DAYLIGHT & ARCHITECTURE
MAGAZINE BY VELUX

AUTUMN 2010 ISSUE14 **RE-NAISSANCE** 10EURO

RE-
NAISS

E

VELUX EDITORIAL

RE-
NAISSANCE

The Renaissance was a time when intellectuals and philosophers proposed a new image of mankind and of the world, based on empiricism, experimentation and observation. This new birth of mankind acted as an inspiration to teach people to be responsible, citizens with wide ranging abilities.

Today, old dogmas are once again challenged by new demands. Our ecological footprint exceeds the load capacity of the planet - currently it is about 30% higher. Buildings represent an enormous potential to resolve this challenge. However, we must ensure that the actual purpose of the buildings – to provide health and comfort for the users – will not be lost.

This issue of Daylight & Architecture concentrates on how to update the existing building stock. To face this huge challenge of updating, giving renewed value and rebirth to the existing building stock, we must ask ourselves what we could do differently now and in the future. Daylight & Architecture 14 addresses the following question: how do we secure the intrinsic values in our homes and houses and carry these forward to an updated, healthier and carbon-neutral building stock that we define today and hope to realise tomorrow?

The issue contains articles featuring the building stock as it is today, experiments currently taking place and a glance into the future. It starts with a retrospective look at realities of modern-day building renovations by Fred Scott. Georg Giebeler then analyses the architectural qualities of existing residential buildings from four typical epochs, considering their potential for the future. Immanuel Stieß describes the motivations that influence homeowners considering renovation; he summarises the three most important as saving energy, saving money and improving indoor comfort.

Examples of Green Renovation are demonstrated in four redevelopment projects by the VELUX Group and various partners in Germany and Denmark - a school, a cultural centre and two types of housing schemes with potential for mass customisation solutions for sustainable living.

How do we make buildings that people will still value 50 years from now? What processes will lead to such buildings? Daylight & Architecture posed these questions to David Cook, Renate Hammer and Henrik Sørensen. Their replies reveal much about current practices in planning and building. The process of redefining, revitalising and reshaping the history of buildings is about forward-looking design, proportionality, socially acceptable uses, functionality and economic efficiency - the co-creation process covering the whole spectrum of sustainability in contemporary urban development.

In the VELUX Group, we believe that the goal of successful modernisation lies in the concept of Sustainable Living'. In essence, that means greater energy efficiency, the use of renewable energy sources and optimal living conditions, particularly through improvements to the indoor climate – with user comfort at the focal point.

Enjoy the read!

The VELUX Group

AUTUMN 2010
ISSUE 14
CONTENTS

NOW

The things that make architecture tick: projects, events and selected new developments from the world of daylighting.

THE ANTI-GUGGENHEIM

"We wanted to create something that is beautiful but that does not compete with the art, a building that puts the art first and foremost," said Thomas Phifer, talking about the new West Building of the North Carolina Museum of Art in Raleigh. The 11,700 square metre building designed by Phifer supplements the old museum building (East Building) built in 1983. A greater contrast would be difficult to imagine: on the one hand, a fortress-like, angular 1980s construction with almost no openings to the outside and, on the other hand, the single-storey, clearly cut new building, with 50 per cent of its facade surface consisting of glass. The rest of the building is panelled with satin-finish facade panels, which are over seven metres high, are made of anodised aluminium and make the building look like an outsized jewellery box.

Five completely glazed recesses lend structure to the otherwise rectangular building. Unusually for a museum building, it has four entrances, the most important of which leads directly into a large sculpture hall that, like a backbone, runs through the new building along the central longitudinal axis.

"All of the building's elements, from the oculi in the ceiling, designed to bring in controlled natural light, to the expanses of glass that bring the outdoors indoors, to the views between and among galleries, have been created with an eye to providing the best possible experience for viewing the diversity of art in the collection," said Thomas Phifer. The most important source of daylight for the building is 230 skylights that protrude from the roof like waves. On the outside, they have slats that only allow glare-free northern light into the rooms. Textile scrims on the inside of the oculi subdue the entering light additionally. The large facade windows have curtains with three degrees of transparency. The curtains enable adjustment of the daylight exactly to the requirements of the exhibited works of art. Moreover, roller blinds make it possible to completely block out the daylight. Additional electric light is provided by halogen lamps, which are switched on depending on daylight levels. The museum employees also feel the difference in the daylight in the old and new buildings: "Even for me as a curator who has lived with these pictures for more than 25 years, it's a revelation to see them in this kind of light," says David Steel, Curator for European Art at the museum on the online portal ArchNewsNow.

PHOTO: SCOTT FRANCES, COURTESY THE NORTH CAROLINA MUSEUM OF ART

PHOTO: DANIEL RYBAKKEN

DAYLIGHT AS ILLUSION

They still exist, even in Europe: growing municipalities. Located around 15 kilometres to the south east of the Spanish capital, Rivas-Vaciamadrid is one of those communities in Europe that have undergone the fastest growth in recent years. In 1980, only 500 people lived there but today it has more than 60,000 inhabitants. This has created a need for new churches – not really surprising in Catholic Spain. The land that the town made available to the Catholic church, however, was anything but cheap: small and elongated, demarcated by sports fields on the south side and by two traffic intersections in the north.

Originally, architects Vicens + Ramos intended to erect an elliptical central building containing an altar in the middle, around which the local community would be able to gather for worship. The built reality is completely different. The altar is right at the end of the nave and daylight plays a central role. In the east, the transept ends in seven funnel-like protuberances that, on the outside, are difficult to imagine as being part of a church. They are not only dominant features of the urban landscape but mainly serve to channel indirect, effective lighting into the chancel. Coming from seven directions, the light sweeps over the insides of the funnels, which are covered with plaster board and gold leaf (reminiscent of Spanish baroque altars). Depending on the viewpoint, it makes the altar wall look like a sculpture or a composition of surfaces with different levels of brightness. Narrow, vertical rectangular windows in the long side walls bring additional light into the nave.

The outside of the church is a complete contrast to this picturesque, spatial lighting effect. Apart from the windows, the exterior surfaces are completely clad with Corten steel and have an overall forbidding appearance. In the west, where the community centre and the priest's apartment are attached to the nave, the building ends in a quarter circle like a ship's bow. Only the 'light cannons' in the altar wall and the large glazed entrance of the community centre in the south are recognisable as openings. All other windows are covered with metal grilles on the outside, thus seamlessly blending into the homogeneous, rusty shell of the building.

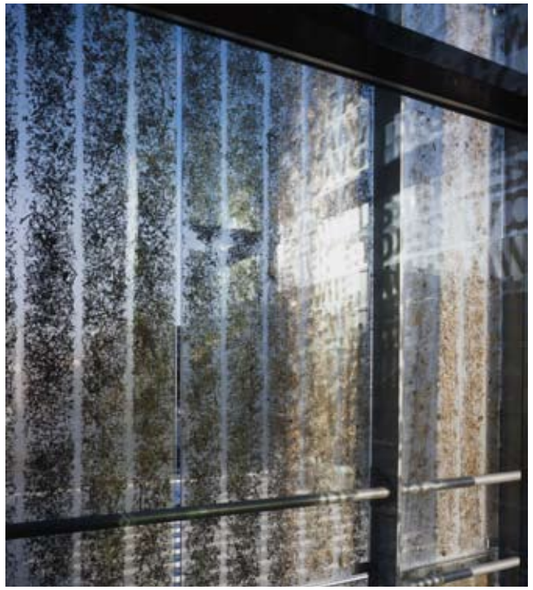


PHOTO: SBBT ARCHITECTES

VEILED IN BRONZE

When light strikes it, the facade of the new media centre of Tours-Nord looks as if it is covered in a layer of fine mica dust. The new building of architects Sophie Berthelier, Philippe Fichet and Benoît Tribouillet is located in the Place du Nord, a not particularly attractive square surrounded by four-storey residential buildings and mainly used previously as somewhere for locals to park. With their publicly used new building, the architects wanted to create the greatest possible contrast with the private, rather monotonous neighbouring buildings. They succeeded in doing so with a highly transparent structure that is only two storeys high. It has a double facade whose lightness is intended to be evocative of sheets of paper. A fitting feature of the design is that text passages of Jorge Lluis Borges are printed on the outer glass shell of the entrance facade. Less literary are the curved north and south facades, where the building's second skin consists of 75 × 275 cm Plexiglas panels intermittently secured to the building. Their slightly waved surface generates a continuously changing interplay of reflections and slightly distorted views into the interior and to the outside. In their search for a special form of screening for privacy purposes and as protection against the sun, the architects found what they were looking for on the premises of a scrap metal dealer. The latter sold them bronze filings – waste material from a metal turning workshop – at a very good price. The architects then used the filings to cast PMMA panels. The degree of shading (opacity) provided by the composite panels thus produced is around 40 per cent. In order to allow for deformation, there are narrow gaps between them. The architects speak of a kinetic effect that the facades are intended to create due to their multiple reflections and the shadows they cast. However, they also refer to their dual practical benefits: the integrated bronze protection against the sun prevents the interior from overheating while the plastic panels hinder self-declared graffiti artists from gaining access to the inner building shell, which is glazed with insulating glass.

WOODEN VAULT

There is no such thing as bad weather, only inappropriate clothing. This principle applies especially to children who grow up in Norway. In the region around Trondheim, heavy rain or snow is a daily occurrence and the winters are usually freezing cold. Nevertheless, people spend a lot of their time outdoors all year round.

For a kindergarten in Trondheim, the municipal authorities were on the lookout for ideas for a new outdoor playground. Oslo architects Marit Haugen and Dan Zohar proposed the creation of a place where children could make fires, tell stories and play while being protected against the wind and the rain. The new building was to offer protection, while simultaneously conveying a feeling of secureness but ensuring optimum air circulation on the inside.

For economic reasons – the budget was extremely limited – Haugen/Zohar started to look for inexpensive building material for the fireplace and finally found what they were looking for at a building site in the vicinity where there were large amounts of left-over wood. The architects also used these pieces of pine as "bricks" for their construction, which was inspired by Norwegian peat huts as well as by the regional log-cabin method of building. On a concrete base, Haugen/Zohar placed a total of 80 circular layers of wood, kept "at a distance" from each other by narrower oak sections. Each circle has a different diameter and another centre but the number of "wooden bricks" per layer is always 28.

A sliding door made of two curves makes it possible to close off the fireplace at night. The wooden construction is stabilised only by its own weight. However, it looks light when the daylight enters through the slits during the day or when the reflection of the fire appears to transform the cupola into a finely woven rounded cover at night.

PHOTO: HAUGEN/ZOHAR ARKITEKTER

Mankind as the focal point of architecture:
interior views of a corresponding relationship.

THE DOUBLE-NATURED HOUSE

By Fred Scott
Photography by Ann Malmgren

Rehabilitation activities can generate a certain enjoyment particular to the matching of one's life to an existing building. Similarly, extensive refurbishment of a zone of the city always has implications for the life of those inhabiting it. Future housing typologies will therefore have to be adaptable to changing lifestyles, social shifts and varying degrees of human conviviality throughout their lifetime.

Left **Cities change continuously, sometimes with, sometimes without active planning by architects. Here in London's Notting Hill district, layers of time and traces of use overlay each other and thus determine the area's character.**

THE CONTINUOUS PARADOX of re-occupation of the existing built environment is that one seeks to preserve and to change by the same action.

There was a young woman living with an architect in a hundred-year-old house that had been a former worker's dwelling that he had converted in a dramatic manner, with floors removed and double heights inserted into the modest building, so as to astound the visitor on entering. After their relationship collapsed, the girl moved to a neighbouring district and in her own flat, which had been little changed in many ways for decades, she took to a close and caring attention to the original and existing features, polishing old brass light switches and even the old plumbing pipes, and lived quietly so as to least disturb the place.

Within this tale is a fundamental difficulty regarding new life in old buildings. The classic building is composed of arrangements of rooms, discrete separate spaces, and the Modernist intervention to achieve contemporary credentials, strives to introduce spatial continuity and the transparency of a modern lifestyle. The idea of the room is inimical to the idea of transparency; they represent two different and opposed ethos of spatiality. Their balance, or lack of it, within a particular work of refurbishment is somehow also a measure of how much the work is a commemoration of past lives. Yet of course we can't live in museums – buildings must be translated into the present.

The connection between style of life and style of building is little known, but one suspects that there is such a thing. In re-occupying existing buildings, is there a sense that a definitive occupation is being sought? Or is the original occupation the only one that can be thought of as correct? Is there always an element of the intruder, of a transgression with regard to later interventions? It may be just this sense of transgression that intensifies the pleasure of re-occupation, which suddenly gives the occupant a sense of his transitory nature, of being like a spirit, more ghost-like sometimes than the original denizens; the high ceilings, the tall doors, the encumbered walls. This will always be an attribute that is unavailable in the acquisition of a newly-built property.

There is another drawback of building anew rather than adapting and inhabiting the existing. There is a currently extensive uncertainty in the relationship between house and city – for at least two reasons. One is the now extensive global uncertainty; cities themselves may transform beyond conventional prediction. Even without this Apocalyptic potential, there is also an absence of a credible building type capable of making a contemporary union between dwelling and the urban condition, ruined or otherwise. Nothing now exists like the Haussmann block, a typology with which it would be possible to make the concurrent city. Equally the Corbusian vision, la Ville Radieuse, the impulse to wipe away the old city and start again, has perished along with other Modernist crusades.

THE URBAN CYCLE OF RE-OCCUPATION

But one might wonder if a new typology is needed anyway; it doesn't seem to be at a point when we might consider that our cities need such radical reconfiguration. The bourgeois insurgency into other city centres of recent years has managed to appropriate existing building stock for its purposes. As a result the city itself, although re-populated, pretends to be unaltered. By these means, one class has taken over the houses and the history of another, that of the urban proletariat, and in the process has converted it into nostalgia, that most inert and durable of mental conditions.

Yet, these recent trends may obscure a more general rule. If one looks at a quarter of London such as Notting Hill, largely made up of 19th century terraces, many as grand as on a Parisian boulevard. Many of these houses, although built for the rich, stood empty for decades from their beginnings before being later colonised by immigrant workers, first from Ireland and later from the Caribbean. When we taught together at the Architectural Association in the 1970s, Robin Evans would tell me stories of great houses taken over by the poor in earlier times, in Drury Lane in the centre of London, by velvet waist-coated impecunious dandies and others, the original oil paintings still hanging in the rooms of the appropriated mansions.

So in these two contrasting phases one sees the rich taking over the houses of the poor and, conversely at another time, the poor taking over the houses of the rich. This may be the recurrent law, the means by which the city is resurrected, the two tendencies part of the same dynamic, that are interdependent and inexorable. The prompt for such shifts will be, as

The city as a global roller coaster? Notions such as "upper class" or "working-class district" are transitory. What is a designated ghetto today can be an enclave of the rich tomorrow – and vice versa.

always, socio-economic, be it the collapse of industries or of the housing market; perhaps the cycle is akin to a medieval agricultural rotation, which required a season of lying fallow to succeed. The sure sign of the fallow period ending in cities is the infiltration of Bohemians into unfashionable quarters; they are the seemingly harmless first wave of a following gentrification. For the architect in his grandest personage as the urban designer, this presents certain difficulties, which become more concentrated with respect to housing. For the interventionalist, conversely, it represents opportunities.

Many cities, on the other hand, have swathes of public housing schemes built in the post-war period up to the point when no more were allowed, standing now like abandoned experiments, as Alex de Rijke once said, in a vast laboratory. They seem to stand outside the rule of the rich and poor because of the degree of their prescription, tainted as they are by functionalism, the lesser inheritors of the house as 'machine d'habiter', tied to their inception so that they lack the flexibility, the spatial generosity that permits the conversion of a big Victorian terrace house into multi-occupancy. They derive instead from the quest for the minimal dwelling that is at the heart of Modernist housing, cloaked as it is in an aspiration of equality, but also perhaps as a means to instil correct or proper behaviour upon the urban working class.

A CRUSADE AGAINST CONVIVIALITY

The prescription for the family home that emerges during the 20th century from its 19th century roots can be understood in certain aspects as an intent to make a definite template for the conduct of life, which in its refinements sets out to exclude certain aspects of behaviour that were considered undesirable by those drawing up the description. One might guess that paranoia lurked in these plans regarding the manners of the lower classes, for it was for them that the rules were to be devised. Thus the names of the rooms define the expected correct behaviour in any given part of the house – sitting room, bedroom, dining room. By the one act of thus defining proper conduct, the delinquent is also identified. Our age values quietism with regard to housing, which seems sometimes almost like a longing for the grave. As a result of this craving, we collectively brand anything approaching rowdy behaviour as anti-social. But it is the quietism that is anti-social; commonly people are now stigmatised for their vigorous sociability, which is then wrongly branded as anti-social. In spatial terms, one might trace the progress of such a crusade against conviviality in the evolution of the modern house in the 20th century. It will seem reasonable to many to protest at this point that there was no such conspiracy to wring vivacity from the house, but one may answer that it was part of the trend towards Modernism and that in itself may be as an unrecognised and so unchecked conspiracy.

The architectural contradiction at the heart of the great post-war public housing programme is that the projects tend to be big, often monumental buildings but they contain minimal spaces, the tight rooms of the prescribed house. Access in particular, being easily ascribed as functional, holds to the rule of the minimal. Consequently these are immense works of architecture from which a sense of promenade, of wandering, has been suppressed. One might comment that Modern architecture can make large or small spaces, but is not well suited to making anything in between.

Peter Reyner Banham used to refer to 'That Old Sixties Future'. Has it arrived? If not, where has it gone? Within it were proposed habits that will now become untenable. The city, not the suburbs, will be central, the air-conditioned gipsy lifestyle only available to the rich. With the possible collapse of industry, whatever other consequences may arise, the house is liable to re-assert its place at the centre of human affairs. It will be then less a sanctuary from the outside world, and become more of a primary setting for the ongoing human drama. Such a place would also need to be more than something tailored strictly to the nuclear family.

THE HOUSE OF HIDDEN GRANDEUR

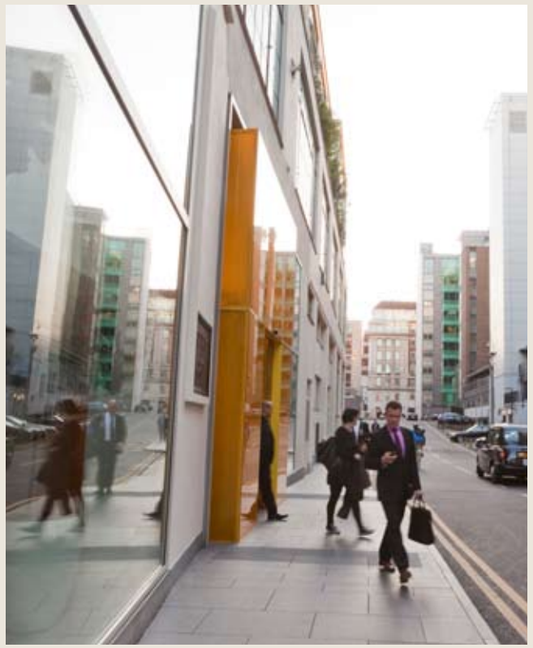
We can only prescribe new housing in terms of the Modernist menu – all the systems are in place and long practiced to deliver what we in the United Kingdom call 'Parker Morris standards'. The all too usual parade of diminutive kitchens, bedrooms, dining and sitting rooms must be rolled out or nothing at all will be built. Is it possible to conceive of a house at two scales? One the scale of the established everyday, but packaged and placed within not a sentinel concrete frame as in the Unité d'Habitation, but within a deeper gestalt, a hid-

Every old building is a store containing all kinds of memories – and every act of conversion or re-use will interfere with these. The ability to accommodate both old memories and new uses is an indicator for architectural quality.

den building at a grander scale that might one day become revealed? Might it not be, when considering mass housing, that the architect may design as though a reverse of a multi-occupied large 19th century house, or something even larger like a palace perhaps, or a public housing scheme, in which the original prescribed minimum may be demountable to reveal an underlying spatial generosity? What if, through ingenious planning as well as rooms that can be hived off for the private realm, meandering sequences of interior spaces can become revealed through some future insurgency, brightly lit from unexpected sources, often from on high, the building stripped back having the chance to achieve its full flowering, both spatially and socially? Cavity wall construction is well suited for these purposes. This may seem to be in favour of the rich acquiring the houses of the poor, but its opposite is also possible, depending on other wider factors.

I'm not sure exactly what such a place might be like, or the post-industrial city even, but as Palladio once said, a large house is a small city. One can suppose that the future will be information-rich, so not requiring the explicit plan of Modernism or its precision of purpose, and everyday life will be under surveillance, so that such a mass dwelling should be like a maze rather than a villa, with a less stark division between public and private; instead, an ambiguity, an intrigue and complexity that is both social and spatial. Behind the façade humanity goes about its business, in the public realm mankind flitting between ancient shadows.

By such means, the architect might see his role as an enabler of future occupations, beyond his own time, to fit the modest model of the modern house within a structure of greater scale. Within it, at some future time when perhaps property has lost its value, and through the relegation of modesty, a new conviviality and beauty may be revealed. In addition to what may be thought of as a typology suited to the intensification of urban life, this different form is potentially amenable to the existing; that is it may be used to repair the ravages of the last sixty years or so, and may give an equanimity between the new and the existing. The city's continuous processes of migration will be perhaps made easier by these means; the acts of rehabilitation are of course related to the past, the present and necessarily also to the future.



Fred Scott is a writer, designer and teacher who taught for many years at the Architectural Association in London. He was a collaborator with the Archigram Group and wrote for Architectural Design in the 1960s. Later he ran the Interior Design course at Kingston University, and is Visiting Professor in Interior Architecture at the Rhode Island School of Design in Providence. He is the author of On Altering Architecture, published in 2008 by Routledge. Currently he is working on his second book., *Dwelling: a Socio-spatial Inquiry.*

RENOVATING RESIDENTIAL BUILDINGS: CHANGE IS THE ONLY CONSTANT

By Georg Giebeler
Illustrations by Lisa Fleck

The renovation of residential buildings is not merely a technical task; design is also an integral and extremely important factor. It can only be done successfully if the existing building is known thoroughly, together with all its inherent potential and weaknesses. A chronological consideration of residential building construction over the last 140 years shows that structure, ground plans and building materials are logically interrelated.

Left **Average dwelling area per person in different European countries**

IT IS FREQUENTLY SAID that renovation of old buildings is a complicated matter. But this is not really true – at least in most cases. The situation is made unnecessarily complicated by some seemingly inextinguishable false assumptions and prejudices, which often prevent the right thing from being done and negative results from being avoided. Three of the most widespread assertions are examined in this article and refuted.

FIRSTLY: IT IS BEST TO LEAVE BUILDING RENOVATION TO CONSTRUCTION COMPANIES AND TECHNICIANS.
From the point of view of the architect, this is a grossly negligent attitude. The fact that the planning volume of European architects' offices in the new building sector is stagnating or is already decreasing is the pragmatic side of the issue. The other side relates to the – already, unfortunately, heavily loaded – idea of sustainability and is illustrated by the combination of four apparently randomly selected statistics:

- 25% of all waste material comes from the construction and demolition of buildings
- 40% of our energy is used for heating or cooling buildings
- 25 years is the average length of time that windows and facades fulfil the requirements of the people living and working behind them
- 85 % of residential buildings were built more than 25 years ago

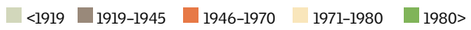
Whether renovations, particularly in respect of energy, are a planning task for architects is up to the architects themselves. The opinion that this is a purely technical undertaking still predominates. A regrettable error of judgement. Regrettable because renovation is inextricably intertwined with design, with the appearance of our buildings and cities. This is radically demonstrated in the regions of northern Europe, where brickwork facades disappear behind plastered-over thermal insulation panels – a deplorable situation. And yet renovation of the energy aspects of a building can be the trigger for extensive modifications of the entire structure. This is shown by the frequently observed renovations of open-plan offices in the 1970s, where only architects were able to bring out their – admittedly few – positive qualities.

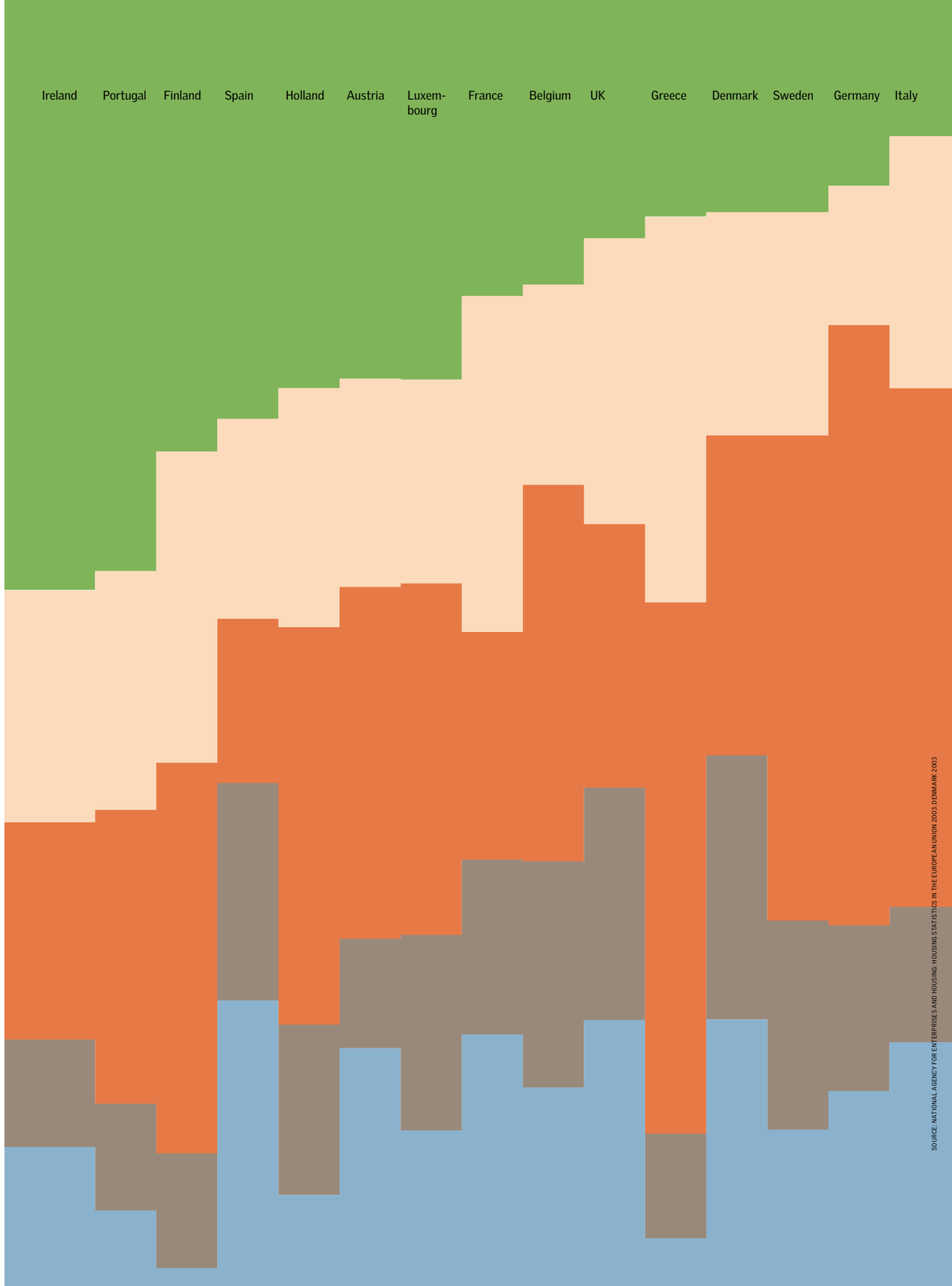
SECONDLY: IN THE LAST HUNDRED YEARS, THE JOB OF THE ARCHITECT HAS FUNDAMENTALLY CHANGED.
This is far wide of the mark. The task that clients used to entrust the architect with and still do today is to plan and design a building that can be erected in the shortest possible time at the lowest possible cost and that can then be used for the longest possible time.

The fact that, towards the end of the nineteenth and beginning of the twentieth century, an architect had to handle this task differently than we do today does not affect this basic truth. If it had been possible to make reinforced concrete ceilings at a reasonable price in 1885, buildings from that time would not have wooden-beam ceilings. If it had been possible to order large, horizontally pivoted insulated-glass sash windows from a factory with a quality monitoring system, single-glazed transom windows with poor sealing qualities would not have been installed anywhere. Arrogance, however, is inappropriate in this context; the technical solutions used at the time were the best that could be afforded and the architects were well aware of their advantages and disadvantages.

But the technical possibilities were not the only important factor; the zeitgeist played an important role as well. The very small kitchen as the workplace for a full-time housewife did not appear until the modernist period and then disappeared again when the post-modernist era arrived. Before and after, the kitchen was merged with the dining room, although for different social reasons.

European building stock by building period





THIRDLY: EXPLORATION OF THE HISTORY OF BUILDING IS OF PURELY ACADEMIC INTEREST.

On the contrary, it quickly becomes clear that knowledge of the historical conditions and those specifically relating to building is not only of scientific interest but also has tangible advantages when it comes to renovation planning. Without an understanding of the way in which buildings were created, for example towards the end of the nineteenth and beginning of the twentieth century, the evaluation of an existing structure itself presents a problem. Before an architect is engaged, he or she must therefore provide a relatively certain answer to the following questions:

– what modifications are necessary and which ones can be dispensed with?
– what construction measures are possible and which ones are excessive in terms of "quick + good value for money + durable"?

When these queries are answered, measurable factors such as energy efficiency and daylight supply have to be taken into consideration as well as factors that can be assessed qualitatively such as health and comfort. However, other factors such as attractiveness and fashions which are very difficult to define also play a role. If knowledge about the expected weaknesses and qualities of the existing building can be used to answer these questions before planning is actually started, the risk involved in renovation for architect and client is only insignificantly higher than that involved in the planning of a new building.

The following examination of the strengths and weaknesses of four different epochs shows typical areas of action. The epochs are not so much oriented to the usual historical sequence of political events as to transitions that have occurred in the culture of building, even though similar terminology is used.

A REQUEST

Adapting the residential buildings of the last hundred years to new needs succeeds to a greater or lesser extent, depending on how previous architects designed and built them. Other factors such as the location and social factors cannot be altered and provide new prospects for districts that people wanted to flatten 40 years ago in western Europe. The fact that this is not only due to the inner-city location and the trendy bars but also the not-exclusively-functional ground plan design is a great advantage for renovations today. The biological neutrality of pre-war and early post-war buildings that have not yet been renovated is another benefit.

However, this is also to be understood as an appeal for renovations today. 75% of the construction waste mentioned at the beginning of this article can be recycled because such waste comes from a time before the introduction of synthetic materials and plastic. But what about full thermal insulation and other composite building materials, today massively subsidised by the state? The lifetime of a facade is 25 years and the next generation of architects will have to renovate our renovations in 2035. Perhaps one of them will write about us in the same way as I have written about the past when asbestos was used without any consideration of the harm it could do: 'Because it was cheap'.

Georg Giebeler (*1963) has been head of the 4000architekten architects' office in Cologne since 1995. Since 2004, he has also been professor of building construction and design at Wismar university. He is co-author of Atlas Sanierung (Birkhäuser/Edition Detail 2008). The main focus of his work and research is on building with (and in) existing structures and on the exploration of the works of Ulrich Müther, the pioneer of the concrete-boarding method of building.

1870–1920

RESIDENTIAL BUILDING CONSTRUCTION (1870–1920)

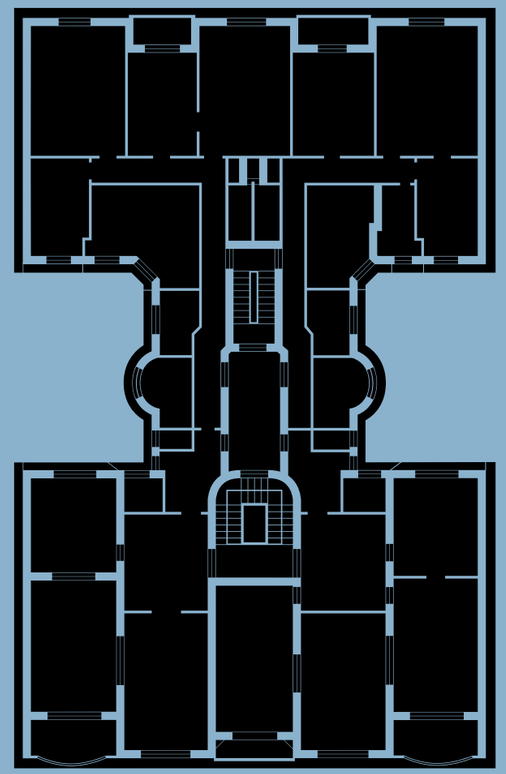
The first great building boom took place in the era of industrialisation: mass housing construction on the outskirts of cities, which had frequently been left unchanged since the Middle Ages. No consideration was given to the topography and little attention was paid to the needs of the tenants. The beautiful large rooms were, in the best case, the living space for an entire family of four. To set limits to the worst outgrowths of profit maximisation, building regulations stipulated minimum room heights and prohibited basement apartments, for example. Today, these districts are highly sought-after and they will remain so. That they are now located within the city, in wide streets often lined with trees in a dense urban setting, makes them attractive.

The building topology chosen was in line with the interests of the investors at that time. The expensive homes were fitted out with a richly adorned front, a spacious stairwell and oriels or balconies. The windows are generously sized. This contrasts with the rear houses, which were set back from the street and featured unplastered brick facades, narrow stairwells and rooms that were badly lit via courtyards and allowed access only on one side. The advantages and disadvantages of this system can only be balanced out by combining the apartments to make larger homes.

In the front houses, it is always the longitudinal walls, two outer ones and one in the middle, that bear the load. The rear houses are the same but often have only two load-bearing walls. Because rigidity is achieved by means of the fire walls and the ceilings (anchored with tie rods to the outer walls), most inner walls have no structural function whatsoever. The large undifferentiated rooms were appropriate to the use which they were put to at the time. Combined with the non-load-bearing inner walls, they are the big advantage of apartments from this epoch today. From a typological point of view, almost any use is conceivable: a large apartment for a family but also for a well-off single person, a doctor's surgery, the office of a freelance worker or combination of all the apartments to form a prestigious head office for a company. The high ceilings and the elegantly designed front houses result in living spaces that are often far superior to those of a new building. However, there are two weaknesses resulting from the physics of the buildings: the poor sound insulation and fire protection provided by the ceilings between floors. The wooden ceilings were made up to six metres wide and the floorboards were nailed directly onto them. In order to improve protection against air-borne noise and fire, mixed clay and straw or similar heavy building materials were placed on the inserted subfloors. The ceilings were covered with plaster applied to a plaster base. The filling materials mentioned were the best solution at the time and they do not, of course, meet present-day standards. This becomes a problem when the apartments are rented out for high-quality lettings and especially when the use changes. In the latter case, they lose their protected status and the architect is tied to today's building regulations. One of the few solutions is to replace the filling material with sound insulating materials and to add suspended fire ceilings and wash floors. The disadvantage this brings, however, is fairly substantial: floorboards and stucco ceilings are lost, window breast heights after renovation are problematic, as is access from the stairwell and many more formal details.

Architects from this epoch used four basic materials: bricks, wood, lime and iron. Apart from the problem of dry rot, there is no need to worry about harmful substances in unrenovated residential buildings: the houses from that time are 'bio' through and through.

Because the outer walls alone bear the load, they are correspondingly thick and solid on the lower floors. On the top floor, they are at least 25 cm thick and, every second floor downwards, they become 13 cm thicker. Their ability to store heat is very good, with the exception of the attic walls. Together with the solid middle wall and the large amount of space, apartments from this epoch have a very well balanced indoor climate. The thermal insulation, however, is inadequate, and renovation is not completely without its problems. If insulation is applied to the inside of the outer walls so as not to cover the stucco facade, the advantages of heat storage are lost. The thermal bridges, in contrast, can be ignored due to the wooden ceilings. What is more of a problem is the requirement that, after renovation, the new windows be air-tight and water-tight. Inadequate ventilation of the ends of the wooden beams in the outer walls can lead to rotting of the previously undamaged sections and thus to structural hazards.



Apartment buildings at the Hohenzollernring, Hamburg-Ottensen
Architect: Fritz Neugebauer
Year built: 1912

This grand building with large apartments and a brickwork facade shows signs of the German "Heimat" style and the beginnings of expressionism. At the same time, it has certain features that are typical of many residential buildings from the time before 1920. This includes the elongated ground plan, which, in this case, is lit up by means of two small atriums, and the load, which is borne primarily by the longitudinal walls.

1920–1940

RESIDENTIAL BUILDING CONSTRUCTION DURING THE INTERWAR YEARS (1920–1940)

Revolutionary times were followed by revolutionary approaches to building. Central demands of the new social movements were not only better working conditions but also, and above all, better places to live. Air, sun and one's own four walls were being called for. The experience of the war years resulted in small-scale farming coming back into the suburbs. New clients in the form of cooperatives were asking for new buildings: cooperative estates with low density due to large interior courtyards and few floors as well as estate houses with relatively large gardens. The only economical way of erecting such buildings was to build them on the least expensive pieces of land. This is one of the reasons why such residential areas are on the outskirts of cities. The advantages and disadvantages at that time are still noticeable today. Many of the estates are strangely cut off from the rest of the municipal area. They have retained their suburban character and appear somewhat conservative or, in the worst case, petty-bourgeois. On the other hand, they are full of green areas, airy and cheerful and often have an economical but fully committed design such as proven by the well-known estates of Ernst May or Bruno Taut.

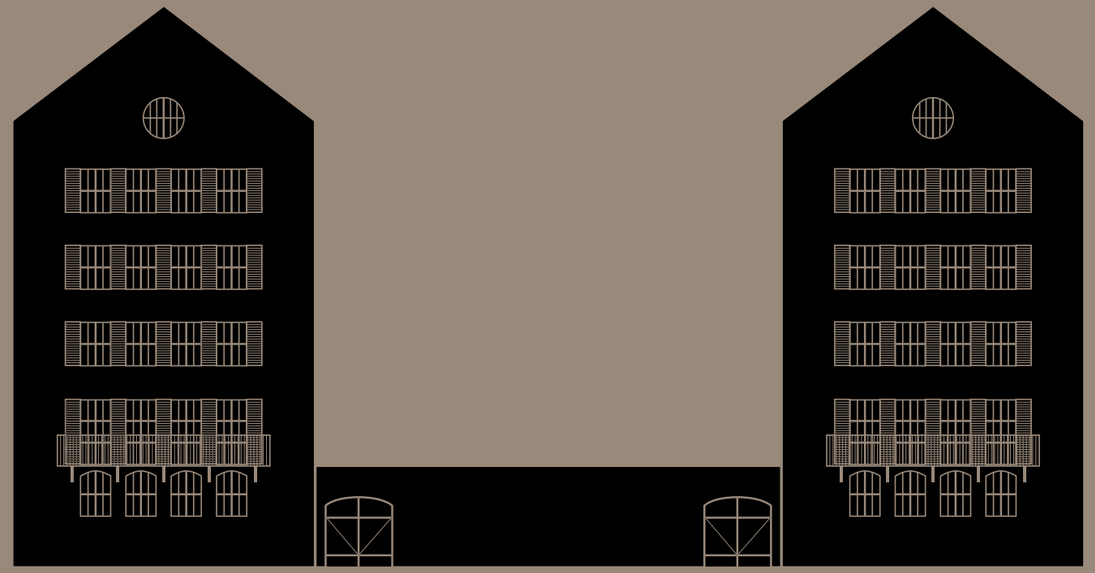
It was also possible to enhance the economic efficiency of the residential buildings by means of rationalisation. Rationalism was not only a fashion but also an economic necessity. One expression of rationalisation is the famous Neufert estate, the first version of which appeared in 1936 and was sold out after only three weeks. Very small bedrooms and living rooms, low ceilings, thinner outer walls and steep, narrow indoor staircases were features incorporated in the houses on the estate. In the apartment blocks, many rooms, especially the kitchen, were now assigned clear functions and the room dimensions were correspondingly minimised. A perfect example of this is the completely rationalised 'Frankfurt kitchen' of architect Margarete Schütte-Lihotzky.

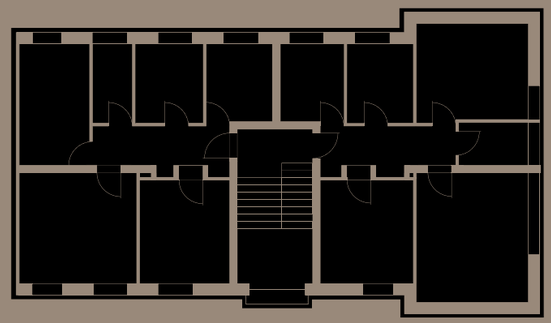
This ground-plan rationalisation often collides with the wishes of present-day users. The lower ceiling heights compared to the late 19th-early 20th century, together with the associated deterioration of the lighting, are problematic. As they are identical in terms of the load-bearing longitudinal walls and the building materials used, their advantages and disadvantages are also similar. In order to eliminate their smallness when they are converted, however, much greater efforts are needed than for buildings from the late 19th-early 20th century.

The 'modernism' frequently associated with this epoch, in contrast, did not play a role in mass housing construction. The new method of building with reinforced concrete or steel skeletons combined with a great deal of glass was reserved for factories, warehouses and office buildings. In the area of residential building construction, only the intellectual upper classes could afford and wanted such high-tech luxury. The renovation of such buildings is therefore also a subject for art historians and is often accompanied by the loss of their original use as homes.

Forstenrieder Straße residential estate/ Fürstenrieder Straße, Munich
Architects: Fritz und Sep Ruf, Hans Holzbauer
Year built: 1939–1942

These five-storey apartment blocks are a typical example of national-socialist estate building. Each stairwell enables access to two apartments on each floor, each with 75 to 90 square metres of floor space – very spacious at that time. The apartments receive light from both sides. Between the blocks, gardens where the occupants could grow vegetables were provided.





1950–1965

RESIDENTIAL BUILDING CONSTRUCTION IN THE POST-WAR PERIOD (1950 – 1965)

Thriftiness was the prime virtue of the post-war period. Apart from workers, the building industry lacked practically everything: infrastructure, building material and, above all, time and money. The lack was made up for by the use of innovative techniques specially developed for this situation: the wooden-beam ceilings were replaced with prefabricated ceiling sections with small span widths fitted along just a single axis. Due to a large amount of shuttering, ceilings made of site-mixed concrete were minimised in terms of the amount of material needed as the example of ribbed floors shows. The outer walls that used to be made of solid bricks gave way to constructions made of building materials such as porous concrete or breeze blocks, which had been known for a long time but had hardly been used until then. The reason for this was described by building construction professor Franz Hart in 1951: "The hollow brick, as opposed to the solid brick, enables thinner walls with the same degree of thermal insulation, a larger format with the same weight, and thus saves on materials, gains space, increases the brick-laying rate and reduces moisture in the building. (Hart, Franz: *Baukonstruktion für Architekten*. Stuttgart 1951, p. 41)

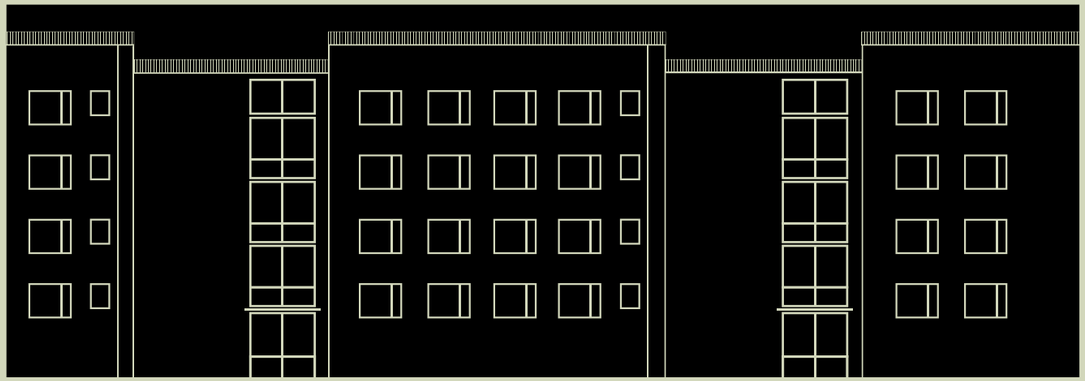
What was not new, in contrast, were the urban-planning principles and the tendencies towards rationalisation: the ideas of the garden city were even upheld in Nazi Germany, a fact that is often overlooked in one-sided views of the Third Reich's crazed infatuation with monumental architecture. After the war, these ideas were put into practice on a large scale throughout Europe, albeit with planning that was even more rationalised than before. Ceiling heights less than 2.5 m and children's rooms with seven square metres were a result of the unconditional desire to save space. The disentanglement of the world of work from the world of living which now took place – a result of the Athens Charter produced in 1933 – went a step further in order to enhance the previously described advantages and disadvantages of such estates compared to their predecessors from the 1920s.

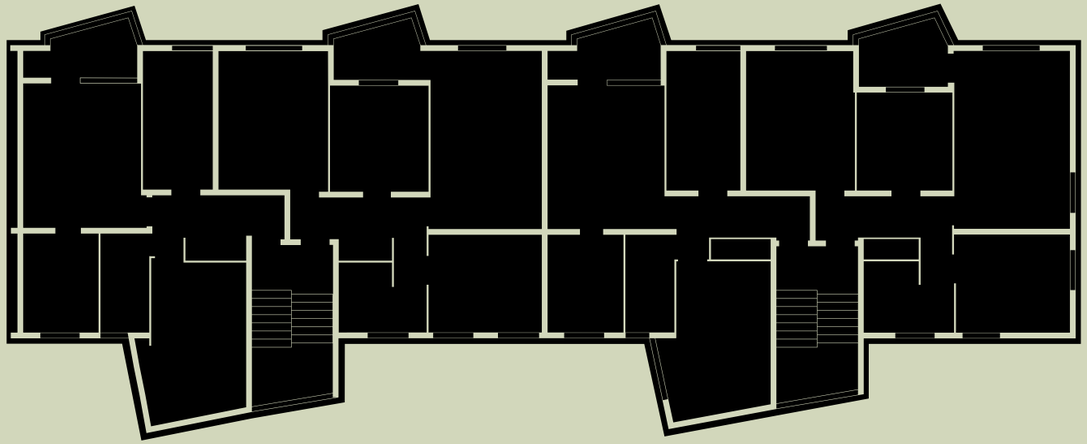
The use of innovative building techniques that saved material in post-war residential buildings is a source of considerable problems today when renovations are carried out. An example of this is a standard type of ceiling, which, after the war, was almost always made of concrete but brought about hardly any improvement in respect of sound insulation and fire protection compared to the pre-war period. Directly applied wash floors do not provide any footfall sound insulation, ribbed ceilings – some as thin as 6 cm – are practically useless as insulation against air-borne noise and the minimal concrete covers do not comply with today's fire protection requirements. Moreover, the reinforcing elements are already subjected to the maximum amount of stress and therefore loads cannot be increased. A wash floor or a suspended ceiling are therefore also ruled out as well. Another fact not yet considered is that such renovation measures would further reduce the height of rooms in which the ceilings are already low. The technically possible renovation of the ceiling/floor by means of retrofitted reinforcement is not economically feasible in mass-produced residential buildings and is therefore not done. These are the reasons for only renovating such buildings to a moderate extent and otherwise not endangering their protected status. Residential buildings of the post-war period – still accounting for 30% of today's residential buildings in Germany, by the way – are therefore mostly renovated in respect of energy and technical aspects and are only rarely subjected to extensive structural modifications. This reduces opportunities to increase the financial gains to be made. On the other hand, these estates often have social structures that have been stable for a long time. This will ensure their survival for the next few decades.

Lighting, indoor climate and building biology should not prove a hurdle to this as the materials used are almost exclusively of a mineral nature, unless the buildings were already renovated in the 1970s.

Residential block in Petrarcastraße, Munich
Architect: Matthä Schmölz
Year built: 1960/1961

The four-storey building with its double-pitch roof is aligned in a west-east direction. Two stairwells on the north side provide access to the four apartments on each floor. With 57 to 67 square metres for 2 ½ to 3 ½ rooms, they are considerably smaller than those in pre-war estate construction. In compensation, there are loggias on the south side for the occupants.





1965–1980

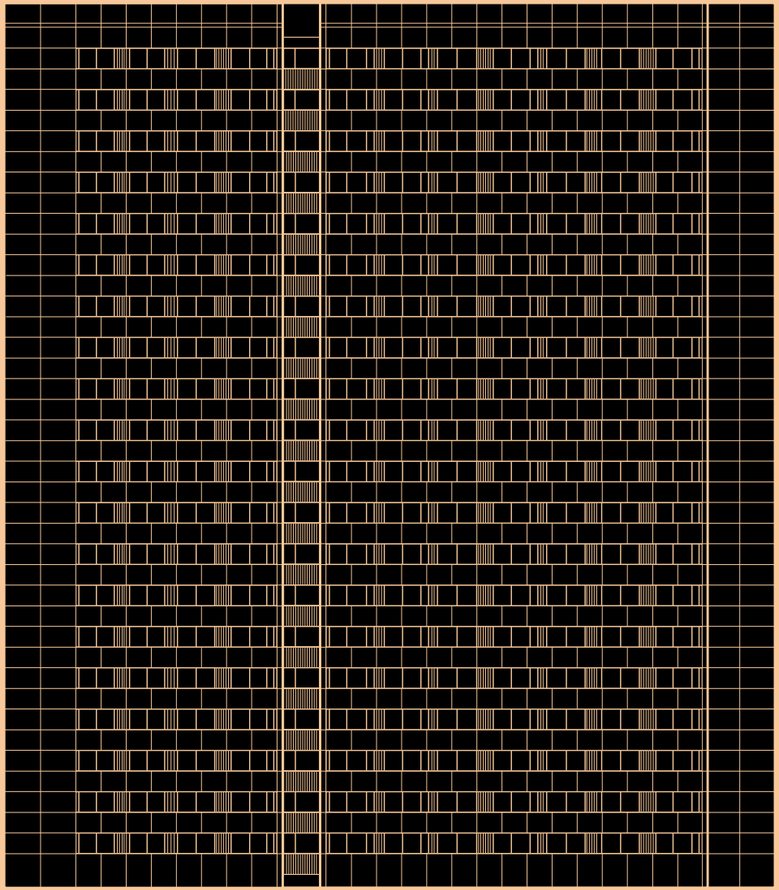
RESIDENTIAL BUILDING CONSTRUCTION IN THE PERIOD OF PROSPERITY (1965 – 1980)

The economic boom in western Europe after 1950 made people affluent. The confidence and trust that was placed in technical progress at the time boosted innovation and thus secured this affluence for the west over the next several decades. People treated themselves to a little luxury on the dining table as well as in their home: the average living space per inhabitant in Germany doubled from 14 (1950) to 28 m² (1975). The buildings of the pre-war period remained in a terrible condition far into the 1970s as they were regarded as old-fashioned. Because the inner cities were unable to cope with the growing – self-created, mind you – lack of living space, new towns were dreamed up in the form of the garden city: open, bright, in green areas but close to a motorway, with an underground garage and a shopping centre. Most of these 'satellites', as they were called, only functioned for a short time. It did not take long for their fragile social system to fall apart and leave behind a ghettoised subculture of the socially displaced.

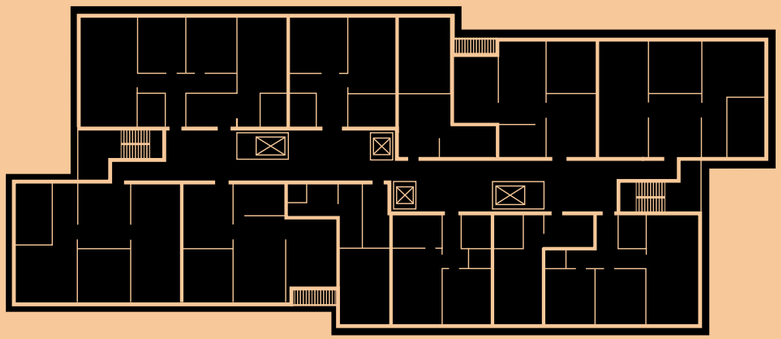
This could not have been due to the way the cities were constructed, given that the residential buildings built in the middle of the 1970s were the first to come at least close to present-day standards. New regulations regarding air-borne and footfall noise insulation were introduced in this epoch as well new requirements for thermal insulation. Trust in the new was quickly engendered in the choice of building materials as well. Research provided architects with materials, whose properties, in many cases, were an improvement on the old, for example in terms of their economic efficiency. The fact that these materials were also accompanied by harmful substances previously unknown in the home was often blithely accepted, as the example of asbestos, the miracle material, showed. Asbestos was present in nearly all parts of the building, such as thermal cladding, fire protection insulation, roof panels and parquet adhesives, even though the deadly nature of this substance had already been known for a long time. And yet the new ways of building dispensed with some of the old ways of doing things. In residential building construction, the load-bearing direction of ceilings was rotated by 90° so that transverse walls now bore the load, making it possible to design the facades without restrictions. This creates a number of problems for renovation today. Because the transverse walls bear the load, alteration of the ground plan is practically impossible and it is no longer possible to enlarge the rooms along the facade.

Because the distance between load-bearing walls was mainly chosen for functional and not so much structural reasons, conversions of such buildings for new uses are almost impossible or the result is unsatisfactory; a children's room cannot be made into a conference room. A second difficult problem of renovation is caused by the massive thermal bridges. The load-bearing transverse walls often penetrate the outer skin in order to form loggias on the outside of the building. These thermal bridges are extremely difficult to eliminate retrospectively, even if the loggia ceiling is separate from the ceiling inside, something which is not always the case.

In 1970, the triumphal march of reinforced concrete began in the east and west of Europe, albeit according to different methods of construction. The advantages were evident: excellent load-bearing qualities, very good sound insulation and protection against fire, as well as a high heat storage capacity. In conjunction with the large glazed, lintel-free surfaces on the outer facade and the loggias that served to provide protection against the sun, the homes in these estates were very comfortable and the social milieu was less desolate than it had been for a long time. The position of these estates on the outskirts of cities helped to encourage people who could afford it to move away. The prognosis of above-average energy price increases – in the short term and the long term – is also a prognosis that these estates will not be retained. Effective renovation in terms of energy will hardly be economically feasible given the rents currently being paid and the non-central location additionally increases the cost of living for the inhabitants due to the long distances they have to travel. Terraced houses are a special example in that they have much greater thermal bridges. A bet that the total lifetime of this type of building would be much shorter than that of buildings from the end of the late 19th-early 20th century would probably attract very low odds.

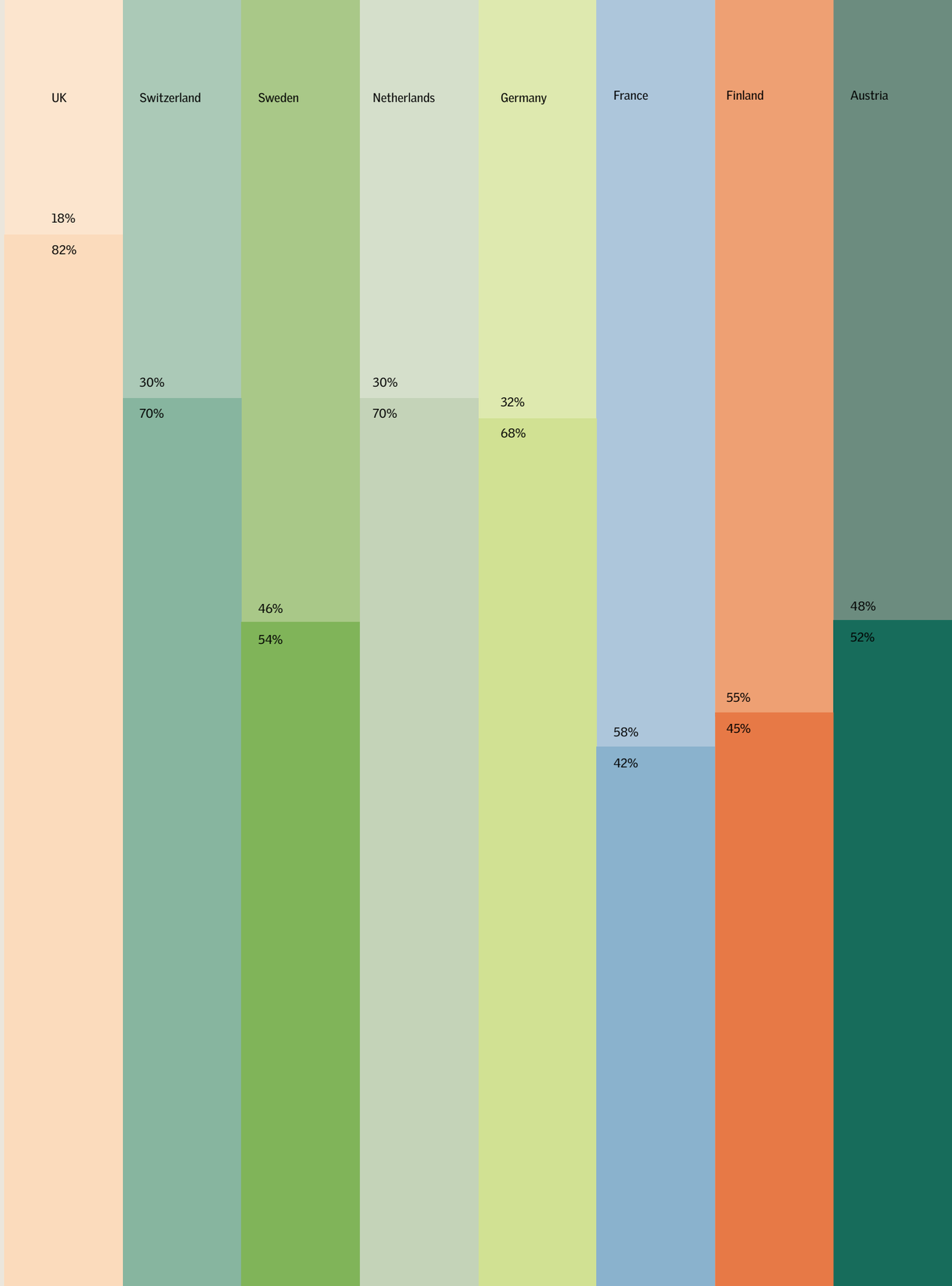


High-rise residential buildings on the Fischerinsel, Berlin
Architects: Hans-Peter Schmiedel, Manfred Zumpe, Wolgang Radke, Günter Piesker and collective
Year built: 1967–1973



These 21-storey high-rise residential buildings were regarded at the time as a pilot project of the concrete-slab building method in the GDR. A passageway in the middle of the building enables access to the twelve apartments on each level. All the apartments receive light only from one side. None of the rooms is wider that the slab size of 3.60 metres. The apartment sizes are 42 square metres for two-room apartments, 62–65 square metres for three-room apartments and 75 square metres for four-room apartments.

Right page
Dwelling stock by type of building
Basic data on residential building stock



Housing stock
Basic data on the residential building stock

	Population	Residential buildings		
		m^2 U.A.	Number of dwellings	% m^2 U.A.
Austria	8 206 500	300×10^6	3 863 000	n.a.
Finland	5 236 600	212×10^6	2 478 000	43%
France	60 561 200	2135×10^6	25 800 000	72%
Germany	82 500 800	3301×10^6	35 800 000	63%
Netherlands	16 305 000	724×10^6	6 969 931	81%
Sweden	9 011 400	312×10^6	4 404 059	66%
Switzerland	7 418 000	330×10^6	3 581 000	96%
United Kingdom	60 034 500	2236×10^6	26 200 000	71%
European stock		9858×10^6	113 876 000	69%

Housing stock
Basic quality of residential building stock

	Running water (%)	Lava-tory (%)	Bath/ Shower (%)	Central heating (%)	Average number of rooms	Floor area (m^2)	Average number of persons (2003)
Austria	99.9	98.7	97.5	87.3	4.3	60–90	2.4
Finland	98	96	99	92	3.8	85.7	2.2
France	99.9	99.2	99.2	96.3	4	90	2.4
Germany	n.a.	n.a.	n.a.	n.a.	n.a.	88.4	2.2
Netherlands	100	100	100	90	4.2	n.a.	2.4
Sweden	100	100	100	100	4.2	71	2.1
Switzerland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.3 (2000)
Mean in Europe	93.3	88.2	88.7	72.7	3.6	76.5	n.a.

COMFORT, MONEY AND GOOD INTENTIONS: REASONS FOR MODERNISING BUILDINGS

By Immanuel Stieß
Photography by Bert Teunissen

Whoever wishes to improve the energy efficiency of more buildings in Europe must, above all, be aware of an important issue: the wishes and priorities of the buildings' owners. These wishes and priorities are by no means always of a financial nature. The degree of desired comfort, economic considerations and a sense of ecological responsibility all combine to create a wide range of individual but allied motivations. And the advice offered, the financing and planning must be equally individual if the aim is to increase the proportion of modernised, retrofitted buildings over the longer term.

Silvia Bierbaum
Fintel

MORE THAN HALF of all households in Europe live in detached, semi-detached or terraced houses. In Germany, these types of houses account for just under 60 per cent of all households. A significant number of owner-occupied houses were built in the 1960s and 1970s. Around one quarter of all homeowners in Germany live in a building built before 1978. It is expected that, in the next few years, there will be a considerable need to modernise and retrofit these buildings. Houses built in the 1960s and 1970s in particular will undergo their first big renovation.

These renovations and modernisations represent a great potential for saving energy and reducing CO_2 emissions. In Europe, approximately 70 per cent of the energy con-sumption of a private household goes on heating and hot water. The energy-efficient renovation of a detached or semi-detached house can decrease the amount of energy consumed by 50 to 75 per cent. The decision of homeowners whether to opt for or reject energy-efficient renovations will have an important impact on the climate policy goals that can be achieved in the building sector in the coming decades.

Compared to new buildings, the motivations driving homeowners when they consider their options to renovate their house are less well known. One reason for this is that the initial situation in existing houses is far less clear. In contrast to the situation with new buildings, the persons renovating older buildings are not necessarily young families. Renovations may affect homeowners in very different situations and phases of their life. Having said that, this article will present a range of motivations and decision criteria which may affect the homeowner's decision to renovate and retrofit[1].

LIVING IN YOUR OWN HOME: WHAT DOES THEIR HOME MEAN TO HOMEOWNERS?

The construction or purchase of an own home is a decision with long-term implications. The decision is not necessarily always linked to the intention of remaining in the same house for the rest of the owner's life. Younger homeowners in particular tend to view their house more as a "house in which they will spend a certain period of their lives", a dwelling that will be gladly and intensively used during a certain phase in their lives. But even if the homeowner is not planning to spend the rest of his or her life in the house, an own home still rep-

Fam. Moormann
Bakum

"What is particularly important about living in your own home? Being undis-turbed, having enough room, the opportunity to change things, with nobody who will interfere."

Conventional renovator, 49 years old

resents more than a mere asset. The relationship to one's own home is affected by emotional wishes and needs, which differ quite considerably depending on the individual person's lifestyle and situation.

The wish to be "master of one's own four walls" still ranks in first place. An own home offers scope to realise one's very own aesthetic, structural or technical ideas.

The home can be flexibly adapted to the requirements of different stages in the home-owner's life, for example when the household expands to include more members or later when the children leave home. And for older people it offers the opportunity to adapt their living environment better to the particular needs of old age.

An own house is a home and the centre of much of the homeowner's life. It offers an undisturbed private sphere and the opportunity to retreat without difficulty. It permits the owner to keep social life at a greater distance and offers fewer opportunities for conflicts with neighbours or housemates than living in buildings housing multiple families. And finally, owning one's own house is also an outward status symbol that often resonates with the pride of ownership – even if this pride is often not shown directly.

People may often have a particularly close relationship to their house if they planned or built it themselves or the house was extensively renovated over a longer period of time. For many people, carrying out repairs, improving or expanding their own house is both a passion and a hobby. The work is form of self-realisation and offers the opportunity to fulfil dreams that would otherwise not be financially possible. However, not all home-owners share this enthusiasm. A house always also involves responsibilities that many may perceive as onerous. Particularly older houses, which "always require something doing to them", can quickly become a permanent financial and even psychological burden that may dampen the enjoyment of owning your own four walls.

"...the house is no hobby. I associate the house with a feeling of home, I feel comfortable here. It is the place where I belong. But having to look after the house is more of a chore."

Woman who renovated her house to improve its energy efficiency, 52 years old

REASONS FOR RENOVATION

The decision to repair, exchange or renew the heating system, facade, windows or roof is associated with typical situations. Upcoming maintenance and repair work are the most common reasons to consider one's own house in more detail. But buying a house or extensive rebuilding can provide the occasion for a more sweeping transformation.

In general, only individual parts of buildings and facilities are renewed when carrying out ongoing maintenance. The catalyst for carrying out maintenance work may be seri-ous damage, for example when the heating breaks down. But more commonly old or damaged structural components and units are replaced before they are defective. There is rarely a direct or urgent need for action. In most cases, a time slot of several years is available for planning and carrying out maintenance work.

With maintenance work the emphasis is usually on functional considerations. But there is still some latitude for technical and energy-efficient improvements as old building elements are generally not simply exchanged for new ones but, instead, are usually replaced by state-of-the-art components.

"Technology is constantly progressing; when it makes sense to me that it would be good if I purchased it, then I will do it. Technically I would like to have it state-of-the-art but without any fancy nonsense."

Conventional renovator, 64 years old

In addition to functional aspects, the wish to beautify the house is a central motivation for carrying out maintenance work. Older homeowners in particular set great store by ensuring that their houses are not merely in good order but that it also looks 'decent' from the outside. And finally, upcoming maintenance work, for example the need to replace a heating system, may lead the homeowner to focus more intensively on the topic of energy and energy saving.

In view of the massive increases in energy prices, many homeowners view a renovation as an occasion to reduce the energy consumption of their houses. Particularly with older houses many homeowners are very conscious that these buildings consume an unnecessary amount of energy due to their insufficient heat insulation and outdated technology.

"We knew that the heating was at least 15 years old, that it was more or less a time bomb, and we were thinking: in five years at the latest this heating system will have to be replaced. And then [...] we thought maybe we could do something more to save energy."

Woman who renovated her house to improve its energy efficiency, 44 years old

"It was quite clear to us that [...] *the status of the house was about that of* 1960 *and that a lot of energy was being lost, and we thought it would be possible to make some improvements."*

Woman who renovated her house to improve its energy efficiency, 48 years old

Many homeowners hope that lower energy consumption will result in a perceptible reduction in their living costs. The wish to save energy is often supported by traditional thriftiness: older people especially want to avoid wasting energy and not simply heat their homes 'to let the energy dissipate up the chimney'.

Climate protection can be another important reason prompting owners to renovate their house. Homeowners with a strong sense that sustainability is necessary believe that they must behave responsibly and take the opportunity when renovating their homes to do something for the climate. Solar collectors on the roof are not merely a practical expression of climate protection – they also epitomise an affiliation to a forward-looking low-carbon lifestyle:

"...I have watched a lot of programmes on Arte and 3*Sat* [two German TV channels] *about the melting of the polar ice caps. It's really not a sham and it is generally just played down whereas in fact it is a real catastrophe.* [...] *Of course I have to do something, who else should do it?"*

Woman who renovated her house to improve its energy efficiency, 52 years old

The wish to be independent of energy obtained from fossil fuels indicates a similar mindset. Many homeowners would like to reduce their longterm dependence on limited resources and hope that they can cut their connection to the unpredictable developments on the energy markets. The idea of being able to autonomously satisfy their energy needs is a particularly fascinating concept.

"And that is why we would like to be self-sufficient to a certain extent and not only grow our own vegetables in our garden and have our own fruit trees, but also utilise the sun a bit, because the sun never runs out."

Woman who renovated her house to improve its energy efficiency, 33 yrs

And finally, a fascination with new technology can also be a motivation for renovation and should not be underestimated. Male homeowners in particular are fascinated by the possibilities of innovative technology. Often this enthusiasm for new technologies reinforces the decision taken in favour of innovative energy concepts or to utilise renewable energies.

"What would really interest me is the passive house. I don't know how it works, but I think it is really great. Yes, it does fascinate me, just like heat pump systems do."

Man who renovated his house to improve its energy ef-ficiency, 50 years old

A different point of departure for renovation occurs when the owner plans to fundamentally alter the house, for example after recently purchasing or because of planned remodelling. We are dealing here with futureoriented solutions that require more extensive planning and execution. For many homeowners, such a renovation offers an opportunity to improve the quality of living in the house. The objectives and starting points differ, depending on the living arrangements and requirements. In buildings where nothing has been modernised for many years, the desire for modern comforts typically focuses on modernising the electrics and sanitary installations or the supply of warm water. To feel comfortable in one's own home, the arrangement of the floor plans may be changed, small rooms knocked together to make larger rooms, or bigger windows and doors installed to improve the lighting in the living space.

"The house used to be very dark. And so I put in a few doors instead of windows."

Man who renovated his house to improve its energy efficiency, 37 years old

Windows do not simply influence the atmosphere of the room, they also play an important role in determining the quality of life. Particularly in areas with high noise levels, heating insulation and noise insulation often go hand in hand.

Fam. Moormann
Bakum

Fam. Stefan Scheper
Goldenstedt

"The new windows we had installed have triple glazing. You can't hear it [the noise, author's note] through the window any more."

Woman who renovated her house to improve its energy efficiency, 46 years old

Renovations may often create a better interior climate. Measures taken to improve the thermal insulation of a house will result in a more comfortable climate both in summer and in winter. Many homeowners are surprised to discover just how much their living quality improves after carrying out renovations to improve the energy efficiency of their homes. Similarly, the range of utilisations may expand, for example when a workroom in the top storey can be used all year round following the installation of roof insulation.

"For one thing it was important because it was so difficult for us to get this living room warm. It's a question of comfort."

Woman who renovated her house to improve its energy efficiency, 48 years old

COMBINED MOTIVES AND TYPE OF RENOVATION

Particularly when considering large-scale renovations, the decision to renovate is rarely based on a single objective or motive – usually, many different goals come together. The various motives of homeowners wishing to improve the energy efficiency of their homes differ considerably from those homeowners who do not introduce any particular energy-saving measures. This was borne out by a standardised poll of homeowners renovating their homes.

The most important motive for carrying out renovations to improve energy efficiency is the wish to reduce energy consumption and its associated costs. The renovation should not merely reduce current expenses but also reduce the long-term costs. Usually additional motives play a role in the decision to carry out energy-efficient renovations, for example the wish to improve the quality of living or an enthusiasm for innovative technologies. Climate protection and the aim to reduce dependence on fossil fuels are also important motives behind renovations to improve energy efficiency.

The inducements and objectives of homeowners who carry out conventional renovations without any particular energy measures tend to be of a more pragmatic nature. Conventional renovators often simply carry out necessary maintenance work or replace defective components to safeguard their house. If something is done that goes beyond what is strictly necessary, then the goal above all is to beautify the house and expand the living area.

RENOVATION PROCESS AND COOPERATION PARTNERS

The maintenance or renovation of a house requires detailed specialist and technical knowledge and even experienced homeowners may reach the limits of their own knowledge. They need to obtain information from elsewhere, and the range of sources and paths of information are very wide. In addition to talks with workmen and tradespeople, homeowners rely on the advice of the people around them. Discussions with relatives, neighbours or colleagues with the relevant experience who have already gone through similar situations play a particularly important role. These people are often very willing to help and constitute a sort of mutually supportive group of house modernisers, in particular as homeowners living in the same street or area – due to the year in which the houses were built – often face or have faced similar problems. Their statements and recommendations are considered credible and unbiased and are commonly scrutinised less critically than those given by professionals.

"We asked my father-in-law a lot and friends and acquaintances. We already had some ideas […]. *For me, it is important that someone gives me the feeling that I can trust him. I tend to act more based on my gut feelings. If I get the impression that something sounds coherent, then I also assume that that person knows what he is talking about."*

Woman who renovated her house to improve its energy efficiency, 41 years old

Many people turn to tradesmen to answer their questions about renovations. Plumbers, fitters, heating contractors and carpenters are consulted particularly often. This often creates a bond of trust over many years. But this loyalty has its downsides: many tradesmen tend to give pragmatic assessments that reflect their own horizon of experience and that are limited to their own trade. Their recommendations are therefore not always optimal with regard to renovations aimed at improving energy efficiency.

Architects, engineers and energy consultants offer profes-

"The architect militated against solar collectors – and basically also against the insulation, saying that it required energy to make and would take a long time for that energy to be recouped. [...] He paid no attention to the solar collectors, we had to do all of that ourselves."

Man who renovated his house to improve its energy efficiency, 57 years old

sional advice on renovations. However, the architect's role is rated very controversially. Many people consider consulting an architect to be an expensive luxury and question the return they will receive for the architect's fees. The willingness to consult an architect is usually greater if the homeowner is well off and is even greater if the architect is someone from the homeowner's own circle of acquaintances.

The advice provided by architects is not always beneficial. Some architects are not very familiar with the full particulars required for a renovation aimed at increasing energy efficiency or may even give counterproductive advice by advising against certain energy-efficient measures because of their alleged economic costs or because of a general antipathy to such measures.

Little is known about energy consultants, both as regards to the job description and to their actual function. Some homeowners fear that an energy consultant will be too much inclined to focus solely on energy efficiency, even though the homeowner may have other and additional goals and preferences. Even among homeowners who are convinced of the need to improve energy efficiency, only around one half will call upon the services of an energy consultant.

DECISION CRITERIA FOR AND AGAINST ENERGY-EFFICIENT RENOVATION

When homeowners consider renovating their own homes, objective criteria are not the only decisive factors. This also applies to renovations to improve energy efficiency. The weighing of costs and benefits is affected by a mix of emotional desires and objective criteria. The important factor is to improve the subjectively felt housing quality, but this may find its expression in many different forms.

Although the homeowner may often invest several thousand Euros, most homeowners do not consider a renovation aimed at improving energy efficiency as an investment that should be evaluated primarily from an economic standpoint. They may often even voice the opinion that renovations to improve energy efficiency "do not pay off" in the strict sense of the word.

"As far as that is concerned, we were of the opinion that it would not pay off in the sense that the resulting energy savings would not pay for the entire scheme. We thought right from the start that it was more of a goodwill ac-tion undertaken to support climate protection and of course in consideration of possible increases in energy costs. Maybe some sort of vague future amortisation."

Man who renovated his house to improve its energy effi-ciency, 57 years old

One reason for this is also that the profitability of the renovation depends on factors such as the future development of energy prices, which are difficult to predict. Many homeowners are therefore convinced that the precise savings can only be roughly estimated.

"I have not calculated the possible savings accruing from the insulation. I am not going to do it either, because I cannot foresee how energy prices will develop."

Man who renovated his house to improve its energy effi-ciency, 37 years old

In this situation many fall back on simple rules to justify their decision. The emphasis is on advantages that are difficult to calculate in purely monetary terms, such as the ad-vantage of no longer being dependent on fossil fuels or of being less dependent on price developments in the energy markets. Some homeowners also see a benefit in that a renovation that improves energy efficiency may have a positive impact on the value of the house if it is sold at some later time.

"Costs do play a role when making choices, also the long-term costs, above all; whether it will pay off in the long term, that is, not just in two years but in twenty. Long-term benefits, durability, longer term utilisation. I haven't worked it out to the last penny but we have already done a rough estimate and looked into it, particularly into which form of energy supply is sensible over the longer term."

Woman who renovated her house to improve its en-ergy efficiency, 56 years old

The conviction is often voiced that modernisation to improve energy efficiency is worthwhile because it will not make the homeowner worse off than if the measures were not effected. For example, the expectation that energy prices will rise makes measures undertaken to save energy appear economically sensible, even if their concrete financial benefit cannot be precisely assessed.

The reason for extensive modernisations to improve energy efficiency not being carried out in many cases is primarily the result of a lack of an awareness of the problems and an unwillingness to finance the necessary expenses. Many homeowners are also not prepared to take out a (further) loan to cover the high financial costs of such renovations – or they may not obtain a larger loan from their bank due to their age. For many homeowners, a renovation to improve energy efficiency is not of interest because they believe that their house is already quite energy efficient and that there is therefore no need for further action. As the poll showed, however, this assessment depended less on the actual energy consumption of the building itself than on the homeowner's subjective belief that he/she had already done enough, for example, if insulation had been installed in the house some years previously. It made no difference whether the insulation measured up to current standards or not. Homeowners with no previous experience with modernisations to improve energy efficiency in particular often harbour prejudices, fears and apprehensions with regard to such renovations. Many are afraid of being unable to cope with the planning and realisation of such renovations, fear structural damage or fret about being 'taken for a ride' by unreliable contractors.

CONCLUSION

Decisions on the maintenance and renovation of privately owned homes are not taken based solely on technical factors or economic considerations; subjective preferences and needs decisively influence the decision. This also applies to renovations aimed at improving energy efficiency. Many homeowners are open to the topic and may be prepared to invest quite considerable sums of money. The wish to reduce energy consumption and its associated costs is a central motive. Many homeowners do think in the longer term and are prepared to do more than is economically profitable in the short term as long as they can perceive a clear benefit for themselves. In most cases, the decision to modernise in order to improve energy efficiency is influenced by additional motives.

In addition to the wish to protect the climate, the utilisation of renewable energy sources is a fascinating prospect for many homeowners as it allows homeowners to become independent of finite resources. The utilisation of solar heat, the installation of heat pump systems and the utilisation of geothermal energy therefore appear to be attractive options to many homeowners. This also applies to their use in existing buildings, despite the fact that the realisation of such measures may be difficult for technical or financial reasons. The wish to improve the quality of living or a fascination with inno-vative technology may often play an important role when deciding to renovate to improve energy efficiency.

But numerous homeowners also have reservations and misgivings about renovations to improve energy efficiency. Despite the increases in energy prices and many years of public awareness campaigns on the topic, many homeowners see no need for action because they underestimate the savings potential in their own home and are not prepared to seize opportunities to act.

This is not due to the fact that only those owners who are already convinced of the benefits of renovating to improve energy efficiency will enlist the services of professional consultants. Only a fraction of renovations are carried out under the aegis of professional experts or energy consultants. To increase the awareness of the range of possible measures among the homeowners who only carry out 'regular maintenance', a further differentiation of the range of consultancy services and the targeted use of 'low level consultancy services' would be helpful. In view of the coexistence of numerous grant programmes, some assistance in obtaining an overview of financial support programmes and how to access them ('financial advice') would also be desirable.

Fam. Stefan Scheper
Goldenstedt

Note

1. The article is based on the results of the research project 'ENEF-Haus – Energieef-fiziente Modernisierung im Gebäudebestand bei Ein- und Zweifamilienhäusern' [ENEF House – Energy-Efficient Modernisation of Existing Single and Double-Occupancy Homes], supported by the Federal Ministry for Research. For this research project, 44 homeowners in Germany, who carried out general maintenance or renovations to their heating systems or to the outer shell of their homes during the period 2005 – 2008, were questioned by the Institute for Social Ecological Research (ISOE) by means of qualitative in-depth interviews. In addition, an opinion poll of 1,008 homeowners who had renovated their homes was conducted using a standardised questionnaire. Enef-Haus was carried out by ISOE in cooperation with the University of Applied Sciences Lausitz and the Institute for Ecological Economic Research (IÖW). The study aimed to compile recommendations on how to support homeowners in their decision to carry out renovations and to motivate homeowners to carry out renovations that will improve the energy efficiency of their homes.
The reports and opinion polls are available online at: www.enef-haus.de

Dr. Immanuel Stieß is a social scientist and planning expert working at the Institute for Social Ecological Research (ISOE) in Frankfurt/Main, where he is head of the research area 'Energy and Climate Protection in Everyday Life'. He has carried out numerous studies on the topic of the energy-efficient modernisation of existing buildings, in particular into user integration, advisory services and communication strategies for target groups. Other research areas include energy-efficient building technologies and social sustainability.

Architecture with VELUX
from all over the world.

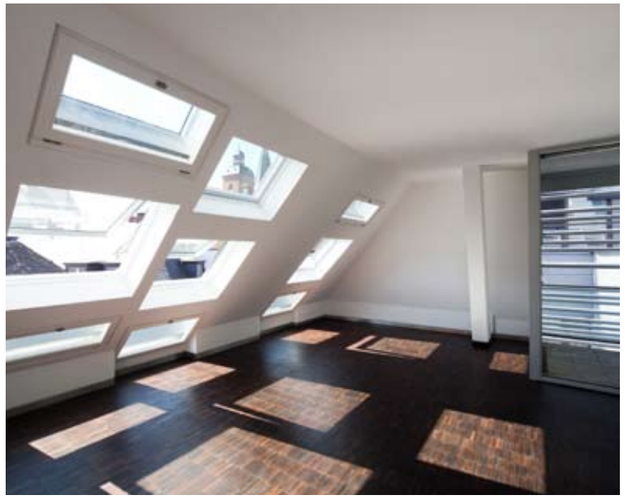
By Enrico Santifaller
Photography by Adam Mørk

THE TRANSFORMATION OF THE HISTORICAL: MARKET HOUSES IN MAINZ

The city centre of Mainz suffered enormously in the past. After 85 per cent was destroyed in the Second World War; everything was first cleared away although some foundation walls still existed. In the 1950s, Mainz first tried undemanding functional architecture and then, a decade later, attempted to create a dynamic city setting with monumental architecture, as it was called at the time – rough lumps of buildings that, apart from Arne Jacobsen's town hall, gave no consideration to the surrounding architectural context. A few years later, historicising facades, some of which were copies of copies, decorated banal purpose-built buildings and satisfied the sensibilities of citizens shocked by the inappropriately sized blocks, and at the same time gave tourists something to photograph as well. The result of all these efforts is somewhat chaotic: a mismatched conglomeration of buildings, with the most annoying examples in terms of urban planning having been repaired – but only on the outside and not in their substance. Apart from this, there is a lack of new concepts in Mainz, accompanied by indolence and, all too often, lazy compromises. All this, one would think, should constitute a perfect starting point for a bold, spectacular or even avant-garde project that, in addition to the architectural benefits, could enable urban development to make progress. The Mainz market houses facing the cathedral, which is over 1,000 years old, are such a bold, avant-garde project. Their design comes from the pen of Roman architect Massimiliano Fuksas, who, in the cathedral city, has shown a preference and talent for extravagant forms, unusual materials and technically advanced innovations to stir the feelings of the citizens. "An explosion of lines and colours", explains the master on his homepage.

He says that his main concern was to create a contemporary building that shows respect for history without falling into the trap of historicising rhetoric. For example, by taking into account the roof landscape and height contours of the surroundings without wanting to expose himself to the compulsion of ubiquitous gables and eaves, the alternative partial hip end roof or the ridge roof. Fuksas, of course, abstracts the context and transforms it in a very unconventional manner, whereby, like a high-fashion couturier, he clothes the new building in an iridescently sensual silk shawl in the form of a highly original and also subtly profound hybrid of sloping roof and variegated, multiply divided facade. Who can avoid thinking of framework constructions when confronted with the apparently thousands of thin rods, the vertical inclinations, the seemingly tiny windows? Who, when confronted with an urban mixture of shops, catering establishments,

The collage-like character of the Fuksas building is made apparent by the passageway in the direction of the market square. The corner tower as well as the roof surface to the right of it belong to the same apartments.



offices and apartments, all under a shared outer shell, can fail to be reminded of the town houses of the Middle Ages that combined all possible functions hidden behind a gothic gable? Who will the multiplicity of windows and the completely glazed ground floor not encourage to think of the shining crystal about which Paul Scheerbart and Bruno Taut were so enthusiastic at the beginning of the 20th century?

Mainz and its progressive thinkers have been waiting for an architect of international renown for a long time. Ernst May made a significant contribution to the city in terms of urban planning. Arne Jacobsen, mentioned earlier, dedicated a large expressive sculpture to the city in the form of the hulking yet very sensitive town hall, which many people hold to be the Mainz building of the 20th century. Now, at the beginning of the 21st, jet-set master architecture is again set to endow Mainz with cosmopolitan flair and metropolitan stylishness. The selection procedure was organised completely in favour of Fuksas, who was then working on the spectacular shopping centre called myZeil in Frankfurt, practically next door. He had nothing to fear from well-known competitors from Germany and abroad and even the client, Mainzer Wohnbau GmbH, let slip its preference for the star architect. However, the city insisted that the historicising facades of market houses 11 to 13 be retained at all costs, "no exceptions being possible". The fact that the facades were merely surface adornment and, in reality, concealed a trivial purpose-built edifice – a dilapidated cinema with rather uncomfortable apartments above it – and the fact that the height levels of apartments and windows were often horribly different, did not bother the city fathers. Ridiculed by many as "cardboard baroque", the symbol of Mainz-type neo-historicism had admittedly become brittle. The facades were slowly but steadily crumbling, moisture was making inroads and the insulation was rotting. Then came the solution: Fuksas had to completely re-build the entire complex – including its market facades.

The resulting building is therefore a compromise. The historical fronts have been completed – painted more attractively, more perfectly reconstructed and even featuring a thermally separated balcony. This shell is composed of white glazed ceramic rods, most of which are one metre long and, with a cross-section of 5×5 cm, somewhat thicker than those used by Sauerbruch Hutton for the Brandhorst collection in Munich. This shell, which encloses a six-storey building and a high atrium, is borne by a standard wooden roof construction. Fifty centimetres under the skin, which is not only composed of the aforementioned rods but also of flush-

Top left **The light-filled top-floor apartments have literally the entire city as neighbours. From here, the view sweeps far over the roofs of the inner city and, at the same time, the outer cover, composed of ceramic rods, prevents the curious from seeing into the apartments.**

Top right **Towards the market square, historic town-house facades were placed in front of the new building to conceal it. Nothing about them is original – they were built from scratch but, in terms of design, are in line with the preceding buildings that existed here before the Second World War.**

Opposite page **An atrium with a glass roof allows light to penetrate into the centre of the building block. An intermediate level separates the apartments on the top floors from the shops on the lower levels.**

Facts

Building type:	Residential and commercial building
Client:	Wohnbau Mainz GmbH, Mainz, D
Architect:	Massimiliano und Doriana Fuksas, Rome, I/Paris, F
Location:	Markt 11–13, Mainz, D
Completion date:	2008

mounted ceramic panels and glass, there is a normal reinforced-concrete construction with numerous roof windows. Two passages in addition to the main entrance lead into the hall, with the elongated luminaires on the ceilings of the passages resembling the ceramic rods on the facade. The atrium itself is a surprise – a public place exposed to the wind and weather. Three striking columns, which admittedly support nothing else but themselves, attract the attention of visitors through two kidney-shaped openings in the ceiling between the 3rd and 4th floor and the roof, which is partially open to the sky. Access to the 14 apartments, most of which are maisonettes, is gained via a lift in Korbgasse and through a 4th floor piazzetta, which is reserved for the residents. The attractive apartments incorporate exceptionally good fixtures and fittings such as bathrooms with lustrous black tiles, glass walls in some cases and open floor plans. The roof facade elements, by the way, can be pushed upwards like window blinds.

It must also be mentioned that the building does have some weak points, for which the architect is only partly responsible. This primarily concerns the concept of use and the tortuously narrow basement, with the escalator that leads there ending at a glass wall. As a result, the basement is still not being rented, even months after completion of the building. What is more, there is no underground car park – a deficit that nothing makes up for as far as the target apartment clientele is concerned. All the shops on the ground floor except one have direct access to the outside. The atrium, which is closed at night, is therefore often empty during the day. On top of this, there was no marketing plan for the houses, which explains why tenants for the relatively expensive apartments are still being sought. Yet, after the initial outcry, the building is finding more and more acceptance among the people of Mainz. Whereas some people speculate whether Fuksas has again written architectural history in the city, some investors in the surrounding area are revaluing their properties upwards. Nevertheless, in spite of this ambivalence, the fact remains that Fuksas has succeeded in transforming the historical.

Along the narrow alleys to the west and north of the new buildings, there are rows of nondescript post-war houses. It is here that the Fuksas building enters into an exciting dialogue with its neighbours.

Previous spread **"I wanted to keep the skyline of the city with the roof, but I didn't want to do a vernacular roof", said Massimiliano Fuksas. Glazed ceramic rods form the outer skin of the roof. In between, roof windows that can be opened supply the apartments with light and fresh air.**

41°49′51″ N
12°28′10″W
Murmur 21
November 26, 2006
Richard Barnes

Richard Barnes
Murmur

Flight Patterns
By Jonathan Rosen

European starlings have a way of appearing in unexpected places – the United States, for example, where they are not native but owe their origin to a brief reference in Shakespeare's "Henry IV, Part 1." In 1890, a drug manufacturer who wanted every bird found in Shakespeare to live in America released 60 starlings in Central Park. After spending a few years nesting modestly under the eaves of the American Museum of Natural History, they went from a poetic fancy to a menacing majority; there are now upward of 200 million birds across North America, where they thrive at the expense of other cavity nesters like bluebirds and woodpeckers, eat an abundance of grain – as well as harmful insects – and occasionally bring down airplanes.

In Europe, where the birds are native – Mozart had a pet starling that could sing a few bars of his piano concerto in G major – they still have the power to turn heads. Each fall and winter, vast flocks gather in Rome. They spend the day foraging in the surrounding countryside but return each evening to roost. (Rachel Carson, author of "Silent Spring," called the birds reverse commuters.) They put on breathtaking aerial displays above the city, banking in nervous unison, responding like a school of fish to each tremor inside the group.

The birds are beloved by tourists and reviled by locals – understandably, since the droppings cover cars and streets, causing accidents and general disgust. A flock of starlings is euphoniously called a "murmuration," but there is nothing poetic about their appetites. Their ability to focus both eyes on a single object – binocular vision – allows them to peck up stationary seeds as well as insects on the move. In the countryside outside Rome, they feast on olives. Like us, the birds are enormously adaptable but what we admire in ourselves we often abhor in our neighbors.

Richard Barnes's photographs capture the double nature of the birds – or at least the double nature of our relationship to them – recording the pointillist delicacy of the flock and something darker, almost sinister in the gathering mass. Many of Barnes's photographs were taken over two years in EUR, a suburb of Rome that Mussolini planned as a showcase for fascist architecture. The man-made backdrop only enhances the sense of the vast flock as something malign, a sort of avian Nuremberg rally.

It is, of course, natural for birds to surrender individual autonomy to the flock; according to the Roman ornithologist Claudio Carere, who has identified 12 basic flock patterns, the starlings are primarily trying to evade falcons. But we project onto the natural world a large measure of ourselves. In ancient Rome, augurs studied the flight patterns of birds to divine the will of the gods; part of the fascination of the starlings is the way they seem to be inscribing some sort of language in the air, if only we could read it.

A consortium of ornithologists, physicists and biologists in Italy and other European countries has in fact begun studying the birds with the aim of learning not only about the relationship of individual birds to the surrounding flock but about human behavior as well. The project, named StarFLAG, entertains hopes of using the birds to illuminate herding responses in human beings with a particular eye on stock-market panics. When humans contemplate animals, the question is always who is imitating whom. The starlings that so plague us in America (where we kill more than a million of the birds a year) grew out of our desire for nature to be poetic, rather than truly wild; they reflect the consequences of such self-serving fantasies. It isn't their fault that they treated an open continent much as we ourselves did.

More and more, as surrounding habitat is flattened, we may find fragments of the wild world coming home, literally, to roost. The abundance of starlings in Rome is partly the result of climate change – they used to go farther south before Roman winters warmed up. Bird-watching thrives on the recognition that the urban and the wild must be understood together. We are, after all, urban and wild ourselves, and still figuring out how to make the multiple aspects of our nature mesh without disaster.

Jonathan Rosen is the editorial director of Nextbook. His book about bird-watching, "The Life of the Skies," was published in 2008.

MURMUR 02, NOV. 15, 2005

MURMUR 17, FEB. 15, 2006

MURMUR 19, NOV. 29, 2005

MURMUR 20, NOV. 3, 2006

MURMUR 23 DEC. 6, 2006

MURMUR 24, NOV. 6, 2006

GREEN RENOVATION

Although there is a considerable need for renovation in buildings in Europe, the rate of renovation continues to be very low. In order to change this, affordable solutions are needed that not only reduce the CO_2 emissions of buildings but also enhance their comfort and improve their indoor climate. Together with its partners, the VELUX Group has come up with four solutions that 'activate' existing buildings for their occupants in precisely this way.

Introduction by Christian Bundegaard
Project texts by Jakob Schoof
Photography by Michael Reisch

Among the many figures related to climate change, one in particular stands out – over 70% of the average city's greenhouse gas emissions derive from buildings. As new buildings account for just a tiny fraction of the total building stock, sustainable refurbishment or renovation of existing buildings is paramount to any efficient CO_2 emissions reduction strategy.

Thus, UN data shows that building upgrades are among the most effective ways to reduce greenhouse gas emissions. In a review of over 80 studies on buildings and energy use, the UN Intergovernmental Panel on Climate Change determined that cost-effective energy efficiency measures in buildings could reduce building emissions by 30% from the 2020 estimated baseline.

Unfortunately, research and development have hitherto primarily focused on new buildings, whereas what may be called 'green renovation' is a field in need of extensive programming. One obvious reason for this is the high complexity in dealing with existing buildings, e.g. regulations, preservation orders, technical and design issues in connection with structural modifications, the interests of the tenants (as buildings are often in use) and many other aspects. Another reason for the lack of development in green renovation is financial, as resistance towards sustainability measures resulting in a rent increase (with the owner passing on the cost to the tenant) can be strong. What is more, the economic advantage related to investments in energy saving measures that go beyond standard is often either limited or long-term. Progressive government policies, subsidised programmes and full-scale experimental research and development are therefore necessary in order for the building sector to deliver its contribution to CO_2 emissions reduction.

The four projects later described all result from close collaboration between the VELUX Group and partners with strong views on green renovation. They show how the many other good reasons for focusing on renovation interact with sustainability issues in a manner calling for a holistic approach.

The potential for improvement in many housing estates and villas of the 1950s to '70s is quite large. In many cases the construction standards of that time are relatively low, and many houses simply need thorough structural renovation if they are to survive another 50 years. But the main challenge is to update these buildings architecturally in line with sustainable measures and technical issues, providing more living space and a better indoor climate.

In the years that have passed since the houses now due for renovation were built, the architectural needs changed fundamentally. With the massive migration from the countryside to the big cities, the rising welfare society shaped new family patterns and created a leisure culture that was directly reflected in architecture. The need for larger, brighter rooms that integrate accommodation, cooking, children's homework etc. in an aesthetic and useful way, also during the day, has created some very specific requirements for the design of dwellings.

As people spend more time at home and pursue more activities there, they require rooms that are attractive, robust, well lit and ventilated – and still affordable. Interestingly, during the same period the workplace became more 'residential', stressing the need for an attractive, well-designed environment featuring some of the same qualities as our homes. The time spent at work went from being a more or less necessary evil to a place where we develop an important part of our identity and are recognised not just as professionals but as human beings. In order to play this enhanced role in our lives, the environments of offices and factories have to live up to our notions of an attractive living space.

This expansion of the requirements for the layout of the physical environment has

not only taken place within the confinements of buildings; it includes the urban space that has become an extension of our homes and workplaces.

The architectonic element of our culture is not just an aesthetic issue. The role of design in everyday life becomes clear through the integration of function and aesthetics with sustainability, and the efficient use of energy resources, including daylight and natural ventilation. Here the advantage of renovating and refurbishing existing buildings becomes clear. It is within the framework of the inherited tradition that the architectural layers become visible; not only the temporal but also the functional layers. A building's former function – as a workshop for example – will always affect the perception of the possibilities of the new layout. The outdated features and construction of the old are challenges that inspire and direct the renovation process. In fact, these layered structures may influence the design to such a degree that in some cases the building's new architecture comes into being as a direct consequence of the value of the traditional.

All four of the following energy renovation projects were designed with a holistic approach to refurbishment. As modern homes and workplaces must accommodate the changing needs as described, the design aspects of the renovation are inseparable from construction issues and sustainability – hence the stress on a holistic approach. However, even if the trend of renovation is getting stronger, there is still a great need for experimentation and for proven new solutions and experiences.

LichtAktiv Haus in Hamburg and Solar Prism in Albertslund near Copenhagen are both renovations of post-war residential buildings, and both are based on integral planning in which architects and energy planners worked together to incorporate concepts of use, indoor climate, daylight provision and energy supply. Both existing buildings were originally conceived as system solutions. The renovation concepts applied to them are thus suitable for mass customisation. In both projects the goal is to increase energy efficiency as well as the social value of the building.

In Copenhagen, the Osram Culture Centre provides a pleasant learning and working environment through a renovation using thermal-insulated glazing, new roof windows, and the solar-chimney function of a two-storey entrance hall.

In Guldberg School, also in Copenhagen, interactive touch panels and screens teach the schoolchildren about the energy consumption levels and the amounts of energy obtained from renewable energy sources installed in their own school building.

In all four cases, sustainability, design, function and new knowledge are integrated in a carefully planned and executed holistic renovation. Their design is focused on optimal indoor comfort and based on the combined goals of providing better buildings for the daily users in their urban environment and contributing to a reduction of CO_2 emissions through energy efficiency and extensive use of renewable energy sources.

FOUR EXPERIMENTS/

1/KATENWEG 14
2/VALHALS GADE 4
3/SJÆLLANDS GADE 10
4/STORE TORV, HYLDE SPJÆLDET

1/ LICHTAKTIV HAUS: SEEDBED FOR URBAN RENEWAL

The LichtAktiv Haus in the Wilhelmsburg part of Hamburg is one of six buildings that VELUX is constructing in Europe in the framework of the Model Home 2020 project. At the same time, the house is an official part of the *Internationale Bauausstellung* (IBA = International Building Exhibition) in Hamburg.

Like all the experimental buildings in Model Home 2020, the *LichtAktiv Haus* is intended to function neutrally as regards CO_2 emissions and to offer its occupants a pleasant and healthy indoor climate with a minimum use of technology. For the Hamburg project, these aims represent a special challenge in that, in contrast to the other five 'model homes', the Wilhelmsburg project involves renovation of an existing building. Like all its neighbours, the house at Katenweg 14 was erected in the 1950s as a two-family house and a typical example of contemporary housing-estate homes: one and a half floors with a gable roof and an almost quadratic ground plan. On the gable side, the neighbouring house is attached and, on the other, an extension that originally housed a stall, a WC and a wash house.

The plot of just under 1,100 m² was chosen to be this size so that the residents could grow their own fruit and vegetables.

Unlike the large piece of land, the rooms inside are narrow and dark. It was therefore evident that a renovation concept for the house would not only have to address energy consumption but also bring about a substantial improvement in terms of space utilisation and daylight.

Self-sufficiency as a design motif

The idea of the housing-estate resident and the associated food autonomy of the occupants was a central source of inspiration for the design of the Licht Aktiv Haus. Under the supervision of Manfred Hegger, Professor of Design and Energy-Efficient Building at the TU Darmstadt, architecture students initially developed ideas, concepts and models as a closed competition. The winner, Katharina Fey, took the idea of self-sufficiency and independence and adapted it to notions of house occupants of the 21st century. Instead of vegetables, energy is now 'cultivated'. Large living areas and windows connect the house of the future to its surroundings.

"For me, what is special about the Model Home 2020 experiment is the idea of combining quality of living, function, climate protection and good design. Although it is a truism of any form of integrated planning, such a holistic view is often neglected in actual practice. User comfort, energy efficiency, good materials and attractiveness are basic premises of sustainable building."

Prof. Manfred Hegger

Page 62–65 **"Living in the green" with a great deal of privacy – the central ideas according to which the Katenweg district was planned are still unmistakeable today. Retaining these qualities and nevertheless making the houses fit for the 21st century in respect of comfort and efficiency were the main goals of the conversion project "LichtAktiv Haus".**

Below and right **Traces of life in an estate of detached houses: In the 55 years after being built, many of the houses in Katenweg were modernised by their occupants. The handwriting of every single one is unmistakeable. Nevertheless, the serial character of the estate houses can still be easily detected.**

"Daylight is a source of psychological well-being and physical health. As a source of energy in the scientific sense, however, daylight also supports the efforts of architects and planners to build sustainably. The VELUX Model Home 2020 combines both these aspects."

Prof. Peter Andres, light planner and honorary professor at the Peter Behrens School of Architecture, University of Applied Sciences, Düsseldorf

The design, which is to be implemented before the end of 2010, re-zones the piece of land. Whereas the basic structure of the residential building is largely retained, the old extension is replaced by a new section that divides the garden into a part for rest and recreation and a part that serves as a kitchen garden. In addition, the new section considerably increases the living space and useful floor area of the LichtAktiv Haus and plays a central role in the overall energy concept. A single-floor intermediate building with a flat roof functions as a connecting piece and as a "distributor" between the old and new building. The new building is modular and can be built in sequences, in separately financed modules, and with prefabricated elements.

The new open vertical room structure functions as a daylight lantern, Roof windows shed natural light into the house and make it possible to experience the different times of day. The staircase is integrated into the central space like a piece of furniture and enables views into the garden through a window front that is almost five metres long.

The new extension building, made of a prefabricated wooden frame construction, is linked to the existing building by means of a vestibule. Its southern and northern facades consist of a combination of opaque and transparent elements. On the inside of the extension, the living, cooking and dining areas are one continuous room divided up by various items of furniture. At the west end of the new rectangular section, there is an open carport and, at the east end, there is a covered outdoor area that creates an uninterrupted transition to the garden.

The aim of CO_2-neutrality: energy concept

In order to meet the standard of the German energy-savings directive (EnEV), the limestone outer walls of the existing building are insulated on the outside. Modern facade windows replace the old windows. A new prefabricated roof structure completely replaces the existing one.

The extension ensures that the LichtAktiv Haus is supplied with energy and compensates for the restrictions of the existing structure. Renewable sources of energy provide all the energy required for heating, hot water, house equipment, lighting and household electricity. An air-water pump powered by solar collectors is the heart of the technical equipment in the house. The overall system uses solar and environmental heat for energy supply the whole year round, running on natural ventilation and using solar thermal energy for heating.

Photovoltaic elements integrated in the roof glazing compensate for the power consumption of the heat pump and all the household appliances of the occupants.

An automatic control system enables all the rooms to be ventilated naturally, making a mechanical air-conditioning system superfluous. A cistern in the front garden collects rainwater that is used for the toilets, watering the garden and the washing machine. As a result, water consumption decreases dramatically.

Focus on the user

The results of the experiment will clarify how the vision of optimum living conditions with a pleasant indoor climate, daylight and optimum energy efficiency turns out in practice. This vision stems from the conviction that the focus of planning should be on the person as the user of a building in order to make sustainable living ready to meet the demands of the future.

With the Model Home 2020 project, VELUX wants to build climate-neutral houses of the future that adapt themselves dynamically to their environment in order to create an optimum indoor climate – the Active House principles. In the case of the German model home, these goals are particularly ambitious because the project in this case involves modernisation of an existing house.

1/ LICHTAKTIV HAUS

Building type:	Renovation and extension of a single family house
Client:	VELUX Deutschland
Concept:	Katharina Fey and Tim Bialucha, Prof. Manfred Hegger, TU Darmstadt, Faculty of Architecture, Chair of Design and Energy-efficient Building; Prof. Klaus Daniels, TU Darmstadt, Faculty of Architecture, Chair of Design and Building Technology
Location:	Katenweg 14, Hamburg-Wilhelmsburg
Year built:	1954

Previous spread **Large roof surfaces with only a few skylights dominate the appearance of the houses with their pointed gables. It therefore seemed a good idea to bring light and air into the inside through the roof when the houses were converted.**

The semi-detached house at Katenweg 14 is still waiting to be converted. Its old annex at the front has already been torn down. Here, a new wing made of wood is to be built.

2/ OSRAM CULTURAL CENTRE: DAYLIGHT INSTEAD OF LIGHT BULBS

The Osram Cultural Centre of today was first erected in 1953 as an administration and warehouse building for the Danish branch of the lamp manufacturer of the same name in Nørrebro, a Copenhagen suburb where many working-class and immigrant families live. The company's name and logo, a light bulb made of coloured glass, still decorate the front entrance facade but the building has not been used for its original purpose for a long time. In 1982, it was taken over by the Municipality of Copenhagen and converted into a cultural centre. Finally, in 2008, it was decided to renovate this former industrial building and 21 other urban properties in order to improve their energy efficiency. On the one hand, Copenhagen wanted to send out a signal for the climate summit that took place at the end of 2009 and, on the other, the users of the building were to be provided with a more pleasant learning and working environment with a better indoor climate, more daylight and – where necessary – better sound-proofing.

The Osram cultural centre was one of the first buildings in Denmark to be built with prefabricated concrete sections. Its entrance facade with visible facade supports, infills made of shaped concrete panels and 'window grilles' composed of extremely slim concrete sections, is now under a preservation order. For this reason, an external layer of thermal insulation did not even come under consideration by the planning team (T-Plus architects and Wissenberg engineering). Instead, the facade facing the street was fitted with ceiling-high thermal-insulation glazing on the ground floor as a second, inner skin. The other facades were insulated from the inside with mineral wool, and only the rear side of the building, where the demolition of a former annex used for storage purposes had left an 'open wound' in the facade, received external insulation and was covered with green and grey panels.

The rooms inside the cultural centre are now much more open and brighter than they were before the conversion. Anyone entering the building for the first time notices this immediately. Entering from the street, a visitor first comes into the stairwell which then takes him to the left and into the entrance hall, where part of the intermediate ceiling has been removed and new roof windows have been installed in order to allow more daylight into the interior. From here, a corridor along the street facade leads to a large multi-purpose room and three smaller meeting rooms. They are all lit by daylight, either directly via the facade facing the garden or indirectly via interior walls with glazed cut-outs near the top of each wall. This way of dividing up the interior also has climatic advantages. In spite of the inner

Building type:	Cultural Centre
Client:	The city of Copenhagen, DK
Architect:	Karl Weidemann Petersen/
	T. Marke, Copenhagen, DK
Architects (conversion):	Tegnestue T-Plus,
	Copenhagen, DK
Location:	Valhalsgade 4, Copenhagen, DK

glass facade, the corridor is not as well insulated as the other areas and thus serves as a buffer zone between the inside and outside. The two-storey section at the entrance functions as a solar chimney in which used air becomes warmer, flows upwards and escapes through the roof windows high above under the roof ridge.

On the top floor, the previously existing division of space has been essentially retained. In the centre, there is a large hall, which is big enough to hold 120 people and also allows daylight in through 16 new roof windows. Together, the latter form two large light openings in the ceiling and make the roof truss construction visible. This was concealed by a false ceiling for many years (and still is in many places).

In addition to their lighting function, the roof windows also make a contribution to the interior climate in that they ensure the hall is adequately ventilated during special events. Their specification is exactly matched to the climatic requirements. The ones that face the north were fitted with high-performance thermal-insulation glazing while those looking towards the south are made of standard Low-E glass, which is mainly intended to maximise the solar energy gain. Electrically-operated awning blinds reduce overheating and glare in the summer. They can be controlled either directly by the user or by an automatic control system. The latter is also part of the building's nervous system, which controls 28 roof windows and their associated shades and also operates four facade windows in relation to the interior and exterior temperature, the CO_2 content of the air and the uses to which the building is put at any particular time. The cultural centre is divided into several ventilation sections, each of which features different ventilation parameters and is fitted with its own sensors. In addition, a mechanical ventilation system with a heat recovery function was installed in the building. It primarily supplies fresh air to the meeting rooms and also acts as a back-up system for especially hot or cold days.

The entire building is equipped with LED lighting whose light output is balanced with the daylight intake via the control system. The elements water and heat round off the energy concept of the Osram cultural centre: thermal solar collectors on the south side of the roof are intended to meet up to 70% of the building's hot-water requirement. On the garden side, there is a rainwater basin that collects water running off the roof to water the garden and thus reduces the amount of water entering the drains.

P 72–73 **Alone the much lower height the special status of the former industrial building in its surroundings. Today, cultural events are held where electrical lighting equipment was once stored.**

Previous spread **The large hall on the upper floor is the heart of the building. Some parts of the roof construction made of wood were exposed in part. 16 new roof windows bring light into the middle of the room and ventilate the hall.**

Left page **The street-side facade with its filigree window grilles made of prefabricated concrete parts is a protected building. In order to nevertheless upgrade it, the architects inserted a second facade made of insulating glass behind it.**

3/ GULDBERG SCHOOL: NEW CLASSROOMS FOR CLIMATE PROTECTION ACTIVISTS

The Copenhagen district of Nørrebro is undergoing a process of change: the city of Copenhagen is investing a lot in the former workers' district in order to retain its social mixture and persuade families with children to remain. The measures being taken also include renovation of Guldberg School with its two premises located 500 m apart in Sjaellandsgade and Stevnsgade. It was no coincidence that it was completed just in time for the UN Climate Change Conference that took place in the Danish capital at the end of 2009. For the conference, the municipal council had planned several showcase projects on the themes of climate protection and the preservation of resources (Guldberg School being one of them). In addition, some of the delegates of the UN's Youth Climate Change Forum were to be accommodated in the school. Even after the conference, the school is to be used as a 'climate school', integrating this subject in the daily lessons.

One of the main objectives of the conversion project was to make climate change comprehensible to the schoolchildren – not only intellectually but in real concrete terms as well. The aim was also to make it clear that reducing CO_2 emissions does not always mean having to do without things but can also be associated with gains in comfort and room quality. Everywhere in the buildings, interactive touch panels and screens that show the schoolchildren specific energy consumption levels (for example, for lighting or hot water in the changing rooms) as well as the amounts of energy obtained from renewable energy sources have been installed. The individual renovation measures are not only tailored to the typology of the buildings, their location and the available degree of sunshine, but also to the didactic goals of the overall project: in the building in Stevnsgade, where sixth-form students are taught, photovoltaic modules have been integrated into the facade and LED lighting has been installed in the rooms. In the classrooms facing south, different lighting concepts are employed. They range from 'low-tech' to 'high-tech' and their energy consumption is monitored continuously. This is intended to make it possible for the schoolchildren to draw conclusions regarding the fluctuating interrelationships between daylight, artificial light and energy consumption.

The two brick buildings built in Sjaellandsgade in 1913–14 accommodate the elementary school and the middle school. A look at the roof is all that is needed to see that a new era has dawned for Guldberg School. Here, thermal solar collectors have been installed and, in future, will provide hot water for the changing rooms. The classrooms on the top floor also profit from the conversion:

Previous spread and left **A look at the roof reveals that a new era has commenced for the Guldberg school in Copenhagen. Solar collectors provide hot water for changing clothes. The roof windows are now considerably larger than before the conversion.**

Next page **After the conversion, the rooms under the roof are among the most attractive in the entire school. In each of the three rooms, there are temperature and CO_2 sensors which are used to automatically control the roof windows.**

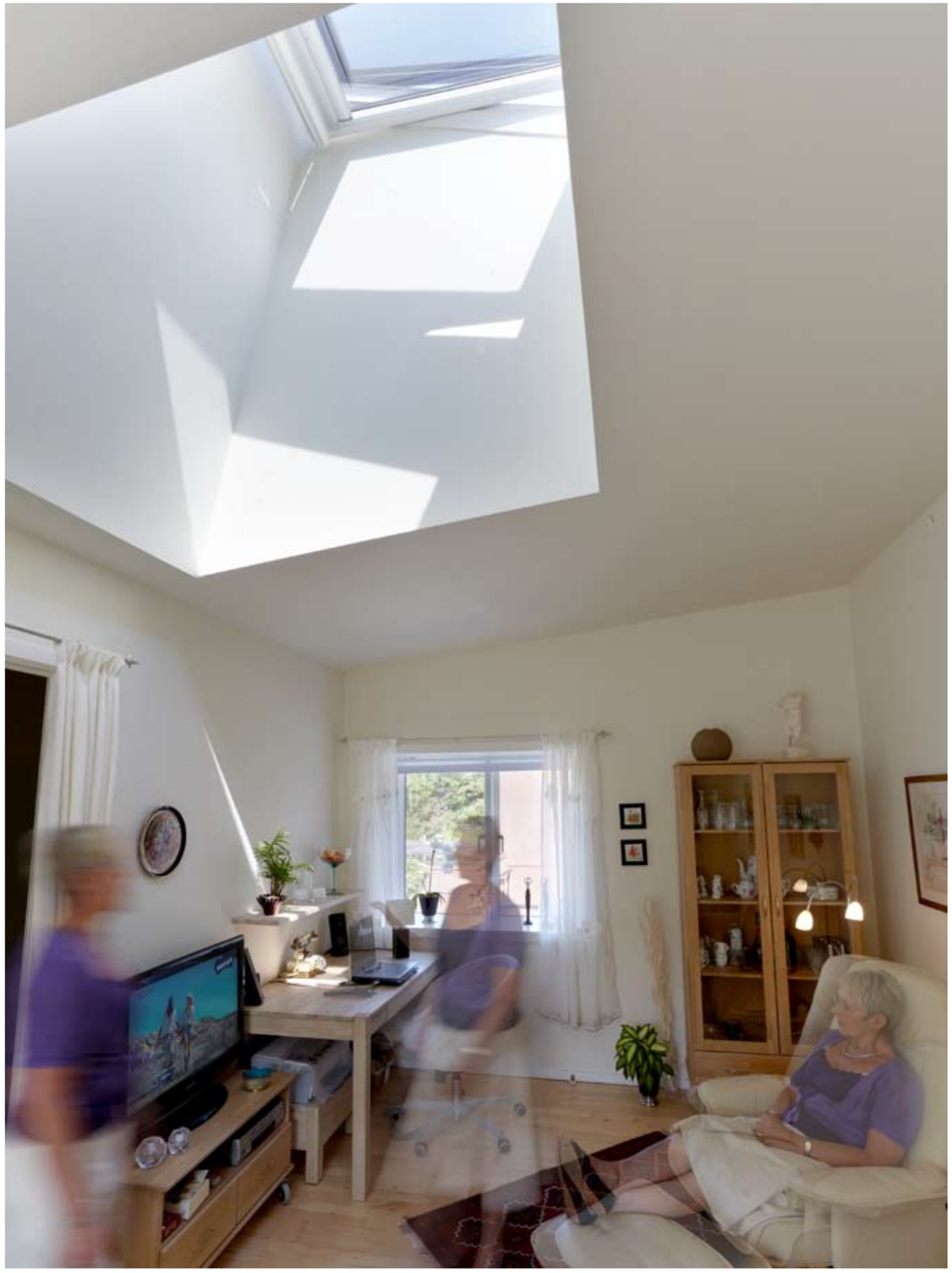
3/ GULDBERG SCHOOL

Owner:	City of Copenhagen, DK
Consultants:	EKJ Rådgivende Ingeniører AS, Copenhagen, DK
Architects:	NOVA5 arkitekter AS, Copenhagen, DK
General contractor:	MT Højgaard A/S, Søborg, DK
Partners:	VELUX A/S, Hørsholm, DK

the existing openings in the roof have been enlarged, the previous windows have been moved further down and, above them, new automatically controlled roof windows have been installed. This means that, in future, the children will enjoy an unobstructed view of the outside and the rooms will receive considerably more daylight than before.

The roof windows are also crucial for control of the indoor climate. Together with their external motorised awning blinds, they are integrated in an automatic control system for the indoor temperature and ventilation. The control system 'knows' when it is time to admit fresh air, reduce incoming sunshine or provide maximum thermal protection. The three attic classrooms are divided into three climate zones, each with its own room sensors for indoor temperature and the amount of CO_2 in the indoor air. A weather station reporting wind direction, speed and outdoor temperatures is mounted on the roof. A calendar module regulates the ventilation in relation to the time of day and the season. With its fresh air function, for example, which is activated shortly before lessons begin as well as in the breaks, the system automatically ensures that the classrooms are thoroughly aired. The 'pulse ventilation' program works in a similar way, having been specially designed for brief bursts of ventilation during the winter months. For longer warm periods, there is a different program that ensures a continuous gentle flow of (fresh) air in the rooms. In 'night cooling' mode, the windows are opened in order to allow the heat stored in the building to dissipate. How long this lasts is regulated automatically in relation to the level of heat caused during the day by the sun shining through the windows.

Of course, all these functions can be manually overridden by the user if so desired. During stormy and wet weather, the windows also close automatically. All the control parameters can be checked and altered via the Internet. Moreover, the children can use the Internet as well as the touchscreen in the school to look at the most important key data relating to the energy supply and the interior climate such as temperature, CO_2 level and the performance of the solar collectors..



4/ SOLAR PRISM: REDISCOVERED SIMPLICITY

For decades, renovations in respect of energy aspects were regarded as exceedingly complex and this is still true in many cases. However, there is often a lack of money, especially in small building projects, for an interdisciplinary, individual form of planning that would guarantee the necessary quality of the solutions.

In order to resolve this dilemma, at least for part of all existing buildings, VELUX joined forces with Danfoss and other industrial partners to develop Solar Prism, a modular system of building components. The triple requirement of making the result as simple as possible, as complex as necessary and as comfortable as feasible determined the way in which the joint development work was approached. The aim was to divorce energy saving from the old idea of doing without and rather to link it to a decisive improvement in living comfort.

The modules, which can be combined with each other flexibly, are placed on a flat or inclined roof and contain all the essential components for supplying the building with renewable energy. The energy consumption of an average home, say the project partners, is to be reduced by around half as a result, even with no further renovation measures such as thermal insulation.

And yet Solar Prism is much more than just a technical centre for the roof. Roof windows allow light into those areas in the middle of the building that were previously inadequately lit. In addition, they are an efficient way of ventilating the building, especially in spring and autumn.

Other components of the Solar Prism are thermal solar collectors and a 160-litre water tank for storing solar heat, two photovoltaic modules for supplying electricity, a 3.5 kW heat pump and a ventilating unit with a heat exchanger that recovers 90% of the heat in the used air and uses it to heat the incoming air. All these technologies have also been tested in renovation projects many thousands of times but are usually installed in the form of more than half a dozen different systems. In the case of Solar Prism, they are unified in a single, completely prefabricated and well-insulated building element. This makes for considerable savings in terms of planning, construction costs and time, and thus reduces the hurdles for clients new to the idea of energy renovation for existing buildings. Given that the needs of house owners almost always differ, Solar Prism can be extended with additional modules according to wishes and can be given other surfaces or the devices can be configured differently on the inside. The later replacement of components is also possible at any time, for example if the family situation – and therefore the energy consump-

Previous spread **Prototype for green renovation. The "Solar Prism" – installed here for the first time on a residential building in Albertslund – is energy control centre and source of daylight for the residential building.**

Left **Inside the building, it becomes clear how much the Solar Prism upgrades residential buildings in spatial terms as well. Whereas the much too small facade windows used to only allow in a dim light, new roof windows now light up the rooms with daylight.**

Building type:	Prefabricated modular system for renovating and upgrading residential building
Partner:	VELUX A/S, Danfoss A/S, BO-VEST, KUBEN Management, ROCK WOOL A/S, Teknologisk Institut
Consultants:	RUBOW arkitekter, CENERGIA Aps,
Suppliers:	Racell Solar A/S, EcoVent Aps, Kingspan Denmark A/S, DTU Byg

tion and requirements regarding comfort and indoor climate – change. Adaptation of the concept to sloping roofs is also conceivable. In this case, the modules would be built in flush with the surface of the roof in such a way that the equipment would be integrated in the attic and thus be invisible from the outside.

Its modular structure makes Solar Prism a supreme example of mass customisation, which is currently beginning to gain ground in the construction industry. In order to exploit this potential, the project partners want to develop an online platform in the next few years with which clients can configure and order their own Solar Prism to suit exactly their needs.

First implementation in Albertslund near Copenhagen

Solar Prism was tried out for the first time in a residential building in Albertslund near Copenhagen. The community is one of the numerous dormitory towns that originated around the Danish capital in the 1960s and 1970s. Several hundred houses of the same kind made of fair-faced concrete with inclined roofs are to be found in the Hyldespjaeldet district and, throughout Albertslund, there are thousands of buildings with exactly the same problems: little daylight, low indoor comfort and an exorbitant level of energy consumption. 2,200 of them are to be renovated in the coming years in terms of energy efficiency.

The Hyldespjaeldet district is the perfect opportunity for an idea such as Solar Prism: a residential district for wide layers of the population, where the need for renovation is tangible. But it also constitutes a market for simple and low-cost solutions. Solar Prism combines both these qualities. In the next few years, VELUX and Danfoss want to try out their joint concept at other locations in Denmark before it is made available to final customers.

Right **Although no longer in keeping with the time in terms of their technical construction, the houses in Hyldespjaeldet are characterised by their human scale and their relatively high density. Seen from the street, the Solar Prism is almost invisible but primarily exerts its effect in the rooms inside.**

Next spread **The view over the Hyldespjaeldet quarters reveals the potential of the Solar Prism. As here in Albertslund, thousands of flat roofs or even sloping roofs are waiting to be used as sources of energy and daylight.**

What distribution of roles in planning processes and what competences are required to design more sustainable buildings? What political framework is needed to achieve better planning results? Daylight & Architecture put these and other questions to David Cook (Behnisch Architekten), Renate Hammer (Danube University Krems) and Henrik Sørensen (Esbensen Consulting Engineers). One conclusion of these talks was that we are living in a time where time itself is in short supply – and this has serious consequences for architecture. Yet time is a key criterion when planning more sustainable buildings: it takes time to listen to planning partners and users, and it takes time to adapt buildings to the needs of the people even after they have been completed.

COOK SØRENSEN HAMMER

© MICHAEL WESELY, VG BILD-KUNST, BONN. COURTESY NUSSER & BAUMGART, MUNICH

DAVID COOK: WE SHOULD BUILD BUILDINGS AROUND PEOPLE

D&A: Planning a building is a collaborative effort, much like playing in an orchestra. What should be the distribution of roles in this 'planning orchestra' in your opinion?

DC: First of all, I think time is the most important issue here because the more time afforded the process of planning, the more refined the actions of the orchestra. Conversely, if time is short, ensuring that all members of the orchestra are performing to expectations may become incredibly difficult.

However, what matters is not just the size of the orchestra, or the time available for rehearsal, but being given the opportunity to select the members of the orchestra that you wish to play with. If their styles of playing are not complementary, then there may be problems.

In an orchestra, you obviously need a conductor, just as you need a first violinist. Now, without wishing to appear arrogant, I believe it appropriate that the architect is best suited to the role of conductor. However, here it is important to respect the role of the architect in different countries and the respective planning cultures. But in general, I think that an architect who fulfils the role of the traditional German 'Baumeister', being in control of costs and of the construction on site, can make the most of the role of a conductor.

Other professionals who may step up to play this role, for example project managers, have a natural tendency to exert a bias towards control and restriction. Although the architect should also be in a position to enforce an appropriate degree of control, he is also obliged to ensure that the creative forces within the orchestra are allowed to come to the fore.

D&A: What skills of the 'musicians' are needed to design sustainable buildings, and what qualities do your cooperation partners usually have?

DC: If you consider the client being a member of this orchestra, then he needs to have open ears, be accommodating to his fellow 'musicians' and not to dominate by shutting down too many avenues of thought too early. The climate engineer obviously has a leading role to play in any such orchestra. (I use this term rather than the traditional 'MEP engineer' because to a certain degree they are different disciplines). Ideally his relationship with the architect is one of a sparring partner, with whom project objectives can be defined thorough the form of an ongoing dialogue. At Behnisch Architekten, we prefer to collaborate with firms such as Transsolar or Buro Happold, with whom we have long-standing relationships. There is a natural advantage for us here; because if you have not been given the opportunity to work with such 'musicians' beforehand, then there is a natural tendency to revert to type; to the tried and tested. However, even to achieve the tried and tested on a project can be difficult if the ears and eyes of the other members of the orchestra are not open.

D&A: Have the typical roles and competences of the planning partners changed over time?

DC: The role of the climate engineers has become ever more important. Their numbers remain limited. But as the industry recognizes their importance, the demands on these firms become ever harder and it becomes difficult to get much of their time. Here we have a certain advantage over some of our colleagues because we have been working with these companies for 15 years or more. Hence they are generous in their time and more accommodating in the way they work for us.

Obviously, our own role has also changed. We too cannot simply revert to our past projects and do as we have done before. Objectives must be continually reassessed in the context within which we are working. We must remain aware of what is going on outside our office, our region and open to influences from other countries and cultures. And we need to understand how these different influences can possibly impact upon architecture – or affect our discussions with the first violinist, so to speak. In Central Europe, for instance, we are fortunate enough to have a very accommodating climate in which we can then exploit using a range of different architectural or engineering moves time and time again – or combine them in different ways. But working in different climates often means going back to first principles. And again this requires time in order to properly understand these climates and the corresponding cultures.

D&A: Do you need different competences when dealing with existing stock rather than new buildings?

"Everybody expects e-mails answered immediately. Previously a letter could lie on your desk for 4 or 5 days before responding, but now, everyone expects things to be literally delivered overnight."

DC: Dealing with existing stock may indeed be more difficult; however, it is clear that the industry is now confronted with massive challenges with regards to upgrading existing building stock. Sometimes the design team needs more time and more patience to understand exactly what is going on within existing buildings; how they can take advantage of the latent potentials within them; to examine what needs to be replaced and what can be reused; to understand which different regulations and rules apply to the existing stock. So – again – it is a matter of affording the design team adequate time.

Traditionally, our office has mainly designed new buildings, but it is inevitable that we will be working more and more with existing stock in the years to come. Although there are different rules which apply in this field, I think the process of design is generally the same albeit with different 'musicians'.

D&A: In your opinion, what are the biggest obstacles today if we want to plan buildings differently tomorrow?

DC: Time. Schedules have definitely become shorter. That is also a natural response to developments in society as a whole. Everybody expects e-mails answered immediately. Previously a letter could lie on your desk for 4 or 5 days before responding, but now, everyone expects things to be literally delivered overnight. This obviously has consequences for the way a design team works: things can be done immediately only if you reach for the top drawer and refer to something that has been worked on before. Experimentation and innovation are almost impossible under these circumstances. As challenges posed by the future become ever more complex, it is essential that the design team be afforded adequate time to consider their response.

Then there is the institutional side of the equation. One cannot realistically expect institutions always to take the lead in promoting innovation; this remains the role of the design team. There is always a certain time period before rules and regulations actually become upgraded or amended to such an extent that they will have widespread impact. Here it is important to recognise the difference between regulations and recommendations. Through simply scraping beneath the surface, it is often clear that many of the demands on our cities or buildings are actually defined by recommendations, not regulations. And these can indeed be challenged. But the process of challenging, and subsequent approvals of all members of the orchestra, again takes time.

D&A: How can the best link between the planning, building and operations phases be achieved? And what is the role of the user in this respect?

DC: The role, and indeed capabilities, of the user differs from project to project. Sometimes the building owner is the end-user, and sometimes, especially in developer-led projects, the developer and the user are very different parties with quite different interests. These can have a major impact on the operations of a building. Although the user is interested in the building operations during occupation, he is often held at a distance until development agreements have been signed, in which case it is often too late for him to get involved in any design decisions, which may well impact upon the future operations of a building. Such an indirect way of dealing with the end-user has a tendency to make the entire process very difficult. Luckily, in most of our projects we are fortunate enough to actually build for the end-user, as such design discussions can be much more fruitful.

D&A: Most end users are in fact first-time clients when they build a building, i.e. they are not experienced in planning processes. How do you discover what they really need and want in this case?

DC: We always hope that we are given the opportunity to nurture a dialogue with the user, not only concerning the planning of the building but also concerning subsequent occupation. To give you an example of this: when we started planning the Harvard's Allston Science Complex in Cambridge, USA, we were actually afforded a three-month period by the user in which we undertook shadow studies, carefully studying the behaviour of scientists and students, how they used their existing facilities and how they would like to use the new ones.

This preliminary study period is not necessarily afforded to every architect on every project. However, it certainly helps in tailoring systems to suit and in minimising eventual operational costs. Previous projects have shown that it can dramatically reduce the take-up period, where the end-user feels much more comfortable in the building and adapts it to his needs within a much shorter period of time.

D&A: What is the significance of monitoring buildings in this respect, and how can you ensure buildings are actually monitored?

DC: This is a difficult one to answer. Of course the architect or the climate engineer can offer monitoring as a service. But all too often, there is very little follow-up after the building has been delivered. This will change in time.

It is currently all too easy now to proclaim a building as being 'gold-rated' or 'ecologically advanced'. But these claims and labels are in most cases only applied in respect to the planning and as such can be seen as ungratified targets. It would be much more relevant if it were a requirement for such an award to be ratified through measurement on a bi-yearly basis; this would certainly keep everyone on their toes. Unfortunately, if we are not careful, it also makes the entire design process more complicated and places onerous demands on the building user. I do not know the solution to this problem, but we should definitely try to enhance the public's awareness of what the different rating systems are really about.

D&A: How do we build buildings now that people will still cherish in 50 year's time? (And how can we know what future generations will need, cherish and love in buildings?)

DC: We should build buildings around people, not in spite of them. It is essential that people do not feel alienated by their environment. We should seek to ensure that there is a degree of interaction between people and their immediate environment; that people should have a degree of control over their environment. Buildings should also be flexible to a certain extent, so that people feel that they can, if necessary, adapt them. We should not promote mechanical or control systems for their own sake; this is a problem that arises time and again. All too often, design teams propose to resolve problems through technological means. A more considered design investigation would probably reveal that a much more simple and enduring response is available. It follows that the means that we apply to problem solving must be different from country to country and from culture to culture. Without wanting to revert to the use of a cliché, I could see a tendency to turn to a 'new vernacular' in architecture. All too often simple issues of place and local culture have been neglected in the design of buildings. Furthermore, we should not forget to respect human scale which will help avoid intimidating building occupants. That is what I mean when I say that buildings should be centred around people and not vice versa.

D&A: How much influence do you have on scale as an architect, especially if you are confronted with clients or developers who stipulate oversized programmes for buildings?

DC: A large programme remains a large programme; however it can be dealt with in terms of building form through a differentiated massing, or through the careful consideration of the circulation systems within a building, such as streets, squares and parks. A large building may be thought of a structure that provides for and houses a series of different communities, each of which may have a different character and have different focal points. We often choose to design our larger buildings in such a way that there is constant reference to human scale respecting both living and working patterns.

D&A: What changes in regulations, incentives and the overall political framework are needed to achieve better planning processes – and ultimately to build better buildings?

DC: That's the question I would like to ask! In any case, we have to avoid restrictions and promote incentives. People are by nature generally lazy, so we have to encourage them to make any change in lifestyle or behavioural patterns. Over-regulation should be avoided. Instead we have to offer people opportunities to go through the planning process in an expedient manner if they propose to take on environmentally sensible manners in their buildings.

Although I hope that in the near future, everyone will be encouraged to finance, plan, construct and operate environmentally responsible buildings, it is essential that the demands of all parties are addressed, not just the architects and city planners, but also owners and developers, as they are the ones that hold the financial keys to the project. Let me give you a simple example: in terms of zoning or building lines, the envelope thickness of buildings is often an issue. We therefore have to ensure that people are not penalised if they choose to increase the envelope thickness in order to meet requirements for energy performance, and lose usable space in a building in return. Instead, it is essential that planning authorities find numerous ways to encourage environmentally responsive buildings. This is not an easy task. Onerous regulations may lead to buildings becoming more expensive. It is therefore essential in this period of transition that the client or developer is offered something in return. Tax incentives or the foreshortening of the approval process could be options.

On the regulatory side, it is critical that energy performance targets can be reviewed and revised on a regular basis; that they take into account different building typologies and locations. However before you know it, the rules for the designer become very complicated indeed, and anyone who wishes to creatively navigate their way around them needs – again – plenty of time.

D&A: Do we also need new, other or improved tools to design better buildings?

DC: I do not believe that we necessarily need more sophisticated modelling tools. We already have them. The question is whether they are being used properly. On a worldwide scale, differences in construction qualities are much more relevant than the sophistication of planning tools. Another problem is that everyone tends to hide behind different figures, different ratings, and different methods of measurement. Sometimes, when we go into a certain country and talk about the targeted performance values of our buildings, the audience do not have a clue about the measurement systems that we use. Likewise, the way the performance values are calculated differs from country to country. We need to encourage an honesty of use and a degree of standardisation, because otherwise far too much is lost in translation.

D&A: Given this situation, what is your approach to planning in an international context?

DC: We always tend to look for local partners with whom we can pursue a critical design dialogue, because there is much to be learned in a short period of time. It is far too simple to go into a different country and impose preconceived architectural suppositions on particular cultures. I believe that all designers must acknowledge and then learn from the mistakes of the past. Our forefathers made huge mistakes in imposing their architectures on foreign countries. As a consequence, many parts of our cities look the same ignoring climate, culture and tradition; many of the modernist buildings of the last century simply fail to perform in many countries.

A considered response to climate and place, as well as to local expertise and to local handicraft – in other words, an evolving form of vernacular – is inevitable.

David Cook is a partner at Behnisch Architekten in Stuttgart, Germany. After studying architecture at Manchester University, he graduated at the University of East London in 1992 and joined Behnisch Architekten the year after. Since the spring of 2010, David Cook has been Visiting Professor at the University of Oregon.

© MICHAEL WESELY. VG BILD-KUNST, BONN. COURTESY NUSSER & BAUMGART, MUNICH

HENRIK SØRENSEN: WE HAVE TO CHALLENGE THE ARCHITECT FROM TIME TO TIME

D&A: Planning a building is a collaborative effort, much like playing in an orchestra. What should be the distribution of roles in this 'planning orchestra' in your opinion?

HS: The 'orchestra' is definitely changing in these years: it is both increasing in size and the players are getting more specialised. However, it is not enough simply to have an orchestra – you also have to agree on which tune to play. In this respect, our own role as energy designers is changing from being a more specialised musician to a more supporting function, to keeping the whole orchestra together and being aware of how everything is interlinked. This becomes ever more important because there is a tendency today for the roles in the orchestra to be defined in too narrow a fashion, and for everyone to try to 'play their own tune' rather than to contribute to a good overall sound.

This presents a great challenge to the conductor of the orchestra – whoever that may be. Historically, the architect has always played this role and there are good reasons for him to keep on playing it because he usually has the most interdisciplinary function in the planning team. On the other hand, many more instruments are entering the orchestra now, which makes it ever more difficult for the architect to fully exploit its potential. In this situation, I think the architect needs a supporting function and we, as integrated energy designers, can perform this function.

Some architects also have a tendency to want to play all the instruments themselves. But there is no need to. The architect needs rather to come back to the conductor podium and make the musicians aware that they are part of a team and have to do more than just fulfil their own little function.

Last but not least, the client is the one who decides what will be played. If he is not fully aware of the possibilities and the potential of the orchestra, then it will be a very simple tune and leave the architect with a quartet rather than a symphony orchestra. Which can be very nice sometimes but often is not sufficient to exploit the full potential of a building.

D&A: What skills of those 'musicians' are needed to design sustainable buildings?

HS: Everyone in the team should be well aware of what their role is and what knowledge they should provide at the various stages. In the traditional planning process, a lot of engineers wait for the architect to do the drawings first. Then they have their say on what can be done and what can't, and what would have been a better solution and so forth. This corresponds very much to the nature of the engineer as he was brought up in the past – to tell the architect, "draw anything you like and we will make it work". But this option is not viable any more. As good engineers, we have to be much more upfront in the planning process and support the architect rather than waste his time by letting him draw something that is not possible or too expensive, or maybe misses some great potential that might be known only to the engineer.

So what is needed from us is the skill and will to be proactive in the initial design stages. We should also challenge the architect from time to time, just as architects often challenge a technical design, which is usually very helpful. There are some good engineers already who have this challenging ability but there could be more.

D&A: What qualities do you appreciate in your working partners?
Ideally, our working partners need a basic awareness of what matters and what doesn't. They need such broad and interdisciplinary knowledge as – what can you do with photovoltaic or solar thermal energy, how important is thermal mass in a housing development, and some basic knowledge of the thermodynamics and energy balance in buildings. All of this is crucial.
Besides, a good planning partner should be able to use the right tool at the right moment. Sometimes, too simple tools are used for detailed design and sometimes too complicated tools are used at the beginning of the process.

D&A: Do you need different skills when dealing with existing stock rather than new buildings?

HS: In very old buildings – i.e. dating from before 1910 or 1920 – a good knowledge of the methods of construction and the architectural values is crucial if you want to change them to a more sustainable mode of operation. We have seen some bad

"Maybe in the future we will even see a symbiosis of new and old building stock, where the energy surplus of the new, such as 'active houses', provides an option to maintain much of the old stock we would like to retain in our cities."

examples in which modern technology and thick layers of insulation were added to old buildings that later encountered problems with mould and condensation in the construction.

Then you have the younger buildings from the 1950s, 60s and 70s that were built before energy was even an issue. To make this part of the building stock sustainable, more radical solutions may be needed. We should not be too afraid of tearing down some of these buildings, because quite often they are difficult to upgrade to a better energy performance without spending a lot of money.

Obviously, demolition is always controversial, but we need to discuss it. And maybe we will find that there are many more options than we are actually aware of. On-site recycling of building elements and materials could be one of these. I can see a large need for product and process development to be able to recycle building components on site. This applies for example to brickwork, which, if a building is demolished in a proper way, can be re-used and a new building erected with a much better performance.

D&A: What about re-using and recycling technical installations? Isn't that much more difficult?

HS: Oh yes, that is a very difficult task. Usually when demolishing a building, the technical installations are those parts that suffer most and there is virtually no chance of recycling them. Maybe in the future, when more and more buildings from the '70s and '80s are refurbished, there will be an option that installations could be more carefully demolished and then recycled. Another aspect with technical installations is that they are usually replaced long before the buildings themselves. In that case, extra insulation and the re-introduction of natural ventilation into previously sealed buildings may lead to a much lower need for technical installations after the refurbishment.

D&A: In your opinion, what are the biggest obstacles today in planning buildings differently tomorrow?

HS: I think the greatest obstacle is the different time perspectives of the stakeholders. There is the developer, who usually operates on a very short-term perspective; and the investor, who can adopt a longer perspective – if it is a pension fund, for example. In the case of a private investor, the time perspective is obviously much shorter. The city, on the other hand, has a very long-term perspective, whereas the clients have a shorter one and the tenants an even shorter one. Establishing a financial framework for all these stakeholders, with their different time perspectives, is very hard in practical terms.

Another obstacle is that there is no tradition in the business of real estate brokers for setting any value on sustainability. To them, the prime criterion is still "location, location, location" and it is very hard to argue for sustainability as long as you have no precise figures for the added financial value of, say, a BREEAM Excellent or a LEED Platinum rated building. Some studies from the US already indicate that there indeed is such an added value in monetary terms – with sustainable buildings yielding higher rents and being unoccupied less frequently – but this message is only very slowly coming to Europe. The real estate brokers therefore need help to understand this added value and to communicate it to their clients.

Currently, I see little chance for the various stakeholders in the real estate business to adopt a common time perspective or strategy related to sustainability. But at least they can (and should) agree on how to measure and calculate the value of sustainability in the built environment. Research in this field is currently somewhat overshadowed by all the new technological issues being launched. Of course we need the technological stuff but the aspects related to politics, financing and evaluation need much greater research efforts than in the past. Otherwise we will end up producing the world's best PV cells but they will never be sold because we haven't managed to bridge the gap between those different stakeholders.

D&A: Do you see any obstacles in terms of regulations?

HS: A great deal could be improved through taxation of energy. Basically, energy is too cheap at the moment to find appropriate arguments for many of the longer-term investments in energy efficiency. Take insulation for example insulation: within its technical lifetime, of course, insulation will always 'pay back', but within the time span that is relevant to the financing, it often does not.

Another powerful tool could be the tax on real estate. Currently ideas are being developed in some countries as to how green buildings can be taxed differently from conventional ones. In this respect, it can be useful to take a look at other industries such as the car industry, where taxation and long-time operational costs are now becoming real drivers for investment decisions. There are obviously many differences between the car and construction industries: the initial investment in a building is larger, buildings are usually 'one-off' solutions (so that lessons learned about real energy savings cannot easily be transferred from one building to another), and, maybe most importantly, investment cycles in buildings are much longer. In 15 years' time, 90% of the vehicles that you see in the streets now will have been replaced by new models, whereas in the building industry you have to wait 80 or 100 years to reach this percentage of replacement. So the decisions that we make now on the level of sustainability of our buildings are crucial in the long term perspective. This applies not only to new-builds but also to renovations, because a newly renovated building will stay there almost as long as a new one.

D&A: To what extent do these obstacles differ between working with existing stock or designing new buildings?

HS: In the refurbishment of apartment blocks for example, where the residents are tenants and do not own the flats, there is a dilemma: why should I, as a tenant, agree to a higher rent in exchange for energy refurbishment? The extra energy measures may pay back within ten years but that perspective won't be very useful to me if I know that I will be out of the flat in five. So matching the environmentally sensible long-term investment with the short-term interest of the tenant will be crucial. In Denmark, for example, there is now a lot of legislation for energy refurbishments that regulates what percentage of the investment may be offset by higher rents and what percentage the house owner himself has to bear.

Still, many investments in energy refurbishment are not being made even though they would be perfectly sound, because the 'bridge' between the time perspectives of the owner and the tenants is not yet in place. To build this bridge – be it through regulation or through the introduction of a funding body – is a tricky task that has to be carefully investigated. Throughout Europe there is widely differing national legislation on the distribution of burden between owner and tenant.

D&A: How can the best link between the planning, building and operational phases be achieved? And what is the role of the user in this respect?

HS: Very often when we design new buildings, we do not even know the user. All we have is some general knowledge of the market. We can then try to address certain market segments by planning a building within a specific price range, and to meet a range of general market demands – for example by providing balconies and other amenities. So for a lot of new-builds it is simply not possible to have an interaction with the user. But if we renovate buildings, this is very different - then we are back to the issue of the stakeholders' different time perspectives that I mentioned earlier.

To better link planning, construction and operation of a building, a crucial point is to have a common vision of what we are trying to do. You have to agree on the means and the ends, and especially be able to make decisions on the course of the project – for example on how you value future savings on operational costs and how you compare them with investment costs here and now.

A lot of clients are not clear themselves on how to choose between options. If we tell a client "we can dramatically improve the energy balance of this building. It will cost you 5% extra here and now, but it will all be paid back within 15 years," then for many clients it is a difficult exercise to decide whether to make the investment. And unfortunately, many clients are totally focused on the initial investment costs and will argue, "alright, but we do not know about future energy prices and you cannot plan for that".

On the other hand if you ask people irrespective of a specific investment, everyone will agree that energy prices are bound to rise. This also means that owners of inefficient buildings will run the risk of having to renovate the building sooner than they ought to if they had built 'the right way' in the first place. What we learn from this is that the ability to evaluate the risk of doing nothing or doing too little in the first place is not yet sufficiently developed. There is a lot of discussion about the maintenance costs for seemingly more complex energy-efficient buildings. However, we need to be just as careful to acknowledge the risks and costs that will arise if we leave something out of a building or build in a less ambitious way.

D&A: The operation of buildings has indeed become more complex. How do you achieve a smooth handover of a building to the operators and owners? Do you train these people or provide them manual?

HS: In principle, I am very much against such operational manuals. I think that you can do so much purely by design, and it should be easy to live in a building without having to push lots of different buttons and to behave in a certain way to make everything work. If a specific behaviour is necessary, then we as designers have not done our job right.

To use an analogy from the car industry once again: in the early cars, you had a lot of knobs and handles, you had to prepare a special fuel mix, you had to do things to get a car started that no one would even dream of doing nowadays. Today, no matter what car you get into you will instinctively be able to drive it without damaging the engine or any other components.

Similarly, the building industry should become much better in designing and providing options for equipment and controls that can be used instinctively, rather than making the user solely responsible for achieving the sustainability goal.

Obviously, users do have a large practical influence on energy costs – for example if they leave the windows open in wintertime. But I am very sure that if the energy performance of a building was communicated more clearly and understandably to the users, they would quickly become more aware of the energy costs that are related to their behaviour. We should definitely not act in any specific, individual way against the interest of the user, but we should raise their awareness of the consequences of their specific actions. This works a bit like the eco-meter in a car: it is probably not very precise, but if a some red bulb lights up when people drive too fast or accelerate too quickly, then a lot of the drivers will probably say, "OK, let's slow down and make it turn green again!"

D&A: How do we build buildings now that people will still cherish in 50 years' time? And how can we know what future generations will need, cherish and love in buildings?

HS: I strongly believe that there are some generic architectural qualities that which are valued by almost everybody: high floor to ceiling heights, daylight and the associated variations in lighting throughout the day; but also the desire to be in visual contact with the surroundings and the appreciation of good materials and well-designed details. Even though may not be immediately conscious about it, when we really think about it, we appreciate things that look nice, work well, and are understandable. In Scandinavia, this tradition of designing objects that are functional and uncomplicated is very much engrained in our culture.

If you consider buildings as a framework for life and try to incorporate some of these very basic features, then the precise layout of floor plans or the look of the façade become less critical – because you have provided a solution that addresses very basic human desires. We tend to cherish these same aspects now when we look back at buildings that were built 50 years ago, aspects that create the feeling of being in a nice space rather than raise questions about what materials were used in the construction. If you visit old buildings and see timber and bricks, you have a very direct connection with the material and the structure of the building. I think it is this clarity that people cherish – and will continue to cherish in the future.

To achieve this straightforwardness and clarity at the same time as reducing the carbon footprint and improving energy performance of the building is the challenge to the orchestra. In other words – we have to combine the most basic functions with the high-tech requirements that also apply to our buildings nowadays.

D&A: What changes in regulations, incentives and the overall political framework are needed to achieve better planning processes – and ultimately to build better buildings?

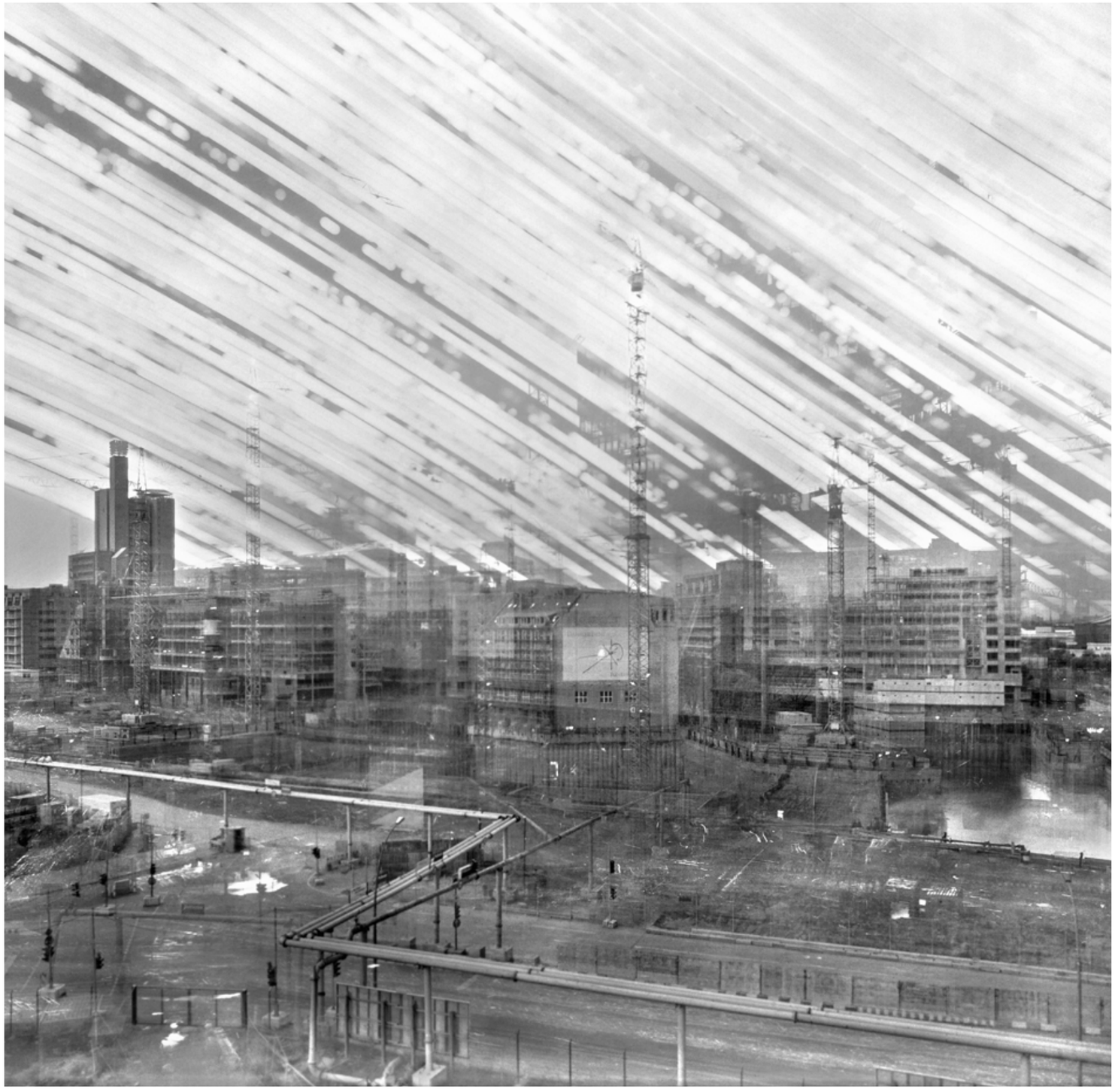
HS: As mentioned, I see a lack of common goals and means in the building sector. The sector is special because it just comprises so many different stakeholders who all have their own agenda. If we ever want to find a common way forward for all these stakeholders, we need to define clearer goals and provide a more long-term framework for planning, taxation and incentives in the building sector. Clearly, if you do not know what the framework will be in five years' time, you just end up doing what everyone is doing and try to do it a little bit cheaper. If you want to create something new, however, you have to believe in a new generation of buildings that have a much more long-term perspective embedded into them.

The other challenge is to see the whole building stock as part of the overall balance of energy systems in our society. It is rather easy to understand the energy balance of a single house – but the majority of our built environment is not comprised of isolated houses but of buildings that form cities and thus large energy systems.

There is a huge potential to combine the options for decentralised energy production such as solar thermal and PV with the rest of our energy systems. Maybe in the future we will even see a symbiosis of new and old building stock, where the energy surplus of the new, such as 'active houses', provides an option to maintain much of the old stock we would like to retain in our cities. This could be an interesting perspective for future 'active houses': to conceive a new generation of buildings that not only benefit the global environment but also, more specifically, contribute to the neighbourhood in which they are located.

Obviously, there are still considerable obstacles to overcome. Currently, we have one sector in our industry that works with energy supply planning, another group of stakeholders that works with housing or city planning, and a third that designs and builds individual buildings. Each of these needs to understand much more about the overall goals to be achieved. This 'silo thinking' will have to be overcome by political initiatives and legislation, because none of the stakeholder can cross these borders by themselves. We really need the politicians to define overarching goals for cities or for the building sector that force make the various stakeholders to collaborate.

Henrik Sørensen holds an M.Sc. in Energy Engineering and an executive MBA (MMT) in Innovation Management. He is Director of Business Development at Esbensen Consulting Engineers in Copenhagen and, for more than 15 years, has been involved in projects focusing on development of products and architectural Integrated Energy Design strategies for energy-efficient buildings.



© MICHAEL WESELY, VG BILD-KUNST, BONN. COURTESY NUSSER & BAUMGART, MUNICH

RENATE HAMMER: AN ARCHITECT IS NOT ONLY A CONDUCTOR, HE IS ALSO A COMPOSER

D&A: Planning a building is a collaborative effort, much like playing in an orchestra. What should be the distribution of roles in this 'planning orchestra' in your opinion?

RH: When considering this question we should not lose sight of an important point: the first job of the architect is to write the score for the orchestra. I think it is a symptom of our times that the discussion often only focuses on who will take on the role of conductor. In reality, the important thing is the piece of music itself, the creative effort which – and here I think everyone would agree – only the architect can provide.

Consequently, the person conducting must really have an intimate connection with music. It is quite conceivable that the designing architect can take on this role, at all events it must be a person who is really capable of judging the merits and qualities of a 'piece of music'. If you take music as an example, it is immediately evident that the person waving the conductor's baton cannot be the same person as the person who is responsible for the orchestra's finances. If the only conductors are persons who administer the budget, then the music will be unrecognisable unless the musicians are extremely talented and capable of transcending a poor or unqualified conductor.

D&A: What skills should 'musicians' have to design sustainable buildings?

RH: The necessary skills are similar to those required in music: you have to be able to listen really well and know your capabilities but also your limitations and those of the others involved. Given these conditions, it should be possible to do justice to a 'piece of music' together. We should never forget that, historically, the separation between design and technical planning is quite young. Originally, all knowledge relevant for the design of a building was literally inside someone's head – that of the architect or master builder. Nowadays, this knowledge is distributed between several different heads, all of whom nevertheless have to work together as though the separation had not occurred. The biggest mistake we can make is to shift the timing of work phases between disciplines. Usually the design is created first and the technology is applied at a later date. This is a far cry from the planning process as it used to be practiced in architecture. Doubts have often been voiced as to whether it is still possible to have concurrent processes today, but I am convinced that it is possible. It has only become more difficult as the technical demands made of buildings have become increasingly diverse and sophisticated. And it requires changes, both to the capabilities of planners and in their definition of their own role.

D&A: You are head of the Architecture and Engineering Division at the Danube University Krems. How do you prepare your students for planning processes, and what skills do you provide them with?

RH: We do not teach first-year students in our division, only postgraduate students. Real-life planning processes are therefore our daily bread and butter.

Another distinctive feature of our training is that we train architects and engineers together in the same classes. We do not aim to 're-educate' architects to become engineers or vice versa; we want to strengthen the skills of students in their respective fields and make them understand the interface between their field and other disciplines. Because only a shared basic language and an understanding of the other people's capabilities will enable people working in different areas to value each other and find a basis for reciprocal listening. At the beginning of the degree course, the respective characteristics attributed by each group to another usually correspond to those we are familiar with from routine planning processes: the architect is the aesthete without a clue about reality while the engineer destroys the aesthetic vision. Our students do not invent these role models but they are often underpinned by the experiences of their working lives. Our task as a university is to scrutinise how such experiences occur.

D&A: Do you need different skills and expertise when dealing with existing stock rather than new buildings?

RH: I think that the necessary basic understanding is very similar in both cases. It is important to carefully consider two separate thematic areas: firstly, the cultural meaning an architect can give to a new building or which he must be capable of perceiving when he is working on an old building. And secondly, the functional

solutions he can offer. The difference between renovating and creating a new building does not lie principally in the architect's ability or knowledge but in how this ability is applied. For example, when renovating a building it is necessary to focus more strongly on the cultural and historical importance of the current building and to consider decisions such as: what is the importance of a particular building or element in a building? Is it important for the overall context? Or does it have no particular relevancy and should be reworked? Or is it not even worth reworking and needs to be entirely replaced? The renovating architect must be responsible for making these decisions and giving the developer competent advice.

The question of whether the existing parts of a building can be made to harmonise with current requirements starts with the future utilisation of the building. Recently we were discussing a project in which the debate revolved around the question as to whether to pull down or renovate an insurance company building. Operational procedures in insurance companies have changed dramatically. When you consider, for example, that transactions are now effected electronically and customers no longer enter the cash office to receive their money, the result can well be that a desired 'transformation' of utilisation of an existing building is no longer possible. In the case we discussed, the final result was a decision to construct a new building. But the decision was not an easy one because elements of the existing building were still definitely worth keeping. In this case, the architect must be responsible for ensuring that the new building offers at least the same standard of quality as the old building did.

Even when designing a new building, it is still necessary to understand the building's context. During training, we place great value on educating our students to be 'sensitive to context' in all respects. Of course, the architect is much freer when building a new building, his leeway is greater. I think that is the greatest difference even though, in principle, both tasks are very similar.

D&A: In your opinion, what are the biggest obstacles we face today if we want to plan buildings differently tomorrow?

RH: I think that the imperative for us to build sustainably because of climate change is still difficult to comprehend. This is due in no small measure to the fact that we do not experience the problem directly. The current climatic changes are almost imperceptible to individuals. Instead, we talk about the weather and think: "nothing is really changing; we are having another cold summer." It is therefore difficult to translate climate change into emotions – and it is well known that emotions determine a large part of our actions. Everyone knows about climate change 'in their head' but nobody feels it 'in their gut'. This makes arguing about climate change difficult.

I now see more opportunities in another area: up to now, we have not been able to design real estate such that it represents a sustainable value, an investment. But here we may see a sudden advance in the general understanding as many people have lost money in the property market. The goal must be to reconstruct the market such that people again put their trust in real estate and in its continued value. Then we would indeed have the opportunity to plan sustainable buildings that will retain their value. In future, it will no longer be possible to obtain an enormous rate of return from buildings within the space of a mere three years. But we can indeed ensure – and that makes more sense for real estate – that a building will represent something along the lines of long-term wealth if it has been built to a high standard. When you look at the current developments on the stock exchanges, you will see that there appears to be no greater desire than for something with lasting value to endure. We should and must seize this opportunity in the real estate sector by demonstrating that buildings may have a lasting value – but only if they are also environmentally sustainable.

D&A: Are the current speed of change and the pressure to offer a good rate of return the reasons why so many buildings are constructed on a purely speculative basis, without knowing who will use them and without even being sure whether a user will be found for them within the space of a year?

RH: That is precisely the culture in which we currently exist. The obligation to achieve good short-term rates of return is basically alien to real estate. Of course, it is dramatic when people lose all their money on the property market and companies go into liquidation. But it appears that these experiences are necessary as the contradiction can otherwise not be made intelligible. However, I believe that the situation we are currently experiencing could lead to a change of paradigm. We probably need a further 2–3 cycles of financial catastrophes until the message finally gets through. But this could give buildings a whole new meaning, such as offering reliable value that will be maintained more or less irrespective of what happens around them.

If this occurs, then maybe we will have a little more time for planning again. At present I consider that the biggest obstacle is that planning is always done under pressure, despite the fact that this is the only stage in which fundamental decisions can be taken. Financial and time pressures are completely counterproductive to planning.

The same also applies to architectural training: here too, the increasing time pressure is a completely undesirable development. If we return to the starting point of our discussion – where planning was compared to an orchestra – and follow the assumption that the architect must indeed be at the same time the composer and the conductor, it is clear that we must give our students time to learn something and that we should not simply train them to become 'quick draftsmen'.

D&A: Do you also see obstacles with regard to the standards, regulations and benchmarks governing the current way in which we build?

RH: I do see an erroneous trend in the way in which we currently assess energy efficiency. An enormous amount is talked about the heating demands of buildings, which is understandable because in most cases that is the first point where potential improvements can be effected. Only this is far from enough - unfortunately. It would make more sense with regard to environmental sustainability to use a higher reference number, for example the CO_2 emissions per person. Because what does it help to have a passive house if it is sited in a greenfield development where one person has a living space of 200 square metres? I also think that we will be moving towards more complex forms of assessment. The new European energy performance certificate is on the right track, as it includes information on CO_2 emissions and primary energy requirements. It is more difficult to communicate this perspective politically than using simple reference values such as heating requirements. But it is very necessary because, particularly when renovating old buildings, a single-minded focus on heating requirements will not be helpful. Quite the opposite.

D&A: How can we achieve the best link between the planning, building and operations phases? What is the role of the user in this respect, and how can he/she be integrated in the process?

RH: For me, the question as to whether I am doing my planning for a known user or not represents a much greater difference than the alternative between renovating a building or constructing a new one. The value of being in contact with the end-user is incalculable. If I am dealing with merely an investor, I can only plan a building which is as flexible and open to as wide a range of functions as possible, and leave enough leeway for the user to adapt it to his individual needs. If I don't do this, the user will not be able to identify with the building. And once this identification is disturbed, this is also likely to jeopardise the building's sustainability because the user will simply not take much care of the building. Although the building is actually supposed to be built to last, it will more or less become an unappreciated 'disposable object'.

Therefore, even if I do not know who the end-user will be, it is important to ensure that he can interact with the building and is able to operate it himself. He must feel that he can modify his environment – whether through changing the climate controls or with the help of simple things such as windows that can be opened, an individually adjustable sunblind, or individual office equipment and furniture.

User polls, like those carried out in the context of residential renovation projects, are a good source of information when planning for unknown users. Their goal is to learn about the real needs of users – and these often include such everyday practical matters as too little storage space, not enough light, or insufficient noise insulation. These field studies, of which there are some particularly instructive ones from Great Britain, show us that the subjectively important needs of users may not necessarily be those on which we focus as the planners.

D&A: How do we build buildings now that people will still cherish in 50 years' time?
(And how can we know what future generations will need, cherish and love in buildings?)

RH: De facto, we don't know what they will need. But as planners we always have to make our decisions on the basis of what we know now – even if we are aware that we may make mistakes.

Moreover, with regard to buildings, there are two relatively accepted findings on which we can rely. On the one hand, we know that global CO_2 savings are urgently necessary. On the other hand, we now live in an indoor society and we must adapt our buildings to take account of this fact. A building which still functions in 50 years must enable its inhabitants to communicate with the exterior. Buildings are no longer simply 'momentary dwelling spaces' for certain times of the day as they used to be. We now spend the greatest part of our lives in them, and this will still be the case in 50 years. Precisely because we have become indoor dwelling creatures, we need to bring together interior and exterior spaces, interior and exterior climates in new ways. The complete decoupling of interior and exterior space can no longer be maintained because – apart from the enormous energy costs involved – this does not make people happy and has negative consequences on people's health. This starts with thermal comfort but goes far beyond that to cover such things as solar radiation: everyone needs the sun's ultraviolet and near infrared light, yet our current window glazing filters them out of our interior spaces. The need to bring back nature into our constructed environment does not merely apply to the design of buildings, it also applies to their environment: today, creating good exterior spaces is at least as important as designing good interior spaces.

D&A: What changes in regulations, incentives ... the overall political framework are needed to achieve better planning processes – and, eventually, to build better buildings?

RH: One incentive for planning would be to have more scope. Currently many details are overregulated, also for historical reasons. One example is the standards for thermal comfort, which have only just taken account of the recent realisation that people do not require an even indoor temperature of 20°C all year round and at all times of the day. Similar to the new rules and standards on 'adaptive comfort', in many areas it would be sensible to reappraise existing norms with regard to whether they are still valid. In addition, I would wish that the regulations no longer stipulate individual measures down to the smallest detail but just define goals. How they are achieved would then be left to the creativity of the planners. This would amount to a reversal of the approach used up to now, which specifies many individual steps but often does not check what the result is.

The logical consequence of this approach would also be a different way of checking buildings from the one currently used. This applies above all to the monitoring of buildings: we must move away from the established forms of handing over buildings, which only assess the technical status quo without taking the end-user into account. Instead, buildings should only be formally handed over after they have been in operation for two years when information is available as to how the building's 'system' works together with the end-user. That would be my vision for the future.

D&A: You talked about the necessity of revising standards. How do matters look with regard to daylight?

RH: The standardisation of daylight is still in its infancy. The indicators we have, such as the daylight factor, are merely makeshift solutions. That is because an important point has still not been generally understood: we live in interior rooms which differ entirely, with regard to solar radiation, from outside spaces, and this is an enormous strain on us as human organisms. In our institute, we are currently working on simple instruments that would allow us to define the effect of daylight using a standard that offers a better indication of daylight's actual impact than the daylight factor does. The daylight factor is quite useful as a basic indicator but it does not portray reality. Above all, it does not permit inferences to be drawn as to whether the necessary amount of daylight required for our health is actually achieved. Moreover, the requirements for the daylight factor specified in our current standards are minimal and there are usually no inspections to determine whether these standards have been achieved.

Occasionally we receive inquiries at our institute from companies whose employees complain of eye strain. When we then measure the intensity of the available light on site, we often get figures that are hugely below the minimum standards required, even though the standards themselves are quite low. Unfortunately people are not yet very sensitive to the topic of daylight. Many people will only notice that something is not right a lot later – because of the negative consequences for their health.

D&A: Do we also need new planning tools?

RH: I think that the tools currently available to us are basically sufficient. As regards representation techniques, I even wish that we could scale down the technology because the representations are now often more beautiful than the reality and may give a false impression to contractors who are often not trained to assess renderings.

On the other hand, we still have a lot of catching up to do with regard to dynamic light simulation. This type of simulation is extremely time-consuming because calculations are based on ray tracing and this often exceeds the computer's capacity. Finding a method that would speed up the process of representation would be a wonderful dream for the future. But maybe it will be possible to develop alternative ways of assessment.

Renate Hammer is head of the division for Architecture and Engineering at the Danube University in Krems/Austria. Her key research areas are solar architecture and applied daylight planning and the thermal and climatic optimisation of buildings. Renate Hammer studied architecture and philosophy in Vienna and took a master's degree in solar architecture. In 2009 she was awarded a PhD from the Institute for Architecture and Design of the Vienna University of Technology.

BOOKS

REVIEWS
For further reading:
recent books
presented by D&A.

ON ALTERING ARCHITECTURE

Author: Fred Scott
Routledge Publishers
ISBN 978-0-415-31752-8

"Alteration is more like a duet than a solo. It is about an art of response as much as it is an art of individual genius; it sets out to make a concord between the new and the existing, or even a discord". This is one of the numerous definitions – his own and others – that Fred Scott uses to approach the book's central theme: the continuous changes undergone by buildings in their life cycle. On Altering Architecture describes the 'unplanned' changes made by occupants as well as the academic discourse concerning the maintenance and restoration of historic buildings. The author discusses a range of artistic methods of dealing with existing structures and takes a look at the constant transformation of our cities. At the beginning of the book, he poses a question: why are buildings – usually for social and economic reasons – forced to change and what role do the users and their needs play? In the subsequent chapters, the issues examined by Scott include the following: the processes and scale of alterations, problems of geometry and materials, the remembrance of the forgotten (which colours the character of cities, especially European ones) and the renewal process as ritual (for example, the temple that is re-built every 20 years in Ise in Japan).

On Altering Architecture is an attempt to distil a kind of theory of alteration from the analysis of completed projects and from detailed research in the literature. Scott looks at historical sources and built examples and then comments on them and compresses them to create a special narrative of their own, without, however arriving at a generally valid definition or theory. His role is that of a careful observer who draws the reader's attention to many frequently ignored aspects of the renovation process. He thus succeeds in gradually revealing some recurring basic design issues in this context – and in pointing out the duplicity of many a discussion, such as the one concerning the conservation of historic structures: "The idea that works of conservation are ever entirely governed by expediency and necessity is misleading. Consequently, conservation is a falsehood, an attempt at neutrality to avoid the minefields of restoration".

In spite of its relative brevity, On Altering Architecture is a book that demands the reader's concentration and does not become boring even after being read several times. This is ensured by unusual insights such as the one to which Scott guides the reader in the final chapter: "Incompletion is the clear aim of alteration because of two prime purposes: it is only by such means that the allusion to the ideal, or paradigm, can be made, and it allows the building to become an element of continuity."

METROPOLIS: REFLECTIONS/ RESOURCES/ EDUCATION/ METROZONES

Published by: IBA Hamburg
Jovis Verlag
ISBN 978-3-939633-90-7 (Band 1),
ISBN 978-3-939633-91-4 (Band 2)
ISBN 978-3-86859-070-8 (Band 3)
ISBN 978-3-86859-071-5 (Band 4)

Five IBAs (international building exhibitions) took place in Germany in the course of the 20th century – with changing concepts but often path-breaking results, as borne witness to by the Mathildenhöhe colony in Darmstadt, the Weißenhof estate in Stuttgart and the Hansa quarter in Berlin. The sixth IBA that started in Hamburg in 2007 and is to last until 2013 is also intended to have this impact. It is dedicated to three main themes: 'cosmopolis' – the globally networked city of trading transactions and immigrants; 'metrozones' – city districts with their boundaries and transitional zones; and 'climate change and the city'. Wilhelmsburg, an island with the river Elbe flowing around it, is the venue of the IBA and is only a few kilometres south of the city centre. In the last few years, it has received considerable attention in the media due to its social problems. It is here that, in the best tradition of the IBAs, measures aimed at architectural and social transformation, as well as at structural economic change, are to be tried out and the self-healing forces of the city are to be activated. The five-part book series entitled Metropolis, of which four volumes have been published so far, is monitoring the mammoth project scientifically. The books are richly illustrated collections of essays and interviews to which architects, urban planners, politicians and a wide variety of scientists have contributed. They are an attempt to give equal treatment to large and small issues, to the global and what is specific to Hamburg. Some of the books do this well, others not so well. Whereas the first volume (Reflections) includes a highly convincing look back at the history of the five international building exhibitions in Germany and describes the starting situation for the IBA in Hamburg, the authors of volume 2 (Resources) only regurgitate mainly familiar ideas about cities and climate protection. In any case, the books are at their most interesting when they throw light on the situation in Hamburg or on the IBA projects planned there. The reason is that a lot of what has been conceived in the framework of international building exhibitions in Germany up to now has served as a model for others to follow, even though it has sometimes failed to prove itself locally - and some IBA constructions, in Berlin for example, have even been torn down. What the IBA in Hamburg will result in remains to be seen – whether this is schools, neighbourhood initiatives or a new power supply grid based on renewable energy. It will not be possible to reach a final judgement until years and possibly decades have passed.

In this context, the Metropolis series only offers momentary views of a metropolis that, with a lot of scientific back-up, wants to shape its own transformation and of a worldwide discussion of urban growth, globalisation and the consumption of resources in cities. However, in this respect, the books have a great deal of interesting things to say on a wide range of topics and from diverse points of view.

SUSTAINABLE BUILDINGS IN PRACTICE

Author: George Baird
Routledge/Taylor & Francis Group
ISBN 978-0-415-39932-6

The user – an unknown creature? In contrast to technical building monitoring (the kind that primarily records climatic data and energy consumption), scientific investigations of user satisfaction in buildings are still very rare and are almost never published. One praiseworthy exception is the book entitled Sustainable Buildings in Practice by George Baird, professor at Victoria University in Wellington (New Zealand). On the basis of standardised questionnaires, he and his co-authors investigated user satisfaction in relation to 30 office buildings, institutes and laboratory buildings worldwide which were, in general, regarded as "sustainable" exemplars. The following comparison shows just how important such surveys are for the companies and university staff working in such buildings: for every euro that a company spends on energy in a building's life cycle, 10 euros are spent on capital costs and rent and 100 euros on salaries.

The authors questioned over 2,000 people within a period of five years, asking them to assess 45 individual factors – from the building's image value, cleanliness and floor space to indoor climate factors such as temperature, air quality, noise and other variables including the subjectively perceived level of productivity at the workplace. Detailed interviews with the planners were also conducted with regard to their intentions and the planning processes. All the buildings had one thing in common, namely that they had won national prizes for sustainability or had been given particularly good ratings in evaluation systems such as BREEAM or LEED.

By far the greatest part of the book is taken up by 30 case studies in which the buildings are described in detail and the results of the respective questionnaires are shown. Baird was not interested in "ranking" the buildings, as he says himself. Nevertheless, he precedes the case studies with a close statistical analysis of the overall results from which some extremely interesting conclusions can be drawn. One of these is that the 30 "sustainable" buildings were rated considerably higher than the average of all buildings investigated by the British Building Use Studies organisation (one of the few worldwide that regularly conducts user surveys) in the months before the book was published. The level of satisfaction with the lighting, especially daylight, was generally high; indoor climate and air quality were evaluated as satisfactory. The main causes for complaint, according to the authors, were noise and a lack of storage space in the office. The users also stated that they did not have enough control over factors such as lighting, temperature and noise.

In the foreword, George Baird writes that he is still astonished at how little interest architects and engineers have in finding out about the level of user satisfaction in buildings. They would do well to consider how the solutions they concoct are actually evaluated in practice. In future, he fears, this lack of knowledge management is unlikely to change much. However, Sustainable Buildings in Practice represents a unique opportunity to take a closer look at user-survey methods and, at the same time, to find out how some much discussed "sustainable" buildings have proven themselves in practice.

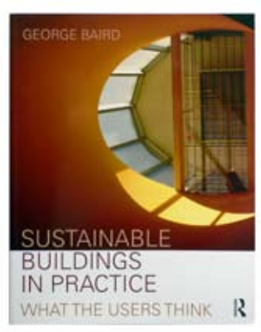
GREEN DREAM
How future cities can outsmart nature

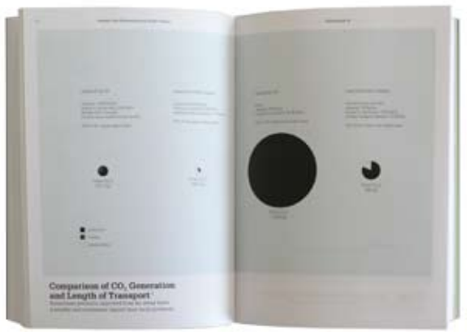
Edited by: The Why Factory
NAI Publishers
ISBN 978-90-5662-741-6

Winy Maas, co-founder of the architects' office MVRDV and professor at the technical university in Delft, is not known for naivety or exaggerated political correctness. In the book Green Dream, which he wrote in collaboration with The Why Factory, he puts his finger on some of the sore points of our society, which wants to save the environment, the climate and the diversity of species but shrinks for any kind of financial risk and therefore ends up getting nowhere. "Some things are wrong with Green" says the blurb, and the second chapter of the book entitled Twenty-Two Observations on Today's Green describes just what these things are: the complexity of the problems often has a paralysing effect, the efforts towards sustainability are progressing too slowly and, in a process of so-called 'greenwashing', green thinking and acting are all too often downgraded to become mere marketing ploys. And this is only what some of the authors have to say. Other theses are headed Green Buildings Are Ugly, Green Has Become Religious, Green Dismisses Science. The argumentative tenor of the 22 'observations' can be summarised concisely: the sustainability movement is currently becoming debilitated, especially as a result of its tendency to concentrate on the small scale, to overemphasise changes in individual behaviour and to engage in unscientific argumentation.

Trust in facts and progressive technology forms a golden thread through the book. Numerous, well-researched and illuminating diagrams illustrate the 22 theses in the second chapter. Chapter 3 contains five interviews and essays with and by experts, who mostly confirm the underlying theses of the authors. At the end of the book, The Why Factory takes a look into the future. Double-page renderings portray nine "green dreams", visions of the future for concrete cities around the world. Here, the inclination of the MVRDV office towards large, provocative concepts that intentionally break with convention and the given context is evident.

Unfortunately, the book suffers from its one-sided belief in technology and from the fact that it fails to combine individual ideas and concepts to form a logical holistic approach. Above all, the new visions of the future tend to ignore the people who are actually supposed to use them and live in them. They also fail to do justice to the complexity of the modern city. Moreover, in their revelation of the deficiencies in our sustainability society, the authors demonstrate little analytical depth. Even less do they seem to have internalised what they themselves write, namely that sustainability can only function in a democracy and, for this reason, has to rely on the culture, ambitions and participation of the people who are affected by it. Thinking in terms of master plans, as this book does, instead of plans of action will hardly take us towards the desired goal.





DAYLIGHT & ARCHITECTURE
MAGAZINE BY VELUX
AUTUMN 2010 ISSUE 14

Publisher
Michael K. Rasmussen

VELUX Editorial team
Per Arnold Andersen
Christine Bjørnager
Lone Feifer
Lotte Kragelund
Torben Thyregod

Editor, Institut für Internationale Architektur-Dokumentation
Jakob Schoof

Translation
Sprachendienst Dr. Herrlinger
Michael Robinson
Sean McLaughlin

Re-write
Tony Wedgwood

Photo editor
Torben Eskerod

Art direction & design
Stockholm Design Lab ®
Per Carlsson
Nina Granath
Björn Kusoffsky
www.stockholmdesignlab.se

Cover photography
Ann Malmgren

Website
www.velux.com/da

E-mail
da@velux.com

Print run
50,000 copies

ISSN 1901-0982

ANCE


VELUX®