

# Hard Hats

## Siemens at Work

*Cities are permanently under construction. The Siemens Infrastructure & Cities Sector is involved in a broad range of projects worldwide. The following ten pages illustrate the technological and geographical scope of the Sector's portfolio, which is as diverse as the customers it serves.*

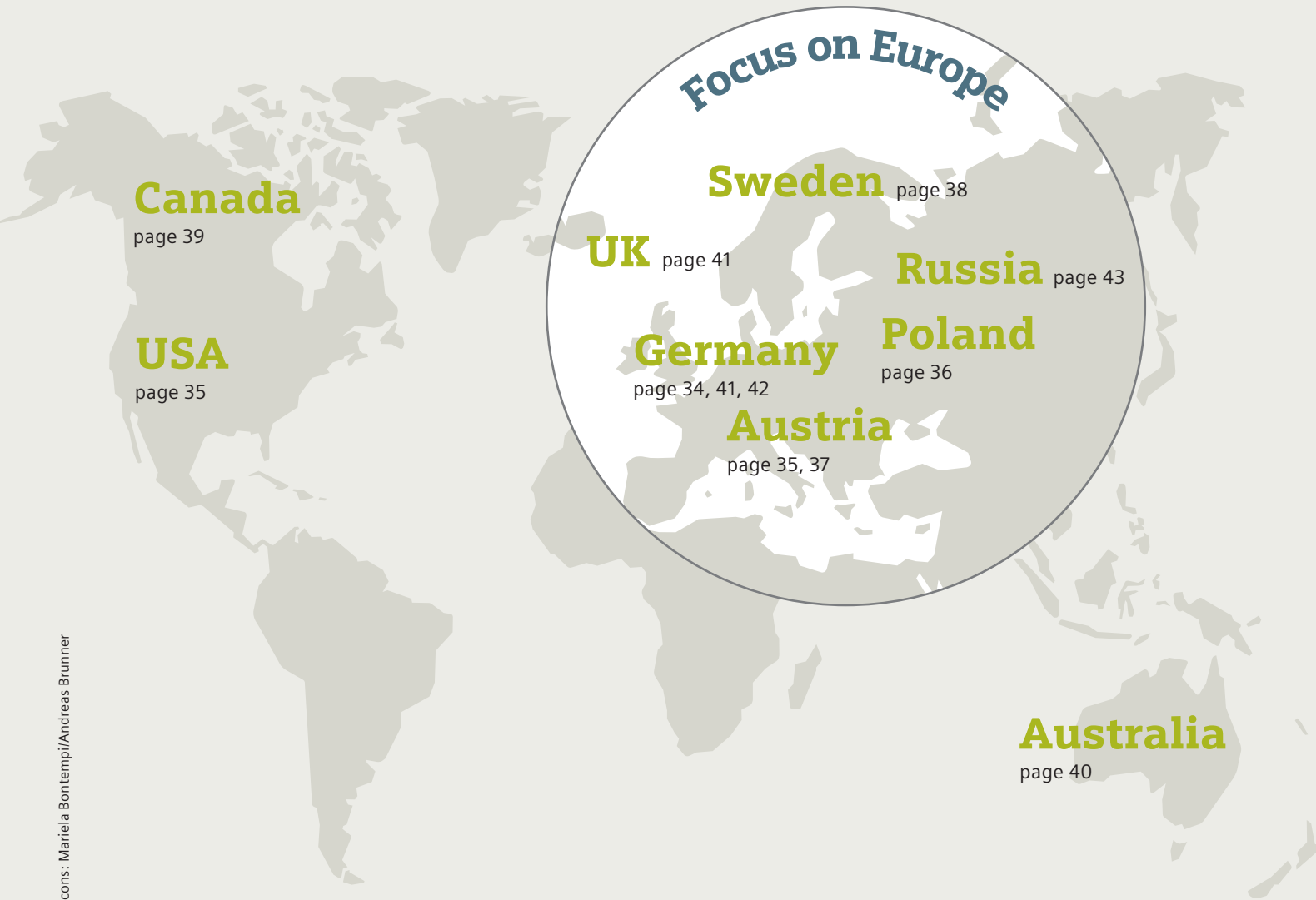
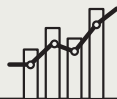


Illustration: independent, Icons: Mariela Bontempi/Andreas Brunner



Siemens  
Building Technologies



Siemens  
Financial Services



Siemens  
Low and Medium Voltage



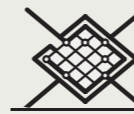
Siemens  
Mobility and Logistics



Siemens  
Rail Systems



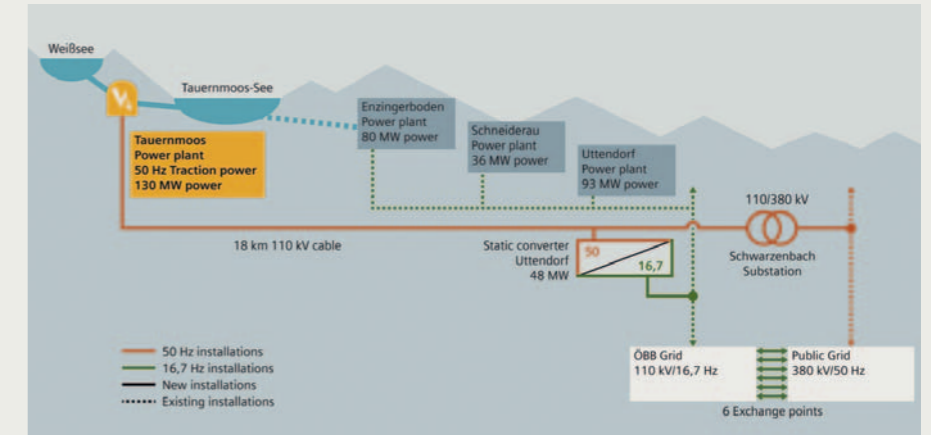
Siemens  
Smart Grid



## Stronger Traction Power Supply in Austria

Facts: 48 MW output | 10% less power loss in conversion | Contract worth €8 million | Commissioning in late 2014

In order to increase the efficiency of its traction power supply grid, the Austrian Federal Railways (ÖBB) have commissioned Siemens to install a static frequency converter with an output of 48 megawatts from the Sitras SFC plus series as a network interconnection in the Stubach valley near Salzburg. It will convert in both directions between the 16.7-hertz traction current system of ÖBB and the 50-hertz public power supply grid in addition to the six already existing network interconnections. The converter is being installed at a hydroelectric power plant in Uttendorf in the Stubach valley and should enter service in the fall of 2014. "With this frequency converter, we can minimize transmission losses and use our traction-current-generating plants even more efficiently for operations in the Austrian rail network," says Christian Wild, head of project management at the Energy division of ÖBB-Infrastruktur AG. The special feature of the Sitras SFC plus converters is their multilevel current conversion technology



When the Tauernmoos pumped storage power plant with a rated capacity of approximately 130 megawatts begins feeding into the public grid in 2018, it will also be directly integrated into ÖBB's 16.7-hertz traction current system – thanks to the Siemens converter's two-way currency conversion capability.

comprising several power transistor components connected in series and capacitors that build up the required voltages in small steps. This reduces the switching frequencies and consequently the power loss by around 10 percent compared to existing systems. The Siemens converter technology is currently in high demand:

The Swedish transport authorities as well as the Swiss Federal Railways (SBB) placed orders for eight and two multilevel direct converter blocks respectively. The converters are strengthening the traction power supply networks of both countries through their additional links to the public power grid.



## Powering Europe's Largest Tropical Greenhouse

Facts: 24,000 plants | 300 animals | Europe's largest indoor tropical garden

Thanks to reliable building management systems and power distribution, a rich tropical experience has been thriving beneath the canopy at the Leipzig Zoo since July 2011. In the humid, tropical, 25 °C climate of Gondwanaland, a lush rain forest with more than 24,000 plants and around 300 animals from Asia, South America, and Africa, offers a variety of impressions and perspectives to visitors of all ages, whether they walk on narrow paths or across swaying suspension bridges or travel by boat. However, guests will probably notice nothing unusual about the power supply, without which the air-conditioning, ventilation, and lighting in the dim hall would not work. Ambient parameters such as temperature, air and light are vital for imitating a totally different climate zone. The survival of plants and animals in this environment depends on these factors remaining stable.

The planners and builders of the sensitive structure played it safe, relying on Totally Integrated Power (TIP) from Siemens. The efficient TIP concept combines power distribution components into an integrated and technically consistent solution. All components of the system were matched precisely to each other and optimally dimensioned using the software tool Simaris design. To ensure the required high availability in Europe's largest indoor tropical environment, almost all of the system components are backed up by redundant elements. Bus bar trunking systems – protected against the high humidity – play a central role. The electrical power distribution has been running smoothly since the construction phase, thus providing the required safety and comfort of plants, animals, and visitors in the unique Gondwanaland experience.

Illustration: Mariela Bontempi



## Infrastructure Upgrade Saves Costs for Florida Institute of Technology

Facts: Energy savings exceed annual financing costs | US\$10 million investments

The majority of the buildings on Florida Institute of Technology's campus were planned or built around 1960 – at a time when energy efficiency was not a very big concern. Rising energy prices and a shift in attitude prompted the school to take action in 2009: The university wanted to replace its outdated lighting as well as its heating, ventilation, and air-conditioning systems and other equipment. The new technology was required to meet modern energy efficiency benchmarks and live up to the school's high-tech standards. Siemens designed an energy conversion solution that comprises both the equipment and the financing for the

US\$10 million project using the Energy Saving Performance Contracting model. The equipment technology focuses primarily on lighting and air-conditioning – the latter being especially important in subtropical Florida. As an independent, private technical university, the Florida Institute of Technology keeps an eye on cost-effectiveness. The energy savings realized with the new equipment exceed the annual financing costs for the entire project, meaning that the modernization measures proved to be profitable for the university right from the start: The investment will pay for itself within the ten-year financing period.

Graphic: Siemens AG



## Smooth Cruise in Poznan

Facts: Over 200 measurement points | More than 85 information panels | Contract worth €15 million

Traffic in Poznan, Poland's fifth-largest city and a hub of science, industry, and commerce, has been increasing since the introduction of the market economy over 20 years ago. But traveling through the city is about to become a much more enjoyable and efficient experience. Zarząd Dróg Miejskich w Poznaniu (ZDM), the municipal transport authority, has commissioned Siemens to supply an intelligent traffic control system in a contract worth €15 million. The Siemens Sitrtraffic Scala/Concert system will reduce congestion; at the same time, it will provide commuters with information on transit time, the quickest route to their destinations, and parking options.

How will this be accomplished? Essentially, by synchronizing public transport and individual traffic. To this end, Sitrtraffic gathers data at 200 measurement points positioned at key traffic nodes such as busy intersections, car parks, and public transport infrastructures. The system collects and processes this information on traffic status and passes it on to commuters through

various interfaces, including information panels at bus and train stops, as well as a dozen variable message signs (VMS) positioned along key thoroughfares. Of course, these status reports can also be accessed through the Web and on mobile platforms. However, Sitrtraffic also makes smart autonomous decisions on signaling on the basis of the data it gathers, and can change the patterns of traffic lights to prioritize and speed up the flow of public transport.

The system will be commissioned in 2015, at which time the 500,000 residents of Poznan should notice considerable improvement in the flow of traffic across the entire town. So great is the confidence of the Polish authorities in this innovative solution for transport management that the city of Białystok (population 300,000) has also opted for Sitrtraffic Scala/Concert, which is already operational in major Polish cities and around the world, including Warsaw, Cracow, Athens, Berlin, Bogotá, the Rhine/Ruhr area of Germany, Prague, and Vienna.



Poznan forms the largest metropolitan area in western Poland.

Photo: Radosław Maciejewski / Turizm Poznan



## Vienna Introduces Electric Buses in Regular Service

Facts: 2 exclusively electric bus lines | 9 LFP batteries | 96 kWh | 150-km range | 10–15 min recharging time

Electrically powered buses with drive and charging technologies from Siemens have been operating in regularly scheduled service in Vienna for several months. Since mid-2013, transportation authorities have been operating lines 2A and 3A in the historic inner city of Vienna exclusively with electric buses, which feature the latest charging technology. At the terminal stop, the buses use an extendable pantograph to connect to the electric supply for the Viennese tram system and can recharge in less than 15 minutes. This recharging

technique made it possible to install a smaller battery system and at the same time save on investments in infrastructure. In addition, their regenerative braking systems allow the electric buses to recover energy. As soon as drivers take their foot off the accelerator, the energy recovery system is activated.

The drive system in these buses is significantly more efficient than a conventional diesel power train. Nine lithium iron phosphate (LFP) batteries with a total capacity of 96 kilowatt-hours supply the motor

– through a power inverter that converts direct current to alternating current – with enough energy for up to 150 kilometers with one charge. Recharging at the terminal stop gives the buses full autonomy for the entire day. The batteries supply not only the drive system, but also all of the onboard electronics, the heating, and the air-conditioning.

Illustration: Mariela Bontempi



## Fully Automated Accommodation

Facts: Desigo™ building automation | Sinteso™ fire detection



In the small town of Kalix in North Sweden, not far from the Finnish border, in the remote but beautiful region of Lapland, the weary traveler might just experience the future of the hotel trade when checking into the 11-room Nils Hotel. Built in 2010, it is a good example of modern, high-tech travel: All hotel reservations, payments, and check-ins can only be made online via Internet or mobile phone. When the hotel operator receives payment, a door code is provided via SMS or e-mail to the guest for access to the hotel and a specific room. When the guest checks out, the system automatically sends a message to the cleaning company with all the required information. For this reason, the reception desk remains unmanned, and there are no employees. However, with the help of an integrated solution from Siemens, the hotel owner PartAB – a company that manufactures prefabricated bathroom pods for projects such as hotels, apartments, and student accommodations – made sure that their guests still do not lack a thing. As a provider of safe, secure, and energy-efficient solutions for hospitality and entertainment services, Siemens installed a Desigo™ building automation and control system as well as the Sinteso™ fire detection system, combined with access control and intrusion detection systems, in the hotel building. The owners of Nils Hotel needed a system that covers all disciplines in a hotel including building automation, fire safety and security. These solutions were to be integrated with the hotel booking system in a central server. At PartAB's factory in Kalix, a Desigo Insight management station has been provided. Via Internet, the Desigo Web solution allows authorized personnel to access the system regardless of time or location for remote control, remote fault diagnostics, or online optimization.

Illustration: Mariela Bontempi



The LRVs are designed to operate in the harsh winters prevailing in the western Canadian province of Alberta.



## First Order of New Light Rail Generation Goes to Calgary

Facts: Order for 60 LRVs worth €135 million | Max. speed 80 km/h | 300,000 passengers per day

Operators of North America's busiest light rail system located in Calgary, Canada, have ordered 60 light rail vehicles (LRVs) from Siemens in a purchase worth €135 million. It is the first order of the newest light rail generation from Siemens. Built for the Canadian winter, the vehicles have coupler heaters so they can operate in ice and snow, and cables and connectors were designed to withstand ex-

treme weather conditions. The first LRVs will be delivered in mid-2015, and the order will be complete by December 2016. Calgary has long shown a preference for Siemens LRVs. The current 156-strong fleet of LRVs consists entirely of Siemens vehicles. The city's newly ordered S200 model vehicles are designed for energy-saving operation, since they are equipped with a weight-reduced propulsion system

that allows for the recovery of braking energy; the LED lighting requires up to 40 percent less energy than conventional fluorescent lighting. An electrically heated windshield, triple-pane side windows with low solar transmittance, and improved insulation reduce thermal losses by more than 20 percent compared to previous models. The LRVs will be built at a Siemens factory in Sacramento, California,

where about 80 percent of electricity required for production is supplied by a 2-megawatt photovoltaic plant. This saves 1,470 tonnes of CO<sub>2</sub> a year. Calgary is the third-largest city in Canada and home to more than 1 million people. The city's light rail system transports more than 300,000 passengers a day. The network is roughly 56 kilometers long and has 44 stations.

Photo: Siemens AG



## Melbourne's Federation Square Gets Carbon-Saving Overhaul

**Facts:** CO<sub>2</sub> savings p.a. > 7 t or 49% | Water savings p.a. > 17,000 m<sup>3</sup> or 26% | Food waste savings p.a. > 46 t or 100%

The Australian government's Greener Government Buildings Program was launched to reduce the country's notoriously high carbon footprint and save operational costs by improving energy and water efficiency. In a bid selection process, Siemens prevailed against its competitors and signed an Energy Saving Performance Contract with Federation Square, one of Melbourne's prime attractions. Covering 38,000 square meters, the civic center is home to major cultural attractions, world-class events, and an exceptional array of restaurants, bars, and shops.

The ambitious goal of Federation Square was to become carbon neutral by the end of 2013. With a major cutting-edge technology upgrade, Siemens has managed to lower carbon emissions by 49 percent and decrease overall water use by 26 percent – the amount needed to fill about 30 Olympic swimming pools. The improvement in water efficiency is of particular interest, since Melbourne has experienced extended drought conditions. Among the innovative technologies applied for the Federation Square complex are an energy-harvesting pavement that generates electrical energy from foot traffic and a 25-kilowatt solar photovoltaic array. Other technologies include rain-water harvesting, green square cooling through evaporative misters, a



cogeneration plant, and low-emission lighting. A biogas plant processes 100 percent of the on-site organic food waste and transforms it into heat energy. All measures add

up to a reduction in energy costs of more than 40 percent. Federation Square is now the lighthouse project of the Greener Government Buildings Program, with its own education program

that invites young people to learn about the technologies used and develop an understanding of the environment and energy efficiency.

Illustration: Mariela Bontempi



## Traveling Safely on London Crossrail

**Facts:** 21-km-long tunnel | 200 million passengers p.a. | Orders worth €110 million | Commissioning in 2018

In 2018, a 21-kilometer-long rail tunnel below London with an east-west connection will link the Great Western Main Line at its present terminus, Paddington, with the Great Eastern Main Line at Stratford. The tunnel is the centerpiece of the London Crossrail project, which will comprise a 118-kilometer-long line from Maidenhead and Heathrow in the west to Shenfield and Abbey Wood in the east. Up to 24 trains per hour are scheduled to travel along the core section, with an estimated 200 million passengers per year.

Rail automation solutions from Siemens will coordinate and control the 21-kilometer Crossrail tunnel, linking up the local transport system to the suburban regional services of Network Rail. For the first time ever, a solution is being used that ensures uninterrupted train movement between a mass transit and a mainline network – changing trains on the 118-kilometer Crossrail route isn't necessary. Europe's largest construction project will provide more effective travel across the London area for an estimated 750,000 daily commuters.

Siemens is to supply signaling and control equipment as well as IT solutions for rail automation in the tunnel and nine new central stations, including integrated station management, line management, security and information systems and SCADA systems. Crossrail Ltd. has placed orders with Siemens worth approximately €110 million.



Control and communications systems supplied by Siemens will help facilitate the integration of mass transit and mainline network transport in the Crossrail tunnel.



## Environmental Excellence at Heidelberg University Hospital

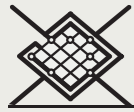
**Facts:** Compound of 9 clinics | 7,250 employees | 1,500 inpatient places | Annual energy savings of 1,385 MWh | Minimum of total savings of €200,000 p.a.

For any medical institution, a good reputation is of cardinal importance. An energy-saving project that contributes substantially to minimizing energy consumption and operating costs at the same time has recently added a green touch to the Heidelberg University Hospital's reputation for clinical excellence. To achieve this reduction, the lighting system was overhauled on a large scale, and the energy management of the main exhaust air system was dramatically improved. Both measures were made possible by an innovative financing solution from Siemens Financial Services and were implemented by Siemens Building Technologies.

Energy Performance Contracting makes it possible to undertake necessary refurbishments on buildings, which

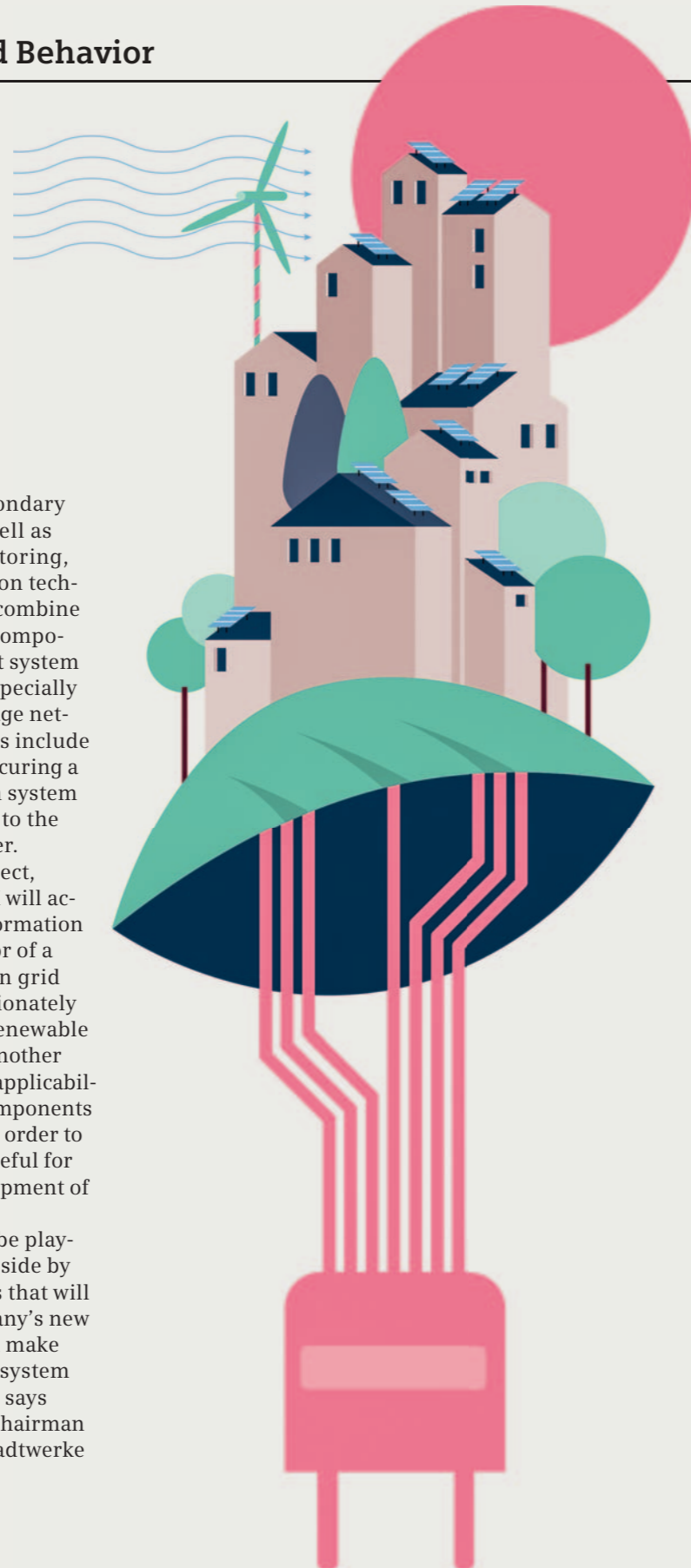
make sense from an ecological and an economic point of view, without having to invest own funds. Coincidentally, this was one of the key requirements set by the clinic management. Bernd Kirchberg, managing director of Klinik Technik GmbH at the Heidelberg University Hospital, was won over by the guarantee of savings, which make sure that the investment will be profitable and ensure that the hospital's liquidity and budget remain intact. "Energy Performance Contracting is advantageous from every point of view. Contractually agreed savings guarantee that our investment actually pays for itself. The upgraded technology and energy-saving measures have amounted to savings of 1,385 megawatt-hours. This translates to total savings of €200,000 annually," says Kirchberg.

Photo: Siemens AG



## Research on Smart Grid Behavior

Facts: 100 homes equipped with smart meters | 80% renewables



Siemens and the municipal utility Stadtwerke Krefeld AG (SWK) are joining forces to transform the existing power supply system in Wachtendonk on the Lower Rhine in Germany into a smart grid for research and testing purposes. Siemens supplies the components for smart secondary substations and smart meters, as well as measuring, monitoring, and communication technology. SWK will combine these individual components into a smart system and test them in specially selected low-voltage networks. The 8,000-strong community was selected as the smart grid model region because of its high proportion of distributed power generation plants that feed into the grid. About 80 percent of its electricity comes from renewable energy sources – for example roof-mounted photovoltaic plants. As part of the project, smart meters will be installed in 100 homes and in numerous cable distribution boxes to perform the necessary measurement functions. Siemens will also supply the components needed

for the smart secondary substations, as well as measuring, monitoring, and communication technology. SWK will combine these individual components into a smart system and test them in specially selected low-voltage networks. Other goals include developing and securing a data transmission system from the network to the SWK control center. Through this project, Siemens and SWK will acquire detailed information about the behavior of a power distribution grid with a disproportionately high number of renewable energy sources. Another goal is to test the applicability of technical components in everyday use in order to obtain insights useful for the further development of the smart grid. “We are proud to be playing an active part side by side with Siemens that will help shape Germany’s new energy policy and make the power supply system fit for the future,” says Carsten Liedtke, Chairman of the Board of Stadtwerke Krefeld.

Illustration: Mariela Bontempi



## Sustainable Power Distribution Comes First for Moscow Business Center

Facts: 21 floors | approximately 28,000 m<sup>2</sup>



Photo: Siemens AG

In 2001, the Country Park site on the outskirts of Moscow was nothing more than an overgrown plot alongside a narrow stream – albeit conveniently located at the intersection of the Moscow-Saint Petersburg freeway and the Moscow ring road. Now, Country Park is a multifunctional complex of buildings in the 5-hectare business

and commercial center of the same name on the outskirts of Moscow, to which further office and residential buildings are continuously added. The business center is a showcase for environmentally friendly and sustainable planning in Russia. With its 21 floors and a total floor space of almost 28,000 square meters,

Further development is planned at Moscow’s Country Park multifunctional center.

the Country Park development presented a particularly stern challenge in terms of building management systems. Siemens’ solution consists of nine panels of gas-insulated medium-voltage switchgear 8DJH, combined with four GEAFOL double-wound transformers, Sivacon 8PS LD and Sivacon 8PS LX bus bar trunking systems, 3WT circuit breakers as connecting devices and 3VT compact circuit breakers in the decoupling lines. With these optimally coordinated elements, the integrated power distribution solution provided by Siemens controls power consumption in the Country Park building complex, at the same time making a major contribution to preserving resources and cutting costs.