Focus: Service
How technical services decide the success of companies.

Core business

Strategy
The characteristics of good service – and how successful companies apply them.

Future
How water technologies are solving one of humanity’s most urgent problems.
Dear Readers,

Responsibility, excellence, and innovation – these are the principles Siemens AG has been committed to for the past 163 years. Under the distinguished leadership of my predecessor, Dr. Heinrich Hiesinger, the company successfully continued these values. Mr. Hiesinger will join the Executive Board at the ThyssenKrupp Steel Group as Chairman. We at Siemens wish him the very best in his new endeavors.

Continuity and dynamics – these are further attributes governing Siemens Industry. For me, they are an essential key to success. Continuity provides our customers with security, enables long-term customer relationships and makes us credible. But continuity alone is not enough to both maintain and expand our technological leadership. The dynamics of our organization are the fuel to develop innovations, set benchmarks, and recognize trends.

We have taken this combination of continuity and dynamics and successfully linked them to innovative technologies, economy, and ecology in the past. We will continue on this path and expand our environmental portfolio accordingly. Siemens plans to increase its sales volume to 25 billion Euros with its green solutions by the end of 2011. Already today, the Industry Sector is responsible for more than half of overall sales for the Siemens environmental portfolio.

The portfolio not only demonstrates our contribution to climate protection, it also increases the competitive edge of our customers – our most important mission as a company. We succeed in this effort through constructive development partnerships and intensive communication with our customers. Additional support is rendered by our worldwide network and our highly committed team that drive our technological topics.

In my opinion, the expansion of our service and modernization business is among the key levers for our future success. Technological leadership in this area ensures value added for our customers and provides us with the necessary proximity to further facilitate the requirements of our customers and to support them as strong partners with the most suitable solutions. This business focus also puts us in the vanguard of a global trend – as the articles dealing with service, the special subject of this edition of the Industry Journal, demonstrate.

Sincerely,
Siegfried Russwurm
Focus: Service

10: Service means business
Even in critical years, such as 2008 and 2009, technical service providers experienced an upward trend. A report on a growth-oriented sector.

19: Customer service will drive success
According to US expert John Tschohl, only very few companies know what good service means. In his guest editorial, he talks about what is important in a company’s service strategy.

22: All-around expert on world tour
His job takes Siemens service technician Axel Fuchs to the world’s remotest places. The reason – to support customers quickly and expertly.

Performance

10–18: Service means business
Many companies have made service a strategic field positioned for growth. Read about markets, potentials, and areas of activities.

19–21: Customer service will drive success
The US consultant John Tschohl tells us what characterizes good service strategies and why they are so important.

22–27: All-around expert on world tour
Portrait of Axel Fuchs, a Siemens service technician. Today he is working in Mexico, tomorrow in Mongolia – but always in the service of customers.

28–29: Service without limits
Indian service providers support Western businessmen with virtual services.

30–33: Blueprint for factories of the future
How a modernized US factory became the pacesetter for an entire industrial sector.

34–37: All about RFID
RFID technology brings goods and data streams together. External specialists ensure successful implementation.

06–09: Spotlights
Breaking news in business, science, and technology: from organic panel lights to deep-sea research, and automation technology for KIA.

38–43: Changing sides: completely impossible
How two BMW engineers helped the BMW Oracle team to win the world’s most coveted sailing trophy.

84–85: How does this work?
A water management system

86: Imprint
Contents

44: Clear gold
During the next ten years, the global supply of drinking water will be among the greatest challenges for mankind. Physical, chemical, and biological technologies could be the answer.

Environment

44–51: Clear gold
Filtration, disinfection, and water desalination systems are able to reduce our global water shortage.

52–54: A sustainable business model
The environment, society, and companies profit from the UN Clean Development Mechanism program.

55–57: Hidden heroes
Inverters are the heart of photovoltaic installations used for generating electricity, which are growing in popularity worldwide.

58–63: The creation – part two
Geoengineering is considered one of the most promising scientific disciplines in the battle against climate change.

64–67: “We should not optimize the wrong systems”
The internationally renowned chemist and consultant talks about resources, intelligent waste, and recycling.

Urbanization

68–72: Not only under divine protection
There is possibly no other place on earth that holds as many art treasures, historical buildings, and traditions as the Vatican. Technologies from Siemens ensure the protection of buildings and people.

74–75: Clearing the way
Traffic management systems ensure less traffic congestion and greater environmental protection.

76–80: Flat out through modern times
The YAS Marina Circuit in Abu Dhabi is one of the most modern race tracks in the world.

81–83: Farming up high
Vertical farming in high-risers could conquer food shortages.

Award for Industry Journal
The Siemens Industry Journal was awarded with the Silver Prize 2010 for “Best of Corporate Publishing (BCP)” in the category of B2B Industry/Energy/Pharmaceuticals. BCP is Europe’s renowned competition for company publications. More than 600 entries were submitted.
Spotlight

Siemens furnished the corporate headquarters of the Süddeutscher Verlag in Munich with single-source building technology across the property. The result: the US Green Building Council awarded the environmental certificate “Leadership in Energy and Environmental Development” (LEED) in Gold for the building, considering it the most outstanding office building in Germany. All spatially related functions are controlled for optimized energy efficiency via the Desigo building automation system. A first: Employees are free to choose to operate room ventilation as well as heating and air-conditioning either manually or automatically. In the background, a networked alarm system from Siemens provides for safety with a fire and intrusion system as well as video surveillance. Each workplace is supplied with non-glaring light via a multifunctional ceiling panel. The electronic Quicktronic Dali Dim (QTi Dali) by Osram is responsible for a positive energy balance sheet. The equipment saves approximately eight percent on electricity.

Gold for German publishing building

In an effort to reduce the energy consumption of the average citizen, the European Commission plans to apply higher environmental standards for household appliances. The basis for this decision is a ruling made by the EU Parliament and the 27 EU Member States in 2009. The ruling provides for the introduction of energy standards for products that do not use electricity but nevertheless affect the energy consumption of a household. These are products such as shower heads, water faucets, windows and doors, detergents and cleaning agents, as well as insulation material for buildings.

A time schedule for the ruling to go into effect is not yet in place. However, products that do not meet the guidelines are not to be sold within the EU in the future. To date, energy standards have been introduced for ten product groups. The most prominent example is the lightbulb. It is in the process of being phased out as it was announced in September 2009. The EU Commission expects savings of 150 million tons of CO₂ from the energy norms that have already been put in place so far. This value should be increased by another five percent once the new environmental standards for households come into effect.
Osram Opto Semiconductors is launching OLED (organic light emitting diodes) panel lights. Their warm white color temperature (2,800 K, CRI up to 80) matches the warm light of an incandescent lamp. However, they require only half the energy of a light bulb. Special characteristics of OLED panel lights are that they consist of paperthin, organic layers that allow for lightweight and flexible lighting. They are also at least as efficient as modern halogen lamps with a luminous efficacy of only 25 lumens per watt. The Osram OLED panel is the first commercial light source of its kind. Target applications are the premium segments of designer lamps as well as the use by architects, hotels, and stores. Thanks to their lightweight design, OLED panels will enable previously unknown lighting forms, for example flexible panel lights as well as windows that simultaneously function as lamps.

The US Port Authority Trans-Hudson (PATH) has requested that a consortium headed by Siemens modernize rail traffic between New York and New Jersey. The order volume amounts to 224 million Euros. The more than 100-year-old railway system of PATH is to be automated with a communication-based train control (CBTC) system. The objective of the project is to shorten train intervals, which will simultaneously increase the number of passengers from 240,000 to 290,000 per day. At the same time, the CBTC system improves the performance of the railroad network during peak times. It also reduces the maintenance costs for the subway despite the new security and reliability features. Also, the new train control system developed by Siemens is designed to locate each train within the railroad network. The modernization should be completed by 2017.

On behalf of China Oilfield Services Limited (COSL), Siemens Marine Solutions is equipping two ships for deep-sea research with drive technology as well as integrated automation and control systems. The order is worth approximately 25 million Euros. COSL is part of the China National Offshore Oil Corporation (CNOOC), a leading provider of integrated oil field services for the offshore market. The two special ships – one seismic research ship and one deepwater engineering survey vessel – expands the exploration activities of COSL to depths of up to 3,000 meters. The seismic research ship is one of the largest of its kind. It tows a total of twelve streamer cables, each of them eight kilometers long.

The cables include sensors for analyzing geological conditions at the bottom of the ocean. Delivery of the ships has been planned for mid-2011.
Climate protection pays off

Europe will benefit from an early entry into climate protection even if all other countries remain inactive. The prerequisites are effective measures to ensure climate protection – for example in especially CO₂ intensive sectors such as energy, cement industry, aluminum, iron and steel industry, transportation, traffic, and agriculture – that have to go into effect no later than 2020. Only then will the necessary investments in climate-friendly technologies cost less than subsequent updates and new constructions. This is the conclusion reached in the report on Energy and Climate Policy in Europe (RECIPE). The study was performed on behalf of WWF and Allianz SE by the Potsdam Institute for Climate Impact Research and by four additional European research centers. The scientists compared three futuristic energy-economic models to derive recommendations for the global climate policy.

Siemens receives award

Siemens PLM software, a Business Unit of the Industry Automation Division, received the 2010 PACE Award from the US magazine "Automotive News" for the category "Information Technology and Service." Siemens was honored for its Teamcenter software “In-Vehicle Software Management System.” The software manages, follows-up, and evaluates binary software files in the automotive field. PACE stands for “Premier Automotive Suppliers Contribution to Excellence.” Since 1995, Automotive News has awarded this prize to honor innovative products and developments from suppliers in the automotive industry.
In 2009, KIA Motors, the Korean car manufacturer, opened the company’s first factory in the US. The 890-hectare-large area in West Point, Georgia, includes the assembly hall for the KIA Sorento as well as the gear production by Hyundai Powertech, a supplier for KIA. Siemens equipped both manufacturing sites with modern automation and drive technology. The orders, valued at 2 and 3.3 million Euros, comprised the delivery and implementation of automation systems Simatic S7-300 and Sinumerik 840D as well as subsequent service and support functions. The new factory in West Point, equipped for a yearly production volume of up to 300,000 vehicles, represents an additional step in the US market offensive of KIA Motors. And successfully, at that: as one of only three car manufacturers, KIA was able to increase its US sales as compared to the previous year.

In early 2010, an area-wide toll collection system for trucks equipped with satellite technology was put into operation. Siemens supplied the electronic toll collection solution as well as 80,000 onboard units (OBUs) that acquire the data necessary for determining the toll. In January 2009, Siemens received an order in the amount of 81 million Euros from the operator, SkyToll. Different from conventional microwave systems, satellite-supported toll systems acquire the position of the vehicles directly via GPS through the onboard units installed in the vehicle. Via the mobile telephone system GMS, the data are sent encoded to headquarters for further processing. This makes the technology especially suitable for far-reaching road networks extending beyond interstate highways. In Slovakia, a total of 2,400 kilometers of road are acquired.

A Siemens success story: Xstrata Copper ordered electrical equipment for ore mills in South America. This means that the fourth-largest copper producer in the world is relying for the second time since 2008 on technology from Siemens AG. The order includes motors, drives, and energy technology for a SAG mill and two ball mills. The SAG mill is equipped with a gearless drive having an output of 24 MW. The ball mills will also be equipped with gearless drives, each of which will have an output of 16.4 MW.

In addition, the delivery includes transformers, as well as safety and operating equipment. The ore mills are to be used for a South American development project.
Many companies have been hard hit by the recent economic crisis. Things are looking much better in the technical services sector, however, with reports of significant growth. The upwards trend is not losing momentum, and business with highly qualified services is experiencing extraordinary growth.
Whether consumers buy computers, televisions, cars, or homes, two key concerns are always central to the decision to buy – quality and price. Research has shown that before and after sales service are of minor significance, i.e. service considerations do not bear any real influence on the decision-making process. Service does become an issue, however, in the event of a product or a service not meeting up to customer expectations. Once the sale has taken place, the seller’s interest in fulfilling its after-sales obligations is rather limited at the best of times.

A change is on the horizon, however. Services for machines, production plants, traffic systems and commercial property is growing in leaps and bounds. This begins with consultation and financing services and includes installation, commissioning, system optimization, maintenance, and operation. It doesn’t stop there. These days, service is fully integrated right up to the disposal of a product or system at the very end of its lifecycle.

Trains are an interesting example. Around 300 Siemens Desiro ML regional passenger trains are to be delivered to the Austrian Federal Railways (ÖBB) over the next five years – a multi-billion contract. Not only does the contract cover the manufacture of first-class locomotives and carriages, it also includes the maintenance of the locomotives. This is significant, when one considers that, as a rule, most European railway operators carry out this kind of work on their fleets themselves. It also illustrates the current global trend in outsourcing services to external service providers. “The sector finds itself in a dynamic process of development,” says Reinhard Mass, CEO of the industry service trade association “Wirtschaftsverband für Industrieservice” (WVIS). “This trend will become all the more apparent, once the financial crisis has ended.” The market for such services within Europe is estimated currently at around 100 billion Euros. According to a study carried out by the market research company Lünendonk, Germany alone saw a nine percent increase in turnover in 2008.

Service as a strategic growth area

Many manufacturing companies have identified the service sector as a strategic growth area. Their strategy is to strengthen their market position, increase customer satisfaction, and generate follow-up contracts for the duration of the entire product or system lifecycle. Providing services creates opportunities for developing new business models. “Energy Efficiency as a Service,” for example, involves selling equipment to the customer together with a host of related services. It can even include a financial package in the form of a service contract over several years.

“As service partners for our customers, we have a detailed insight into all kinds of processes relating to our customers’ businesses. This is an invaluable asset when it comes to further developing our systems and plants,” confirms Michael Reichle, General Manager of Industrial Technologies at Siemens Industry Solutions. The ongoing interac-
Position with customers is an ideal situation to identify their needs.

“This allows us to develop enhancements and functional extensions, and culminates in development systems for completely new applications,” adds Rolf H. Sigg, head of service management at the Building Technologies Division.

Are there any other advantages? Yes – sustainability. Once a contract has been signed, the services to be provided along with the associated turnover and the deployment of employees are secured long-term.

Growth during the financial crisis

Leading investment goods manufacturers have been in a position to increase their service-related turnover by up to two and a half times that of overall turnover, according to Bain & Company corporate consultants. In their study “Service fuels growth,” machine and system manufacturers in Germany, Austria and Switzerland were examined. It was established that on average, the industry generates four times as much EBIT, i.e., operating income from the maintenance, modernization, and financing of systems and plants than it does with new product sales. Since the beginning of 2008, manufacturers of elevators, for example, have been able to increase their EBIT by 50 percent due to service-related business for the most part. By contrast, the competition that offers service as a mere sideline business reported an overall downturn.

According to the Bain study, the financial crisis has seen solution providers go more or less unscathed. Interestingly, though, although 81 percent of the service providers that took part in the study confirmed the growing significance of service provision within their businesses, 89 percent claimed there was a gaping need for improvement.

Providers are moving into position

“In the past, many companies have relied too heavily on selling their machines and neglecting the service business in the process,” says Armin Schmiedeberg, Bain partner and manager of the European working group on industrial goods and services. Nevertheless, the wake-up call seems to have been heard after all. “Service providers are moving into position,” observes Kai-Stefan Schober, outsourcing specialist at Roland Berger strategy consultants.

“Nowadays, many companies are concentrating more on their areas of key competence,” he continues. According to a study carried out by his company, these companies expect outsourced services to bring along cost reductions, higher flexibility and the increased reliability of their production systems.

International companies with a clear service strategy are generally not focused on specific sectors or countries, and in that sense, they are global. This also applies to companies that operate hospitals, government and public buildings. In the same way, the Nuremberg clinic has entrusted the servicing of its radiological imaging devices and nuclear medicine entirely to Siemens. In addition to lowering costs, the switch to Siemens service means that CT scanner tube breakdowns at the clinic are now being predicted in advance and unplanned breakdowns are being avoided.

Airport operating companies, too, are turning more and more to external service providers to outsource key services. Early this year, for example, Siemens secured the contract to deliver a baggage conveyor system to the largest airport in northwest China. Siemens is to deliver and install the
baggage conveyor system together with the information technology for material transportation in the departures and arrivals areas. Both high-quality reliable equipment and comprehensive quality services are needed here to ensure maximum system availability.

The challenges associated with Xi’an Xianyang International Airport are enormous. Once expansion has been completed, the airport is expected to handle 31 million passengers a year. The current number of passengers per year is barely half of that, at just over 12 million.

The sustainability of services is also an important issue. For example, Siemens Industry Solutions has developed comprehensive maintenance concepts and plans and implements the required maintenance, tailored to its customers’ needs. MTU Aero Engines in Munich-Karlsfeld benefits from Siemens comprehensive services, too. Here, more than 6,000 machines are maintained, repaired, and continually optimized within the framework of a ten-year maintenance contract. Professionally configured processes with clearly delineated responsibilities create greater transparency in both cost-reduction and performance. Maintenance costs at the plant are decreasing sustainably. The lifecycle of a plant is being prolonged and with it, the need for investment has been reduced.

Service for securing locations

Industrial companies are increasingly using all-inclusive trouble-free packages that are made up of planning, financing, and operation. External experts are being contracted to provide support, particularly in high-speed processes to which the downtime created by system maintenance and breakdowns can be detrimental. WVIS CEO, Mr. Mass, believes that the service market for established service providers is far from saturated. “The provision of all-round service packages to industry will continue to grow stronger and stronger. It will become a significant factor in sustaining and further developing industrial locations.” The invaluable contribution to industry made by service providers is based on comprehensive portfolios that optimize cost reduction and increase the energy efficiency of machines and plants. In addition, carrying out planning, realization, operation, maintenance, and modernization as a whole, rather than in isolated processes, makes for comprehensive technological innovations that can be implemented in a fraction of the time previously needed to do this.

The fruit juice manufacturer Tropicana located in Zeebrugge, Belgium, is a good example of how this works. Siemens Industry Solutions carried out an
energy audit there to determine effective and cost-efficient measures for increasing overall efficiency at the plant and put the most profitable measures into practice.

An “energy health check” was applied to detect and to calculate initial energy-savings potential. During the implementation phase, the main aim was to optimize the energy consumption of the equipment, to improve the conveyor belt control system, and to adapt this suitably to the planned expansion of the plant. Last but not least, Tropicana employees were given practical information and advice on how to use the manufacturing equipment in a more economical and environmentally-friendly way. Over a period of four years, energy efficiency of the system increased by 5.5 percent each year.

Lifecycle service increases ROI

Due to ever-increasing energy costs and ever more stringent laws governing greenhouse gas emissions, all-inclusive service concepts that form an integral part of the construction and operation of industrial plants are vital to overall commercial success. Lifecycle service begins with the planning phase. It guides the guarantee and usage phase and is used to carry out system modernization as required. “The aim of this kind of service is to make the highest return of investment possible for our clients,” explains Michael Reichle of Siemens Industry Solutions. More return of investment means more productivity and minimal downtime. Siemens currently offers a process-oriented service package portfolio for energy and maintenance management called asset performance management. Mr. Reichle explains just how comprehensive asset performance management can be. “On request, we take over and manage entire business processes, such as the complete motor facility of a company,” says Mr. Reichle.

Prime example – the paper industry

The paper industry is an interesting example of how professional service can bring about cost-saving and resource-efficient manufacturing. Availability has been optimized, and systems currently operate at 93 percent availability. The performance factor is at 95 percent and 99.9 percent quality is guaranteed. Such outstanding results can only be achieved using far-sighted, active maintenance processes.

Highest quality service provision that also increases energy efficiency, reduces costs, and guarantees the future viability of a company, especially when one considers how current government regulations demand a drastic reduction in energy consumption. Both the EU and China are calling...
for a 20 percent reduction in energy consumption by 2020. In Germany, energy-intensive companies have agreed with the government to reduce their energy consumption by 30 percent. Russia is planning to make energy savings of 40 percent over the next ten years.

Energy-saving contracting is establishing itself as an additional innovative and cost-transparent method of reducing energy consumption with the aid of experienced service providers – without the need for further investment.

The Bremerhaven Reinkenheide Clinic is a perfect example of how this is done. At the outset, the standard of the building technology of this therapeutic and diagnostic center was somewhat outdated. It was impossible for the clinic to fund the necessary investment itself. Siemens Building Technologies planned, financed, and realized modernization and optimized the facility within the framework of a long-term service contract. This led to a 25 percent reduction in energy consumption and a cost-saving of around 520,000 Euro annually. In the process, an annual reduction in CO2 emissions of 3,200 tons was achieved.

**Lifecycle management reduces costs**

External service providers are already active in service provision for all aspects of building security and automation and in the operation of commercial property. Outsourced technological solutions are used here to carry out maintenance and upkeep that is too expensive for operators themselves to carry out profitably. One of the significant success factors in preventing costs from increasing during operation is lifecycle management.

Energy and function-related modernization concepts increase the profitability of the building and reduce cost overheads and downtimes. They also bring about an increase in long-term utilization of the building. System maintenance makes a significant contribution to this. This constitutes active and corrective maintenance, consultation, training, and operational services. Where necessary, service experts can also take over the operation and upkeep of a building entirely, including financing. Remote monitoring of alarm systems makes it possible to react instantly to technical or security-related incidents, should they arise. This allows the client to concentrate more on the core business.

The advantages of forging service contracts with external service providers couldn’t be clearer, adds Rolf H. Sigg. “When an external service provider markets its services as a clearly-defined product, the client knows exactly what they can expect.” Service is no longer dependent on the perfor-

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### Tremendous backlog

Energy-saving potential in the property sector is far from being exploited to the full, and most energy efficiency measures can be installed long after construction.

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<tr>
<th>Type of property</th>
<th>Energy-saving potential by property type (percent)</th>
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<tr>
<td>Hospitals</td>
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<tr>
<td>Hotels</td>
<td>41</td>
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<td>Residential property</td>
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<td>Catering</td>
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<td>Schools</td>
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<td>Office buildings</td>
<td>51</td>
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<td>Shopping malls</td>
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Source: Siemens Industry
mance of the technician at any given time or on the style of a local branch office. Larger clients benefit from the added security of having one single service concept in various locations. This builds trust and keeps costs down. In the building services sector, many companies underestimate the financial consequences of system breakdowns or sub-optimal system operation. As a result, they try to do without professional external assistance, especially in building automation, for example. As Mr. Sigg explains, “After we have informed the client in detail on this, they usually change their minds, but it takes some convincing.” Convincing potential clients of the benefits of external service contracts when it comes to safety and fire-prevention is somewhat easier. “In this area, either regulations or concrete economic aspects require that clients cannot operate their business without service contracts,” explains the service expert.

**Contractually-defined performance parameters**

Clearly defined performance parameters are the cornerstone of an efficient, lasting cooperation between companies and their service providers. In this way, the external service provider guarantees that, in case of an event, they will be on site within a predefined time period. In some cases, a timeframe for solving a problem is also agreed. “In some of our offers, we even guarantee to adhere to performance indicators based on the result experienced by the customer,” says Mr. Sigg. This means that energy consumption or maximum system downtime is contractually agreed.

In extreme cases, the service can even become top priority. This applies to alarm management, for example. In most cases, the issue is ensuring service quality at the alarm control center in the event of an alarm going off or eliminating a false alarm. It is also ensured that the alarm system functions perfectly, of course.

**Service as a key differentiator**

Unusually high-quality service in a period of increasing product quality is always a decisive mark of distinction. For this reason, manufacturers design their service portfolio in order to achieve measurable value added with top-class performance. “Our service portfolio has become a key element in setting us apart from the competition,” says Georg Möller, coordinator of the Drive Technologies Division service board at Siemens. “Round-the-clock availability is part of the service, so that we can respond instantly to any emergency, worldwide.” In order to keep such emergency responses to an absolute minimum, Mr. Möller and his team place an emphasis on “proactive prevention measures such as lifecycle and modernization service contracts, for example.”
Siemens is also one of the leading service providers in essential industries such as tool manufacture. System efficiency in this sector is increased by installing new control technology, reducing the time needed for calibrating machines, and exchanging manufacturing tools.

In other sectors, too, these services can bring about savings and reduce emissions significantly. On the advice it received from Siemens, the British metal manufacturer Corus Strip Products decided to switch to variable speed drives at its manufacturing facility. Energy consumption per annum was reduced by 16,400 MWh, maintenance costs were reduced, and carbon emissions fell by 450 tons a year – all in a mere three-year payoff period.

Whether in relation to investment or consumer goods, it is self-evident that service quality will play the decisive role in the economic development of companies and entire sectors in the coming years.

“Mere cost-driven procurement is a road paved with many hazards”

Interview with Prof. Dr. Robert Schmitt, engineer and professor of manufacturing measuring technology and quality management, and managing director of the machine tool laboratory (WZL) of the RWTH Aachen University. Prof. Schmitt is also a member of the directorship of the renowned Fraunhofer Institute for Production Technology.

What has been the experience in the machine tool sector in relation to external service providers?

Service providers always offer value added in three ways: when they possess key competence that the manufacturer doesn’t have at their disposal, if they offer services at a lower rate than it would cost the manufacturer to carry these out themselves, and, of course, if their services solve specific problems comprehensively. It’s best if all three conditions apply concurrently.

Lifecycle costs are a major issue these days. How can external service providers reduce these expenditures?

When an all-round service package has been agreed, costs can be calculated very well over a long time period. Furthermore, costs generated by unforeseen downtimes are minimal. I recommend using so-called “total cost of supply” as a means of evaluating service packages in order to detect potential opportunity cost, because acquiring services depends on uncertainties that are related to a lack of product character. This information asymmetry leads to major insecurities when purchasing. Systematic evaluation concepts are the only real way of tackling this uncertainty.

To what degree should external service technicians be integrated into internal processes specific to particular companies?

The more integration, the better. This is conditional upon a stable trust basis, of course, which can only be reached over long-term collaboration. Service to machine tools is very know-how intensive, for example. This means that, in addition to a non-disclosure agreement, a clear code of conduct in relation to client information must be both communicated and lived out.

Finally, the integration of services in industrial production is only possible when sufficient knowledge of the production and the product exists. From the point of view of the company wishing to contract a service provider, specific criteria must be taken into account from the very beginning. Purely cost-based acquisition poses the risk for companies of their vital know-how being lost. By evaluating the associated risks, such hazards can be detected early and minimized accordingly.

“How can service provision be made more efficient?”

Above all, I recommend communicating performance with transparency, together with agreeing on quality features by using service level agreements, for example. It is also important that the service provider presents a clear business model. Many companies fail to market their services as distinct stand-alone offerings, and to price them as such, even though there are very effective ways of representing such services, which we communicate to specialists and managers from the service sector in our seminars. This also includes customer requirements analysis and the development of a service strategy.
Focus: Service

Customer service will drive success

Many companies boast of their outstanding customer service. But according to American service expert John Tschohl, few understand what characterizes good service. And even fewer have a real service strategy. In his article for the Siemens Industry Journal, the consultant to many international corporations explains the key emphasis.
A company that can master both a technological and customer service leadership position will dominate the market. Many, however, are weak in customer service. I blame this on changes in management, the move toward financial wizards running companies and focusing strictly on numbers while ignoring strategies that can help them improve those numbers. Service leaders understand that they are not in the manufacturing, retail, or banking business; they are in the customer service business.

Service doesn’t just happen; it has to be integrated into every facet of a company’s business, from the hiring and training of employees to the implementation of technology. Everything an organization does should be done to provide the best possible service to its customers. At the core of a service culture is the belief that no transaction is complete unless the service that customers receive is sufficient enough to motivate them to return and do business with you again. The only strategy your competitors will not copy is a service strategy. You will have a ten-year lead on the competition. And it will cost one-tenth of what you would spend on marketing and advertising.

Most companies have unlimited money for marketing but few realize the value of keeping customers and building customer loyalty. Technological leadership is very important but keep in mind your competition is right behind you. The goal should be to create a consistent customer experience so the customer is a fan, not just a customer. This is targeted marketing money.

You need to find the right balance between customer-friendly goodwill and service with costs. When there is a conflict between non-contractual warranty work and service the customer has to pay for, you need to understand the lifetime value of the customer. Keeping customers is critical and making sure they are more than happy will ensure their business. Perceptions are reality. If the customer thinks you are taking advantage you should treat the expense as marketing money and take care of the customer. If you are providing exceptional service, the client will be less likely to demand something for free.

Service recovery is critical to every organization but almost impossible to find. We all make mistakes no matter how committed we are to quality and service. Most employees lie, run for cover, and rarely understand the power of service recovery. How to take a customer from hell to heaven in 60 seconds is the key and it must be handled by the employee on the front line. The cost is less, the impact is higher, and the customer is more loyal.

There are four techniques for service recovery:

**Act Quickly.** Acknowledge the mistake immediately. The employee at the point of contact is the person in the best position to successfully implement service recovery. When problems and mistakes are moved up the chain of command, it costs the organization more in time and money to deal with it, and the time delay increases the customer’s level of frustration and anger.

**Take responsibility.** Don’t place the blame on someone else; the customer doesn’t care whose fault it was, he merely wants it rectified. Employees have to take responsibility and apologize. It’s also important to thank the customer for pointing out the problem and for giving you the opportunity to correct it.

**Be empowered.** Employees do not make empowered decisions because they’re afraid they’re going to be fired, reprimanded, or have to pay for whatever they give the customer. But empowerment is the backbone of service recovery and organizations that truly want to serve the customer and retain their business must not only allow, but insist, that employees show gestures of goodwill in order to keep those customers coming back.
Compensate. You must give the customer something of value, something that will impress the customer and give him the feeling that you really do value his business. Every company has something that doesn’t cost a lot but has value in the eyes of the customer, and that can be given away without conflicting with the law or with compliance standards. An airline can upgrade a passenger to first class. A computer repair store can extend the customer’s warranty by a year. Let’s say you give something away for a mistake that had a value of 500 US dollars and a real cost of 100 US dollars. If you took the 100 US dollars to your ad agency and said “I want to run a media campaign to bring more customers to my company,” how much air time or print space will they give you for 100 US dollars? If a frontline employee did this, he retains the customer. If top management has to do this, the impact is small because it is too late and expectations are higher for management.

Service leaders focus on several principles:

Service is a strategy. You must be consistent. In a service culture, all employees operate under the belief that no transaction is complete unless customers receive service that is sufficient enough to motivate them to return. It is providing customers with service that is so exceptional that they wouldn’t think of doing business with anyone but you.

Eliminate roadblocks. Service leaders constantly look for the internal barriers to good service – and eliminate them. They hire the right people, and treat them well so that they, in turn, treat customers well. They look at systems, policies, and procedures in place that make it difficult for customers to do business with them.

Train employees. Successful organizations train their entire workforce on customer service. They teach their employees the fundamentals of customer service, and reinforce them. Just as you wouldn’t run the same commercial for five years, you should not use the same training program for five years.

Evaluate effects. It is critical to evaluate the effects and results of all efforts at providing better customer service.

In the face of global competition, businesses cannot succeed if they focus solely on price and product. Customer service is the distinguishing factor. If you focus on doing whatever it takes to delight the customer, you will have a competitive edge that will drive your business to great heights.

About the author:

American John Tschohl (62) is an internationally renowned service strategist and consultant. Media such as “USA Today” and “Time” call him a “Customer Service Guru.” Tschohl is the founder and president of the Service Quality Institute in Minneapolis (USA), the world’s largest provider of customer service coaching. 95 percent of his clients operate internationally, including industry giants such as DHL Express, Thomas Cook, and Pizza Hut Europe.

In 1979 Tschohl brought the world’s first customer service training program to market, long before the subject of service quality became of interest to senior management. He has published a range of professional articles and books on the subject, including best sellers such as “Achieving Excellence through Customer Service” and “Loyal for Life: How to take unhappy customers from hell to heaven in 60 seconds or less.” His books are available in eleven languages and more than 40 countries.
Excellent service is one of the most important factors in the success of forward-looking companies. This requires employees who not only have excellent technical qualifications, but also a passion for service and a willingness to always take on new projects. Axel Fuchs is just such a person. Like many of his colleagues he constantly travels the world and has to get used to strange environments and other time zones. This is the portrait of a service technician – representing thousands of others at Siemens.
The Chihuahua Desert in Mexico. A humid 35 degrees during the day, at night, a frosty five degrees. It’s the rainy season which is also marked by frequent storms. Working in this region is not one of the more pleasant experiences imaginable. However, such conditions do not frighten Axel Fuchs, an industrial mechanic with a business degree. The Siemens service technician just returned from a four-month stay in the Mexican state of Zacatecas. Despite the adverse weather conditions, Axel Fuchs looks back on his time there with enthusiasm – as he does with his many other international testing assignments. “They are fascinating jobs. And I get to learn about other regions and cultures through these assignments,” reports the 35-year-old. Regular leisure time for him is as unimportant as the weather. “My colleagues and I relax during vacations after successfully completing projects. And then I am excited about the next assignment.”

For Axel Fuchs, service means more than completing a written order and then disappearing: “We see ourselves as partners to the customer, with whom we successfully complete various requirements and challenges. It is for this reason we are always available for technical questions, even long after the project is complete.” And when retrofits are performed, the service team is there to provide advice to optimize future maintenance on the system. The service technicians are so dedicated that they often have to work late and at weekends. This is the case for example when performing service on large systems where extended downtime would cost the customer a lot of money, as well as when installing new machines and systems.

Gigantic machines, rain, and storms

The assignment in brutally hot Mexico was for the installation of a gearless motor for grinding gold and silver ore at one of the country’s largest mines. “Motor” is actually more of a euphemism: the machine in question is almost 20 meters high. While the motor was specified for outdoor installation, the Siemens service team had to fight a constant battle against the negative effects of the weather.

“Installation began at the start of the rainy season, then came the wind and lots of small tornadoes,” Axel Fuchs remembered. In addition, the whirling dust was full of minerals and therefore electrically conductive. But despite all these hurdles, the project was completed in seven months as planned – a time period that would have been necessary even in optimum climatic conditions. During this time, Siemens completed the entire mechanical installation, including the pole segments, O-ring seal, and stator.
Technical service deals primarily with maintenance. What is needed is a manager with a technical background, customer orientation, and a certain understanding of processes. However, services are considered a general management function in companies that provide a full range of services for their clients. This means that management personnel also have to have entrepreneurial talent.

How has the demand for service-oriented managers developed?

The demand has increased dramatically. Companies are based more on division of labor, competition is becoming more difficult, and customers are more demanding. Service has become an important differentiating factor, a profit center, and often even has its own business model.
Ready for the unexpected

At first glance, the typical workday of the service employee is not much different than that of his stationary colleagues. In Mexico, the day began by driving to the installation site early in the morning, and ended with the return trip to the hotel in the evening. But the time in between was completely different. The experts sent from Germany were directly at the machine or the facility where they could monitor and control the installation activities. “It is not like in the office. One never knows what to expect, what the circumstances are on-site,” said Axel Fuchs. Again and again, the ability to improvise is necessary to solve unforeseen difficulties on-site. For example, this includes quickly replacing missing materials with other items or by purchasing them somewhere.

And language barriers and cultural differences often lead to misunderstandings. However, such problems are often corrected through a little empathy. The service experts sent out by Siemens Industry are successful in this regard because “they are not afraid to get their hands dirty.” Axel Fuchs has one firm rule: “I cannot ask somebody to do something I am not willing to do myself.” Demonstrating and showing how technical workflows function are part of his recipe for success. This is true of customer employees as well as subcontractors on-site. When working at the mine there were daily meetings with ten Mexican assistants that Axel Fuchs had to organize into teams and to direct. “For this reason, I was on-site most of the time and made sure that all of the work was done to our high standards. I did some of the more delicate work myself.”

Motors in China, excavator in Mongolia

The success of these strategies has been proven time and again through the positive results of previous assignments. In China, the Erlangen-based employee installed motors for conveyor systems. The most difficult task in the assignment was making it past the cultural differences. Axel Fuchs took it as a personal challenge, and not an annoying obstacle. In mid-2009, he went to Inner Mongolia to repair the world’s largest excavator. The shovel of this monster, which has a 98-meter cantilever arm, is driven by two ring motors. A technical defect resulted in a fire. The water used to put out the fire damaged both units. Axel Fuchs and his team had the motors up and running again within six weeks. Once again the speed and professionalism of the team was able to keep downtime to a minimum.
All-around ability required

These highly complex and varied projects are only successful when the service employees have broad knowledge and experience. This enables them to develop and implement comprehensive solutions. No one else has a chance. Axel Fuchs: “The service technician who focuses only on one area of expertise would be out of his element. We have to be interested in what is happening on both sides of the street.”

Continually sharing experiences with colleagues in production and employees on-site help the technicians to be up on the latest developments and recognize their benefits for customers. Through close consultation, machines and systems can be adapted more to the client’s requirements, increase their profitability, and create added value.

Of course, subjects of a more personal interest are also part of these meetings. Discussing the latest Bundesliga (German professional soccer league) results are of interest whether at the headquarters in Erlangen or thousands of kilometers from home.

Every new assignment is a challenge

During the project in Zacatecas, Mexico, the Siemens employees who got together every evening initially included five German employees and one employee from Siemens Mexico. By the end of the project, the count was down to three service technicians from Germany and the Mexican subcontractor.

Once again it was enthusiasm, patience, and a mutual understanding of differences in culture and working habits that brought this assignment to its successful conclusion. “It is something you have to be able to do and like to do,” said the 35-year-old, who has been working in machine building for more than 15 years and is always happy to share his know-how with Siemens colleagues.
The Peñasquito Mine in the Mexican state of Zacatecas has enormous gold, silver, lead, and ore deposits. When completed, the mine will be one of the largest and most cost-effective in North America.

Siemens received the order to deliver two gearless motors for the facility. By using special motors, gold and silver ore can be ground more efficiently.

The continuously variable speed enables the process to be adapted quickly to the properties of the material to be ground.

There are no mechanical parts between the motor and the mill. This reduces wear and maintenance. The result: facility up-time is increased dramatically. Optimum start-up and braking reduce energy consumption.

The first ring motor installed by Siemens is rated at 19.3 MW. It has been driving the SAG mill of line 1 of the new mine for a full year. Commissioning of the second motor was completed at the beginning of June. The entire facility should be ready for operation by mid-2010.

Axel Fuchs does not know when and where his next assignment will be – just like always, at some point the order will come and our all-around expert will hop on a plane and continue his world tour, facing this new assignment with new curiosity. First, he has to work through the project-specific information and technical documentation, as well as the information regarding the situation on-site. Once on-site, he learns the latest details, and adjusts accordingly with his team which is assembled from scratch for each new project.

If it were up to Axel Fuchs, he would travel the world for as long as possible, installing, modernizing, and maintaining new systems. The enthusiastic service technician is happy when confronted with new projects and the possibility of getting to know other people and cultures. For this opportunity he is more than willing to take heat, cold, storms, and heavy rains in his stride.
Assistant used to be reserved for heads of companies in Western industrialized nations. But that is changing: Indian providers are leveraging low wage costs to offer cost-effective support, even for private persons.

Service without limits

It is just another Tuesday morning as engineer Jürgen Dach sets off early – not for work, but rather to go fishing. The fact that this German manufacturer of brake pedals has to create a complex presentation and compile market data today is not keeping him from relaxing outdoors. While he dangles his fishing line and feet into the cool water of the Altrhein, the work is being done by his personal assistant: Dillip in Bangalore. The presentation is completed on time, as is an Excel spreadsheet of the missing data. Welcome to the world of the virtual assistant.

When Indian conglomerate TTK in Bangalore established its service branch in 2000, it originally planned a concierge service. The target group: fellow citizens living abroad who took care of relatives back home or who had other things that needed to be handled there. Business went well. But the really revolutionary idea came five years later: the Virtual Private Assistant (VPA), the helper in the background for all tasks and circumstances. No longer should just managers of major corporations or wealthy heirs and family businesses enjoy the privilege of an assistant, but also small companies and the self-employed as well.

TTK is a typical Indian conglomerate. It produces everything from sanitary products to roadmaps and kitchen utensils. According to its own statements, its annual sales have reached 160 million Euros.

Most of the customers for the VPA service come from the United States and New Zealand. “But we already have 130 customers in Germany,” said Thiruvallur Thattai Venkatesh, the manager responsible for VPAs.

These assistants take care of time-consuming, annoying routine tasks. The system is simple. All tasks can be sent via the Website getfriday.com, or via email, telephone, or fax. It includes everything from travel preparations to online pur-
“There is a market”

Sunder Prakasham, CEO of TTK Services Pvt. Ltd. of Bangalore, spoke about virtual services and real customers.

How did you come up with the business idea for Virtual Private Assistants?

When we only had the concierge service, “YourManinIndia.com,” Arnold Stephen Jacobs, the editor of Esquire Magazine, came to us. He wanted to “outsource” his life. Things like reading bedtime stories to his children or arguing with his wife. Regardless of how crazy the task, we took it on. And we realized that there is a market for such services.

How many customers and employees do you have for this service?

We presently have 180 employees and 1,350 customers worldwide, mostly in English-speaking countries such as the US, Canada, and New Zealand.

What customers are of particular interest to you?

Our target group includes the owners of small companies, the self-employed, and freelancers. People with enough work for a part-time or even full-time assistant, but who cannot afford or do not want to pay for a salaried employee.

Do the VPAs perform more private or more business tasks?

Both. When you have a small company it is difficult to keep them separate. In Germany, for example, the most popular services are online research, translations, and the development of Websites.

Does your company also outsource tasks – or do the VPAs really do everything on their own?

Physically, we are not present internationally. In this respect we actually have to outsource many tasks or limit ourselves to online offerings.

Who are your largest competitors?

The economic crisis gave rise to a lot of copycat services. But most are gone. BrickWorks is one of the surviving serious competitors.

What advantages do you have over European competitors?

Our main advantage is price, even compared with Eastern Europe. Another is the qualifications of our assistants. We sometimes have difficulties with communication. There simply are cultural differences between India and Europe. But with our long-term customers we have found ways of solving these problems.

There is no limit to the types of tasks that can be requested. Arnold Stephen Jacobs of Esquire Magazine found this out as well: “Asha and Honey, my two VPAs, never say no. I have tested them repeatedly, asking them to take on increasingly bizarre tasks. They should read the New York Times for me, send me a collection of the questions from ‘Who Wants to Be a Millionaire,’ and compile a list of jokes. I tried taking them to their limit, but we never reached it.”

Thanks to the low wage costs in India, a VPA from TTK can be had starting at 7 Euros per hour. That would correspond to a full-time assistant for 1,120 Euros per month. Depending on need, the customer can decide on a monthly allotment of hours or pay only for actual usage. In that case, however, the hourly wage increases to 15 Euros. Additional costs are incurred for special skills beyond those of a secretary.

“We are redefining assistance,” said TTK Manager Venkatesh. VPAs are secretaries, personal trainers, or research assistants, all at the same time. They can even keep the customer’s blog updated. “The more expensive life becomes in other parts of the world, the more customers will truly benefit from VPAs.”
Blueprint for factories of the future

When factories age, lose productivity, and are barely competitive, they are usually closed, torn down, scaled back, or transferred. Siemens went a different way with one of its US motor factories in Ohio: thanks to massive modernization measures and a comprehensive training program, the company increased productivity by 50 percent and was awarded the sought-after “Top Plant Award.”
Top Plant Award

With its “Top Plant Award,” the renowned US professional trade magazine “Plant Engineering” singles out a company that has obtained excellent results from its production process. Performance is evaluated in particular in the areas of productivity, energy efficiency, quality, and safety. Applicants have to answer more than 80 written questions, and the jury takes a close look at the finalists.

The prize has been awarded since 2004 and is given out at the annual “Manufacturing/Automation Summit” industry conference. This year, it took place in Chicago at the end of March. With its motor factory in Norwood, Siemens was this year’s only winner.

Even a motor factory can be sexy. Bob Taft, the Governor of the State of Ohio, was excited: “This is exactly the type of global, innovative production that represents the future of Ohio’s economy.” That was five years ago during the groundbreaking for a trendsetting project: Siemens invested more than 33 million US dollars to get its US motor factory in Norwood, with 385 employees, ready for the future. The result: productivity increased by 50 percent.

Instead of 2,000 motors as in the past, the factory can now produce 3,000 motors per year. The motors are used in fans, pumps, compressors, and rail vehicles, among other applications. But the increase in productivity with a comparable number of workers is not all that was accomplished by the investment: energy consumption in the test facility – one of the core areas – dropped by 90 percent. This means CO₂ emissions could be reduced by 10,000 tons per year. Occupational safety increased as well. Thanks to these impressive statistics, the factory recently received the distinction of the “Top Plant Award” (see box above). The plant has provided industry with “a blueprint on how to move forward in this unprecedented economic crisis,” according to the renowned professional trade magazine “Plant Engineering”. Siemens management did not make the decision in favor of the modernization project easily. Alternatives such as a completely new building or a transfer of the location were part of the debate. The State of Ohio offered financial incentives. “But the experienced, committed employees were the decisive factor,” said Keith Lang, who currently manages the factory. “That is capital one does not want to lose.” Anne Cooney, Drive Technologies Department Manager at Siemens Industry, Inc. confirms: “The people in Norwood stand completely behind what they do. They feel responsible for the customers and products.” Some of them even had grandfathers who worked at the factory in the past.

Cautious rebuilding

Norwood is a factory with tradition: established in 1898, it is one of the oldest continually productive industrial plants in the United States. It began as the Bullock Electric Manufacturing Company, named after its founder George Bullock, and even then produced motors. In 1978, Siemens joined with successor company Allis Chalmers, henceforth known as Siemens-Allis, and took over the plant in Norwood. A few years
Norwood

Norwood, Ohio, is a small town with a population of 20,000 and is part of the Cincinnati metropolitan area. It has a long tradition as a company location: Norwood is located in one of the oldest industrial areas in the USA, known as the “rust belt” after many years of decline. The structural changes are drastic – in Cincinnati as well. Between 1999 and 2008 the region lost one-fifth of its industrial jobs. Nevertheless, Cincinnati is a lively and innovative area: Procter & Gamble, the world’s largest consumer products company, retail giant Macy’s, and the Kroger supermarket chain, are all headquartered here. New biotech and medical technology companies are located here, the university draws a lot of young people, and the region offers a wide variety of recreational activities. The unemployment rate in Norwood is just slightly above the US average – a rarity in the Rust Belt.

Shorter production line

Shortening the production line was the most important step. Previously, a motor had to travel a distance of ten kilometers from blank to finished product. Today, it is slightly more than three by switching from batch and queue operation to flow production. Factory manager Lang explains what this means: “Previously, a colleague performed a production step on 60 parts, and then sent these parts collectively to the next station. Now, each part is forwarded as soon as it is finished.” This reduced intermediate storage by 80 percent, and throughput time for coils was reduced from one full week to two single shifts.

Drastically reduced step-up times

Workflows were optimized systematically for even small details. For 36 years, John Cox has worked in the department where the stationary parts of the motor are installed – housing, stands, blades – called stators in the industry. “Before when I came to work I needed one to two hours to set up my workstation. Now when I come in I can start immediately.” His manager Mike Thomas compares the work of his team with that of a surgeon. “He does not have to set up the table and obtain the correct instruments before starting the operation.”

Another example: the test facility where the motors are tested before they go to customers. It used to be a bottleneck for delivery, now there are no wait times. Using a variable frequency drive that feeds excess current back into the network, energy consumption was reduced. This one measure saves the factory 140,000 US dollars each year. In addition, the workplaces are safer. Workers no longer have to replace the high-voltage cables by hand; this job is now done by a computer-supported system.

Externally, the factory appears unchanged in most regards. The few buildings that had to be torn down contained the shipping and storage areas, which were in a building more than 100 years old. In the new plant, tractor trailers can load the motors directly from the end of the assembly line. Flat-bed trailers that transport particularly large generators travel to a special area of the building, where they are loaded using a suspension crane.

Lean manufacturing training for employees

For factory manager Lang, the point is to continue optimizing workflows at individual workplaces. All employees have completed a half-day “Lean Manufacturing Training” course where
they learned what characterizes efficient production and how much money, for example, is saved by reducing wait times. In addition, they can register for more in-depth training that takes about six to nine months. Two employees each are trained on the rotation process and then return to their workplace. As a result they gain a different perspective and later on are able to offer their own suggestions for greater gains in efficiency.

Interest is high. Some 40 employees applied for the first two places. All of this took place with the approval of the employees’ union, the International Union of Electronic Workers/Communications Workers of America and the workers’ representatives actively participated in the program.

Customers who visit the factory today are impressed, reports Lang. Recently, one even wanted to participate in the lean production training course. “In many companies, the boss says to sales people: don’t bring any customers into the factory! I say: bring in as many as you want and show them the kind of work we are doing here – that is the best advertising for us!”
Complex logistical processes and increasing individualization of products require processes that are both flexible and highly automated. RFID technology brings together the flow of goods and the flow of data. For its implementation, Siemens relies on cooperation with specialist companies known as integrators.
From barcode to intelligent RFID tag

In traditional barcodes, the information is stored in a pattern of thick and thin stripes and is read out optically with laser scanners. Since the end of the 1980s, the use of two-dimensional barcodes has also spread. As many air passengers know from the boarding passes on their cell phones: these barcodes can store more information. The data are encrypted in a matrix of white and black areas. 3-D codes have been developed as well, where color tones and saturation represent another level. 4-D barcodes, which were developed at the Bauhaus University in Weimar, are supposed to hold even more information. In addition to color, they use the fourth dimension, time, because they can change their pattern.

In contrast, RFID systems consist of a tag – a sort of radio label also called a transponder – and a reader. The data are transmitted via radio instead of optically. Many RFID tags do not have their own power supply, and are referred to as “passive.” The power for their electronics comes from the reader. Its antenna generates an electromagnetic field used not only for communication, but also to deliver power for the transponder. Siemens offers a broad spectrum of reusable tags – from the Smart Label to the 64 kByte transponder.

RFID systems can cover various distances depending on the frequency range. The widely-used 13.56 MHz tags have a range of only a few centimeters. In contrast, UHF (865 MHz) RFID tags have a range of up to six meters. And at 2.45 GHz, the range is around one and a half meters.

Aleris Recycling in Töging, Bavaria, can process more than 400,000 tons of aluminum scrap every year. The scrap is melted down and processed into new alloys for the auto industry, for example.

It doesn’t sound too complicated – the raw material has to be delivered to the customer in a heated form not exceeding 200°C. Insulated crucibles are filled with liquid aluminum, loaded on trucks, and transported over large distances.

The speed at which the heated material cools depends on the weather and the age of the crucible. “It can store more or less energy depending on its state,” explained Heinz Döhner of the Finze & Wagner engineering firm in Burghausen, Bavaria. “If used often, its ability to store heat drops due to the wear of the insulating layer.” As it ages, the crucible requires more preheating. But that takes a lot of energy, which is why Aleris tries to avoid any unnecessary warming.

The company has been helped in this area for the past few years by using RFID technology (radio frequency identification) from Siemens: every crucible was equipped with an electronic chip to give it its own identity (Simatic RF620T transponder). Antennas at the Aleris plant and goods receipt at the customer site read the stored information by radio and enter it into the company’s IT system. Thanks to the high range of the UHF system (ultrahigh frequency) at 865 MHz, the RFID tag and reader can be spaced several meters apart. As a result, the antenna can be installed outside the hazardous area, for example at the truck scale in the goods issue area.

Using RFID technology, the temperature of the aluminum when leaving the Aleris site and upon delivery can be compared. This enables conclusions to be made about the state of the crucible, resulting in a profile that provides information about the location, content, and insulating layer of the container – which helps in minimizing the energy required for preheating.

The example not only demonstrates the benefits of RFID technology, it also shows the many
adaptations required in practice. “The crucibles have an external temperature of up to 130°C, while the RFID tags can only handle a maximum of 60°C,” said Döhner. “In addition, the raw conditions in a foundry are similar to those in a mine.” For this reason, the experts Finze & Wagner, together with the Munich University of Applied Sciences, first had to develop a robust housing to protect the sensitive technology from the environment. In addition, the automation specialists ensured that information from the RFID tags continually updated the Aleris IT systems and were available in real time.

In the automation industry, companies like Finze & Wagner are known as integrators because they adapt existing solutions to individual customer requirements and can offer them tailored, comprehensive concepts. In the RFID area, Siemens works with countless partners that bring together the company’s components (tags, readers, and software) with various production and logistics processes.

Floor mats with radio devices

ISW, the Austrian automation service provider from Neuzug bei Steyr, also specializes in adapting RFID technology to special requirements. ISW customer Eder Werbematten from Luftenberg is the Austrian market leader in floor mats. Eder can not only design and cut the goods individually, it also offers a full range of flooring services, such as cleaning, inspection, and laying. When a mat is removed, the Eder employee brings the replacement along with him.

The company is backed by elaborate logistics and RFID technology from Siemens. Each mat is equipped with an RFID tag that identifies it uniquely and provides information on the customer to whom it belongs. At Eder, the RFID labels operate at a frequency of 13.56 MHz, which makes them almost completely immune to interference in the environment. And the operating range of only a few centimeters is an advantage here because read errors due to an excessive operating range are practically excluded.

At the Eder logistics center, the textiles are on hangers that are also equipped with intelligent radio technology from Siemens. “This way ISW-logistics, our logistics system, always knows the location of each hanger for each mat,” said ISW CEO Alexander Girkinger. “In addition, the capacity to uniquely identifying each mat means that the special fibers can be cleaned with minimal use of water, cleaning agent, and energy.”

Previously, barcodes were supposed to perform this task. But the data carrier was contaminated by dripping water and developed tears and scratches, often making identification impossible. “Thanks to RFID tags, read errors are practically eliminated,” said Girkinger. And customers
Interview with Markus Weinlän-der, Product Manager for RFID Systems at Siemens.

What are the critical advantages of RFID technology for production and logistics?

RFID brings the flow of goods and data together; today, they usually run in parallel. In automobile production, for example, we have observed that products are becoming more individualized. Today, it is almost impossible to find two luxury-class automobiles that are identical because of the number of extras offered by the manufacturer.

And what does that mean in practice?

To produce flexibly and cost-effectively, production has to be highly automated. RFID tags on the car body provide all the necessary instructions for the individual workstations, for example to a painting robot that has to know whether the car in front of him is a notchback or a station wagon. Using RFID, you can say that the vehicle itself knows what the customer ordered.

For which industries is the technology of particular interest?

In addition to logistics and the automobile industry, companies from the electronics and metal processing fields could benefit, for example. Take a simple shower basin. Customers can now select individual designs that differ in terms of size and color. As in the automotive industry, the desire for individualization and the requirements of highly efficient production have to come together under one roof. RFID solutions are also in demand in the pharmaceutical and food industries, as well as in transportation technology.

Potential in the pharmaceutical industry

RFID technology is also helping improve workflows in the pharmaceutical industry. A major manufacturer in Germany uses passive UHF tags from Siemens to identify high-quality cancer medication: a bottle is filled with the drug, five or six of the bottles are packed in sealed cartons, and shipped to Japan or the USA.

Every bottle has a tag containing the batch number in its memory. “This is used in the fight against drug fraud and for quality assurance – for example, when an error occurs in production and you want to determine what went wrong,” explained Kristian Tolk, CEO of Centiveo in Magdeburg.

Centiveo developed a special “RFID tunnel” for the project: it consisted of a short conveyor belt, a type of bridge with the RFID read and write technology, and a monitor to display the data. “In contrast to barcodes, the tags can also be read in closed cartons,” according to Tolk. “In this way we can establish a unique correlation between the bottles and cartons. This is important because of the regulations in the USA regarding traceability.”

Centiveo installed the Siemens technology in the tunnel and developed the software to control the data exchange between the tag and reader. In addition, they linked everything with the manufacturer’s ERP system. “As integrators, we are specialists in using Siemens technology according to customer conditions,” said Tolk. “The RFID tunnel has been running for about a year, and the experience has been so positive that we are expecting the project to be expanded.”
This past spring, the BMW Oracle sailing syndicate won the America’s Cup, the world’s most prestigious sailing regatta. And they did so without a sailboat. Oracle founder Larry Ellison’s floating Batmobile had about as much in common with a sailboat as a stagecoach has with a Ferrari. An estimated 750 million US dollars went into the victory. The victory was due in no small part to Munich sailing amateurs and BMW engineers Thomas Hahn and Christoph Erbelding. This is a study of successfully establishing respect, decision-making structures, personnel selection, motivation – and about the courage to take risks.
The fans celebrate, wave American flags, and sip champagne. In the duel between the fastest sailing yachts in the world, the BMW Oracle team and its giant trimaran have just gone into the lead. At the course off Valencia (Spain), they raced at 20 knots to quickly catch the Swiss Alinghi catamaran, passed just behind the stern, provoked a tactical error by their opponent, and were first around the first course marker.

It looks like the race is just about over. The 159-year-old America’s Cup, the oldest, most venerable, and perhaps ugliest sporting trophy in the world, is going back to the United States. Team leader Larry Ellison, the founder of Oracle and one of the world’s richest men, is about to achieve his goal after ten years and an investment estimated to be around 750 million US dollars.

But Thomas Hahn on board the 24-meter VIP spectator yacht cannot relax. The BMW engineer is part of the 200-person team responsible for the structures of this high-tech piece of sporting equipment. If something breaks on the ship, there will be hell to pay. He keeps remembering the saying, “To finish FIRST, you have to FINISH first.” The race has an hour to go. The swell appears to be stronger. Hahn knows that the sensors on board are setting off alarms. The ship was built to its absolute limit.

He ignores the hors d’oeuvres offered to him. He does not want to sit in one of the massive leather chairs, he is not waving a flag. His chin is dug deeply into the collar of his jacket. His shoulders are hunched up. It is brisk, the sun is setting.

Hahn restlessly walks back and forth between the window and the computer. On the water, he sees the giant yachts only dimly. Despite its motor, his ship cannot keep pace with the sailing racers. The screen shows the course and speed of the contestants. If the line breaks and speed drops abruptly, something is broken, destroyed, torn. Then, Hahn would be the biggest loser. But if it all holds together, he will be a hero.

Integration through performance

It was a long road for Hahn until reaching the finale in February 2010. He and his BMW colleague Christoph Erbelding were largely responsible for the structural calculations and optimization of the high-tech ship. When the two Munich residents joined the BMW Oracle team in 2003, the amateur sailors and specialists in auto body development were given a hard time by the circle of professional sailors from 35 countries. Many viewed them as token Germans. They had to fight for recognition and inclusion. “It took almost a year for us to become somewhat integrated with the team,” Erbelding remembered. They achieved this respect through hard work and by continually proving their competence and value, not through platitudes, modesty, and a friendly beer with the rest of the team.

Taking personal responsibility

The expectations were extremely high. Larry Ellison had already tried twice – in 2003 and 2007 – to win the prestigious Cup, without success. Both times Team Alinghi crossed the line first. For this third attempt, Ellison’s hopes and demands were that much higher – as was the strain on the team.

For an America’s Cup team, which generally exists only for the three years preparing for the race and is then disbanded, leadership structures and management styles are extremely important. There is no time to tediously find one’s bearings and allow natural hierarchies to develop. In this constellation, economic experts see a labor situation comparable to the fast establishment and functioning of a company.
In 2006, a Harvard Business Review studied the success of defending champion Team Alinghi and determined, “The unique manner in which the managing crew deals with the human factor has given the team a decisive competitive advantage. Both consciously and intuitively, Ernesto Bertarelli and his fellow teammates have recognized the value of human capital as a differentiating factor in competition and the know-how to use it.”

At that time, Larry Ellison was going in another direction. For his second title challenge in 2007, he transferred all power to sailing professional Chris Dickson. But Dickson’s interpretation of that power did not help the team. Within his dream team, he established a rigid hierarchical structure and micromanaged everything. Dickson was in charge of all aspects, monitored the design team, even piloted the yacht himself. He lost in the semi-finals.

**The best bring out the best**

Ellison learned his lesson. For the 2010 challenge, he hired a completely different type of manager to run things – three-time America’s Cup champion Russell Coutts. In international regatta circles, Coutts commands the highest respect – both as a sailor and team leader. His management style is characterized by individual responsibility and flat hierarchies.

At BMW Oracle he repeated what he had done at Alinghi, his former employer: he built a strong team with the best people in the world. This time, however, the New Zealander was faced with a difficult problem: Ellison and billionaire defending champion Ernesto Bertarelli of Alinghi went at each other like two sullen boys with public defamation lawsuits and legal wrangling.

An unprecedented, year-long series of lawsuits before New York’s highest court to lay out the design and performance rules for the Cup created a great deal of uncertainty among the participants. Suddenly, Coutts not only had to direct a sailing team and design group. He also had to deal with an army of lawyers requiring information, direction, and guidance on trial tactics.

**Stepping into the shadows**

Exasperated, the world’s best sailor handed control of the fastest yacht in the world to a younger man. It was the greatest and most important sacrifice Coutts had to make to bring about success. He had to let go. He simply did not have enough time to get to know the ship. The legal strategy was more important.

The athletic preparations became more complex due to the legal skirmishes: the prerequisites for constructing the yachts changed continually and radically. For months, the team had to react continuously to contradictory statements from Alinghi and the courts.

Soon enough it became clear that the team would have to sail on two hulls instead of one. This meant redesigning – from one day to the next. The young Australian helmsman and single-hull professional James Spithill, alias “Jimmy Spitfire,” had to learn his job from scratch. It would be like taking a talented motorcycle racing professional, putting him in a Formula 1 race car, and expecting nothing less than winning ad hoc the world championship.

**Increasing flexibility**

The initial situation in this environment, consisting of far more variables than constants, significantly impacted upon working conditions. “Initially, we had no idea what kind of boat we were to build,” said Hahn of BMW. Neither the size of the yacht nor the actual date of the race was set. The back and forth situation required
short decision-making processes, streamlined structures – and the ability of all participants to work under maximum pressure.

BMW Oracle demonstrated this clearly. The boat construction requirements were changed continuously. The development objective was ambiguous. Broadly, what was to be built, a rally car or Formula 1 racer? With every new ruling by the New York court, the key data changed for engineers Hahn and Erbelding, who were responsible primarily for the rigging design.

Initially, a 60-foot (about 20 meters) single-hull vessel was to be produced, then a 90-foot by 90-foot trimaran. This corresponds to the approximate area of three tennis courts. The ship had to be faster than its competitor in a strong wind and a light breeze, which is impossible if the competitor puts all his eggs in one basket and designs his boat specifically for one condition or the other. And without a set race location, there is no way of knowing the wind and swell conditions.

In the course of the legal battle, as it became clear that the designers would have to come up with a mammoth multi-hull vessel, BMW Oracle flew in a team of specialists from Paris. The French normally build record-setting high-sea catamarans. In contrast, the America’s Cup is a sprint race. While the knowledge from the French was valuable, their working methods were incompatible. This produced a debilitating power struggle.

Once that ended and everyone began working toward the same objective, the team became functional again, and had to deal with the next design challenge. Traditionally for the Cup, the sails are manually hauled by a troop of massive, high-performance athletes. That is, until Alinghi legally won the right to use motorized winches, making the up to 150-kilogram musclemen obsolete. As a result, the boat itself behaved in a completely different manner, and again had to be completely redesigned under extreme time pressure.

Hahn’s masterstroke came in replacing the entire bow sequence. The old tip was sawn off and a new one built. The bow was subject to the highest stress – a serious concern. “The zig-zag course was nerve-wracking, of course,” said Erbelding. “But management kept us out of the legal maelstrom. There were several people with vision that kept us away from the daily drama.”

Motivation through focus

Erbelding has praise for the short decision-making process, the limited need for time-consuming coordination, and the high levels of transparency and commitment. He is convinced that these experiences will help him in his own job at BMW. “What motivates someone in his work? It is the feeling of making a difference. Even if someone is just a small cog. We all knew what was going on.” It is not easy to take such drive into a company. There it is not about historical victories, and operational processes are more established and complex. But Erbelding believes that it is possible to establish more focus in large
structures. “Regarding specific processes we have to continually ask why we actually do certain things. Is this or that meeting really necessary or just a waste of time?” At BMW, Erbelding has become group leader in the lightweight vehicle design area and is responsible for comprehensive strategic questions. He has to build lightweight cars to reduce CO₂ emissions and bring together various parties. Clear objectives – something he now knows a lot about.

Imagining the unthinkable

In the end the impossible happened: in record time the team brought a never-before-seen innovation to the starting line: the largest wing in the world. A 68-meter-high, 3.5-ton filigree carbon-Kevlar frame covered by a tight skin. The wing of the largest passenger plane in the world, the Airbus A380, looks like a toy by comparison, as it is 20 meters shorter.

The back nine parts of the propulsion element, which have nothing in common with conventional sails, can be set individually at specific angles to the mast – like the landing flaps of an airplane. They are operated by the crew via computer on the lower arm. The engineers had already calculated the best trim for various courses and winds and programmed them in. More than 200 load sensors provide information on the current trim and the pressure at various points along the profile. It is a new dimension in sailing.

During the development phase, Alinghi’s lead designer Rolf Vrolijk had a similar idea, but rejected it. “For 20 years we have known that wings are faster. But we did not think that one could get that much potential from them in such a short time,” he said just before the race.

BMW Oracle did, though. “There were many skeptics on our team as well,” reports Hahn. “The decision in favor of the wing was a big deal. Opinions were split 50-50. Would it be possible to make the wing fast in such a short testing time? But in March 2009, we believed we needed this weapon.” The strongest argument in favor of the wing was sheer need. “We could not afford not trying it,” said Erbelding, “because we had no idea what Alinghi would pull out of the hat.”

The problems are complex. How do you transport the profile to Spain? How can it be set and positioned? What should be done with the monster and its enormous windage area in the harbor? It was a risky decision, a game of roulette. But Larry Ellison absolutely wanted the wing. He wanted to make history at any price. “It simply had to function,” remembered Erbelding. “When conventional mast three with conventional sails broke during training, we were happy to have the wing alternative. After that, there was no safety net. The revolutionary project brought a certain atmosphere to the team, and probably led to even better performance.”

Thomas Hahn beams as the trimaran crosses the finish line at Valencia. Success! The sun goes down, but the mast still stands tall – thanks to a pair of Bavarians.

Powered by BMW

Engineers Christoph Erbelding (41, left) and Thomas Hahn (44) work for the BMW Group in Munich. Hahn, an expert in structural analysis and optimization, was responsible at BMW Oracle for the structural development and design of the monster catamaran. Before changing jobs to work with the sailing team, he was responsible at BMW for the structural and acoustic design of the new 5 series structure, and for the rigidity, crash safety, design, and producibility of the bodyshell for the MINI.

At BMW Oracle, air and space engineer Erbelding was responsible for the structural rigging design of the racing yacht. At BMW he worked primarily on the structural integration of the MINI.
Water is one of mankind’s most essential resources. Yet the global supply of this raw material will represent one of the world’s greatest challenges in the coming decades. Billions of liters of groundwater is contaminated each day due to pollution. Hundreds of people die each hour due to thirst or bacteria in drinking water. However, industrial filtration plants, intelligent disinfection solutions, and water desalination systems can contribute to solving these problems, as can small and cost-effective regional solutions.

Clear gold
"Management of water resources and water systems is absolutely necessary to meet the objectives of societal and economic progress."

3rd United Nations World Water Development Report
Nothing is possible without water: in the industrialized world, we each use on average seven-and-a-half liters of water just to brush our teeth—because we leave the water running. His morning shower sends 100 to 200 liters down the drain. The production of a cup of coffee, from planting until it reaches the breakfast table, swallows up 140 liters. Another 150,000 liters circulate through the industrial production machinery to provide a mid-size automobile. To create a lunchtime hamburger, almost four liters are required, a serving of salad involves another 22 liters, and the indulgence of a steak, that’s 1,000 liters. Many people don’t realize the importance of clean drinking water to their daily lives.

Unlike the industrialized world the developing world faces significant challenges. UNICEF estimates that some 1.2 billion people in the developing world do not have access to clean drinking water. And double that number have to live without sanitary facilities. That is more than one-third of the world’s population. Often, there is nothing else to be done than make do with contaminated water. The consequences: disease, poverty, death. Each day, 4,500 children alone die as the result of contaminated water. And the situation is getting worse. UN experts have calculated that by the year 2025 some 3.4 billion people worldwide will suffer from water shortages. That is almost half the world’s population. By 2030, people will need 40 percent more clean water than is available on earth. The global crisis in water quality has already begun, according to the 2010 report by the United Nations Environment Program (UNEP).

**Water consumption increasing**

The reasons are numerous—and have long been known. Population growth continues; by 2050, the population is expected to be around nine billion, 6.4 billion of whom will live in cities, mostly near the coast. Because of insufficient infrastructure and aging sewage systems, increasing quantities of untreated wastewater will flow into streams and rivers, threatening coastal ecosystems like never before. Already a great deal of wastewater is flowing unfiltered into bodies of water. In regions such as warm sections of the Atlantic, fish can no longer survive. Additionally, according to information in the UN’s “Water for Life” report, by 2030 global food production will have to increase by 60 percent in order to feed the world’s growing population. Generally this means more artificial irrigation and greater use of chemicals. This not only increases water consumption, it also threatens water quality.

In developing countries today, 90 percent of water from sewage systems and 70 percent of industrial wastewater is directed unfiltered to farm-land. Ten percent of the world’s population is being fed by plants irrigated with contaminated water. When industrial, agricultural, and urban hazardous materials flow together in the waste-water, and even more chemicals are applied, the effects multiply.

**Agriculture is the largest consumer**

At 75 percent, the lion’s share of water consumption goes to agriculture, between 5 and 20 percent is consumed by industry. But global economic growth has increased demand to record levels because all forms of industrial production require water. Whether for cooling, cleaning, or production, water is necessary in factories. And potentially fatal if unnecessarily high volumes of valuable potable water are consumed and then flow contaminated into rivers or sewers.

Higher industrial production and more cities also means an increased need for energy. Which means: more water. From power plants to geo-thermal energy sources to – naturally – hydropower. Without water, there is not a single source of energy that could be tapped.

It is conceivable that in the future hydropower will become one of the most important sustainable alternatives to fossil fuels. Small hydropower plants already meet half the energy required in 66 nations. Where in 1995 worldwide industrial water demand was at 752 cubic kilometers, by 2025 that number is expected to reach 1,170 cubic kilometers.

The problem: clean water resources are dropping worldwide. Although our blue planet is three-quarters water, only two percent is freshwater. And much of that is locked up and cannot be tapped, frozen in a glacier or hidden in mountain rocks.

In addition, human encroachment into nature has left its detrimental mark: deforestation, monoculture, empty groundwater reserves in urban centers, redirection of natural water flows, and the construction of reservoirs. “Such measures seriously impact water supplies,” said Markus Weiler, Director of the Institute for Hy-
75 percent of worldwide water consumption is due to agriculture. A large share returns to the groundwater contaminated by fertilizers and chemicals. Groundwater levels sink, the water seeps down to inaccessible depths. Even some areas with high levels of precipitation now have to buy additional water.

**Climate change aggravates water problems**

Climate change is making the global water supply situation even more acute: it is becoming increasingly more difficult to forecast how much water will be available in any given location. “Water supply and hygiene are being impacted by climate change, and they in turn are impacting climate change,” according to the “Vision 2030” water report by the World Health Organization. Water supply facilities and sewage treatment plants also have a carbon footprint – for example because of the energy required to run water pumps and wastewater treatment technology, adding to climate change. It is a vicious circle.

There is no denying that water scarcity and quality will be critical global subjects well into the future. There’s a reason for the challenge set forth by the authors of the latest McKinsey study, called “Charting Our Water Future”: “These gaps in supply can only be closed through radical rethinking and more efficient water usage.”

Chuck Gordon nods in agreement. The head of Siemens Water Technologies in Warrendale, PA, USA, knows how extremely necessary a change is. Since 2005 he and his international team have been doing everything to offer industrial customers and communities sustainable solutions for highly efficient water usage and supply. Siemens Water Technologies has grown to become one of the world’s leading providers, serving more than 90 percent of the Top 500 companies.

The water specialists have more than 900 products on offer. From sophisticated cleaning technologies that return available water supplies back into circulation for reuse, to disinfection, to tapping new water supplies through ocean desalination, to elaborate wastewater management.

“Water is a valuable resource. It is time that it is treated as such,” said Gordon. Water treatment is a very energy-intensive enterprise. It not only negatively impacts the environment, it represents a significant cost factor for companies and communities. The scarcer water becomes, the more costly it will be in the future to clean it so that it can be used as potable water.
Simulations for water networks

More than five billion cubic meters of potable water flow through German water pipes annually. Almost double that flows through sewer systems. Controlling these flows is a complex business for water managers. Back-up storage should be neither too full nor too empty. The pressure in the pipes has to be correct, pumps must not dry out. The only way to control the water flow is through sophisticated automation technology and numerous sensors together with measurement and control instruments.

But do all these components work together optimally in every situation? Previously, this was difficult to predict. Siemens Corporate Technology has deve-

Drinks producer in the forefront

The management of CPF, Inc./Northeast Hot Fill Co-op, Inc., the bottled water producer in the US state of Massachusetts, has recognized this. The company produces Aquafina bottled water and carbonated beverages such as Pepsi and Schweppes ginger ale. The company wanted to minimize the cost of their water and wastewater, while producing purified bottled water. They asked themselves: How can we use our process water sustainably, instead of sending 25 percent down the sewers as previously?

Today, an ingenious water treatment system, a combination of two single-pass RO systems and continuous electrodeionization, produces first-class results: 90 percent water recovery rate. The company reduced the plant’s water consumption by about 15 million gallons per year. “We are very happy with the system,” said the plant quality manager.

Disinfection system for Walt Disney World Resorts

Management at Walt Disney World Resorts in Lake Buena Vista, Florida, was also looking for greater efficiency. The water in the pools, fountains, and water slides used by children has to meet the highest standards. Previously calcium hypochlorite was solely used for disinfection. But this resulted in high storage costs and potential hazards.

The new water treatment technology from Siemens is saving significant costs as part of a strategic overall concept: the OSEC electrochlorination system generates hypochlorite directly onsite using salt and electricity. The transport and storage of chemicals is eliminated and disinfection is safer and more efficient.

In addition to the individual components, Siemens Water Technologies delivers comprehensive service packages. The disinfection systems are controlled remotely using the Strantrol Impact controller, constantly ensuring the same water quality. In addition, Siemens technicians perform all maintenance and customer service on the 165 fountains and pools at the resort and parks. The contract between the leaders in family entertainment and Siemens Water Technologies runs for ten years.

Largest treatment plant in the USA

The example provided by the Orange County Water District (OCWD) in Fountain Valley, California shows how efficient treatment technologies can also work for communities. As in all communities, county officials have a major challenge. They have to provide the right quantity of water of suitable quality at the right price, so that the region remains attractive for private and industrial consumers. Orange County has an additional problem to deal with: the region is growing rapidly and the demand for water has skyrocketed.
Pressurized membrane filtration systems offer a compact and modular solution for water reuse and pretreatment for desalination.

In January 2008, the largest treatment plant in the USA was established here. It combines Memcor membrane technology from Siemens, reverse osmosis, and advanced oxidation. Treated secondary wastewater that at one time was flushed into the ocean is now filtered by a system of membrane fibers, which removes the dirt particles, bacteria, and other contaminants. A clever arrangement of filtering ponds produces a natural waterfall. This made it unnecessary for the pumps to force the amount of water through the membranes. As a result, five times the amount of water of conventional systems can be cleaned using the same amount of energy. And the water requires little chemical pretreatment.

After this process, the water is pumped into retention ponds, mixed with groundwater, and then allowed to seep into the ground – an additional, natural cleaning process. Orange County officials should be satisfied. On the second anniversary of the plant last year there was reason to celebrate. At that time, the process had provided the region with 119 billion liters of additional groundwater.

Membrane technologies have proven themselves not only for wastewater treatment, but also for ocean desalination. Without desalination it would be impossible to meet water needs in many regions. At the ocean desalination plant in Perth, Australia, for example, membrane filters are used for pretreatment. The pressure membrane filtration system presses 360,000 cubic meters of water through its tubes each day, with little energy required. An effective pretreatment step.

Desalination for resource conservation.

Water reuse and desalination help reduce the burden on source water supplies. When the environmental needs and economics make sense, desalination can provide alternative source water, especially in water-scarce regions like the Middle East. Energy efficiency will be a key factor for future wider adoption of desalination technology. Today, Siemens is working specifically on new desalination technology to reduce energy consumption by up to 50 percent, as compared to existing technology.

Extremely pure water for the pharmaceutical industry

Consistent high-quality water is critical for pharma applications. Extremely pure water must meet quality requirements and industry standards. One Canadian medical device manufacturer required USP quality requirements. The company selected the PreVUE system from Siemens due to its integrated, automated design, which packaged the entire system on a single skid. The prevalidated system ensures USP quality water, allowing the customer to focus on what it does best – manufacturing.
Cost-effective technology for poor regions

Modern technology alone will not be enough to solve the problem of water scarcity. This is especially true in developing countries that often cannot afford expensive plants. However, there are now affordable solutions, such as the SkyHydrant mobile water filter, developed jointly by Siemens and Australia’s SkyJuice Foundation. It is based on membrane technology. “Using the SkyHydrant, this excellent cleaning process can even be used in crisis areas,” said Rhett Butler, Sales Manager for Siemens Water Technologies in Australia and founder of the non-profit SkyJuice Foundation.

The Siemens Foundation has donated the SkyHydrant primarily to supply people in poor regions of Africa and Asia with clean drinking water. The technical assistance is linked to an educational concept. “Because these projects are successful only if people understand why clean drinking water is important, what hygiene is, and how to work with these technologies,” said Christine Weyrich, Water and Health Project Manager at the Siemens Foundation in Munich.

Take Ethiopia, for example. Many fountains are dry, sanitation is lacking, and the fight for water determines the daily routine. For the Afar, a nomadic people that live on livestock breeding, access to clean drinking water is becoming increasingly scarce. Together with UNESCO and Hope’87 (Hundreds of Original Projects for Employment), an international initiative, the Siemens Foundation built fountains and ponds, and tapped into new sources.

To prevent the spread of disease, latrines were established and SkyHydrants installed. The people were trained on how to maintain these water stations on their own. Children are taught in school about hygiene, the environment, and water supply. In peace groups at the schools, the subject of water conflicts among tribal groups is part of the discussion. According to Weyrich: “In regions like Ethiopia, comprehensive, decentralized measures in the local communities are most effective.”

Regional solutions instead of comprehensive systems

Markus Weiler from the Institute for Hydrology at the University of Freiburg finds this approach to be a sensible one. “Uniform solutions do not work in developing countries. We have to look for regional approaches that fit with the cultural, climatic, and geological prerequisites of the country.” A mixture of centralized and decentralized approaches is what is needed, a combination of industry-based top-down methods and explanations and training on-site. Because mistakes have long-term consequences. According to Weiler: “When the groundwater reserves are pumped dry, it takes 20 years to refill the water level.”

It is even more important to look critically at water consumption in agricultural production. It uses the lion’s share of the world’s water reserves. “Why do we have to cultivate cotton or rice in water-starved regions, instead of cultivating plants that provide maximum yields under local conditions?” asked Weiler. “Why don’t we more carefully control the use of chemicals in agriculture, before they cause long-term contamination of our soil and groundwater?”
Interview with Chuck Gordon, CEO Siemens Water Technologies

Which are the most effective strategies to overcome the increasing lack of water in the world?

Ultimately, technology is just one component in addressing future water issues. Proper water management, better infrastructure, conservation of water and energy, and education – along with innovative technology – will help provide a sustainable future for our water resources.

Where do you see the most relevant difficulties concerning water quality and water supply worldwide?

Clean, available water is truly a gift. It’s not something that is readily accessible in every country. Unfortunately, water is sometimes taken for granted. The sooner governments and individuals start putting a higher value on water, the sooner we’ll see funding priorities change towards better and more sustainable water technologies.

How important are changes in consumer behavior?

There is an enormous amount of resources, technology and energy that goes into making our water clean every day. Not only is water getting scarcer, but because of the energy it takes to make water usable for us, we need to be more aware of both the water volume, and the potential energy we are also squandering by not using our water more responsibly.

What can companies do to save water?

As a major component of manufacturing, companies consider good water management strategic to their business and a key competitive advantage with positive bottom line impacts, too, as well as being good for the environment. Reusing/recycling water within the plant is one way that companies can save water. Since water is used in all parts of the manufacturing process, companies can help reduce the impact on freshwater supplies by capturing and reusing water for boilerfeed water or utility water.

Can you give an example?

One of our customers, a beverage manufacturer, recaptured the water they were using for bottle washing. Before it was simply going down the drain, afterwards they were able to recycle the water and reuse it again and again – saving 25,000 gallons a day.

What is Siemens’ contribution in terms of providing sustainable ways of water supply especially in the industry sector?

When you consider it takes about 39,000 gallons of water to produce the average domestic auto, including tires the impact of manufacturing on the water supply is very significant. Today, forward-thinking manufacturers are looking at ways to have a “net-zero” impact on the environment – creating a sustainable water supply. Siemens Water Technologies’ research and development efforts are focused on helping industry better manage its water supply through water reuse and recycle, energy management, and technologies that reduce long-term operating costs.

And why in so many industrialized countries is the polluter-pays principle, where if you contaminate the water you are responsible for its cleanup, not in effect? This approach has proven to function well in many nations, such as the Netherlands.

To be certain: there are no simple solutions, and a variety of players have to work together – from politicians, to industry, to consumers. But if successful, mankind will enhance its most valuable treasure: clear gold.
A sustainable business model

Companies that implement projects to reduce CO₂ in emerging or developing countries receive valuable carbon credits from the UN. Actions such as these which are part of the UN Clean Development Mechanism, benefit many – in particular the environment and citizens. But investors benefit as well: in addition to the rate of return for the tradable credits, there is the enticing opportunity to do good and build know-how in markets that have barely been tapped.

This kind of light is pure luxury to Mrs. Laxmi. And luxury as such simply does not exist for this fisherman’s family of five in Visakhapatnam, India. That an Osram Dulux Longlife energy-saving lamp nevertheless lights up the small home of the Laxmi’s has something to do with the involvement of Osram.

Together with energy conglomerate RWE, the Siemens Industry Division has started its first worldwide Clean Development Mechanism project in the area of energy-efficient lighting in the Indian states of Andhra Pradesh, Haryana, and Maharashtra. A total of 1.7 million energy-saving lightbulbs were distributed. They consume 80 percent less electricity than conventional incandescent bulbs. Based on the project’s ten-year life span, this represents savings of about one million tons in CO₂ emissions.

The Clean Development Mechanism (CDM), part of the Kyoto Protocol, is intended to promote climate-friendly investment by Western industrialized countries in developing and emerging nations (see the box on page 54). In return, the investors receive CERs (certified emissions reductions, also known as carbon credits), which either can be credited toward the company’s CO₂ reduction obligations, or can be traded. For Osram, one of the world’s leading lighting companies, there was an additional motive: “The projects in India confirm our claim that we are taking a leading role in providing innovative products for climate protection and energy efficiency,” says Boris Bronger, who is responsible for CDM projects at Osram.
Multistaged approval procedures

The bar to measure the quality of such plans is set very high; the approval procedures are appropriately exacting: from the development of the methodology to the registration of the first Osram project by the Executive Board of the United Nations Framework Convention on Climate Change (UNFCCC) in early 2009, the process took more than four years. “But our determination was worth it,” underscores Boris Bronger. “All of the participants are benefiting from our projects.”

One project – many winners

The environment benefits from a reduction in CO₂ emissions. Another plus is the low mercury content of the Dulux EL Longlife. And APEPDCL, the local energy supplier and an Osram partner, benefits as well: the robust, energy-saving bulbs reduce the load on its somewhat fragile power network. Thanks to this project, the power supplier has managed to reduce peak demand by approximately 30 megawatts. In addition, the mostly poor families also benefit: they pay the same price as for their old incandescent bulbs, 15 rupees, about 25 Cents. This symbolic amount is a good investment; the energy-saving bulbs lower their electricity costs, and their long average life of 15,000 hours makes purchasing replacement bulbs unnecessary. For the CDM project, Osram’s best energy-saving bulbs were just barely good enough. According to Bronger: “Given the length of the project, high-quality bulbs were extremely important, both from an ecological and economic perspective.”

The components of the energy-saving bulb were assembled at the Osram plant in Sonipat, in the state of Haryana. Osram has had a subsidiary in India since 1994 which participates significantly in the implementation of the CDM project. This type of local presence is critical to the success of the concept, stresses Bronger. The energy-saving bulbs are now being distributed by Mahyla Samakhya, having been trained extensively by Osram and APEPDCL. For more than 20 years, this self-help organization has been promoting equality for women in rural areas.

Local connections as success factor

The Mahyla Samakhya teams know the villages very well, which makes them the ideal distribution partner. “There is much more involved than simply placing a new light bulb in the family’s hands,” emphasizes Boris Bronger. The recipients are also supposed to be made aware of

3 questions for ...

John Kilani, Director of the Sustainable Development Mechanism Program of the UNFCCC.

1. After Copenhagen, what measures did you look at to improve the effectiveness of the Clean Development Mechanism?

In Copenhagen, the signatories of the Kyoto Protocol agreed on a range of improvements currently being implemented by the CDM executive committee. This includes giving the executive committee greater flexibility in registration and certification, which should accelerate the CDM process. Countries that have had less than ten project activities to date will be promoted heavily in the future.

2. How high is the interest in CDM projects at present?

The number of projects in the validation phase was eight percent higher in the first quarter of 2010 when compared to the same period the previous year. This shows that interest in the Clean Development Mechanism remains as high as ever. The 2000th CDM project was registered in January of this year. How do you assess subsequent development?

At present there are more than 2,000 projects in the validation and registration phases. Based on the improvement measures already mentioned, we can assume that the pace of registrations will pick up.
environmental protection and energy efficiency. In addition, the replacement of the incandescent bulbs has to be documented precisely. The distribution team takes the replaced incandescent bulbs with them. “Environmentally responsible disposal and recycling are important components of the concept,” says the Osram project manager. This also ensures that the incandescent bulbs are not being used elsewhere, which would otherwise go against one of the most important CDM rules: additionality.

This criterion has multiple dimensions. First, the project has to verifiably reduce greenhouse gas emissions. The benchmark for this is the CO₂ emissions in a reference scenario without the effects of the respective CDM project (the baseline). Second, the measures in the CDM project have to exceed the legal requirements and technological standards of the host country. The UNFCCC requires proof of the CO₂ reduction achieved. Without it, the credits are not issued, and there is no refinancing. For monitoring, special measuring devices were developed that can transmit data via a cell provider’s network. At the start of the Visakhapatnam project, the usage time per day and therefore power consumption were measured over a period of 90 days in 200 households with conventional incandescent lightbulbs. Additionally, measuring devices were installed in 200 other households to obtain data on the usage of the energy-saving bulbs. Electricity savings were calculated on this basis.

This enormous effort did not put off the CDM team at Osram. After the successful premiere in the Visakhapatnam district (Andhra Pradesh), projects were started in Sonipat (Haryana) and Pune (Maharashtra). These examples obviously impressed the Indian government. It is planning to initiate projects throughout India based on the Osram model. Boris Bronger is thrilled with the reaction, and hopes that the success of the Osram project will open the door to other CDM projects at Siemens: “We developed a forward-looking business model that fits ideally with the sustainable orientation of our corporate strategy, because it takes into account ecological, economic, and social aspects.”

Background

The states that have signed the Kyoto Protocol are obligated to significantly reduce their greenhouse gas emissions. As an alternative to measures at home to reduce emissions, the protocol provides for three additional mechanisms: international emissions trading, joint implementation (JI), and the Clean Development Mechanism (CDM). These mechanisms for environmentally responsible development enable government institutions and companies from industrialized nations to deduct certified emissions reductions (CERs) in emerging and developing countries from their own reduction targets, or to sell them. To date more than 2,000 CDM projects have been registered, which will save 1.76 billion tons of CO₂ emissions by 2012.
By now just about every child recognizes them: the blue shimmering photovoltaic modules on roofs or as part of the landscape. They are the most noticeable components of solar systems that generate environmentally friendly electricity from sunlight. To ensure that the panels feed usable electricity to the grid, they require inverters. Siemens is one of the leading providers of these devices.
One of the most important features of an inverter is its level of efficiency: the inverter specifies which part of the solar energy can be fed into the grid. “Today, an efficiency level of 98 percent is the minimum a customer can expect,” explains Reza Foroutan, inverter expert at Siemens Industry. “What's also important is a constant, high level of efficiency across all areas. Currently, the Sinvert PVM inverter family ranks among the best on the market.

What’s more, the inverters have to support the grid so that energy providers can access the devices via Internet, for example to reduce the feed-in of the photovoltaic installation in the event of grid overload. Also, the inverters have to be able to follow the network frequency variations within the specified tolerances.

And all that should have to function across the inverter’s entire operating life of at least 20 years. For larger installations with several central inverters, an intelligent cluster design ensures a uniform load of the inverter: “We can combine up to four inverters, where one drives the others as a lead inverter for the cluster,” says Foroutan. “Depending on the solar radiation and electrical output, the lead inverter activates additional inverters.” Because every day the inverter with the least operating hours becomes the lead inverter for the cluster, and therefore changes its role, the load on the devices gets distributed uniformly, which extends...
their operating life. Should one of the inverters fail, the system continues to run because the others immediately take over.

**Safety through market leadership**

The high quality and availability of the inverters were key reasons why Gehrlicher Solar AG in Bavaria selected Siemens technology for their endeavors. Gehrlicher – with subsidiaries in Italy, France, Spain, Greece, and the US – specializes in planning and building solar installations in the megawatt range. The company is also responsible for the Rothenburg project. “When dealing with such a large installation, we prefer working with a market leader,” comments Klaus Gehrlicher, founder and chairman of the company. “Siemens provides us with mature technology and excellent service.” In Rothenburg alone, 11 Sinvert inverters have been implemented. In the course of this year, the company plans to implement additional solar installations with 50 MWp using Siemens inverters.

Hanau énergies, the photovoltaic specialist in Weinbourg, France, is another Sinvert customer. “We are operating the largest roof installation in the world on our company building,” reports Jean-Luc Westphal, CEO of the company. “It measures 36,000 square meters and the panels generate up to 4.5 megawatts of power.” The installation has been up and running since May 2009 and will be listed in the Guinness Book of Records in the near future. The Sinvert products won the race, hands down, because Siemens is able to offer the best technology. “We compared all inverters and came to the conclusion that Siemens is currently the leader in inverter technology,” continues Westphal. “Siemens has a great deal of experience in this area and was able to provide many satisfied customer references. For this reason, we are exclusively using Siemens inverters.” During this fiscal year, Hanau énergies plans to implement installations with a total of 40 MWp, among them a solar park with 12 MWp close to Reims as well as another with 5 MWp in the Provence.

Eye-catching projects of this kind create a strong demand for inverters. “During the past year, the inverter market grew by approximately 30 percent,” says Foroutan. “The lion’s share is the commercial segment, which amounts to 50 percent. The power plant and residential sector added one quarter each.” Already today, inverter customers have to factor in wait times due to the unexpectedly high level of demand. This will hold true in the future as well. Worldwide for 2010, the European Photovoltaic Industry Association (EPIA) expects newly installed loads between 10 and nearly 15 GWp. In 2014, additional solar installations will range from 13 up to almost 30 GWp. This makes the manufacturers of modules very happy and provides the makers of inverters with full order books.

**How inverters work**

At their output, photovoltaic modules supply a DC voltage while AC voltage is used for households and for transporting currents. This is when the inverters come into play: they convert DC voltage into AC voltage – typically at a frequency of 50 Hz or 60 Hz. Without these inverters, it would not be possible to feed solar energy into existing grids. Inside the inverters, high-performance transistors “chop” the DC voltage into rectangular voltage pulses. An additional electronic component ensures the correct value of the voltage forwarded: inverters for large solar installations feed their load directly into a medium-voltage power grid. For them, a transformer ensures that the output voltage of the inverter is transformed from approximately 300 V to the typical medium-voltage power of 20 kV.

To obtain maximum yield, the inverters adjust to the time of day and temperature levels. The voltage of the solar modules is higher in the winter, for example, than in the summer. The load of the modules is optimal when the inverters are operated at the “maximum power point,” which depends on the irradiation and ambient temperature. This guarantees the adjustment of the inverters to current environmental conditions.
The poles are important locales for geoengineers. Here at the Filchner ice shelf, kilometer-long hoses attached to helium balloons could, in the future, rise into the air pumping liquid sulfur dioxide into the stratosphere – as a protective shield against solar irradiation.
The creation – part two

Time and time again, their colleagues and the public have laughed at scientists who have wanted to manipulate the weather with state-of-the-art technologies. But in the meantime, geoengineering has grown up and become socially acceptable. The stars of the scene are sought-after members of government panels courted by industry. The British Royal Society – the most renowned scientific body in the world – heralds the young discipline as the last hope to save the world. Currently, this hope is fueling a billion-dollar business, especially in the US, that will help benefit conventional industrial corporations as well.
The scene could be part of a science fiction movie: highly trained scientists in hermetically sealed research facilities develop technologies to affect the weather. To cool the planet, they plan, for example, to send kilometer-long hoses at the North and South Pole into the air attached to helium balloons. Pumps push liquid sulfur dioxide through the hoses and into the stratosphere as a protective shield against solar irradiation. Also ships with huge underwater turbines travel the world’s oceans. They shoot saltwater into the sky and create artificial clouds.

Crazy notions of a Hollywood screenwriter? Not in the least. The vision fills Nathan Myhrvold, former Chief Technology Officer of Microsoft, with hope: “Of course we are competing with Mother Nature. But that does not have to be negative.” Myhrvold is a physicist and heads Intellectual Ventures, a corporation with 600 employees located near Seattle. Many employees of the 50-year-old are involved primarily in geoengineering models designed to artificially change the weather. “We are going to solve the global climate crisis only through innovative ideas and technologies,” says Myhrvold.

The start of a climate industry

Currently, a new group of company entrepreneurs is coming to the fore in the US. They signal the beginning of a new climate industry. The Internet industry and biotechnology developed...
in a similar way. And where the New Economy held opportunities for established industries back then, the so-called Old Economy will be needed again this time. When geoengineers begin to implement their ideas one day soon, they will need turbines, motors, pumps, compressors, speed regulators, and inverters. They will also depend on the knowledge and innovative know-how of international corporations such as Siemens.

100 million pounds in research money

Until a few years ago, blinds in space and reflectors across the oceans were considered the brainchildren of technology disciples. But the further global warming progresses, and the more futile international efforts appear on behalf of CO₂ reductions, the more momentum ideas for artificial climate changes gain in importance. Last fall, the British Royal Society, the most renowned and oldest scientific society in the world, published its first report on the subject matter. The society’s conclusion: geoengineering could be “our last hope” one day soon. The Royal Society requests an investment of one hundred million pounds during the next ten years to support more research in this area.

Germany is showing some modest beginnings as well. Last year, the Max-Planck Institute for Meteorology in Hamburg began an interdisciplinary research project in the amount of 1.3 million Euros financed by the European Union. At the same time, the Marsilius College of the University of Heidelberg funded a research group with 600,000 Euros.

In the USA, however, research is funded by the private sector. The lender is usually motivated by a mixture of business instinct and altruism. The same is true for Nathan Myhrvold. Most likely he is showing exceptional modesty when he claims that his geoengineering models are most likely not going to make money for him. After all, this will depend on supply and demand. As a company, Intellectual Ventures develops and utilizes patents and has the right, for example, to develop the equipment for preventing hurricanes – in this case a hose-cylinder construction that takes the warm surface water of oceans and plows it under. Most likely it is just a matter of time until states that are increasingly ravaged by hurricanes due to climate change show an interest.

Opponents criticize interfering with nature

Many people are skeptical or reject these attempts altogether. Some of them feel this way because they see it as an unacceptable invasion of nature. Others are afraid that the pressure to save CO₂ will fade when the movement that talks about resolving the problem of global warming through mundane, technical developments has gained a foothold. However, not even the fierc-
est advocates believe that. “Geoengineering provides a transitory solution only,” says Martin Bunzl, Director of the climate initiative at Rutgers University of New Jersey.

Other critics warn that human intervention in the complex climate events may have unpredictable consequences and side effects. Bunzl explains: “They see it as an expression of the same ruthless attitude that led us to today’s situation. But moralizing about it does not help us with the real problem.”

**Geoengineering as a last resort**

Increasingly scientists are starting to realize that geoengineering has to be available as a last resort. If the change in climate should accelerate drastically, artificial clouds and protective shields of sulfur particles could be “the only way to cool down global temperatures quickly,” declares the Royal Society. The principle behind this statement was proven by volcanic eruptions that catapult sulfur dioxide into the sky. In June 1991, the eruption of Pinatubo in the Philippines cooled the earth between 0.5 and one degree Celsius according to varying estimates.

To those who are fundamentally opposed and consider geoengineering too risky, Nathan Myhrvold responds with: “These are arguments that call for more research and not for less.” Cary Comer agreed with Myhrvold. Comer, who died in 2006, was the founder of Land’s End, an outdoor clothing and equipment supplier. When he sailed the Arctic Ocean in 2001, he was alarmed because ice was not blocking his way. In response, he decided to act and founded Global Research Technologies (GRT) in Wisconsin, USA, together with renowned scientists. One of his associated researchers is Klaus Lackner, geophysicist at the Columbia University of New York. His project: artificial trees that absorb carbon dioxide one thousand times quicker from the air than their natural counterparts. These catchers of carbon dioxide work on the basis of exchanging ions: chlorides contained in liquid synthetic resin bond with CO₂ in the air.

The synthetic resin filters are subsequently edulcorated – the result is liquid compressed carbon dioxide. For this process, Lackner requires powerful pumps and compressors because “we have to climb from low to high pressure.” Lackner proved that the technique works in tests at Columbia University. Currently he is negotiating with investors to finance building the first prototype. The Canadian physicist David Keith works from a similar premise (refer to interview on page 60).

Billionaire Bill Gates showed his stellar support in the idea and invested 4.5 million US dollars in establishing Keith’s company Carbon Engineering. Currently, the system is not yet marketable and will require a great deal of basic research. But already today, Lackner can imagine huge artificial woods and hundreds of thousands, even millions of synthetic trees all over the world. “The magnitude is not unrealistic,” he says. And what will happen to the CO₂ harvested? For Lackner, that is a question of secondary importance that can be answered in many ways. “You can use it in a greenhouse to grow tomatoes, push oil out of the ground, make fuel from it, or store it.”

While the industrialized nations are slowly coming to grips with geoengineering, the fear of excesses grows in connection with climate technologies. China, for example, is already using silver iodide in large amounts to create artifi-

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**How it works**

One of the main objectives of geoengineering experts is to increase the reflections of the earth and the atmosphere and thus stop global warming. But even optimists consider the presence of giant blinds made from 15 billion mirrors in the stratosphere as highly unlikely. Similarly, a fleet of remote-controlled ships on the world’s oceans that permanently spray clouds of sea water into the sky is more likely a vision of fantasy. Much more realistic is a worldwide reforestation or storing of CO₂ in the ground, in the oceans, and in polar ice, or fertilizing the oceans to increase CO₂ absorption or the production of artificial clouds by introducing sulfur dioxide.
cial rain. The country even has an agency for it called the Weather Modification Office. In November 2009, it accidentally overdosed and created a heavy snowstorm. In Russia the scientist Juri Israel recently conducted the first real solar experiment. He equipped a car and a helicopter with aerosol generators and used them to spray sulfurous particles. Subsequently he measured the changes in solar irradiation.

**An ambivalent legal situation**

Can individual states be left alone with geoengineering? How far can private citizens go with their weather experiments? The legal situation has not been clarified. In 2008, Planktos Science in California caused excitement with their announcement that they wanted to fertilize part of the South Atlantic Ocean by adding iron. This was to promote the growth of algae which derive CO₂ from the air and transport it to deep layers of water. The project was stopped for lack of money, but the idea did not die with it. Recently, Climos, a young company in San Francisco, acquired risk capital in the amount of 3.5 million US dollars for this purpose. The enterprising founder of the start-up, Dan Whaley, is known for his business instincts. In the mid-90s, he founded a company for online travel reservations named Get There. Just four years later, he sold Get There for 750 million US dollars to the Sabre Group, an online travel company.

For centuries, passionate, visionary, and occasionally eccentric human beings have had provocative ideas fueling changes and business models nobody thought possible at that time. There are many signs that the world can expect this kind of surprise again by the protagonists of geoengineering, such as Dan Whaley, Klaus Lackner, David Keith, and Nathan Myhrvold.
“We should not optimize the wrong systems”

The German chemist, environmentalist, and corporate consultant, Professor Michael Braungart, in an interview about basic new forms of resource implementation, the need for intelligent wastefulness, and the biomass of ants.
Mr. Braungart, there is hardly an environmental conference that would not like to have you as a guest speaker. And what’s more, for some people you are the potential rescuer of the world. Why this prominence?

By now, many people understand that we cannot save our planet by self-limitation, reduction, and efficiency alone. We have to radically change our thinking. It is not enough to create things that are less damaging. And it does not make any sense to save CO2 at any cost. That’s comparable to a person who used to smoke three packs of cigarettes a day and has now cut back to one pack per day. Instead we have to learn to handle raw material intelligently. In the near future, we should have only two types of products: consumables that are fully biodegradable, and durable goods that are indefinitely recyclable from cradle to cradle instead of as we know it now – from cradle to grave. The result would be a healthy, vital, and life-affirming world without waste.

Please explain.

The basic problem is that we consider a human being as a pest and treat him accordingly. The reason for this is that humans are the only living creatures on this earth that produce garbage and quite often even highly toxic garbage. What we as human beings leave behind us is comparable to a catastrophe. In the North Pacific, we have regions where the plastic concentration in the water is eight times higher than the plankton concentration. If we were as intelligent as an ant, we would not have environmental or overpopulation problems. Overall, the biomass of ants is about four times larger than that of humans. And the calorie consumption of all ants put together corresponds to that consumed by approximately 30 billion people.

But a human being is not an insect that is happy with what nature offers it. A human being wants to drive a car, eat strawberries in winter, and buy new clothes for every season.

But we are not talking about doing without. People should retain their accustomed lifestyles. But we should not walk around in highly toxic designer suits or buy cancer-causing toys for our children. This is completely unnecessary. We are ready today to produce consumables and durable goods that we can throw on the compost or recycle in full. For the Airbus A380, EPEA (refer to box above) developed fully compostable seat covers; for Triumph, the lingerie manufacturer, a skin-friendly black was created; for Trigema, the sports fashion manufacturer, EPEA designed compostable T-shirts; and for Herman Miller, the British manufacturer of office furniture, the institute designed a chair with 95 percent recyclable parts.

Granted these are interesting individual examples, but they are not revolutionary. Recycling is after all not a new idea.

Take any newspaper, anywhere in the world. It is quite toxic – despite that we have eliminated one-quarter of the print colors in the meantime. One kilogram of toilet paper produced from old newspapers continues to contaminate three million liters of water at a minimum. If we would be working according to our “cradle-to-cradle” principle, it should be possible for me to throw the paper without hesitation into the biodegradable waste.

While Arnold Schwarzenegger pronounced California the “cradle-to-cradle state” and Denmark, the Netherlands, as well as New Zealand “cradle” as well, other countries show little interest in your ideas. Do you know why?

Germany, for example, manages by guilt. People there feel guilty and tell themselves: I am an environmental pig – 100 percent. Their goal is to reduce their piggy behavior to 90, 80 or 50 percent. This means that they issue limits and prohibitions, such as the law about lead-free...
Industry Journal | 02 | 2010 | Environment

**The pacesetters**

The list of corporations that have been brought fully or in part under Professor Braungart’s cradle-to-cradle principle, is a long and prominent one. In Denmark Lego, the toymaker, and Maersk, the largest shipping company, have joined the ranks. In the Netherlands, we are talking for example about the chemical giants Akzo Nobel and DSM as well as the waste management company Van Gansewinkel.

In Austria the manufacturer of high-end furniture and curtain materials, Backhausen Interior Textiles GmbH, reorganized its entire production. The company foregoes hazardous chemicals and accepts used materials that can be fully recycled. The customers get a bonus for their efforts.

**electrical devices. But what do they use instead? Zinc, silver, copper, nickel, bismuth – everything that is just as toxic as lead. And these are just a few of the 4,360 chemicals which we found in a single television set.**

**What has this to do with climate protection, to which you are also committed?**

Take biofuels, for example: One hectare of rain forest stores approximately 300 tons of carbon, a one-hectare-large palm oil plantation stores just a fraction of it, to be exact less than 40 tons. The rain forest obviously does much more for the climate, yet we continue to deforest it to re-plant it with palms for seemingly green biodiesel production. Due to biodiesel promotion, Europe has become the largest importer of cooking oils. In reality, such supposed improvements cause enormous damage. And that’s my point: If we focus on optimizing a system that’s basically wrong, we actually prevent necessary changes.

**It’s probably not possible to forego critical substances all together, not even in a cradle-to-cradle world.**

That’s correct. But we have to consider these substances as a valuable technical medium and reuse them. Up to now they have become lost when melting them down during downcycling or even ending up in an incinerator. Another one of those typically human traits: When they are at their wits end, they fight danger traditionally with fire and destroy all nutrients. That does not speak of progress, instead it’s pure dark ages.

**How do we move forward, then?**

We need integral, demanding visions instead of being happy about passive houses, zero emission and waste avoidance. I am talking about positive objectives that appeal to everybody. Breast milk, for example, contains 2,500 chemicals. Not a single drop of it should be marketed as milk. If we would put out an objective such as “chemically free breast milk in ten years,” every chemist or scientist would have the feeling of providing a worthwhile contribution through his work and improving the world a little, or let’s say, make it really better. Because all people would profit from these efforts. Another objective would be improving indoor air. It’s up to eight times poorer than inner city air.

**How is that possible?**

Because clothing, furniture, rugs are full of chemicals that get into the air. We have to reinvent everything. And the great thing is – we can invent everything again. In the sense of intelligent wastefulness.
The principle

Cradle-to-cradle is the vision of a waste-free economy devised by the German chemist and process engineer, Michael Braungart, and the American architect and designer, William McDonough.

The central term is eco-effectiveness. In two closed circles products are manufactured intelligently so that they can be returned to nature free of toxic chemicals – for example, compostable shoe soles, T-shirts, and vacuum cleaner bags – or can be fully recycled. Critics claim that this vision cannot be implemented on a global basis.

A hedonistic interjection at a time when the norm is to save, save, save.

Take a look at the trees in spring. They are not efficient. They are total squanderers. They do not save, they don’t deprive themselves, they do not avoid anything. But they produce all things in a way that’s beneficial to other creatures. Instead of romanticizing nature, we should use it as an example. Nature does not know waste, relinquishment, or limitations. Instead it uses the right materials at the right time in the right place.

How then should people act in the future?

When we exclusively use non-toxic and reusable substances from the beginning, we are practicing ecological effectiveness and can be as lavish as nature itself. This would greatly contribute to feeding the growing population of the world and at the same time maintain our standard of living.

Would you need a different understanding of consumer and ownership in your cradle-to-cradle world?

In the cradle-to-cradle world, the consumer becomes the user who has to ask himself only two questions: Can I throw the product away and make compost from it? Or can I return it to the manufacturer for recycling? Years ago I took a look at my television and found 4,360 toxic chemicals. All I wanted was to watch television – and not be held liable for 4,360 toxic agents.

Do you have a choice when you want to watch television?

Right now, no. This is really absurd and could be resolved by a different economical solution. Why is it not possible to lease a television or a computer for a set number of operating hours? Drive cars for 100,000 kilometers? Or look through windows for 25 years? In this manner, manufacturers would be tempted not to produce goods as inexpensively as possible, but rather as intelligently as possible. And above all, made from material that can be reused over and over again.

Why don’t we have this type of ecoleasing by now if it would simplify everything?

But we do have it already. The US rug company Shaw, probably the largest rug manufacturer in the world, developed rug material together with experts and raw material suppliers that can be recycled without loss in quality. The rugs are no longer sold but leased instead. The example shows: We already have an economically feasible market for these types of useful concepts. ■
“The collaboration that Siemens brings to the Vatican, both in terms of its highly responsive managers and technicians, as well as the technologically advanced instruments the company provides, demonstrates Siemens’ commitment and technical skills that are prized accordingly by the upper echelons of the Vatican City.”

Cardinal Giovanni Lajolo, President of the Pontifical Commission for Vatican City State and President of the Governate of Vatican City
The many artworks, historical buildings, and traditions at the Vatican requiring protection are unlike any place else on Earth. Human eyes and attentiveness have long been insufficient to provide proper security monitoring. High-tech, individual solutions are necessary for security and for maintaining building technology at its highest level.

Not only under divine protection
Interview with Peter Löffler, the head of Lifecycle Security of the Security Solutions Business Unit of the Siemens Building Technologies Division

How has the security field developed economically?

Since the 9/11 attacks in New York in 2001, the worldwide threat level has increased dramatically. As a result, the field saw above-average growth and has become one of the fastest growing markets. This development will continue.

Can security problems be solved through technical means alone?

No unfortunately not. But we can make the world much safer with our systems. We continue working on this with our customers and the authorities.

What would you like to see to further increase security on streets and plazas?

Algorithms capable of evaluating the characteristics of milling crowds of people. This would enable previously defined measures to be put into place and prevent accidents. For example, if panic is spreading because of an overfilled train, access to the track or train station could be closed in a timely manner.
Who is responsible for security at the Vatican?
“The Swiss guards” is the accepted response.
And it is true, up to a point: in early May of this year, Pope Benedict XVI expressed again his trust in the Swiss guards: “Peter’s successor sees your true support and entrusts himself to your vigilance.” The Swiss troops have been guarding the entrances to the Apostolic Palace since 1506. The 110 faithful guards have been called upon many times to protect the leader of the Roman Catholic Church against assaults, and selflessly provide for his personal protection.

However, when talking about protecting the inestimable treasures of the world’s smallest recognized state against theft, vandalism, fire, or other harm, the Vatican relies on its close partnership with the Siemens Building Technologies Division (BT).

A singular 44 hectares

It is an enormous challenge because every detail in the 44-hectare city is a historical work of art. Almost every building is unique. Historians, architects, and tourists rave about the beauty of Saint Peter’s Basilica, the Apostolic Palace, and the Sistine Chapel. Small wonder that UNESCO designated this center of faith for one billion people in the middle of Rome a World Heritage Site back in 1984.

Cooperation with Siemens dates back long before that, to 1941, to be exact. The Vatican awarded Siemens the contract to install telephone and electrical equipment. In 1986 linear smoke detectors were installed in rooms containing priceless artworks. And just ten years later BT participated in the expansion and renovation of Casa di Santa Marta. Innovative technologies were installed in the Papal guest house to safely accommodate cardinals and bishops during their participation in conclaves, consortia, and other religious ceremonies. But guests are also supposed to feel comfortable during their stay. For this reason, the Vatican brought the building technology up to start-of-the-art, including air-conditioning and electric power supply and distribution.

Protecting the Vatican newspaper

In 1999 the Casa di Santa Marta and the headquarters of L'Osservatore Romano, the Vatican newspaper, were equipped with fire detectors and special fire control panels. And over time, new orders came from the Holy See to make Vatican City more secure and adapt its building technology to the latest developments. In 2001, the mini-state had 90 working fire control panels and around 2,000 smoke detectors. These were not commercially available products, but rather highly sophisticated units with specialized equipment to protect the irreplaceable treasures of the Vatican museums and other buildings. An additional requirement from the customer: the required installed equipment could not in any way impact the presentation of the artworks.

It was not just the forward-looking innovations from Siemens that convinced the Vatican to seamlessly continue its cooperation with Siemens. “Our successful cooperation with the Vatican is due to the fact that we do not position ourselves as sales people, but instead as partners and advisors,” explained Armando Trevisi, who directed the Italian subsidiary of Building Technologies through the end of 2009. In 2003, additional security and safety products based on the latest technology were installed. To ensure the highest levels of security, BT works together with the Vatican’s technical employees. This enabled them to determine potentially critical areas that could lead to fires and include them while planning the control panels.

A single network for all control panels

Together with the customer’s technicians, Siemens has now connected all fire control panels to a single network. The fiber-optic-based network now includes 120 panels and thousands of fire detectors linked to the MM8000 danger management system. The building technology systems are also being continually optimized, and have now been linked using the Desigo building automation and control system. The same is true for the modern lighting solutions from the Siemens Osram Division that light several halls.
Several months ago the Vatican Bank, the “Istituto per le Operere di Religioni,” began using Siemens systems to protect against fire and theft. The installed solution provides the financial institution with the highest level of autonomy for control and monitoring. To meet customer requirements, the Desigo building automation and control system is also used. Multiple management stations control and manage via the Internet. The fire detectors are connected by an interface to the Vatican City Fire Department’s monitoring system. It activates immediately if the graphic displays on-screen and messages make deployment necessary.

Pope Benedict XVI is also benefiting from Siemens solutions in his private quarters, which control and monitor lighting and control panels in his inner sanctum. The same is true of the Cappella Paolina, the Vatican audience chamber – the Sala Nervi, the Papal helipad, and the small state’s police station.

Further expansion of cooperation

The cooperation between Siemens and the Vatican is expanding further: for example, technicians are currently working on a procedure to enable all systems installed in the museums to be merged, further improving monitoring. For Siemens, this new order is yet further proof of the appreciation Rome has for its solutions. Transparency and partnership along with single-source, comprehensive solutions are the foundation for this trust.

Saint Peter’s Square is the border of Vatican City. There, the traditional Swiss Guards provide security.
Clearing the way

Growing cities, increasing traffic – but with fewer traffic jams and greater safety: transportation technicians are working on making the impossible possible. They are developing intelligent, networked, and dynamic concepts that point automobile drivers in new directions.

Every year, tens of thousands of German vacationers answer the call of the Swiss mountains. For many, their travels take them through the Austrian city of Bregenz. To avoid paying the highway toll, drivers traveling to Switzerland often take the toll-free road on the eastern shore of Lake Constance and through downtown Bregenz. This leads to serious traffic jams; during the season, bumper-to-bumper traffic is the norm.

For some time now, however, an intelligent traffic sign has been getting drivers to rethink their plans – allowing city residents to breathe a sigh of relief. Instead of a general, widely ignored recommendation to take the highway, display panels now inform drivers of the actual travel times into Switzerland. Drivers can then decide whether they would rather fight their way through downtown, or whether it would be smarter to invest a few Euros on highways tolls and get there in less than half the time. Since
the sign has been erected, many more drivers are opting to travel the toll route, significantly relieving traffic in the city. And travelers feel well informed, not patronized.

To determine the dynamic travel time information reliably, Siemens installed infrared sensors on downtown street lamps. The sensors register every movement of the autos passing by. Traffic density on the highway is determined by loop detectors embedded in the asphalt. Using this information, the computer calculates the respective travel time. The display panel is continuously updated via radio. Traffic management systems such as these reduce traffic congestion and increase road safety (see interview to the right).

Solutions for megacities

What works for highways and wide-scale areas also works for the megacities of this world, as London clearly shows. There, Siemens has implemented many elements of its “Complete mobility” strategy. To optimize traffic flow and reduce congestion, automobile drivers are kept up to date and networked accordingly. Public transportation is also included in the concept. London improved its local and regional transportation using Siemens commuter trains, and initiated a city toll system with the participation of Siemens. The result: more that 50 percent of drivers switched to buses and trains, and street traffic in the toll area was reduced by 15 percent. And each year, 150,000 tons fewer CO₂ emissions are generated.

Greater mobility, increased safety, sustainable environmental protection – more than 2,400 employees of the Intelligent Traffic Systems (ITS) segment are committed to these goals. Their products and solutions are always based on three levels. First, transportation flows are determined and analyzed – using video cameras, satellite images, or radar detectors. Based on the data collected in this way, real-time information, short-term prognoses, and long-term scenarios and recommendations are established in the next step. The information is intended for motorists as well as public and private institutions. The third step involves influencing traffic flows both in the short term and sustainably. This could be handled in the short term, for example, by using variable message signs posting information such as dynamic speed limits, bans on passing, use of shoulders for traffic on a temporary basis, and warnings. In contrast, long-term transportation control is focused on traffic signaling and control, such as giving buses and trams preferential treatment, as well as sophisticated toll and parking guidance systems.

“The greatest challenge is coordinating the traffic data and linking the systems,” said Uwe Strubbe. This is the job of the head of Siemens Mobility in Bavaria and the director of the Bavarian Transportation Information Agency (VIB), a consortium with participation by the state government. “Our job is to provide citizens and companies with comprehensive traffic information. Traffic data – from cars to trains to bicycles – are collected, evaluated, and made available for free on the Bayerninfo Web site.”

A similar job is performed by the traffic management center (VMZ) Berlin, where Siemens has a 100 percent share in its operating company. Through online offers, information boards, and a local radio station, motorists are kept informed continually. “Berlin has one of the most modern traffic control centers in Europe. Traffic is recorded at more than 600 measuring locations with more than 300 video cameras,” said Jürgen Glauche, Senior Product Manager at Siemens Mobility in Berlin.

Green waves in the Persian Gulf

It is not only the western world that depends on networked traffic control. The growing metropolitan areas in Asia and South America require intelligent strategies to handle the onslaught on their road networks. Abu Dhabi and Dubai were the first to be equipped by Siemens with a central traffic management system that ensures green waves in the Persian Gulf. The result: fewer traffic jams, reduced energy consumption, lower environmental impact, and more relaxed drivers. Other Asian megacities such as Bangkok and Shanghai use high-speed rail and toll solutions from Siemens. And in Santiago, Chile, Siemens technology controls some 2,000 crossings. This information is continually updated and provided via the Internet.

But even the most intelligent concepts function only when drivers follow the information provided by traffic centers. However, many find it difficult to deviate from their usual routes. “The recommendations provided by the Berlin traffic management center are followed only by 30 to 40 percent of motorists. Comparatively speaking, this is a relatively high level of acceptance,” said Glauche. With ever more exact data and precise information, he and his colleagues are working on increasing these numbers – to benefit both citizens and the environment.
Interview with Sylvia Piszczek, traffic expert at the German Federal Road Research Institute (BASt)

To what extent do traffic control systems contribute to traffic safety?

To a significant degree: evaluations of seven tested route guidance systems have shown that appropriate systems help prevent accidents. Where the systems are in use, the accident rate fell 25 percent, and for multi-vehicle accidents with more than six vehicles, the rate dropped 54 percent. In fog, the accident rate dropped by 80 percent.

What is the reason for this effect?

Route guidance systems such as variable message signs or flexible speed limits and warnings mean greater attention on the part of motorists. They have been shown to adapt their speed and following distance better to the actual traffic situation.

How do traffic control systems contribute to the prevention of traffic jams?

The control systems ensure a much more efficient distribution of traffic flow. Depending on the size of the network and associated detours for individual drivers, up to 15 percent of drivers can be redirected, thereby reducing the volume in stretches where jams commonly occur.
Abu Dhabi, the capital of the United Arab Emirates, has one of the most spectacular racetracks in the world. On this track, Formula 1 cars speed through a hotel, drive during both daylight and the dark, and give their all in neck-breaking curves—and to boot the background technology is the most modern in the world.
Most spectators along the 5.5-km-long circuit don’t notice the efforts made. They are more interested in the layout of the route, the imposing buildings, the pit lanes, and the luxurious VIP lounges than in electrical systems. Yet without this nervous system, they would be robbed of their fun: the cars would stay in their garages because electricity is of elementary importance to the racing business.

This is the reason why the consortium of PKE and Siemens with its 1,800 employees in multi-disciplinary project teams was requested to develop and install a 22 kV high-tension network. The network includes 18 substations, 30 transformers and an entire battery of switching panels and distributor boxes to supply the racetrack complex. The energy is routed through a labyrinth nearly 5,000 kilometers in length filled with wiring and cabling systems, as well as cable ducts to supply 20,000 electrical connections, outlets, light switches, dimmers, motion sensors, and other devices for the facilities.

The heart of the Yas Marina Circuit is the race control center. In this center, auto race marshals...
and officials watch all events on the track. In support, PKE and Siemens installed cameras that provide sharp, crisp images, day or night. The cameras transfer these images to freely scalable rear projection monitors in the race control center, where the marshals are able to check each split second of the race for compliance with the rules. The pictures are saved to special servers for digital real-time storage of video images – in case the jury wants to look at details after the race.

If it becomes necessary to interrupt the race, the marshals and the race control center communicate via a marshal intercom system from PKE and Siemens. After consulting with the race organizer and other officials, the race control starts the traditional racing flag procedure in yellow, red, or green. At the Yas Marina Circuit, however, a button gets pushed – there the “flags” are high-tech digital signal lamps installed across the entire track at specific intervals and in agreement with FIA guidelines. They are configured so that they can be easily recognized in glaring sunlight or during the night.

**Timing systems for two racetracks**

At every race, time is of the utmost importance. To meet this requirement, PKE and Siemens provided state-of-the-art timing equipment for registering and storing times and speeds obtained. The two racetracks combined into a parcours for Formula 1 races, are equipped with Wireless Local Loop (WLL) systems. On the acceleration straightaway, laser technology is used instead to follow the vehicles provided with transmitters to within ten thousandth of a second. The information is forwarded via fiber-optic cable routed for kilometers below the entire track.

Fiber-optic cables also play an important role in the communication infrastructure. They connect 2,500 phones and 6,000 data input points to one another and to the outside world. This network is also of central importance for the on-site media. As compared to the up to 50,000 spectators, most media representatives follow the action via monitors. In this case it’s a wall-sized rear projection screen – the world’s first in race car journalism – provided in the media center for the more than 600 accredited media representatives. From there, the journalists send their reports to their headquarters in London, Frankfurt, or Tokyo. Again, they use the broadband Internet connection and the digital telephone systems by PKE and Siemens.

In addition, the technology consortium developed and installed a Satellite Master Antenna Television (SMATV) system. This is actually an
in-house cable television station that distributes different programs or video feeds via 7,000 outputs located across the facilities. In addition, almost 1,000 TV receivers were installed at especially critical areas, for example garages, team buildings, administrative offices, and VIP areas, as well as in the pit areas and in the Sun Tower for VIPs.

For luxurious locations of this kind, a multifaceted and unusual lighting technology is a must. PKE and Siemens delivered and installed a convincing ensemble of architectural lighting fixtures for the overall facility – both inside and out. Especially noteworthy are the LED lighting systems operated with solar energy. They are used in the Sun Tower as well as effect lighting found throughout the facilities. The outside LED lighting of the Yas Hotel is an example of unique lighting design.

When the lights went out across the track at the end of the opening race, everybody was happy about the successful premiere. And not just Sebastian Vettel as the winner of this race, but even more so Jenson Button who became the 60th Formula One World Drivers’ Champion, and who finished third.
Soon there will not be enough land to provide food for humanity. People will have to look for something new – in the middle of the city. “Vertical Farming” is the name given to this vision by some not-so-crazy urban planners.
For as long as there have been cities, they have differed from the land surrounding them in two ways: the land is flat, but cities reach toward the sky. And in the city, all food that is purchased is produced in the countryside. For centuries there has been an unwritten rule: farming cannot take place in the city.

However, Dickson Despommier is attempting to change this. The professor of environmental medicine at New York’s Columbia University has been championing the idea of moving farming into the city for more than a decade. His concept is called “Vertical Farming”: hothouse high-risers being cultivated in the middle of the city to meet the fruit and vegetable requirements of residents. “A 30-story farmscraper can produce as much food as 1,000 hectares of farmland,” said Despommier. “And with far less environmental impact and water consumption.”

**Lack of arable crop land**

As the New York ecologist began developing his idea in 1999, his primary idea was for a solution for the land. Conventional farming requires a lot of energy and water, endangers the soil and biodiversity, and is reaching critical mass due to the growth in population. “Today, the 6.8 billion people throughout the world are cultivating an area the size of South America in order to produce food. Based on current forecasts, by 2050 the population will grow to 9.5 billion. The world will need additional fertile land the size of Brazil to feed itself – and that land simply does not exist.” Despommier’s conclusion: build upward.

**Solutions for major cities**

There are already a myriad of reasons why vertical farming could be a solution for cities. Food production in the middle of a city could bring many positive impacts – for example, promote growth, stop urban decay, recycle water, and generate energy. Today, more than 50 percent of all people live in cities. According to UN calculations, by 2030 that number will reach 75 percent. A metropolitan area such as Tokyo houses some 37 million residents, followed by Mexico City and New York, each with 23 million. Providing for these people would be much easier if every lettuce leaf did not have to be transported hundreds of kilometers. In cities affected by
industry changes, once industrial or commercial areas lie idle. The change to agrarian spaces offers an opportunity for revitalization. And with vertical farming, the otherwise serious problems of conventional farming, such as contaminated soil, never occur in the first place. In Detroit the investor John Hantz, with the support of the city, has begun converting deserted industrial and residential areas into farms. The plants can be irrigated with non-potable water, and the production waste can be converted into biogas or electricity at biomass facilities.

Chicago as leader

In industrial countries, cities developed under the premise of low-priced, available energy. When these assumptions begin to be questioned, as they do today, new, sustainable solutions have to be found. Vertical farming is perfectly suited to this. U.S. ecologist Ben Kennedy, a colleague of Despommier at Columbia University, examined what would be required if someone in a city such as Chicago wanted to cultivate the six most consumed fruits and vegetables following the vertical farming concept – namely iceberg lettuce, red oak leaf lettuce, tomatoes, strawberries, broccoli, and spinach.

His results: cultivation would require 1,467 “garden carousels,” modules consisting of one of each of the six plant types in rotation. The total required area, approximately 100,000 square meters (one-twentieth of the area required for conventional cultivation) could be housed in five inner-city warehouses that already exist. In addition to the total investment of 122 million dollars for the purchase and renovation of the buildings and purchase of the garden carousels, an additional 5 million dollars per year would be required for personnel, maintenance, and energy costs. This would produce a yield of foodstuffs with a market value of close on 100 million dollars per year.

“It would bring in money, create jobs, and even become a tourist attraction,” said Dickson Despommier on why vertical farming makes sense for Manhattan. Maybe not in Times Square, but perhaps in Harlem. And perhaps not quite as extravagant as the 132-story “Dragonfly Building” that Belgian architect Vincent Callebaut wants to build on Roosevelt Island next to Manhattan: a combination office building, farm, and solar power plant. One hundred fewer floors would be enough for Despommier.

Hyatt Hotels with farmland

He already has the Manhattan Borough President on his side; all he needs now is a suitable investor and the right property. This is partially due to New York’s strict building codes, which are not designed for hothouse highrisers. For this reason, Despommier is running a pilot project in Jordan: the Hyatt Hotels there will become carbon neutral by cultivating farm highrisers. “You’ll have an abundance of sunshine – for the water, you have to drill deeper than in New York.”

But now the time may be right for Despommier’s dream: local food production is now the trend. “After the flood of staged productions, what’s missing now are grounded, authentic results,” said Nicole Lüdi, trend researcher at the renowned Gottlieb-Duttweiler Institute in Rüschlikon near Zurich. “We long to undo our perceived disconnection from our roots. The longing for reconnection is growing – a reconnection with our origins. It is a sort of homesickness.” The city dwellers want to return to the land.

Naturally, there have always been critics of today’s type of urban way of life. But the adherents of alternative, rural ideas were always nothing more than fringe groups, or back-to-nature types. Now in the developed countries of Europe they are part of the mainstream. And because, according to Lüdi, “not everyone can be self-supporting, in a consumer society organized according to division of labor. Eventually the economy will come to grips with the longing for reconnection, and it will make an offer containing the hope of coming closer to that longed-for state.”

Something like the recently opened “Prime and Toast” in Kuwait, a restaurant with an integrated farm. For irrigation, one of the highest cost factors for agrarian undertakings in the desert, the condensed water from the restaurant’s air-conditioning system is used. But the production, the cultivation of herbs, salad, and vegetables are also integrated directly into the restaurant experience. Guests can personally select their head of lettuce or cauliflower, which is picked and prepared before their very eyes.
How does this work?

A water management system
Management of global water resources is vital to creating sustainable water supplies for potable, agricultural, recreational, and industrial use.

Keeping water flowing across the entire water cycle will become increasingly essential for mankind – for drinking water, industrial process water, wastewater, and water transport. This requires high-performance, efficient solutions for water treatment, plant automation, electrical systems, and building technology, and the requisite services from financing, design and planning, commissioning, maintenance and emergency support, to modernization.

Drinking water treatment

A full range of potable water treatment and systems support municipalities in providing drinking water to their customers. These include conventional filtration, membrane filtration, clarification, disinfection, and control systems.

Wastewater treatment

A large portfolio of technologies and services help communities meet their wastewater treatment requirements. These include biological and anaerobic treatment, clarification, digestion, chemical feed, reclaim and reuse systems, and odor control systems. By reclaiming and reusing highly treated wastewater, communities can reduce the costs of clean water, ensuring adequate supplies, and help to preserve a diminishing natural resource.

Industrial process water

Process water and high-purity water needs differ significantly across industries, with each industry having its own application requirements. High-purity water and chemical feed technologies help industrial and laboratory customers ensure consistent quality and quality for their production and research needs.

Industrial wastewater treatment

In today’s competitive environment, companies must manage costs associated with water and wastewater treatment. Siemens helps companies meet ever-increasing industrial regulations, while improving efficiency and reducing waste disposal costs.

Water transportation

Efficient, high-performance pump stations and long-distance water supply systems ensure an efficient transportation process from the waterworks to the area to be supplied, ensuring that the end user can be supplied with water at any time.

Treatment plants and building topics

Lighting, grounding, intercom and radio systems, air-conditioning, water and sewage, or pulpits – all these systems, while not part of the core process itself – are nevertheless necessary for the smooth operation of a plant. A complete range of services ensures that infrastructure systems always operate at high availability and productivity.

Energy and automation

Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) from Siemens provide an integrated and scalable product and system basis for meeting customers’ specific automation solutions. They allow reliable, flexible, and economical energy distribution and automation for the plant’s daily operation.

Electrotechnology and automation

A modular water management system optimizes the plant’s water supply. It consists of sewer control, leakage location and detection, and optimization of operations, and, beyond that, a document management system and electronic operation journal. This is accomplished with a wide product range such as flow measurement equipment, automation, SCADA and control systems including telecontrol technology, complex power unit systems, MV/LV-switching systems, and the complete program of electrotechnology. Services such as monitoring over the lifecycle, maintenance, upgrades, and rebuilding are included.
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