CARE

A GIANT LEAP
WITH SUBSIDIES

COUNTRY-SIDE
AWAKENING

TOTAL MAKEOVER:
18TH CENTURY FLAGSHIP
GOES GREEN

EYEBALLING SIXTEEN ENERGY EFFICIENT PROJECTS IN EUROPE

A MAGAZINE FROM BUILD WITH CARE, A TRANSNATIONAL PROJECT AIMING TO MOBILIZE ALL FORCES AVAILABLE
TO MAKE ENERGY-EFFICIENT BUILDING DESIGN THE MAINSTREAM IN EUROPE

EDITORIAL

What comes to mind when you hear energy-efficient buildings?

Boring houses with little holes for windows? Complicated engineering? Not for normal people?

The magazine you're holding has been produced to prove the opposite. We want to show you that anyone can build energy-efficiently without compromising on design, comfort or function. In addition, it doesn't have to cost more.

We will be using sixteen examples from northern Europe to show that innovative and attractive designs can also be energy efficient. We've met people who live and work in these buildings, and given them an opportunity to talk about the excellent indoor climate and high level of comfort.

As you'll discover, there isn't only a single solution; there are many. Energy efficiency is possible both for new buildings and in renovation projects. This can be applied to homes, schools, offices and valuable historical and cultural landmarks.

The world is facing a gigantic challenge. We need to radically decrease our emissions that affect the climate, and we have to do it now. The building sector accounts for more than one-third of the world's energy consumption and carbon dioxide emissions. In addition, a building has a lifetime of at least 50 years, so if we don't act effectively now, it will be too late to achieve the environmental objectives for 2050 set by European decision makers.

The good news is that the building sector is capable of living up to its potential, and greatly contributing to the decrease of emissions that must be brought about. The technology and the expertise are available. What's needed is the political will, as well as people and businesses prepared to act as a vanguard, and show what is possible.

The Build with CaRe project wants to be one of these. We are an association of regions, cities, municipalities and puplic/private organisations in five countries around the North Sea that have united in order to make our voices heard. In this magazine, we will be presenting innovative solutions, asking you to accompany us into the future. A future without environmental destruction, where we instead build houses that will make good places for people to live.

So enjoy reading this, and feel free to contact us for additional information and continued dialogue.

HANNA BLOMDAHL
Project Manager, Build with CaRe
Region Västra Götaland, Sweden

Since the spring of 2008, Region Västra Götaland has been conducting the EU project Build with CaRe. This project is meant to promote lower energy consumption in both existing and new buildings. A total of 18 organisations from five different countries – Belgium, the Netherlands, the United Kingdom, Germany and Sweden participate in Build with CaRe. The project will last for three years, until 2011. Build with CaRe is partially financed by The Interreg IVB North Sea Region, European Regional Development Fund.

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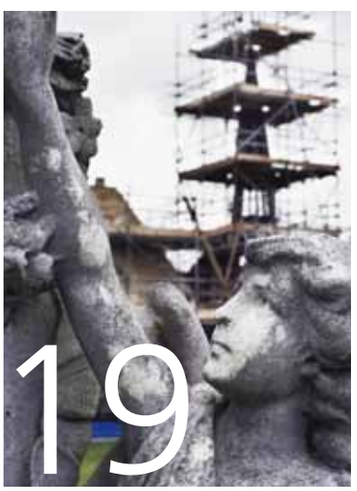

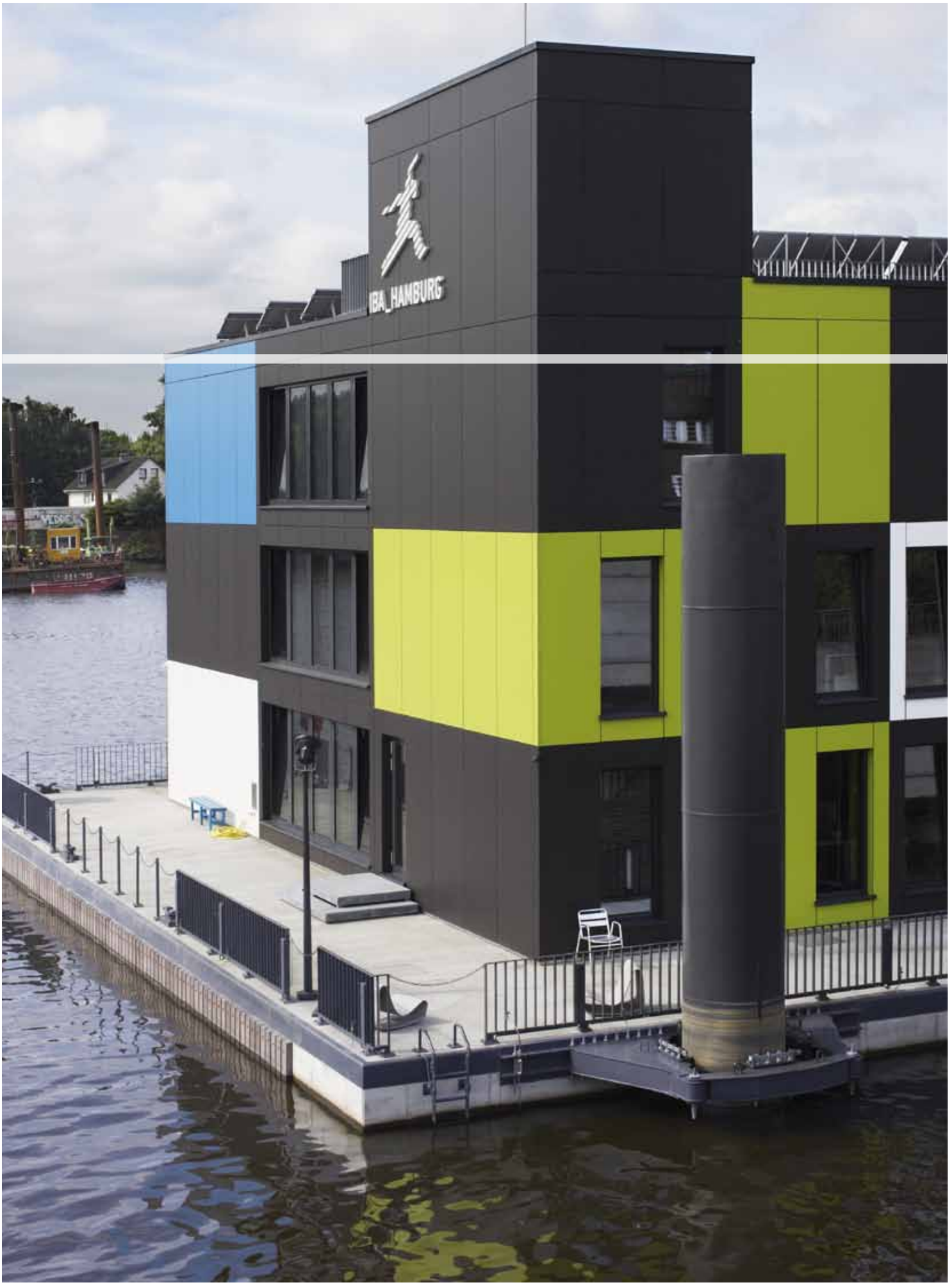
IBA_HAMBURG

A NECESSARY LEAP

IBA DOCK, HAMBURG, GERMANY

The Hamburgische Wohnungsbaukreditanstalt (HWK) gives local residents and builders a 240/m² Euros subsidy for the construction of passive houses. For the past three years, the city has been part of a sustainability effort based on the IBA Hamburg progressive building exhibition.

It's no exaggeration to say that Germany plays in the First Division when it comes to building passive houses. After all, passive house technology was born in Darmstadt, Germany, in 1990. Since then, Germany has built 10,000 passive houses, and expects its head start to widen unless other countries begin using German tactics: giving financial incentives and imposing requirements, in order to push the conventional construction industry to change.

In Hamburg, the Hamburgische Wohnungsbaukreditanstalt (HWK) subsidises each passive house built, in the amount of 240/m² Euros.

Urban development

Another major driving force for promoting energy efficient buildings in Hamburg is the international building exhibition IBA Hamburg that began in 2007, as an active project partner in Build with CaRe. Simona Weisleder, a project coordinator at IBA Hamburg, explains:

"A purpose of the IBA challenges is to find innovative solutions for the problems a city faces. In Hamburg, we focused on three sustainability themes regarding the central island of Wilhelmsburg, Veddel and Harburger Binnenhafen: How the city could grow while protecting the climate, how the island's metro zones could be made habitable, and how social life could be enhanced by utilising the diversity of the population."

The IBA development project of the south of Hamburg, called "A leap over River Elbe", is part of the city development plans.

Geographically, the island of Wilhemsburg is like a brake block between central Hamburg and the southern districts. In the early 1960s, 300 people died in Hamburg – 200 of them in Wilhelmsburg – when the water level of the river rose sharply because of the flood catastrophe. That marked a stop to urban development on the island, that is a home for the island's approximately 55,000 residents from about 40 different countries.

Energy conservation leader

The intention of the IBA Hamburg is to develop Wilhemsburg into a community that is advanced socially, ecologically and a leader in the area of energy conservation, using construction that meets the requirements of the future. The international building exhibition IBA Hamburg is like an experimental laboratory where those with interdisciplinary expertise meet in an effort to create new, sustainable ideas and solutions. Residents are being offered many different opportunities to participate in the project. In 2010 a concept proposal was presented featuring sketches of the project's various subprojects with houses and themes.

After consultation and discussions, construction began in 2010, in the central part of the building exhibition focusing on four different subthemes: energy-efficient buildings with new, intelligent materials; hybrid houses that are flexible for the changing needs of their residents, and cost-effective multi-family houses and buildings that are not affected by raised water levels.

IBA DOCK

The headquarter of the IBA Hamburg GmbH is the first building completed in the course of the building exhibition: The so-called IBA DOCK, a three-storey floating structure built on a 1,075 m² reinforced concrete pontoon, combines office space for the staff of the IBA with an ample visitor's centre. At the same time the IBA DOCK itself is a key exhibit relating to the theme "Cities in Climate Change": The building rises and falls with the Elbe tides and thus offers a conceivable example of safe construction methods in areas subject to flooding. Inside, in the exhibition IBA at WORK, information can be found about the history of building exhibitions in Germany, the approach taken in Hamburg as well as all ongoing IBA projects in Wilhelmsburg.

"The IBA DOCK opened its doors in May 2010. In addition to its functional purpose as an office and exhibition space, it represents a seizable topic for a dialogue with the general public and an iconic landmark for the exhibition," explains Hans-Christian Lied, project co-ordinator at IBA Hamburg.

By responding to the rivers tidal movement, the IBA DOCK shows by way of example how innovative construction methods can deal with the effects of global warming and the subsequent threat of flooding of city areas. Furthermore the building is equipped with state-of-the-art technology, which completes the approach of sustainable and CO_2-neutral construction: With its photovoltaic collectors (which transform sunlight into electricity), a solar-thermal plant (which convert the energy of the sun into heating energy), a water-source heat pump (which uses the water of the river Elbe for heating and cooling), a ventilation plant with heat recovery system and an insulated building envelope that undercuts the requirements for energy saving at the time of the planning permission by 50%, the IBA DOCK is an outstanding example of sustainable building.

The heat pump extracts heat from the harbour water via heat exchangers attached to the base of the pontoon, increasing its temperature level and releasing it to the air of the office and exhibition areas via ceiling panels. On the lower deck, accumulator tanks buffer heat throughout the day. The ventilation system is equipped with a recovery system that utilises the heat from the exhaust air of the building.

Hans-Christian Lied: "On the roof approximately 34 m² of solar thermal collectors tilt towards the sun and con-

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vert its energy into usable energy for heating and the production of hot water. The 103 m^2 of photovoltaic panels generate the same amount of energy as the heat pump requires over the year – hence the heating of the building can be considered as CO_2 neutral."

Flexible building on water

The three-storey modular "boathouse" is erected over a 1,075 m^2 reinforced concrete pontoon. "The fact that this is a modular structure means that the upper floor can be dismantled in case the building has to pass under low bridges in order to move and moor elsewhere", Hans-Christian Lied explains.

The IBA DOCK is reached via a gangway with mobile supports, which guarantee access at any water level. The building has a net floor area of 1,623 m^2, of which 760 are used as a display area, the remaining 863 m^2 are offices. The wraparound terrace gives the visitor the opportunity to connect to the water body. A cafeteria at the south-western corner allows views over the adjacent harbour area.

As a floating structure the IBA DOCK does not claim any land and its location in Hamburg's dilapidated southern area supports the regeneration of the Elbe Islands, where new offices, homes and green areas are slowly but continuously being created. There is also a more symbolic value to the building: With its colourful steel modules it is reminiscent of stacked containers on internationals freighters in the in adjoining docks and hence fits very well into its environment.

Projects for self-sufficiency

The Climate Protection Concept is the "road map" developed by IBA Hamburg to transfer the concepts for 100% renewable energy, which are generally intended for rural areas, into the urban context.

The first step is to accomplish climate neutrality for all construction projects at the International Building Exhibition, measuring their CO_2 emission during operation. IBA projects should not raise the CO_2 balance through an increase in greenhouse gases emissions. Unavoidable CO_2 emissions of new developments will at least be compensated by reductions in existing projects, and by increasing the number of renewable energy projects.

Four strategic pillars

It is essential to anchor this pilot concept in the local economic and social environment on the Elbe island. The citizens and local businesses should become partners – the winners of the Climate Protection Concept for a Renewable Wilhelmsburg. The objectives of the four strategic pillars are:

1) increasing the proportion of renewable energy and energy generated, step by step to "100 % renewable"
2) improving energy efficiency through combined heat and power (CHP) plants as well as local and regional integrated network management system
3) "virtual power plants" reducing energy consumption by means of high standards of technical building equipment (new developments and refurbishments)
4) involving and motivating citizens on the Elbe islands through comprehensive communication measures and providing economic incentives for participation.

One project of the key theme cities in climate change is the Energy Bunker. The former flak bunker in Wilhelmsburg is being restored and made suitable for new uses: in the future it will function as the technical centre of a local heating network and there will be a documentation centre with a café in its publicly accessible areas. From 2012, heating and electricity production will be concentrated in a block heating power station fuelled by woodchips on the ground floor of the Energy Bunker (joint power-heat system on the basis of biomass). In addition, solar installations on the roof and the south façade totaling 3,000 m^2 will produce electricity and heat from solar energy.

This energy mix will make it possible, in a first step, to supply the neighbouring "Weltquartier" (comprising more than 800 apartments) with heat from sustainable energy sources.

At the same time, a portion of the electricity required there will be generated as well. A water tank holding 2,000 cubic metres of water will be constructed to buffer the heat in the gutted interior of the Energy Bunker.

"Germany requires that every building constructed in 2010 or later is equipped with smart grid meters, which read and indicate the times when electricity costs more or less to use. This is to help residents save and get the most out of the system," Simona Weisleder explains.

At the same time as IBA Hamburg culminates in 2013, the International Garden Show igs 2013 (igs 2013) will open in Wilhemsburg.

IBA DOCK personnel: Hans-Christian Lied, Jan Gerbitz and Caroline König.

Rules that promote change

For many years, Frankfurt has used the passive house standard as a norm for the city's own new construction and renovation projects. The city creates financial incentive to build in an energy efficient way, and sells building lots only to those who are willing to accept passive house technology. There is currently discussion regarding the introduction of passive house technology as the standard for all public buildings in Germany by 2012.

WIDE AWAKE IN A SLEEPY COUNTRY TOWN

PUMPKÄLLEHAGEN, VISKAFORS, SWEDEN

When the Borås suburb Viskafors planned to build rental units there were two choices: build cheap or unique. Today, 18 high-quality passive houses attract visitors and prospective residents from around the world.

Gigantic old red brick industrial buildings. Fancy wooden homes with their paint flaking off. Rapids that sometimes whisper and sometimes thunder through fertile countryside.

You can see the proud tradition of the Viskafors area as you drive through this active suburb of Borås, the centre of the Swedish textile industry. It's a bedroom community that's beginning to wake from its 30 year sleep by long-term thinking and the creation of a stronger identity.

"The Pumpkällehagen passive house area has been the tonic this community has been waiting for a long time," explains Mikael Bengtsson, CEO of Viskaforshem.

Sustainability in real homes

It's been ten years since Mikael Bengtsson began studying the possibilities of creating long-term opportunities for living and finding homes in the Viskafors area. Part of the work involved analysing the supply of municipal housing, as well as discovering what is worn out, what can be preserved, and how Viskafors can regain its status.

"Our point of origin was to build real homes for people, rather than for the building industry. Houses and neighbourhoods that enable people to continue to live in our community, and contribute to its progress."

Several projects grew from that vision, and one day a tract of land next to the centre of town became available, a beautiful hill in a perfect location, covered with leafy and evergreen trees, that could provide Viskafors with new housing.

"We had phased out the use of oil, and worked actively with energy-saving measures in existing houses. When it was time to plan the rental units in Pumpkällehagen, it felt natural to adopt life cycle thinking and not choose to simply save money for the present."

The industrial community of Viskafors has a long history of craftsmanship behind. At its peak, the community provided about 2,000 jobs through Rydboholmsbolaget, the first weaving factory in Sweden (established in 1834), and the Viskafors Gummifabrik (rubber factory established in 1890). Increased competition gradually led to cut-backs, and in 1982, both businesses were closed. Viskafors became that low-status community passed by commuters on their way to Borås.

Despite the low status of Viskafors, its history of design and superior craftsmanship has remained a part of the identity of its inhabitants. And this would permeate the entire planning of Pumpkällehagen.

"We missed those really exciting designs on our travels through Sweden and the rest of Europe in a quest for inspiration. When we began to plan the area the focus was on the technical aspects. At a conference, we heard Ola Nylander, an architect, talk about the immeasurable values in housing, with a holistic view of sustainability, beauty and comfort. That meeting proved to be a revelation."

A new concept programme and drawings, signed by Ola Nylander, were prepared, as well as a vision combining passive house technology with great attention to detail. The aim was to make the houses durable and cheap to maintain, while providing an authentic home feeling.

The most well-sealed houses in Sweden 2009

An intense and unusual building process followed, in which the craftspeople first looked down their noses at needing to cut the plastic for the insulation, and then were proud when they realized that they had built the most well-sealed houses in Sweden. Finally the Pumpkällehagen passive house area stood where it was to stand.

These buildings are filled with satisfied tenants. One of them is Jan-Åke Brorsson who moved here with his wife, Inger, from a large 220 m^2 house, via a temporary 55 m^2 apartment:

"Our daughters had moved out, and we tried to find a home in Viskafors. When we heard about Pumpkällehagen, we knew right away that this was the right choice. Extraordinary layout, close to buses and the centre of town, and of course, in Viskafors."

A learning period followed, as the construction took longer than expected, and the costs were too high with the first contractor. New offers were accepted, and after two years, Inger and Jan-Åke were able to move in.

"Those were two useful years. We sorted and thinned out our belongings a few times, and learned to appreciate the value of space and things. Now we love living here."

In their 109 m^2, airy, single-level apartment, Inger and Jan-Erik each has an office.

"In addition to the large, attractive living room, the apartment has three rooms of equal size. It's a great advantage for these houses to be flexible both for various families and over time. We are probably the only ones who chose to make the room facing the outdoor space into a bedroom."

Do you have to be environmental crusaders to live in a passive house?

"Absolutely not....all you have to do is just live in the house. On the other hand, we have begun to realise what can be done with our system, which operates so cheaply, and we are increasingly thinking in environmental terms both due to financial and environmental considerations. Finally, we understand what home environment means for quality of life."

Life cycle thinking

The houses are built based on Ola Nylander's philosophy regarding the importance of the immeasurable values to housing: good craftsmanship, axiality (possibility to have an integrated experience of several rooms at the same time), generality (free choice of uses for the rooms), large light inflow, and a balance between the experience of enclosure versus openness.

The houses made of linseed oil impregnated wood opens in back to a private, outdoor area, protected from view. The window areas toward the neighbours and the central square are smaller, and there is more of a public seating area. The home has its own carport, a service entrance from the laundry room, ground lighting toward the square from the mailbox "to avoid being blinded by the streetlights when you look up toward the starry sky", and grey rheinzink roofing.

Mikael Bengtsson explains:

"The choice of roofing is an example of life cycle thinking. We discussed simpler solutions for a long time. However, Rheinzink lasts about 100–150 years, as compared to a felt

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roof that costs half as much, but will have to be replaced after 15 years."

Life cycle thinking is not limited to the house itself. During the construction phase, interference with nature has kept to a minimum, while at the same time, local material and craftspeople were employed as much as possible in order to stimulate the area and minimise transports.

Harmony and cost-effectiveness

The interior of the house has thick wooden flooring with light-coloured glazed wooden walls that create a tasteful, cosy feeling and are perfect for hanging pictures on.

Mikael Bengtsson says:

"The idea behind combining the passive house concept with high quality is to ensure that the houses will last a long time and be cheap to maintain. You feel the fine craftsmanship as soon as you enter. Everything exudes thoughtfulness and authenticity."

The living room has a ridged ceiling, and a skylight acts as an exceptional source of light.

The architect fought to keep it, as it's not really part of the passive house standard. And we're happy it turned out that way. There is little energy loss, less of a need for lighting, and the skylight creates a natural light show on the wall during the daylight hours.

The windows toward the porch are large, and the low, solid stone window sills are from nearby Kinnekulle. The kitchen features low-energy appliances, stone counters from the same supplier, and oak cabinets from Lidhult, known for its solid craftsmanship that lasts a lifetime. Instead of wardrobes in every room, there's a single large walk-in closet at the heart of the house, the heat pump.

"The first winter we lived in this house was the coldest in living memory, and in January, the output was not enough. But Viskaforshem increased it, and I didn't have to do anything at all. It's easy to be an environmental hero in a passive house," Jan-Åke Brorsson smiles.

A model apartment with a local touch

The area's tasteful model apartment has received a great many delegations of public officials, architects and media people.

In addition to the focus on energy efficient solutions and the architecture, local suppliers have been highlighted. Gunilla Allard, who is a stage and furniture designer, furnished the model apartment with furniture from Lammhult, rugs from Kasthall and Josef Frank textiles printed in Rydboholm. The apartment also has textiles from Spira in Borås, ceramics from

House facts:
Pumpkällehagen, Viskafors

High class, aesthetic housing, very low energy consumption, and ecologically sustainable material produced in compliance with the requirement of Agenda 21.

- 18 apartments with detached home quality
- 109 m² heated floor area
- Outer walls with wood stud frame divided into four layers
- Mechanical ventilation with heat recirculation
- Ecologically intelligent choice of material
- Healthy and pleasant interior environment
- First passive house detached homes designed as rental housing
- Architect: Nylander arkitektur/Karlsson Wachenfeldt arkitekter
- Energy requirements just below 60 kWh/m² (including heating and hot water)
- Rent exclusive of heating and hot water: 1130 Euros/month
- Water: 16 Euros/month (fixed fee)
- Waste disposal: 20 Euros/month (130 litre container)
- Heating/hot water: 400-450 kWh/month
- Contractor: Olofssons Bygg AB

Rotor in Borås beds from Kinna.

"We've created a kind of interdisciplinary educational centre around Pumpkällehagen, with visitors from all over the world," explains Mikael Bengtsson.

Local potential

Even though many people commute to Borås, there are jobs available in Viskafors and its vicinity. Most of them are in the care sector, but there are also jobs in the garment industry. Many of the old large properties are now used as warehouses for that industry. Rydboholms Textil is now back in operation after its 1982 bankruptcy. In 1992, they began using their name again, and today there are 35 people working in the old brick building near the rapids in Rydboholm. More than two million metres of cloth is dyed, printed and prepared each year for various manufacturers, wholesalers and retail chains.

Although ecology and the environment are undeniably important, the efforts in Viskafors also are intended to ensure community sustainability. The town supplies its vicinity with everything from library books, games and bowling to food, baked goods and spiritual nourishment.

"What the town offers is very important. We welcomed a fantastic pastry cook who with a passion and professionalism enabled the bakery to grow from one to five employees. Today, people travel long distances to buy bread and pastries," explains Mikael Bengtsson.

The will and visions have attracted other skilled people to the community. Young people and families with children are moving in. And when the hospital in nearby Borås was looking to hire new staff, Viskaforshem found out that a doctor all the way from Germany had applied for one of the positions.

"What were the chances that a German doctor would settle in a tiny little country village in Sweden? I succeeded in getting the municipality to tell him about Pumpkällehagen. The doctor took the job and moved into one of the houses last autumn."

Local suppliers have been highlighted in the building process.

WHAT'S IN IT FOR NOORD-BEVELAND?

This beautiful island and tourist destination in south-western Holland was on its way toward a prosperous future when the financial crisis hit. Now it's full steam ahead with the marketing of the Build with CaRe project.

"We were ready to create lasting values for the future with our investment in passive houses. But the financial crisis in 2008 shut off our financing opportunities," explains Tom Vermin, who is in charge of the Build with CaRe project in Noord-Beveland.

Instead of accepting quotes from building companies and architect firms, our building plans just stood still. At that time pioneer architects from Italy and Germany had produced conceptual plans for the area with passive house types that fit well into the local community. The plans were to build four houses for seniors, five flexible life cycle houses for all ages, 16 starter homes where people could begin by living in a small area, and then expanding when finances allowed, sixteen free standing houses, eight semi-detached houses, and ten small flats.

Architect Erik Franke of Franke Architekten, has sought out opportunities to implement the passive house philosophy and build sustainably ever since 1981, when the passive house organisation was established in Holland.

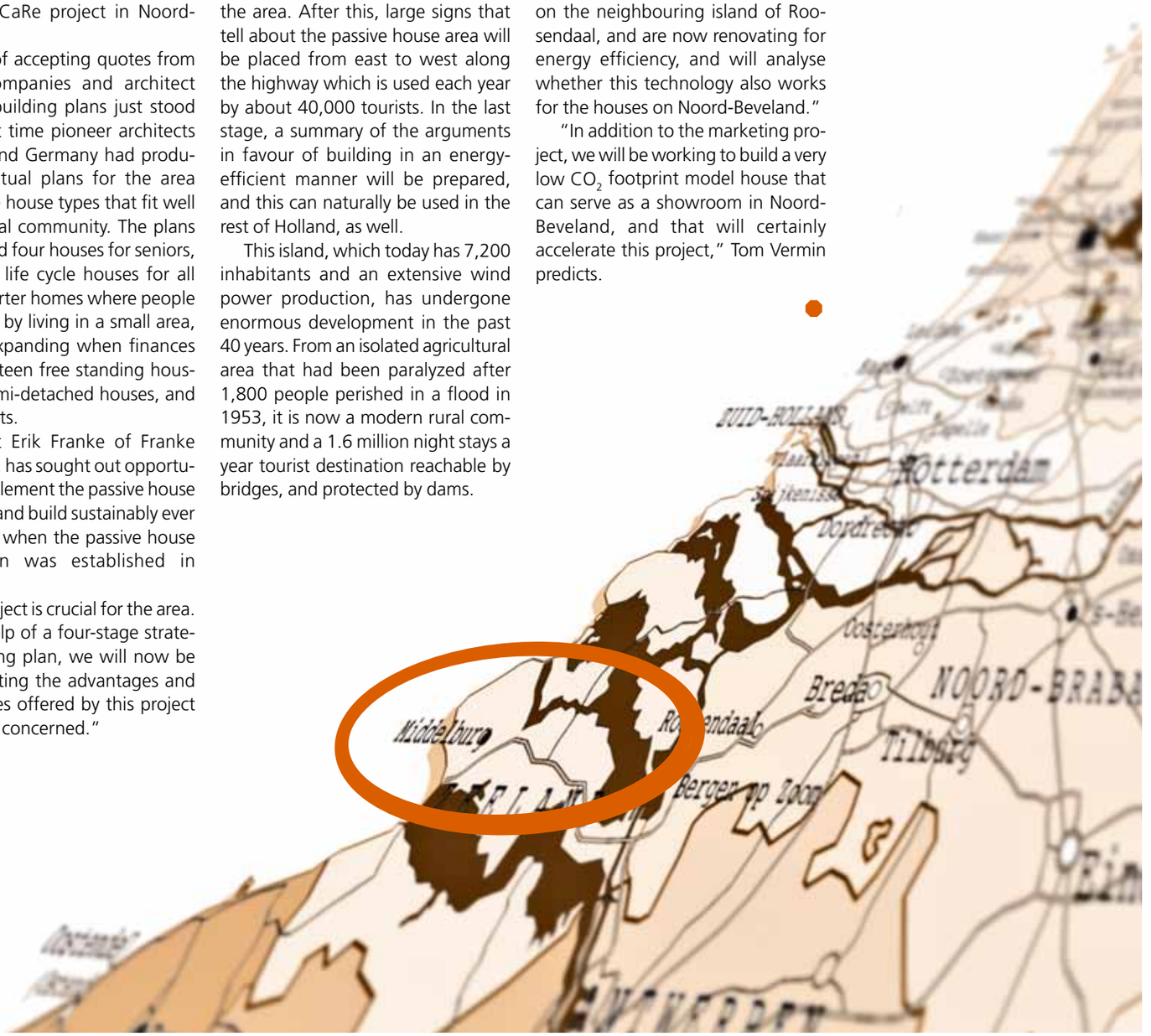
"This project is crucial for the area. With the help of a four-stage strategic marketing plan, we will now be communicating the advantages and opportunities offered by this project to everyone concerned."

In the first stage, a website will be established for the developers and builders of the project. In stage two, a 3D artistic model rendering will be created in which every owner or family can see how their house fits into the area. After this, large signs that tell about the passive house area will be placed from east to west along the highway which is used each year by about 40,000 tourists. In the last stage, a summary of the arguments in favour of building in an energy-efficient manner will be prepared, and this can naturally be used in the rest of Holland, as well.

This island, which today has 7,200 inhabitants and an extensive wind power production, has undergone enormous development in the past 40 years. From an isolated agricultural area that had been paralyzed after 1,800 people perished in a flood in 1953, it is now a modern rural community and a 1.6 million night stays a year tourist destination reachable by bridges, and protected by dams.

Erik Franke is enthusiastic. "It's exciting to see the municipality and its residents decide to take one more big step by choosing houses that comply to the passive house standard. We have already built 55 passive houses on the neighbouring island of Roosendaal, and are now renovating for energy efficiency, and will analyse whether this technology also works for the houses on Noord-Beveland."

"In addition to the marketing project, we will be working to build a very low CO_2 footprint model house that can serve as a showroom in Noord-Beveland, and that will certainly accelerate this project," Tom Vermin predicts.



GRONINGEN GOES GREEN

DE TUINWIJK NEIGHBOURHOOD, GRONINGEN, THE NETHERLANDS

Sebastiaan van der Haar, Energy Adviser, The Province of Groningen.

Ilja van der Veen, The Municipality of Groningen.

The Dutch province and city of Groningen have high aims: not only was the city recently involved in transforming two old working class areas into energy efficient ones. The province has challenged the Dutch government for a new, tougher energy norm.

The City of Groningen in the north of The Netherlands wants to be one of the country's most sustainable cities. That's why they're building projects like the green corridors in the centre of town, making Groningen as bicycle friendly as possible, and ensuring that the city's university focuses on energy issues. The city's first energy-neutral office building is being constructed in Kempensberg. In addition, the province of Groningen, in collaboration with several other provinces and municipalities in northern Netherlands, has challenged the Dutch government for a new, tougher energy norm for the whole Northern region of the country. The Build with CaRe project of the Province of Groningen is a policy project as a result of the Energy Agreement between the national government and the Northern Provinces Friesland, Drenthe and Groningen. One of the goals of this agreement is a new norm for new build dwellings based on the passive house principals.

"To make this norm possible we need support from most of the involved parties in the building sector, such as municipalities, contractors, developers, housing associations etcetera", says Sebastiaan van der Haar, energy advicer of the Province of Groningen.

Next to the development of this new norm a lot of attention goes to communication and negotiation with all these parties. It's not only about a new norm, it's also about improvement in the building process, better cooperation between the building sector and the municipalities and last but not least the right information to the customers.

"We have excellent cooperation between the City and the Province, and this is a necessary condition for a more broadly-based development," says Sebastiaan van der Haar.

An important part of the efforts to become the "energy valley" of Holland is also to make existing buildings as energy efficient as possible. Since most of the buildings that will be standing in 2050 have already been built, real energy saving can only be achieved from improvements of existing buildings.

Energy efficient renovations

One of the most interesting projects is now taking place in two neighbourhoods: De Tuinwijk and De Hoogte. The old working class districts, which were built in the 1920s and 30s, and most recently renovated in the 1970 and 1980s, are now being reconstructed in their original colours and materials. In the neighbourhood Tuinwijk one thought is to restore former vegetable gardens with the help of the residents. But first and foremost, the typical brown and red brick buildings of both neighbourhoods are being renovated to make them more energy efficient.

We take a tour of the area Tuinwijk in the company of project manager Roelof Jong and policy advisor Jos Idema. Roelof Jong: "We're talking about a total of 284 townhouses, of which 245 have been modernised so far. We've primarily been insulating the roofs, floors and facades of the houses. This has not only made them more energy efficient, but has also resulted in a better acoustic environment. We have also fitted double-pane windows and installed air exchangers behind the radiators in the living rooms, as well as placed intelligent ventilation with heating recovery and heating systems in the attics", explains Roelof Jong, who at the same time is working with a similar renovation project in De Hoogte, a neighbourhood close by.

In 2008, new energy norms were introduced in The Netherlands, and these renovated houses satisfy them with a wide margin.

"More than half the houses in De Tuinwijk will remain rentals, with cooperatives accounting for the remainder. We started selling right at the beginning of the recession, and considering that, we nevertheless have done well." Many of those who had bought a house had lived here already. They received 5,000 Euros as a thank you for changing houses, as well as a promise of lower energy usage in the future.

Low future energy costs

We look at a model house that was built as a combination of two old apartments to help satisfy the rising demand for larger houses. The more than 130 m^2 are divided into three levels and will cost about 200,000 Euros. The little garden has new wood planks that add warmth to the environment.

The previously state-owned housing company, De Huismeesters, and the City of Groningen are the main supporters of a more energy efficient Tuinwijk district. De Huismeesters specialises in homes for low-income groups and other vulnerable categories in society. Jos Idema, strategic advisor to that company, is convinced that we will be seeing many similar projects in the future:

"De Huismeesters will invest a total of 17.5 million Euros by 2015 in energy-

saving renovations. And there are plans for more energysaving projects in the making. It is primarily the residents of our houses who will be having as low energy costs as possible. This additional assistance is extremely valuable for members of our target group, who often have great difficulty in investing on their own in this type of sustainability."

"De Tuinwijk and De Hoogte are important investments. Up until now, such initiatives hasn't been done to reduce energy consumption in existing social housing," says Jos Idema.

Get the residents involved

In one of the community facilities, we meet Gerry Wijlhuizen and André van Zalen, who live in de Tuinwijk. They're part of a planning group, which together with Roelof Jong, Jos Idema and others, meets regularly to plan the future of the neighbourhood and share experiences about conserving energy, in general, and de Tuinwijk, specifically. They have also started a website on which they share their experiences with everyone living in the area.

André van Zalen was one of the first people to buy a renovated house. He moved from his old house in the area in December 2009.

"It's much quieter in the new house. Not only does the insulation save energy, but it also works to dampen sound. There is no longer any draughts from windows and doors, and naturally, the energy bill is lower," he explains.

Gerri Wijlhuizen has seen an improvement in the indoor climate. "My feet no longer feel cold. The walls no longer have moisture, and it's a pleasure not to have the draughts any more."

André van Zalen and Gerri Wijhuizen view it as an important task to motivate the other residents of the area to learn more about saving energy. Even very simple measures can make a long-term difference. Like keeping the airing outs brief and intensive, or letting food cool off before putting it in the refrigerator. And naturally, it's more fun to live together with people who share one's goals.

Handbook for effective, sustainable renovation

"We want to share what we have learned in this project, as much as possible," says Jos Idema. "In cooperation with the City, KAW Architects, Noorderlings Communications, project developer BAM Woningbouw and Agentschap NL we at De Huismeesters have taken the initiative to compile a handbook to describe how to implement this type of renovation in a structured manner with involvement of the residents. Our idea is that it should provide the reader with valuable tips in the form of simple points. That handbook will be accompanied with an interactive and informative website that's free to use for anybody who's interested."

"It's incredibly important to have the support of the residents of the neighbourhood," says Jos Idema. "As well as to motivate them to learn more about energy saving issues, and to encourage them when they do something good. But the handbook will also include other parties, such as housing companies, land developers, builders, behavioural scientists and marketers. We want to encourage more people to transform old buildings into modern, energy efficient homes."

Energy efficient reconstruction of old working class areas.

"THE TYPICAL BROWN AND RED BRICK BUILDINGS OF BOTH NEIGH-BOURHOODS ARE BEING RENOVATED TO MAKE THEM MORE ENERGY EFFICIENT."

LIVING IN A PASSIVE HOUSE

SCHNELSEN, HAMBURG, GERMANY

Not everyone has the good fortune to have an architect in their household.

"Many people I've spoken with tell me that they had read about passive house technology and wanted to use it to build their new house. Then they went to a construction firm and were advised against it. So they chose to build a conventional house because the firm didn't have the necessary skills or expertise to build a passive house, or offer it as an option."

Nisse and Yvonne Gerster's semi-detached house is located in Schnelsen on the outskirts of Hamburg. Here they live in a pleasant indoor and outdoor setting together with their children, Merle, 6, and Neele, 1. They have no radiators, operating costs of 55 Euros a month for both units together for heating and hot water, and rental income from tenants in the other unit.

Convinced by the client

For the Gersters, building a passive house was pretty much of an obvious choice. Back in 2005, architect Nisse Gerster had built his first passive house for a customer who had not chosen a passive house for any ideological reasons, but more because the family wanted a quiet place to live.

"I was invited to visit many times, and soon began to sing the praises of passive houses as much as my client. The indoor climate in a passive house is so pleasant that you end up not wanting to live anywhere else. It's quiet, and the children can play or sleep next to the windows without any draught. And, of course, operating costs are at a minimum. In short, a passive house is good for your conscience as well as your wallet."

The Gersters bought the lot in May 2007, and built their home as a semidetached house with three floors and two units of 138 and 124 m², respectively. They did much of the work themselves.

"We did things like digging and pouring the foundation, setting up plasterboard, building the roof and painting", says Nisse Gerster, and Yvonne nods to confirm that this was teamwork.

The house is built with thick walls, insulation in the exterior walls and a highly efficient ventilation system that makes use of the warm air from the kitchen and bathroom, and then warms up the fresh air blown out in the living room and bathrooms. Radiators are not necessary; instead the house is heated by the people who live there and their electronic equipment. Hot water is produced by 10 m² solar collectors on the roof, and by a supplementary heat pump for times when the sun is not shining in Hamburg.

Not a showy house

The family wanted to keep a low profile, and made sure that the exterior would not show that the house was special in any way. But neither is the house a nondescript one. It wins points with is plum-red, plastered facade and pleasant outdoor areas. On their yard, the family built a storage structure with a wooden carport.

In 2008, the family moved into the house in Schnelsen, and are very satisfied.

"It feels better to repay loans than to pay high bills for electricity."

Too early to get the subsidy

The family missed out on the subsidy of 240 Euros/m² that the Hamburgische Wohnungsbaukreditanstalt (HWK) gives to those who build passive houses. They had already built their house when the subsidy was introduced in 2008.

"Naturally, we were disappointed," Nisse Gerster declares. "We would have received more than 30,000 Euros per unit – in other words, more than 60,000 Euros. But this is all hypothetical, and besides, we already had a financial solution."

The family is currently partially financing their home with the help of their tenants, who have also become ambassadors for the passive house concept. Nisse Gerster uses his house as a model for the Build with CaRe project, and for new clients who want to see how a passive house works.

"This is the best way – to let them experience the quiet, the clean air, and the lack of a draughts next to windows and corners."

Nisse Gerstner turns to Yvonne:

"It's mostly gone well. We only had one problem in construction, and that related to the windows. The supplier had promised completely sealed windows, but that was unfortunately not the case. Now we've solved that problem, and the windows are again tight. Thoroughness and precision mean everything in the building process."

House facts:
Passivhouse in Schnelsen

DESCRIPTION: Three storey semi-detached house with passive house standard
SIZE: 138 + 124 m²
SIZE OF PROPERTY: 550 m²
ANNUAL HEAT REQUIREMENT: 12 kWh/m²
HEAT LOAD: 9 W/m²
ENERGY REQUIREMENTS: 56 kWh/m²
HOT WATER: 10 m² solar collectors with an accumulator tank, as well as an air-water heat pump

PINNASBERG
HAMBURG

In the 1980s, several dilapidated buildings in the St. Pauli neighbourhood next to the Hamburg red-light district was under occupation. The landowners gave up their plans to build offices, and the occupiers won and their historical buildings were renovated. In 2003 a passive house with 19 flats was built in the direct vicinity, which was then the first and the absolute tallest passive house in town. The building's playground with its palm trees and flying carpets was constructed according to drawings by the children living in the house. The building has acted as a lift for all of St. Pauli, and many of the first tenants are still there – and happy.

House facts:

TYPE OF BUILDING:
Multi-family dwelling

NUMBER OF FLATS: 19

SIZE OF PROPERTY: 550 m^2

HEAT REQUIREMENT: 14 kWh/m^2

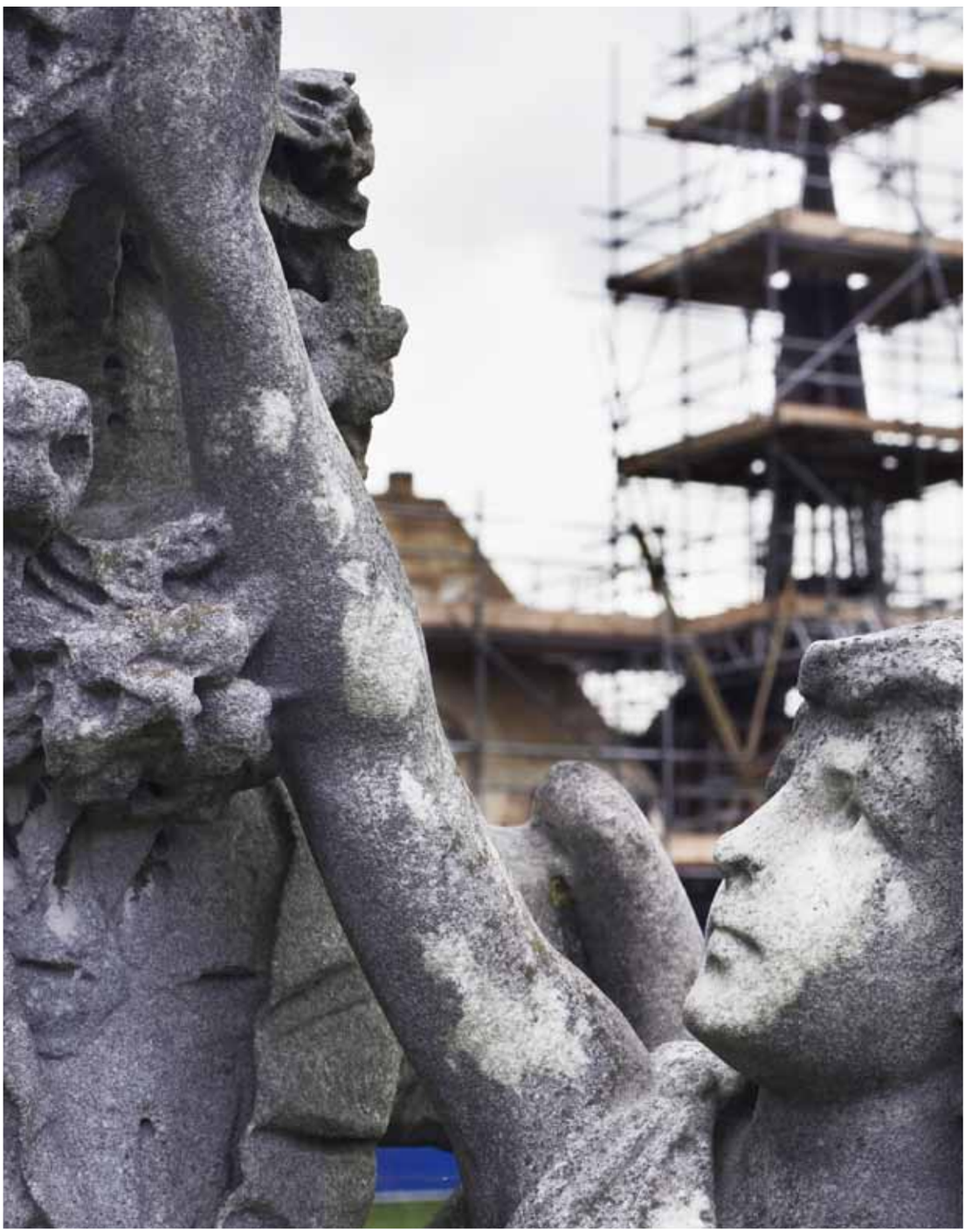
HEAT LOAD: 8 W/m^2

PRIMARY ENERGY REQUIREMENT:
96 kWh/m^2

ECOLOGICAL ASPECT:
Photovoltaic cells 5.2 kW

CHAPEL OF HOPE

PRITTLEWELL CHAPEL, SOUTHEND-ON-SEA, UK



The English are masters at renovating old houses. Now they're adding energy efficiency to their model.

"Gloomy, spooky, vandalised and broke." That's how a group of fifth year students described Prittlewell Chapel and its burial ground, which they visited wide-eyed during a history lesson in September 2009. At that time, the 130 year old chapel had lay abandoned for more than 60 years, and the burial ground was now a venue for graffiti, an exercise place for fighting dogs, and a hangout for restless youth gangs.

Of course, there were occasional visitors to the chapel and burial ground, and even a burial in a family grave was held. But only a few people felt drawn to their relatives' graves in the socially depressed area near Victoria Ward.

The school class decided to use the local newspaper to ask local residents to share their stories about those who were buried in the burial ground (and generated a gratifying response). At the same time, the Southend Borough Council was granted a government grant to renovate and make Prittlewell Chapel with its burial ground into a more hospitable and inviting place.

New beginning in a depressed area

Neil Pointer serves as the project manager for the renovation of Prittlewell Chapel.

"We have long understood the architectural value of the chapel and the potential it and its burial ground have to be the area's green space and meeting point. Back in 2005, we examined the possibilities of renovating the chapel in a sustainable way, and finding a new function for it. However, it would cost a million Pounds,

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and where would the money come from? Luckily, Southend-on-Sea became a prioritised area for the English government. Thus, when we received financing for this project in September 2009, we had the solution and could press the button to proceed full speed ahead."

Architect Rob Neobard from Urbanology participated and helped prepare the plan and engineering solution for 2010.

"As usual, before we started, we created a picture of how people felt when the building was first built. Based on this, we decided how to proceed, how we could combine traditional techniques and aesthetics with modern ones, and how we could preserve the original values in a sustainable and respectful manner, but with a modern twist."

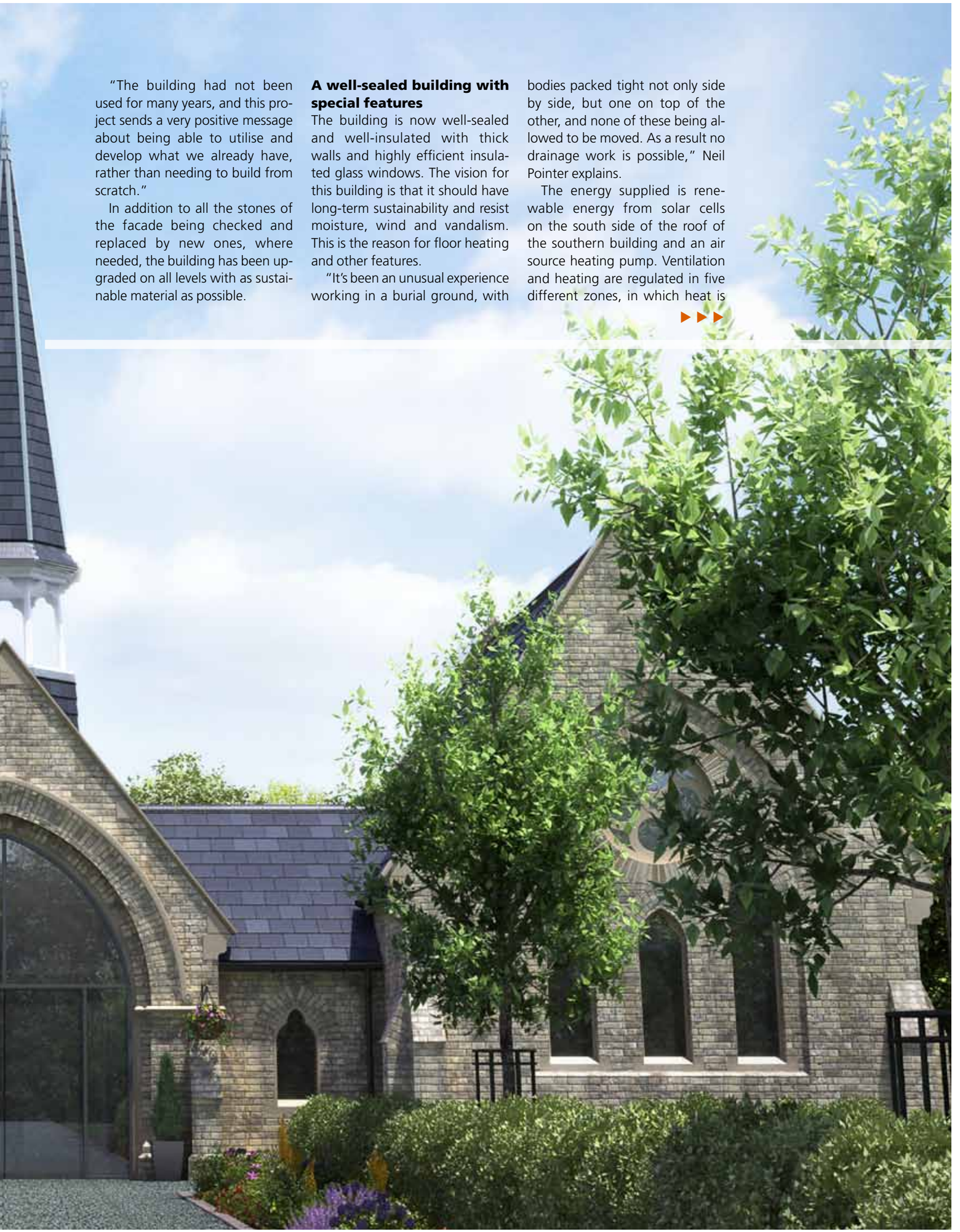
Believers and non-believers

The original chapel, built in 1879 in a Victorian Gothic style, with a facade of stone from Bath, consisted of two wings. The left (north) chapel was the site of funerals for "non-believers", while the right (south) chapel was for believers. Between the two chapels was an opening through which a horse and wagon could drive in with the coffin, and then continue straight ahead for the burial in the grounds.

"The opening between the chapels previously separated them, but now connects them instead, with a glassed in reception area," explains Rob Neobard.

The renovation work has gone fast, in part because the financing required that.

"The work involving the application documents went very smoothly," recalls Sophie Glendinning, a planner for the Southend Borough Council.



"The building had not been used for many years, and this project sends a very positive message about being able to utilise and develop what we already have, rather than needing to build from scratch."

In addition to all the stones of the facade being checked and replaced by new ones, where needed, the building has been upgraded on all levels with as sustainable material as possible.

A well-sealed building with special features

The building is now well-sealed and well-insulated with thick walls and highly efficient insulated glass windows. The vision for this building is that it should have long-term sustainability and resist moisture, wind and vandalism. This is the reason for floor heating and other features.

"It's been an unusual experience working in a burial ground, with bodies packed tight not only side by side, but one on top of the other, and none of these being allowed to be moved. As a result no drainage work is possible," Neil Pointer explains.

The energy supplied is renewable energy from solar cells on the south side of the roof of the southern building and an air source heating pump. Ventilation and heating are regulated in five different zones, in which heat is

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Neil Pointer, project manager.

utilised through heat exchangers. This is fully automated, but there is also an option for manual operation, as well. Toilet waste and waste water are handled through a bio tank and rain water tank, respectively, close to the building. As mentioned, the floors have floor heating, lighting is by high frequency and LED low-energy lamps, and a BMS system monitors the energy efficiency of the building.

"The chapel's technical equipment is advanced, with an integrated alarm, lighting and security system that allows viewing on a monitor any persons who wish to enter, turning off the alarm, turning on lighting, and allowing people to enter the building," Neil Pointer explains.

The best ambassadors

Back to that school class from Westborough School. After the appeal in the newspaper, a creative effort was led by the set designer at the London Royal Opera House. The children created pictures of life, death, and the stories of the people who were interned in the burial ground. These pictures were applied to the high level windows, as well as placed as decorations inside the chapel. The burial ground's planted areas were designed to reflect the ideas of the children.

"This has been a fantastic investment in an important generation. The children have been incredibly creative and involved. And they have acquired a strong feeling and understanding of this place. It would be most unlikely for them to want to destroy what they had researched and built up," says Neil Pointer.

A hub for new entrepreneurs

The renovated chapel has been rented for a nominal amount to SAVS, a local volunteer organisation that provides counselling and support for people who wish to start their own non-profits or who need help in their existing ones. These businesses include socially-oriented associations, groups that take care of relatives at home, people with disabilities or illnesses, tenants' associations and others. The main thing is that the support given should improve quality for life and faith in the future in the area.

Build with CaRe spreads the message

Neil Pointer and his group are grateful for the help they've received through Build with CaRe.

"The project is described in a film on working with the children, and four specialised films. Sharing our work here, thanks to the financing by Build with CaRe, is most valuable, both locally and internationally. The energy efficient renovation and improvement of the burial ground has a symbolic function to the regeneration of the area."

Valuable lessons

What was the most difficult experience in this project?

Neil Pointer and Rob Neobard agree.

"In August, we discovered that practically all the wood in the roof of the south chapel was completely rotten, despite it having appeared to be in good condition upon a visual inspection and a test using a screwdriver. The large amounts of wood required were not easy to obtain, so we lost time. The next time, we will request funds for a thorough initial examination of existing material, even if we would thereby risk losing time or not getting the project."

And the best experience?

"This has been a completely fantastic project. From the enthusiasm of the children to being able to give back this lovely building and burial ground to the people who live here. The fact that the building now does not need to be renovated for another 130 years is definitely a bonus."

A GREEN ICON

MARISCHAL COLLEGE, ABERDEEN, SCOTLAND, UK

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Visualisation of the new entrance and facade.

ABERDEEN
CITY COUNCIL

The Granite City of Aberdeen takes a flying start towards the new Scottish building requirements: a 30% decrease in CO_2 emissions in new buildings, beginning in October 2010.

Aberdeen residents were sceptical when their city council decided to appropriate funds to renovate Marischal College and move the municipal offices there.

"But people's attitudes soon changed when they discovered all of the advantages, both the savings and the opportunity to develop and preserve the heritage of their city and other important values. This will be a building for all the people," explains programme director Andrew Sproull.

This renovation is really something special. The inside of this 16,200 m^2 granite structure with its 70 metre high tower and ornate facade has been entirely gutted, and replaced by a new structural frame, insulation, energy efficient solutions and a contem-porary design that will accommodate workstations for 1,300 employees.

Renovation well worth its price

"Energy efficient renovation need not cost more than ordinary renovation. Not when you do it the way we do – appropriately and commensurately," declares Andrew Sproull.

This magnificent building had been left unoccupied and allowed to deteriorate for 12 years when Andrew Sproull and his team began calculating and planning the renovation.

"There was nothing of the interior that was worth saving. With the exception of a fantastic room that will be used for civil weddings and other such purposes, we've demolished the interior. The exterior stone facade was secured by eleven facade retention towers, we've created an entirely new structure with a new interior structural frame."

A total of 4,200 tons of material was removed during the demolition process, of which 90% has been recycled. The granite has been carefully cleaned (with high-pressure grit spraying and without the use of any toxic chemicals) or replaced, where needed.

Walking an architectural tightrope

Douglas Jack of the Holmes Partnership architectural firm is the chief architect for the conversion of Marischal College. Like Andrew Sproull, he possesses a healthy combination of fearlessness and respect for the task ahead that is born of many sensitive renovations of venerable buildings:

"We are dealing with a unique treasure of the City of Aberdeen. Without being sentimental and risking sustainability, our task is to preserve the best of the city's collective memory, which takes its residents back to their roots."

According to Douglas Jack, the greatest architectural challenge was to connect the full extent of the building's floorplates across the existing vehicle entrance pend to the Quadrangle, which effectively divided the building in two.

"We connected the wings by infilling the entrance pend with glazed screens, creating a grand entrance lobby for the building, lined with the existing granite cladding of the pend interior. Visitors should feel the spaciousness and a message that they are welcome, while at the same time, appreciating the magnificence of the building."

Public access areas are immediately adjacent to the entrance lobby, with the main reception to the left. This area is double volume to create an impressionable first contact with the building and it also allows the original window openings, which are greater than a storey height, to be viewed in their original form (albeit with new double-glazed energy efficient windows). To the right of the entrance lobby lies the Customer Service Centre which again benefits from double volume. This is a long grand space and again makes full use of the tall existing windows facing Broad Street. Accessed off this space is the beautiful 'wedding room' which is the richly decorated Senate Room from the original University building. The room was retained in place throughout the construction works.

"Marischal College is being transformed from an empty, abandoned and decaying structure to a vibrant and attractive administrative centre for the city and its citizens," explains Andrew Sproull.

The rest of the building will house offices in an open layout, as well as quiet group rooms for 4, 10 and 20 people. Presiding over the building from the top floor between the wings, there will be a magnificent assembly room for 60 people, with a view of the city, a glass ridged ceiling presenting a panorama of the (often granite-grey) sky above, and the building's towers and pinnacles at eye level.

Other than that, the interior design is as modern as any new office building. Only the ornate sandstone windows tracery works reveal the age and external magnificence of Marischal College.

BREEAM rating: Excellent

Sustainability consultant Angela McCann with a team from Wallace Whittle joined the project in 2007. They have been involved in all the technical services design.

"Our goal is to create an optimum indoor environment, and to reach what was then the highest rating – BREEAM Excellent."

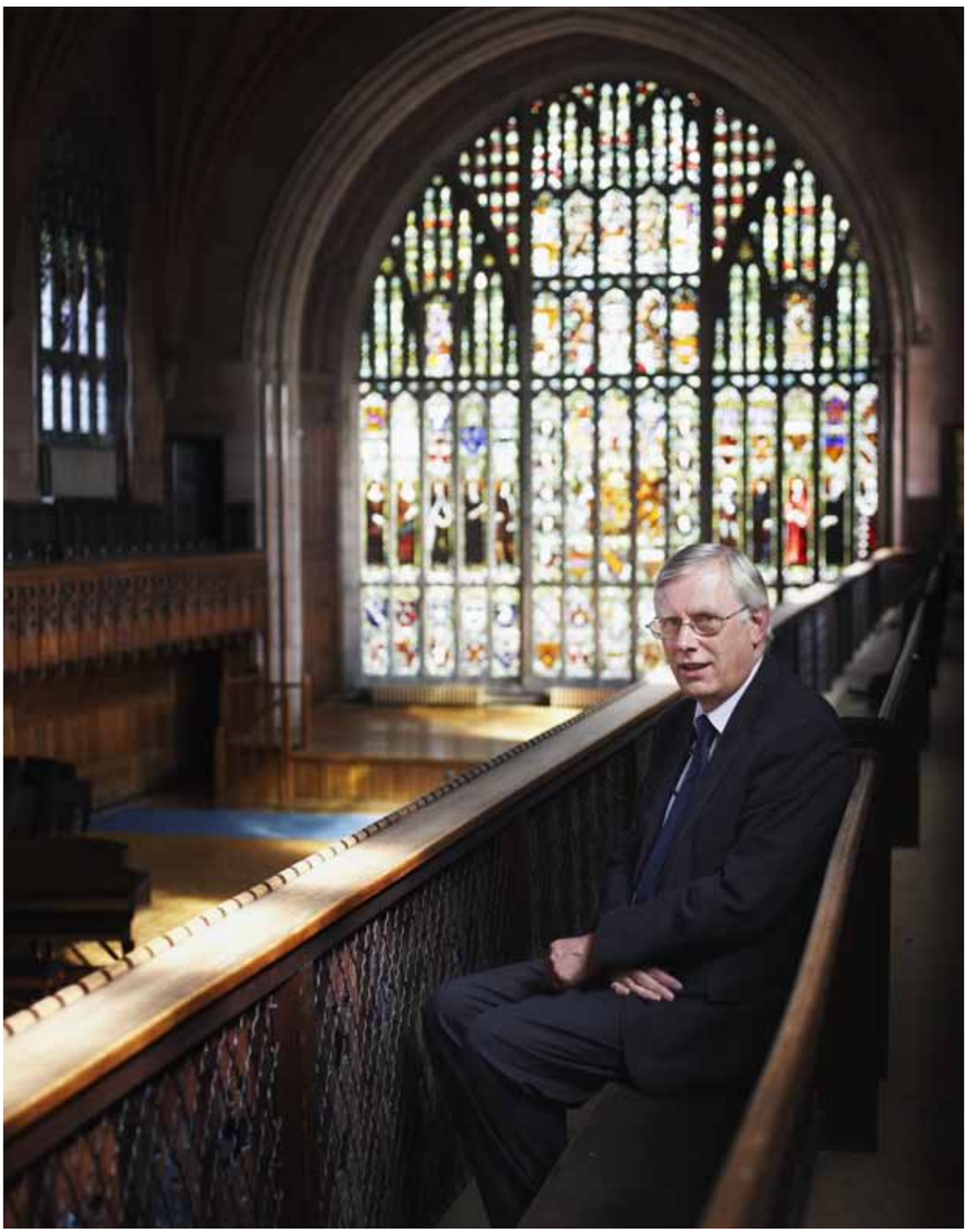
The solution includes insulated wall lining, high air tightness, double-glazed energy efficient windows behind the original windows, and a mechanical ventilation system that utilises the heat in the outbound air flow via a heat exchanger.

"The indoor climate will be very pleasant. The air will be fresh, and there will be even heating throughout the premises. No one will work more than 15 metres from direct daylight."

The building is heated passively by free heat from electrical machinery, incoming sunshine, and the people inside. The rest of the heating requirements are satisfied through a water-loop terminal heat pump system led by a biomass boiler.

"We have set a goal of reaching an annual building emission rate of 22. This is over 20% better than the performance required for an equivalent new building and an energy performance rating of B has been achieved," Angela McCann explains.

The members of the Marischal College team agree that these new rules will come as a surprise to many in the construction industry, and that financing from Build with CaRe helped spread the energy efficiency message.



"Energy efficient renovation need not cost more than ordinary renovation," says programme director Andrew Sproull.

"What we are doing now is just a part of what we do for goal-oriented environment efforts. The Marischal College project will open the eyes of the industry and the public. By 2013, CO_2 emissions in all new buildings must be halved, and by 2016-2017, all buildings and homes in Scotland must be free of CO_2 emissions.

An energy waster

The initial reason for the relocation plans was that for the past 40 years, 1,000 of the city's employees had been working in St Nicholas House, a 1960s building that has a terrible indoor climate and is a notorious energy waster.

Andrew Sproull explains. "We had three choices: renovate St Nicholas House, find a new site peripheral to the city and construct a new building there, or renovate Aberdeen's faded beauty nearby, as energy efficiently and successfully as possible."

An extensive study demonstrated that the third alternative was both the most economical and most environmentally friendly one.

"It provided new opportunities to open up and develop the neighbourhoods around it. In addition, there are benefits to the fact that we did not have to find a site peripheral to the centre of the city. This allowed us to keep a large and important population in the centre of town, which promotes our urban core and the finances and development of its businesses."

Treasure of the Granite City

A bit of history. In addition to being an iconic building for the city of Aberdeen, Marischal College is an A-listed cultural treasure for the entire nation. This Protestant college was founded in 1593 by Earl George Keith at a time when there were only

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two universities in all of England.

The facade fronting on Broad Street was completed much later, in 1906, at the height of the city's granite glory days. Thus, the world's second largest granite building was built, surpassed only by El Escorial Palace, outside of Madrid.

"Marischal College assumed not only an educational and cultural function for the city of Aberdeen. The building was also a potpourri of magnificent solutions, and was used as a demonstration for the qualities of granite and what could be produced," explains Andrew Sproull.

One can say that we've come full circle with the renovation of Marischal College.

"Absolutely. In addition to the actual planning, the most important function of the project has been to keep the vision alive and visible throughout the project, and not to compromise," says Andrew Sproull.

And the vision?

"Having Marischal College as our first energy efficient project shows that we're serious when we say that we want to be the energy capital of Europe in the future."

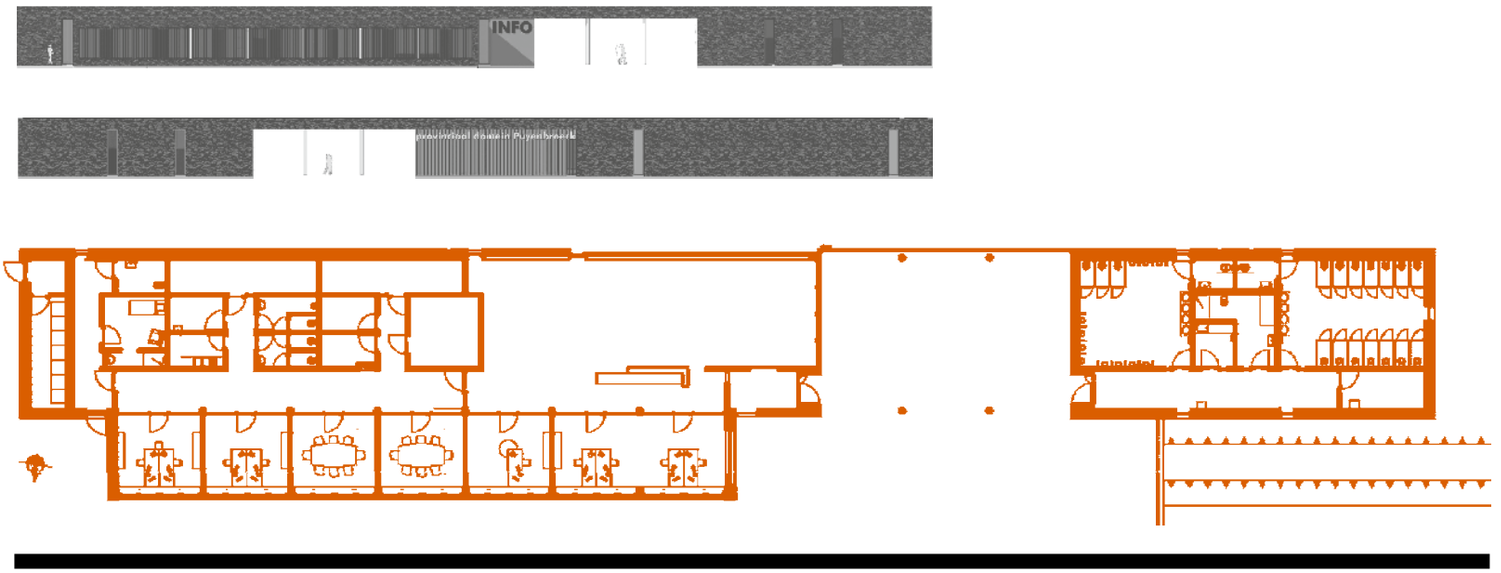
Angela McCann, sustainability consultant at Wallace Whittle.

"OH! BIGGER THAN ANY CATHEDRAL, TOWER ON TOWER, FORESTS OF PINNACLES, A GROUP OF PALATIAL BUILDINGS RIVALLED ONLY BY THE HOUSES OF PARLIAMENT AT WESTMINSTER… YOU HAVE TO SEE THEM TO BELIEVE THEM."

THE POET JOHN BETJEMAN ON THE MARISCHAL COLLEGE

SPREADING KNOWLEDGE

VISITORS CENTRE PUYENBROECK, GENT, BELGIUM



The visitors centre in the park ground of Puyenbroeck outside Gent will not only give the visitors a great beginning of their park visit. As the first passive house built by the The Province of East Flanders it will also host a passive house exhibition that everyone can understand.

The drawing shows a low, extensive building made of grey-black sandstone brick. It extends like a compact wall at the entrance of the Puyenbroeck park grounds. Through the big glass doors of the building, visitors can see the endless greenery waiting within.

We are in the vicinity of the Belgian city of Gent, studying what will be the first passive house built by the government of Province of East Flanders. In front of the parking area, where the architect, Tine van Besien is showing us the drawing, an information centre for all park visitors will be built, starting in the autumn of 2010. This building will contain a ticket office, shop, toilets, conference room, and offices for employees. In addition, however, there will be a prominently located exhibition about passive houses that will use this building as a starting point.

A passive house exhibition that everyone can understand

"Puyenbroeck is the largest and most well-known park area in the province," explains Marc de Ruelle, architect and project manager in the Province of Eastern Flanders. "Each year, many thousands of visitors, both Belgian and Dutch, come, often with their entire family. They get the passive house exhibition as a kind of bonus, and I think this makes eminent sense. Having our exhibition here means that we reach a varied audience, and can place a lot of emphasis on explaining the principles of the passive house in a way that everyone will be able to understand."

Puyenbroeck has an area of 500 hectares. The park is divided into a wild area and a cultivated one, and includes everything from primeval forest to sports facilities. In high season, visitors can ride a train around the park. There are boats to rent, minigolf and a traffic park where children can learn the rules of traffic. Naturally, guests can also play golf on the 18-hole golf course or swim in the new indoor or the outdoor pool. If you don't have time to do everything you want on a single day, you can also spend the night at the three-star camping ground that is also within the park.

"We used to have family parties here in the park when I was a child," Tine van Besien recalls. "Now, the information centre will be the natural starting and ending place for visits to the park, and will thus be a most important building."

Conventional building techniques

At first she envisaged a wooden facade, but after a discussion with the builders, the facade ended up being another example of conventional Belgian building techniques: a layer of outdoor bricks, insulation, and a layer of indoor bricks.

"In Belgium, there is a widespread fear that wooden passive houses will be too warm in the summer, as opposed to brick houses where temperatures change more slowly," Tine explains.

The lack of experience of passive houses on the part of builders is a problem here, just as it is in other countries. But Tine van Besien feels that this will be a temporary obstacle. She has personally gained experience by building her own home using the passive house standard during the construction of the information centre.

With its four levels and 150 m², her home on a little property in central Gent in naturally much higher and narrower than the information centre. But in terms of building engineering, there are many parallels, not least in the choice of insulation material, Resol. It's a kind of foam that looks like mineral wool, but has such a high insulation capacity that a mere four centimetre thick layer suffices, rather than an eight centimetre one. A fact that gives Tine valuable space in her house.

In addition, the ideas of solar panels, passive solar heat from the windows and a small reserve heat pump, are the same in both buildings.

New ways to think and act

Tine van Besien's interest in passive houses began while she was still at university, where she specialised in building engineering and heat transfer.

"It wasn't as much an interest in ecology as a fascination about building design and problem solving. I'm interested in new techniques, and in personally getting a low energy bill."

In her own house, Tine will be able to regulate everything. All lighting and all electricity will be able to be shut by a single push of a button. And at the top of the house, next to a bedroom and bathroom, there is a kind of engineering room where Tine can adjust everything depending on her own situation. For example, she can lower the heat after she's been out playing tennis.

"Passive houses make us question our habitual ways of thinking," she says. "We must get used to thinking differently."

"It's time to redefine the concept of fresh air. Fresh air is not necessarily cold air. If you live in a passive house, fresh air can be warm air. But this new truth is hard for many people to accept. They want to open the windows even though they don't need to, because they feel closed in, and don't feel the scents they're used to smelling."

Later, Tine van Besien tells about the time Aiko, her architect firm, built a nursing home using the passive house standard:

"If the radiators were cold, the seniors automatically concluded that the room was also cold. They didn't understand that the radiators were there only as a reserve, and that it was actually a heat exchanger that controlled the indoor climate. What I asked them whether they felt cold, they would say 'No, but…'"

Increased interest in passive houses

Mia Versijpt is the head of strategic planning for the Province of Eastern Flanders. She was the person who took the initiative of collaborating with the Build with CaRe EU project, which was a crucial factor in being able to build the information centre in Puyenbroeck.

"Belgian interest in passive houses has increased markedly in the past two years," she declares. "But builders are still used to low budget thinking, especially when they renovate."

"Belgian law does not encourage renovation to the passive house standard," adds Tine van Besien. "The rules for new construction are stricter than the rules for renovation, which is one reason many choose to renovate rather than building a new passive house. I would like to see a change in legislation on this point."

Tine van Besien, architect at Aiko.

Mia Versijpt, head of strategic planning,
Province of Eastern Flanders.

“WE HAD SUCH A LOW BUDGET THAT WE SIMPLY HAD TO BUILD A PASSIVE HOUSE”

Ingo Lütkemeyer, architect.

A WIN-WIN SITUATION

SPORT CENTRE AT THE ALBERT EINSTEIN SCHOOL IN BREMEN, GERMANY

A low budget is not an excuse not to build a passive house. The German architect Ingo Lütkemeyer designed Bremen's first passive standard sports centre with no extra money at all.

"We had such a low budget that we simply had to build a passive house."

Bremen's first passive house standard sports centre is clear evidence that truths are never engraved in stone. While the rule of thumb is that construction costs of a passive house are about 10 to 25% higher than for a conventional building, architect Ingo Lütkemeyer asserts the opposite.

Thanks to pragmatic architecture and simple design, Lütkemeyer and his architect firm, IBUS Architekten & Ingenieure, succeeded in accomplishing the feat of uniting two seemingly incompatible values: passive house standard and low budget.

The sport centre at the Albert Einstein School, with a budget of 2.5 million Euros, is characterised by a wooden structure, triple pane windows and very tight walls.

Capturing light

"Just as is the case in other projects of this type, we have also been careful to passively utilise solar energy by building large windows to the south, and small ones to the north. We have also made sure to optimise daylight by planning a building with windows at several sides," explains Ingo Lütkemeyer, whose firm, in addition to planning a number of low energy and passive house projects, also has produced a large number of research reports on daylight utilisation and other topics.

Inside the sport centre there's a scent of wood. Large, retractable "garage doors" indicate the entrance to a number of equipment storage buildings. Clear Polaroid pictures indicate which equipment belongs where: 20 badminton racquets, 10 badminton shuttlecocks, three boxes here, two ping pong tables, 20 ping pong racquets, and 30 ping pong balls there. The striped pattern of the interior walls is a decorative savings measure, as the relatively expensive wood panels near the floor have been replaced by masonite boards and noise-damping boards a little further up the wall.

Passive house "a matter of attitude"

"It should be easy to build passive houses. But still it isn't," says Ingo Lütkemeyer. "Actually, it's mostly a problem about attitude."

There are many people who would not hesitate to spend 5,000 Euros more on a car, but when we're talking about a building, the first question they ask is, "When will I get my payback?"

BETTER INDOOR CLIMATE AND SMARTER STUDENTS

HAUPTSCHULE KREYENBRÜCK, OLDENBURG, GERMANY

The students at Hauptschule Kreyenbrück in Oldenburg love the look of their new passive house standard school building. But the greatest improvements are not visible at all.

If you didn't know that Hauptschule Kreyenbrück was a school building, you could easily mistake it for another type of buildning. The nondescript aluminium facade with its minimal windows facing the street don't give the least hint of the wood facade and the many large windows that face the schoolyard on the other side.

But that's the way Oldenburg's first school, built according to the passive house standard, is planned.

"The rule of thumb for passive houses is that there are small windows facing north and large ones facing south. This way, the house has minimal heat loss and optimal solar inflow, which can be used to heat the house," says Rolf Ellermann, the school's architect.

The fact is that it's the building's pragmatic planning that's given it its own unique feel. While the classrooms enjoy the sunny desirable southern side, Ellermann has placed the control and utility rooms toward the north. As these were fewer and smaller than the classrooms, they did not need the same ceiling height, which explains the sloping and rounded aluminium roof that becomes the facade and gives the entire building its character.

The placement of the building was also something the architect put a lot of thought into. Since the property is a small one and Ellermann wanted to consider valuable trees as well as passive use of solar radiation, he located the school as close as possible to the street, thus transforming a minimal schoolyard into one about the normal size.

Soft values

Hauptschule Kreyenbrück opened its doors in March 2010. Here, 300 students, 11 to 16 years old, study aesthetic subjects, and the architect has intentionally chosen a calm colour scheme that keeps the focus on the works of the students. White and grey predominate, combined with scattered reds. The classrooms have awnings that automatically folds down when the window panes get too hot, and lighting turns on and off automatically when people enter or exit the room.

The headmaster of the school, Heiko Weber elaborates on the soft values on the new building:

"The students love it here. You can really notice how they appreciate attending school in a new, aesthetically pleasing building. There's less conflict than before, and no graffiti anywhere. There's also no doubt that the municipality will reap long-term dividends from their investment."

Many of the most important improvements, however, are not at all visible. The air mass in a passive house circulates through a ventilation system that replaces it every half hour and of course that's great in a classroom where the CO_2 concentration is usually on its way to top the critical value after half an hour. According to scientific studies, lower CO_2 content in the air means more concentrated and motivated students.

Challenges of the passive house

Because a passive house is much better insulated than a conventional one, there is no difference in temperature near the windows, so you can actually use the entire room.

"The insulation in this building is double as thick as in an ordinary house, both in the facade and the roof," explains Rolf Ellermann.

It didn't make the construction process more difficult, but it was more expensive. Of the budgeted 1.9 million Euros, Ellermann estimates that the additional cost relating to the passive house standard represents about 200,000 Euros, or about 10% of the total cost.

The big challenge was the cafeteria on the ground floor. This is a large room that seats 70 persons and has gigantic windows, or more accurately, a glass facade looking out toward the schoolyard.

"The students, teachers and I all like the glass facade and the contact between indoors and outdoors it provides. But finding a company that would supply the glass- and aluminium construction needed proved to be a very time consuming task. One among many in this project," Rolf Ellermann recounts.

▶ ▶ ▶

No problems with large window panels in a passive house.

The cafeteria is also the room that demanded most of the school's janitor, Dieter Kern. Doors that are constantly opened and closed present a challenge in a passive house, where temperature is controlled by heat-exchange ventilation and there is actually no need to open windows at all.

"At first, there were many fine adjustments of the ventilation system," says Dieter Kern, who explains that the school has had problems with kitchen odours being spread to the classrooms via the ventilation system. However, this has been solved by installing a separate ventilation system for the kitchen and café.

Germany sets a good example

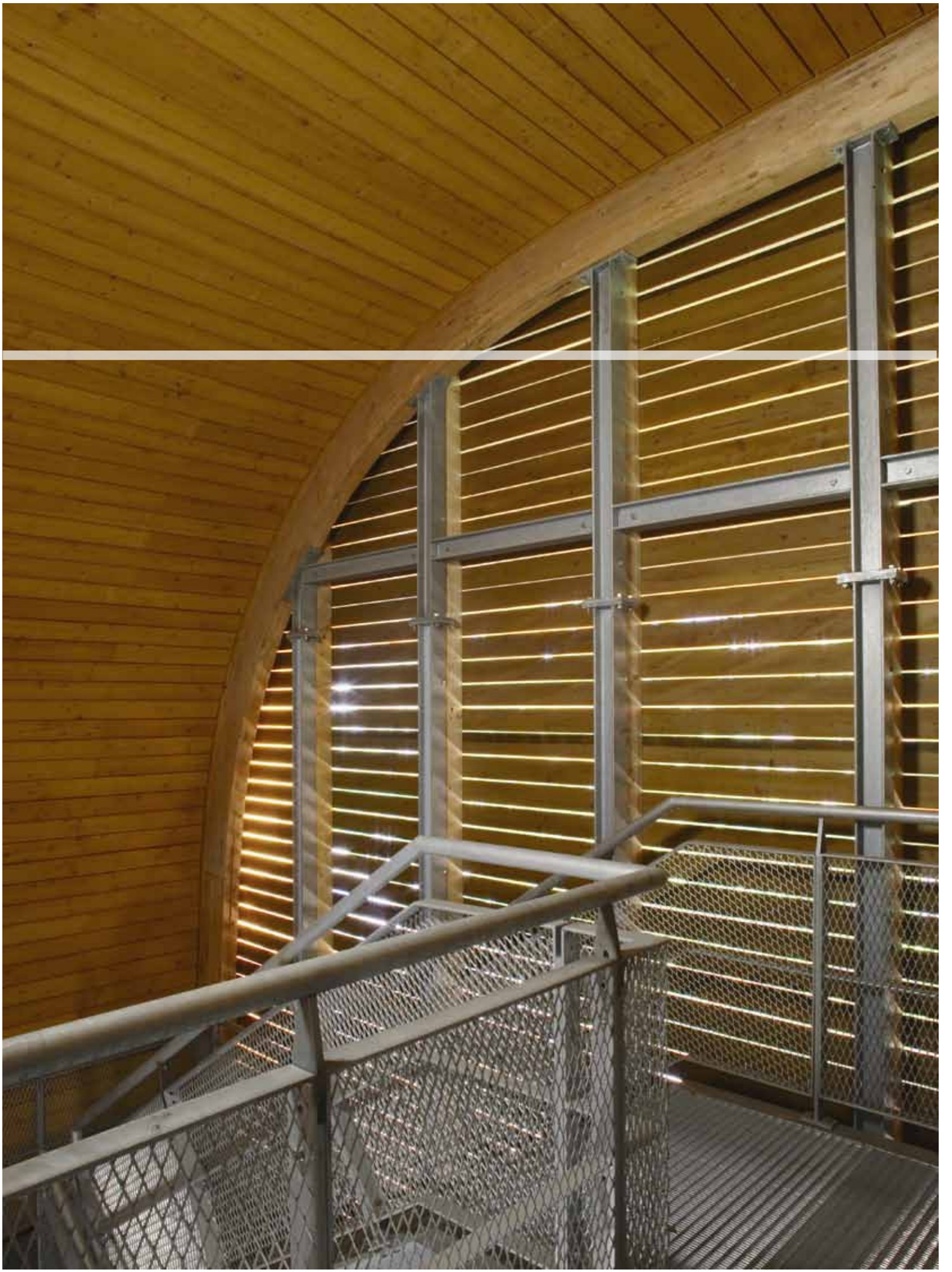
Gerd Iwanuk, Special Services Leader Environmental Management of the City of Oldenburg, is proud of his municipality's energy-saving efforts, but admits that there are those in Germany who have progressed even further.

There are now more than 10,000 passive house standard buildings in Germany, and the City of Frankfurt is the leader here. That municipality sells sites only on condition that new buildings conform to passive house standard. And all the buildings the municipality itself builds have used passive house technology for the past several years. Frankfurt's housing society ABG Frankfurt Holding has decided that they only build passive houses and apply this standard also in retrofitting.

However, Oldenburg too is setting a good example. Since 1995 the city of Oldenburg builds 25% better than the at a time legally required standard.

"But in my opinion, we need to do more also with existing buildings," says Gerd Iwanuk. "Oldenburg takes part in a European Environmental management and certification system called European Energy Award® which also allows a benchmarking on a European level. Here we are so far very successful and we want to make it right to the top. At least one second passive house project is a short term goal, a general passive house standard should be introduced soon after. Maybe Build with CaRe is our pacemaker."

Rolf Ellermann, architect.



AZB

ASSERTING WELL-EDUCATED GENERATIONS

Europe needs skilled construction workers. AZB in Hamburg has a method to produce them. Also, they conduct a Build with CaRe-financed teaching network project.

"The construction industry in many European countries is quite conservative, but there is also a good deal of new expertise out there. We all can greatly benefit through international networking," Jens Schwarz declares. He is an active networker in many construction organisations, as well as an architect and trainer at the Ausbildungzentrum-Bau (AZB), the vocational training centre of the building sector, in Hamburg.

In fact, AZB is currently leading a work package in the Build with CaRe project with the purpose of producing a range of useful educational packages for passive house construction, and thus disseminating this knowledge throughout Europe. Participating partners in this project are from Dundee College, West Suffolk College, Staatliche Gewerbeschule für Bautechnik in Hamburg, Technische Universität Hamburg-Harburg and Passivhuscentrum in Alingsås, Sweden.

"The members of this project have various areas of input and responsibility," Jens Schwarz explains. "Dundee College, for example, is responsible for the production of e-learning material."

Insight in other trades

Understanding between the different trades is just as important as sharing knowledge between countries. It's a necessary ingredient in passive house construction.

"In late summer 2010, we began a new workshop model here at AZB. We gather together inter-disciplinary expertise in a single group consisting of apprentices from several crafts, university students, and even architects. This group reviews various stages together, and understands now what is required in drawings, design and the various aspects of construction in order to produce highly air-tight conditions around a window, for example."

Interval training

Since 1971, AZB has trained about 22,000 craftspeople for the German construction industry. Their model based on rotation during the apprenticeship is successful.

"First, the student needs an employment for apprenticeship within a construction company. That's the ticket to three years of dynamic training in real-life work situations and the latest technologies. In this dual system of education and training, they take turns doing four weeks of practical training here at AZB, four weeks of theoretical studies at the vocational school (Staatliche Gewebeschule für Bautechnik) and four weeks out at a construction site with their employers."

Each year, new experts from the industry and other educational institutions enrich the apprenticeship with innovative energy models and new technology. And both the school and the training centre AZB are eager to form that new generation of well-skilled construction workers.

"During their three years with us, the AZB students learn a rational way of thinking, and the importance of taking responsibility for every element of the work. Build with CaRe supplies us with a constant flow of opportunities for proactive learning," Jens Schwarz explains.

For 39 years, AZB in Hamburg has trained people for the construction industry. Their model of rotation is successful.

Jens Schwarz, architect and AZB trainer.

BUILDING FOR THE FUTURE IN NORWICH

THOMAS PAINE STUDY CENTRE, NORWICH, UK

Consistency and a long-range perspective are the key words in the environmental work of the University of East Anglia. This is where tomorrow's environmental experts are being trained, and it is already 15 years since the University's first energy-efficient building was completed.

"If students fall asleep during lectures in this building, it's certainly not because of a stuffy atmosphere."

Martyn Newton, Sustainability Manager of the University of East Anglia (UEA) in Norwich, is clearly proud of the indoor climate at the recently opened Thomas Paine Study Centre. And he has every reason to be. The building is the latest in a series of low-energy buildings on the university's 230 Ha campus. The University is one of the world's leading universities in environmental science and climate research, and understood, early on, that its credibility would increase if it practised what it preached.

"Any institution that has made such important contributions to getting the world to understand climate change ought to make sure that it's a shining example in the environmental area," says Roger Bond, Director of Estates and Buildings.

That's why the university's first low-energy structure, the Elizabeth Fry Building, was completed back in 1995. The Thomas Paine Study Centre is the sixth low-energy building.

In recent years, the University has also prepared a most ambitious plan to reduce its carbon dioxide emissions. This plan contains everything from requirements for new buildings to raising the energy efficiency of older buildings, the development of district heating (still less common in the UK than in many other countries), and England's first biomass gasifier for combined heat and power which will be opened in a few month's time. The University's goals are ambitious. By 2020, its carbon dioxide emissions should be reduced by 60%, compared to its already low level in 2005.

The Thomas Paine Study Centre houses the University's Business School. When we visited, the building had been officially opened only a few weeks earlier, and the term had not yet begun.

In a meeting room in the still barely occupied building, we met Jonathan ▶▶▶

Roger Bond

Dr Bruce Tofield

Martyn Newton

"I WOULD RATHER BE PART OF THE SOLUTION THAN PART OF THE PROBLEM."

Stanley, one of the students in the MBA programme in Strategic Carbon Management, which is not only a first for the UEA, but also the first such programme in the world.

Jonathan is a British student; however, the course attracts students from a host of countries, ranging from India, China and Japan to Spain and France. And at 31, Jonathan is one of the younger students in the programme.

"I would rather be part of the solution than part of the problem," he declares, as he talks about climate change and why he chose this programme.

Jonathan started his career as a purchaser for the British retail chain Sainsbury's, and then continued at a restaurant company, which he urged to improve its record in the area of sustainability. When his efforts failed, he realised that he needed to acquire more knowledge.

"I applied to this programme because I wanted to see whether there could be a combination of a business perspective and a sustainability perspective. So far, I feel it is possible. Not least because I've learned models such as green procurement, a spending and investment model that takes into consideration criteria beyond price and quality."

The Thomas Paine Study Centre, like the other energy-efficient buildings on campus, is a well-insulated, sealed building with triple-pane windows. Like the others, it has been designed with the TermoDeck energy efficient climate system. "This technology is originally Swedish, but has been developed further at the university," Martyn Newton explains.

"TermoDeck works with the concrete in the building floorplanks, and utilises the heating capacity in an efficient manner. The idea is based on the principle of thermal effusivity, which basically holds that a building with a large physical mass stores heat by day and releases it by night. In this way, the temperature is evened out and variations during a 24-hour period are delayed. This makes the premises somewhat cooler during the day, and a little warmer at night."

With the TermoDeck system, all air passes through a labyrinthine system in the concrete floor slab before it enters the room. In this way, the indoor temperature of the ceiling and floor remains stable and comfortable for everyone on the premises. Heating, cooling and ventilation are integrated, and the air blown in will be silent and free of draughts. The system reduces the need for radiators, cooling machines and sound dampers.

"The building also has light detectors that turn off the lights as soon as the room becomes empty, and the movement detectors shut off the ventilation when no one remains in the room. However, you can still open the windows," says Martyn Newton.

"The Elizabeth Fry Building was the first building of its kind in England without any radiators," he explains. "And even though this is a 3,200 m^2 building, the boiler is no larger than one you would find in a private home."

Thanks to TermoDeck technology, the building has an annual heating energy consumption of only 25–35 kWh/m^2 a year, compared to the normal annual standard for Great Britain of 120–140 kWh/m^2. The values only slightly exceed the passive house standard, and the Elizabeth Fry Building was completed in 1995.

From the start, Martyn Newton and his colleagues were careful to measure how the building reacted during various seasons and at various times of day. This provided evidence that helped to improve later buildings.

"Today we can even predict how a building will react in the future. And we will use the knowledge we derive from the new buildings when we renovate the university's brutalistic concrete buildings from the 1960s."

Estates and Buildings Director Roger Bond asserts that the UEA has made great progress, but that, in the future, it should expand the involvement of students in energy saving even more. Already, a 'switch-off' campaign started by UEA student Eco-Power Rangers has spread to other UK universities. There are now plans to motivate the students and staff by giving the money saved by their energy efficiency to their department.

There is also a desire to start more cooperative projects of the type the university has with West Suffolk College, which trains students for careers in the construction industry. Together, they've even lobbied the British government. "This is a very fruitful cooperation indeed," says Dr Bruce Tofield – UEA, Build with CaRe Work Package 4 leader.

But a part of the future is already present on campus. At the edge of a parking lot, the university has recently built the first combined heat and power plant in the UK that's powered by biogas from gasified wood chips. The University already generates 60% of its electricity on site, and, once the biomass plant begins full-scale operation, that figure will rise to 90%. But Martyn Newton can see futher benefits:

"Gasifying wood chips creates biochar as a by-product, and there are researchers at UEA who are looking into the benefits that this biochar can provide in improving soils where it will last for hundreds of years and sequester the carbon the growing trees have captured from the atmosphere."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CHRISTIAN KORNEVALL
DIRECTOR, WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT (WBCSD)

"We have many good examples of Eco-buildings, Green buildings, LEED certified buildings worldwide etc. But they are just examples, and that is not enough to change the building sector. What we need is mainstreaming. Therefore I think objective of Build with CaRe (Carbon Reduction) aiming to mobilise all forces at local level in order to make energy-efficient building design the mainstream is just "spot-on".

The building sector is very complex, fragmented and having a lot of strong barriers preventing real change. The market alone will not achieve necessary progress, therefore policy and behavior changes are crucial to stimulate the building market and achieve more energy efficient(EE) buildings. To make things happen we need a comprehensive package, where the different components mutually reinforces each other. Such a package should include the following components;

Mobilize for an energy awareness; Strengthen codes and labeling; Use price signals and subsidies to stimulate EE investments; Use passive and active design approaches; Develop and use smart technologies and, last but not least, develop and train a workforce for EE.

Transformation of the building sector is of critical importance because;

- *The net carbon abatement costs are lower in this sector than in others*
- *EE measure can be implemented at once while other sector actions will take longer time to develop and implement*
- *Investments in EE are net job creators*

In conclusion, we must begin immediately to create the transformation of the building sector that will deliver sustainable business success and jobs as well as cut energy consumption to curb climate change.

Finally, I hope that the Build with CaRe project will trigger sustainable changes in the building sector in the regions covered by the projects."

WE ENDORSE BUILD WITH CARE

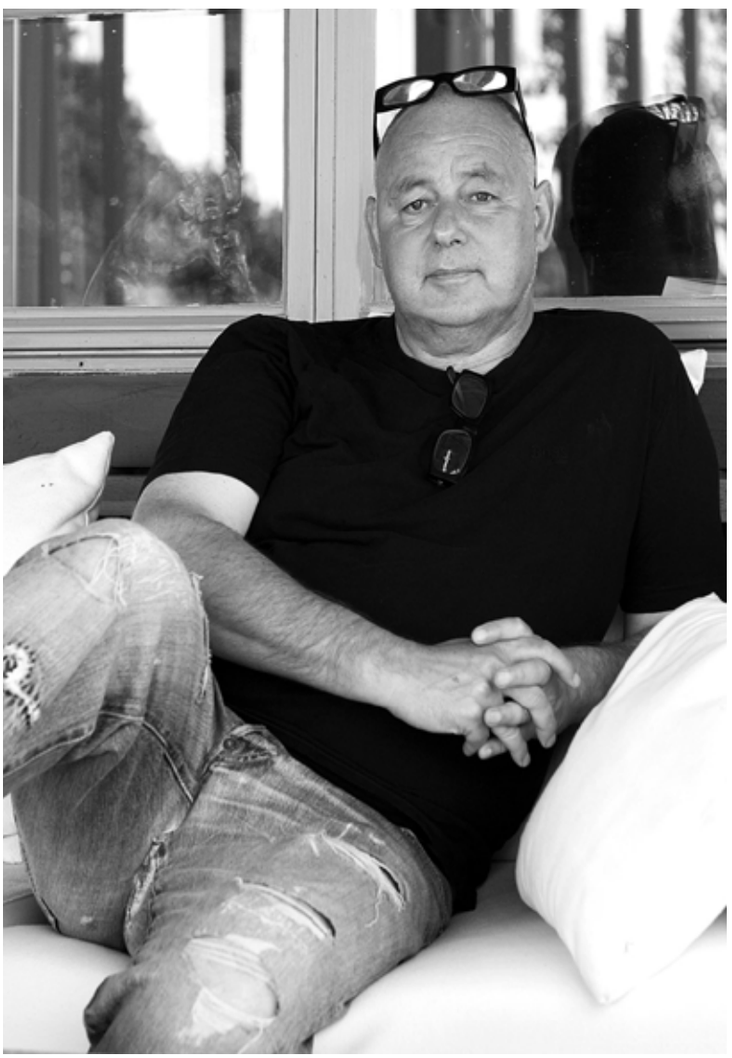

PHOTO: JESPER RAY

"THE LONG-TERM PURPOSE OF ALL OUR BUILDINGS IS MANY YEARS OF FUNCTION,

...comfort and pleasure. We are adamant about high-quality materials and sound energy economics – and are absolutely against any unnecessary waste!"

GERT WINGÅRDH
ARCHITECT SAR/MSA

OLE B. SØRENSEN
CHAIR INNOVATION & EDUCATION GROUP, NORTH SEA COMMISSION

"ONE OF EUROPE´S GREATEST CHALLENGES

...is the future supply and consumption of energy. It is thus important to find new standards for how we use energy and make it last for as long as possible. The Build With CaRe project can help make a difference and should be followed with great interest. Build With CaRe will without doubt deliver the solutions of the future."

"IT IS AN HONOUR TO SERVE AS AN AMBASSADOR

...on such a progressive, innovative and important project as Build with CaRe. With the building sector accounting for almost 40% of the European Union's emissions, Build with CaRe's mission to make energy efficiency in building design the norm is not only hugely commendable but a necessity if we are to reach our EU goals for cutting carbon emissions."

JEAN LAMBERT
GREEN MEP FOR LONDON

OFFICE LIVING

STEUBENSTRASSE, OLDENBURG, GERMANY

Jan Boos owns a company that sell energy management systems for smart houses. No wonder he chose a passive house when moving his home and office to Oldenburg.

The neo-modern white house on Steubenstrasse in central Oldenburg differs from the surrounding 1940s and 1950s buildings not only by its appearance. The new house is also different because it's a passive house equipped with an intelligent energy management system.

This is the home and workplace of Silke and Jan Boos, who together with his father, operates a company that sells energy management systems for smart houses. Lighting, indoor climate and music are controlled from a panel on the wall, which can also be regulated through the Internet. For Jan, taking the step to living in a passive house was hardly a difficult one.

In May 2010, he moved both the office and his home to Oldenburg. We visited the couple when they had lived in the house for a few weeks.

"It feels like living in any other house, but the indoor climate is definitely better," says Jan Boos.

But naturally, sometimes you have to think in a different way.

On one of the first evenings in her new home, Silke Boos placed the exercise bicycle in front of the TV and started cycling.

"When I wanted to have fresh air, I opened the window, even though I knew that a passive house constantly gets fresh air through the ventilation system, and therefore no one needs to open windows."

And there are certainly visual differences. On the top floor of the house on Steubenstrasse, there is an entire control room where heat exchangers and the ventilation system can be controlled in detail. And just as in other passive houses, the windows facing south are gigantic in comparison with those facing north. The dining area, in a corner out toward the garden, is bathed in light, as is the living room one floor up. Only the window glass marks the boundary between the house and the outdoors.

Knowledge transfer takes time

The choice of architect was easy, as Jan's father knew Ulf Brannies, an architect who is a real authority in this area. Based in Oldenburg, Ulf Brannies has been interested in environmental and energy issues ever since the early 1990s, and planned his first passive house all of 15 years ago. He says that it wasn't until the past five or six years that interest in this has really taken off.

"But it's still difficult to find construction firms with experience in this technology. Knowledge transfer takes time, and is also slowed by architects who often feel insecure with someone who is building his first passive house."

"In my experience the optimum size for a passive house villa is around 200 m^2, when you build smaller it becomes difficult to get an economical overall cost result," Brannies says.

Record low energy consumption

The house in Steubenstrasse was 10-15% more expensive to build than a conventional home. But Jan Boos now also has a house with an annual heating requirement of only 14 kWh/m^2.

"If the solar panels don't provide enough energy, a geothermal pump is used to top up the store of solar energy. In the summer, we can do the opposite, using the cold ground to cool down the rooms," Ulf Brannies explains.

Ulf Brannies is now building about two passive houses a year, and feels that interest is constantly increasing.

"I see a clear correlation with oil prices. Every time oil prices rise, so does interest in passive houses. But we are still far from a passive house norm."

Jan Boos, his house and his dog.

Ulf Brannies, architect.

BAURAUM BREMEN, AN EXHIBITION CENTRE FOR ENERGY SAVING, BREMEN, GERMANY

PRACTICAL TAKE ON PASSIVE HOUSES IN BREMEN

bauraum Bremen is not an ordinary building centre. Besides energy efficiency, bauraum also focuses on practical and pedagogical advice in order to reduce the complexity of sustainability.

Intelligibility and objectivity are the key words behind bauraum Bremen, an information centre that focuses on energy saving and has opened new opportunities for sustainable building in northern Germany.

"There is a great deal of interest in saving energy, both due to climate change and economic considerations. But many give up when they see how complex this issue is," says Jürgen Ritterhoff, board of management of bauraum.

The idea of creating a permanent exhibition of energy efficient construction is not a new one. There were already several exhibition centres in Germany that displayed high-tech solutions, and provided (often abstract) technical information and ambitious energy-saving solutions that required huge investments.

"Visitors left fascinated, but also dubious," Jürgen Ritterhoff explains. We saw a need for a centre that provided more practical information.

A self-explanatory exhibition

bauraum, which opened in April 2009, is now a place where homeowners, architects, planners, energy consultants, craftspeople, financiers and suppliers can all meet and examine objectively selected, financial justifiable solutions for houses in the Bremen area, itself.

This exhibition provides information in a way that is a shining example of straightforwardness and practicality. It is structured around about twenty models, where the visitors can feel, see, hear and measure. The "doll-house" near the entrance is a good example of the educational approach used. It has detachable roof, wall and floor insulation, which the visitor can experiment with. What happens to the energy values when we add more insulation to the roof or walls, or when we install new three-pane windows?

A model close by shows how thick a layer of insulation is needed depending on the material one uses. Another model shows heats transfer with various types of window glass. A third shows how various insulation materials work as a sound damper.

"EVERYONE CAN SAVE ENERGY IN SOME WAY. JUST BY BUYING A NEW REFRIGERATOR AND NO LONGER LEAVING THE TV ON STAND-BY, MANY PEOPLE CAN SAVE 100 TO 200 EUROS A YEAR."

At bauraum, there are also examples of heat pumps that work in various contexts, as well as a range of ventilations systems. And naturally, there is a demonstration of the blower door test to find out whether a passive house is really sealed. A blower door is a powerful fan attached to the frame of an outer door. The fan presses air out of the house, and lowers indoor air pressure. The higher air pressure outdoors then causes air to try to get into the house through any existing leaks, which one can then discover and repair.

Further away in the exhibition is a little room that is completely non-insulated, so that you can feel how hot it is in the summer and how cold it can get in the winter.

Expert help within reach

"It's not hard to live in a passive house, but you have to know how to use it so it will work well. That's why we've concentrated on showing practical, achievable solutions that are self-explanatory, and can therefore be experienced on one's own", explains Jürgen Ritterhoff.

bauraum also arranges meetings with energy consultants and other experts. The Centre aims to combine energy efficiency with other house-related topics, such as health issues, comfort and sound insulation.

"Living well at home is a lot about feeling well. And we feel well when we surround ourselves with natural, healthy materials," says Jürgen Ritterhoff.

Visitors to bauraum include a steady stream of architects seeking new solutions, supplier companies that want to train their employees, and homeowners who want advice and ideas. Two days a week, the Centre is open for study circles, company events or information meetings on environmental and energy issues. On the day we met, Jürgen was later off to give a presentation about saving energy at a day-care centre in a low income area in the vicinity.

"Everyone can save energy in some way. Just by buying a new refrigerator and no longer leaving the TV on stand-by, many people can save 100 to 200 Euros a year," Jürgen Ritterhoff explains.

Cooperation and patience

bauraum was founded by energiekonsens, the climate protection agency in Bremen, and 6 other institutions in Bremen. Currently some 50 companies, organisations and foundations sponsor bauraum. They include representatives of homeowners, banks, small, medium and large business of various types, public officials, environmental organisations, energy suppliers and – experts. All of them have different reasons for participating in this project. The Sparkasse bank, for example, views its involvement in Bauraum not only as a way of marketing itself as a future-orientated, progressive bank, but also sees the centre as a meeting place where the bank can establish contact with future borrowers," explains Jürgen Ritterhoff, who previously had worked with an environmental organisation.

"Operating a joint project with so many players is a complex project," Jürgen explains. "Everyone has different reasons for their participation, different ways to attack a problem, different organisational cultures, and differing financial and staff resources."

But during the course of the project, Jürgen Ritterhoff has also learned what the most important factors for success are: a idealistic and hard-working core group, a good regional contact network, patience, flexibility and the ability to solve unforeseen problems, and last but not least, persuasiveness.

A PASSIVE HOUSE SCHOOL EXAMPLE

ULZBURG SÜD PRIMARY AND LOWER SECONDARY SCHOOL, HENSTEDT-ULZBURG, GERMANY

Long term commitment and passive houses is a fantastic combination. Thanks to a 25-year contract with the building's general contractor, the Ulzburg Süd Primary and Lower Secondary School has every chance to contribute to the development of the passive house market.

The Ulzburg Süd Primary and Lower Secondary School in Henstedt-Ulzburg is an example of long-term thinking. Not only does this school conform to the passive house standard, a fact which, in itself, indicates a philosophy of sustainability, but the Commune Henstedt-Ulzburg, the principal for this project, has also signed a 25-year contract with the building's general contractor.

"This is unique in the context of passive houses, and provides us with a fantastic opportunity to learn from experiences and thereby develop the passive house market," says Siw Wrobel, project manager at the privately-owned building project management firm, IPC, which is responsible for construction operation and follow-up."

"It takes time, for example, to optimise a ventilation system in a passive house. That's why it makes things so much simpler if the same people continue to work with the project."

The school opened its doors in October 2008, and looks like other north German schools, with its brick facade that reflects regional traditions. In fact, there is no special passive house architecture, which is one reason why the cost did not exceed 6.9 million Euros, including an adjacent sport centre with the same standard.

The contractor expected the additional cost associated with the passive house standard to be 10%, but it actually was less than that.

"The more experience the contractors get, the less the additional costs for passive houses will be," Siw Wrobel believes.

IPC is now monitoring the energy consumption of the school and making surveys every three months, and have received a very favourable response from both students and teachers, who especially appreciate the perfect indoor climate. This is far from something taken for granted in Germany where there is no legal requirement for schools to have a mechanical ventilation system at all.

"I have a strong belief in the power of a good example, and Ulzburg Süd has every chance to be that example," Siw Wrobel declares.

"Actually, the idea of building this school is a result of something like this. It all started when the leader of the department planning, building and environment of the Commune Henstedt-Ulzburg read about a passive school in Frankfurt and got inspired."

TERMS AND DEFINITIONS

What is an energy-efficient building?

Energy-efficient buildings are houses that to various degrees provide and stimulate lower energy consumption. They are built for minimum heat loss with features such as airtight building envelopes, efficient heat recovery, and techniques that utilise heat from people in the house, electrical appliances and absorbed solar heat. This requires well thought-out solutions and great accuracy in the building phase.

What are passive houses?

A passive house is a well-insulated building largely heated by means of the energy already in the house, such as absorbed solar heat, and waste heat from cooking, electric equipment, lighting and people. At the same time, heat leakage is minimised by well-insulated design and the efficient recovery of heat in the ventilation air. In order to use the term passive house for a building, a number of fundamental requirements must be met.

Interior from Thomas Paine Study Centre, Norwich, UK.

Important concepts

Solar cell
Creates electricity from sunlight.

Solar panel
Heats water with the help of the sun. Used for producing hot water, and sometimes for heating.

Heat exchanger
Transfers heat from one medium to another. Often used in low-energy buildings for transferring heat from exhaust air to intake air, thereby reducing heat loss in ventilation.

Starter house
The first house you buy. Often small, simple and cheap.

U-value
Describes the insulating ability of a building element or material. The unit is W/(m^2/K) = the heat passing through a square metre of the building element or material per °C of temperature difference. This value depends of thickness and heat conductivity (lambda value) of the component material.

Geothermal pump
A heat pump moves heat from one medium to another. When an element changes state (e.g. from liquid to gas), a large energy exchange takes place. A geothermal pump transfers heat from one or more bore holes in the ground with the help of a heat pump.

Blower door
Air tightness testing of buildings is done by pressurizing apartments or entire houses, and measuring the flow. This is done with the help of a computer-controlled fan mounted in a door opening, hence the name.

BREEAM
BRE Environmental Assessment Method. Environmental rating system for buildings, developed in Great Britain.

Energy windows
In daily usage, a window with excellent insulating ability, and U-value of less than 0.8 W/(m^2/K). Often a triple-pane window with inert gas between the layers of glass, and a low emission layer that lets in light but retains most of the heat radiation.

TROSA
SWEDEN

Ecological 120 m² low-energy villa with solar panels and walls built by recycled bricks.

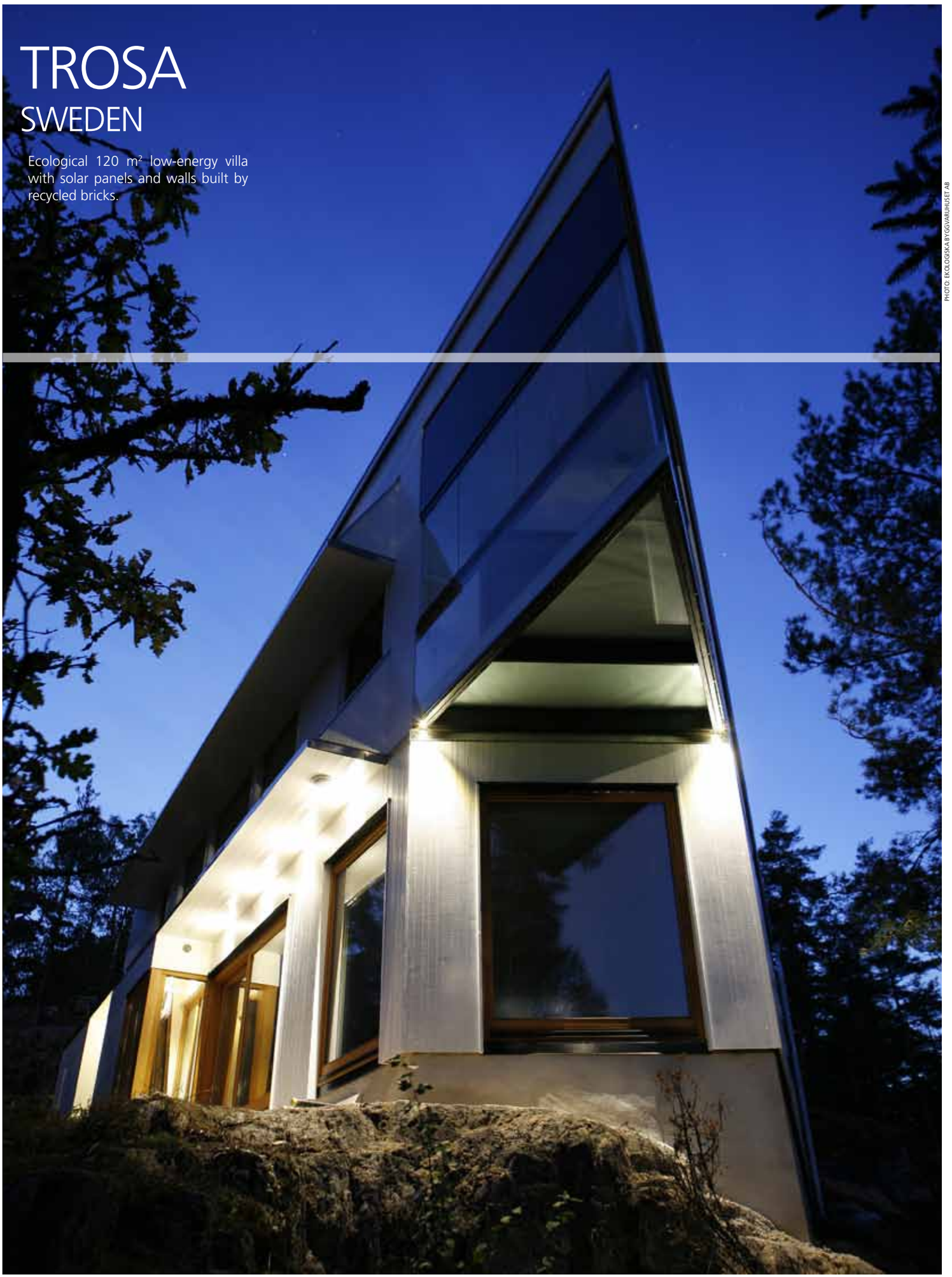

PHOTO: EKOLOGISKA BYGGVARUHUSET AB

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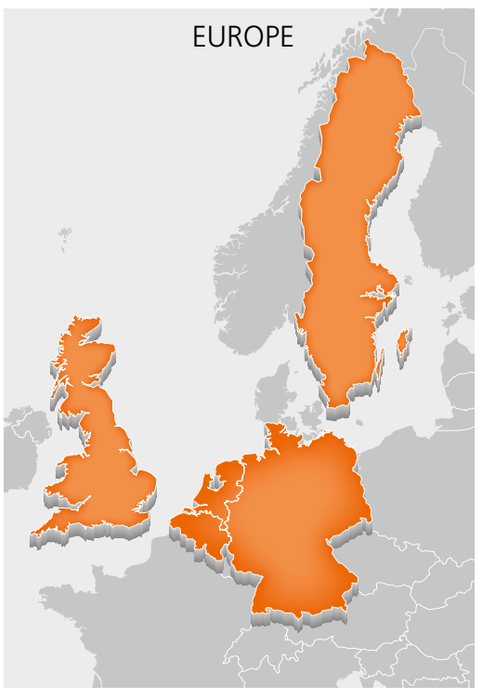

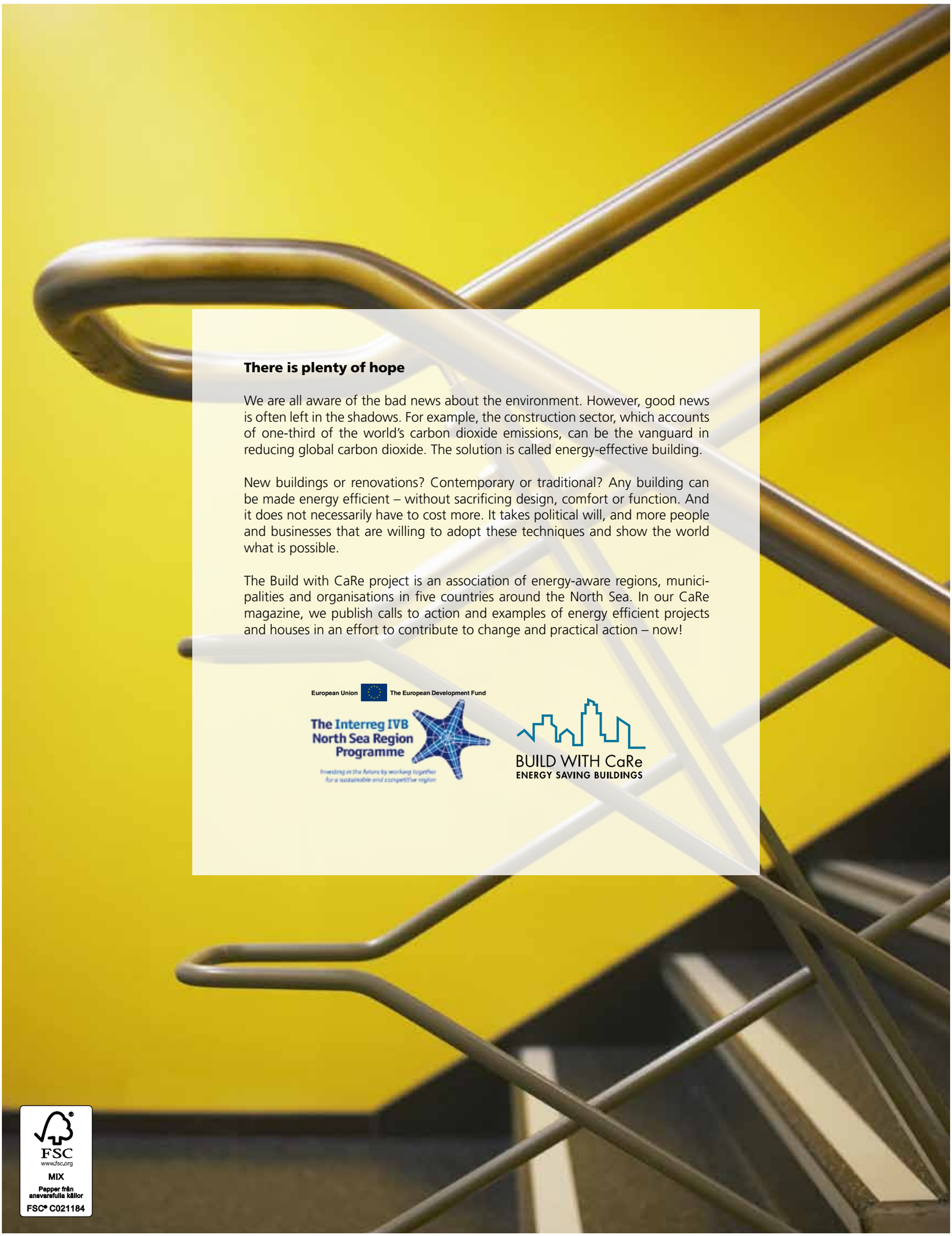

There is plenty of hope

We are all aware of the bad news about the environment. However, good news is often left in the shadows. For example, the construction sector, which accounts of one-third of the world's carbon dioxide emissions, can be the vanguard in reducing global carbon dioxide. The solution is called energy-effective building.

New buildings or renovations? Contemporary or traditional? Any building can be made energy efficient – without sacrificing design, comfort or function. And it does not necessarily have to cost more. It takes political will, and more people and businesses that are willing to adopt these techniques and show the world what is possible.

The Build with CaRe project is an association of energy-aware regions, municipalities and organisations in five countries around the North Sea. In our CaRe magazine, we publish calls to action and examples of energy efficient projects and houses in an effort to contribute to change and practical action – now!

European Union The European Development Fund

The Interreg IVB North Sea Region Programme

Investing in the future by working together for a sustainable and competitive region

BUILD WITH CaRe
ENERGY SAVING BUILDINGS