAT created a new category of definition, the harmonious city. With it, UN-HABITAT paid heed to the need to broaden the concept of sustainability to encompass factors such as a functioning administration, legal security and social cohesion. Just as much as ecological and economic sustainability, these factors contribute to help form a successful city which is braced for actual and future challenges.

gross domestic product. Also, a Siemens study on Munich⁶ showed that a comparable city can reduce its CO₂ emissions by 90 percent by mid-century without impairing the quality of life for their inhabitants. These studies have also shown the connection between abatement potentials and investments and RoI (return on investment). This helps city decision-makers prioritize their investments.

There are purely economic reasons for making the transition to sustainability, and for cities the prediction stands that a competitive, green city with a high quality of life will attract the best and brightest people who have the knowledge and skills needed to drive innovation and economic growth. Siemens currently is advising several city governments around the globe

on how to make use of worldwide best practice and technology in this regard.

Last but not least, there is quality of life. It is intricately connected to the two other pillars, especially the environment. While cities are the engines of economic growth, they feature huge inequalities in distribution of wealth and economic opportunity. The World Bank predicts that by 2035 cities will become the predominant locations of poverty, as opposed to rural areas now. Achieving sustainability requires that city decision-makers think and act cohesively: technological, environmental, and political perspectives need to be taken into consideration in order to formulate appropriate solutions. ■



Madrid



Copenhagen



Bratislava



Athens



Dublin

European Green City Index

Measuring your city's ecological performance

It's all very well talking about sustainability, but in the end a big slice of being sustainable for a city means being ecologically sustainable. How do you know where your city stands? For the first time, Siemens, in cooperation with the Economist Intelligence Unit (EIU), has created a methodology to measure the current environmental performance of a city as well as its commitment to reducing its future environmental impact by way of ongoing initiatives and objectives.

The resulting index, called the European Green City Index⁷, is independently researched, which distinguishes it from other studies in this area. 30 individual indicators – some qualitative, some quantitative – across eight categories are taken into account per city. Cities are ranked using a

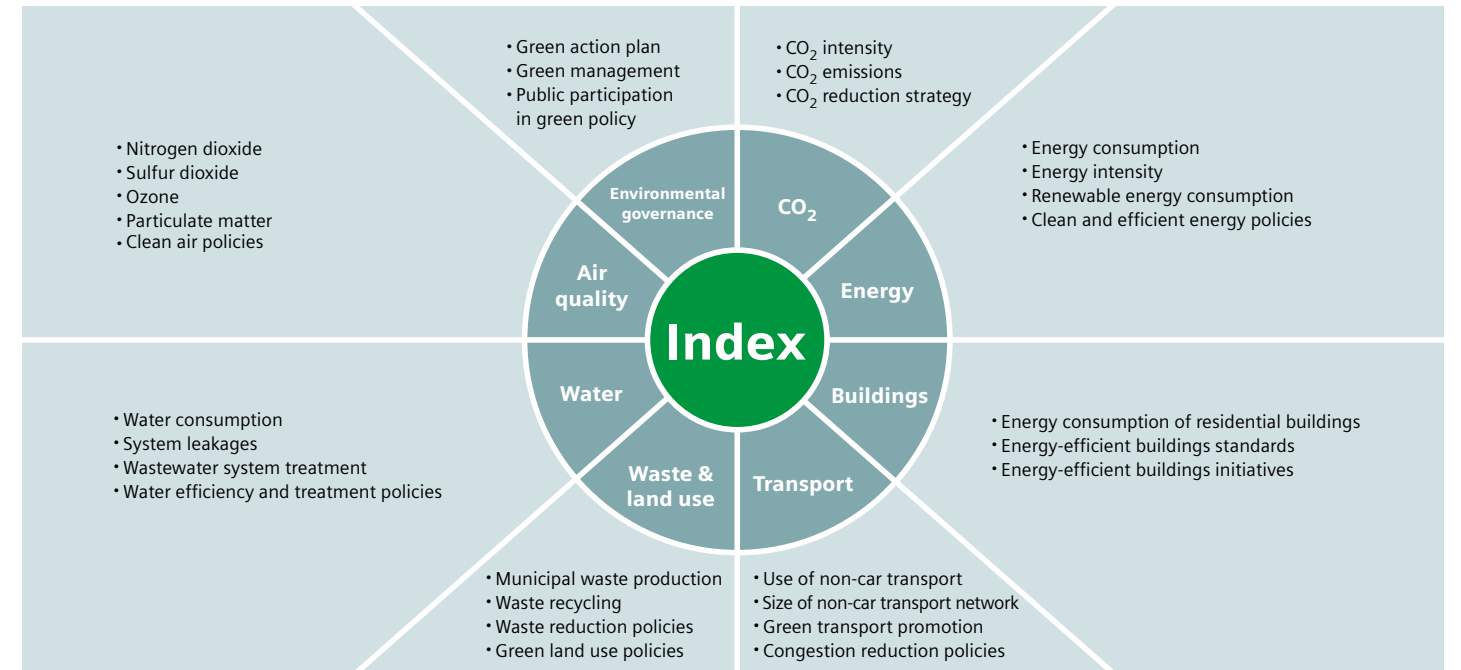
transparent, consistent and replicable scoring process. The relative scores assigned to individual cities (for performance in specific categories, as well as overall) are unique to the index and allow for direct comparison between cities.

To start with, we initially applied our methodology to 30 European cities. Although problems abound even here, where most cities are mature and environmental awareness tends to be high, encouraging trends are emerging. All had lower CO₂ emissions per capita than the overall EU average.

As for the problems: acceptance of public transport is still far from satisfactory; nearly one in four liters of water consumed is lost through leakage; renewable energy's share

of total energy consumed is just 7.3 percent. A long way from the EU's stated goal of 20 percent by 2020. Clearly, there is no room for complacency with so many issues still unaddressed. Much hinges on behavioral change. This, however, is often difficult to influence as cities customarily have little leverage to induce citizens, companies or even levels of government to modify their actions or policies.

One example in this encouraging area comes from London. The city has introduced a congestion charge to reduce vehicle traffic, while investing heavily in the expansion of the public transport and bicycle network to encourage people to use green modes of transport. ■





Toward the Future

Our best efforts must be directed toward improving cities everywhere

It's not for nothing that the 2010 Expo in Shanghai runs under the theme of "Better City, Better Life". Cities are the key to a sustainable future, and Siemens is eager to take its unique portfolio of sustainable technology into battle and assist cities in their effort to create sustainable living spaces for the 21st century and beyond.



中国2010年上海世博会全球合作伙伴
Global Partner of Expo 2010 Shanghai China

We are pleased to have been given the opportunity to showcase some of this technology in the China Pavilion, situated right at the center of the Expo site. We have equipped the Pavilion, one of the five permanent structures on the site, with some of our most advanced green technology. From converter cabinets to lighting and fire detection, the Pavilion is packed full of our most energy-efficient products. The



innovative power distribution equipment includes low/medium voltage switchgear, a low voltage control box and the converter cabinet, all of which contribute to energy savings of up to 50 percent. Added benefits are extremely low operating costs, a compact design and the recycled materials from which the components are made.

World leading "green" Siemens Osram lighting technology, including LED modules, provides the illumination, architectural lighting and other components which last 15 times longer and are 80 percent more efficient than conventional bulbs. To make sure all the building's systems run at optimum performance, we have installed our APOGEE building automation systems, featuring the latest tech-

nology geared toward monitoring air quality, heat and water supply, fire detection systems etc. This centralized approach guarantees energy savings and operational efficiency.

TECHNOLOGY PAVES THE WAY TOWARD SUSTAINABILITY

Siemens operates at the very forefront of sustainable technology and we would like to give you an overview of where we think sustainable technology will be going over the next years. We will focus on the three main areas for sustainability in cities: energy, transport and buildings.

ENERGY

Smart Grid. Promoting a newly conceived and administered power supply grid. From centralized and decentralized power sources interacting with fluctuating energy sources like wind and solar, to the intensification of energy trading and transparency for consumers, Smart Grid solutions hold many challenges. The proven Siemens Energy portfolio includes all the major Smart Grid technologies which are ideal for power utilities facing growing pressure who seek Smart Grid solutions to modernize their grids. Central to this is our position as world leader in HVDC (high-voltage direct-current) technology which lies at the heart of the power transmission needed for the implementation of visionary smart grids.



e-Car. Along with automotive engineering, the electric mobility focus is on the interaction between vehicles, the power grid, and the technologies needed for storing and bidirectionally transmitting energy derived from renewable sources. Siemens takes a comprehensive approach involving not only automotive engineering but also systems for connecting vehicles to the power grid. Here, both the charging process and communications are being addressed.



Las Vegas



DeserTec. Within six hours, the world's deserts receive more energy from the sun that mankind consumes within one year. DeserTec aims to exploit some of this renewable energy for Europe, the Middle East and northern Africa. The concept plans the construction of many mid-sized solar power plants combined with offshore wind farms with ratings up to 200 MW at twenty sites extending from Morocco to Saudi Arabia. Siemens has been involved from an early stage and supports the concept with its technical solutions for solar thermal power plants and low-loss transport of electrical energy over long distances. The Siemens portfolio includes steam turbines and solar receivers for solar thermal power plants as well as solutions for high-voltage direct-current (HVDC) transmission. Siemens is also the world leader in offshore wind farms.

TRANSPORT

Our **Airval** driverless airport train is aimed at connecting terminals efficiently and reliably, while lowering CO₂ emissions and reducing energy requirements. Energy generated from braking, for example, will be fed back into the system and used when the train pulls away. Using rubber tires makes the train, which can reach up to 80 km/h, especially quiet. The service capability of up to 24 hours, seven days a week, is adapted to the fluctuating demand of large airports. Airval will also be introduced under the name "Cityval" as a metro system for large cities, offering great comfort to make it an attractive alternative to car travel. Air conditioning, large monitors connected to a dynamic information system and the attractive design of the trains all work toward that goal.

Complex **Traffic Management Systems** as used in Vienna since summer 2009 are pointing the way to the future of urban transport. Real-time information from several sources can be downloaded by passengers, making trip planning convenient and easy. Vienna also uses our ultra-low-floor trams, providing easy access to all users. With 35 percent of all weekday trips made with public transport, Vienna is a shining example of where the right technology can take you.

BUILDINGS

Automated Building Management System. Incredibly, buildings are responsible for 40 percent of all energy used globally. 40 percent of this could be saved if all buildings were equipped with the latest in building management systems. By networking

all the various systems within a technical infrastructure, Siemens can ensure that each building delivers the highest possible levels of comfort, security and energy efficiency. Smart building solutions from Siemens are one of the quickest and cheapest ways to turn buildings into sources of energy, thereby reducing energy costs. The technology integrates and optimizes the physical and digital infrastructures of commercially used buildings. The facility can react to price signals from the grid and shift or reduce energy consumption at high-tariff times. Moreover, buildings are used as storage for electrical energy, generate electricity for their own use and act as electricity providers to the grid.

Organic Light Emitting Diodes (OLEDs) are an exciting prospect. Siemens Osram



has been working on their development since the 1980s and in 2005 the first OLED screen was introduced. Unlike LEDs, OLEDs can be used to light up entire surfaces. Part

of our most innovative lighting components of lamps, electronic ballasts and Light Management Systems, OLEDs can contribute to energy savings of up to 85 percent, with LEDs sometimes offering the highest efficiency for white light. Long-life products and innovations in outdoor illumination mean substantial savings. Both LEDs and OLEDs may change the nature of light in cities and experts predict a literally bright future for this product. ■





Airports

The “green and efficient airport” of the future is about much more than optimized individual parts of the airport. Siemens can help design the architecture, technology and logistics for environmental compatibility. Our products and systems incorporate ecological concerns – featuring environmentally compatible, health-friendly, recyclable materials and low resource consumption.



Harbors

Our Siharbor solution, based on the Siplink DC transmission system, enables ships docked in port to connect to land-based power grids. As a result, docked ships no longer have to use diesel generators, which produce exhaust, soot, fine dust and noise. Siharbor saves fuel and reduces air and noise pollution.



Buildings

Sustainable green building strategies require technologies that facilitate information management and increase operational efficiency. Our solutions and services cover the entire life cycle of facilities, enabling them to benefit from the latest green technologies, and to reduce their carbon footprint while improving indoor air quality and energy efficiency.



Public Administration

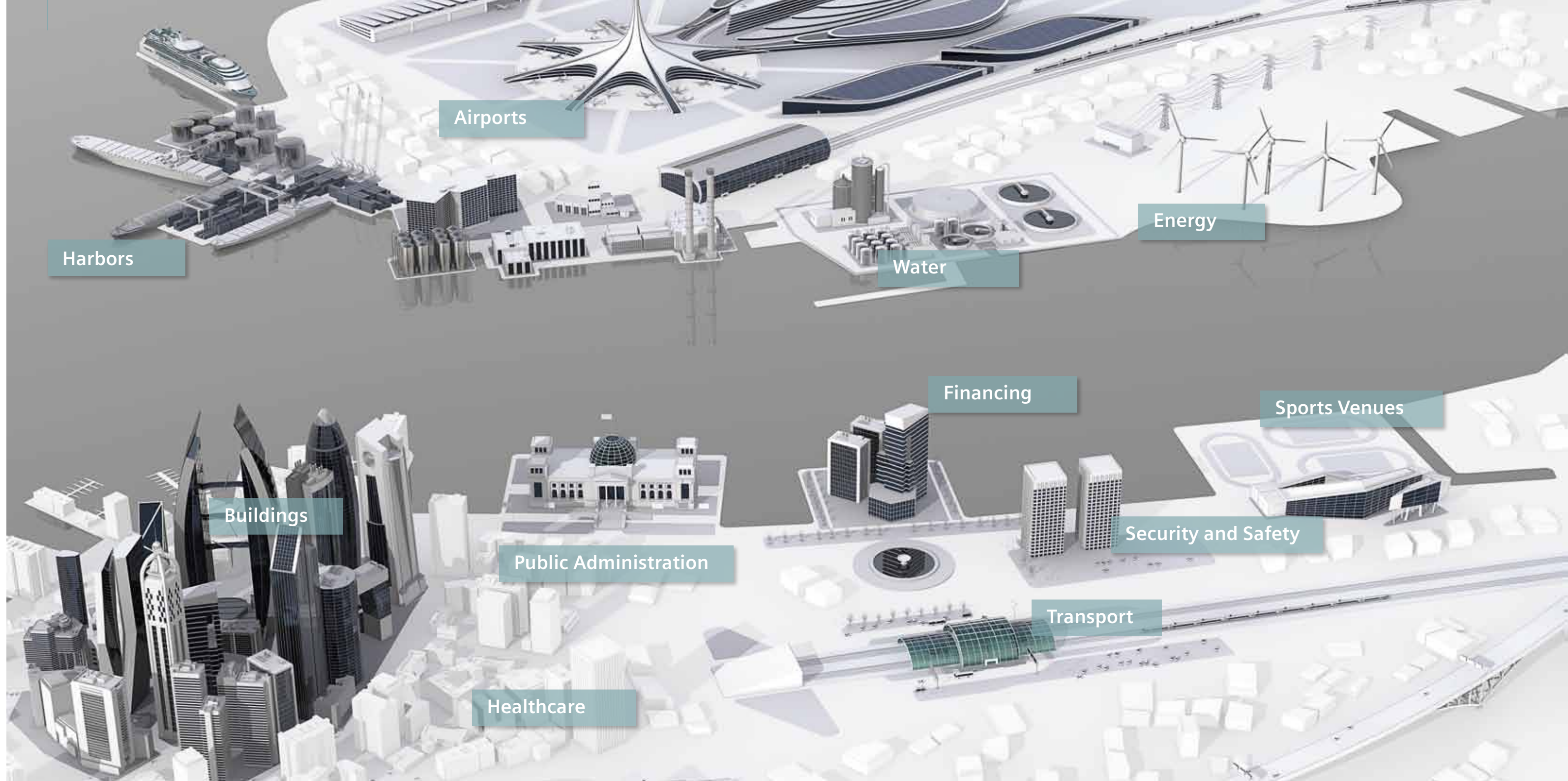
For cities, eGovernment is the way forward. We support the modernization and transformation of government by combining our extensive process expertise in the public sector with our solid experience in the computing sector. We plant the seeds of future cost-effectiveness and improved service quality.



Healthcare

From our Green+ hospitals to the latest in imaging, therapy, healthcare IT or diagnostics, Siemens is committed to making the healthcare sector more efficient while increasing quality. Advanced imaging technologies, tracking software for specimens and the latest in building technology are just some of the areas we are active in.

For more information:
www.siemens.com/cities



Energy

Totally Integrated Power (TIP) technology platform comprises tools and support for planning and configuring as well as products and systems for power distribution systems. Communication-capable modules interface them with higher-level management systems, affording noticeable savings potential throughout an entire project cycle – from investment to operation.

Water

SIWA includes all services related to water – from design and planning to implementation, as well as services for complete water treatment and purification plants. SIWA means a critical advantage: consistently high water quality and lower fresh water usage with high product quality.

Financing

We offer various financing options from lease financing to structured loans as well as managed services. Then there’s our flexible, usage-based financing for equipment investments, such as pay-per-use schemes. Our services cover the management of financed assets as well as end-of-term issues, including logistics, equipment servicing and remarketing.

Sports Venues

Sports and event venues challenge urban infrastructures in many ways. For their integration into the urban infrastructure they require highly sophisticated networked solutions both inside and outside the area. Siemens delivers world class event solutions as part of its long term global commitment to drive forward the boundaries of technological innovation.

Security and Safety

At the frontier of our security solutions, our Siveillance portfolio combines innovative command and control systems, intelligent software-based video analytics and security management, thereby providing highly effective security solutions for intervention forces, critical infrastructure (power plants, airports, etc.), corporate customers and buildings.

Transport

Siemens' cutting edge “Complete Mobility” solutions meet the challenges of growing global population, rapid urbanization, climate change and resource conversation. With “Complete Mobility” we offer integrated solutions for urban and inter-urban transportation and logistics, affording significant benefits for people, industry and the environment.





Due to its greater efficiency, the world's most innovative gas turbine saves fuel and thus around

40,000 tons of CO₂ per year.

This is equal to the CO₂ emissions of 10,000 cars with an annual mileage of 20,000 kilometers.

Energy

Individual action and technological advances generate big savings

Cities account for 75 percent of global energy demand and generate 80 percent of all greenhouse gas emissions. Meeting the ever-growing energy demands of businesses and private households without increasing CO₂ emissions beyond any acceptable level is one of the main challenges cities face today. Sustainable energy can be thought of in terms of technologies that en-

able management of demand, more efficient use of energy and more efficient and cleaner generation of power.

Managing demand will require tamper-resistant control and security systems such as distribution monitoring and secure payment devices as well as power plant protection. Efficiency and reliability can be sup-



London Array wind farm

Recently, Siemens was awarded the contract to connect the London Array wind farm situated in the Thames estuary to the power grid. We will provide the electrical equipment for two offshore substation platforms, which are to be installed right at the wind farm. The substations bundle the power generated by the 175 Siemens wind turbines before it is transported via high-voltage subsea cable to the coast. This is also an important step in preparing London's power supply for the 2012 Olympics' challenges.

ported through hybrid devices that can deal with multiple power sources and variable voltages/amperages, and through intelligent power grid management.

Sustainable energy means finding a balance between a secure supply, affordability and environmental impact, not forgetting that both the number of applications and our consumption of electricity will continue to grow. There is also the increasing scarcity of natural resources, which calls for a reduction in our consumption of these resources and energy. Siemens has a unique environmental portfo-

lio of green products and solutions which are available today to help cities reduce their environmental footprint. Our innovative gas turbine, the world's largest, now implemented at E.ON's Combined Cycle Power Plant in Irsching, is a case in point. To meet the growing demand for power, an intelligent and flexible grid infrastructure will be essential. Fluctuating feed-in from renewable energy sources completely changes the traditional topology of the grid – and therefore also changes the way such grids are managed. In the future, power generation will follow consumption, rather than vice versa.

A recent Siemens study on London found that if all recommended technology levers available today would be applied, the city's overall emissions could be reduced by 44 percent by 2025. In energy, just as with all other aspects of sustainability, behavioral change can make a real difference; each megawatt avoided is the cheapest and cleanest way to cut emissions and save resources.

However, behavioral change is not an easy feat to achieve. Cities must also leverage all technical possibilities for increasing energy efficiency. ■

Our Portfolio for Sustainable Cities



The new Oslo Metro cars use
30% less energy
 than their predecessors and are made
 out of 95% recyclable material.

Transport

The lifeline of any city, public transport is a critical component of sustainability

When asked, city administrators overwhelmingly cite transport as the most urgent infrastructure investment to enhance their city's sustainability. This is for two reasons: Cities cannot function without a fast, efficient and affordable system of mass transit. A city in gridlock is a city that loses billions of dollars worth of productivity over the year. Also, the

use of private vehicles is one of the main contributors to CO₂ emissions, which cities are eager to curb.

Our "Megacity Challenges"⁸ study showed that stakeholders usually prefer incremental improvements to the transportation system, such as adding new lines to existing net-



MST Lisbon

The "Metro sul do Tejo" trolley line in Lisbon covers 13 km of track, 19 stations and possesses 24 trains. This complete rail solution was put up by Siemens in four years – "just in time". It is equipped with our innovative hybrid energy storage system Sitras[®] HES which allows it to run for 2.5 km without touching an overhead contact. Furthermore, energy costs are reduced by up to 30 percent and the vehicle produces about 80 percent fewer CO₂ emissions compared to conventional operation.

works, rather than outright spending on new transport projects. Showcase projects are taking a back seat, and 33 percent of stakeholders questioned favored reorganizing or revitalizing the existing infrastructure.

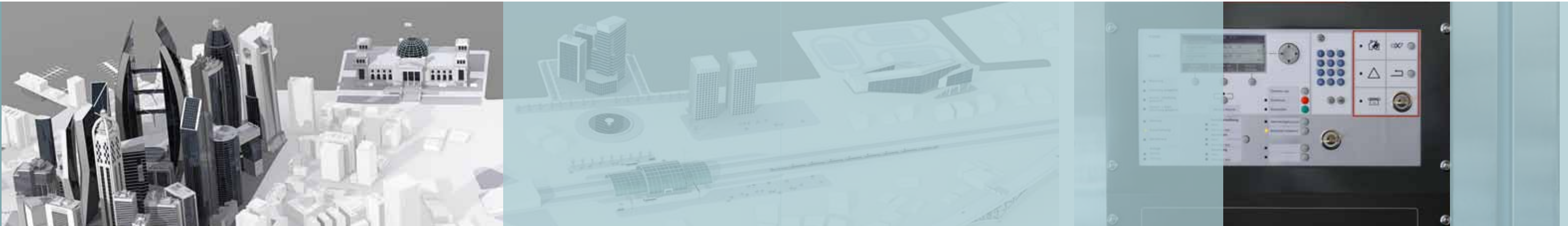
Transport is a big field and the obstacles to improving a city's situation often seem prohibitive, lack of resources (funding) first among them. However, new technology will often pay for itself over a surprisingly short time. With its "Complete Mobility" solutions, Siemens has answers to the challenges of growing global population, rapid

urbanization, climate change and resource conservation.

"Complete Mobility" stands for efficient mobility solutions for an integrated traffic system that move people and goods economically, quickly and safely. For more on this, see our "Sustainable Urban Infrastructure – Vienna Edition"⁹ study, available on the internet. In a city context, we offer integrated mobility solutions which make traveling on public transport easy, safe and – most importantly – an attractive option. With transport especially, behavioral change is all-important.

A city can order the most energy-efficient trains, buses or trams, fit all signals with LED technology – saving up to 90 percent in energy costs – and make sure stations are using the latest in building technology. If people still prefer to use their cars, these efforts may save energy, but CO₂ emissions and congestion will go unchanged.

Siemens has all the necessary experience and expertise for making public transport an attractive option, saving cities money and reducing their ecological footprint as they go along. ■



Buildings are responsible for

40% of global energy consumption.

Buildings

Often overlooked, buildings can be transformed from energy wasters to savers

Usually we don't really think about buildings. We just use them. If you're charged with making your city sustainable, it's worth taking a closer look: buildings are responsible for an astonishing 40 percent of global energy consumption. Intelligent solutions can save up to 40 percent of this energy. Since 1994, Siemens has implemented over 1,900 energy efficiency programs, reducing CO₂ emissions during the period by about 2.4m tons. Additionally, these projects have reduced energy costs

by some 2bn euros. We believe that buildings should provide a maximum of comfort, use energy sparingly and react automatically to external climate influences. And they should protect people, assets and business processes against intrusion, theft and fire. Our Total Building Solutions (TBS) approach uses intelligently networked infrastructure, innovative systems and solutions for electrical installation technology and building automation to provide comfort and energy efficiency while reducing



MGM Mirage in Las Vegas

Siemens was chosen by MGM Mirage group to equip the new ambitious Las Vegas "City Center" complex with sustainable technology. Osram lighting systems will substantially reduce power consumption. Combined heat and power technology will be used to independently generate some of the energy needs, and water use will be optimized by installing filtration systems that recycle wastewater and use it for air-conditioning within the complex. Also, our innovative fire safety systems with digital displays have now been made the standard for all future construction in Las Vegas.

CO₂ emissions. Our fire safety and electronic security systems and services deliver all-encompassing protection for people, assets and processes that contribute toward maximizing operational efficiency and business continuity: they draw on innovative technologies and concepts to optimize incident prevention, detection and mitigation, but can also interoperate with our HVAC and lighting systems to both further improve the effectiveness of incident response and recovery and enable a more efficient energy use in day-to-day operations.

Almost 90 percent of the carbon abatement potential identified for residential and commercial buildings in London is based on technological levers that will pay back over the relevant time period. And there's no reason to think this percentage will be much different for other cities.

Siemens can analyze and monitor your buildings for lighting, heating, air conditioning and refrigeration, water, compressed air and process systems control and maintenance. Often a relatively low investment will return substantially reduced operating costs and

CO₂ emissions and, under Siemens Energy Saving Performance Contracting, even with guaranteed energy cost savings. Together with energy and transport, buildings form the most important basic triangle that should be looked at with regard to a city's sustainability. Amazing feats can be achieved: the new Bank of America Tower in New York, for example, will generate 70 percent of its energy needs using its own 5.1MW combined heat and power system, which will achieve 77 percent efficiency using clean-burning natural gas as well as capturing and re-using heat from electricity production. ■



Water

The most basic of commodities needs careful management

Mostly, we take our water supply for granted. However, supplying ever-growing cities with the right amount of quality water at the right time and at the right price is a complicated task. Municipalities worldwide rely on Siemens Water Technologies for water and wastewater treatment technologies designed for operational efficiencies and lower life-cycle costs. Our security systems for water treatment plants safeguard this critical infra-

structure from sabotage. We also cater to the specific water needs of industry, where wastewater treatment is usually critical.

From drinking water, industrial water, wastewater to water transport, Siemens has the answer for water treatment, plant automation, electrical systems, building technology and the requisite services, from financing, design and planning, to products,

solutions and services. We are the No.1 in the world market for water treatment and purification. With market-leading technologies, we offer the industry's largest portfolio of water and wastewater solutions.

While water must be used much more efficiently, levers can cut water production required for cities dramatically, keeping demand stable despite a growing population. ■



NEWater Singapore

Due to a shortage of freshwater reserves, Singapore had to find alternative water supply ideas. The city's wastewater is now processed in three Siemens NEWater plants, which return 92,000 cubic meters of water a day into the city's water system. Most of this goes to industrial use, but 1 percent of it makes up the volume of daily drinking water. Micro-filtration and reverse osmosis are added to the standard process, turning wastewater into water that meets the highest international quality standards.

The most serious

security and safety problems

are organized crime (36% of the respondents) and terrorism (18%)⁸.

Security and Safety

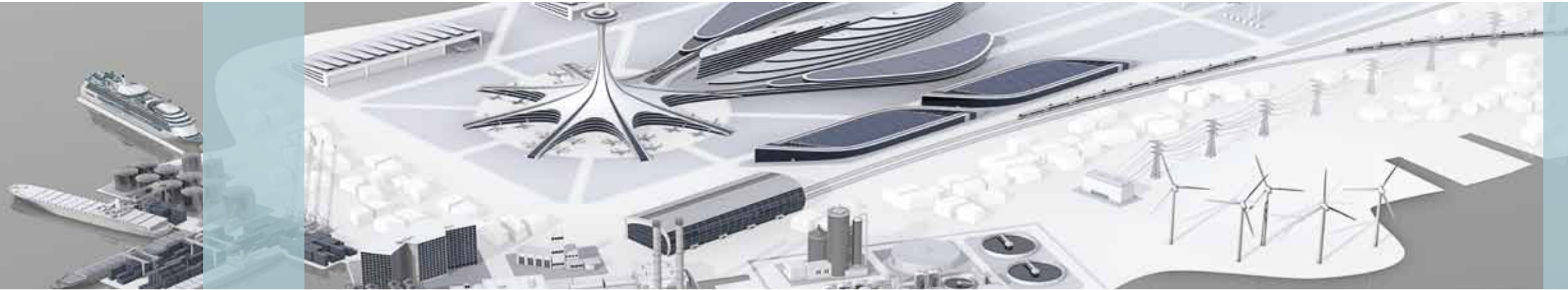
Ever increasing security demands need adapting technology

Increased mobility of people and goods brings with it considerable security risks that cities must be prepared for. International terrorism, smuggling, organized crime and natural disasters are but a few of the threats faced by city management authorities. Vital infrastructure and public facilities have to be protected from sabotage and accidental damage. Dense conurbations of millions of people can descend into chaos very quickly once a critical threshold of infrastructure supply has been

undercut. Complex emergency scenarios, which include traffic management or embedded healthcare, have to be in place.

Siemens' Safe City approach is providing a quantifiable increase in public security and blanket of protection without delays or inconvenience to our citizens. This approach will promote confidence, eliminate excess violations, increase theft prevention and enhance protection of our cities' vital infrastructures. Prevention of crimes and situa-

tional awareness allow better decisions to be made correctly and in time to make our future cities a safe place for us and our families. Our broad range of innovative projects and partnerships in this field brings together the different security disciplines: surveillance & intrusion protection, identity & access management, command & control and communications & IT networks. Trust us to come up with the right solution to make your city safe. Our Siveillance portfolio has the solution for the safety of your city. ■



Airports

Exponentially growing air traffic must be complemented by sustainable development on the ground

With air travel expected to continue its recent growth rates, airports are facing several challenges: handling the ever-increasing number of passengers, freight, and baggage rates in an efficient and cost-effective way as well as creating environmentally friendly solutions and products, plus satisfying the rising security standards required worldwide. Our efficient and green solutions mean airports and airlines are optimally prepared for

an economically successful and green future. Siemens is one of the few companies in the world to offer a comprehensive green portfolio of products, solutions and services for all airport-related processes.

Our experience and know-how lie in the areas of efficient baggage and freight handling, passenger information services, green airport consultancy, security and

safety as well as building management systems, transportation equipment, energy efficiency, operation and maintenance. An energy-efficient baggage handling system can save around 10 percent CO₂ emissions alone. Installing energy-efficient solutions will enable airports to grow on a CO₂ neutral base. CO₂ reductions of individual solutions range from 10 to 100 percent by using renewable energies. ■



Stuttgart Airport

At Stuttgart Airport, energy efficiency measures implemented by Siemens have helped cut the energy bills by 40 percent. We operate on the basis of values calculated from the counting pulses of roughly 500 water meters and 400 heat and cooling meters. The set points as well as the controller settings from the automation and field level are also documented and processed by the airport's energy management system. The calculations are so precise they rely on hourly values to assess the efficiency of the system.

SIHARBOR solution

generates **35%** less CO₂ and around **97%** less nitrogen oxide than the emissions produced when using the ship's diesel engines.

Harbors

Goods traffic in a globalized world relies on state-of-the-art harbors

Global commerce and hence supply of cities is strongly dependent on the movement of shipping containers, which carry about 95 percent of the world's international cargo in terms of value. Harbors are all about efficiency and speed as well as security and safety. Additionally, environmentally friendly operations and cost optimization are of growing importance.

We offer a wide portfolio of technologies and services, ranging from intermodal logistics and terminal solutions to vessel and ship automation and propulsion.

For supply chain security, Siemens provides solutions for port and container security like Command&Control, Intelligent Video or Screening&Scanning. Ports have

great energy saving potential: this is why Siemens has invested in R&D for innovative solutions, from environmentally friendly shoreside power supply to energy saving crane drivers for shipyards and terminals. ■



Sports Venues

More than sports arenas, these buildings can be at the heart of sustainable events

Major events, from the Olympics and World Cup Soccer, to congresses and other cultural or sports events increasingly serve as a trigger for investments and infrastructure improvements. Sports venues themselves are often regarded as a catalyst for the overall redevelopment of a given city district, including new residential and office space, retail facilities and parking, etc.

Our experts can come up with sustainable and scalable solutions for meeting the challenges of such urban growth. Siemens offers a comprehensive portfolio of products and solutions in the fields of security and safety, transport and airports, sports and non-sports facilities, hotels, environmental technologies, energy, healthcare and IT & communications.

For sports venues we have a fully integrated portfolio, "Stadium & Arena", but our other portfolios such as "Green" Energy & Lighting, Safety & Security, Information & Communication and Traffic Control all contribute to making major events sustainable as well as leaving a city with a positive legacy embodied by sustainable infrastructure. ■

Around
3,500,000 kWh of energy
a year could be saved through the use of modern lighting management.

Healthcare

A growing market with plenty of room for efficiency improvements

When it comes to sustainable infrastructure, the big challenge in healthcare is the unification of ecological and economic demands. Siemens supports its customers in meeting these demands and prepares them for the future with Green+ Hospitals. And Green+ Hospitals solutions mean more than saving energy and lowering emissions: they help optimize efficiency and increase qual-

ity. We plan entire hospitals from scratch, from building management to precision diagnostics and patient asset tracing. Our Integrated Healthcare solutions, covering medical imaging, laboratory diagnostics, therapy systems and healthcare IT, enable you to gain significant workflow improvements and provide high quality care.

Innovative technologies support a facility's clinical and financial success with savings of up to 25 percent on installation costs, power requirements and construction by integrating efficient building technologies, IT and communication solutions. Green+ Hospitals counteract your rising healthcare costs. ■



American Heart Institute, Nicosia

In Nicosia, Cyprus, Siemens is delivering a turnkey solution for the region's first "green" hospital. The private American Heart Institute (AHI) is building new premises, which aim to obtain up to 80 percent of their energy needs from renewable sources. The institute is relying on Siemens for green building technology, our end-to-end diagnostics portfolio and intelligent IT solutions to make the founders' vision of a sustainable hospital which provides excellent care a reality.



Financing

Cutting-edge developments need bold financing initiatives

Across the world, funding requirements for investments in public infrastructure will increase over the next few years. In 2007, Siemens Financial Services (SFS) calculated investment requirements of 15 trillion Euros over the next 20 years, drawing on Global Insight data on the healthcare, energy, transportation and water fields. Where will the money for these much-needed invest-

ments come from? The significance of equity interest through public-private-partnerships (PPP) is expected to increase by 20 percent by 2010. The importance of lease financing is expected to grow by 19 percent. Private financing partners are not a cure-all for empty government coffers but the integration of private experts can lead to efficiencies that will make projects commer-

cially viable. Cooperation between the public and the private sector covers a wide base of investments as well as spectacular large-scale projects. We offer Asset Finance & Leasing, Project & Export Finance, Contracting & Partnerships as well as insurance and investment management to make sure your city can afford to take the right steps to sustainability. ■



Windy Flats wind farm, Washington State

Windy Flats wind farm in Washington State is currently one of the largest such projects in the US. Siemens Financial Services has just extended a credit line of \$ 178 million to Windy Point Partners II, LLC, which will be used to expand the existing farm. Once completed in 2010, the wind farms will supply more than 110,000 households with energy. For a customized financing plan, SFS Inc. worked closely with Siemens Energy. With this new line of credit, additional Siemens wind turbines are to be purchased and existing lines of credit refinanced.

Cutting edge technological advances can bring cities up to **25% savings** through increased cost effectiveness.

Public Administration

Ever more complex administrations demand adaptable solutions

City administrations around the world are especially hard hit by increasing urbanization and the challenges of sustainability. While citizens' expectations are rising, officials are wrestling with complex, constantly changing and interdependent challenges. They will have to respond to these challenges in a resource-efficient way. eAdministration, the Virtual City Hall and

the City Cockpit are the result of over 40 years of experience in providing a full range of innovative solutions to government and city authorities.

eAdministration supports these bodies with robust back-end solutions that allow the city to operate efficiently. The Virtual City Hall allows citizens and businesses

to access a full range of services any-time, anywhere, at their convenience while the City Cockpit will help the city administrations manage and improve the performance of their cities through a modern management information and decision support system. Citizens are sure to enjoy the up to 30 percent reduction in response time. ■



London

Cities of all shapes and sizes are the focus of this brochure for a reason: if we can take cities toward a sustainable future, mankind will have a sustainable future on this planet. The challenges are many, the obstacles are high, but the technology to tackle the problems already exists. Behav-

ioral change is ultimately critical, but human inertia sometimes stands in the way of our best intentions. Modern technology can guide citizens toward this required change without infringing on their liberties. We should put it to use wherever possible. At Siemens we strive to develop more intel-

ligent products and solutions to make cities truly sustainable living spaces, places where dreams can come true, where successful lives can be lived and where climate change is effectively combated without infringing on people's liberty. Let us help you make your city truly sustainable. ■

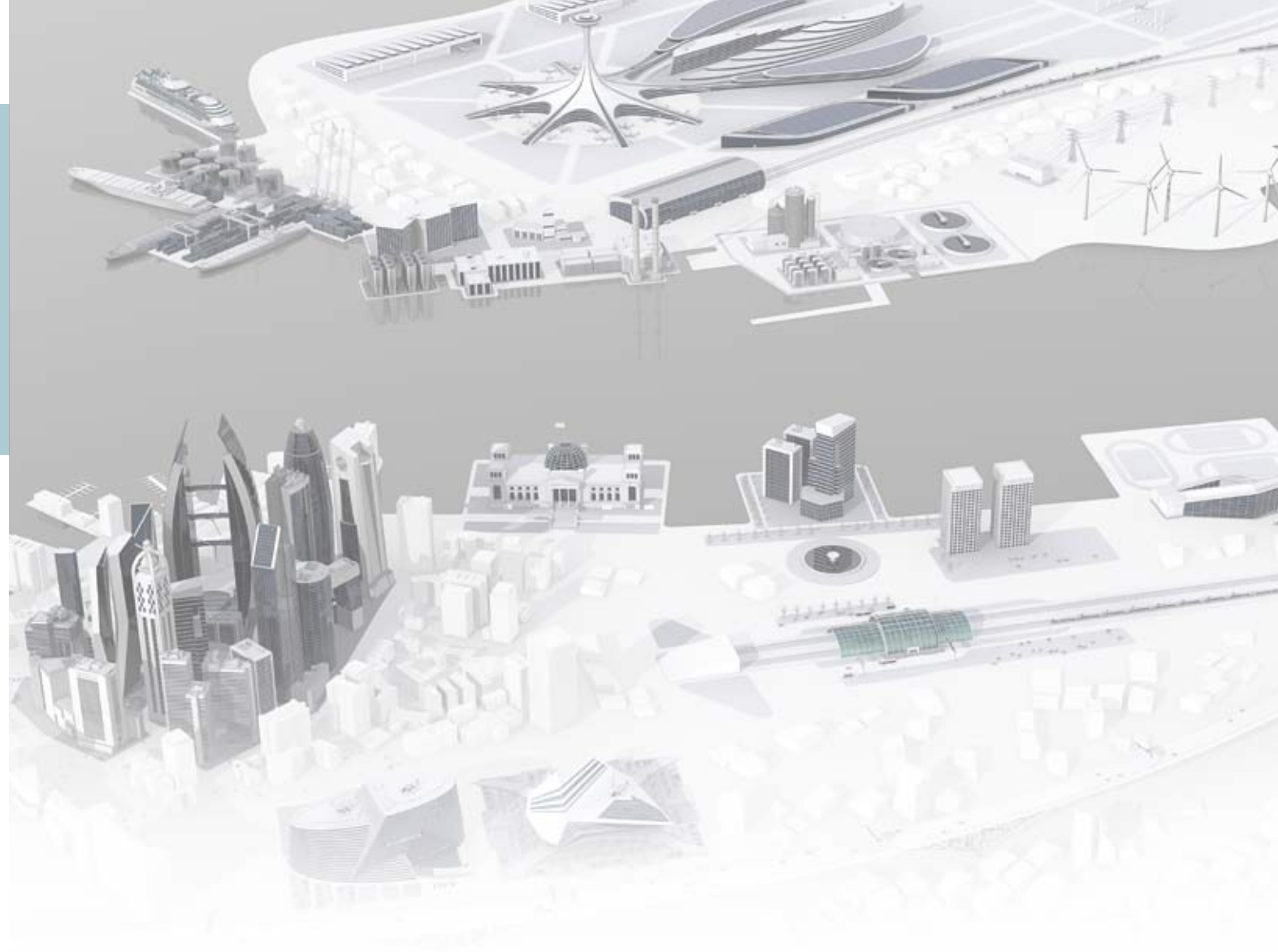
All studies mentioned in this brochure can be ordered online. Go to www.click4business-supplies.de

⁵ Sustainable Urban Infrastructure	London Edition – a view to 2025	Article number: A19100-F-P126-X-7600
⁶ Sustainable Urban Infrastructure	Munich Edition – paths towards a carbon-free future	Article number: A19100-F-P135-X-7600
⁷ European Green City Index	Assessing the environmental impact of Europe's major cities	Article number: A19100-F-P152-X-7600
⁸ Megacity Challenges	A Stakeholder Perspective	Article number: A19100-F-P111-X-7600
⁹ Sustainable Urban Infrastructure	Vienna Edition – Role Model for Complete Mobility	Article number: A19100-V901-B108

References:

- ¹ see e.g. Global Footprint Network at <http://www.myfootprintnetwork.org>
- ² <http://www.citylimitslondon.com/download.htm>
- ³ Ecological Footprints of Canadian Municipalities and Regions, by Jeffrey Wilson, Mark Anielski, 2005
- ⁴ THE ECOLOGICAL FOOTPRINT OF BERLIN (GERMANY) FOR THE YEAR 2000, by Jens Pacholsky.
- ⁵⁻⁸ see studies above

Photo of 'Windy Flats Wind Farm' (p. 28) by Cannon Power Group



Ecofriendly production

In line with our strong commitment to the responsible management of natural resources and the goals of the Forest Stewardship Council (FSC) – which was founded in 1993 to promote the environmentally appropriate, socially beneficial and economically viable management of the world's forests – this Sustainability Report has been produced using chlorine-free materials and climate-friendly production processes.

In accordance with FSC guidelines, all the paper used in this report comes from recycled materials or controlled sources such as sustainable forests. The mill in which the paper was produced is certified in accordance with ISO 14001 environmental guidelines and the Eco Management and Audit Scheme (EMAS). The pulps used are totally chlorine-free and were partly bleached without the use of chlorine gas. The inks used in the printing process were all made from renewable raw materials.



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