



An education in design

Can we build sustainable and eco-friendly buildings without compromising design aesthetics?

HELEN RAYMOND, Joint Head of Sustainability, Capita Architecture, looks at how architects are marrying the environment with creativity...

Green buildings generally adapt to their surroundings, subtly, squinting towards the sun between louvres and deep, overhanging eaves, blending into the landscape with unadorned, natural materials. In urban environments, low-carbon developments can stand out from the crowd as easily as they can blend in, with high-tech design and innovative use of materials.

For those who see green buildings as small rustic structures, built with twigs and straw bales, there is a brighter future for construction, with clean lines, modern aesthetics and hidden technology all shouting from the rooftops. Even straw bales can look slick and sharp edged.

The future is bright, too for developer-occupiers who can reap the benefits of low-carbon efficiency. Low energy bills, better build quality and a stimulating, healthy working environment are requirements which should be at the top of every client's Christmas list.

MODERN, UNDERSTATED DESIGN

Take, for example, Howe Dell School in Hatfield.

Hertfordshire County Council has together with a Capita Architecture-led design team and MACE, built local children a new replacement school which ticks all the green boxes. Its aesthetic is 'new green' — a strong contender in modern, understated design. What's more, hidden behind the clean lines lies one of the newest technological advances in low-carbon systems — the ICAX Interseasonal Heat Transfer (IHT) system which sprawls unassumingly under the asphalt play area, providing clean heat to the classrooms all year round.

The new IHT system, which was nominated for the Sustainable Building Services green product award, has been pioneered by ICAX Ltd (Interseasonal Collection and Exchange). It works by capturing heat energy from the sun via a collection-pipe network just beneath the surface of the school playground. It then stores the energy in computer-controlled Thermal Banks in the ground under the school, and releases it to heat the buildings in winter via a series of heat exchangers linked to both the underfloor heating and a TermoDeck system (a specialist heating/cooling and ventilating system that

uses the structure of the building to stabilise the internal environment). The system — awarded an Innovation grant by the Carbon Trust as part of the Government's drive for implementing renewable-energy technology — is also able to capture the energy from cold winter nights, store it, and use it to keep the building cool in the summer.

ON THE ECO-CURRICUWM

The school — Hertfordshire's first 'eco-school' — also boasts the best in energy efficiency with natural ventilation, low-energy photosensitive auto-dimming lighting, rainwater harvesting and a play space which encourages not only biodiversity but pupils' learning and education in all things environmental.

The passive features and the ICAX system are complemented by a host of other renewable-energy technologies — including solar thermal water heating, a photovoltaic array and a wind turbine capable of exporting surplus electricity production to the National Grid. Internally, the development utilised zero-VOX materials, including Ecoseal paints and interface recycled carpets, along

with the natural ventilation strategy to improve the oxygen levels and aid concentration.

Over the life of the project, the school has also integrated sustainable principles into an 'eco curriculum', with collaborative approaches to involve and inspire the pupils; making sure the building users are fully aware of the consequences of climate change and their own actions on the efficiency of the building. After just a few weeks, the scheme has already been rated as outstanding by Ofsted inspectors. As Debra Massey, Headteacher, recently explained: Our curriculum has sustainable education principles at its core and we've already had a lot of positive feedback from Ofsted. Our 'Eco Squad' of pupils helps to promote ideas of sustainability and learning about the environment across the school, enabling us to engage pupils of all ages with the school's ethos."

PUSHING THE BOUNDARIES FURTHER

The school has also been awarded ECO Green Flag accreditation (the highest level of award granted by the UK's eco-schools programme) and will act as a Learning Resource for both its pupils and the wider community. As well as providing education for children up to the age of 11, the project also incorporates nursery provision, a child day-care facility for children from the age of six months, and a community centre that can provide a range of after-school learning courses for adults, among other traditional community uses.

Development and installation of new and wholly integrated technologies like these are the only real way forward for a zero-carbon future. There will never be one 'fits-all' solution, but through research, development and, above all, close teamwork — as with Fulcrum Consulting on the Howe Dell School — we can push the boundaries further. Each development relies on a careful balance of maximum efficiency, renewable technologies with cost and delivery. Concentrating on maximising the potential of an energy-saving envelope is key to the future

of low-carbon developments. It's common sense really — insulating well and focusing on air tightness and well-detailed junctions gives not only a better building, but also a cost-effective solution to lower emissions and energy costs. Renewable technologies should be considered from the inception of the project, after designing the maximum efficiency of the envelope to keep the cost of renewables down to a minimum.

KEEP DEVELOPING AND INNOVATING

We are developing systems to ensure all of our projects stay a step ahead of legislation, providing cost-effective buildings. We use project reviews with our Environmental Research Group and environmental modelling to ensure all of our projects meet a standard which, with client buy-in, pushes schemes beyond current regulations. The standard focuses on efficiency, renewables and materials and from the briefing stage of a project ensures that all aspects of environmental, social and economic sustainability are covered.

With up-and-coming products like phase-change materials (PCMs) and screen-printed photovoltaics, there will be cost-effective solutions just around the corner, but we need to keep developing and innovating to ensure we always have the best solution for every individual scheme.

Schools have been at the forefront of sustainable design with the help of the Building Schools for the Future programme. Housing has been in the limelight for some time too, but with energy-performance certificates for all buildings being phased in next year, we should see rapid improvements in building efficiency—after all, nobody wants to be left with the burden of leaky, energy-guzzling, high-maintenance buildings.

DIFFICULT DECISIONS AND TRADE OFFS

Legislation is changing at an unprecedented rate with a step change in the political social and

commercial climate. The main political parties are now vying for the green seal of approval; the government wants 10 new eco towns; Arnold Schwarzenegger has pioneered groundbreaking sustainable legislation in California; large companies are openly responding to the green agenda; and communities are taking it upon themselves to move towards carbon neutrality.

It is essential for all areas of sustainability to be considered, from biodiversity of the landscape, community integration and in-built flexibility, to addressing awareness and behavioural change for users of low-carbon developments. These social economic and environmental factors sometimes complement each other, but often they can compete, demanding difficult decisions and trade offs. This is our challenge. Working together to make the best use of technology and current research, education and communication are essential to develop strong and cohesive zero-carbon communities who have pride in their built and natural environments. □

