Focus: Urbanization
How sustainable city planning has the power to mitigate climate change.

Environmentalist
How Shanghai is preparing for 70 million Expo visitors – and for the future.

Pioneer
European Green City Index: How green are Europe’s metropolises?
Can you actually wash water?

Siemens helps supply millions of people in Singapore with clean water.

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Dear Readers,

“Cities possess the enormous potential to become well-balanced living spaces. Places where people live in concord, and where harmless health conditions prevail. Places with a low level of energy and resource consumption, which don’t produce much waste matter,” said Ban Ki-Moon, Secretary General of the United Nations. But he also knows that, expressed in absolute figures, the reality is different today. At present, cities consume 75 percent of all energy and emit 80 percent of all greenhouse gases. And many urban congestion centers do not have sufficient healthcare and drinking water supply systems. The problems will grow as urbanization increases around the world.

But there will also be a considerable rise in opportunities for getting at the root of the climate change problem and excessive consumption of resources. Nowhere does the use of new technologies pay off more handsomely than in cities. And nowhere are the positive benefits for the environment more perceivable. Appropriate investments benefit everyone: our customers and consumers, because the investment quickly gives a good return; for society through an improvement of living conditions; and for the economy through growth and the possibility to generate new jobs. And Siemens Industry and its more than 200,000 employees also profit. As early as the last fiscal year, Siemens generated revenues of 23 billion Euros with its environmental portfolio – 11 percent more than in the year before that. Over half of this was produced by the Industry Sector.

A study carried out by the Booz Allen Hamilton management consultancy firm has shown that in the coming 25 years cities will spend an enormous 27 trillion Euros for infrastructural measures in the areas of water, electricity, and transportation. Sustainable urban development should soon become synonymous with economic growth – and with climate protection. Reason enough for the current issue of the Industry Journal to spotlight this topic. I wish you exciting reading.

Sincerely yours,
Heinrich Hiesinger
Focus: Sustainable Urban Development

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Sustainability’s world champion

Siemens AG is represented once again in the well-known Dow Jones Sustainability Index (DJSI), and is in first place in the “Diversified Industrials” sector. The company also significantly improved its evaluations in the “Environment” and “Society” categories. For the tenth year in a row, Siemens was recognized for its sustainable actions, and this year received its best overall score ever. The DJSI is one of the world’s leading directories of sustainable, listed companies. The result shows Siemens’ continuing commitment to sustainability.

Partners of the best

Six of the ten best airports in the world are equipped with baggage conveyor systems from Siemens. They include the world number one, Incheon International Airport in South Korea, as well as airports in Hong Kong, Kuala Lumpur, Munich, Singapore, and Zurich. The best airports are nominated each year by Skytrax, the air travel research institute. In addition to international air transportation hubs, Siemens also serves airlines and regional airports. The company’s baggage-handling system provides quality, reliability, and speed. However, it also focuses on energy efficiency – for reduced costs and less environmental impact. During off-peak periods intelligent controls prevent empty conveyors from running, and during peak periods additional subsystems are activated.

US photovoltaic project with technology from Siemens

Since October 2009, the largest photovoltaic system in the USA has been located in Florida: with 90,000 photovoltaic modules, the “DeSoto Next Generation Solar Energy Center” provides energy for more than 3,000 homes. The inverters and system components come from Siemens. The Sinvert grid in-feed system converts highly efficient direct current into alternating current, which is then fed into the power grid via medium-voltage components, also from Siemens. Technology from Siemens is helping Florida eliminate 575,000 tons of greenhouse gas emissions.
Almost half of all European companies invest regularly in systems engineering that contributes to improvements in the CO₂ balance. This was determined in a survey of more than 2,750 companies by Siemens Financial Services. The main reasons for the investments are increased efficiency and the need for greater social responsibility. However, there are secondary reasons as well, including high preliminary investments and conversion costs. The need for alternative financing methods, in particular leasing models, is very high. In this context, performance contracting for buildings has proven itself. It helps to extend investments over a long period of time. In many cases, the energy savings realized are enough to cover the financing rates.

**Shell relies on Siemens**

In September 2009, Shell Oil opened a research center for 1,300 employees in Amsterdam. Shell has 11 such centers worldwide, the Dutch center being among the four largest. The majority of the building services engineering comes from Siemens; its Total Building Solutions approach meets the particularly sensitive requirements of the 80,000-square-meter complex. The MM8000 security management system provides the core of building services control. All subsystems are integrated here – from climate control, to fire protection, to process control. Danger management in the laboratory area is a particular feature: intelligent control of ventilation and shut-off valves, as well as the supply and discharge of gases minimizes risk. The SiPass access control system provides for building security, while the Desigo building automation system ensures an optimum internal environment, particularly in laboratory areas.

**Glowing example**

The Volkswagen L1 consumes only 1.4 liters of diesel per 100 kilometers. The most fuel-efficient automobile in the world will go into series production in 2013. Joule JFL2 LED systems from Osram play a critical role in its energy efficiency. Compared with conventional headlights, most of which use 55-watt halogen bulbs, the LED lights from Osram operate with 19 watts, resulting in significant savings. Even 35-watt Xenon bulbs used in low-beam headlights use over 75 percent more energy. Longer-lasting than the average automobile, LED lights require far less maintenance than conventional lighting. They already can be integrated into new vehicle models regardless of platform.
Metaphors for energy savings

To show the sense behind energy-saving measures requires only one thing: understandability. For this reason David MacKay, Professor of Physics at the University of Cambridge and an advisor to British environmental minister Ed Milliband, uses a rather unconventional unit of measure: the kilowatt per day (kWh/D) corresponds to the energy consumed by a 40-watt bulb that is on continuously for 24 hours. MacKay compares the consumption with the number of glowing bulbs. Both generated and consumed energy is taken into account here, regardless of how it is generated and whether it is used for heating or automobile transportation. Calculated in kWh/D, every European burns some 125 bulbs each around the clock. Even abstract numbers such as the 10,950 kWh required for a passenger to fly round trip from London to Cape Town become much clearer: the trip corresponds to 365 times 30 kWh/D – or 30 bulbs being on continuously for one year.

High-speed train on record-breaking trip

The Velaro from Siemens has been operating between Barcelona and Madrid since February 2008. Even in areas other than speed – the Velaro travels at 350 km/h – the world’s fastest series production train is breaking all records: one year after start-up, passenger numbers have tripled to 2.3 million. In the third quarter of 2009 alone some 651,000 passengers traveled the high-speed route between these two major Spanish cities. For the first time, more passengers traveled this route via train than via airplane. They value the time savings, reliability, and high level of comfort. The Velaro requires only 2 hours 40 minutes for the 600 kilometers between Madrid and Barcelona, a timesaving of more than two-and-a-half hours compared with the old connection. And its on-time rate: 99.2 percent.

The Velaro is also setting standards in the areas of energy efficiency and environmental impact: on average, the train uses only 0.33 liters of gasoline per seat per 100 kilometers. This is made possible by the optimized aerodynamics and the feeding of braking energy into the power grid.
Green drives and energy management systems for freighters

Lowering CO₂ emissions and actively participating in protecting the environment – this was the objective of the United Arab Shipping Company (UASC), the largest dry cargo shipping company in the Middle East, headquartered in the United Arab Emirates. They commissioned Siemens with equipping nine new container ships with booster drives and waste heat recovery management systems. The waste heat recovery management system converts emissions from the main diesel drive into steam which drives turbo generators. Electricity generated in this manner can be used to supply the on-board electrical system. This improves the overall efficiency of the ship’s drive and reduces maintenance costs for the auxiliary generators.

In combination with the booster drives from Siemens – electric motors integrated into the drive shaft – this provides a much improved energy balance. All of the systems and components are part of the Siemens “Siship” solution platform. The order volume from UASC is in the tens of million Euros range.

Economical tram with hybrid energy storage

Siemens has launched Sitras HES, an energy-efficient hybrid energy storage system for trams. The system makes it possible for trams to run without catenary systems for up to 2,500 meters. This proves most useful in historic city centers and tunnels, bridges, intersections, and other sections difficult to access. Moreover, the trains require 30 percent less energy than conventional models. Sitras HES consists of a combination of two energy-storing components: a double-layered capacitor (Sitrás MES) and a nickel-metal hydride battery. The capacitor provides for rapid charging of the battery through regenerative braking during train operation. The integrated battery allows for slow and even energy output, and enables the passing of longer tracks without external energy sources. Thanks to a new connection concept, the system can be also installed on existing vehicles. In Portugal, the hybrid energy storage system has already been in use for over a year now, connecting the cities of Almada and Seixal, south of Lisbon.
The cities will be the decisive factor on how humanity will be living in a hundred years or less. The metropolises of the world are, on the one hand, gigantic power plants for innovation and economic growth. On the other hand, they are also genuine eco-monsters! For all of this, sustainability in congested urban areas is not an impossibility. Worldwide, many examples show how the interests of economy, society and environment can be brought together. In any number of countries, revolutionary planning is about to go into action. The Siemens Industry Journal presents future-oriented approaches in Europe, the United Arab Emirates and the United States.
“Metropolises are suffering more and more under climate change, the scarcity of resources and food, overpopulation and economic instability. These factors will lead to a drastic change of the cities.”

Dr. Anna Tibaijuka, Executive Director UN-Habitat
Cities provide an outstanding example of how we can explain the relativity in numbers: in terms of area, they cover only one percent of the earth’s surface. That’s not much. Yet they consume 75 percent of the world’s energy requirement and produce 80 percent of all greenhouse gases. That’s a lot.

Added to this is the fact that urbanization is rapidly increasing. About half the world’s population currently lives in cities. This means that this one half is accountable for 80 percent of all greenhouse gas emissions. In 40 years, 70 percent of humanity will be city dwellers – and cause more than 90 percent of the greenhouse gases. In addition, the number of megacities with 10, 20, even 30 million residents is steadily growing. In threshold and developing countries, especially these crowded areas are steadily expanding, most of them uncontrolled – and with them pollution, poverty and criminality.

Cities are increasingly developing into catalysts for the problems of humanity: global warming, scarcity of resources, water shortages, unavailable education, social unrest. Condemning urbanization however would be the wrong approach to these problems. According to studies made by the consultation firm PricewaterhouseCoopers, the hundred biggest cities in the world alone account for one third of the global GDP (gross domestic product). Within the European Union, the cities bring in as much as 85 percent of the GDP according to studies made by the European Commission.

Urban development as a lever

Statistics like these show: cities hold the key to the future of earth – in both a good and a bad sense. Getting started with improvement measures in the big cities is the longest lever to promote growth and encounter global hazards head-on. The magic word is “sustainable urban development” – a project that will do equal justice to the economy, the society and the environment.

In actual practice this means three things: firstly, urban planners must come up with innovative comprehensive concepts for future cities. Secondly, cost-efficient green technologies have to be developed, implemented and financing concepts created. And thirdly, urban residents must be integrated and convinced.

First and foremost, the final factor – the human one – is an aspect that is occasionally shortchanged. And so, cultural differences in Europe alone are already so extreme that they make unified approaches impossible: “We’ve already got gridlock problems on the bicycle paths,” says Gunnar Söderholm, Director of Environmental Administration and Health for the city government of Stockholm.

Things are different in Poland. “Anyone here who uses public mass transit instead of a car is branded a loser,” Leszek Drogosz reports. He is the Vice Director of Infrastructural Development for Warsaw.

“When sustainable urban construction is the issue, there is only one direction to move – upwards. The horizontalization of poor cities is a global problem,” says Dieter Läpple, professor of building art and metropolitan development at the HafenCity University in Hamburg. After all, cities can only be designed sustainably with low surface consumption, compression and short access paths, which is why they have to grow upwards. Läpple says: “We can see how this works right now with examples in Shenzen and Shanghai.”
Sweden sets a good example

A prime example of sustainable urban development is the Stockholm district of Hammarby Sjöstad. The “Hammarby Model” was even exported to Russia, Great Britain and China. In the one-time pollution-stressed industrial area, the city fathers began the ecological reconfiguration some 20 years ago. The goal was to cut CO₂ emissions in half. To reach it, the residents, for example, generate half their energy requirement themselves. This way, they take advantage of wastewater and household refuse to heat and cool their homes and generate electricity. In addition, they separate their garbage, which is then removed by vacuum force through a system of subterranean pipes.

One sustainable success is also the newly constructed Malmö district of Västra with 3,000 dwellings for 10,000 residents. Electricity and heat are provided here in complete balance from renewable energy sources. Pedestrians and bicycle riders have priority and new bus lines reduce the individual traffic.

Greentech is the decisive factor for the future

The most important prerequisites for a sustainable urban development, however, are green technologies, which also provide economic usefulness. Many of them are already on the market. This way, measures for the energy optimization of buildings generally begin showing a profit in a very short time – and have an enormous climate-protection effect, because buildings consume 40 percent of all energy worldwide and cause 21 percent of the greenhouse gases. Building changes could lower the energy requirement by 40 percent. Siemens not only makes the appropriate technologies available but also provides financing concepts. Siemens makes the initial investments under the terms of an energy contracting plan. The repayment comes from saved energy costs. Siemens has already realized 1,500 such projects and thus provided cost savings of two billion euros and an annual reduction of 1.2 million metric tons of CO₂.

In traffic systems, green technologies can likewise save sizable costs while also protecting the climate. For example LED traffic light systems: they consume up to 90 percent less electricity than conventional systems – with ten times the lifespan. This starts paying off as soon as five years later. According to current estimates, a large city with 700 intersections could save some 1.2 million Euros by switching to LED technology. Or traffic jams: they devour an annual three percent of the GDP in industrial nations and produce millions of tons of unnecessary emissions. These levels can be drastically lowered by converting to modern traffic management systems.

Energy-efficient trains such as the ones on the Oslo subway lines are also easy on the environment: they need 30 percent less energy than their predecessors. Then there are the hybrid buses in São Paulo, which emit one third less CO₂. Or the new signal system for the Metro in Delhi, which reduces thousands of tons of CO₂ emissions.

Citizens would also welcome steps like these. A study conducted by the European Commission in conjunction with the EU action plan entitled “Urban Mobility” concluded that 90 percent of the citizenry consider traffic management systems worthy of improvement.

On the following pages we will present concepts, developments and trends from different regions of the world, all united by a single thought: the development of sustainable, future-oriented cities and metropolitan areas.
Data and facts

With a population of 1.6 million, Abu Dhabi is the largest state in the United Arab Emirates (UAE), which also includes Dubai, Ajman, Fujairah, Ras al-Khaimah, Sharjah and Umm al-Quwain. The UAE ranks among the most oil-rich nations in the world.

The economy has been growing steadily to a very high level over the past ten years. A correspondingly large workforce has moved here from other places – and with it an increase in the housing requirement. Even now, 80 percent of the population is made up of foreign workers.

In 2008 Abu Dhabi presented an overall economic plan for municipal development up to 2030. By then, the “Greater Abu Dhabi City” is expected to grow to a population of some three million.

The first groundbreaking for Masdar City took place in 2008. By 2020 50,000 people, a university, as well as 1,500 companies are expected to move into the six-square-kilometer area in the south-east of the emirate. The “Silicon Valley of Regenerative Technologies” is consistently oriented toward the principles of the WWF One Planet Living Sustainability Standards and is striving to become the first city worldwide to leave no ecological footprint behind.

All in all, ADFEC, the Abu Dhabi Future Energy Company as representative of the Masdar City Project, reckons with investments in the amount of around 22 billion US dollars. Part of the costs should be refinanced over the emissions trade.

Example Masdar City

Tiruvenamalai in India, Rovigo in Italy, Tsarinsk in Russia, and Pirmasens in Germany – these cities have two attributes in common: each one has a population of around 50,000 people, and each of them is virtually unknown outside their own countries.

Some 50,000 people will also live in Masdar City, but unlike those other places, the six-square-kilometer infrastructure project in the emirate of Abu Dhabi was a world-famous sensation years before its completion, because over the next couple of years the vision of a climate-neutral high-tech city, which goes easy on precious resources and makes possible a consistently sustainable living and working environment, will become reality here in the midst of the desert sands.

By 2020 at the latest, the population will find a totally environment-friendly home town here, and an additional 40,000 commuters will come to work here. 1,500 companies and a sizable number of scientists from all over the world will settle here. They will be doing research at the newly established Masdar Institute of Science and Technology on such sustainability topics as renewable technologies and building engineering.

Masdar City will be carbon-neutral, and will be able to get along without ordinary air conditioners, cars or the combustion of fossil fuels. The new city will mainly consume self-produced energy derived from photovoltaic systems, solar power plants, and thermal refuse recycling. Even during the eight-year construction period, a solar power plant with a capacity of ten megawatts will supply the required energy. It has been on line since May of 2009.

Shade instead of conventional air-conditioning

Masdar City was planned by the British star architect, Lord Norman Foster. His team planned the city so that the closely situated, shade-giving building construction style would keep the city 20 degrees cooler than the surrounding desert areas. Light industry will be situated in a technology park on the outskirts of town.

The residents of Masdar City will be able to enjoy getting from one place to another on foot. Cars will have to remain in parking garages outside of town, the ground-level streets are reserved for pedestrians and bikers. Trees and plants border the sidewalks. At high temperatures automatic sun shields will roof over the public
Close quarters for plenty of shade, coupled with ultra-modern building engineering, provides pleasant temperatures without energy-guzzling air conditioners in the Arab Masdar City.

squares. For longer distances, new-fangled mobility concepts with futuristic electric personal rapid transit vehicles are available bringing passengers to their destinations underground in a cabin with no waiting times. An elevated light rail transit system will connect Masdar with the airport.

Ultra-modern building engineering

The people will live and work in buildings with futuristic façades. They stand on concrete stilts, and their building engineering for heating, ventilation, cooling, light, and household appliances observe uncompromising sustainability principles. The municipality will supply drinking water through a solar-driven seawater desalination plant. The refuse will be collected via a state-of-the-art system and completely recycled. Masdar City should be the cleanest city in the world and become the prototype of a sustainable lifestyle.

Beyond Masdar City as well, Abu Dhabi is investing heavily in upgrading green technologies. Of all places, the country with one-tenth of the world’s petroleum reserves, where a liter of gasoline costs less than thirty cents, where public transportation is virtually unknown, this very emirate wants to become a leader in the field of renewable energies. The motivation: the improvement of the ecological footprint and the build-up of an alternative to oil dependency. “The emirate has committed itself to providing at least seven percent of its energy production from renewable energy sources by 2020,” says Dr. Sultan Al Jaber, CEO of the Abu Dhabi Future Energy Company. In the coming ten years this could generate a market of up to eight billion US dollars, just like banks and holding companies. Masdar City is the solution for the entire value-added chain in the area of renewable energies.

Siemens AG is also involved here. It has committed itself to developing environmentally sound technologies for the energy market. The staff members in divisions like Environmental Systems & Services and Renewables are currently working full speed ahead on increasing the efficiency of buildings, industrial plants, and transportation systems.

“The Masdar Initiative is an interesting project for Siemens and fits strategically right into our Energy Efficiency and Environmental Protection Program,” says Tom Ruyten, Key Account Manager at Siemens LLC Siemens One in Dubai. Intelligent building engineering with room automation, for instance, uses sensors to recognize when rooms are vacant and then turn down lights and cooling systems – which in turn leads to a sizable reduction of CO₂ emissions.
Example U.S. suburbs

“Is the American dream turning into a nightmare?” the U.S. cable news network CNN recently asked. A little house on a green lawn, plus a snazzy car – since the 50’s this has been the epitome of the American Way of Life. But because of heavy traffic, the daily trip to work from the suburbs meanwhile takes up to two hours – for just one way. Most people could only afford this because of the low fuel prices. When they meanwhile exploded in 2008 because of the skyrocketing price of petroleum, the freedom of the suburbs became an unaffordable luxury for many Americans. In addition, the voices of the environment advocates got louder – the energy balance of the car-dependent suburbs is monstrous.

“Americans will have to settle into the American countryside differently” because of this, the well-known urban scholar James Howard Kunstler demands. He wants to teach Americans the European lifestyle. Expressed less dramatically this means, primarily, compression. Multi-storied, multi-family dwellings should make it possible for residents to walk to shopping areas and public transport stations. In many big cities such as Phoenix, Arizona, “walkable urbanism” is already a way of life.

An outrageous demand on the suburbs, because here the car is king – pedestrians are foreign objects. There’s a shortage of sidewalks. But these communities are beginning to recognize the signs of the times. To remain attractive with their extra-urban location, they have to take action. “The model of the U.S. suburbs is over”, says François Bellander, Director of the French think-tank TransitCity. For Harry Kitchen, an economist at Trent University in Canada, the solution is clear. “Transportation is the key to solving all the problems of the suburban lifestyle.”

If gasoline were again to get as expensive as it was two years ago, many U.S. suburbs would be trembling over their survival. Commuter towns from which the majority of the residents go to work in the nearby large city could experience an exodus. The farther the homes are from the center, the more they will drop in value. Tax revenues will drop, and so will property values. Chris Leinberger, professor of urban development at the University of Michigan estimates that communities where public transportation is accessible by foot will command between 40 and 200 percent higher real estate prices than suburbs dependent on car ownership.

In the early 20th century, America’s suburbs grew along the streetcar lines and thus into the access roads. “With the rapidly growing expansion of the public suburban transport lines, the U.S.A. was now able to return to its roots”, says Alan Berube, research director for the Metropolitan Policy Program at the Brookings Institution in Washington, D.C. With regional trains instead of motor travel, Siemens Mobility calculates, up to 25 percent of the required energy could be saved.

But the United States will remain the United States. The people will not dethrone King Car. To come to terms with the gridlock problem, an increasing number of mayors are getting in-
interested in traffic management systems based on the European model— from parking guidance systems to a green wave of staggered traffic signals. ”The crisis offers opportunities for us”, says Christy Peebles, who heads business operations at Siemens ITS (Intelligent Traffic Systems) U.S.A., headquartered in Austin, Texas. “The government has appropriated 48 billion US dollars in conjunction with an economic stimulus package for traffic projects. This doesn’t just result in orders, but also sparks the awareness of decision-makers for the options of modern traffic technology.”

Automated traffic guidance versus gridlock

At Siemens ITS, an adaptive control system called Scoot is in heavy demand. It is currently being introduced in 15 U.S. communities. It measures the traffic volume at intersections and regulates the traffic lights accordingly. “Scoot optimizes the traffic flow and thus reduces CO₂ emissions and fuel consumption,” says Peebles. Not long ago, she introduced the system in Orange County, Florida. The frequent sudden rainfalls there regularly lead to traffic jams when the many tourists try to go back to their hotels from the beach. Thanks to Scoot, the city no longer needs anybody to reset the traffic lights manually. Peebles estimates that in the next four years, her division will enjoy a double-digit growth rate. Siemens ITS holds a large share on the U.S. market for intelligent traffic solutions. This means every fourth traffic light system in the United States is from Siemens.

Meanwhile, more and more American cities are expanding their rail traffic. This is good news for Jürgen Wilder in Sacramento, California. As head of Siemens Rolling Stock U.S.A., he is in charge of the light rail business in North America. This is the name of a specifically American mass transit system on narrow tracks where trains with speeds of up to 110 kilometers per hour can travel some 25 kilometers per hour faster than German suburban trains. With their help, U.S. mayors not only want to open up the streets again, but also regulate the growth of the communities. In April of 2007, for example, Siemens delivered mass transit systems to Charlotte, North Carolina. The rail route also goes through an abandoned industrial zone. Today, after less than three years, despite the financial crisis, many new stores and restaurants have opened up here. “A rail route will be dependable for the next 50 years. High-speed buses, by contrast, can be re-routed over night,” says Wilder.

Real estate prices climb thanks to railroad routes

Business people appreciate investments like these. And they know: as soon as a blueprint of a rail line is submitted to the building commission, the real estate prices rise all along the route. A good sales argument for the rapid transit systems that have been excellently marketed in the United States, especially on the east and west coasts and in the middle west. “Our rapid transit business has significantly grown over the past few years,” says Wilder. His market share climbed from 40 to 60 percent. Whereas he previously sold 30 to 60 trains a year, today that number is from 60 to 100.
Example Seoul

More than 25 million people currently live in the South Korean metropolis of Seoul and the satellite municipalities on the periphery. The number of residents in the world’s fifth largest city has increased ten-fold since the 1950’s. This enormous growth has its downsides. In this sense, Seoul is among the capital cities with the worst air quality in the world. The traffic noise is, at least during rush hour, often unbearable.

This should be over and done with in just a few years. Currently, this megacity is becoming a pilgrimage site for city planners eager to witness sustainable development. Trail-blazing processes and technologies are being exemplarily implemented to improve the quality of life in the city and protect its environment. The goal of Seoul’s mayor is ambitious. Se-hoon Oh wants to develop his municipality to a model megacity. This is why the motto of the official four-year plan is justifiably “Seoul – a clean and attractive global city”.

300 kilometers of subway routes

Seoul has already taken the first steps on the way to becoming an outstanding example. In a cooperative effort between government, corporations, international experts and citizens, projects are coming into being to establish milestones worldwide. This goes especially for the transit system, but also the building engineering and city planning. The subway system went into operation as early as 1974. Today, it covers a track system of some 300 kilometers underneath the city of millions. Further expansion is now under way. In 2011, a new, 10.6-kilometer-long, fully automated connection in Uijeongbu, north of Seoul, will go into operation. Siemens is supplying, among other things, the rubber-tired Val model rolling stock, the automatic train control system, the operation control center as well as the system engineering and has also assumed the project management.

Exemplary city bus system

The city bus system with over 350 routes is also impressive and banks on customer orientation. Passengers pay their fares cashfree with credit-card-sized “Smart Transportation Cards”. The cards are used around 31 million times a day. A bus management system informs passengers on arrival and departure times and serves concurrently as a planning instrument for the bus company.

These are just a few examples of how the city administration of Seoul is successfully making mass transit vehicles appetizing for its citizens. Further improvements are already on the drawing board. As of 2017, there will be a bus or train stop every 500 meters.

Best airport in the world

Airline passengers should also have every possible comfort. In 2001, the Incheon International Airport opened near the capital city. Three years later, the expansion began to increase its capacity to 44 million passengers annually. The aviation research company Skytrax singled Incheon out as the best airport in the world. Siemens had a share in that. The company supplied an innovative high-speed tray system. This sends luggage whizzing rapidly through the 900-meter-long tunnel that connects the main building with the new terminal and serves around 240 check-in counters. Normal baggage and bulky luggage travel on the same conveyor line. 33,000 pieces of baggage an hour are transported this way. To make sure this world’s first facility of this kind functions smoothly, Siemens first tested the special demands on the control system at the Siemens Airport Center in Fürth.

People who want to decide for themselves how they will reach their destination use the city government’s web-based PTA (Personal Travel Assistant). In a matter of seconds, the electronic travel guide ascertains the route with the lowest CO₂ emissions or calculates the pollutant emissions the PTA owner causes. This schools their awareness of personal responsibility. The service is based on the future-oriented IT infrastructure and the outstanding broadband coverage of South Korea.

In the struggle against environmental pollution and traffic noise, Mayor Se-hoon Oh and his team don’t count on high tech alone. Now and again, the city government also decides to take radical, rather conservative measures when it
Green areas are rare in Seoul and as highly respected as paintings in a museum. This makes environment-friendly transport systems all the more important – not just for excursions to natural surroundings.

comes to sustainable action. This included rippling out an approximately 3.7-kilometer-long expressway over the Cheonggyecheon, the "cold water stream". On the grounds, a generous green area was created for the citizens right in the heart of the downtown area, bifurcated by the river.

**Getting the citizens involved**

Acting sustainably to set the course for a future-worth living is, according to Se-hoon Oh, also a task for the citizenry and the business community. This is why in 2009, the starting shot was fired for the construction of a zero-energy building, which was developed in cooperation with the ISE, the Fraunhofer Institute for Solar Energy Systems. It has been planned to incorporate all the knowledge of modern energy-saving engineering, and be heated and cooled with such regenerative energy sources as sun, geothermics and wind. "We want to show that this is possible throughout the year in the zero-energy house, and that it is also comfortable", explains Professor Volker Wittwer, deputy head of the ISE. Siemens became involved, among other things, in the installation of the water conditioning and the optimization of the refrigeration plants in three business centers in the South Korean capital.

In existing buildings, Seoul also places its bets on sustainability. Here, the job is to use energy renovation to increase both comfort and energy efficiency.
The Pearl River Delta at a glance

<table>
<thead>
<tr>
<th>City</th>
<th>Population (in millions)</th>
<th>Area (in km²)</th>
<th>GDP growth (in % p.a.)</th>
<th>Export (in billions of US dollars)</th>
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<td>1,688</td>
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</tr>
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</table>

Source: Guangdong Statistical Yearbook 2008

Example
Pearl River Delta

Something the experts had long reckoned with actually happened in 2009. China ousted Germany from first place on the list of worldwide exporting countries. One region made the largest contribution to this success: the Pearl River Delta. A place that would sound to many people today like the setting of an adventure novel will soon be as familiar to schoolchildren as New York, Tokyo, London, Cairo, Moscow or Berlin, because today the Pearl River Delta numbers among the most powerfully growing and richest economic regions in the People’s Republic of China – it is the Asiatic Dorado of our times.

At the spot where the Pearl River flows into the South China Sea, over the past few years a veritable world factory has come into existence at incredible speed. Nowhere else are more watches, telephones, radios, toys, shoes as well as electrical components and clothing produced and exported. And the growth is unstoppable.

This colossal boom is also reflected in the already almost explosive development of the nine cities in the region as well as the two special administration regions of Macao and Hong Kong. An urbanization that has been ongoing for years attracts more and more job-seekers to the delta – especially former farm workers. Whereas 30 years ago, only 20,000 people lived in the former fishing village of Shenzhen, today’s population is 8.6 million.

Many other towns in the region have meanwhile also grown into cities with millions of residents. Guangzhou, once called Canton, with its current population of ten million is also one of these megacities. And there are now some seven million people each living in Dongguan and the former British Crown Colony of Hong Kong. More than 50 million people make their homes today on the 43,000 square kilometers of the Pearl River Delta. And growth places a heavy burden on the environment.

Growth entails environmental impact

The nearly inexhaustible requirement for work forces in the cities of this boom region is leading there to similar problems as in most of the other million-inhabitant metropolises around the world. These include chaotic traffic conditions and sizable environmental stresses. No wonder the region is now in first place on the list of the biggest Chinese environmental malefactors. Besides this, the energy and water supply fail to meet requirements everywhere.

The signs in the Pearl River Delta, however, are now pointing to sustainability. In this sense, a consortium in Guangzhou is now expanding the Metro lines 2 and 8 with modern control and signaling systems. Besides this, the company supports the city in optimizing its energy mix. Renewable energies are slated to be put into
operation more and more. And work is also under way on an up-to-date health care infrastructure.

These activities are urgently required, because the Chinese government has given the green light, now that the eastern half of the delta has been made attractive for investors, to make the western half equally interesting. This is where, among other things, roads and rail connections are now being improved. In addition, the 50-kilometer-long Hong-Kong-Zhuhai-Macao, the longest bridge in the world, will soon span the distance between the cities. This will further increase the inflow into the region and in turn raise the population. Where once water buffalos ploughed the rice fields, today an unstoppable increase of production sites is the order of the day.

Impulses emerge from Hong Kong

This continues the development that began about 30 years ago and has since picked up speed more and more. Back then, it was largely firms in Hong Kong that opened up the economic area. Today, companies from the former Crown Colony alone operate more than 60,000 production sites and employ in the neighborhood of eleven million people – tendency rapidly rising. But the region is not only continuously gaining in attractiveness because of its low salary level. A more significant factor is that the most eager consumers in all of China also live here. The per capita income and the retail sales revenues here are higher than anywhere else in the People’s Republic. All in all, the nine provinces in the Pearl River Delta contribute more than one third of the aggregate gross domestic product.

The management of the factories is primarily in the hands of Hong Kong Chinese. They live on site or steer the companies from their home town. The special administrative zone on the Chinese south coast, however, also assumes an important role as a finance and logistic center for the Pearl River Delta. Hong Kong’s Chek Lap Kok International Airport is one of the most important airports in Asia. In five hours, people can fly from here to about one half of the world’s population. The key Chinese markets are only four hours away. Every day 750, planes land here from all over the world. Some 80 airlines fly from Hong Kong to 140 international destinations. The financing for Chek Lap Kok was once provided by the British. When they turned over their former colony in 1997, they decided to invest a large portion of their income surplus in the airport to provide the city with a foundation for economic growth.

The Pearl River Delta also profits from this investment and government support. The area has transformed itself into one of the foremost economic centers worldwide. The economy in most of the cities in the Pearl River Delta is growing by double-digit figures annually.

Power supply from far away

Siemens contributes to the improvement of the climate balance in the Pearl River Delta. In December of 2009, the company put the first pole of the world’s highest performance high-voltage direct current transmission system into operation. The system uses water power to convey CO₂-free-generated electricity from the coastal province of Yunnan 1,400 kilometers to the industrial region. This happens virtually loss-free. 95 percent of the electricity for five million households goes to Guandong Province. The alternative would be fossil-fired power plants on-site – which would emit 30 megatoncs of CO₂ annually. The entire high-voltage direct current transmission system will be up and running by mid 2010.
The research institute Economist Intelligence Unit analyzed 30 European cities in 30 countries in terms of environmental sustainability and climate protection. The researchers wanted to find out how green these metropolises really are, and they wanted to present best practice examples. Scandinavian cities received top rankings – with Copenhagen in first place – whereas Eastern European cities have the greatest catch-up to do.
Copenhagen is greener than any other city in Europe. Seventeen percent of the city’s energy consumption comes from renewable sources, and that number is predicted to increase to 30 percent by 2025. Public transport is exemplary: the distance to the closest underground, streetcar, or bus station is no further than 350 meters from any location. Almost one out of three people rides a bike, and it is predicted that by 2015 every second person will ride a bike. Copenhagen wants to become the world’s most attractive cyclist city. There is a park on every other block. More than 50 percent of all garbage is recycled. The city’s buildings are among the most energy-efficient in Europe and the per capita CO₂ emissions do not exceed 5.4 tons per year.

Already there are new plans for the future: by 2025 Copenhagen wants to be completely free of CO₂ emissions. It doesn’t come as a surprise that the Danish capital was nominated as the greenest metropolis in Europe. The first European Green City Index, a new sustainability study initiated by Siemens, listed Copenhagen in first place.

Cities play a decisive role in the fight against climate change. Not only are they responsible for 80 percent of all greenhouse gas emissions, they also consume 75 percent of all energy worldwide. And more than half of the world’s population today live in urban areas. “The technology required to increase energy efficiency in urban centers and considerably reduce the carbon balance is there,” says Barbara Kux, member of the Managing Board at Siemens. “It’s all about putting it to use now.” And they are extraordinarily suited to doing that. Because there is a high

### Europe’s greenest cities

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<th>Value</th>
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### CO₂

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<td>1 Stockholm</td>
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<td>9 Zurich</td>
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<td>10 London</td>
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### Transport

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Source: European Green City Index.
Munich – the CO₂-free metropolis

How can a modern, expanding city reduce its CO₂ emissions without having to worry about economic cutbacks or constraints on the standard of living? Siemens asked researchers of the Wuppertal Institute for Climate, Environment, and Energy to find an answer to this question. In "Munich – ways to a CO₂-free future," they presented a detailed study that provides an outlook for half of the century – until the year 2058.

The result: there is a chance to achieve a 90 percent reduction in CO₂ emissions in a metropolis like Munich if city administrators, power suppliers, and citizens work together to support efficient technologies – from refrigerators to power plants. And there is a chance if politicians support renewable energy sources such as wind, solar, biomass, and geothermal energies.

The greatest potential of reduction, according to the researchers, lies in the heating of Munich’s buildings, which accounts for almost half of the city’s CO₂ emissions. “Think Big” is therefore the motto when it comes to the restoration of buildings. In the future, all house renovations must adhere to the Passivhaus standard for energy efficiency in buildings. This includes first-grade heat insulation and vacuum-insulated windows as well as a ventilation system that maintains the room temperature before the exhaust air is released. Equally important would be the increased utilization of efficient combined heat and power generation plants, which use about nine-tenths of the energy contained in fuel. Transitioning to electric cars would have to be promoted in addition to city planning considering that everything is within walking distance.

Currently many stakeholders are still reluctant because the initial cost of resource-saving technologies is often very high and energy cost savings are not being considered across the entire lifecycle. Financing and compensation plans as well as information campaigns could steer consumer behavior in the right direction. Energy efficiency has nothing to do with abdication of comfort but everything to do with a change in behavior, the study concludes.

Concentration of problems in urban areas, cities have the best lever to slow down climate change.

Thirty cities in eight categories

On behalf of Siemens, the experts of the London-based research institute Economist Intelligence Unit have analyzed the 30 leading cities in 30 countries in Europe. They looked into the cities’ performance and ambitions concerning environment and climate protection and analyzed the differences in eight categories: CO₂ emissions, energy, buildings, transport, water, air quality, waste and land use, and environmental governance. “Using the study, the cities can now prioritize their activities to improve their carbon footprint,” says Reinhold Achatz, head of Corporate Research at Siemens.

Stefan Denig has been part of the study from the beginning. “In the last two years, we conducted studies of challenges of megacities and analyzed London and Munich, among others. We wanted to include more cities and compare them, with the goal that they could learn from each other,” says the project manager of Siemens’ European Green City Index. “There are best practice examples out there that hardly anybody has heard of.” For example, a recycling lottery initiated by city officials in Ljubljana in Slovenia rewards their citizens for recycling garbage. The city of Paris offers 10,000 bicycles that can be rented for free for 30 minutes by their citizens. An official hitchhiker network station is supposed to motivate car drivers to take pedestrians a part of the way. Or a comprehensive energy contracting system as in Berlin achieves sustainable and efficient energy savings solutions in public buildings through close cooperation among the city and enterprises.

Complex methodology for an overall comparison

In order to be able to compare the performance and strategies of the cities, the EIU defined 30 individual indicators for the eight categories of the study. There are quantitative criteria such as: How much water and energy is being consumed by their citizens? How often do they use public transportation? And there are qualitative aspects: What are the environmental goals of the city’s administration? How strictly do they enforce the building regulations and support environmental protection measurement? In addition, city portraits characterize the strengths and weaknesses of each metropolis and present exemplary projects. In particular, the study not
The English Garden is the green lung of Munich. It is one of the biggest parks in the world.

only allows the individual indicators to be compared, but the total result as well.

Cities ahead of rural areas

The outcome is surprisingly positive for European metropolises. Environmental protection has become one of the top priorities in city politics. Almost all of the cities have developed an environment strategy. With an annual rate of 5.21 tons per citizen, the average CO₂ emissions of these 30 cities is well below the European average of 8.46 tons. Cities can be even more climate-friendly than rural areas. The reason for that, according to the study, is the fact that industry strongholds have developed into service centers.

The winners of the ranking are the Scandinavians: runners-up after Copenhagen are Stockholm and Oslo in second and third place, followed by Vienna, Amsterdam, Zurich, Helsinki, and Berlin. The protection of the environment has traditionally been important for Scandinavians. In addition, the cities in the north of Europe are comparably wealthy. “There is a close connection between a city’s wealth and its ranking within the European Green City Index,” says Denig. Nine of the ten highest-ranking cities have a per-capita income of more than 31,000 Euros per year.

Europeans benefit from financial incentives when they invest in environmental protection. “The wealth of a city is not the only factor. Comparably poor cities, such as Berlin or Vilnius, achieve excellent results for the environment.” For example, the Eastern European city of Vilnius has the best air quality. Berlin is particularly strong when it comes to energy-efficient buildings. And nowhere else are more people using public transportation when they go to work than in Kiev. There are also historical reasons for the fact that Eastern Europe achieves relatively low rankings. It will take years to catch up in areas where environmental protection was hardly a priority for decades, and therefore the infrastructure is dated.

Despite their good performance, there is still considerable room for improvement in European cities. Up until now, only seven percent of their total energy consumption is covered by renewable energies. They are still a long way from achieving the 20 percent goal required by the EU by 2020. Only about one-fifth of the garbage is being recycled. One out of four liters of water is lost through leaking pipes. Also, when it
comes to building technologies, which accounts for 30 percent of the energy consumption of a city, there is room for urban areas to improve, estimates the Siemens expert Denig.

Three levers to increase environmental protection

For cities to be able to align their environmental strategies, it is important to make use of three levers: politics should create incentives. For example, they can impose a fee on car usage in inner cities so that people will be more likely to use public transport. Industries need to offer more energy-efficient, innovative technologies which are so cost-effective that they can compete with conventional products. The metro light rail system that Siemens installed in Oslo, for example, feeds the braking energy of each underground train back into the system for the next train to use for acceleration – and beats the competition. “However, most important is the motivation of everyone,” says Denig. “The study also shows that the more motivated each citizen, the better the ranking of the city in environmental protection.”

“Increased problems”

Interview with Professor Dr. Dr. h. c. Kurt Kutzler, President of the Technical University (TU), Berlin.

What are the most important levers to make our cities more sustainable?

Cities are incredibly complex systems. Sustainable solutions can therefore only be successfully organized by utilizing interdisciplinary research associations, networks of external research institutes, and by integrating the real-life environment. Urban development can only be successful if it embraces diverse disciplines like sociology and the construction industry, ecology, power engineering, water supply and distribution, architecture, and applied geosciences and many more areas of science. At the TU in Berlin, approximately 100 professors and more than 700 employees are working for sustainable urban development. Sustainable urbanization is one of the major fields of research at the TU Berlin.

Worldwide there is a trend for urbanization. What does this entail for the cities?

We are observing a trend of rural migration into the cities, a trend towards the development of megacities. Shortages of housing and water will increase. And the problems of climate change will worsen over time. The TU Berlin is leading internationally the research on megacities. The German Ministry of Education and Research (BMBF) supports two projects of the TU Berlin in Teheran-Karaj and Casablanca with more than twelve million Euros to support sustainable development of the “megacities of tomorrow.”

What roles do cities have in climate protection?

Urban development is an important parameter, not just for mega-cities. The important sectors of urbanization today, such as construction, traffic, energy, waste, and water management are successfully managed by using specially designed tools. For the construction and energy sector, for example, we are currently developing three-dimensional city models which are being fed by comprehensive databases. They help us to simulate on the computer which measurements need to be taken in order to most effectively influence construction and energy technology in residential areas. In addition, we are developing concepts together with research partners like Siemens to create models that allow us to determine the balance of sustainability. This allows us to complete the picture from a bird’s-eye view in order to align the individual areas and to determine their relevance.

Will the leading role of the Technical University make it the engine for increased sustainability in Berlin?

The competencies of the TU Berlin have long been an important engine of sustainable urbanization in the German capital. Berlin benefits from our research work in the areas of urban-suburban relations, safety in the city, or the development of virtual city and landscape models, for example in terms of energy-efficient buildings. A decisive factor of sustainable urban development is the close cooperation of industry, science, and society. The TU’s international leading position in metropolis research makes us an ideal partner for Siemens. Together we can further advance technologies and concepts for a sustainable future of our cities.
The Stanford economics professor, Paul Romer, advocates establishing drawing-board cities for the Third World – including an independent economic and legal system. Building these so-called Charter Cities requires the support of other countries. This would allow for easily controllable urbanization and generate economic growth. Some experts consider this to be a fairy tale, others see it as ingenious.
It was in October 2009 when Paul Romer surprised everybody with an unusual idea at a conference held by the Mexican Central Bank in Mexico City: the renowned US economist suggested that Mexico create a second Hong Kong or Shenzhen. To Romer, all that is needed is getting together with an industrialized nation such as Canada and adopt its laws to apply to a tract of land in Mexico. Companies have long-term legal security and would invest, while Mexicans could migrate to create a better life for themselves – and the economy could not help but flourish.

The greenfield strategy has many advantages, argued Romer. For example, energy-efficient buildings could be constructed, solar cells on roofs would be mandatory, and the city would have to be planned so that public mass transportation would be available to everybody. The city would be perfect for the use of alternative energy. When the sun is shining or the wind is blowing, electricity can be used for saltwater desalination plants – potable water is extremely scarce in this region. “Already existing technology could be used in a highly cost-effective manner,” continues Romer.

He travels throughout the world and campaigns for a groundbreaking idea – Charter Cities. Behind it hides the thought of a start-up called megacity. For this purpose, an unoccupied tract of land should be made available. Partner countries supply the necessary funds and act as a development agency. However, before the city is built following the drawing board, it is provided with a charter. This contract establishes general legal, political, and economic conditions. The charter replaces the existing government, enables inhabitants to create something completely new, and provides investors with security in politically rather unstable areas. Some find this idea eccentric, others see it as ingenious. “The difference between revolutionary and crazy is not that big. Romer is balancing exactly on the fine line drawn between them,” says Bill Easterly, economics professor at the New York University. There is no question that Romer has to be taken seriously. His work on economic growth and technology makes him a candidate for the Nobel Prize in Economics. The American believes so strongly in his concept that he resigned from his tenured position at Stanford University in 2008 to establish the non-profit Charter Cities foundation.

Voluntary is a prerequisite

“I want to make the world a better place,” says Romer, nothing more and nothing less. He likes to use Hong Kong as his model. Great Britain was the colonizing power while China used the
city as a laboratory for practical market economy and created the special economic zone Shenzhen in the vicinity. Different from the practices once applicable to Hong Kong, Romer’s idea of Charter Cities is based on voluntary contracts among the participating countries.

However, serious criticism is the order of the day. There are voices that claim that charter cities are neo-colonialistic and unfeasible. Failed attempts such as South Africa or Mauritius show that special zones are not big hits. “You can accuse Romer of many things, but you cannot accuse him of neo-colonialism,” says Ranil Dissanayake, who is a UN advisor for the governments of Zanzibar and Malawi. He applies a more psychological perspective to the problem: “A charter city would be an admittance of failure for the government of a developing country.” “Foreign civil servants could line their pockets with over-dimensional profits,” adds Gulzar Natarajan, who works for the Indian government in Andhra Pradesh.

Valid regulations make the difference

Other critics consider Hong Kong an unsuitable model: the city has natural advantages such as its bay and its central location. The success of the city rests more on geographical and cultural aspects than on the introduction of British law. Romer does not accept this objection. “If this were true, Hong Kong would have developed earlier. When the British came to Hong Kong in the late 19th century, there was nothing there,” asserts Romer. “Location or culture matter somewhat, but the rules that apply – they make the difference.”

When he founded Aplia in the year 2000, the economist proved that he can convert ideas into practical application. The company sells learning programs at a rate of 10 million dollars per year. In 2007, he sold Aplia and took the profit to finance Charter Cities. He borrowed the name from the Charter of Pennsylvania. The state’s guaranteed religious freedom as well as freedom of trade attracted a large number of able immigrants from Europe and pressured (coerced) the neighboring states to provide similar guarantees.

Romer considers Cuba to be the ideal place for the first Charter Cities. Cuba could transfer the administrative rights of the special zone Guantánamo to Brazil. Another one would be North Africa, where the “Shenzhen of Europe” could be established. Despite the criticism received by Romer, his idea, as he reports, is met with a great deal of interest by under-developed countries in Africa as well as South and Latin America. Magatte Wade, an entrepreneur from Senegal, successfully sells products with an African flair in the US, for example beverages and cosmetics. She exercises considerable political influence in her own country. For instance, she works together with the wife of Senegal’s president in a healthcare and education foundation. Several months ago Romer discussed his idea with her in San Francisco. Wade liked the concept: “Economically it would hit us like a bomb.” Despite this statement, the Senegalese does not agree unconditionally with Romer. Only the economic law (commercial law) could come from abroad, but the criminal as well as the family laws are determined by the host country. Otherwise, you are faced with the accusation of colonialism. “It would work in Senegal,” says Wade, “but not in the form proposed by Romer.” But what are the optimal norms for a Charter City? Romer does not want a direct democracy. Instead he uses the model of a central bank: the bank is democratically legitimized, however, it also possesses considerable autonomy. This is exactly what Romer proposed to the bankers of the Central Bank in Mexico.

“ Aren’t elections a good thing?”, one of them asked, rather put out. “Would you find it appropriate if the prime rate would be decided in Mexico each week?” Romer responded. The banker laughed.

Personal profile

The US scientist Paul Romer (54) earned a BS in astrophysics to be able to solve “truly difficult problems.” Later he enrolled at MIT for a degree in economics and received his PhD in economics from the University in Chicago. He is a Senior Fellow at the Stanford Institute for Policy Research and taught as a professor at the US universities of Stanford, Berkeley, Chicago, and Rochester. In 2008, he resigned his teaching positions and founded the Charter Cities foundation (www.chartercities.org).

Focus: Sustainable Urban Development

City oases

Comfortable climate, architectural brilliance, and exemplary energy efficiency are not contradictory. On the contrary, the combination of those qualities results in trendsetting buildings. To realize such projects is not witchcraft: the necessary technologies are already available on the market.
If you asked in a street poll what is the greatest climate killer, most likely you’d get the answer “cars,” or maybe “traffic.” In third place would presumably be industry. Most likely, the ranking would not contain buildings. As a matter of fact, buildings are the greatest energy consumers in the world. They account for approximately 40 percent of worldwide energy consumption and produce 21 percent of all CO₂ emissions. This includes high rises and office buildings as well as historical buildings and private homes. Automobiles and factories use just under 30 percent of primary energy consumption.

Ullrich Brickmann knows why buildings are No. 1 on the disreputable list of energy-wasters. He is an expert in energy-efficient building solutions with Siemens Building Technologies (BT) division in Frankfurt am Main: “Many building owners still shy away from making the necessary primary investments to install efficient solutions. They prefer budget-priced but high-energy technology.” This isn’t surprising considering that owners pass the operating costs of buildings on to the renters.

**Competition factor operating costs**

High operating costs will increasingly become an important factor for renters when it comes to leasing properties, as buildings have an enormous potential for energy savings. The German Energy Agency (Deutsche Energieagentur, dena) estimates that the costs of heat consumption can be reduced by 30 percent, and electricity consumption by 15 percent. A study conducted by the German Federal Environment Agency (Umweltbundesamt) shows that the results are even more favorable in historic buildings. According to the study, the costs of heat consumption can be reduced by more than half through careful restoration, insulation of walls and basement ceilings as well as using heat-insulating windows. In other words, the investment will pay off in a relatively short period of time.

**New York Times a pioneer**

Energy-efficient construction does not only help the bottom line. Environmentally friendly technologies offer a more comfortable climate for users and allow for the creation of architectural masterpieces, such as the headquarters of the New York Times, designed by star architect Renzo Piano. The 52-story skyscraper not only uses approximately 30 percent less energy than a conventional office building: the façade, made of clear glass, offers a clear view through the lobby into a beautiful atrium – an oasis in the middle of Manhattan.

Up until now, glass façades were considered to be massive energy consumers. Like greenhouses, they retain heat in the summer, and therefore require specially designed, high-performance, cost-intensive air-conditioning. Not so in the headquarters of the US-based daily newspaper. Piano had a second façade installed made of ceramic elements which block direct light. The blades automatically change their position according to the course of the sun. Sensors support adequate light saturation to ensure that enough light brightens the inside rooms at all times. Electrical light is hardly ever used.
The air-conditioning of the New York building is similarly efficient. Valves feed the highrise building with cool air in the early morning hours, ensuring a comfortable temperature throughout the day. It sounds easy, but requires a lot of advanced technology. Among other things, inner and outer temperature, occupancy of the building, and the performance of the combined power–heat generation units need to be considered in order for adequate decisions to be made.

**Facility management is the centerpiece**

Trendsetting technologies are needed to integrate the vast amount of information to ensure that the operation the New York Times company headquarters is both environmentally sustainable and cost-efficient. This highly demanding task is handled by the building automation and control system “Apogee” developed by Siemens. It monitors and controls air-conditioning, water cooling, heating, fire alarm systems, and power generation. Hundreds of sensors installed anywhere in the building deliver the necessary data. Only a few control commands are needed to adapt the systems to the time of day. The goal is to operate as few systems as possible, which was achieved without compromising the comfortable climate.

Sensors are not only essential instruments to create a user-friendly and energy-efficient environment at the New York Times. “We can use them to imitate nature,” says Dr. Osman Ahmed, Head of Global Research and Innovation Siemens Building Technologies in Buffalo Grove, USA. He is confident that buildings will eventually not be mere casings, but intelligent systems that communicate with their users.

**Automatic measurement of the CO₂ concentration**

Today, this scenario is reality in the laboratories of Siemens Corporate Technology. A prototype of an optical laser sensor monitors if the air-conditioning in the building is working. The CO₂ emissions within the building amounts to 400 parts per million (ppm). Companies that don’t have sensors installed have a considerably worse balance of more than 1,000 ppm, which is when people get tired, have difficulty concentrating, and don’t feel well.
According to Paolo Bertoli, head of the Green Building Initiative of the European Union for the improvement of energy efficiency for non-residential buildings, those who wish to optimally heat, cool, and light a building need not wait any longer: “The most important technologies we need are already out there.” This includes the utilization of intelligent power meters for private households. These devices measure the usage of electricity several times per hour and transmit the results via cable or radio transmission to the power utility company. The advantage for the customers: they receive detailed information about their electricity usage, enabling them to influence their power consumption. According to the German Federal Ministry of Economics and Technology, the approximate savings potential for intelligent meters amounts to 9.5 terawatt hours, i.e. 9.5 billion kilowatts. Several pilot projects are currently underway at a number of energy supply companies. Another important factor is the use of low-energy lighting: 19 percent of worldwide energy is used by light sources. Exchanging these with LED lights has the potential to reduce CO₂ emissions by 450 million tons.

Energy Saving Performance Contracting

Energy Saving Performance Contracting has long grown up. According to this model, suppliers offer their customers clearly defined energy savings throughout the term of the contract and provide advance financing of the start-up expenses, bearing considerable savings potentials. Michael Geißler, chairman of the Berlin-based energy agency “Berliner Energieagentur” does the math: “Germany-wide, contracting can result in annual savings of 800 million Euros and a reduction of CO₂ emissions by 4.5 million tons.”

Building engineers have determined additional potential. Buildings of the future need to conform to the highest standards in terms of comfort and safety as well as energy and cost efficiency. The course is set to achieve this goal in the near future. In China, for example, sustainable satellite neighborhoods, so-called “Eco Blocs,” are on the rise, employing trendsetting technologies and offering thousands of apartments all operating self-sufficiently and emissions-free.
Construction worker on the roof of the China Pavilion at the Expo 2010 in Shanghai. From the outside the construction looks rather traditional, but a closer look reveals that it is pure high tech.
Expo 2010 as the technology turbo

On May 1, Expo 2010 will start in Shanghai. With the slogan “Better City, Better Life,” the exhibition focuses entirely on the living conditions of the city’s population. Few cities represent this slogan better than Shanghai: the metropolis is working at a breathtaking speed to optimize traffic systems and construction. After all, the approximately 70 million visitors at the Expo want to see more than just the exhibition grounds.
Bjarke Ingels will bring the world-famous mermaid of Copenhagen to Shanghai plus 1,000 city bikes from the Danish capital will be available to visitors at no charge. “We will place the bicycles on top of the pavilion,” says Ingels, who designed the Danish Pavilion for Expo 2010. He is also the founder of the up-and-coming architectural firm BIG. Visitors who manage to make their way to the top of the pretzel-shaped building are able to borrow the bikes to ride across the Expo site. “It is important that we move away from the concept that sustainability equals relinquishment,” says Ingels. “That’s why we want to show that when all is said it is more fun to live in an environmentally friendly city.”

During his presentation at the City Planning Center of the renowned Tongji University located to the north-east of Shanghai, Ingels showed photos of a swimming pool drifting through the harbor of Copenhagen, which is filled with purified harbor water. He will bring this water to the Expo on one of the usually empty freighters making its way to the Far East and pour it into a pool in the center of the pavilion: “Whoever is brave enough can take a swim in it.”

The slogan of Expo 2010 is “Better City, Better Life.” This makes the world exhibition a platform for exchanging green ideas incorporated by many pavilions as a future envisioned with less CO₂ emissions and air pollution. For example, the City of Hamburg plans to build a passive house on the grounds that includes a solar energy system and an insulated glass frontage imported from Germany for this very purpose.

This topic is a burning issue. In the Asia-Pacific region alone, one billion people will move to the cities during the next 20 years. Most of the megacities with more than ten million inhabitants are located in threshold countries such as China, India, or Brazil. These are countries that are just beginning to focus on environmental issues. As a result, sustained urbanization has become a key factor in the area of development.

**The model for future city development**

“Shanghai is confronted by enormous challenges in the areas of providing clean air, clean water, sustained energy supply or efficient transportation means, and less waste,” says Achim Steiner, Director of the UN environmental program (UNEP) in his environmental report about Shanghai. The city, according to Steiner, “is determined to become a green example for future city developments.”

Shanghai already has a number of advantages. As compared to Mumbai or São Paulo, Shanghai...
has barely any slums, the city is relatively well organized, and started to build a subway as early as 1989. Wide bicycle lanes have been standard for decades – even though politics in the nineties greatly promoted automobile traffic.

Today, the city is extensively expanding the subway that was just put into operation in 1995 and is equipped with modern Siemens technology. The city is also experimenting with electric cars as well as hybrid or fuel cell buses. “During the last nine years, we’ve invested more than 3 percent of our BIP year after year in environmental protection – in other words a total of 225 billion Yuan (approx. 23 billion Euros),” says Zhang Quan, Director of the Shanghai Environmental Agency.

Shanghai’s master plan of 1999–2019 has always included environmental steps, for example the expansion of public parks. Per inhabitant, the city includes 12.5 square meters of public parks – in 2000 it was not more than 4.6 square meters. In 2002, for example, a brickyard made way to the Xujiahui Park filled with trees, basketball courts, and artificial lakes. Today the park is a “green lung” directly adjacent to the sub-center Xujiahui in southwestern Shanghai that is marked by apartment towers, electronics stores, and shopping malls.

Expo 2010 accelerates sustainability plans

In 2002, Shanghai was awarded Expo 2010, which intensified the city’s efforts for sustainability. The approval was immediately followed by a renunciation of the pro-automobile concept. “Transportation is the most important element for sustainable city planning,” says Shan Wenhui, head of Urbadata, the city’s design agency. From her office on the 9th floor she looks down at Luwan, one of the most congested inner city districts of Shanghai. “In Luwan alone, we are going to have 30 subway stops,” she continues. From anywhere within the district, it will be possible to reach the subway within less than 500 meters. At the end of 2008, Shanghai had eight lines with 260 kilometers, by 2010 the city should have ten lines with 400 kilometers. That makes subway travel comfortable and more attractive than the car, added Shan. The UNEP considers the speed used to build the subway as nothing short of a miracle.

For years now, Shanghai has limited the number of cars by auctioning off license plates for approximately 4,000 Euros. For about ten years, the traffic has been flowing via a network of overpasses through the city. In addition, Shanghai has tightened the emissions standards. Of late all taxis and buses have to correspond to the Euro III standard. Accordingly, 4,000 older buses will be replaced for the Expo. The Transrapid high-speed magnetic levitation train connects Pudong International Airport and the financial district of Shanghai at a speed of up to 430 km/hour.

“Shanghai’s fast-paced development during the last decade has not exacerbated air pollution,” determined UNEP experts. “Quite the contrary: for the first time in the history of the city, we experienced economic growth while the concentrations of different pollutants either remained the same or were even reduced.” For decades factories were scattered throughout the city. These were relocated to industrial parks at the outskirts of the city and modernized. What’s more, 1,500 factories were closed altogether between 2005 and 2007. According to UNEP, the energy intensity of the economic performance dropped by 31 percent between 2000 and 2008.

Reversal in energy politics

Shanghai is also reducing the percentage of coal in the energy mix – from 2000 to 2007 it dropped from 65 to 51 percent. Especially in the inner city, combined heat and power plants were replaced by gas heating plants. By 2010, the...
city will have closed 29 old coal-burning power plants. Also new power plants include fuel gas desulfurization installations. The results are lower concentrations of nitrogen oxide, sulfur dioxide, and dust. In parallel, the city is focusing on reusable energy – especially on wind energy. On Chongming Island lying off the northern shore of the Yangtze River, a wind park with 19.5 megawatts of installed capacity has been established.

A host of unsolved problems

However, the ecological future has not yet started. Shanghai’s energy consumption increased steadily – per head and absolute. Large investments in sewage treatment plants have reduced water pollution, yet the situation requires further efforts. The share of untreated garbage in unstable landfills is still too high. The population density in the inner city has reached a staggering 8,265 people per square kilometer. The actual master plan envisions enlarging several satellite cities to 300,000 inhabitants. But many dwellings there are still empty, says Shan Wenhui. “The build-up of social functions and the connection to rapid transit to the center of the city are still lagging behind.” Shan also misses a true green belt moving through the entire city – as once planned in the master plan of 1959. But she knows that “it is not possible to obtain sustainability overnight.”

Other plans are in the pipeline as well. The agencies established strict approval guidelines for energy-intensive industries. By the end of 2010, three million square meters of building area are to be equipped exemplarily with energy-saving technologies. The new East China Headquarters of Siemens includes these types of technologies as well and will be built in accordance with the strict American LEED standards for green buildings. At the Hongqiao domestic airport, a transport junction point will be established where the hinterlands of Shanghai with their many production sites are connected via rapid transit. An expansion of the Transrapid to Hongqiao is under discussion.

Shanghai’s authorities are even considering not charging buyers of electric cars for the expensive license plates. As a result, UNEP believes that Shanghai, despite its apparent problems, could become the model for China’s cities in separating growth and pollution. After the Expo, UN experts will take stock in their second report.
To use real projects for demonstrating how to implement the Expo vision “Better City, Better Life,” Siemens concluded a strategic partnership with the Yangpu district in the north-east of Shanghai in December 2007. Elements of the cooperation are energy-saving management, green buildings, and intelligent traffic management systems. Yangpu, an old industrial and university canton, will also be the location for the new East China headquarters of Siemens. The new building will consume one-third less energy than conventional buildings of the same size due to the building automation system developed by Siemens.

In addition, the heads of the district of Yangpu modernized their government building by using Siemens technology. They optimized heating and air-conditioning systems, lighting, and building automation. The local government will benefit from these efforts and save 16 percent on energy costs for the building as well as on carbon dioxide emissions of 600 tons per year.

In Wujiaochang – one of the four sub-centers of Shanghai with several large shopping centers – Yangpu installed an intelligent car park routing system that will be expanded in the future to cover the entire district. Siemens also upgraded old living quarters to state-of-the-art – by using, for example, decentralized water purification systems and space-saving parking spaces for residents with a lift system that allows for car-stacking.

Also, from the very beginning, the company joined the construction of the Shanghai subway which started in 1989. Siemens delivered cars as well as drive and signaling technology. “The better the drive technology, the less energy will be consumed,” says Peter Herweck, President Industry for Northeast Asia* and Executive Vice President Siemens China. In addition, Siemens supplied technology for the Transrapid (below).
The Expo grounds are to be an example for sustainable architecture and city development. Consequently, five of those large buildings equipped with energy-efficient systems will remain after the event: for example, the China Pavilion with its traditional red cross-ties, the theme pavilions that recall Shanghai’s old row houses, and the World Expo Center used for ceremonies, conferences, and forums located in the center of a river-wetland area created especially for the fair.

The Expo village with its 10,000 inhabitants will serve as a model for an ecological residential area. Siemens participated as a global partner on the Expo grounds, for example with its building automatization system, an own Siemens development. The objective is to automate buildings so that they are at once comfortable and energy-efficient, reports Peter Herweck, President Industry for Northeast Asia and Executive Vice President Siemens China. “With heating and air-conditioning systems, you run the risk of using more energy than you need. Our control technique optimally connects our outside and inside environment.” In the afternoon, window blinds automatically adjust to provide maximum shade – instead of the air-conditioning unit cooling the facility by an additional two degrees. This system was installed in the China Pavilion, the theme pavilions, the World Expo Center as well as the Expo village. In the theme pavilions, the Siemens automation system saves up to 30 percent in energy as compared to conventional buildings.

Siemens also introduces its automation systems as well as energy solutions within the framework of the exhibition partnership with the German Pavilion. In China, electricity has to travel many miles, reports Michaela Stolz-Schmitz, Vice President Siemens Ltd. China and Director Major Events and Corporate Cultural Affairs. “Using innovative Siemens technology (HVDC), electricity is transported up to 1,400 kilometers at a minimal loss. These technologies are highly important for expanding the infrastructure of the country.” Because of the special technique used in the integrated circuits, the loss in current for the system is cut in half in accordance with the global industry standard IEC 60898. “Low and medium currents as well as the transformer systems are optimally adjusted to one another,” says Herweck.

The lighting systems of Expo 2010 are also of low-current design. Osram, a division of Siemens Industry, equipped the 23-floor office building in the Expo village with the highly efficient lighting system LINEARlight that saves up to 80 percent energy as compared to conventional light bulbs. After dark, the China Pavilion...
Figures, data, and facts

**Duration:** May 1 to October 31, 2010

**Slogan:** “Better City, Better Life”

**Visitors:** 70 million (expected), of these five to ten percent will be international guests.

**Participants:** Over 240 states and more than 50 international organizations – in all, a new Expo record.

**Area covered:** 5.28 square kilometers on both sides of the Huangpu river. The main tract is located to the east of the river (Pudong). On both shores more than 26 pavilion clusters are located each on two to three hectares. Pedestrians can cross the river with special ferries. For cars and subways there are tunnels and bridges. Parts of former industrial plants on the grounds were integrated as exhibition elements. The grounds will be turned into a public park after the Expo.

**Topics:**
- Economy and prosperity of a city
- Cultural variety
- Innovations
- Redevelopment of parts of a city
- Connection between an urban and rural environment

**German Pavilion:**
Visitors either walk or use moving floors or escalators to pass through topic-related rooms of “Balancity”: the harbor, gardens, parks, a city planning office, a factory, the opera, and the city power plant. The message: it is worth living in a city if it is balanced between renewal and conservation, innovation and tradition, city and nature, community and individualism, work and recreation.
“China is changing its model from imitation to innovation”

Asia expert, futurologist and best-seller author Prof. John Naisbitt on China Inc., about a change of paradigm in the People’s Republic of China, about the “trial and error” principle and about the lessons of a battle fought 1800 years ago.
Mr. Naisbitt, you rank as one of the most accomplished China experts in the western world. As such, you compare the People’s Republic with a multinational corporation. What characteristics do China and a corporation have in common?

For the Chinese, the legitimation of the government is mainly based on the quality of its performance. This is no different from a business enterprise: company management is not newly and democratically elected every four years by the work force. In multi national corporations as well, the executive board only sits firmly in the saddle as long as it delivers a convincing performance. In this sense, the same rules apply for the executives as they do for Chinese political leaders. They can only put in an outstanding, ongoing performance when they build a dynamic balance of top down and bottom-up processes and are able to keep it running on an continuing basis.

How can a country with 1.3 billion “employees” manage that feat? After all, it’s hard enough even for medium-sized corporations to maintain that sort of balance.

That’s the wrong question. You can see: it works. That’s why the question shouldn’t be: how can that work? But rather: How does it work?

Couldn’t we have asked that question decades ago?

That would have been foresighted and clever. After all, the starting point for the economic paradigm change we are witnessing today goes back to 1978, the year Deng Xiaoping came to power. Back then, over 30 years ago, he took over China Inc. with the goal of turning it into a healthy, profitable and sustainable company. It all came about the same way as if a new CEO were to take over a run-down corporation. And he had a clear strategy to reach this goal. It consisted of what we now see as eight pillars on which the Chinese model rests to this day.

What are those pillars?

Doris Naisbitt, my wife and co-author, and I needed a whole book to describe them. But let’s take one of those pillars as an example, namely a kind of corporate leadership which doesn’t suit our way of doing things in the west at all. Trial and error. The Chinese use an aphorism from Deng to describe this strategy: “crossing the river by feeling the stones.” This river has never been crossed before throughout the
Do you know the story of the arrows at the Battle of Red Cliffs? Everybody in China knows it, and it exemplifies the Chinese understanding of competition. 1800 years ago, the armies of the war lords Cao Cao, Sun Quan and Liu Bei faced one another across a river narrows called “Red Cliffs”. As the battle was about to begin, a thick fog came up. Under the cover of the fog, Sun Quan and Liu Bei had several ships packed with straw and sent them unmanned on ropes to the enemies on the opposite shore. When Cao Cao saw what he believed to be the attackers emerging from the fog, he commanded his men to shoot at the ships. Tens of thousands of arrows got stuck in the straw. Then the ships were pulled back, and the arrows were pulled out of the straw. Without having shot a single arrow, Sun Quan and Liu Bei had taken a large portion of their opponent’s munitions away from him and added them to their own armaments. The Chinese had this story in mind when they entered into the first joint ventures with western automotive concerns back in 1978. They borrowed, so to speak, the arrows the west had shot at the joint venture boats. And they pointed the arrows at their partners by imitating them and then taking advantage of the cost benefits.

That’s how it was before, but now it’s happening less and less. In the initial years of reforms it was a clever strategy to build on western know-how. But now China has begun changing its development model from imitation to innovation. Take the automotive industry. The Chinese government doesn’t financially promote investments based on copying western cars. But they do promote the development of electrically operated vehicles, led by BYD, a private company. China’s economy, by the way, is now 70 percent in the private sector. This is innovation instead of imitation.

Nevertheless the concepts of “innovation” and “China” don’t really seem to fit together. As Doris and I discovered, it just takes a little time to get used to it. In the old days, “China” and “progress” or “China” and “stock exchange” didn’t fit together either. In five years you’ll regard those combinations as self-explanatory because you know enough suitable examples of them. Even so, your doubt is not entirely unjustified. China can only reach the goal of becoming an innovative society if it provides its students and workers sufficient freedom for autonomous thinking. In America, school kids and employees aren’t disciplined enough. China has exactly the opposite problem.
Because the Chinese are afraid of making mistakes?

Yes. And is not just the consequence of a Communist regime but rather millennia of old components in their culture. A Chinese person’s goal has always been to become a wise man, to be perfect. Making mistakes, on the other hand, means losing face. This is why the real challenge of a Chinese innovation initiative is to bring about a change of the way people think.

Mr. Naisbitt, are you a China fan?

I’m a fan of the China story. In 1967 I visited China for the first time – one billion poor people, and they played absolutely no role in the world! And now look at China today: the third-largest, soon the second-largest national economy in the world, and since 2009 the world champion exporter – China has just overtaken Germany both in economic and in export performance.

Many people are less enthusiastic about China than you are.

Sure. The same arguments like environmental damage all keep coming up. That isn’t all wrong, and plenty of things are in a pretty sorry state in that country. The arguments, however, don’t do justice to the actual situation and development in China. This becomes clearest in the criticism of the lack of democracy in China. The west cannot imagine any other political system than a horizontal democracy. But there is a very well-functioning vertical democracy in China, the one we were talking about at the beginning. Above the masses of citizens there is a leadership, call it a party or a government or a people’s congress. This leadership regularly issues directives for the people. At the same time, signals and feedbacks go to the leadership from the people. You can regard this system as good or bad. But I wouldn’t advise anybody to declare it illegitimate, just as we would consider it presumptuous if the government of any country were to demand democratic structures for our corporations.

John Naisbitt

John Naisbitt (80) studied political science at Utah, Harvard and Cornell. He served, among other posts, as Assistant Secretary of Education under John F. Kennedy as well as being a Special Assistant to American President Lyndon B. Johnson and the Thai government. In 2007 he founded the Naisbitt China Institute in Tianjin. He is a professor at the Chinese universities in Nankai and Tianjin and a Board Member of the Asia Business School in Tianjin.

His publications include "Reinventing the Corporation" (1985) and "High Tech/High Touch" (1999). His biggest success, however, was the work “Megatrends” published in 1982 with which the futurologist landed a double bull’s-eye. On the one hand the work was a world-wide best-seller and set the style for everyone concerned with the medium and long-range development of business and society. On the other hand, the book was a major coup in terms of content. Globalization has since developed exactly as Naisbitt predicted it would.

Book Tip:

“China’s Megatrends – The 8 Pillars of a New Society”

13 years ago, John Naisbitt might have been on the verge of writing a megatrends book about China. At a meeting with the Chinese President Jiang Zemin, he said: “Taiwan has a little story to tell and tells it very well. China has a big story to tell, and it does a lousy job of telling it.” Jiang’s reply: “Why don’t you tell our story?” Naisbitt declined: the times, the country and also he himself did not seem ready for it.

Three years ago he was asked again, this time by the President of the Chinese M&A Society, Wang Wei. After all, a whole generation of Chinese business executives had grown up with his book "Megatrends", which came on the market as China was finally waking up from its long Maoist sleep. This time Naisbitt agreed. In "China’s Megatrends", published in September of 2009, Naisbitt and his wife and co-author Doris define eight pillars on the future development of the Middle Kingdom.
Diver at the Olympic diving and swimming pool in Barcelona. The mega-event led to massive improvements of the local infrastructure. The Spanish city has since been one of the world’s most popular venues for trade shows and fairs.
Many people, many chances

A major event is more than just a specific location! Appealing major events that attract worldwide attention mean mainly two things for their host cities, and even for their entire host regions: the chance for enormous image improvement and an influx of tourism – and the need for massive investments. To some this means added efforts, increased costs, liabilities, and new debt. For others it is a tremendous chance to drive forward a city’s development in a relatively short time – a catalyst for a greener, more productive environment.
Interview with Shaun McCarthy, Chairman of Sustainable London 2012, about the goals for the Olympic Games in the British capital.

What are the responsibilities of the Commission for a Sustainable London 2012?

We are an independent body that has to ensure that London doesn’t just set sustainable goals, but also adheres to them. That is something that has never been done with public projects in the past. Together with my three colleagues, I have insight into all reports, we can request any and all information, and check contracts. We have expert support, and work closely with all organizations that are involved in London 2012. We see to it that the goals set are being reached, but we also critically analyze ways to make things even better. We issue information to the public and to those stakeholders who have an interest in the Games being truly sustainable.

But what happens when sustainable solutions are too expensive or cannot be realized within the set time-frame?

Sustainability does not have to be expensive if we are able to convey to our contractors from the very beginning that it is most important to us. In our bid for the concrete industry, for example, the carbon emissions per ton of concrete was such a criterion. Suppliers had one year to improve their production.
London 2010. Preparations are running at full steam. In just over two years, the best athletes from around the globe will come to the capital of the United Kingdom for the Olympic and Paralympic Games. For the British metropolis, this major event is more than an opportunity to showcase itself to the world. It also is a great opportunity to drive urban development. The Olympics are meant to serve as a catalyst for such development, aiming to make the city greener and more sustainable. “Sustainable London 2012” promises the lowest waste and carbon emissions possible, protection of the environment around the venues, and buildings designed with the city’s long-term development in mind. Public transportation is being improved, the banks of the River Thames are being newly developed, a new train station is almost finished, and sport venues and modern housing areas are expected to become a driver of change after the Games.

Technology partners as prerequisite for success

In order to turn major events into powerful engines of sustainable urban development, experienced partners are needed to provide the proper technology and ensure a solid basis from the very start. Siemens is such a partner. The company has already built a fleet of extra-light public transport trains, which save 50 percent of energy through the utilization of efficient technology. Hybrid-buses that produce 30 percent less emissions are currently in the pilot phase. And the turbines for the largest offshore wind park on the River Thames are supplied by Siemens, the expert for sustainable technologies, and, with a revenue of 23 billion Euros, the largest provider of environmental technology.

Sally Chatterjee appreciates this. “Through our cooperation with an innovative and dependable partner such as Siemens, who understands the potential of a mega-event for a city, we are always a step ahead in technological matters,” says the interim CEO of Events for London (EfL). “In global competition, this is of fundamental importance for a city such as London.”

Wolfgang Kuhn, responsible for Sport Venues at Siemens Major Events, agrees. He recently took part in the preparation efforts for the UEFA Euro Championship 2012 in Warsaw. Shortly after, he traveled to Rio de Janeiro to prepare the FIFA World Cup in 2014. Tomorrow he will travel to Paris. France intends to upgrade 30 stadiums and the government is investing millions for it. Why? “In order to be able to better position themselves,” says Kuhn. His colleague, Helmut Mausser, Senior Sales Consultant and responsible for major events around the globe, explains: “Competition between cities has increased tremendously.”

It is not only the big cities anymore that are in competition with each other. Independent of size and geographic location, urban areas are trying to attract companies, investors, and tourists. Major events such as the Soccer World Cup or Olympic Games play a considerable role in these efforts. This is supported by a study named “Major events, the right choice for your city?” submitted by Roland Berger Strategy Consultants.
and Siemens. In a joint effort, they examined whether mega-events render an improved profile and commercial appeal to a city. The answer was “Yes. If done properly, a mega-event can sustainably improve a city’s future opportunities.” A country or a region moves into the global spotlight. Thousands of broadcasting hours and countless articles produced by journalists from around the world cover the tournaments and, even years in advance, the country, its people, and its economy as well.

Improving quality of life and economic potential

Governmental agencies and the private sector are raising the infrastructure to new levels in a major national effort. The best example is Barcelona. The city built beautiful parks, established an attractive access to the sea, created Port Olympic, the mile-long beach promenade, built the Olympic Village, which includes two 44-floor skyscrapers, and constructed a marina for the Olympic Summer Games of 1992, “an improvement of quality of life not only for the citizens,” says Mausser. “Since the Olympics, Barcelona has become one of the world’s most popular locations for trade shows and fairs along with Paris, Vienna, Berlin, and Singapore.”

However, are all cities able to gain profit? Is every city suitable for a major event? “Of course not,” says Mausser. “If you want to apply for such an event you need to be honest with yourself, and you must be aware of your city’s weaknesses and strengths.” For that purpose, the study by Siemens and Roland Berger included the development of a ten point plan that enables decision-making. Is the application and the planning process worth the effort? Which event would be a good match? The Olympics, the Soccer World Cup, or rather an annual Formula 1 race? Many aren’t aware of what their city can accomplish. They focus too strongly on economic growth while underestimating the complexity of such events and the necessary coordination efforts,” says Mausser. His advice is not to view the event as a one-time occurrence, but to tie it into the long-term development of the city. Only then will there be sustainable benefits. And the public’s hearts and minds must be won, because the residents’ enthusiasm is key to a successful event. Moreover, innovations should be included in the plans, as technology in particular has a sustained influence on cities.

Sports venue expert Kuhn uses Munich as an example: today, one of the world’s most spectacular soccer stadiums is situated where once visitors from Stuttgart or Berlin were greeted by two waste dumps and a foul-reeking sewage plant. More than five million soccer fans have visited the Allianz Arena since its inaugural game during the Soccer World Cup in 2006. Even when there are no games, visitors from around the world line up to experience the avant-garde

Seven employees are able to manage 70,000 visitors at Munich’s Allianz Arena from their control booth. A fire alarm system with 15,000 sprinkler heads, 6,200 speakers, and 90 cameras is part of that, as well as 24,000 Osram fluorescent tubes that illuminate the stadium in changing colors.

As FC Bayern AG’s official technology partner, Siemens was on board from the very beginning. “We were, so to say, the general contractor for anything electric,” says Kuhn. “To this day the complex is regarded as an example of innovation and sustainability in the construction of a soccer stadium.” The control booth is a special highlight. Almost all important information converge here: heating, air-conditioning, and security. “During game-day operation, six or seven people are enough to manage the entire stadium with its almost 70,000 seats,” says Kuhn. “On game-free days, we implement technical innovations and take care of maintenance.” Each separate section can be controlled, temperatures can be adjusted, and failure messages can be reacted to immediately. “This saves resources and time,” says Kuhn. Aside from the fire detectors with its 4,600 sensors and 15,000 sprinkler heads, the alarm system with its 6,200 speakers, the video surveillance with its 90 cameras, and the car-park routing system for the Arena parking garage, which offers 11,000 spaces and is the largest in Europe, Siemens Technology can also be found in the electronic solution for the lighting of the entire stadium and its veneer. 24,000 Osram light bulbs bathe the stadium in red, blue, or white on an area of 25,000 sq m, and additionally 68,000 lamps provide for the atmosphere within the stadium.

90 percent of the cost for infrastructure

When asked whether the Soccer World Cup 2006 was worth it for Munich, Mausser has only one answer: “But of course!” The Allianz Arena was only the tip of the investment iceberg. With any major event, it is not only about the actual event site, but even more so about the bells and whistles around it. “Only 10 to 20 percent of the entire investment are earmarked for the specific event facilities,” says Mausser. “80 to 90 percent goes into the surrounding infrastructure, such as new and improved roads, subway stations, hotels, and housing areas.” And that’s considered the exciting part. “From consulting and planning all the way to implementation and service, Siemens offers solutions for all key areas at every step of the way towards running successful events: airport, transport, energy and environment, sports venues, information and communication, broadcasting, healthcare, safety, and security.” His colleague Nigel Kirby, Program Manager and responsible for major events in Great Britain, adds: “The growing market for stadiums, arenas, and race tracks increasingly demands electronic solutions. Our comprehensive portfolio of solutions and services offers owners, organizers, and operators of event venues the ideal technical infrastructure to provide a safe and pleasant environment.”

Lord Sebastian Coe, Chairman of the Olympic and Paralympic Games 2012 in London, and himself a gold medalist runner over middle distance, is confident about London’s future and rejects the argument that the major event produces mainly one thing – debt. With a prize tag of nearly 11 billion Euros, the games will cost almost four times as much as first assumed. “But 75p out of every pound we spend have nothing to do with the Games,” states Coe in an interview with German radio station Deutschlandfunk. He claims that this money is spent for the benefit of the structurally weak Stratford quarter, which will be the primary location of the Games. Currently, this part of East London, with its high crime rate and a youth unemployment rate of over 35 percent, is known as one of the capital’s most diverse and economically deprived areas. The Games and the corresponding “regeneration program,” as the city fathers call it, offer the East End and its residents a chance for a new, a better future.”


Up until now product lifecycle management (PLM) and automation technology were two relatively separate areas. Now the gap is closing: product data is seamlessly integrated in production. This not only alleviates production planning – it also increases productivity.

Not only people have a biography, products have a history as well: at first they exist simply as an idea in the heads of engineers and marketing experts. Then they begin to take shape on paper and on the computers. They see the light of day during the production process. Yet after that, new products and solutions still depend on care and assistance for quite some time until they can stand on their own feet: customer service and maintenance is a serious obligation for manufacturers for many years. Once a product idea proves successful in the market, the circle begins to close – a new generation then restarts the cycle from the first idea to market entry. The experience derived from the forerunner is a huge advantage.

This process will only run smoothly if a manufacturer systematically collects all data pertaining to a certain product and then integrates it into a single system. Conventional product data management (PDM) mainly focuses on development and construction information – the administration of bills of materials or documents. The innovative product lifecycle management (PLM) follows a more comprehensive approach: infor-
Information from other fields is integrated in addition to PDM data, such as data from supply chain management (SCM) and customer relationship management (CRM), just to name a few. In short: the PLM approach comprises a product’s entire lifecycle.

Establishing homogeneous structures with PLM

“PLM is primarily used by globally operating companies in the automobile industry, the aerospace industry, mechanical engineering, or the high-tech electronics industry,” says Ralf Ritz, Vice President of Sales for Siemens PLM Software. “The comprehensive approach opens up new potentials, not least with synergies between ERP, office, and PLM.” Department-specific solutions that were implemented up to now could have been replaced and turned into accessible and homogeneous structures throughout the entire company. Aside from improving processes in general this would lead to high cost savings and a much improved communication for all process participants. Other industries are striving to profit from these developments as well: “Companies in consumer products and in food and beverages are starting to engage in PLM,” states Ritz. The technical prerequisite for the implementation of the PLM philosophy is software that keeps all information ready as a central data server and that can seamlessly work together with other programs – such as office suites or CAD solutions.

The PLM system used most worldwide is called Teamcenter from Siemens PLM software. This solution is the base for all PLM processes within Siemens as well. “The new Teamcenter generation has state-of-the-art applications that support every single role in the company along the entire supply chain,” Ritz explains. In June 2009 software version 8 was introduced and offers amongst other things – an improved integration of Microsoft Office and Outlook.

Clearly optimized production processes

A forcefully implemented PLM approach will have direct consequences on production. That is to say, the production process can be substantially improved. Today, this usually takes place in a “digital factory”: a virtual construction of an existing factory. A virtual factory can help simulate production processes and improve them – long before manufacturing even starts. Siemens PLM software offers a complete solution called Tecnomatrix. For example, manufacturing companies can perform supply chain simulations and commissioning with this software suite.

Possible difficulties such as collisions between components and storage racks during loading and unloading or areas of the production site that are not accessible by robots can be identified by the software as early as during the production planning phase. Expensive rework at the already existing site can thus be avoided. “We want to be 100 percent error-free and failsafe right upfront, just as in the CAD area,” says Rainer Aicher, Group Leader of mechanical construction at Hermle-Leibinger System Technology in Tuttlingen, Germany. “This is exactly what we can do with Tecnomatrix Process Simulate.”

Up to now the world of PLM was not seamlessly connected to the world of automation technology – after all, once all simulation is concluded the actual production plants have to be supplied with PLC programs (programmable logic controllers) to run respective production processes. In addition, software is needed to control the motion of drives (motion control). “What usually happens is that PLC programs are carried into the plant by the commissioner per laptop, are then optimized, and then loaded into the controllers manually,” explains Wolfgang Schloegl, head of Digital Engineering at Siemens Industry Automation. This is a huge potential for errors that can lead to problems in production. If data is not transferred correctly or to a wrong place, cost and time schedules are totally out of control. On top of that, massive consequences for product quality are a possibility – all the way up to costly recalls that heavily damage a good reputation.
Automation and PLM come together

Consequently automation technology and PLM are coming together. A prime example is the new Siemens Software that directly connects production planning and manufacturing on the floor. It combines Teamcenter with the Motion Control Information System (MCIS) from Siemens Motion Control Systems. Now manufacturers can send production data – for example from a CAD system – directly to the plant, universally from a single system. This not only reduces error potential, but also increases the entire plant’s productivity. “To this point, manufacturers could oftentimes not access complete information on availability and location of certain tools,” Ritz explains. “By integrating all information these resources are now optimally put to use.”

Software that automatically generates itself

The Simatic Automation Designer software is a further example of the convergence of PLM and automation technology: it combines the digital factory’s data with other production information, such as of the precise automation solution. Based on the specific topology of the production plant, a description of the components used – such as robots and sensors – as well as the designated processes “Simatic Automation Designer” generates a large portion of the software needed in production.

“The program is able to generate 70 to 80 percent of the PLC software automatically,” Schloegl explains. “The rest still has to be programmed manually, since some circumstances can only be detected on-site, such as impending system failures.” This is something that could change. Schloegl says that in the future even these circumstances will be anticipated and avoided using computer models.

Aside from the PLC code, Simatic Automation Designer can also generate the future plant’s entire circuit diagram – from control cabinets to cabling of machines all the way to safety devices. “Fifty percent of engineering expenditure in electronics and automation can be spared,” Schloegl calculates. The manufacturer can even benefit from a virtual picture of his plant during production: he always has a digital mirror of his existing plant at hand, which may be used to plan maintenance activities or simulate and optimize changes in production beforehand. Simatic Automation Designer is being used by Daimler AG – the company uses the software to plan welding plants for body construction. “All data for a single product can now be congregated and transmitted without loss, thanks to the merging of PLM and automation technology,” says Schloegl. “And Siemens offers just the right tools for every phase – from the NX CAD program to the controlling of machines on plant level.” This means that product biographies will be missing expensive disruptions in the future.
Industrial enterprises can save enormous amounts of energy costs by using more modern technologies. For example, during the time in which production machines are not in use. During idle time machines still use at least half the amount of energy compared to when they are in use. An intelligent energy-saving mode is an adequate proposal to counter this loss.
Germany is sitting on a huge source of energy: 20 to 40 percent of energy consumption could be saved by the year 2020 in the field of industrial production alone – and this under economically sensible conditions. Both the environment and the economy would benefit from more energy efficiency, from less CO2 emissions and lower costs.

So it’s no surprise that the industry is focusing on measures for better energy management. And that, for example, the German Federal Government has proclaimed the aim of reducing the use of energy per Euro of the gross national product by half – and, thus, doubling energy productivity.

**Drives consume two-thirds of total amount of energy**

Two-thirds of the amount of energy used in the industry is used by electric drives. And 90 percent of an electric drive’s total costs fall upon its energy consumption during its economic lifetime. Concurrently, more efficient electric drives can be written off in a shorter amount of time, even if they are a little more expensive than conventional components. An efficiency gain of up to 10 percent can be reached simply by converting from drives of the lowest efficiency class EFF2, or IE1, to more efficient products in the categories EFF1, or IE2 – depending on performance.

**Return on investment after ten months**

Exchanging 100 drives in a paint shop in the automobile industry may lead to significant annual savings in the 5-digit range. Some investments are thus amortized in less than ten months. This type of adjustment is not even very elaborate, as Siemens drives in both efficiency categories IE1 and IE2 have the same dimensions. Changing the entire construction of a machine is thus not necessary.

Even more important, though, is the drives’ mode of operation, most of all in turbo engines such as pumps, ventilators, and compressors. The energy consumption of these types of machines starts to climb with the third power of their speed frequency. Meaning, double rotational speed results in eightfold consumption. In these cases drives usually run at maximum speed while the feed rate is regulated with a choke. This can be compared to when a person...
Electric drives are only one example of components carrying a large amount of energy-saving potential. Other areas of potential can be identified with a precise analysis and visualization of energy flows from case to case. Siemens offers energy optimization concepts for the automobile industry as well as other industrial areas. First of all, experts will analyze the current situation and assess possible savings (“Energy Health Check”). Then they will propose a concept for improvement (“Energy Analysis”). Measuring instruments such as the Sentron PAC deliver necessary information on energy consumption during this process. The Sentron PAC continuously measures parameters such as power and voltage and transmits them to the controller. Consumption data can then be captured and evaluated by Simatic products for energy efficiency, WinCC powerrate and B.Data.

According to Dieter Tobisch’s experience as project manager for energy efficiency in automobile industry at Siemens, the largest amount of energy in automobile production is consumed in the paint shop – when the body shell is painted. “A lot of liquid and air is set in motion here. Besides, the body shells and paint baths are heated to high temperatures. Consequently, about 45 percent of the entire plant’s energy consumption has its source here.” Motor production comes in second, due to large amounts of casting and milling (about 22 percent). Welding of the body shell (“Body Shop”) also consumes a pretty large amount of energy, 19 percent, while final assembly (ten percent) and pressing (four percent) are not as crucial.

**Energy recovery for lifting platforms**

Siemens efficiency experts not only propose the exchange of energy gobblers with more effective components, such as higher efficiency drives, after their analysis. Energy recovery is another sensible approach – trains and trams are a prime example: when they apply the brakes the electric drive turns into a generator and feeds energy back into the grid. This works in production areas just as well, when body shells are transported on movable lifting platforms from hall to hall, for example. As soon as the production component is lowered, energy is released which is lost in the form of heat up to now. Frequency inverters such as the FC G120D from Siemens can collect these types of energy and refeed it into the energy grid. Even in modern production facilities considerable energy savings can still be achieved with these types of measures. A German automobile producer was able to save 75 percent in energy costs after a detailed plant analysis.

Machines not only consume energy while in action – energy still flows even when they are asleep. This is why the “standby mode” is so well known in the field of consumer electronics – devices are set into an energy-saving mode when they are not in use for a considerable amount of time. This is not the case with production machines: they stay switched on both during short idle times and during entire weekends of production pauses. “Plants will still use up to 60 percent of the energy used during production in their idle times,” says Gerd-Ulrich Spohr, PhD, in charge of innovation and technology in the strategy department of the Siemens Industry Automation division. “This makes no sense, either ecologically or economically.”

**Energy-saving mode for production machines**

With an intelligent energy-saving mode this number could be reduced to about 20 percent – and this is exactly what is expected of the new PROFIenergy protocol, which was developed and concluded by the PROFIBUS Nutzerorganisation e.V.. Up to now many enterprises have already taken individual measures to switch off production machines during idle times. Yet to do this, quite elaborate and non-standardized procedures were needed in the field of controlling. These investments and increased efforts in software maintenance often led to more costs than gains.

The consequence: Many companies decide to waive these sorts of energy-saving measures. The PROFIenergy approach is much more elegant: the production machines of the future will have dedicated energy-saving services integrated, that will be able to communicate with the plant’s controllers via new Profinet commands. This means that if a production downtime is scheduled, the controller will send an order to the affected machines containing the duration of the downtime as well. Every part of the plant will be switched off in a way that unnecessary delays during the restart phase are avoided. “The first controllers and machines will probably master this new protocol by the end of 2010,” Spohr assumes. “Then even the energy meter can take a break while production is paused.”
The value of valuation

When companies merge or are taken over, company values are present in addition to the actual balance sheet that are difficult to quantify objectively: patents and intellectual property. Quite often they are more valuable than the company’s fixed assets. Not wanting to reinvent the wheel, Siemens Industry frequently acquires intellectual capital in the form of other companies. The so-called fair value is of decisive importance for the rate of return of such a deal.

“The most important capital of our company is our employees.” Many annual reports claim just that. Occasionally it is nothing more than lip service, yet more often than not it is the plain truth. This applies in particular to pure research companies and creative industries where factories or machines are not the largest part of a company’s value, but rather the people in its employ. Through their efforts, innovations and patents are created, good relationships to customers and vendors are established and maintained, in short they are the software to the hardware known as the company.

Intangible assets are gaining in importance

In the meantime, the capital market has also recognized this importance. While three decades ago only the material assets of a company were determined, today more than half of the market value of companies listed on the stock market comprises the companies’ intangible assets – that is, brands, patents, and other forms of intellectual property. This high percentage stands in remarkable disproportion to the consideration of intangible assets in the companies’ balance sheets. To this very day, the focus worldwide continues to be on material assets. Frequently, the book value of a company and how it resulted from the balance sheet says very little about how a company creates or could create financial value from its assets.

This becomes particularly challenging when dealing with the acquisition of a company: what basis is to be used for determining the appropriate purchase price? And after the acquisition, the same task arises again. The International Financial Reporting Standards (IFRS) requires that the buyer determine the so-called Fair Value for all acquired assets – material as well as immaterial.
Three paths for valuation

There are three paths for realistically valuating patents, trademark rights, or long-standing customers: orientation based on costs, or on market prices, or on future earnings. During cost valuation, it is determined what the expenditures would be if the company did not have the current assets and would have to create them first. The market price is valuated by looking at the price obtained at the time of analysis for comparable assets in a real existing market. However, the valuation of earnings becomes especially problematic when immaterial assets are not valuated in total but rather individually. And the earnings analysis examines the future cash flows for the company that result from the assets.

But each of these paths has its own pitfalls. Market price analysis can be used only where the respective markets are available – obviously this does not apply to patents. Cost analysis is not very helpful to a potential buyer because instead of previous expenditures he is interested in future earnings. And the earnings analysis is especially problematic when intangible assets are not valuated in total but rather individually: which portion of the overall success of a brand can be connected to the actual industrial property rights, which portion to the sales organization, and which portion to cooperation with the advertising agency?

Completely just solutions do not exist

When analyzing intangible assets individually, a method that takes a few steps on each of the paths is frequently used: the so-called license price analogy. The method determines the costs to the company if it were to get a license from another company for the asset in question. It is usually possible to determine realistic market prices because brands and patents are frequently licensed. The price established for the license is used as future earnings – after all, by purchasing the asset these (fictitious) costs could have been saved. The Fair Value is determined via the Discounted Cash Flow method.

How fair the values are that have been determined with one or the other method usually leads to disparaging opinions between buyer and seller. The free market economy is still waiting for a valuation method that meets the expectations of all participants and is provably objective and correct.

1. 3 questions for Thomas Fruth, head of M&A activities at Siemens Industry

What are the most important assets when you analyze potential acquisitions?

The two main acquisition topics for Siemens are access to customers and technology. Accordingly, both know-how and the customer basis are of central importance. But we do not analyze respective assets individually, but rather within the general context. What is of interest to us is the value the acquisition could create for Siemens – and for that material and immaterial assets are decisive factors.

2. How do you valuate intangible assets?

Because the value of a company, and as a result its important assets, lies in future earnings, we create a business plan for each company. Here a certain degree of uncertainty is unavoidable. Customers as well as key employees may get lost if they are not integrated in the right way. But they may also display previously unused potential. It is easier to analyze material assets, however factories or machinery are rarely key aspects in an acquisition.

3. In the final analysis, it is not your analysis that decides the acquisition price, but demand and supply.

But our demand exists only as long as the price does not exceed our valuation. Acquisitions are not a value as such, instead they have to create value for Siemens. Whenever this is not safeguarded, it is important to say no.
In the movies, poker players are usually gamblers and tricksters. Enter Greg Dinkin, the successful professional US poker player, management consultant, and publisher who reveals how to succeed in gambling. He tells us why it’s the same players who always win or lose. And, as he adds, there is one element in particular that has nothing to do with winning – the famous lady luck. Dinkins’ realization: the best poker players in the world are known far more for their proactive, clever strategies that include both skill and their knowledge of human nature than for their ability to bluff.
So much for back rooms, cigarette smoke, and dim corners: the tournament is held in a huge room with more than 200 tables where lamps the size of buckets bathe the players in glaring light. The atmosphere is quiet and highly focused. All you hear is the clicking noise of the chips and a few garbled words here and there. The World Series of Poker in Las Vegas is synonymous with hard work. The currency here is real money, actually a great deal of money, at that.

Each year, Greg Dinkin attends the World Series of Poker held at the Rio, a large hotel fringed by palm trees and an annexed casino. Once there, he begins to play, day after day, night after night. Many of the players are old acquaintances of his. He calls them partners, rather than opponents. “Playing poker makes for a community,” says the card player who holds an MBA in finance. “You always run into one another again.” This applies to the business world as well.

But this is not the only parallel that Dinkin draws between poker players and managers. Dinkin, who now lives in California, is one of the few professionals to have created a successful career for himself aside from playing poker. And not just in one field but in multiple disciplines.

Dinkin made the rounds: he apprenticed in the hotel sector, studied finance and nutrition, worked in sales and as a consultant, wrote books and founded a publishing company. He contributes his success in so many different areas to the strict application of poker rules. “They are my key qualifications,” says the 38-year-old American.

Making rational decisions

Managers like to justify questionable decisions with such statements as “risks are a necessity at times.” True enough – but only after carefully weighing the opportunities and risks. All cliches aside, professional poker players are not gam-

Five easy rules for difficult times

It is not hard to win with a good hand. However, the best players and managers in the world are characterized by their skill in making the best out of a difficult situation.

1. Staying cool

An important customer threatens to go to the competition. An order that was as good as in the bag gets cancelled at the last minute. And on top of it all, the best employee has just handed in his resignation. A manager is familiar with such a chain of mishaps – coupled with misfortune and his own wrong decisions.

Poker players, who pick up one poor card after the next, do not fare any better. But whoever starts to panic now makes many expensive errors. “Emotions are the enemy of good decisions”, says Dinkin. “Think about the options you have. Managers can be more creative than players, who have to adhere to strict rules.”
2. Retaining good people

Companies have to save money, especially in hard times. “But even then, you have to think long-term,” reminds Dinkin. "When you save excessively, your qualified employees will leave you tomorrow." “When you win, you lose,” is an old poker adage.

Short-term successes are often followed by negative consequences in the long run. That holds true for poker, when the player with the biggest chip stack gets busted out of the tournament after a quick series of losses. This applies to the business world as well when top performers resign because radical cut-backs make for a highly unfavorable working environment.

3. Evaluating risks correctly

Career plans for managers frequently change in a crisis. Restructuring may lead to less than desirable task assignments – or to a severance package. “People feel like they are trapped,” says Dinkin. “Good risk analysis helps them decide what to do.” When you throw in the towel because you are frustrated or make requests that can’t be taken seriously, you’ll lose everything in the end. A good poker player is disciplined enough to fold when it is time.

The same holds true for business negotiations. The body language of the other player reveals how he feels, if there is still room for negotiation, or if he has reached his limit. In situations like these, skilled managers try to show as little emotion as possible – instead they wear the proverbial poker face.

To put up a good front

Novices in particular try to fake it and usually fail. When the “wannabe” bluffer smiles self-confidently after he picked up his cards, an experienced player knows that the bluffer will not stay long in the hand.

Business is not much different. It is ill-advised to combine weak facts with a domineering demeanor and provide optimistic forecasts despite poor results. Professionals look right through this facade. The phrase among poker players is...
Chip stacks are a decisive factor for your strategy. And this does not only apply to your own cash situation. It is also important to know what the other players have at their disposal, because it makes it easier to interpret their actions.

“The same situations occur in the business world: a supplier who finds himself in deep water may be able to raise the price during negotiations – for example, when he knows that the only other competitor has difficulties delivering the product.”

**Tricking, disguising, and bluffing**

In poker, you are allowed to bluff; in the business world, this kind of behavior is also pretty common. But professionals like Dinkin use this method rather sparingly. Because if all you do is trick, disguise, and bluff, you’ll lose all trust – and soon enough the other players will shun you.

Besides, a truly good bluff is the one that remains undiscovered. “When I have a weak hand but I am certain that my opponent has an even weaker lead, I risk a bluff here and there,” continues Dinkin.

“Very little opportunity for large egos”

When you play poker and assume that all the others play like you, you are doomed to lose because every good player has his own style. That’s why you have to see your opponents as unique and collect information as well as ask and listen.

Dinkin likes to quote Abraham Lincoln, the 16th US president: “When I prepare myself for a discussion, I spend one-third of the time thinking about what I am going to say, and two-thirds of the time on how others will react to it.”
Good players are sociable and communicative

Do you communicate sparingly, not trust anyone, and do everything yourself? That’s how underperformers of a company usually behave. Professional poker players also know that supporting one another and networking are the best steps forward. Generous tips for casino employees may earn them the information regarding where the most knowledgeable players are seated. Whoever invites an experienced tournament player to dinner will come away knowing everything about the rules. “Most people love to talk a great deal when they realize that the listener respects them,” adds Dinkin.

Of course, in the business world you have to be careful in passing on information to the competition. However, within your own organization, knowledge sharing is essential. “At least twice a week, each manager should go to lunch with colleagues.”

Looking for win-win situations

When good managers negotiate honestly with one another, they share a common goal – a conclusion that benefits everyone. Impossible? Not in the least. Even poker players are united by a joint interest: everybody needs a partner.

However, each should know his own wishes and limits. If ideas clash, it is appropriate to try and make small concessions, and to insist that the other does the same. If this works, negotiations can continue. If the attempt fails, negotiations should be discontinued.

An absolute taboo is to let the business partner know that more was obtained than hoped for. Any kind of exultation leads to sustained defensive reactions.

It is far more productive to praise fair dealings and a pleasing atmosphere. “The other player should always be ready to play another game with me even though he literally lost his shirt the last time.”

Recommended book:
The Poker MBA

How to succeed in business, independent of the cards dealt to you, is described by Greg Dinkin and co-author Jeffrey Gitomer using many examples, quotes, and anecdotes.

The transfer of poker rules to business provides a surprising view of strategic thinking, decision management, and people smarts. Attached is a quiz and a short description of the game of poker.

266 pages, English, Crown Business Publisher, approx. 17 US dollars.

About Greg Dinkin

Greg Dinkin (38), was born in Washington D.C. He began playing poker in high school. He increased his knowledge of the game during college when he interned at the famous Mirage hotel casino in Las Vegas. Later on he worked as a paid player in the Bicycle Casino. In 2006 he won more than 100,000 dollars during the World Series of Poker in Las Vegas.

But Dinkin, who has an MBA in finance, always stressed the importance of a career away from the game. He worked as a management consultant for PricewaterhouseCoopers and the Intercontinental hotel chain. In 2000, he founded a publishing house and has published more than 130 books. Today Dinkin lives in Los Angeles and is working on a screen play.
When talking about emissions and the protection of the environment, most of us are thinking about CO₂ and other greenhouse gases. However, Siemens train acousticians focus on identifying and reducing unnecessary noise emissions. They even build entire landscapes along their train’s test tracks to gather representative measurement results. Without these efforts, new trains would never meet the increasingly strict regulations for noise emissions. Now, train travelers can enjoy higher comfort and citizens living along the train’s routes experience less noise disturbance.
All these efforts contribute to train travelers being able to enjoy ever more quiet trains. But, the goal of the train acoustician is not only to raise comfort for people on the trains by reducing noise inside the cars. It is also a main goal to reduce noise emissions for those outside of the trains – the people living along their tracks.

Strict laws

In the last few years, Europe implemented strict laws regarding noise emission. EU directives listed in the so-called Technical Specifications for Interoperability (TSI), are set to become even stricter.

No easy task for acoustic experts. Especially high-speed trains present ever new challenges to their designers and engineers, due to the laws of aerodynamics. “With high-speed trains, we have to make use of every trick in the book to meet the requirements”, says Schüler.

Noise measurements in every component

In order to prevent surprises, the train acoustician and his colleagues measure noise emissions of single components such as, for example, air conditioning units, even before they are installed into the cars. “It’s possible that certain components have to be totally revised because they don’t meet our demands”, Schüler explains.

What may sound trivial is anything but self-evident – and extremely important. “The authorities are extremely precise. If a train misses the required mark by as little as one decibel, we’re denied certification”, says Stefan Meinhold, engineer at the Siemens Test- and Validation-center (PCW) in Wegberg-Wildenrath, North Rhine-Westphalia. This facility tests trains from Siemens as well as trains from other manufacturers. The PCW is one of the most modern facil-

Noise is a huge environmental issue. That is why Siemens, one of the world’s leading companies in mobility technology, considers the reduction of noise as one of its main focus points. All trains which are developed by Siemens meet the strict European guidelines for noise protection. That holds true for conventional technology as well as for high-speed transit.

Problem case freight transportation

The largest source for noise in train traffic is usually not created by the vehicle itself, but by the contact of the train’s wheels with the track. Especially freight cars are often still equipped with outdated cast iron brakes, which grind against the wheels,
bringing the trains to a screeching halt and even damaging the track while doing so. Here, cargo companies and network operators have to find solutions together.

Deutsche Bahn leading the way

Deutsche Bahn is leading by example. It aims to reduce noise pollution from its tracks by half until 2020.

Going below limits

The European limit for stationary noise of regional trains is at 68 dB(A). Siemens’ newest regional train, the “Desiro Mainline” stays below this value by 13 decibels. When in motion, the electric multiple unit, which is used among others by MittelrheinBahn, stays five decibels below the strict limit of 81 dB(A).

Deutsche Bahn is recognized as independent testing center by the German Federal Railway Authority (EBA).

Situated on a former military airport with two test tracks and a total of 28 kilometers of track, trains are being checked for every detail. Part of these checks, among those for brakes and wheel loads, is an acoustic test. Only trains that pass this test get the needed certification and official homologation. “Here, we conduct our measurements in a controlled and comparable environment, which would be quite difficult to do on a line in service”, Meinhold explains. Sometimes, measurements take a full day, and the trains have to run the test track over and over again, until all the necessary data is collected. At the test center, this is no problem. If the tests had to be conducted on the busy railway network, it would be much more difficult.

In order to provide the test track as a reliable and comparable reference, Meinhold and his colleagues put much effort into its maintenance. The test center in Wegberg-Wildenrath, for example, has a special device that measures the track’s roughness. “There are only a handful of these devices around the world”, says the 41-year-old engineer. Through acoustic grinding, the track is brought exactly to the value required by the European specifications. Finally, the track is tamped, which means that any cavities under its sleepers are filled, in order to prevent any wild noise. For the same reason, the landscape on both sides of the tracks was made to fit: Trees and bushes were exchanged for soft grass; natural hills were leveled.

Tracks as the source for noise

As diverse as the trains are that travel on tracks, as different are the tracks that the trains travel upon. “In most cases, the noise from trains doesn’t really come from the vehicles, but rather from the tracks”, says Meinhold. If the infrastructure is in poor condition, the quietest, most modern train is useless. So, if Deutsche Bahn promises to reduce track noise by half by 2020, then they are also talking about a modernization of the track system or at least about keeping acoustic noise from residents by the help of noise barriers (see above).

Another reason for train noise being considered disturbing – although proven to be considerably less loud than the noise resulting from street traffic – are outdated freight trains which are still in use throughout Europe. “Freight trains have the most difficulties to stay below the required noise limits when they come to our test center”, says Meinhold. He adds: “Our reports help manufacturers improve their technology”.
No measurements for prototypes

The work of the acoustical detectives doesn’t stop with measuring. Prototypes are hardly being built anymore. For the most part, it is a first series model of a production series of new trains that is being tested. A certification procedure, required by the authorities and offered by the Siemens Test- and Validationcenter, provides for dependable measurements for all further trains of the same model.

Stefan Meinhold pays regular visits to his colleague Jochen Schüler in Krefeld to ensure that the same components are used in later trains of a series as were used in the one tested at the PCW. “With the implementation of a good quality management system, Siemens provides that the vehicles produced in series are conform with the tested vehicle and don’t have to be measured again”, says Schüler. “When dealing with smaller manufacturers, it is sometimes necessary to look over every component again, to prevent, for example, that suddenly an air fan is being installed that is louder than the one that was used during testing”, Meinhold adds.

Such cases are very rare, though. All in all, the awareness of acoustics as an important subject has dramatically increased throughout the industry. Not only because of new, stricter laws, though. Railway companies want quieter trains as well. Residents along train tracks are often also train travelers.

In an increasingly urbanized world with ever denser population, it is the carriers’ duty to not only reduce carbon emissions, but to also keep noise emissions at a minimum. “A huge transition in thought has taken place, because noise protection is also environmental protection. As recently as 20 years ago, a country like Switzerland, which has always aimed for more quiet trains, seemed exotic – today, everybody is doing it”, says Stefan Meinhold, who fittingly happens to wear a wristwatch of Schweizerische Bundesbahnen.

Much like Jochen Schüler, he too has a trained ear, which aids him with his hobby. He is a singer in a choir. “As an acoustician, I don’t need to have absolute pitch, like some musicians do, but I am not too far from it”, says Meinhold, and he laughs. Sometimes, the two acoustics experts engage in a little frequency guessing game.

But they both are happiest when they hear nothing at all. Like, for example, when they tested the commuter train “Desiro Mainline”, which was recently built in Krefeld and put to service in Wildenrath. Such an electric multiple unit is allowed to be no louder than 68 dB(A) at standstill. Stefan Meinhold’s measurements showed a full 13 decibels less than what is required. “At certain measuring points, the singing of birds along the track was louder than the noise from the vehicle”, the testing engineer remembers.
GreenTech as a way out of the crisis

by Torsten Henzelmann

“Green stands for hope” says an old saying. Green environmental technologies, however, mean a great deal more: they are the future. A worldwide survey of more than 1,500 corporations and research institutes in the environmental field proves the enormous potential of the industry. For more growth and more climate protection.
Our calculations have shown that the global market for environmental technology will develop at an annual growth rate of 6.5 percent, and will have reached a volume of approximately 3,200 billion Euros by 2020. The global finance and economic crisis will not impede environmental technology along the pathway to growth. The global economic stimulus packages put together by countries such as the United States, China, Brazil, and the EU nations, contain more than 400 billion US dollars for GreenTech investments.

And if the government furtherance measures run out, the green boom will still continue. Worldwide population growth, increasing industrialization in the threshold countries, and urbanization will drive the demand for resource-preserving production processes and environmentally sound, efficient technologies, because environmental technology can limit the damage these global megatrends are causing to the earth’s ecosystem. Green technologies are indispensable in the battle against climate change, because they reduce CO₂ emissions.

Environmental technology “Made in Germany” is very much in demand internationally and excellently positioned. Its world market stands at an average of 15 percent in the six leading markets. Suppliers from Germany are technology leaders in many fields. This strength also provides glowing prospects for the domestic market. Germany ranks as an attractive GreenTech site, to which a large majority of domestic environmental technology companies will remain loyal. In 2007 GreenTech revenues in Germany stood at 200 billion Euros. According to our predictions, the industry will reach a level of 470 billion Euros by 2020, and thus earn some 14 percent of the German gross domestic product.

Energy efficiency is an important lever

With 540 billion Euros, energy efficiency represents more than one-third of the total volume for environmental technology worldwide. With an annual growth rate of six percent, this leading market will more than double by 2020. In the future, no country, no corporation, and no budget will be able to afford the luxury of leaving energy-saving potentials unused. The energy sources are far too precious for that – and too expensive.

Energy efficiency is, besides the increase in the share of renewable energies in the global energy mix, the most important lever to reduce CO₂ emissions. The 4th UN Climate Report compares the sectors of agriculture and forestry, industry, transportation, and construction in relation to their potential CO₂ emissions savings. Accor-
According to the report, by 2020 CO₂ emissions in the building engineering sector can be reduced by about one-third.

In the United States the building engineering sector is responsible for some 30 percent of the total energy requirement and almost 65 percent of the electricity requirement. To curb the energy hunger of public buildings and private homes, the US government has already placed some 14.5 billion dollars in its economic recovery package for energy efficiency measures. Of this amount, 5.5 billion alone are earmarked for the construction and modernization of federal buildings.

Some 30 percent of the global natural gas reserves are located in the Russian Federation. For decades, energy management was a non-issue here. For each production unit, Russia consumes twice as much energy as China and four times as much as the Western industrialized nations. According to the World Bank, Russia could economize some 45 percent of its energy requirements through efficient use – and thus increase its economic performance while preserving precious resources. In the meantime President Dmitry Medvedev has declared energy efficiency part of his personal agenda. Measured against the base year of 2007, the energy requirements of the Russian economy should decrease by at least 40 percent as of 2020. To reach this ambitious goal, heating supply must be modernized, and many buildings will have to undergo energy-oriented reconstruction. A large proportion of the industrial facilities must be retrofitted with energy-efficient technologies or completely replaced. China’s energy mix is dominated by a one-third share of coal; many power plants are outdated and have a low output rate, yet the cost factors and environmental burdens are correspondingly high. China has meanwhile become the largest CO₂ emitter in the world. The Chinese government has announced that it plans to reduce the CO₂ emissions level per BIP unit by 40 to 45 percent as of 2020. This target can only be reached if energy efficiency greatly increases. Whether or not this will succeed depends quite significantly on the industrial sector. The “Top 1,000 Industrial Energy-Saving Program” motivates the 1,000 largest companies in the People’s Republic with tax incentives and

An overview of the study

Green technologies, cleantech, GreenTech – this still relatively young economic sector has many names and even more facts. In February 2007, the German Federal Information Ministry entrusted Roland Berger Strategy Consultants with the job of plotting the topography of this growth sector. The result was an analysis of the German and global GreenTech market based on market studies and interviews with experts.

A further component of this study was an online survey of companies and research institutes from the field of environmental technology. It revealed important knowledge in relation to the activity spectrum, revenues, occupation, and result development as well as the world market shares of German suppliers.

And so a complex portrait of the environmental technology industry was created, published under the title “GreenTech Made in Germany. Umwelttechnologie-Atlas für Deutschland” (“GreenTech Made in Germany – an Environmental Atlas for Germany”). Following a positive response, the study was updated, expanded, and republished in 2009 under the title “GreenTech Made in Germany 2.0.”

In order to take the increase in internationalization into account, the status quo and the future prospects of environmental technologies in the national markets of the United States, Japan, Brazil, Russia, India, and China were considered. More than 1,500 companies and research institutes in the environmental industry took part in the online survey.
sanctions to encourage investment in energy-efficient technologies.

**Mobility creates economic growth**

The mobility of people and goods is a basic prerequisite for functioning economies. The increase in transport volume over the past decades, however, exacts a high price from the environment. Transportation requires about one-fifth of the primary energy worldwide, and it is accountable for almost one-fourth of global CO₂ emissions. The challenge here is to secure mobility while at the same time increasing the energy efficiency of transportation, promoting means of transportation that place lower burdens on the environment. The leading market for sustainable mobility faces the task for the future with an abundance of innovative technologies. It currently has a volume of 200 billion Euros and will increase this, according to our predictions, to 300 billion Euros by 2020.

Sustainable mobility can be achieved through a number of approaches: efficient drive technologies such as fuel-saving gasoline and diesel engines, electric, hybrid, and fuel-cell drives, environment-friendly vehicle engineering and design, improved logistic concepts in cargo shipment, as well as traffic management systems. The transfer of traffic to environment-friendly carriers plays a key role here. In terms of energy efficiency and CO₂ emissions, single-passenger motorized transportation ranks much lower than a well-upgraded public local and long-distance passenger transport system.

This realization is beginning to impress more and more government officials and urban planners. In this context, some 8.4 billion US dollars in the economic recovery program were earmarked for the expansion and modernization of rail routes; further funding is also envisioned for subway constructions.

**Promoting renewable raw materials**

In the leading market for natural resource and material efficiency, revenues of 100 billion Euros were realized worldwide in 2007; 335 billion Euros are anticipated by 2020. This turbo growth of ten percent per year is primarily accountable to development boosts in bio- and nanotechnology. The intelligent management of resources goes easy on the environment and saves company costs. A fifth less is doable. The increase in raw material prices is then also the convincing argument for the growing significance of this leading market: after a crisis-triggered low point in December of 2008, prices are moving steadily upward and reflect the relationship between the shortage of supply and the increased demand spurred by the global economic and population growth.
Experts may differ on whether peak oil is now five, fifteen, or thirty years away. There is total consensus, however, on the future development of oil prices: skyrocketing! In view of this scenario, the technologies in the leading market for natural resources and material efficiency are activating two levers: firstly, in efficiency increase and longer durability, and secondly, in the use of renewable alternative raw materials.

White biotechnology plays an important role within this leading market. The interest in resource-preserving and low-cost biotechnological production procedures will increase considerably worldwide. Consequently, revenues in this sector will rise to 173 billion Euros by 2020.

These selections clearly show that environmental engineering has a great future. It is more than a shimmer of hope in times of crisis. GreenTech is a lighthouse showing the way out of the climate crisis and has long since overcome the contradiction between ecology and economy.

GreenTech cross-section industry

Among the conspicuous peculiarities of the industry is its overlapping with other key industries, such as mechanical engineering, electrical technology or vehicle manufacture.

This makes environmental technology a cross-section industry, which expands and partially redefines and interacts with the classic business areas and technologies of the traditional industrial branches. The dividing lines to other businesses are sometimes diffuse. To set them apart from other industries, we have not defined environmental technology in our studies by products, but rather by leading markets. These leading markets play an important role for meeting basic human requirements and preserving the earth’s ecosystem. To this degree economic and ecological aspects are very closely intertwined in these central markets. We have divided GreenTech into six leading markets:

- Environment-friendly energies and energy storage
- Energy efficiency
- Natural resource and material efficiency
- Circular economy
- Sustainable water management
- Sustainable mobility

One-fifth of the entire primary energy worldwide is needed for transportation.

<table>
<thead>
<tr>
<th>Industry</th>
<th>2005</th>
<th>2020</th>
<th>Annual growth until 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway vehicle manufacturing and infrastructure</td>
<td>59</td>
<td>81</td>
<td>+ 3%</td>
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<tr>
<td>Filter technology</td>
<td>8</td>
<td>13</td>
<td>+ 4%</td>
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<tr>
<td>Hybrid drives</td>
<td>0.4</td>
<td>2</td>
<td>+ 11%</td>
</tr>
<tr>
<td>Vehicle telematics</td>
<td>29</td>
<td>61</td>
<td>+ 6%</td>
</tr>
</tbody>
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World market projections in core sectors

above: sustainable mobility (in billions of Euros) below: energy efficiency, source: Roland Berger Strategy Consultants

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<thead>
<tr>
<th>Industry</th>
<th>2005</th>
<th>2020</th>
<th>Annual growth until 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal insulation (bn m²)</td>
<td>13</td>
<td>26</td>
<td>+ 5%</td>
</tr>
<tr>
<td>Process measuring and control technology (bn Euros)</td>
<td>250</td>
<td>470</td>
<td>+ 5%</td>
</tr>
<tr>
<td>Electric motors (bn Euros)</td>
<td>120</td>
<td>155</td>
<td>+ 6%</td>
</tr>
<tr>
<td>Household appliances (bn Euros)</td>
<td>105</td>
<td>155</td>
<td>+ 3%</td>
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Economist Prof. Claudia Kemfert deplores climate change – and yet she concurrently sees it as the trigger for all kinds of opportunities. The renowned energy expert talked to Siemens Industry Journal about investments in greater energy efficiency, the global trade with pollution rights, and her eating habits.

“Climate protection is the economic engine of the future”
The Climate Summit in Copenhagen has now become history. How do you evaluate its results from today’s vantage point?

Unfortunately it didn’t bring about a breakthrough. People may have continued to pledge themselves to the goal of a two-degree temperature limit. But nobody has established how this goal is going to be reached. It would presumably make more sense in the future to deal with the topics of climate protection and adjustment to climate change on separate negotiation levels. Mandatory climate protection and emission reduction goals should be established in conjunction with the G20. Measures for adjusting to climate change (e.g. dike construction or water management systems) for all countries, but especially the developing countries, could be bindingly established in UN climate negotiations.

Wasn’t the Climate Summit in Copenhagen an economic conference, anyway?

It was the most important climate conference ever. But climate change and climate protection also have economic consequences. Over the long run, the costs of climate change – the damage to national economies – will drastically increase. Expenditures for climate protection are thus ongoing investments, which improve the status of a national economy over the long run. And the costs for inaction are doubtless higher than the costs for taking action.

Many corporations hereabouts are demanding that Europe forgo one-sided advance payments because they fear the loss of their competitive edge. Couldn’t these advance payments, however, also trigger an innovative thrust, which might prove economically useful over the long run?

By all means! Climate protection is the way out of the crisis, the economic engine of the future. With appropriate technologies, we can combat three crises simultaneously: the economic crisis, the energy crisis, and the climate crisis. Fossil energies – first and foremost, oil, then subsequently gas – are getting scarcer and more expensive. The fossil resource coal may continue to be available to us for a long time, but its combustion generates climate-damaging greenhouse gases. That means that coal technology must become easier on the environment. Parallel to this, we must also expand our renewable energy sources while economizing far more on energy, concurrently boost our production of heat and electricity, and take greater advantage of both climate-sparing fuels and technologies. The German economy can profit more than any other from the boom in renewable energies, but not only from the expansion of energy efficiency as well as innovative power plant and fuel technologies. Even in the “classic” environmental protection industries such as waste processing, recycling, and water treatment it can also increase its world market share. And up to a million new jobs might come about in these areas over the next ten years.

What should the European governments do now?

The important thing is that they set their course for an energy-efficient, climate-protective economy. They must continue to promote renewable energy sources and should create financial incentives for energy-saving measures – continue to, there are sizable potentials. Through targeted financial assistance, tax savings, and improved cost rollover options for property owners governments can set meaningful signals. And by boosting energy efficiency alone, for example, the German national economy could be relieved of expenditures in the neighborhood of 23 billion euros a year! There is also plenty of room for improvement in the mobility field. Rail transport and public transportation systems need to

Expenditures for climate protection are ongoing investments, which improve the status of a national economy over the long run. The costs of inaction are even higher than those for taking action.

Prof. Claudia Kemfert,
German Institute for Economic Research
be powerfully furthered, air travel included into
the emission trade, and the German automotive
industry made more fit for the future.

There is already an instrument for CO₂
reduction: namely the emissions trade.
Can it become a global success model?

The emission rights trade is a cost-effective in-
strument for climate protection. The prerequi-
site for it, however, is that every country, every
sector, and every technology must be included
in it. This is not the case in actual practice.
The failure of Copenhagen is primarily also a
failure of the global climate protection instru-
ments – first and foremost the global emissions
rights trade. All the national economies that
recommend this solution as a panacea to their
government officials should be told this: in the
near future it will become the most improbable
solution, because at the end of the day all the
various governments want to decide for them-
selves whether they wish to implement climate
protection and how they want to go about it. The
emissions rights trade will thus only remain one
component from among many climate protec-
tion measures.

China and the United States are the most im-
portant countries when it comes to climate
protection. What developments do you envis-
ion there?

Many nations, first and foremost the United
States and China, have recognized that the
economy must sooner or later be converted to
green technologies if they wish to retain their
competitive edge. Besides these measures to
improve energy efficiency, renewable energy
sources will primarily gain in importance, along
with sustainable mobility concepts such as elec-
tric mobility. This is why especially the United
States and China are targeting their strategies
toward the climate protection markets. China
has set itself binding expansion goals for renew-
able energies, and the United States is investing
150 billion dollars in the expansion of renew-
able energies.

Many people connect climate protection with
a sacrifice of their accustomed standard of
living. Are we going to have to tighten our
belts in the future?

Sacrifice is the wrong approach – we should
rather consume with far greater climate aware-
ness. Nobody needs to subject himself or herself

Biographical note

Prof. Claudia Kemfert, 41, has headed the “Energy,
Transportation, Environment” division at the German
Besides this, she is a professor of energy economy
and sustainability at a private Berlin university, The
Hertie School of Governance.

She advises José Manuel Barroso, the President of
the EU Commission, on energy issues and serves as
an expert advisor to the Intergovernmental Panel of
Climate Change. Prof. Kemfert has studied econom-
ics at the Universities of Bielefeld and Oldenburg,
as well as at Stanford University in California, and
was singled out by the German Research Society, the
Helmholz and Leibniz Society, as a top researcher
and elected to the “Eleven of Science.”
to any appreciable limitations, but we should rather only live a little differently. This means, for example, to check where we can economize on energy. The more consumers regard this as important, the more companies will quasi-automatically offer this kind of information for their products. Growing climate protection is the cornerstone for an increase in the well-being of a national economy.

**What can globally operating companies such as Siemens contribute to climate protection? And how can it profit from this contribution?**

Companies that choose to meet the central challenges of climate protection and the sustainable treatment of energy and raw materials will find themselves ahead of the pack in terms of the market economy. Corporations like Siemens, which are already heavily into sustainable energies and climate protection, will emerge from the crisis fortified. Companies like these, which get involved early in the game in the new business areas, will find themselves more attractive to capital investors, especially in times of economic crisis. The markets belong to those who see them. Siemens has the special advantage of being able to supply a wide variety of technologies: starting with energy efficiency and smart metering all the way to recycling and renewable energy sources and modern power plant engineering.

**What are you doing for climate protection in your own everyday life?**

I avoid everything that might put any unnecessary stress on my CO₂ balance. I eat vegetarian food, primarily purchase regional bio products, subscribe to ecopower, own only energy-saving electrical appliances and live in a highly insulated house. I don’t drive a car, but rather ride my bike for my daily trip to the suburban train. And for longer distances I exclusively use the train. Unfortunately, long-distance flights add a burden to my balance! I neutralize these emissions, however, by investing in climate protection projects.

**Climate scientists promote restricting global warming to two degrees. Can we still reach this goal?**

We have to do everything we can to get there. And at the same time begin adjusting to climate change.

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**The DIW (Deutsches Institut für Wirtschaftsforschung – German Institute for Economic Research)**

The DIW in Berlin is the largest economic research institute in Germany and employs 180 people, among them 100 scientists. It engages in application-oriented economic research and economic policy consultancy.

The DIW is a registered association and was founded in 1925 as the Institute for Cyclical Analysis. It is a member of the Leibniz Society of German Research Institutes and primarily financed with public funding.

The special strengths of the DIW are in the wide range of subject matter covered by its scientific work as well as its access to outstanding empirical data.
How does ...

... a green building actually function?

Some 40 percent of worldwide energy needs are due to buildings. This corresponds to 21 percent of CO₂ emissions. As a consequence of these figures, the EU initiated the GreenBuilding program in 2004 followed by GreenBuilding Plus in 2007. Since then, similar programs have been established in many countries outside Europe.

1 Lighting
Fluorescent tubes remain standard equipment in office and commercial properties. Their era will soon be over: light-emitting diodes (LEDs) enable attractive architectural effects, are low-maintenance, and provide a third more energy savings than their predecessors, and close to 90 percent savings compared with conventional incandescent bulbs. Soon, even more energy saving diodes made of wafer-thin organic layers (OLED) will generate stylish, pleasant lighting. One day, it may be possible to use them to provide illumination through window surfaces.

2 Sensors
Room climate, air quality, and motion sensors used in conjunction with innovative control engineering can result in up to 30 percent energy savings for heating, air conditioning, ventilation, and illumination. At present, Siemens is working on odor sensors. They inform the control system when air quality becomes poorer, and trigger a command to release ozone.

3 Room control
Energy savings of up to 14 percent can be achieved with room controls. Systems with high control precision optimize room climate, making frequent temperature readjustments unnecessary.

4 Facades
"Intelligent" exteriors of nanomaterials instead of "classic" materials such as styrofoam or fiberglass are the trend in thermal insulation of facades. These smart envelopes can be operated electronically. Researchers are currently working on controlling windows so that they only let in limited amounts of light in order to regulate heat.
In many ways, the building of tomorrow is already reality today. The Industry Journal presents examples of forward-looking innovations and processes which can sustainably increase energy efficiency without sacrificing comfort. As such, optimizing various systems such as heating, ventilation, air conditioning and lighting in conjunction with building automation can result in energy savings of up to 70 percent.

Power-heat coupling

It is now possible for smaller companies and households to generate energy using mini-plants for power-heat coupling. The plants – block heat and power plants for example – simultaneously generate electricity and useful heat. Advantage: the coupling allows the applied energy to be used more efficiently than seen in traditional power generation. In addition, CO₂ emissions are reduced significantly.

Air conditioning

Concrete core activation is among the forward-looking processes for ensuring a uniform, comfortable room climate. It supports the storage capacity of the concrete parts through integrated tubes filled with cooling or hot water. Advantages: cooling without drafts as well as low investment and operating costs.

Brightness control

Sensors acquire and transmit values for external temperature and brightness and adapt the blinds and lighting system to the current situation.

Intelligent electricity meter

To date it has been nearly impossible for private consumers and small to mid-size companies to know where and when they were throwing money out the window for energy. The common annual consumption billing provided no detailed information. Intelligent electricity meters, known as smart meters, measure current consumption every fifteen minutes. This not only enables one to deal with electricity in a more informed manner, it also results in time-dependent tariffs from energy providers.
Always well-informed, always up-to-date

Keep your finger on the pulse of innovation. Be one of the first to learn about and profit from the latest developments for more productivity, efficiency, and flexibility! Simply download the latest issue as a PDF file, or subscribe free to the printed magazine at www.siemens.com/industryjournal
Can you actually wash water?

Siemens helps supply millions of people in Singapore with clean water.

With our innovative water processing technology, Singapore now has a new, eco-friendly source of water. Over 20 million gallons of used water are purified every day. By 2010 Singapore plans to clean 22.5 percent of all its water this way.

siemens.com/answers
Creating sustainable value through technological leadership

Focus: Urbanization

Environmentalist

How sustainable city planning can be the future of smart urban life.

Pioneer

How Shanghai is preparing for 70 million Expo visitors – and for the future.

Climate Winner

European Green City Index: How green are Europe’s metropolises?