

# BUILDING A SUSTAINABLE FUTURE



Building Schools for the Future (BSF) is an immensely ambitious programme designed to rebuild or refurbish all secondary schools in England over the next 15 years at a cost of £45 billion. The project has been designed to transform the educational experiences of pupils, through improvements to the fabric of school buildings and providing investment in ICT. Since the scheme was launched in 2004 there have been considerable developments in its aims and scope; most notably there has been a huge focus on embedding sustainability within the schools to meet the government's carbon reduction targets.

Schools in the UK contribute approximately 2% of the nation's carbon emissions and almost 15% of UK public sector carbon emissions. In order to meet its targets on carbon reduction, the government has addressed the issue by setting several energy targets that BSF schools have to comply with. The first is for a school's design to demonstrate that it can reduce emissions by at least 60% compared with the 2002 Building Regulations figure. The second target is for the carbon consumption of the school to be below 27kg CO<sub>2</sub>/m<sup>2</sup>/year (roughly half of the output of most existing PFI schools). With these targets built into the BSF contracts and financial penalties for the schemes that don't make them, consortia have to look at innovative ways to meet these high demands.

In July 2009, the Equitix consortium, which included MITIE as the FM provider, reached financial close on the first phase of Derbyshire County Council's £750 million BSF programme. The Derbyshire scheme is one of the

UK's largest BSF programmes and will ultimately see the delivery of 46 schools across the central English county. But with the first phase including three schools in the 25 year deal, the consortium had to come up with innovative ways to cut the emissions to meet the targets.

Early designs looked at various sustainable solutions. Mark Reed, BSF Director for MITIE was well aware of the challenge being faced, and how it should be tackled. "We knew finding a solution would not be straightforward. It is extremely difficult to meet the 60% target even using the most sustainable building materials and design, so we needed to look at alternative ideas. We decided to look at renewable energy solutions as a way of reducing the amount of energy emissions the schools produce."

In order to get the funding to build the schools, the team had to prove that the design can reduce carbon emissions by 60%. However once the school is built it is the responsibility of the consortium to make sure that the energy consumption is below the government's targets, so it is essential to make sure that a robust solution is in place that will help reduce emissions along with an energy management plan to educate the users of the school on the efficient use of energy.

#### Earth, wind and fire

Initially ground source heat pumps were seen as a viable option; however as the ground conditions were deemed unsuitable and extensive pipe work would have been required to provide enough heat, it made the technology ineffective and uneconomical. Biomass boilers were also assessed, but due to the rural locations of the schools the transportation of fuel was impractical. Furthermore they can also take up significant space within the school grounds.

Wind generation was another alternative energy solution; however this also posed a number of issues. For turbines to be built, planning permission is needed from the local authorities. While the schools are within rural areas, they are located within small built up communities. As a result, planning restrictions meant the wind generators could not be constructed at the school sites. A new viable solution was needed, which could resolve the energy issues and be implemented at all three schools.

The answer came in the form of building off-site wind farms, built by MITIE's energy specialists, who specialise in the consultancy and installation of renewable forms of energy.

"The wind farms idea was to construct four 15KW wind generators on an unused part of farmland approximately 50m by 10m in size. One of the generators will be provided to the landowner in recompense for the land, who may then sell the energy generated or use the energy themselves. The three remaining 15KW generators are then dedicated to one of the schools, with one wind farm being built for each school."

The wind farms need to be constructed in a location that meets the required wind speeds and where planning permission can be obtained easily. By building them in rural areas that still have connections to the power grid, the team are making sure that the turbines have minimum impact and maximum efficiency.

The idea is to offset the energy produced by the turbines against the energy output of the schools, essentially using the National Grid as a long cable to connect the generator to the school. With each 15KW turbine generating enough energy to power six three-bed houses, excluding heating, each school will be producing enough energy to power 18 houses.

The wind farm idea for the Derbyshire BSF scheme is the first of its kind to be fully funded by the government and if successful will be considered as part of the energy plan for the remaining 44 schools in the county. By using this method of energy generation there are a number of significant benefits for all parties involved. It ensures that real renewable energy is used to provide electrical energy at the schools which in turn means the carbon footprint of the school is reduced. The Local Authority and the schools also benefit from the financial revenues generated from the sale of renewable energy back to the National Grid, as with government subsidies to encourage the renewable energy schemes, they can sell the energy produced by the turbines at a higher rate than it costs to buy energy from the school's local provider.

#### Educating the next generation

The scheme also has educational benefits for the school as each wind farm will be linked to both the building energy management system and the school's computer network so that the pupils can see – in real time – the energy output from the school, the amount of energy generated and how actions such as turning the lights off can affect energy consumption. Webcams showing live pictures of the wind farms will also allow the pupils to see how the energy output of the turbines is affected when the wind speed drops.

The wind farms are expected to last for at least the term of the 25-year deal, and in that time MITIE will maintain the turbines and deliver facilities management in the schools, implementing energy management programmes to encourage and educate on the efficient use of energy. When the wind farms reach the end of their life they will either be dismantled and the land restored, or new wind turbines will be erected in their place.

The scheme is still in the planning stage with suitable locations and planning permission to build the wind farms being sought; however they will be operational before the first three schools open in November 2010.

It is hoped that the success of this unique scheme will be a model for future BSF programmes, and ultimately enable it to transcend from the public to private sector and help the delivery of micro generation schemes across the UK.

