pulse

MOVEMENTS IN ARCHITECTURE

02 | 2010

Zero energy house surPlushome

By Manfred Hegger

Networking und automation – intelligent buildings

Quo vadis, sustainability?

Ecological concepts – visiting Behnisch Architekten

ABB

Christoph Reichelt

Architect Werner Sobek has never considered architecture that is aesthetically pleasing yet consistently sustainable to be a contradiction in terms.

To the point: sustainability & aesthetics

pulse in conversation with Werner Sobek

Your great passion is architecture that does not require outside energy inputs. What motivates you to pursue this objective so rigorously?
Quite simply the realization that we cannot go on building as we have been doing. We use the most valuable raw materials such as crude oil or coal to produce energy rather than preserving them to manufacture high-quality plastics. The emissions created in producing that energy are also the reason for global warming, the third greatest ecological problem we face today. This is why it is vital for us to achieve an architecture that manages without fossil fuels (both for production and operation) and which can as far as possible be recycled.

Energy efficiency has become the key word of the 21st century. Where do you personally see the greatest energy savings potential in architecture?
First of all in reducing "gray" or "embodied" energy, in other words the energy required to extract raw materials, manufacture base products and half-finished products, but also all the associated transport and assembly processes. The second greatest energy-saving potential lies in the more consistent use of the solar energy that shines on our buildings. The third greatest savings potential lies in managing the energy inside our buildings.

With your R 128 house, you have proven that it is feasible for energy-efficient buildings to also satisfy the most exacting architectural standards.
The sole purpose of my work is to create beauty. This is inextricably linked to achieving a high standard of functionality and sustainability, whereby the latter means we must be proficient in advanced technologies. Architecture whose aesthetics are about renouncing pleasure will never find its way into people's hearts and will not be accepted à la longue. No, sustainable architecture must be breathtakingly beautiful!

Energy efficiency will most certainly shape our lives, but can evolution manage to keep pace with this radical change you are seeking?
I think so, yes. Given the changes that the various societies on Earth have undergone in the last 20-30 years and that they will undergo in the coming decades, such a step, radical as it is, towards a sustainable architecture with a high-grade design is still the easiest way to master the problem. And it can be realized precisely because you can communicate its necessity to everyone.

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Picture editing:
Raphael Pohland / stilradar

H. G. Esch

The atrium is now a regular feature of sustainable office architecture. In the Lufthansa Aviation Center, Ingenhoven Architekten conceived the greenery as a cold, heat and air buffer and in doing so created a healthy work environment.

Quo vadis, sustainability?

Something has altered since the early days of sustainable architecture: today, you do not necessarily immediately recognize its ecological intention. A wide variety of styles has developed. Indeed, at times architects face a bewildering choice given the wide range of techniques for improving the ecological balance. There is also little agreement over the criteria to be applied for evaluating sustainable architecture.

By **Falk Jaeger**

Since the introduction of rolled steel joists and reinforced concrete the building industry has not experienced such radical technical changes as in the last decade. Everything architects design and engineers construct is put to the test: Is the construction sustainable, is it energy-efficient, how is its eco-balance? Yet never before were the criteria distinguishing good from bad as uncertain, as vague, as imprecise – and as easy to manipulate. Just what a "passive house" is may more often than not be defined by the property developer's PR agency. The star architect sells his client an "eco-high-rise" and yet ignores the fact that a high-rise is about as ecologically sound as a Formula 1 sports car run on bio fuel.

New techniques for generating energy

There is considerable uncertainty surrounding the options and techniques concerning energy consumption, but how is it to be less than for that surrounding the generation of energy? Solar energy, wind energy, geothermal energy, surely it must have become clear by now which techniques are most promising. But the race is still on, and all the techniques experience occasional spurts. Sometimes the development of solar cells experiences an advance as regards effectiveness, sometimes it is biogas plants. Then suddenly new low-loss electricity transmission techniques make wind parks in the middle of the North Sea a viable economic prospect, just like the fairly obvious idea to exploit the empty deserts of North Africa to produce solar energy. The scale of the international project Desertec, which has been put on track, is unprecedented; by 2050 the project is scheduled to meet 15 percent of Europe's energy requirements. The project will involve gigantic parabolic mirrors that bundle the sunlight in a receiver where a special oil is heated, which then drives the turbines. Transporting the electricity from North Africa to the consumers in Central Europe will play a key role, and it is here that the firm Busch-Jaeger will have a crucial part to play. When there is a need for cost-effective systems then upwind power plants will likely come into play despite their relatively low efficiency. A 30-square-kilometer "hot house " and a 1,000-meter-high thermal shaft with wind turbines necessitate high investment costs but operation using simple technology cannot be beaten cost-wise. Or maybe the production of biomass in algae cultivation plants will win the race, though its development is still in its infancy.

The very bright lobby of Patchwork House by pfeifer roser kuhn architekten (left) not only forms the communicative link between the two tenants but is also a key element of a sophisticated indoor air quality system. In Peking Mario Cucinella combined solar panels with attractive roof gardens for the SIEEB University (right).

The eco-house

Naturally, the progress made using alternative forms of energy on a large scale also benefits small-scale projects. But here again the protagonists appear to be challenged by the diversity of possible approaches. The eco-house emerged in the 1980s after those architects with an interest in bioconstructive issues also began to show an interest in energy balances. The early eco-house revolutionized the image of the single-family house, nonetheless, sustainability is not an architectural style. The solid core of the house is the warmest zone and is enclosed by a glass house with a pleasant temperature that acts as a heat buffer. A green shell responds to the seasons. On the North side evergreen climbing plants protect against the wind, on the West, South and East sides deciduous plants provide shade in the summer and let the sun enter in the winter. However, the heating of the house cannot be achieved without technical equipment: the energy management concept relies on shading systems, automatically controlled air ducts between the various zones of the house and heat accumulators for energy management. Later, the benefits of a two-stories town house as passive solar architecture were recognized.

Radical solution using solar sails

Generally, however, the eco-architect uses the roof surface in order to produce solar energy. One aspect architects have yet to solve is the design of warm water collectors, which almost invariably lie on the roof as unattractive blobs, cut black holes into the roof surface or squat jacked up on the flat roof. Integral concepts automatically involve abandoning the customary image of the house. As it is typical of the current trend for architects to experiment with the house type, and conceive gable-ended houses without an overhang and with an outer skin of stainless steel, concrete or even gabions, glass or fiber panels it ought to be possible to find radical concepts for realizing the water collectors. Solar architect Rolf Disch from Freiburg in South Germany came up with one solution installing vacuum pipe collectors as railing elements on his rotating solar house "Heliotrop": an effective technique as the pipes are highly efficient even when the sunlight is at an angle. And as the "Heliotrop" house built in 1994 turns with the sun, the collectors always stand in the best sunlight. Naturally, the same is true for photovoltaic, for which Disch realized a radical solution. The solar sail, a special structure on the top of the building, is always turned by the house to face the sun, thanks to the adjustable angle of inclination it follows the position of the sun heilostatically and ensures the photocells are always in an ideal position. Naturally, this is not an ideal solution for everyone or for every house but Disch applies the same ideas in a "normal" town house estate."Solarsiedlung am Schlierberg"(Solar estate on

Daniele Domenicali

Schlierberg) is the name of the district that began to evolve in 2000 and features "plus energy houses", whose buildings boast a positive energy balance. The flat sloping gable roofs have a long section facing South of photovoltaic panels. There is no longer the customary roof covering, instead the collectors themselves form the roof's skin, a saving that helps offset the system's initial costs.

The ecological factory

If is seldom today that administration buildings do not come complete with ecological promises. Nowhere is there such juggling with energy- and eco-balances as on the playground of the investors. What does an ecological high-rise look like? It may be that here and there high-rises post an acceptable energy balance in operation but they cannot be molded to have an economic (and consequently ecological) balance as the investment costs weigh on the projects as an unredeemed mortgage. For cost reasons they have resorted to single-shell facades once again. The latter are just as efficient, it is proclaimed with conviction, as the double facades thanks to new techniques but they require less material, involve less construction and above all, occupy less space. References are made to fantastic new windows, which keep out all undesired radiation, naturally without heating up themselves, which achieve incredible heat-insulation values and do not allow any sound in. They refer to ventilation wings, which open up slightly when the wind blows, and can otherwise be opened at least five centimeters. In short, hardly has the double façade been developed, and it has become obsolete. After all, its performance can be achieved by a single shell glass facade today, according to its proponents. However, given the current state of the economy the latter are under enormous cost pressure, and as such their claims will not be given much credence initially, we will have to wait instead for specific results and figures. But the development also means that from now onwards all high-rise facades will be identical again and that an architectural type of ecological high-rise has not been able to develop in this brief period. But administration buildings of normal height are a different case. They always incorporate an element that varies, however, in style: The green atrium. Various approaches are used to incorporate the heating and ventilation concepts. The sophisticated ventilation system works both with a double facade, elsewhere with internal flues and ceiling channels, with an earth duct for cooling in the summer and heating in the winter, and with the atrium, whose thermal dynamics play a decisive role. That leaves the question of whether you can talk about a generally applicable type of ecological factory. There are few available examples; after all, investments in ecological measures are expensive and need to be assessed over the longer

Marcel van der Burg, primabeeld

Transparent and ecological: The glass office and residential building by Opus architects occupies a gap site in Darmstadt. A photovoltaic and solar heating device is located on the roof.

The unusual sculptural facade of Marc Koehler's Ilburg Haus (above) is transformed in the course of time into a vertical garden. Rooms that exude a sense of great liberty and thanks to cutting-edge technology are sparing in energy consumption: New building of company Solon in Berlin by Schulte-Frohlinde architects (middle). The solar sail fitted with solar cells on the Heliotrope house built in 1994 by Rolf Disch turns to follow the sun (below).

myrzik&jarisch © SOLON SE

Rolf Disch SolarArchitektur

term, but these days factories do not tend to have a long service life. As such, the "eco-factory" is primarily a label that sells well as advertising but has not yet progressed beyond a prototype. In other words, anyone who operates a "solar factory" like that in Freiburg produces solar technology in it, and anyone who has built a "zero-emission factory" like Solvis in Braunschweig, is not only an environmentally conscious person acting for the good of humanity but also researches into and produces solar technology heating systems in the building. At first glance, the Solvis factory designed by the Bochum architects Elke Banz and Dietmar Riecks, is no different from other new factory complexes. You do not notice the highly insulating walls, the advanced ventilation systems with heat recovery are not visible, the delivery boxes that permit loading and unloading of trucks with closed doors in winter resemble large garages. The only striking thing about the factory's appearance: the solar panels on the roof. Large collector areas above the loading boxes contribute to energy production.

As such, there are no elements to suggest a certain type but rather attributes, which however given their lopsided arrangement out of sync with the remaining strictly cubic composition of the building are lent great significance and become highly noticeable. A new building designed by the company Solon in Berlin points the way for future commercial architecture with a sustainable architecture seal. It is a combination of architectural-conceptional ideas and appropriate technical installations, which enables the architects to design more flexible rooms and try out new typologies of work organization. Solon produces photovoltaic systems, which naturally also have a demonstrative character on this building. This might not make the building more sustainable, but energy efficiency is achieved thanks to the overarching concept, which, for example, also includes a newly developed paternoster. As yet the instruments, methods and standards are missing to be able to objectively and completely calculate and evaluate the sustainability of a building. The components, the criteria required are largely known, but work is still being done on the evaluation methods.

Prof. Falk Jaeger studied Architecture and Art History in Braunschweig, Stuttgart and Tübingen. Since 1983, he has worked as a freelance architecture critic and since 2000 has been Professor for Architecture and Theory of Architecture at Dresden Technical University. He is currently writing a book on stadium architecture, scheduled to appear to coincide with the World Cup in South Africa.

Eibe Sönnecken

Integral building automation has proven its worth whenever the goal is sustainable energy use: Systems for regulating indoor air quality, controlling lighting and sun protection are now being integrated into a single system.

Intelligent buildings

Networked buildings and room automation contribute considerably to the sustainability of a building and simultaneously enhance comfort for those persons using the room. Modern communications technology permits the transition from individual systems to an integral system and in the process creates synergies that should definitely be exploited in the interests of energy efficiency and sustainability.

By **Richard Staub**

As the trend moves towards green buildings, increasing emphasis is placed on building automation options. In addition to optimal geometry and alignment of buildings, a highly efficient heat-insulating shell and a high degree of regenerative energy, the control and regulation of building technology can also make an important contribution to energy efficiency. This applies in particular to older functional buildings, which are often veritable energy wasters. Old lighting systems with poor efficiency, shading systems lacking automation, oversized ventilation and air-conditioning systems without heat recovery, to name a few examples. Old automation systems lacking networking or management stations, often a different make for every system. The result: users suffer discomfort due to drafts, glare, not to mention time-consuming and expensive maintenance, high energy costs and much more. Replacing such systems with up-to-the-minute building- and room automation effectively kills two birds with one stone: Firstly, comfort, ergonomics and socio-cultural acceptance are enhanced, which is proven to be able to substantially increase productivity. Secondly, energy is employed more efficiently, which increases the value of the property, above all when this is attested to by a suitable certificate - in Germany, without a doubt pride of place goes to the German quality seal for sustainable architecture, the Deutsche Gütesiegel für Nachhaltiges Bauen (DGNB).

How building automation impacts energy efficiency

Essentially, building automation can positively influence energy consumption in two manners:

- Building/alteration work: reduction of the energy requirements thanks to efficient automation and control
- Operation of the building: reduction of energy consumption by monitoring, optimization and communication of the system components

These two elements are incorporated into the standard published in 2007 as EN 15232 "Energy Performance of Buildings: Impact of Building Automation, Controls and Building Management". Essentially, the aim is to avoid "operations with no additional benefit": Why should the light be on in an office when it is empty? Why should it be on at full strength even though the additional daylight entering the room means it could be reduced? Why should the ventilation operate at full capacity when


Eibe Sönnecken

there are only a few employees in an open-plan office? A study conducted by Biberach University three years ago on the energy savings potential of building automation came up with the following findings: Up to 40 percent can be saved in air-conditioning energy in an administration building and up to 25 percent in heat energy. As regards primary energy, requirements can be reduced by up to 50 percent. These savings can be achieved by installing modern sensors (for example, presence detectors, daylight sensors and air quality sensors) and through the networked control and regulation of all systems in a room using integral room automation.

Integral room automation

The EN 15232 standard defines four classes, namely A - D (A stands for the greatest efficiency, C for the level of "normal" systems to date) and sets out in detail which conditions in automation have to be satisfied in order to achieve the aim of the energy efficiency promoting class A or B. Class A can only be achieved by adopting an integral room automation system; this combines into one system the previously separate systems that control lighting, sun protection and air-conditioning. Networking systems create synergies. Take the following example: The sunlight entering a room creates warmth in a room, which depending on the rooms, a temperature is welcome or not. In unoccupied rooms thermal automation system – the room temperature is measured anyhow to control heating/ventilation – could regulate the sun protection so as to support heating or cooling processes. This means that in summer uncomfortably hot temperatures are avoided and in winter solar heat can support the heating system thereby reducing the energy needed for heating and cooling. Furthermore, room automation means that in "individual rooms" such as offices, hotel rooms or living space it is possible to meet the highly diverse needs of individual users. This is arguably room automation's most enduring contribution, as only what is readily accepted by users will endure. Users' requirements alter constantly; depending on their physical and emotional state, activity and age individuals may need less or more light, shade, heating or cooling to feel comfortable. Modern man is individual and autonomous, and would like his workplace to reflect this. Studies have

Efficiency thanks to networking: a thermodynamic system that regulates the sun shade equipment depending on the heating and cooling processes can help save energy

shown, for example, that simply being able to open a window at all times decisively increases the acceptance of a ventilation system. Integral room automation was enabled by the development of modern bus systems such as KNX, which allow sensors to communicate with actuators via a computer: sensors are devices that give orders such as calipers or temperature sensing devices, actuators perform commands and include light dimmers, switching devices to open and close blinds or valves. The functions are defined by computer programs and this makes them adaptable. This can, in turn, be exploited for simple management of specific footprints: The building technology is adjusted to suit altered rooms in accordance with the axes used. By changing the parameters rather than altering the installation.

Optimized networking

In modern buildings kilometers of network cables are just as much part of the infrastructure as are connections for water, electricity or gas. The internet protocol IP/TCP has established itself as the universal data transmission standard. In recent years other applications were added to these networks alongside computer networking, applications such as voice transmission (IP telephony, unified communications), audio, video and safety applications (for instance, surveillance cameras). So why not combine the various applications by using a multi-service IP platform that supports communication between all the building technology systems and also commercial language, data- and video services? The result: networked, intelligent buildings, which offer true value-added thanks to the bundling of IT networks and building automation systems. The benefits this offers: each device hooked up to the IP network - say a phone or computer at the workplace - automatically becomes an almost cost-free and convenient operating device. As the general planner of a building the architect is in a position together with the investor or operator to act early on and ease the way for the sustainable application of building and communication technology.

Richard Staub is an electrical engineer, electrician and systems integrator. He is Managing Director of BUS-HOUSE, a consultancy firm established in 1998 in Zurich, and works as a specialist journalist. Richard Staub is also a Professor and heads associations in the areas of building automation and intelligent homes.

Winning series with zero energy

In 2007, Professor Manfred Hegger and his students at the Darmstadt Technical University won the Solar Decathlon – the prestigious competition for sustainable architecture in the United States – with the "Plus-Energie-Haus". Now the building that has been developed into a prototype is touring Germany. Hegger's latest design for a zero energy home known as "surPLUShome", which also received a prize in Washington, will soon also be presented to the broad public.

By **Christof Bodenbach**

Anyone strolling across Rathenauplatz in Frankfurt – not far from the Stock Exchange, Alte Oper and the main shopping street, the Zeil – would have rubbed their eyes in surprise. You are struck by an elegant building with wooden louver and a flat roof. A new café? By no means: It is the "Plus-Energie-Haus" sent to tour Germany by the Federal Ministry for Transport, Construction and Urban Development (BMVBS), to inform the public about energy-saving, sustainable architecture. Since 2009 the house has been touring through German cities; it has already promoted sustainable architectural models in Hamburg, Berlin and Munich. Until May 21, it is possible to visit the innovative building in the Main metropolis. How did it come about? Against the background of the federal government's energy-and climate policy goals in 2007 the BMVBS became the sponsor for the German contribution to the "Solar Decathlon". The latter is not as you might first imagine a decathlon under a searing hot sun, but a competition organized since 2002 by the U.S. Energy Department, and open to universities. The aim is to present sustainability and solar architecture to a broad public and simultaneously promote innovation in this sector. Prototypes demonstrating sustainable solar architecture models are showcased in the guise of an architecture exhibition.

Solar decathlon

Energy saving in architecture is not a topic that has only gained ground in the United States of late. And as such "Solar Decathlon" is by no means an insider event: In late summer 2007 the broad National Mall in the heart of the capital Washington DC was transformed for a third time for two weeks into a solar village. More than 150,000 visitors found out about energy-efficient architecture and the related technologies; teams of twenty universities from all over the world competed for the most innovative, most functional and attractive solar house. The quality and functionality of the model houses was assessed and evaluated as a solar decathlon in ten sub-competitions (including Architecture, Lighting, Energy Balance, Engineering). The house developed by Darmstadt Technical University under the guidance of Professor Manfred Hegger won the renowned competition with a design that is not only impressive technically but also in design terms.

Optimized shading meets solar technology: Behind its wooden exterior shell the "Plus-Energie-Haus" conceals a combination of energy-saving materials and techniques.

Thomas Ott

BMVBS/Leon Schmidt (l.); Thomas Ott (M.); Leon Schmidt (r.)

And that is hardly an accident. German technology is a world leader as regards energy efficiency, for years students in the Department of Design and Energy-Efficient Construction within the Architecture Faculty of the TU have applied themselves to the future of architecture under the direction of Professor Manfred Hegger. With its integral concept Darmstadt was the only European university apart from Madrid to qualify for the competition dominated by Americans.

In a class of its own

For three terms the participating students worked on the project and had the unique opportunity of planning and building from the first idea through to the last screw. Not only architects but also civil engineers and electrical technicians from the TU got involved, and finally sent a simple cube clad with oak timber across the Atlantic; it stood out for its clarity and reduction. The 75 square meter house produces more energy than it uses, the surplus, according to the Project Manager Barbara Gehrung, can be fed into the network – or drive an electric car!" In a class of its own, a maximum of innovation," declared the jury. And student Hannes Guddat emphasized that it was especially satisfying to win "in the land of energy wasters ", of all places. After all the fact that the competition is run by the U.S. Energy Department proves that worldwide – and also in the country so besotted with using energy – the use of renewable energies is receiving increasing attention. The "Plus-Energie-Haus" of the BMVBS, which is now on show in Frankfurt, is an enlarged copy of the winning house and serves as a prototype mock-up for the BMVBS "Zukunft Bau" research initiative, which with a total budget of some EUR 34 million has been promoting innovation in architecture since 2006 and places the focus on applied research. The re-planning and advancement of the "Solar Decathlon" winner to the "Plus-Energie-Haus" was achieved by the office established in 1980 by Professor Hegger and his partners Doris Hegger-Luhnen and

Across a full 75 square meters the Plus-Energie-Haus ensures a comfortable indoor climate. Interested visitors in Frankfurt can also admire the reduced design of the prototype

Günter Schleiff Hegger, Hegger, Schleiff Planer + Architekten AG from Kassel, in collaboration with the team of developers "Entwicklerteam Gelber Pool".

Combination of passive and active elements

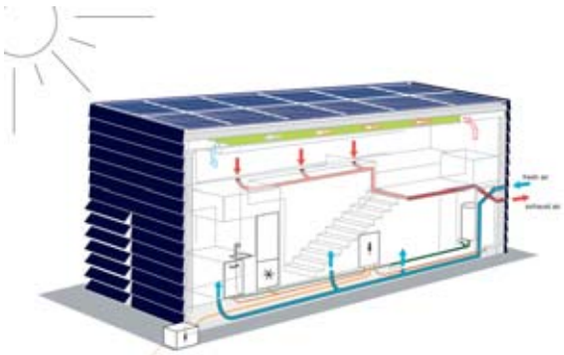
The basic concept of the energy system used in the "Plus-Energie-Haus" centers on losing as little energy as possible via the building shell and producing it sensibly and efficiently. This is achieved by an optimal interplay of various passive (low-tech) and active (high-tech) elements. In this concept the integral and sensible combination of the individual subsystems is very important for an optimized and innovative overall system that integrates building components and building technology and exploits synergies. In the interests of an integral view of the building, already in the design process construction materials and concepts were taken into consideration, which enabled a comfortable and energy-efficient indoor climate without technical aids. Only when the passive measures are not adequate for maintaining the required home comfort are they complemented with active systems such as photovoltaics or a heat pump. The "Plus-Energie-Haus" was designed according to the criteria of the passive house standard. This calls for, above all with regard to the wooden post and beam construction method chosen, protection against overheating in summer (using corresponding shading elements) and the simultaneous use of solar gains when the sun is at a low angle in winter. Additional thermal mass is achieved by staggering the intake and output of heat throughout the day. The generously spaced interior is designed for open and flexible use. The impression is not of individual rooms but one large room, which is divided into zones put to various uses through the installation of a sanitation and technology core. After entering the building through the main entrance in the North you come to a lobby area where specialist brochures and an interactive monitor inform visitors about the "Plus-Energie-Haus", the CO_2 building modernization pro-

In 2009, the prize-winning SurPLUShome reduced energy consumption even further thanks to innovative technical facilities. Temperature, humidity and light incidence can be controlled by a touchpad.

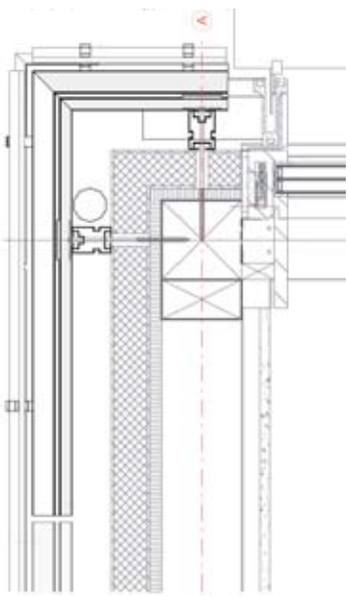
gram and funding programs, you then enter the large lecture room, which has space for up to 40 visitors. Manfred Hegger ensured that the house only employs technology that is already on the market. "It has nothing to do with visions for the future," he emphasizes. Nor does he like the term "passive, that sounds negative to most people. We ought instead to talk of an active house!"

A new lifestyle

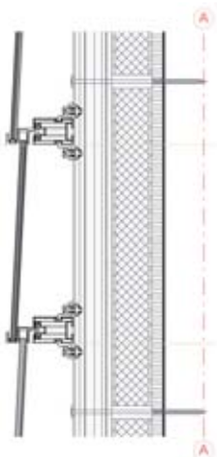
On 16 October, 2009 the winner of the fourth "Solar Decathlon" was announced in Washington DC: "And the winner is ... Germany!" For the second year running the TU Darmstadt team headed by Professor Manfred Hegger won the highly prestigious competition with a new development, the "surPLUShome". "SurPLUS" being a reference to the value-added which the development offers from the perspective of its creators, and which is to enable a "new, efficient, lifestyle". The proposal by the Darmstadt team: a large room spread over two stories with different floor levels and a gallery. The innovative cooling ceiling takes in warm air when needed and cools it by some six degrees centigrade using a panel filled with salt hydrate - a low- energy air-conditioning system. All the equipment in the house is controlled via a central touchpad, and Hegger points out that an application is feasible that would make it possible to control the house via a cell phone. Rather than using ordinary light bulbs, LEDs are used, which have a long life and even outdo energy-saving bulbs when it comes to energy consumption. The entire exterior of the "surPLUShome" is clad with a newly developed thin layer of solar cells, which not only take less energy and material to produce than customary cells but are also more efficient. Even on cloudy days they supply enough energy, and this increases the surplus. Hegger sees this as a fundamental approach: "We must bring together mobility and immobile property. Houses can



Energy concept



Detail



Detail in cross-section

Thomas Ott

supply the electricity that electric cars need. And the vehicles can act as energy storage for the house."
The"Plus-Energie-Haus" can be visited on Rathenauplatz in Frankfurt/Main through May 21, 2010, Tuesday to Sunday from 11:00 a.m. - 6:00 p.m. Entrance is free. Free, guided tours are also available subject to prior registration. From Frankfurt the "Plus-Energie-Haus" moves to Düsseldorf and then Hanover.

The current winner, the "surPLUShome", will be on show from April 26 to the end of May on Burgplatz in Essen in connection with the city's status as European City of Culture.

Further information:
www.ee.architektur.tu-darmstadt.de

Project partners

Competition
Solar Decathlon (2007, 2009)

Architects
Manfred Hegger / TU Darmstadt
Hegger, Hegger, Schleiff Planer + Architekten AG

Integrated products by ABB/Busch-Jaeger:
KNX-sensors, control panel and operating elements of the Future linear switch series.

A new quality in home comfort

Just what building control can achieve in the home area today can be seen by visiting a villa just outside Frankfurt. Architects, light- and electrical planers worked successfully hand-in-hand to design a stylish, user-friendly home ambience.

By **Peter Sieger** Photos **Wolfram Schroll**

The "intelligent house" is no longer a utopian vision. But there are still developers that shy away from investing in highly promising bus technology. The main reason: they imagine it to be a complicated technology that amateurs cannot handle. However, the perfectly equipped house near Frankfurt that harnesses the very latest know-how proves that this fear is unfounded, when developer and electrical planner speak the same language. And when they opt for a system offering intuitive operation, like the Busch-priOn® by Busch-Jaeger used in the said house to control the rooms.

Perfect networking

One way in which bus technology (bus stands for binary unit system) differs from the traditional type of electrical installation is that aside from a "normal" 230 volt electrical current a low voltage cable is also installed. This cable transports information and impulses that can be used to control almost all the electrical equipment in the house. The leader in the world of bus technology is the KNX standard, which not only enables the networking of lighting, heating, blinds or alarm systems but can also incorporate washing machines and hi-fis into the system, if desired.

On all levels warm wooden tones contrast with the white and gray tones preferably used for the interior. Walls and ceilings are consciously used as reflection areas.

One of the technology leaders in this sector is Busch-Jaeger Elektro GmbH, which recognized the various potential applications of bus technology at an early stage. Thanks to alliances with premium brands, the market leader, which offers its customers a product portfolio comprising over 5,500 articles, has realized perfect networking with entertainment electronics, kitchen technology and bathroom technology.

Intuitively operated building control

The owner of the house near Frankfurt completed in April 2009 opted for the stainless steel version, which is characterized by another special feature: The matt shimmering surfaces are protected by an innovative coating, which reliably prevents fingerprint marks. 55 Busch-priOn®-modules were installed in the four-stories house conceived by the architect partnership Ströbel & Gnabs from Hofheim - from a five-way module with a central control knob and display through to triple-way switches. The elegant, flat design of the Busch-priOn® system, complemented in appearance by power outlets from the Busch-Jaeger pure stainless steel and c a r a t® programs, harmonizes perfectly with an interior, which on all stories combines floor coverings in parquet and natural stone with graduated white and gray shades and black accents. In combination with several displays and some 140 switch actuators the Busch-priOn®-modules control almost all the electrical functions in the building and outdoor areas. An estimated 21 kilometers of wiring were installed by Dörflinger Elektrotechnik from Liederbach in 500 circuits. Managing Director Andreas Dörflinger explains:"In planning the wiring we placed emphasis on meeting all the owner's wishes such that children and guests would also be able to use intuitive operation." A key element in achieving this was to be consistent in assigning the functions to the keys on the Busch-priOn®-

module. No matter on what level or in which room you are the top key always switches the light on and off, the one below operates a scene programmed individually for every room and the third key the blinds. This consistent allocation is supported by the clear symbols of the back-lit icons on the Busch-priOn® rocker switches. For example, should there be technical problems - say, because strong wind impedes the correct blind function - occupants are alerted by blinking LEDs. The same applies to the burglar alarm system. There is a similar signal on every floor, when the system which monitors all the areas of the house and outdoor areas, and is perfectly integrated into the building system technology, responds accordingly.

The greatest possible energy efficiency

As regards heating and air-conditioning planners knew their brief was to realize the greatest possible efficiency combined with maximum comfort. The building is heated and supplied with hot water via an air/air-heat pump; warm air from the pump travels along ventilation ducts installed in the floor to the outlets in the outer walls. In the summer, the house is air-conditioned using the same method. Once again, the KNX system is responsible for air quality: controlled by sensors the system ensures fresh air is drawn in when needed. When it came to the lighting, light planner Michael Wichelhaus from Overdick GmbH in Neu-Isenburg struck just the right balance between energy efficiency and a pleasing atmosphere by using an ingenious combination of LED-components and halogen high and low voltage luminaires, which featured the new, energy-saving ECO illuminants. The building's walls and ceilings were specifically used as reflection surfaces and consequently played a key role in the lighting. As regards light design the architectural details of the house were also cleverly

The owner opted for the stainless steel version of the Busch-priOn® (center). To activate the multi-room audio system or start up the sauna oven in the spaciously designed wellness area on the lower level you simply need to tap the operating unit display – thanks to KNX technology.

accentuated: the KNX installation controlled by the Busch-priOn®-modules offered maximum comfort, sensitive regulation of brightness and simple operation. When it is dark the open areas around the building are illuminated using energy-saving outdoor luminaires fitted with fluorescent lamps and LEDs. Likewise integrated into the virtually seamless KNX management system: four man-made water courses and the irrigation system. Moisture sensors control the irrigation automatically from the reservoir - a cistern fed by rainwater. Should there not be enough water in the cistern fresh water is automatically fed into it. And as applies elsewhere in the house, here, too, it is possible at all times to manually correct the individual preset configurations by activating the touchscreen displays in the building. Further highlights the electrical installation boasts are the multi-room audio system, which enables perfect music enjoyment in almost all rooms, and the spacious wellness area on the lower level. To prepare a session in the sauna it suffices to touch the KNX display, and the sauna oven begins to heat up. For Benjamin Schneider, the Project Manager from Dörflinger Elektrotechnik, the house near Frankfurt is an outstanding example of what fantastic options KNX-based electrical installation not only offers in the industrial and functional building area today, but also every private home owner."Fear of technology people imagine is complicated is unfounded," emphasizes Schneider."With the right concept and user-friendly components KNX opens up totally new dimensions for home comfort."

The greatest possible efficiency and maximum comfort: The sensors in the installed KNX system ensure the automatic intake of fresh air and lighting that can be programmed to suit individual tastes.

Project partners

Architect
Ströbel & Gnabs GmbH, Hofheim

Light planning
Overdick GmbH, Neu-Isenburg

Electrical planning
Dörflinger Elektrotechnik, Liederbach

Integrated products by ABB/Busch-Jaeger
KNX room controls Busch-priOn®
KNX switch actuators and sensors
Switch programs in pure stainless steel and carat®

Brave new green world

What is striking about the visionary projects that try to tackle climate change is that they no longer focus on individual buildings but rather on the integral urban planning of an entire setting, be it a city, oasis or residential area. Plans include existing cities that will grow vertically or will be expanded to include superstructures that create small self-sufficient islands and functioning communities.

Vincent Callebaut: Dragonfly, New York

In his "Dragonfly" design, French architect Vincent Callebaut has consistently evolved and visualized the ideas of the UN's Standing Committee on Nutrition. Given the expansion in the global population, Callebaut seeks to bring agriculture into the hearts of cities. His "urban farming" concept is designed to improve the provision of food in cities and considerably shorten transport routes. Callebaut demonstrates this idea in relation to the dimensions of New York by proposing a vertical structure of fields stacked on top of each other as arable land at the southern tip of Roosevelt Island. The gigantic dragonfly wing is 700 meters high and provides 350,000 square meters of arable area. It supplies itself with energy from wind, water and sunlight; its alignment to the sun and the plastic sheeting at the sides are intended to enable the cultivation of agricultural products all year round. In relation to the productive land, the actual footprint is kept relatively small. Callebaut achieved this by using a structure that emulates that of dragonfly wings. In the interior of the wing, the lofts in a honeycomb design exude a sense of urban luxury: generously sized windows offer marvelously varied views of the building's green outer skin.

Research group Baubotanik: Living Plant Constructions

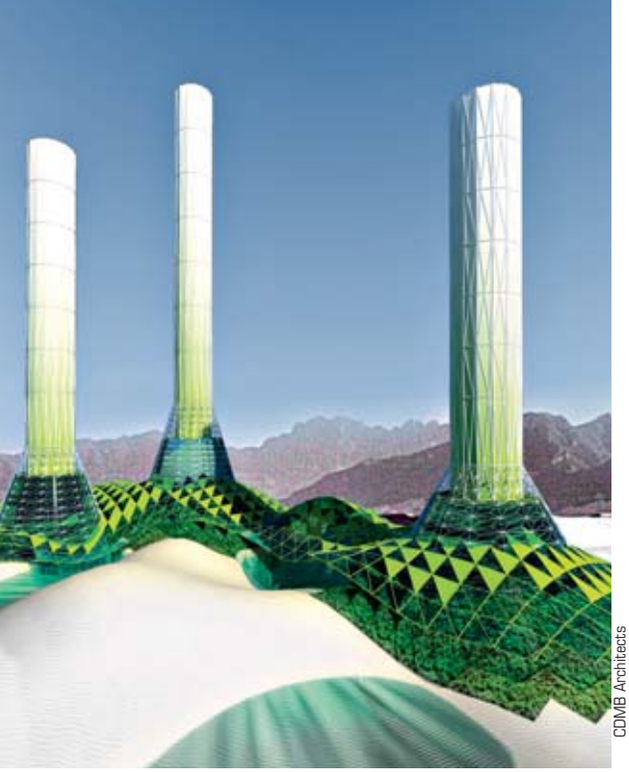
The main area of research pursued by the "Baubotanik" group at Stuttgart University is architecture involving living material, building with trees and other plants with wood fibers. By supporting young trees with a temporary, flexible tube structure, they can grow into a passable bridge creating a green link for pedestrians crossing the river Neisse on the German-Polish border. The impact of the organic bridge on the climate is far from neutral, because thanks to natural photosynthesis it even absorbs CO_2 from the atmosphere. However, the 20-meter bridge has a long construction or rather growing period: Only after about seven years will the inflatable support be removed and make way for pedestrians.

Ferdinand Ludwig/Forschungsgruppe Baubotanik

SMAQ: Xeritown, Dubai

Heat, aridness and extreme temperature fluctuations make the desert an environment that is hostile to life. And yet, for Dubai, one of the fastest growing cities in the world, utilizing the desert is the only means of expanding the city inland. In collaboration with X Architects in Dubai, Berlin-based office SMAQ designed the sustainable residential district Xeritown (from Greek. xerós = dry). Work on the desert town is scheduled to begin this year. It will create homes for 7,000 people. In their design, the architects adapt the principles of traditional Arabic architecture, and with their low-tech approach succeed in creating favorable climatic conditions both inside buildings and in public spaces. There is great emphasis on a sparing use of natural resources and the harnessing of renewable energy. The effects of wind, sunlight and water were incorporated into the concept: for example, interstices in the direction of the wind let cool air from the sea flow into the city; the dense structure, the north-south alignment of buildings, not to mention the numerous arcades provide protection from the sun; the development is based on a cluster arrangement determined by water resources, which are not to be built upon.

SMAQ



CDMB Architects

CDMB Architects: Green Destert Mine

Architect Christophe Barlieb addresses the continuing desertification of entire climate zones with an innovative concept of artistic oases. The plan: enormous upcurrent power stations will generate the electricity for an energy-self-sufficient desert village with 1,400 inhabitants. Warm air will be collected below glass screens measuring a total of four hectares, and this will serve to operate several power towers. Simultaneously, the evaporated water will be collected from gardens and small lakes located underneath the screens and used to cool the apartments and irrigate arable areas. As an almost completely self-sufficient biosphere, Barlieb's concept recalls Buckminster Fuller's Eden project realized in Cornwall. If seen in the context of the planned gigantic solar power plant in the Sahara that has been christened Desertec, Barliebs's idea does not appear at all unrealistic – Israel and Egypt have already expressed an interest in realizing the concept.

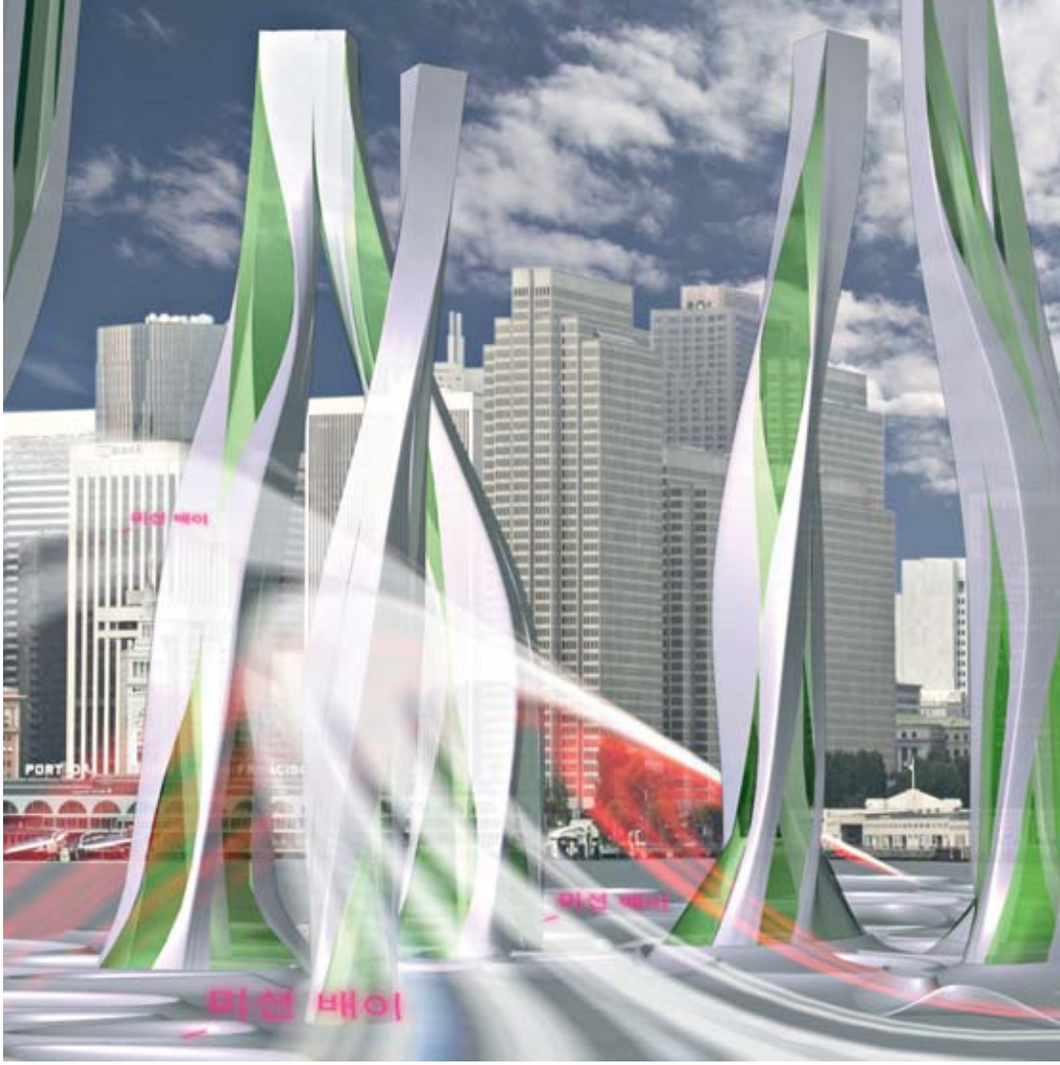
tec architekten

tec and Arup: ECO CITY, Hamburg-Harburg

An ecological district on a grand scale is to be created on the complex of a former comb factory in the inland port of Harburg, near Hamburg: Factory façades under preservation order, the very latest in small turbines, solar-heated warehouses and futuristic residential towers will be combined to form an ensemble. In collaboration with the renowned Arup engineering office, tec architekten from Switzerland have designed the new self-sufficient district. It is to manage without additional external energy, be built from ecological materials and nonetheless satisfy the investor's economic requirements. Two large wind turbines are to become the trademark of ECO CITY and underscore the project's unique quality: Never before were large turbines integrated directly into a building used to generate electricity. These turbines are to generate over 10 percent of the energy requirements of the entire quarter, the rest will be supplied by a photovoltaic system and geothermal heat. Water from the Elbe river is to provide natural cooling for the self-sufficient district.

IwamotoScott: HydroNet, San Francisco

What might San Francisco look like 100 years from now? This was the question examined in the "City of the Future" competition organized by the US History Channel. The winning office Iwamoto-Scott developed an underground network for its native city known as HydroNet, which serves as a transport network for hydrogen-powered vehicles. In addition, the network can serve to collect, store and distribute water and energy in the city. As the sea level in San Francisco is expected to rise by two to five meters by 2108, the flooded coastal strips would be used to cultivate algae, which produce a source of food and hydrogen as fuel. The latter would be distributed along the network via carbon nano-piping. Futuristic architecture marks the points where the HydroNet and the world above ground come together: Enormous structures known as geothermal mushrooms convert the earth's heat into energy, while star-shaped moisture traps provide the city's drinking water. Finally, the areas close to the coast would become habitable again with people living in eco high-rises covered in algae.



IwamotoScott

"Sustainable architecture is primarily common sense."

On repeated occasions Stefan Behnisch has proven that sustainable architecture need not be reduced to an energy balance. His much praised, prize-winning buildings stand out for their open, inviting structures, which encourage communication between their users. He treats technical innovations and aesthetics as being of equal importance. The most recent example: the main building of the Unilever Corporation, completed in 2009.

By **Lasse Ole Hempel**

The success of architect Stefan Behnisch proves that a father need not necessarily be a nuisance or burden. In the Munich Olympic Stadium his father Günter created an icon of post-war Germany, Son Stefan has made a name for himself as a designer with an ecological conscience who is adept at impressively combining an energy balance and expressive form – as he did in the new Nord LB building in Hannover.

Herr Behnisch, you have had your own architect's office since 1989, but it was the new building for the Institute for Forestry and Nature Research in Wageningen, Holland that represented your immersing yourself entirely in sustainable architecture.
The Institute was a European pilot project for resource-saving and people-friendly architecture. A laboratory and administration building for the environmental biologists of the then university - the institute has since been privatized. Naturally, the owners could not have been more ideal for such a pilot project given that the sympathy was already there. Ultimately, this project turned out to be decisive for our office. After all, subsequently we addressed sustainable architecture intensively.

Later you exported this approach to the United States and designed a new headquarters for the biotech corporation Genzyme...
We were in the middle of planning when George W. Bush came to power. At the time we thought the sustainable orientation of the project was in jeopardy but the opposite was true: The interest in the project grew, also on the part of the owner, who incidentally is a Dutchman. In 2004, it was the first commercial building to be granted the LEED Platinum certification, the highest classification awarded by the US Green Building Council.

What criteria did the Genzyme building have to meet to earn this certification?
It is a highly communicative building with many communal areas and communication zones. We achieved excellent daylight conditions there and installed good, effective sun protection systems. We did this by covering approximately 40 percent of the building in a double facade: this keeps the sun protection safe from the effects of wind, snow and ice, and on the other hand creates a buffer climate zone. Finally, we were able to per-

Transparency and communications: The rooms in the Genzyme main building in Cambridge, Massachusetts, are grouped around the atrium, which dominates the design. The project is designed to raise the staff's awareness of ecological issues.

Anton Grassl

Two Behnisch projects side by side in Hamburg's HafenCity: The Unilever Head Office, which opened in 2009, and in the Marco Polo Tower the first apartments are ready to greet occupants.

suade the operator of a nearby power station to run their cooling circuit through our building. This meant we could harness energy that existed anyhow and use it for the building. Absorption cooling and heating devices are operated from the cooling circuit. In other words, except for the electricity, we use so-called waste energy. It was also important that the building should sensitize its users to the topic of ecology so that gradually a new way of thinking could be set in motion. For example, the owner decided not to provide any car parking space, but did provide monthly season tickets. I do believe that things like this can ultimately be assessed as a saving that we were able to realize in the building.

Critics argue that architects neglected the technical aspect of their profession for a long time. Will we now see a return of the engineer in the architect with the revival of sustainable architecture?

If I am to design a sustainable building then I must have a certain understanding of technology as an architect. Otherwise, I am not in a position to weigh up the architectural consequences. And a sustainable building is primarily common sense up to 60 percent. Sustainable buildings have a specific architecture. I cannot retrofit just any old architecture with high-tech so as to transform it into a sustainable building. Whenever architecture has addressed new topics, think say of the Eifel Tower, these topics have been highly influential and have been reflected in a new aesthetic. It is a similar thing with sustainability, which will also influence the design. As such, we should help through our work to ensure that a truly sustainable architecture can also develop as regards formal aspects. However, anyone seeking to achieve this should take things like shade or cooling into consideration early on in the planning process.

But when I look at theNord LB building what strikes me first is the appearance ...

Yes, of course, after all the building was built in different climatic conditions than say the Genzyme building. In the latter's case the design is determined by external influences. Take the second-skin double facade, which draws fresh air from the inner courtyard into the offices.

It also acts as a noise and air buffer for the nearby roads. 30 percent of the electrical energy we produce on this planet is used for artificial light. At the time we were not yet in a position to base everything on LED technology as we did at Unilever. Instead, we tried to organize the building in such a way that 80 percent of the annual working time could take place using natural light. That makes a big difference, and amongst other things it influenced the building design and the proportion of glass employed. Today, we would insulate the parapets better, but we are still learning.

You are currently pursuing very ambitious plans as regards energy efficiency in Harvard, in building the new laboratory building.
In Harvard, where we are building the Allston Science Complex, we wanted to know how scientists move around their laboratories. The underlying theory was the assumption that while research has undergone radical changes in recent years the layout of laboratories has not altered. So we conducted shadow studies, in other words, we followed scientists around with a stopwatch for two weeks. Ultimately we found out that laboratories really are used differently today than we assume and that thanks to re-programming, an alteration in the layout, you make a 25 percent energy saving. 50 percent of the energy used in a laboratory goes on ventilators alone. So we have enormous potential saving there. Then between the area with desks and the lab benches we installed a glass partition with doors that are easily pushed open. Doing this allowed us to create an office atmosphere and a laboratory climate. In traditional labs both these areas are still in single unit. This meant we could cut by a third the volume of air we had to change. In a second step we reduced the air change figures. One of our goals was to save 60 percent of the energy used in conventional buildings and cut CO_2 by around 80 percent.

Where do you yourself see the greatest energy saving potential? In your designs you obviously prefer energy efficiency over integrating even a regenerative energy production into the building concept.
Despite the fact that it is an important topic, it comes lower down on my own list. Heat entry in the summer, reducing heating in the winter, efficient heat exchangers, these are all important topics. Daylight, efficient artificial light. Right now we are working on a project with the company Zumtobel, where together with various other firms such as the climate experts from Transsolar or the light planners from Bartenbach, we are thinking

The Unilever Building not only boasts an exemplary energy balance but also has highly communicative structures and interesting spatial links between the different levels.

Adam Mørk, Torben Eskerod

Reconciling igloos and wellness: On the inside, the white spheres combined with glass elements in the new thermal baths at Bad Aibling (above) feature vaulted ceilings like in an observatory. The Norddeutsche Landesbank building in Hannover, which opened in 2002, is reminiscent of a chest of drawers (on the right). Here, Behnisch Architekten introduced innovative ventilation and shading technologies.

about how the facade will develop in the future. The findings will be presented at this year's light+building fair. We are looking into the idea that because of the thermal mass suspended ceilings will disappear from sustainable buildings. The number of different systems will be reduced. As a result, we will see refined shell constructions such as the Nord LB building with a Thermo Active Building System for cooling and heating. There will be a move away from many sets of inner linings and towards thermal masses. Naturally, that has consequences for the technology. In other words, I will expose the shell building to the elements so as to achieve cooling in summer. So as to compensate for and level off the rapid fluctuations in rooms, which people cause simply through their physical presence but which are also caused by office equipment or the natural entry of light. We are currently examining whether facades should not always become more intelligent. For one reason because I can integrate many of the systems into the facade - that means wiring and light. The facade is already a complex system as it is: sun protection and ventilation, then there are the heat exchangers or the ventilation machines. In other words, current developments in the area of technology and equipment will have an impact on the architecture.

Are aspects of these more complex facades already realized in the Unilever building?

Without a doubt Unilever represents a huge step in the right direction. Take the double façade that architects have always tended to overvalue. On repeated occasions the double façade has proven to be the most cost-intensive measure, and often fell sort of expectations as regards results. In Hamburg in the Unilever building the double facade achieves what it should but does so with a lower use of material. This is done by employing a foil, which is much lighter and consequently will be alltogether much easier to handle. It provides protection from both the sun and wind and relieves the facade of the necessity to be watertight. As such, protection against the elements and protection against heat are separated.

Transparency and communication are also key elements of the Unilever building. Are these topics you are especially interested in?

When we see sustainability purely in terms of figures, kilowatt hours per square meter, then you end up with a really awful building that nobody wants to use. In other words, I always have to consider the life that takes place in a building. The big question we always have to ask

Martin Schodder

afterwards is: Was this building actually worth being built? From a functional, human, cultural and technical viewpoint. All these viewpoints are decisive. Which is why the communication aspect also belongs to the sustainable qualities of a building. This might include the fact that buildings are not only conceived horizontally but also vertically. The Americans use the term pancaking to refer to this. We architects tend to think horizontally in layouts. Yet we ought to think more in three-dimensional terms. Often the vertical links prove to be the more important ones. Not to forget, they enable me to prompt people to use the stairs and not stand around waiting for the elevators. Because elevators use up a lot of energy.

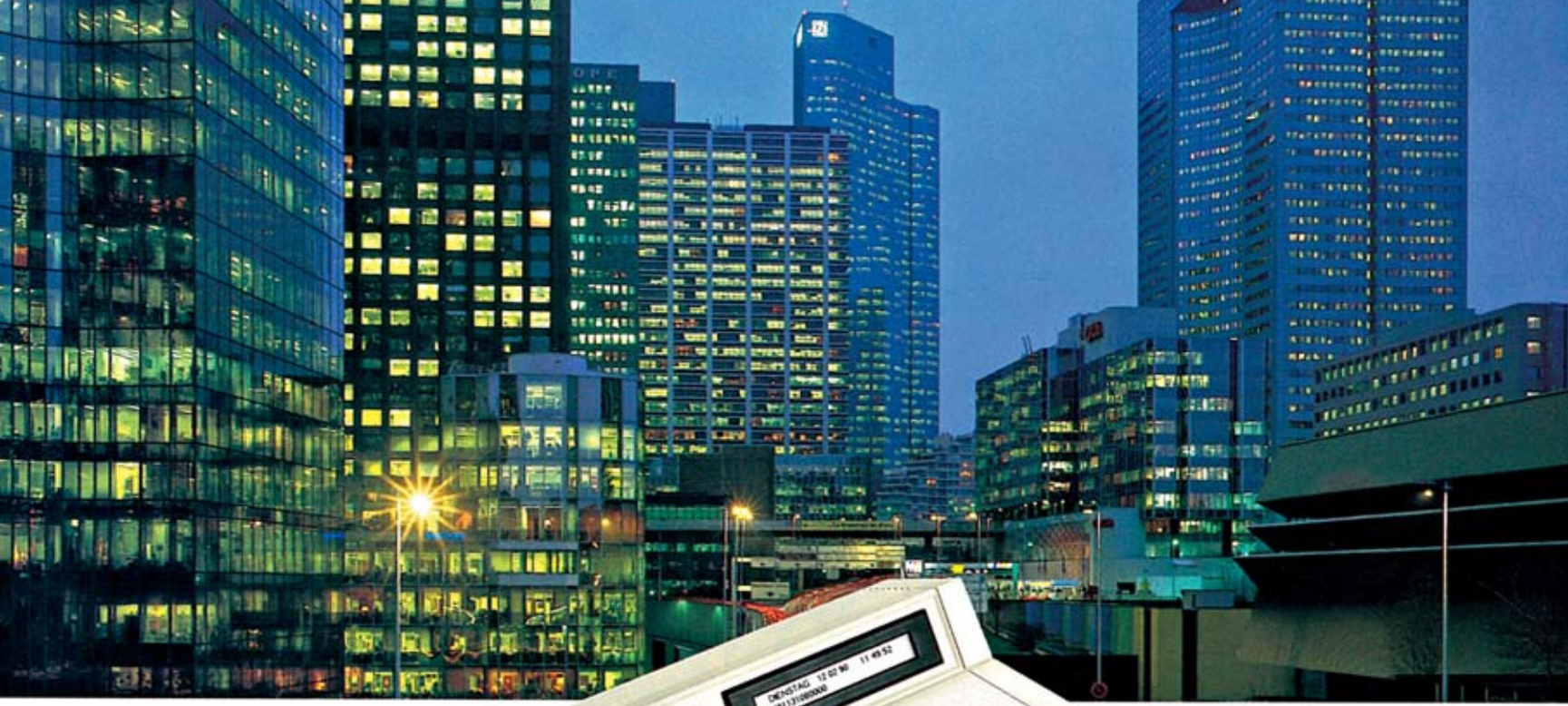
Since 1989, Stefan Behnisch has had his own architectural studio in Stuttgart. He runs Behnisch Architekten together with his partners David Cook and Martin Haas. Given the company's increasing activities in the US market, branches have been set up in Boston and Venice, California.

The Forerunners of Busch-ComfortTouch®

Intelligent energy use is not a new concept in the Busch-Jaeger portfolio. Looking back over the development of the Busch-Timac X-10®, much has changed in building automation since its early days as major advances have laid way for products such as Busch-ComfortTouch®.

by **Dagmar Hohnecker**

"Busch-Timac X-10 technology from Busch-Jaeger transforms engineering systems installed in school buildings into intelligent systems," states a 1987 promotional video, which you can now watch on YouTube. "This enables you to save energy and reduce costs, without restricting yourself," explains the pleasant voiceover. Even in the early days of modern building automation, Busch-Timac X-10 enabled clients to control all of a building's functions centrally. The technology was based on the concept of combining existing infrastructure with new technology. And with low volumes of data, simple power cables can transmit data quickly and efficiently. This method of transmitting data via socket outlet is known as power line communication (PLC). PLC allows you to send information about switching processes, dimming functions, and temperature via the building's existing power network. Busch-Jaeger used this method to optimize energy use in schools in the 1980s by controlling lighting, shade and room temperature via power cables. Users achieved up to 25 percent savings with this method. Timac X-10® systems were able to control up to 256 single or grouped system units. In addition, the solution was easy to integrate in a building's existing engineering system. Busch-Jaeger later developed the Busch-Netzbus X-10®, which was patented in 1995. This system was also soon expanded, and a consortium of companies formed in the field of building automation, the Konnex Association, which now has more than 80 partners. Busch-Jaeger further developed the Busch-Powernet® KNX and Busch-Installationsbus® KNX systems based on EIB/KNX technology. KNX had since established a single, open global standard for home and building systems technology. The sensors and touch panels used in today's new buildings have come a long way since its distant forerunner, the Busch-Netzbus X-10®. Today, our intelligent systems provide real-time information about the state of a building and allow you to manage complex buildings with only minimal actions. Busch-ComfortTouch® and the Busch-priOn® control unit stand for elegance, exclusivity and intuitive operation, and prove that building systems technology has finally grown up and emerged as a reliable and indispensable dimension in building automation.



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1 | Intelligent systems engineering technology: Busch-Timac X-10® placed Busch-Jaeger on the cutting edge in building services engineering in **1981**. **2 |** Scenes from a Busch- Jaeger promotional film from **1987**, which you can now watch on YouTube. **3 |** Monitoring and control unit for the Busch-Timac X-10®. **4 |** In **2008** Busch-Jaeger launched the Busch-ComfortTouch® and therefore a convenient new monitoring and reporting device for the Busch-Installationsbus® KNX and Busch-Powernet® KNX systems. The new device offers touch screen control.

Organic Material

Materials are the soul of architecture. They lend character to buildings and atmosphere to rooms. But what do architects think of classic materials today? *pulse* sought their opinion.

Answers by **Didier Brault, Partner at Jean Nouvel, Paris**

Architects are accustomed to checking everything down to the smallest joint. To what extent is that possible with "living" material?
The architect defines the framework and the limits of intervention, after that how much the plant grows depends on the care it receives. Designing something that incorporates rather than excludes plants is a really interesting prospect. In the Musée du Quai Branly it was not so much the architects who were nervous as the firefighters: They were worried the growth would make it impossible to open the windows.

How do passers-by respond to the green wall in Paris?
Passers-by are really interested in the 20-meter high green wall; there are always people posing in front of the green façade. While we were planning it we were very concerned that the wall, which runs right down to pavement level, might get damaged. There are some uncaring people who simply pull out parts of the plants or pick flowers, but on the whole things are going really well.

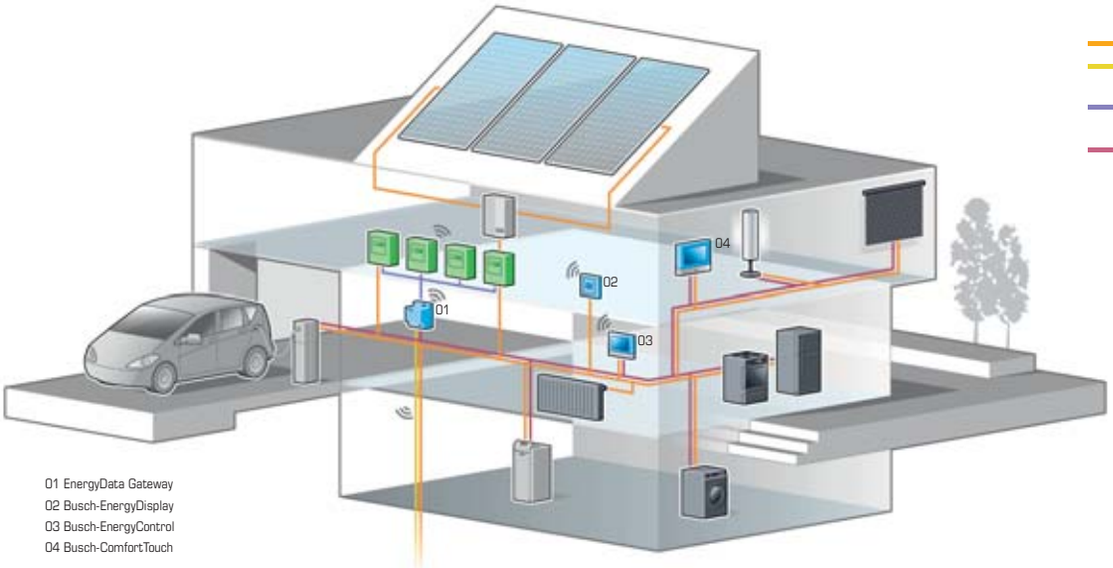
A green façade needs a high degree of maintenance. Are the interests of an aesthetic sustainability worth all the trouble?
It is true that a green wall requires an irrigation system and the plants have to be provided with nourishment via a drip-feed system. That said, it does not require much effort and depends on the choice of plants. There are types that only need a little light and can also flourish under particular conditions, such as the parasites among the plants. And without doubt a green façade contributes to the aesthetic quality of our built environment and must be seen as an extension of architecture's abilities to create urban design.


Musée du Quai Branly

Roland Halbe; Haumprobe

ABB/Busch-Jaeger and SmartEnergy: The Intelligent Way to More Energy Efficiency

Climate protection begins with consuming fewer resources, and you can start effectively in your own home. Greater transparency can help you achieve a lot in terms of savings and sustainable consumption by efficiently processing important information. This is where electronic domestic supply meters (EDSM) come into play. As of January 1, 2010, in Germany these meters must be installed in all new constructions and full renovations. EDSMs provide the basis for smart metering, the exchange of data between customer and energy provider. Future technology will enable users to respond flexibly to rates or too high energy consumption. Busch-Jaeger provides technology that responds to new opportunities to reduce consumption, save money, and protect the climate. SmartEnergy collects information about every device in the entire house, and a control unit such as Busch-ComfortTouch® can help users take control of energy efficiency in their homes for electricity, gas, water, fuel oil and heating.



Electrical connection
Bidirectional communication with network operator, third-party provider on energy market
Communication with consumption billing center/counter (electricity, water, heating, gas)
EE bus communication between electrical devices, control center, and energy storage unit

Increase your energy efficiency with smart metering: Electronic domestic supply meters (EDSM) collect data; the EnergyData Gateway exchanges information between energy providers and end users, and communicates with all the sensors and points of use.

Home Control plus Energy Management

The goals of mapping energy usage more transparently and using resources more responsibly were behind advances such as EnergyData Gateway and the software update for Busch-ComfortTouch®. ABB/Busch-Jaeger thereby provides an intelligent system solution that connects important information: The consumption data for all devices is collected and exchanged with the energy provider in order to compare rates. The home control system then takes over efficient, individual energy management. The current consumption of electricity, water, gas or fuel oil is displayed clearly and centrally. Users can visualize consumption and read rates forecasts for extended periods. SmartEnergy can be incorporated in the design of an intelligent home so that every room is equipped with sensors. For instance, if people are detected in a room, light and heat can be adjusted. When windows are opened, the heating system switches off. And when you go to bed, the temperature is turned down to nighttime temperature. In the future, washing machines or dishwashers could be set to run during low-price energy hours. And soon electric cars will recharge their batteries with solar power provided by the owner's personal photovoltaic system. From the perspective of the technical evolution of living space in the modern home, Busch-Jaeger has developed Busch-EnergyControl 3.5 and Busch-EnergyDisplay 1.5, two monitoring and control devices that are easy to operate and function as add-ons for Busch-ComfortTouch®. These systems can map the necessary information graphically or in compact format on the display. This provides users with convenient, direct access to energy management.

Busch-EnergyControl (left) displays current and forecast usage graphically. Individual devices can be switched off via the touch screen. With Busch-EnergyDisplay (right), you can view usage data, cost information, and a rates forecast. Current low rates are highlighted.

Busch-ComfortTouch® brings together all the control options in a household - from heating, blinds and light controls to all electrical devices and alarm systems, as well as communication media and entertainment units. Current consumption is displayed, and every connected device can be controlled directly.

What storage material does the low-energy air conditioner utilize in the SurPLUShome?

pulse asks a competition question in every new issue. The winners each receive a book.

Thomas Ott

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☐ **Yes, please.** I would like to receive 'pulse' regulary, postage free.

Antwort

The low-energy air conditioner in the SurPlus House makes use of

Name

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Postcode/City/Country

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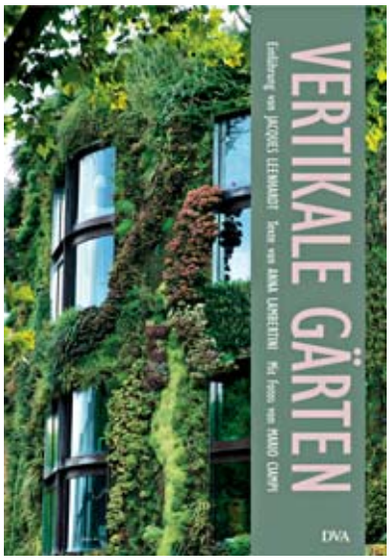

The prizes:

ABB/Busch-Jaeger will draw from among the correct entry submissions and present a copy of the books **Vertikale Gärten** (Vertical Gardens), published by the Deutsche Verlags Anstalt, and **"Architecture of Change 2"**, published by Gestalten Verlag. Closing date: June 15, 2010. The winners will be published in the next issue. Winners of the last quiz question: Eberhard Ritz, Viechtach, and Hans Houben, Stolberg.

Preview pulse 03-2009:

Sports complexes
puls 03/2010 will be devoted to the new cathedrals of sport thanks to which international competitions are doubly thrilling.

Rainer Rehfeld/artur

Imprint

pulse
Movements in architecture

Editor:
ABB/Busch-Jaeger Elektro GmbH
Freisenbergstr. 2
D-58513 Lüdenscheid
www.busch-jaeger.de

Publisher:
Gesellschaft für Knowhow-Transfer
in Architektur und Bauwesen mbH
70771 Leinfelden-Echterdingen
www.gkt-publishing.de

Busch-Jaeger editorial team:
Dieter Lautz, Tobias Schlitzer,
Christiane Schulte, Mirko Simon

Gesellschaft für Knowhow-Transfer Editor:
Britta Rohlfing, Lasse Ole Hempel

Translation:
Dr. Jeremy Gaines, Frankfurt/Main

Printed in Germany – Imprimé en Allemagne