

JUSTIN BERE'S house-cum-design-office masterfully combines great aesthetic features, such as roof gardens, and the latest energy-saving devices

# INTRODUCING

# ECOTECTURE



Top architects reveal the latest developments in sustainable architecture, or 'ecotecture', and its importance for the future

Werner Sobek, internationally renowned architect, with offices across the world, from Stuttgart and Dubai to New York and Moscow, and one of the driving forces behind the push for a more sustainable form of architecture, has no doubts about the responsibilities contemporary architects hold:

"We have to face the problem," he posits, "that the built environment consumes about 50 per cent of all material used, that it causes about 35 to 40 per cent of emissions, that it consumes about 35 to 40 per cent of primary energy, and for central Europe, causes about 45 to 60 per cent of mass waste." Be in no doubt, therefore, that a much more sustainable form of architecture is one of the most pressing issues facing the planet.

**WERNER SOBEK'S** Suvarnabhumi Airport in Bangkok. The concourses are covered in a patented three-layered roof with very high-insulating and acoustic-damping qualities. It still transmits 2.3-5 per cent of natural daylight meaning no external artificial lighting is needed during the day

PHOTOS RAINER VIERTLBÖCK; OPPOSITE PAGE: COURTESY BERE ARCHITECTS



**GERARD EVENDEN**

Senior architect on Fosters + Partners' Masdar city project

**Fosters + Partners** won the commission for Masdar, a hugely ambitious six-million-sq-m carbon-neutral, zero-waste walled city in Abu Dhabi. Work started in 2007 and is scheduled to be completed in 2023.

**Why were Fosters + Partners chosen for the Masdar project?**  
We've been involved in designing and pushing sustainability in our buildings for the past 40 years. From some of our earliest buildings, like the Commerzbank in Frankfurt, which was the first naturally ventilated high-rise office tower, to the 'Swiss Re building' in London. To be involved in a masterplan like [Masdar] ... was for us the culmination of a number of iterations on projects where we'd looked at individual buildings and how buildings should be sustainable. For example, the Reichstag parliament building in Berlin, which is powered by rapeseed oil. All of those projects created their own piece of knowledge. What was interesting about Masdar was you could bring all that knowledge together and then begin to think about it on a city scale.

**How are people going to get around such a city?**  
What's very interesting is the transportation system and where transport is going in the future. Will [cities have] ... driverless systems of transport? How will transportation become more efficient? And how will that effect the cities we live in? I think these are questions we are debating and it is becoming part of the project's thinking.

**How will water be provided in such a harsh climate?**  
The only source of water is through desalination. So, the first thing you have to do is look at the way in which the water is desalinated in the first place. So, how do you remove the salt from the water? Can you do that through a renewable energy? Can you do that through solar? Yes, you can. What can you use the bi-products for, instead of sticking them back in the ocean and ... destroying the natural habitat of the oceans? That's the first issue, the second issue is then how do we reduce consumption? And how do we reuse the water that we've desalinated in the first place? So, instead of throwing away your grey water and your black water, they can be recycled and used for other functions, for example irrigation; toilet flushing can be done with a different type of water than purely drinking water.



**FOSTER + PARTNERS' REICHSTAG**, Berlin, is powered by refined oil and the cupola acts as a source of natural light and ventilation



**RAMSTAD'S VIEWING PLATFORM**, Norway, highlights how oxidised metal can complement a harsh natural environment



**BERE:ARCHITECTS**  
**Green building:** The Muse, London  
**Green Credentials:** the house is aiming for Passivhouse standard, which is arguably the highest standard for energy efficiency, requiring virtually no heating.

Ask five architects to define precisely what 'sustainable architecture' encompasses and you will get five very different answers. Perhaps the best, as well as the simplest, definition is provided by London-based Justin Bere of bere:architects. Sustainable architecture is:

"Designing in such a way that we satisfy the needs of the current generation while at the same time looking after the needs of future generations." In short, this simply means that the days of designing for purely functional or purely aesthetic reasons, with a disregard of how and with what buildings are constructed, is over.

Up until the Industrial Revolution, and the concomitant huge population expansion of the 19th century, the built environment was a lot more sustainable than has been the case since. Bere strongly believes that as people come to terms with the fact that oil and gas will soon run out, there will be something of a return to, if not quite pre-industrial forms of architecture, something a lot more sustainable. "If you haven't got the abundant resources – fossil fuel resources – you automatically design locally."

In the past, the fear for anybody wanting to commission a so-called 'green' building was that it would look like ... a 'green' building: over-functional, unimaginative and lacking soul. While Bere admits that this had occasionally been the case,

today this perception is nothing short of caricature, as Muse, his own house, highlights. Located in London, it has the latest energy-saving devices, such as a heat recovery ventilation system, solar thermal collectors and a sub-ground cistern for water harvesting, and its stylish façade is complemented by four beautiful roof gardens.

As industrialisation took hold across Europe and North America, expanding exponentially in the 20th century, there was arguably an abandonment of centuries' old practices of using predominantly local materials and of ensuring a minimum wastage of resources. Reiulf Ramstad, head of Norway's Reiulf Ramstad Arkitekter, is unequivocal about why: "Architecture is a mirror of the rest of society." And in a world of "neo-liberalism" and "globalisation" this directly led to "architecture going wild," he claims. Moreover, too much of modern design, as he sees it, was "more a question of making logo architecture".

Ramstad recently won the competition to build a 16-storey cultural centre in the Arctic town of Kirkenes, Norway. His plans, if realised, would produce one of the most sustainable and impressive buildings in the



**REIULF RAMSTAD ARKITEKTER**  
**Green building:** Barents Secretariat, Kirkenes, Arctic Norway  
**Green credentials:** Ramstad won the competition to design the new Barents Secretariat. Typically, this is just the first step, however. If realised, this principally wooden construction from recycled timber has hopes to be the greenest building in Norway.

country. Ramstad's Trollstigen project, however, provides a more profound, less sensational perspective of architecture working in harmony with the natural environment. "Good architecture is not just made from analytical analysis," he says. "Trollstigen is like a transition project between landscape and small elements, like bridges, footpaths, benches, small buildings, viewing platforms and how to deal with water ... I believe architecture must respond to the atmosphere of a place."

If Justin Bere and Reiulf Ramstad represent more regionally focused practices promoting sustainability in the built environment, the international-oriented Stefan Behnisch and Werner Sobek are attempting to do something similar, but on a much larger scale. As early as 1991, Werner Sobek was giving lectures about sustainable architecture and became a green pioneer with his Triple Zero concept, which, he says, "means a building does not need any [fossil fuel] energy to run, does not cause pollution and is fully recyclable." Each year,



**WERNER SOBEK ENGINEERING AND DESIGN**  
**Green building:** R128, Stuttgart, Germany  
**Green credentials:** this stylish residential building generates all its own heating with solar panels and it doesn't produce emissions. Any part of it could be removed and used somewhere else.  
**Green building:** Deutsche Post tower, Bonn, Germany  
**Green credentials:** it is enveloped by a double-façade skin, which helps it use around a third of the energy of similar-sized buildings, and means it doesn't require air conditioning.

PHOTOS NIGEL YOUNG, COURTESY REIULF RAMSTAD ARKITEKTER, COURTESY FOSTER + PARTNERS; PORTRAITS COURTESY OF THE ARCHITECTS



## SUSAN ROAF

Professor of Architectural Engineering at Heriot Watt University

Professor Roaf is a vocal critic of modern architecture and its alleged failure to fully understand the immediacy of the changes the industry needs to undertake to become truly sustainable.

### On modern architecture and sustainability:

Unfortunately, architects and architecture have been a large part of the problem, not part of the solution. Students leave many schools of architecture A) not being able to design a building and B) not being able to be part of the solution to climate change. In 1995, I built a house that runs practically on no carbon, so we have the technology ... At Heriot Watt University we are on track to build an eco village ... We're building 16 to 20 different houses, the same shape and form, and then we'll just test everything: we'll see which buildings overheat, we'll see on a scientific comparable basis which actually perform better.

### On high-rise buildings:

Every floor up you go, it takes more energy to build and more energy to run the building. I believe that the great big glass and steel towers are the acne of the 20th century for the aspirations of the built environment ... They are dinosaurs and every tall building in London should be cancelled ... Don't be fooled by this 'aesthetically pleasing' [rubbish]. Name one beautiful new building? Would you go and spend your summer holiday in the business district of Frankfurt because there are such beautiful buildings there? ... The problem with architecture has been Le Corbusier, who said that buildings are machines for living in; this turned people into machines for buildings. What we have to do is put people back in control of those buildings and to value their experience of them because we've certainly forgotten how to do that.

## STANDARDS



## MARTIN TOWNSEND

Director of BREEAM

There are a number of certification schemes around the world that assess the level of sustainability of buildings. A high 'green rating' not only makes commercial sense in the long run, it is seen as great PR.

Martin Townsend, director of Britain's Building Research Establishment Environmental Assessment Method (BREEAM) explains, "When clients decide they want a sustainable building, they need to decide what a sustainable building looks like with regards to the metrics of that building: how much water it consumes or how much waste it generates. BREEAM sets down a whole series of measurements to assess the building at its design, its construction and its operational phases." The British system has been taken up by a number of other countries, for example the Netherlands.

LEED in the US (similarly used in a number of other countries) awards points for: 'Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources and Indoor Environmental Quality'. A total of 110 points are available, and buildings with 40 points get 'Certified', 50 points 'Silver', 60 points 'Gold' and 80 points 'Platinum'.

Germany's scheme, DGNB, is very similar to LEED, according to Stefan Behnisch (see main text), who helped set it up.

Australia and New Zealand have their own Green Star schemes, Hong Kong has BEEM, Italy has Protocollo and France HQE.

Interviews by Paul Wheatley

Sobek designs at least one residential building that adheres to his own Triple Zero standard, and his superb four-storey R128 cube-like glass structure comprehensively allays any residual fears regarding the 'inferior' aesthetic qualities of sustainable architecture.

Internationally, however, Sobek has arguably made more of a mark with his work on high-rise buildings, for example the double-skin façade he designed for the 162.5m-high Deutsche Post tower in Bonn, Germany, which ensures a remarkably low energy input for cooling in summer and heating in winter. How does this work? "You use as much natural light as possible and avoid electric lights, which cause heat and you then have to cool [the building]," he says. "Cooling air by one degree," he explains, "takes five times more energy than heating by one degree." Which highlights why air-conditioning units are top of the hit list for sustainable-inclined architects.

Similar to Sobek, German Stefan Behnisch has offices across the world and is also considered to be one of the pioneers of a more sustainable form of architecture. In the mid-1990s, Behnisch won a commission to build a building for the IBN eco-research institute (formerly Forest and Nature Research) in the Netherlands. His commission was "to do a building for the next century" and just as important, IBN, he says, "were prepared to pay more money for less energy use of the building".

Behnisch sees sustainable architecture as "60 per cent common sense." The key is that fundamental green aspects of a new building "do not add costs. They make it even cheaper." This means that 'passive' green elements, such as adequate insulation and ventilation, are inherent in the design process, not a costly add-on if there is sufficient funding at the end. And what if a client were to say sustainable architecture is simply too expensive? "You have to make the argument. For example, you don't have mechanical ventilation, you have radiant cooling in the ceiling ... For every dollar or euro you invest in mechanical equipment you spend 20 [in maintenance] over the next 50 years."

The damage the built environment continues to do to the planet is enormous, as exemplified by Werner Sobek at the start of this article. It means architects have a unique responsibility but also a huge opportunity. "If we take this dominant part," says Sobek, which is "the dominant part for global warming, and reduce it by say one quarter, then the global effect would be dramatic."

Paul Wheatley



## BEHNISCH ARCHITEKTEN

**Green building:** Genzyme Center HQ, Cambridge, Massachusetts, US

**Green credentials:** achieved the USGBC Leed Platinum rating and uses state-of-the-art technology from Germany and Austria, plus the "waste heat from a nearby power plant ... providing heat in the winter and cooling in the summer"

**Green building:** IBN Institute, Wageningen, Netherlands

**Green credentials:** One of the first and most successful examples of sustainable architecture

PHOTOS ROLAND HALBE (OPPOSITE PAGE); PORTRAITS: COURTESY OF THE ARCHITECTS



WERNER SOBEK'S R128 is considered a genuine showhouse for avant-garde sustainable architecture. The triple-glazed glass provides excellent insulation, ensuring minimal heat loss in winter; while it works along with solar-operated ventilation windows for comfort in warmer months