

A playground in the sun

Bill Holdsworth takes a look at a unique project in Hertfordshire that could revolutionise the future design of British schools

School playgrounds, shopping centers, the forecourts of houses, town squares, airport tarmacs, parking places and roads are not inherently seen as mass producers of renewable energy. But they are, and the energy is being harnessed by the London-based design company ICAX Ltd. Its patented technology provides a sustainable on-site system that was unveiled last month in Hatfield, Hertfordshire, when the Duke of Gloucester officially opened a new primary school.

The new Howe Dell School, designed by Capita Architects, has been built on the site of the old de Havilland airport and factory where the Comet, the first British passenger jet aircraft, was built in 1949.

The school is unique with its ecological construction methods interacting with the ground breaking engineering system of a solar energy system where the thermodynamic principle of direct heat transfer of solar energy is absorbed by the surface of a 600 square metre asphalted playground. Embedded below the surface is a heat collector in the form of an array of reinforced plastic pipes circulating a liquid which transfers heat to two thermal banks beneath the school. Here, the trick has been to store the collected energy with minimal losses across the seasons to suit fluctuating demands. The system has been found to be very suitable for buildings that have multiple uses during daytime and evening throughout the year's cycle of climate changes.

Over a number of years various single and hybrid systems using rock beds, natural and chemical salts and water in storage bunds have been used but without a

satisfactory performance across the seasons. British architect Mark Hewitt and energy engineer Andy Ford have studied in depth the phenomena of heat migration in the ground and have developed a new and radical innovation. The technology has been made possible since the arrival of computational fluid dynamics software that can be used to model the heat migration in the ground over a ten-year period. With such a capability the system can be installed for a whole range of buildings and urban infrastructures.

Storage in thermal banks

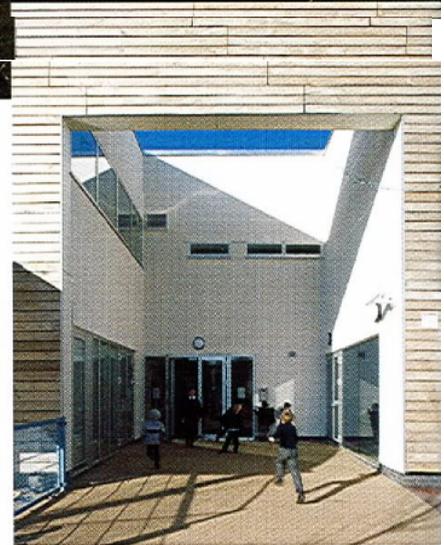
The phrase Interseasonal Heat Transfer (IHT) is used to describe this new technology which is complementary to both solar thermal and ground source heat pump engineering systems that are reasonably well known. The difference is that IHT provides a method for the storage of heat energy in thermal banks across the seasons for many months. This means that excess heat generated by solar panels, chillers, asphalted roads or any waste heat sources can be

safely stored until needed. The system can also collect cold during winter and then store this in the ground until needed to cool buildings in the summer. The need for summer cooling will increase as climate change raises summer temperatures.

The Carbon Trust was instrumental in part funding the design of the ICAX Ltd IHT system. Fulcrum Consulting were the building services consultants



Excess heat from asphalt can now be stored until needed in winter



Howe Dell School is set to become an exemplar for future schools

Both photovoltaic and solar thermal technologies are in use at Howe Dell

who, along with the architects, integrated other alternative energy systems using a TermoDeck pre-cast concrete ventilation system for delivering thermal comfort conditions as well as the installation of solar panels and photovoltaic array to supply hot water and electrical power. Roof top solar panels are used to pre-heat water for use in kitchens together with washing and shower facilities. Surplus heat from this source





Plastic pipes in the playground absorb heat for use in winter

is also stored during school holidays for winter use. On the electrical side there is a 20kW Gazelle Horizontal Axis Urban Wind Turbine to capture energy from the prevailing south-westerly wind. The whole idea of the Howe Dell School and Community Centre is that it becomes an exemplar for the creation of schools with a zero- carbon footprint.

Rapid advances in design
Clare Devine, director, Capita Architecture, said: "Over the last few years, Capita Architecture has designed a number of award-winning buildings along sustainable principles - from pioneering eco-schools to groundbreaking hospitals. The new technologies and

environmental design approaches implemented at Howe Dell are a perfect example of how sustainability in design and construction is continuing to advance rapidly. It really is an

It is hoped Howe Dell will enthuse pupils about environmental concerns



excellent example of how sustainable principles can play a vital role in terms of both building design and the children's education."

The school was commissioned by Hertfordshire County Council, having taken on board the government's desire to reduce overall emissions of carbon dioxide and other climate changing pollutants by requesting the designers to incorporate a number of green technologies. Howe Dell School will become a major regional focus for the education at an early age level of sustainable technologies. This is a matter close to the hearts of Project Manager, Richard Watson of building contractors Mace as well as head teacher Debra Massey who is an apostle of education for ecological development. "Our curriculum has sustainable education principles at its core and we've already had a lot of positive feedback from Ofsted," she explained. "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."

"This unique project is a resource for the whole community," says Keith Emsall, executive member for education at Hertfordshire County Council. "I believe that if our children can be enthused about the importance of caring for their environment from a very young age, they will carry that message with them throughout their lives. I'm proud that Hertfordshire is setting

the benchmark for other authorities with this exciting new building."

While the children of Howe Dell School play on their solar collector playground, not far away, close to the Toddington Service Station the UK Highways Agency in conjunction with the Transport Research Laboratory Ltd have recently completed a two year trial of the ICAX Ltd IHT system on two long stretches of an access road. Last summer your correspondent visited the test station with Lord Robin Corbett of Castle Vale and Alan Simpson, a Nottingham MP. We were told that monitored results showed that the system was working beautifully. Energy watchers, road transport chiefs and also London's Mayoral candidates are keenly waiting publication of the public report promised for the start of 2008.

Spreading to Japan

Confidence in this British invention is spreading worldwide. In Hiroshima City, Japan an ICAX Ltd IHT system is working successfully installed under license by Misawa Environmental Technology Company, whilst a Dutch manufacturer of floating structures is keen to discover if the system can be used to supply renewable energy for a new generation of floating cities.

Mark Hewitt, director of ICAX Ltd, told EiBI that his IHT system is now off-the-shelf technology. "We can deliver because we really understand how heat energy migrates in the ground. We are able to calculate precisely where heat will be when you need it, what happens to it and how much is left." These are brave words for a very brave system. It is essential that Councils and other stakeholders across the British Isles take him at his word. If not then trip along to Howe Dell School in Hatfield and ask the children what they think.

• *Bill Holdsworth is a professional environmental engineer, author, lecturer and journalist.*

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