

# Low Carbon Schools for the future

## Solutions beyond “Building Schools for the Future”



*Richard Berry - Director  
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Whilst the Government Building Schools for the Future programme may have been brought to an unceremonious close and the impact of the Government Spending Review is about to bite, there are still opportunities to make real changes in schools; to reduce energy use, lower environmental impact and save on operational costs. Richard Berry from Climate Change Solutions reviews the ways in which schools can help themselves and use alternative resources to improve their environmental qualifications.

### Background

The Schools sector accounts for approx 2% of the greenhouse gas emission in the UK and 15% of Public sector emissions. The Climate Change Act requires that the UK reduce its emissions by at least 34% by 2020 and by 80% by 2050, below 1990 levels. This is no mean feat particularly as energy use in schools has increased since 1990, a sizeable portion of which was due to the increased use of ICT. For schools to play their part, the previous government proposed that the target reduction for schools should be an ambitious 53% against current emissions. Although this strategy relied on major building works, there are still a wealth of other approaches that can have a major impact.



From a greenhouse gas emissions perspective, the largest contributor from schools is due to the energy use in the school buildings. Other contributors include travel to and from school; companies supplying goods and services to schools; and waste. The energy use in school buildings has seen a 24% increase between 1990 and 2006, this included a 31% increase in electricity.

Major capital investment programmes will still be needed to meet the overall proposed emissions challenge, nevertheless, there are still a number of small cost and lower profile actions that can be taken. Furthermore, now that local councils are registered as part of the Carbon Reduction Commitment energy efficiency scheme, they have an added incentive to support energy efficiency within all public buildings.

The key principles on reducing emissions remain the same: use less energy; use energy wisely and where possible use renewable sources of energy. Since March 2010, schools will have had a School Travel Plan in place with actions to reduce the emissions from cars, however once at school there are a great number of behavioural changes that can make a big difference in the energy used in the school itself.

### Behavioural change doesn't cost a penny

The foundation of behavioural change is knowledge. Schools have taken great steps in educating pupils on climate change, the human contribution and possible consequences. Many have gone further by bringing climate change home to pupils through engaging with them in what can be done locally both at home and at school. Others have identified projects for pupils that assess the schools environmental impact and look to identify ways to better manage and reduce energy use.

There are a plethora of actions that can be taken and many useful websites and agencies to provide advice. However, the key to get things moving is leadership and engagement to raise awareness and promote participation. Schools can set up 'Eco clubs', 'Green teams' or 'Energy Efficiency committees'. These have empowered teachers and pupils to take responsibility, recommend actions and then take ownership to implement them. Head teachers and local authorities need to provide support and guidance to help remove inhibitors to change and encourage those

### 7 Steps to Behaviour Change



*Robinson 1998*

who are passionate about the environment and sustainability; staff, pupils, school managers, site services, parents and governors, to spend time working together to develop energy efficiency strategies and plans.

Outside of school, other agencies and programmes that provide guidance include the Carbon Trust, the ECO Schools programme, the European Carbon Detectives programme and various commercial and third sector support organisations.

### Low cost energy efficiency

Keeping a large school building warm in winter and cool in summer is dependent on 3 key factors:

- How well the building is insulated,
- How efficient the heating system is, and
- The temperature difference between inside and out.

Energy Efficiency Rating		Current	Potential
Very energy efficient - lower running costs			
(92-100)	A		
(81-91)	B		
(69-80)	C		73
(55-68)	D		
(39-54)	E		
(21-38)	F	37	
(1-20)	G		
Not energy efficient - higher running costs			

Whilst it may be at the less exciting end of the energy efficiency opportunities, insulation is still the most effective way of reducing energy waste through heat loss. Thus it is worth reviewing a possible increase in the level of wall and roof insulation and implementing a plan to eliminate drafts. There may be hot and cold spots around the building wasting heat, that if located can be easily corrected. Creating a pupil owned project to monitor and measure energy use in different zones can help identify key energy use areas, provide validation for business cases and involve pupils in ‘real life’ projects.

Ensuring that the heating system is efficient and that the building energy management system is used effectively and flexibly is vital to ensure that heating and cooling are provided to the right areas of the school at the right times. Regular reviews to ensure that the building management system operates in harmony with the school timetable and curriculum should limit the requirement for any localised heating or cooling and reduce energy costs.



Furthermore, subject to ensuring that comfort is maintained, a one degree reduction in internal room temperature could reduce heating bills by approx. 8%, both from lowering the energy demand and reducing heat loss.

Other considerations should be made to use timers and lighting sensors that switch lights off when there is enough daylight. In addition, building/facilities managers are encouraged to work closely with the head teachers to ensure that the building energy systems work optimally to complement natural light and heat, and install sensors in to rooms used infrequently to switch off equipment, heating and lighting when not required.

In order to be able to reduce emissions and energy spend it is important to measure, monitor, publicise, educate, inspire and adapt. One useful first step to start the journey might be to invite the Carbon Trust to carry out a free on-site energy survey.

### Smart technologies for smart schools

As the school moves from reducing energy use, through using energy more wisely, to using renewables, there are a number of options that schools should be aware of and consider as part of their strategy on reducing emissions.

### Renewable heat incentive

With the new renewable heat incentive (RHI) planned for 2011, this Government scheme is aimed at supporting a range of renewable technologies. Incentives will be in the form of tariffs that encourage the take up of renewable heat energy systems to offset the investment and subsequently provide a reasonable rate of return.



Schools could benefit from this by replacing ageing fossil fuelled boilers with biomass boilers, air and ground source heat pumps and/or generate hot water by installing solar heating on south facing roofs.

### **Generate own supply – Solar PV**

In April 2010 the new feed in tariffs came into force with the government providing incentives to individuals or organisations to generate their own electricity. In order to avoid the initial capital outlay, British Gas have announced that it is to give £15m of free solar panels to British schools. The company is intending to donate and install solar in up to 750 schools. This could reduce their electricity bill by around 20%. The company advised that the income generated from the feed in tariff would be used by the company to reinvest into providing solar panels to other schools.

Where schools do not achieve selection or may have sufficient funds to install similar sized projects themselves, they could see a revenue return from the feed-in tariff of between £40,000 and £85,000 over the 25-year tariff period, This would include not needing to purchase some electricity from their supplier and also be dependent on the size of the solar panel array.

In addition, natural cooling systems could be considered in lieu of energy hungry air conditioning units. Using such systems based on evaporative cooling or passive ventilation would also significantly reduce energy costs.



### **CHP and Energy Service Company agreements (ESCO's)**

On a larger scale and obviously requiring sizeable capital investment, there are opportunities for schools to work with their local authorities to upgrade ageing heating systems and utilise more recent technologies such as Combined Heat and Power (CHP). These systems provide both heat and electricity, and whereas with traditional electricity generation the heat energy is wasted, CHP isolates this heat for local use. For larger scale systems schools may be able to integrate into a community heating systems. These systems can provide overall energy efficiencies of 90% and if they are combined with sustainable fuels such as biomass it can provide community heating that has a minimal carbon footprint. In order to manage such a community power supply and distribution network, including fuel supply, Energy Services Companies (ESCOs) can be set up in partnership with local authorities and communities making use of the energy supply companies expertise, management and experience.

### **In conclusion**

Leadership, time and resource are often the biggest inhibitors to making changes, however, by using local authority energy and asset management teams or, where identified, Carbon Reduction officers, Energy companies, Government sponsored advisors such as the Carbon Trust and the wealth of enthusiasm that can be tapped into within the school, many of the barriers can be overcome. This will lead to a more energy efficient, less costly and low carbon school of the future. You are not alone..

For more information, support and links to relevant advice and guidance described in this article visit [www.Climate-change-solutions.co.uk](http://www.Climate-change-solutions.co.uk)

## References and Resources:

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2. ECO Schools website - <http://www.eco-schools.org.uk/>
3. Dept of education Sustainability initiatives:
  - a. <http://www.education.gov.uk/schools/toolsandinitiatives/casestudies>
  - b. <http://www.teachernet.gov.uk/sustainableschools/> (Useful advice from previous government website).
  - c. [http://www.teachernet.gov.uk/sustainableschools/about/about\\_detail.cfm?id=213&levelselected=3](http://www.teachernet.gov.uk/sustainableschools/about/about_detail.cfm?id=213&levelselected=3)
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5. Centre for research, education and training in energy:  
[http://www.create.org.uk/schools/teachers\\_semanagement.asp](http://www.create.org.uk/schools/teachers_semanagement.asp)
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[http://www.esta.org.uk/RESOURCES/CASE\\_STUDIES/Case\\_Studies\\_Educaiton.php](http://www.esta.org.uk/RESOURCES/CASE_STUDIES/Case_Studies_Educaiton.php)
7. Carbon Trust advice for schools - <http://www.carbontrust.co.uk/cut-carbon-reduce-costs/products-services/sector-advice/pages/schools-2.aspx> and  
<http://www.carbontrust.co.uk/publications/pages/home.aspx>
8. Renewable heat incentive - <http://www.decc.gov.uk/en/content/cms/consultations/rhi/rhi.aspx>
9. British Gas solar panels for schools. to register go to <http://www.generationgreen.co.uk/solarpanels/>
10. Sustainable energy without the hot air – David M J MacKay, UIT Cambridge, England ISBN 978-0-9544529-3-3 and <http://www.withouthotair.com/download.html>
11. Energy Saving Trust: <http://www.energysavingtrust.org.uk/business/Business/Local-Authorities/Non-domestic-emissions/Schools>.

