

PARTNERSHIP



ISSUE 14

ROLTON GROUP
ENGINEERING THE FUTURE

The storm is gathering...

Fossil fuel stocks are dwindling across the world,
energy has become a political weapon,
the cost of energy is rising,
the climate is changing, and
UK energy reserves are running out.

So what happens next?



.....inside:



Rolton Group is an award winning multidisciplinary professional engineering practice that is committed to high-quality innovative solutions that contribute to the success of clients and the development of its own people. Partnership is our twice-yearly review for clients and staff. The publication takes its name from the partnering approach we use with our clients and our staff.

POINT OF NO RETURN

The public debate on climate change has left us with two sides to the argument: those who are concerned - and those who are in denial.

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Moving beyond the tipping point...

In his book *The Tipping Point*, author Malcolm Gladwell described the phenomenon by which trends and ideas can begin very quietly, and then suddenly gain a momentum of their own until they become publicly accepted. One of the interesting side effects of the book was that its title was immediately accepted into the language.

The idea of man-made climate change is clearly a concept that has found its own tipping point. The question that we all face is whether the environment reached its own tipping point, before public opinion became aware of the problem. In short, are we too late to fix the problem. Despite all that has been said, and the state of denial, that can be seen in those who argue against the man-made climate change, there is no doubt in our minds that this is a very serious issue.

Even allowing the threat of global terrorism, global warming is increasingly recognized as the greatest threat to the future of the planet and its occupants. The position of those who argue against this concept is reminiscent of the debate that surrounded the health and safety

debate around smoking. It was more than 50 years ago, that Professor Richard Doll, clearly demonstrated the links between smoking and lung cancer. Yet it took almost 49 years from the publication of his initial report to the introduction of a smoking ban in public places in England.

The debate about the implications, and even the existence of man-made climate change carry echoes of the original smoking arguments. Not all of those who propound the idea of man-made climate change are agreed on its causes or its effects. Those who oppose the idea seize upon these gaps, to promote their own beliefs. At the same time, there is a powerful lobby, financed by vested interests (often flying under flags of convenience as research bodies) who seek to delay or confuse the arguments.

More than ever, there is a need for clarity and rational balanced debate. There has been an enormous amount of hysteria, and bad science that has littered the debate and made it hard for the intelligent layman to understand the implications of the problem. Because we believe that man-made climate change is the

greatest issue facing us all, this issue of Partnership is devoted to the debate and its implications, particularly the provision of sustainable energy and the need for joined-up thinking in the way we approach the problem.

Clearly, public opinion has reached a tipping point. Climate change will continue to affect away that the built environment is created around us. As we show in this issue, there are implications for planning, business and residential development, the retail sector, manufacturing industry, and above all for our futures.

Every major high street retailer now has a policy on the reduction of its carbon footprint. Every council in the country is under increasing pressure to recycle more and more domestic waste. New legislation is changing the way that buildings are designed and built, and the way that waste from developments is disposed of and recycled. We have been helping to shape the built environment for more than 25 years. It's in the interests of the next 25 years that we have made this contribution to the debate for our clients, partners and people.

The perfect storm calls for a new look at the cost of energy

IT IS fairly easy to pinpoint the moment at which a groundswell of unease about energy supplies, climate change, pollution and damage to the environment stopped being a concern and became a real cause of worry.

And that was when we came face to face with the understanding that we could no longer take the idea of cheap energy for granted. In fact, we couldn't even take the idea of a guaranteed supply of energy for granted. It took a while for the penny to drop but we were not alone. Most of us have been caught napping as the world has altered around us and changing conditions have come together to create a damaging combination of circumstances that will change the way we think about energy.

Peter Rolton, CEO of the Rolton Group is one of the few who hasn't been surprised. When he isn't running a multi-disciplinary, professional industrial engineering construction consultancy practice, he works in an unpaid capacity as an advisor to the UK Government on sustainable energy as a member of the Renewables Advisory Board (RAB), which reports to the new Department of Energy and Climate Change (DECC) headed up by Secretary of State Ed Miliband. He has worked for RAB for the past two years. The RAB advises the Government on a wide range of renewable energy issues. The board is an independent, non-departmental public body sponsored by DECC.

The RAB brings together government departments, the renewables industry and the unions. It aims to develop mutual understanding of the key issues for the industry - like technology development, barriers to market penetration, and export enhancement - both in the short term and over the next 20 years. He is a member

Public concern about climate change is clouded by a lack of understanding of just how complex, in reality, the problem really is...

of five work groups at the RAB and is the leader of two of them.

Rolton's message is clear and concerning. He sees five key issues combining to make what could be a 'perfect storm' with dire consequences. The five key issues are:

- Reserves of fossil fuels
- Security of supply
- Affordability of energy,
- Climate change question, and
- Taxation

The only lifeboat available to us in the face of this storm is sustainability.

Reserves of fossil fuels are declining. In 1960, estimates of reserves stood at 40 billion tons – about 40 years given the rates of consumption prevalent then. However, since then another 142 billion tons have been discovered. Discoveries are continuing but it's a finite resource. We don't know when fossil fuels will run out but we do know that it will happen. According to OPEC, there are 80 years of oil reserves left, at the current rate of consumption.

Energy became a political weapon in the 1970s. After the Yom Kippur War in 1973, Arab countries stopped supplying oil to countries in the west that had supported Israel. The Government issued coupons and at one point the UK was within two weeks of petrol rationing. It was clear that the plentiful supply of cheap energy could never be taken for granted again.

Fast forward 33 years and the United Kingdom had become a net importer of gas. North Sea reserves are expected to run out by 2017. Gas will be imported

via existing and new pipelines in liquefied form from the Netherlands, Russia, Malaysia, Qatar, Egypt and Algeria.

Given an adequate diversity of supply, no single country should be capable of holding the UK to ransom. However, it's easy to see in any kind of political unrest in one or other of the suppliers could still cause significant disruption across the globe. As far as oil is concerned, the UK has about 14 years with the supplies in the North Sea. After that, all oil will have to be imported, along with all our gas.

For a long time, lulled into a false sense of security by its North Sea reserves, the UK did little to investigate alternative energy sources – but much of the rest of Europe did. In Sweden, for example, 97 per cent of new dwellings are built with ground-source heat pumps. Sweden's electricity sector is currently powered by three fuel sources (hydro power 55%, nuclear 39% and thermal 6%).

Anyone who has looked at a recent utilities bill will know the bad news: fuel prices have mushroomed up in the last year or two, with costs rising by more than 26 per cent from the end of 2005 to the end of 2006 alone. The really bad news is that the UK has one of the lowest priced gas and electricity regimes in the EU, and that energy prices are still set to rise above inflation. In the UK in the past year, energy prices have risen twice as fast as the European Union average, according to latest figures. Gas and electricity prices in the UK rose by 29.7% in the last 12 months compared with a 15% increase for the EU.



Within 14 years the UK will be completely dependent on imported oil and gas

4.4 million UK householders live in fuel poverty - A rise of 50% in five years

2.5 million pensioner householders live in fuel poverty - A rise of 50% in just four years

Gas and electricity prices rose by 29% in the UK in the last year

In the last 20 years a new term has been added to our consciousness: fuel poverty. A household is said to be in fuel poverty if it needs to spend more than 10 per cent of its income on fuel to maintain a satisfactory heating regime. Those on low incomes are more susceptible to fuel poverty as their income tracks generally baseline inflation. According to Energywatch, there are currently nearly four and a half million households in the UK in fuel poverty. The charity Age Concern says that half of those are pensioners and that the number of pensioners living in fuel poverty has doubled in the last four years. Fully integrated renewable energy is an effective way of protecting against fuel poverty, because once the additional capital cost is overcome, the energy is cheaper or free.

Where the energy will come from is another question. Peter Rolton believes that it is wrong to expect that the obligations of the recent Code for Sustainable Homes and its emphasis on carbon neutral homes will provide the answer to the UK's obligations for sustainable energy (see Cracking the Code on page 19). What is needed, he says, is a hierarchical approach in which housing development provides as much sustainability as is practicable but that there should also be a hierarchy of energy provision with local authorities taking a lead by using biomass as a source of power generation to provide cheap heat and power and eliminate the need for noxious landfill. These issues are explored more fully in articles on page 14 (Spelling the end for landfill) and page 25 (Bigger is better for biomass).

CLIMATE CHANGE

He sees two impacts of climate change: economic and environmental. For example, a rise in temperatures of two to three degrees Celsius could reduce global economic output by 3 per cent. A five-degree rise would bite much harder with



A river runs through it: York city centre comes to terms with the changing climate.

up to 10 per cent of global output lost, with the poorest countries it hardest. In the worst-case scenario, global consumption per head would fall 20% and the world economy would stall. The effect on the environment of such levels of warming are Biblical in their proportions. If current levels of emissions are not reduced, greenhouse gases could double their pre-industrial level by 2035.

This would cause a global average rise in temperature of 2.5°C. If left unchecked this could rise to 5°C by the end of the century - the equivalent to the change in temperatures from the last ice age to today. Melting glaciers would increase flood risk leaving 200 million people permanently displaced, crop yields would decline, up to 40 per cent of species could face extinction and extreme weather patterns would increase. Taxation as a way of driving higher environmental performance in new homes has so far failed to create much change in the built environment.

Says Peter: "Stamp duty and tax relief worth up to £15,000 are only available for a newly built zero-carbon home at the first point of sale. There is a need for far stronger incentives for the existing built environment to motivate individuals and business. The strategy so far has been all stick and

little carrot. This just won't work with homeowners, as the donkey has a vote."

The vision is to achieve a clean grid, powered by a combination of power from different sources: wind, wave, tidal, biomass, and nuclear; supplemented by renewable power sources embedded in communities outside the Renewables Obligation mechanism. Peter Rolton is in no doubt that achieving some of the targets for sustainability will be a tough job. But as a father of three young children he sees a need for his generation not to be seen as the ones that sold the family silver, leaving nothing behind for those that follow. His original calling as a Building Services Engineer gave him a deep understanding of the relationships and trade-offs between energy, cost and aesthetics. Turning that skills and experience to helping equip the UK with viable supplies of sustainable energy sees him working on the largest scale of all.

"You can't turn on the radio or the TV without listening to items about climate change and sustainable energy. There is a lot of confusion out there because very few people understand the complexity of the issues involved. A lot of my work is about setting out the parameters of the debate and inviting others to get involved. We have to make a difference. We have no choice."

Andaz Hotel, London



Mission accomplished, as old meets very new...

THE REDBRICK Victorian exterior of what was known for 123 years as the Great Eastern Hotel, alongside London's Liverpool Street Station was a prominent landmark on the eastern side of the city.

Since the turn of the millennium, the hotel has undergone a period of change. The hotel had assumed an air of faded grandeur before its first major facelift. This was a £50 million refurbishment, under the guidance of co-owner Terence Conran and led to the hotel playing a prominent role in the renaissance of Old Street and the surrounding area.

Today the Great Eastern is no more. Now part of the Hyatt Hotel chain, it's known as the Andaz and after a three year refurbishment costing a total of £70 million has restored many of the original Victorian architectural features, and introduced a bold, contemporary aesthetic. The hotel includes 267 bedrooms, 12 private dining and event rooms, four restaurants, four bars and a gym. Room prices start at around £400 a night.

The Andaz's architectural and historical credentials are impeccable, so the brief to work on the redesign of the project came with some responsibility. The hotel, which opened its doors in 1884, was designed by Sir Charles Barry and his son, also Charles Barry. Sir Charles designed, among other things, the Houses of Parliament, the Trafalgar Square precinct, the Treasury Building in Whitehall, the Reform Club, Highclere Castle and the Royal College of Surgeons. Not to be outdone, three of his four sons variously designed the Royal Opera House in Covent Garden, Dulwich College and park, and Burlington



House (the home of the Royal Academy). The other son in this prodigiously over-performing family, Sir John Wolfe-Barry, was the engineer for Tower Bridge and Blackfriars Railway Bridge.

Rolton Group's Kevin Smith was involved in the £50 million refurbishment of the hotel ten years ago. Coming back to the hotel to work on the refurbishment for Hyatt he was aware of the challenge facing him. He explains: "From the outside, the Andaz looks like a Victorian hotel. However, our brief for the new design was clear. Hyatt was keen to create a non-traditional, design-focused living space that is more like a home than a hotel. For example, there are no front desks at check-in, no separate concierge desks and no receptionist. Guests are checked in via a Tablet PC and treated on a one-to-one

basis -all members of staff are guest serving, and without title, from general manager to waiter.

The Rolton team's first role was to conduct studies on replacing engineering systems with more energy efficient ones. For example, the hotel's toilets use 80 per cent less water; a computer-controlled boiler reduces energy consumption by a quarter; and the guest rooms all have intelligent lighting systems.

Later parts of the assignment included designing the mechanical and electrical systems for a refurbished and remodelled gym in the basement and the designs for the creation of a new state of the art

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Twenty-first century style in a nineteenth century building, combined with state of the art energy saving features...

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private dining room, in what had previously been a private club within the hotel.

"Creating a hotel that represents the epitome of twenty-first century style, within a nineteenth-century building presented a demanding brief. Achieving this while reducing the carbon footprint of the operation probably made the assignment unique," says Kevin.

"The refurbishments that had been carried out for the millennium were beautiful, but decorative features such as dark cherry wood veneers had undoubtedly started to look a little dated. And of course, the controls in things like lighting have moved on a great deal. Ten years ago the fashion was for things like Halogen and compact fluorescents. We're now looking at LED as the preferred form of decorative lighting – and of course they are much more energy-efficient, which helps a lot.

"The people using the facility are used to a certain style and ambience and from our point of view, we had to preferably exceed those standards. At the same time, the client wanted to reduce their energy consumption and lesson their carbon footprint. Working within an old Victorian building meant that our options are limited. Hotels need to be able to set the scene for clients and light bars and restaurants in the right way.

"They want different lighting levels during daylight, dusk and evening so they want dimmable lighting systems. Despite the fact that most modern energy systems don't lend themselves easily to that sort of dimming facility, we had to design a solution that worked. We were looking for the 'wow' factor," he says.

The result of it all, as our pictures show is a case of mission accomplished.






The hotel features a stunning combination of traditional and state of the art design with a mixture of traditional, contemporary and natural lighting.



The town of the future...

Changing the way we live and work



NEW ENERGY legislation is set to change the way we all live and work. And with the government committed to creating new homes throughout the UK, the construction industry faces a challenge to meet the demand and comply with the law. So what will the changes mean?

By the year 2016 all new homes in the UK will have to comply with a stringent energy requirement known as Level 6 of the Code for Sustainable Homes. That requirement calls for a level of energy efficiency rarely achieved anywhere in the world.

Written in terms that an engineer would understand, Level 6 requires a heat loss parameter of $0.8 \text{ W/m}^2 / ^\circ\text{C}$. In layman's terms, it means that a three-bedroom house must be kept at 21 degrees at an outside temperature of minus 4° , heated entirely on one-and-a-half bars of an electric fire. This is a hugely demanding target that has never been achieved in Britain, and is rare in the rest of the world. Canada has its Super E standards and in Germany there is a voluntary standard called Passivhaus. However, in the last 12 years only 6,000

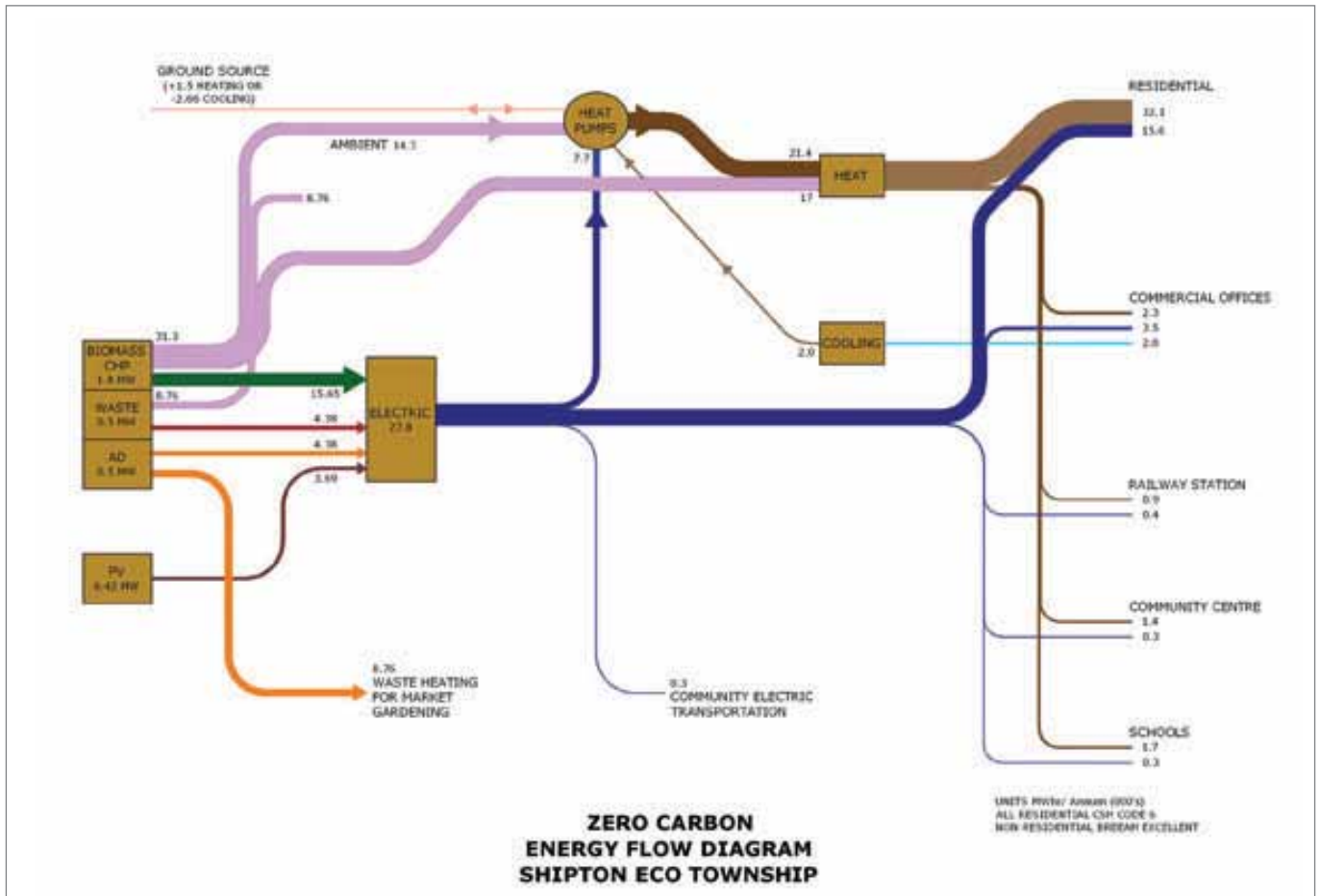
Legal obligations are forcing the construction industry to change the way that it will work. The implications will be seen in all aspects of our everyday lives - and the changes are coming sooner than you might think.

Passivhaus-compliant structures have been built in the entire world. This is the benchmark that the UK is committed to achieving across all its new housing stock in just eight years' time.

At the same time, Britain is working towards another target, for renewable energy. By 2020 the UK must generate 20 per cent of its energy from renewable sources. We currently lag a long way behind the rest of Europe in our use of renewable energy so there is much to do. For example in 2005 the UK was at a little over two per cent, which put us ahead of Luxembourg and Malta – and behind everyone else in the EU including Sweden (40%), Latvia (35%) Finland (28%) and Austria (23%). In terms of percentage improvement, the UK has more to do than any other country in Europe to hit its renewables target.

In the next few years, these two legally binding obligations to improve energy efficiency and to increase the use of renewables will change the way that we live. And while there is a genuine level of public concern about the environment and an understanding that everyone can help, the truth is that the task we face is beyond the control of anyone on a behavioural level. It will call for an integrated effort between academics, government, planners, engineers and construction professionals. So what will the town of the future look like and how will it work?

Working for Kilbride Properties Rolton Group provided the engineering and energy input into the plans for a new Eco Town near Oxford. The team included experts from blue chip advisors on architecture, traffic and infrastructure, hydrology, land



contamination, landscaping, ecology and rail engineering.

Kilbride Group's Technical Director John Broomfield explained: "We specialise in the development of property-based infrastructure projects. Our core business is the procurement of transport based infrastructure specialising in rail. We recognise the importance of integrated and sustainable transport projects reflecting today's environmental concerns

"The scheme proposed the redevelopment of a disused quarry at Shipton on Cherwell into a town that would provide more than 5,000 new homes including affordable and key worker housing plus new schools and community facilities."

Rolton's energy strategy for the development was based on the concept of the zero carbon development. The strategy makes best use of the site's characteristics, which included an adjacent river, a high water table, an excellent electricity grid connection, and equally high quality rail and road transport links. Not surprisingly the strategy relies on the efficient use of energy from renewable resources such as biomass

and bioenergy, photovoltaic and heat pumps with back-up heating and grid connection arrangements to cover the event of a local plant failure.

The key to the energy system for the town is in its self-sufficiency and its integral fit with the surrounding natural resources. Energy consumption is minimised by design and reduced in flow by the use of heat pump technology. Power is generated from local renewable agricultural sources and from waste from the development. Power is delivered to the development by hard wire and to the grid with benefit to the local area. Co-generated heat is employed usefully where it can be delivered efficiently and in a balanced manner. Spare heat is extracted by air source heat pumps and used for the benefit of local agriculture including market gardening.

Anaerobic digestion uses the power of gases created from animal waste such as pig slurry and chicken litter. An anaerobic digestion plant would be employed for part of the development power requirement using a mixed additional feedstock of locally grown energy crops, vegetable oils and local food chain waste. The fertiliser produced

as a by-product of the process can be used locally on farmland. The strategy also called for the provision of a Biomass power station fuelled by wood straw and other suitable organic material. At the same time, photovoltaic power cells would contribute to the town's energy requirements as would ground source heat pumps which can be used for both heating and cooling.

Says Peter Rolton, who worked on the project: "It's important to understand the projected energy requirements of the development and then to create an integrated approach to energy and sustainability that draws together established technologies to create a zero carbon town.

"Our model for Shipton on Cherwell shows how it's possible to combine an array of various technologies to match the needs of a major development, not just in terms of consumption but also in terms of waste and features of the local environment such as agriculture. Legislation will have a profound effect on the way that we develop places for people to live and work, from here on in, and this strategy is a clear pointer to the way forward, where joined-up thinking is going to be vitally important."

New teaching block wins excellent rating

ROLTON GROUP provided low carbon advice and carried out the detailed design of the mechanical and electrical engineering for the Hatchcroft building, a large new teaching and research facility at Middlesex University's Hendon Campus.

The building's environmental credentials have been recognised through achieving an Excellent rating under the BREEAM Bespoke Scheme and being Commended by The Association of Consulting Engineers in their 'Engineering Excellence 2009' Awards.

The Hatchcroft building is located on Middlesex University's Hendon Campus in the London Borough of Barnet. It is the first educational building in the Borough of Barnet to use renewable energy sources for winter heating, as well as to cool the building during the summer months. Prior to development the site was

composed of a number of contrasting structures. They included a number of run down out-buildings and garages, two semi-detached brick cottages, a twentieth century single storey brick building, a prefabricated two-storey unit and the original Hatchcroft building facing The Burroughs. All these buildings were demolished, prior to construction of the new Hatchcroft building.

The site of this new low energy/low carbon building is bounded on four sides. There are university buildings to the north, 'The Burroughs' a main thoroughfare linking the A1 and A41 to the east, Hendon Grove Gardens to the west and Hendon Town Hall to the south.

In 2006, BPR Architects were commissioned by Middlesex University to design a new low energy/low carbon building for the

Hendon Campus. Rolton Group was appointed at the same time from Middlesex University's framework of suppliers to provide low carbon design advice and detailed design in respect of mechanical and electrical building services engineering. Hatchcroft is the second phase of a four-phase development programme to extend and enhance Middlesex University's teaching and research facilities at its Hendon Campus. The new building comprises part of a strategic plan to integrate a number of the university's teaching and research activities in a single new purpose-built, low-energy, low-carbon structure. The research work was previously carried out from a variety of inefficient, poorly serviced buildings on the University's Enfield campus. Teaching activities carried-out in the new Hatchcroft building include biomedical, psychology, computing science and sport science studies. This £13 million building is roughly 14



Pictures by Philip Durrant



metres high, arranged over three floors, with an overall size of 5,500 square metres. Inside there are two lecture theatres, one on the ground floor seating 250 students and there is another on the first floor for 150 students. The building includes 60 bookable, adaptable and sustainable teaching spaces that will grow, shrink and be modified as the University changes to meet evolving demands. The building has been fitted out with £10 million worth of research and teaching equipment, including a £700,000

mass spectrometer, which allows detailed information about a specific sample to be collected. There are two wings for teaching laboratories – wet labs are in the West wing and they house all biomedical academic teaching, while the dry labs are located in the East wing that faces The Burroughs. The dry labs house psychology, computing science and sport-related academic teaching. Rolton Group modelled the building using computational fluid dynamics and thermal analysis option appraisal techniques. The

building incorporates a number of low energy and low carbon design strategies identified within the LZC Feasibility Study carried-out by Rolton Group.

The efficacy of the identified strategies was iteratively tested, improved and proven through the thermal modelling we carried-out. The building is estimated to emit 22% less CO₂ than an equivalent 2006 Part L2A Building Regulations compliant building. Low energy and low carbon design strategies adopted include:

- Closed loop ground source heat pump
- Solar hot water panels
- Gas-fired combined heat and power
- Intelligent lighting control systems
- Variable speed drives on fan and pump motors
- Very high levels of building fabric thermal efficiency
- Air tightness detailing
- Thermal mass and night-time cooling

The ground source heat pump bore holes were installed 60 metres deep into the adjacent Grove Parkland ground, therefore protecting valuable green public open space amenity from future built development.

With these green initiatives, the building was assessed under BREEAM (Building Research Establishment Environmental Assessment Method) Bespoke (2006) and achieved an excellent rating.



Retail development

IKEA builds on old foundations for two new superstores

THE INCREASING reuse of brownfield sites for retail development has helped town and city centres to revitalise themselves – and it has saved greenfield land for future generations. But it's an approach that's not without its problems, as the construction of two new stores for IKEA has shown.

Rolton Group worked with the retailing giant on the structural engineering for the development of new stores in Coventry and Southampton. The Coventry store, which opened in 2007 is IKEA's first in the UK in a truly city centre location, and it called for a new approach.

The first IKEA stores in the UK were single-storey structures, usually situated on an arterial road, close to a motorway junction. The stores were sited on large areas of land with large capacity car park around the store. In recent

years the company's newer stores in, for example, Cardiff and Milton Keynes have two or three storey developments on the outskirts of cities. At seven stories tall and 35 metres in height, the Coventry store represented a whole new set of challenges. The most obvious of these was its proximity to nearby buildings.

Rolton's desk study undertaken as part of its geo-environmental site investigations identified that the proposed store would sit squarely on top of what was the site of a very old river that had been culverted and diverted many years before. The river had been historically navigable so, because it probably had archaeological remains such as piers and jetties the site would require archaeological investigations as well as the geo-environmental survey, before construction could begin

The more serious problem potentially lay in Coventry's more immediate past. Apart from London, Hull and Plymouth, Coventry suffered more damage than any other British city during the second world war. During the Coventry blitz, huge firestorms devastated most of the city's mediaeval heart. The city was targeted due to its high concentration of armaments, munitions and engine plants which contributed greatly to the British war effort. Following the raids, the majority of Coventry's historic buildings could not be saved as they were in ruins or were unsafe for use.

That was during the nineteen forties. The problem more than 60 years later lay with any bombs that had landed

but failed to explode. Ordnance specialists calculate that about ten per cent of the bombs that fell on the UK during WWII failed to function. Of those, only a fraction has so far been recovered. Rolton undertook an unexploded ordnance risk analysis to find out whether the area was safe.

Similarly, the store, in West Quay Road, stands partially on the site of a Pirelli cable works that was bombed during the war. The rest of the site stands on what was then marshland. Any unexploded bombs that dropped there could have been sunk anywhere between three and eight metres below the earth.

The first task was to carry out substructure demolition of massive foundations from the previous uses of the site. This was combined with probing the ground, at depth in all the areas where piling would be required, with sensors that measured variations in the earth's magnetic field. Such variances, typically from ferrous objects, may indicate the presence of unexploded ordnance'

Fortunately, the search found no bombs. IKEA's new store in Southampton opened in the spring. The four-storey structure houses a total of 9,000 different products and a 600-seat restaurant in 34,000 square metres of retail space.



The Coventry store now open for business. The black and white image on the far right shows the devastation of Coventry City centre on New Year's Day 1941. Near right: Clearing away bomb debris in Southampton 1940.



AD - Spelling the end for landfill?



EVERY YEAR in Britain we throw away about a third of all the food that we buy.

We buy more than we need, and throw away 2.5 million tonnes of food that we don't cook, of which 340,000 tonnes is still in date. When we do cook, we prepare too much food and throw away another 1.6 million tonnes a year.

The statistics are mind-boggling. Every day of every year we throw away (among other things) seven million slices of bread, one million slices of ham, almost four and a half million apples, 440,000 uneaten ready meals and more than a million cartons of yoghurt and yoghurt drink. That's every day.

As a nation we spend £10 billion a year on food we don't eat. And then local authorities have to spend another £1 billion a year carting it away and putting it into landfill sites where it rots down and generates ozone-depleting methane gas and leachate, a toxic capable of groundwater pollution. The amount of waste that the

Anaerobic Digestion or AD is a clean and green solution to the problems caused by the UK's massive food waste habit that sees millions of tonnes of food carted off to landfill every year.

UK produces, particularly in the domestic sector, is growing very rapidly, with little sign of this growth being brought under control. The UK's waste management infrastructure has come under increasing pressure and this situation is likely to get worse quickly as new legal requirements restrict access to landfill sites. In some areas we are running out of room in landfills. Existing capacity is only expected to last another five to ten years.

The full environmental impact of food waste in the UK is colossal. Stopping the waste of good food would avoid 18 million tonnes of CO₂ being emitted each year – the equivalent of taking one car in every five in the UK off the road.

Educating people to buy and waste less is one way to ease the problem. The other is to dispose of the waste more intelligently.

BiogenGreenfinch, a Bedfordshire-based company, has taken an existing technology, anaerobic digestion, and adapted it for use in an integrated farm-based application.

'The process takes organic waste such as that from the food-chain that is mixed and pasteurised before being added to sealed tanks which excludes oxygen. In this controlled environment, a natural digestive process is created with the help of naturally occurring bacteria. The digestion converts the waste into three separate components – methane, which is converted into electricity, heat, and a nutrient rich liquid bio-fertiliser.

The whole process has a defined mass energy balance and is carbon neutral. It provides a local energy and waste solution

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The face of the future...

Pig slurry and recycled food waste are being used to generate clean energy and reduce emissions.



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that is efficient (with less transport and energy loss) as well as generating renewable energy and a high-quality, stable and uniform fertiliser that is valuable for farming application. BiogenGreenfinch opened its first AD plant at Twinwoods near Bedford in 2006. The 42,000 tonne plant produces up to 1mW of totally clean energy per year. The site takes food chain waste from manufacturers and retailers and pig slurry from Bedfordia farms. BiogenGreenfinch is also running trials with three local authorities for the segregation of household food waste in association with the Waste Resource Action Programme. All the heat and power used in the process is self-generated.

Rolton Group worked as designers and construction managers to BiogenGreenfinch at its new AD plant at Westwood near Rushden in Northamptonshire. The plant, which will be fully operational by August 2009, will take up to 41,000 tonnes of food waste per year, which would otherwise have gone to landfill.

The plant has the potential to generate enough renewable energy, fed into the national grid, to power more than 2,000 homes. The resulting by-product will be a liquid bio-fertiliser that can be used on the arable crops on the adjacent farm fields, reducing the need for inorganic fossil fuel fertilisers. BiogenGreenfinch's Chairman John Ibbett said: "This will be the first of our second generation plants, which we are planning to roll out to other sites throughout the UK." AD is already being used as a major contributor to green energy



The integrated Anaerobic Digestion process uses food waste and pig slurry to create clean energy and bio-fertiliser.



production in more ecologically advanced countries such as Germany, where by 2010 it is expected to generate power equivalent to almost a quarter of the UK's current total energy production.

Allan Rose, Rolton Group's Managing Director, sees anaerobic digestion as a way forward. He says: "Over the next five to ten years, AD could play a critical role in meeting national and local government targets on waste management.

"An integrated process like Biogen Greenfinch's has clear advantages. It can recycle a wide range of waste and divert waste from landfill. It generates clean renewable energy and supports local and national government strategies. It also reduces greenhouse gas emissions.

Methane is more than 22 times more damaging to the environment than carbon dioxide. At the same time the system reduces the reliance on fossil-fuel based energy production and the use of inorganic fossil-fuel based fertilisers.

"Research shows that the separate collection of food waste is probably going to be the best way of diverting material from landfill and anaerobic digestion is a good environmental option for dealing with it. Discarded food can become a common source of renewable energy and an organic fertiliser for crops. Just as recycling takes rubbish and turns it into new products, the food we throw away can also be recycled, recovering energy to provide electricity and heat."

Cracking the code...

THE GOVERNMENT'S push for zero carbon housing took a step forward last summer when the Code for Sustainable Homes became a compulsory requirement. It means that all new homes have to be rated on their green credentials.

The Code measures nine categories of sustainable design including energy, water and waste that will be required for all new homes. Homes that exceed the sustainable standards in existing Building Regulations will be awarded up to six stars. A six star rating represents the hallmark of efficiency – the totally Zero Carbon Home. Those homes that have not been assessed against the Code will score a rating of nil.

The Code was developed to enable a step change in sustainable building practice for new homes. The Government prepared the Code, working in close consultation with construction industry groups and non-governmental organisations. The Code measures the sustainability of a home against design categories, rating the whole home as a complete package. The design categories included within the Code are energy/CO₂; pollution; water; health and well-being; materials; management; surface water run-off;

While the Code for Sustainable Homes may not be as tough to solve as the Da Vinci Code, it is heavy on detail and strong on obligations. Unlike Dan Brown's work of fiction there is no point in just turning to the last page to find out who dunnit, so here is a quick guide to the groundbreaking legislation.

ecology and waste. Rolton Group Director Chris Evans is an expert on the Code and has worked with clients on the design and development of projects to help them reach the highest levels. He explained: "The Code was developed using the EcoHomes Assessment System.

The Code builds upon EcoHomes in a number of ways. For example, it has introduced minimum standards for a number of categories including energy and water efficiency at every level of the Code, therefore requiring levels of efficiency in these areas for achievement of a high rating. The Code uses a simpler system of awarding points, with more complex weightings removed."

However the recent Consultation Report on the definition of zero carbon homes and non-domestic buildings has drastically revised current thinking on the percentage of new

homes that would not meet the zero carbon standard entirely from onsite renewable energy from just over ten per cent to almost 80 per cent. The Government will press ahead with its zero carbon target for 2016. However, we are likely to see greater flexibility in the use of off-site solutions, with a hierarchy of measures for meeting the zero carbon standard. For a full explanation of this approach see page 22.

The Code is closely linked to Building Regulations, which are the minimum building standards required by law. Minimum standards for Code compliance have been set above the requirements of Building Regulations. It is intended that the Code will signal the future direction of Building Regulations in relation to carbon emissions from, and energy use in homes, providing greater regulatory certainty for the homebuilding industry.

BENEFITS OF THE NEW CODE

Environmental

- Reduced greenhouse gas emissions
- Better adaptation to climate change
- Reduced impact on the environment

Home Builders

- A recognisable mark of quality
- Regulatory certainty
- Flexibility of working

Social Housing Providers

- Lower running costs
- Improved comfort and satisfaction
- Raised sustainability credentials

Benefits For Consumers

- Assisting choice
- Reducing environmental 'footprint'
- Lower running costs
- Improved well-being

To find out more about the Code for Sustainable Homes contact Chris Evans on 0870 726 0000



Getting to grips with changes in the law

THE CONSTRUCTION (Design and Management) Regulations of 2007 replaced the 1994 Act of the same name and the Construction (Health, Safety and Welfare) Regulations of 1996 to form a single set of regulations that cover health and safety of both management and site execution of construction projects.

The aim of the new regulations is to integrate health and safety into the management of the project and to encourage everyone involved to work together to improve planning and project management, to anticipate and identify hazards, so that they can be eliminated or reduced at the design or planning stage and the remaining risks can be properly managed. The legislation was also designed to concentrate effort where it can do the most good in terms of health and safety and to discourage bureaucracy.

One of the net effects of the legislation has been to increase the responsibility of the client who, as the key player, controls the timing and financing of the work. Rolton Group works with clients to provide the expert advice and support that the law now requires and we are seeing an increasing reliance by clients on our services for what are known as 'notifiable' construction projects. We work with clients by providing trained competent personnel to carry out what are known as the Duty Holders roles, including Co-ordinator, Designer

Health and safety legislation is a complex subject and the most recent changes to the law have placed additional responsibilities on the client in any project. Rolton Group Managing Director Allan Rose explains how the new legislation is affecting the construction industry.

and Principal Contractor. We also have a full design capability to support any issues, which the duty holders may encounter. We also organise and carry out surveys that may be required to fill gaps in the Pre-construction information pack

Our approach is to create a team environment for the project to ensure all parties work together to achieve a common goal of a successful and safe project.

So what is different about the new regulations? There are several main areas of change in the new legislation. They include the client's management role, the status of the client's agent, the status of domestic clients, the long-term responsibilities of the designer and the increased importance of communication and training.

CLIENT'S ROLE

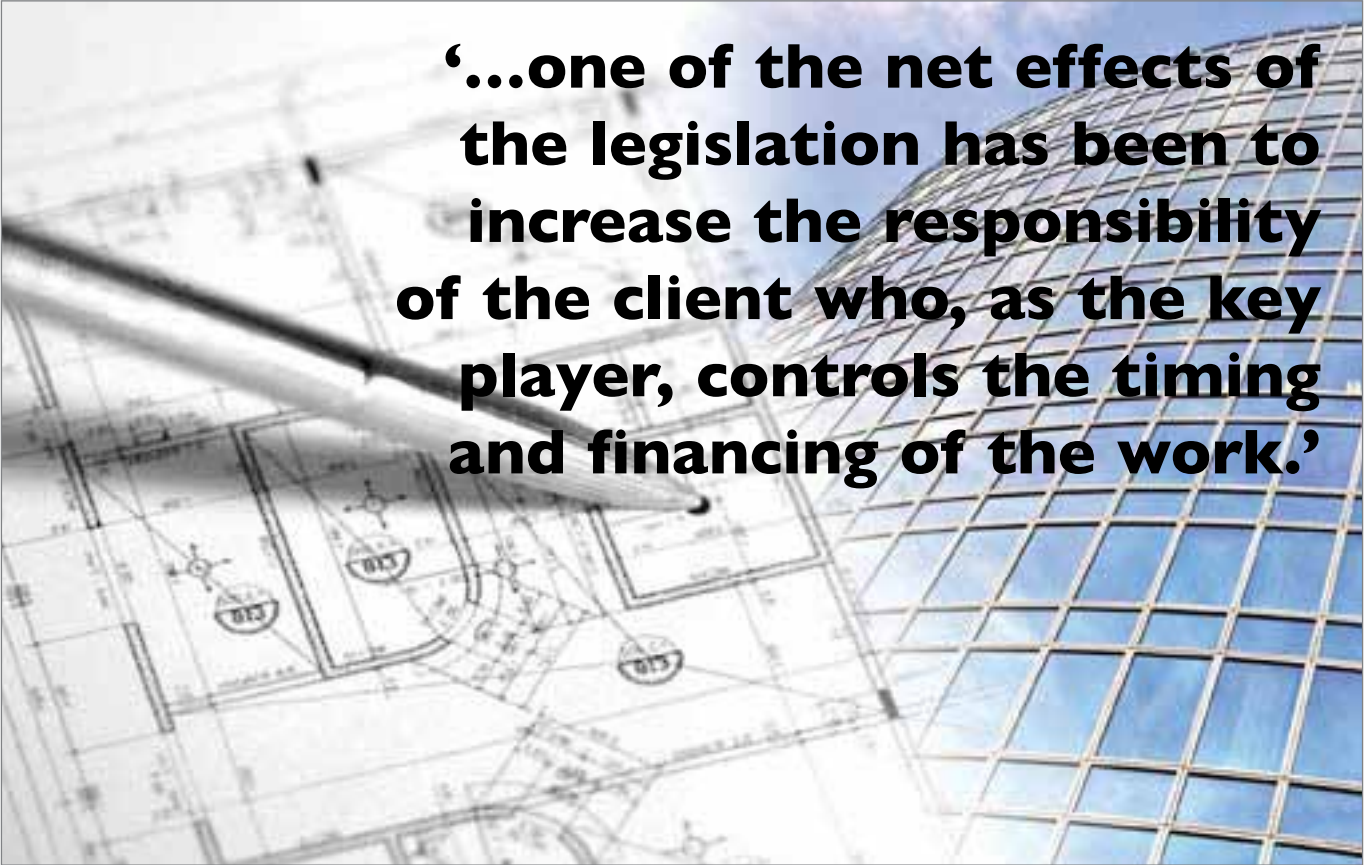
The original CDM Act in 1994 made no provision for the legal responsibilities of clients. The requirement for clients to take reasonable steps to ensure suitable management arrangements for health, safety and welfare for construction work

throughout the project is, in any event, part of their responsibilities under the Health and Safety at Work Act (HASAWA) and the Management of Health and Safety at Work Regulations (MHSWR) however the new regulations make these legal responsibilities more explicit.

The Health and Safety Executive (HSE) regarded this change as a fundamental element of the new regulations and it is seen as a move motivating clients to influence the selection of the project team and the working environment. The HSE's Approved Code of Practice says: "unrealistic deadlines and a failure to allocate sufficient funds are two of the largest contributors to poor control of risk on site."

CLIENT'S AGENT

The second significant change to the regulations has been the abolition of the role of the client's agent. In the past, a client could appoint a competent person to carry out the client role and assume the client's responsibilities under the CDM legislation. To complicate matters, the client's agent couldn't be held liable for



‘...one of the net effects of the legislation has been to increase the responsibility of the client who, as the key player, controls the timing and financing of the work.’

the client's responsibilities under HASAW and MHSWR. The HSE considered that the role of client's agent caused confusion and led some clients to retain influence over a project while shifting their criminal responsibility to another party.

DOMESTIC CLIENTS

Perhaps taking the view that you don't need a sledgehammer to crack a nut, the legislators chose to omit domestic clients from the changes included in the 2007 legislation. The 1994 Act required that domestic clients notified the HSE of their project and laid down formal designers' duties. Since 2007, the notification requirement has been removed. The HSE took view that the inclusion of domestic projects in the latest round of legislation would not have been "practicable, proportionate, politically acceptable or enforceable."

DESIGNERS

The new Act has introduced clear long-term responsibilities for the designer: Clients and designers will have to ensure that any fixed workplaces such as offices, shops, factories or schools, which are to be constructed will comply, in respect of their design and the materials used, with any requirements of the Workplace (Health Safety & Welfare)

Regulations 1992. Designers are also now required to design in health and safety for the life of a structure.

REPLACEMENT OF PS

The CDM Act of 1994 introduced the role of planning supervisor. The role of the supervisor has now been replaced by a Co-ordinator who assists and advises the client on the appointment of competent persons and ability of duty holders to control risks arising from project. It's worth noting that the new regulations have a much more stringent requirement for checking the competence of all parties involved on a project. A co-ordinator is only required, by law, on notifiable projects: those that last more than 30 days or 500 person days. In effect this could mean that a client could be left to manage complex projects without the assistance of a co-ordinator. High-risk activities such as demolition or work on contaminated land will also need to follow CDM procedures, even if the work is not notifiable.

HEALTH AND SAFETY PLAN

In general the health and safety requirements remain unchanged for the new Act. There is no need for a written plan if risks are low and the necessary precautions are well understood by those

carrying out the work. A health and safety plan may be required for high risk activities, regardless of the size of a project. It is the client's duty to ensure that construction does not start on any notifiable project until a plan is in place. The plan should be flexible enough to be developed throughout the life of the project, so that it can be adapted according to changing circumstances. The new Act places much greater emphasis on formal and regular communication and engagement with trade unions and safety representatives including:

- Formal committees or forums
- Regular consultation meetings
- Regular consultation at induction, daily briefings, and toolbox talks.
- Informal consultation such as site manager walks
- Procedures for reporting defects, deterioration in conditions or suggestions for improvement.

The new Approved Code of Practice includes a requirement for induction for all construction projects. Induction training should include risks arising from the work and others nearby, site rules, emergency procedures, the need for each individual to be responsible for reporting hazards and the identity of the person responsible for health and safety on site.

The supermarket of the future

Asda looks for a smaller, greener carbon footprint

ALTERNATIVE energy specialists Cool Planet, who are Partners with Rolton Group, are working with Asda, the UK's second largest supermarket business, as part of the retailer's plans to reduce its carbon footprint. Rolton Group along with Cool Planet undertook a technical audit of their existing stores, for the potential for alternative energy sources which may be used at those stores.

Asda has committed to radically reduce its energy usage as part of a plan to achieve a new clean and green image. The retailer has spent £16 million on its latest high-efficiency store in Bootle, Merseyside. The timber-framed store which opened in late October last year covers 40,000 square feet and boasts a host of sustainable features,

Cool Planet's role has been to develop an open loop ground source heat pump installation. There are two types of ground source heat pumps, closed loop and open loop. Both can be used for heating in winter and air conditioning in summer. In a closed loop system sealed pipes are placed either horizontally or vertically in the ground. Water (with antifreeze) is pumped through the pipes and takes up heat. This is then extracted by a heat pump and released at a higher temperature to drive a space heating system. When the system is used for air conditioning in the summer, it operates in reverse.

A typical open loop system takes water from an aquifer, extracts the heat in a heat pump and then releases the cooled water back into the aquifer. Generally, open loop systems are more suitable for large installations. Steve Gray of Cool Planet explains how the Bootle system works: "The scheme we have just done for Asda used two bore holes. If we had done that as a closed loop system we would have needed

up to 150 bore holes. Creating such a huge array would be very expensive and very time consuming. Using open loop systems has enabled us to broaden the offer we can make to clients." Part of the skill in designing and installing an open loop system lies in understanding where an aquifer is and how strong a flow of water exists. Says Steve: "It is almost the modern day equivalent of a divining stick. We need to know if there any water down there, what depth is it likely to be at and what yield will we get in litres per second. The largest yield that we have found so far is 30 litres per second, which is a lot of water. We need to understand which way the water is flowing and whether take it out with the flow or against the flow. It's a more sophisticated investigation than we would need on a closed loop system, but on larger schemes it is faster and cheaper.

Ground source energy is only one of the techniques that Asda has deployed in Bootle. The store also features recycled bricks, a recycled aluminium roof, rainwater harvesting and natural lighting. The store will be 50 per cent more energy efficient than a typical ASDA store. The store uses biomass boilers to burn wood chippings or wheat

husks to heat or chill, using a heat exchange and has sun pipes that use mirrored tubes to push daylight inside the shops.

Says Steve: "The Bootle store will use Biomass as well and Asda want to understand how these different energy schemes will integrate into this flagship store. It's a brand new supermarket and Asda's greenest to date.

"We delivered the project on time and it works well. The yield was there as we said it would be. We have since been instructed to put together a route map for Open Loop schemes by reviewing every Asda store and distribution centre as well as all the planned new developments on the UK mainland for the next five years.

"We have modelled all of those and put them into league tables under certain criteria. That has all been done and we are currently looking at two particular stores with the planned intention to carry out a retrospective fit. It is a very exciting relationship. They are very committed at Asda and we hope to help the company to deliver its aspirations."



Renewable resources

Soaring fuel prices make the case for ground source energy

IT HAS been a busy last 12 months for Cool Planet, Rolton Group's partners in renewable energy provision.

Rising prices and environmental concerns have thrown the spotlight on to energy costs as never before and raised commercial and public awareness of sustainability to a new level. At the same time, Cool Planet Director Steve Gray says that the sustainable energy industry is going through what he calls its "Wild West" phase and is some way short of maturity.

He says: "The industry has changed a lot. The level of knowledge about renewables has grown. In some forward looking companies they have embraced that and are looking to take it forward. There are companies that are coming up with strategies to do the bare minimum towards sustainability while in effect trying to deceive planning authorities by, for example, installing

things like biomass boilers just to get planning permission, even though they have no plans to use them. They are really missing the point – and in any event planning authorities do check on how these things are used after they have been installed.

"The UK has a commitment with the EU to achieve 15 per cent renewables by 2020 and as a nation we are miles behind other countries. We have a massive hill to climb. There are people still building to ten per cent in London, but London is moving towards a 20 per cent requirement for planning anyway. There still quite a lot of people with their heads deeply in the sand. But some companies and particularly the consultants are seeing the bigger picture. "Movements in Europe mean that the market in some Scandinavian countries is saturated so some of the players there are looking at the UK as market. Their presence

should help to bring prices down. Larger energy companies are also recognising the need to invest in promising and capable renewable businesses. This wild west of renewables that we are seeing at the moment will level out at some time in the future. And there will be a number of larger players emerge."

While the press has been full of doom and gloom about the economy and the credit crunch, Cool Planet's experience has not been typical. Steve explains: "The number of major enquiries coming in at the moment has, if anything, increased slightly.

They are particularly focused in the public sector around schools and colleges, such as at St John Fisher school in Peterborough where a closed loop system has been installed. Cool Planet is also currently working with Asda on a national review of all its current and planned premises (see page 20). House builders are not active at the moment but house owners who are dependent on oil for their energy are looking for alternative energy sources because prices have rocketed.

Says Steve: "I was talking to someone the other day who has a very prestigious home and he is paying £6,000 a quarter for both oil and electricity. That is almost £500 a week for energy, a lot of money. It's quite possible to see the payback on a new system when you look at costs like that. As more and more people drop off the end of fixed tariff agreements with utility companies, this problem is only going to get worse as they face a very unpleasant reality. We are seeing the same thing apply to businesses and homes at the end of fixed tariffs. "We are now getting increasing

A Mitsubishi WR2 Ground Source Heat Pump plantroom providing 100% of the heating and cooling.



continued on next page

**Corporate Headquarters for client VolkerFitzpatrick in Hoddesdon.
Below: circulating pumps for GSHP system and incoming flow and return
pipework form the closed loop ground array.**



from previous page

numbers of enquiries for large high value homes in rural or semi-rural locations. These are often heated by oil and owners are being crippled by the rising costs of traditional energy and they need a new solution. Sometimes they are doing it for altruistic reasons because they want to reduce their emissions but primarily people are doing it on price grounds."

The company has just been appointed to develop a £500,000 project for a private house in Bird Cage Walk in London. The building was formerly the headquarters of the National Trust.

The company has expanded its supply chain by focussing on blue chip partners. The company has a formal memorandum of understanding with Mitsubishi, and is also working with Colt and Eco Pumps. Cool Planet are also accredited installers for the Low Carbon Building Programme which provides grants for the installation of microgeneration technologies in a range



of buildings in the public, private and the non-profit sectors.. Steve explains: "We are currently forging a partnership with a heat pump manufacturer who can supply and fit the heat pump and help us with the initial site visit. We can then design the system, put the whole package together and install it as a cost-effective bespoke solution. We are developing a reputation for impartial

advice when it comes to equipment specification, quality of design and installation and knowledge that is warranted. We can also deliver a 100 per cent finance package through our Green Lend facility where required. In the current economic climate to be able to deliver funding is a valuable extra asset!"

Bigger is better for biomass energy plan

AS ANY fan of the Archers will tell you, biomass electricity generation is a major topic of conversation in the countryside – or in Ambridge at least. One of the plotlines in the world's longest running soap has opinion in the village divided over plans to install a power plant that converts farm and supermarket waste into power and compost.

In one regard, the Archers is not exactly at the cutting edge of the debate. Anaerobic digesters are an increasingly common fact of life. They avoid the need for landfill and the creation of harmful methane, generate clean electricity and make bio-fertiliser as a side



With an ear tuned to Radio 4, Peter Rolton argues that in the real world, there is a need for some joined up strategic thinking when it comes to the provision of combined heat and power.

product. The heat created in the process can also be piped to heat nearby residential developments, known as district heating networks. The plant provides combined heat and power, or CHP.

However, where the Archers is bang up-to-

date is on a plot twist that has seen the firm behind the plan announce that it needs to install a much larger plant than was originally envisaged. The Government recently issued a Renewable Energy Sources Consultation

[continued on next page](#)

An anaerobic digestion plant



From previous page

paper in which it asked businesses, academics, and other interested parties to give their views on the UK strategy for renewable energy.

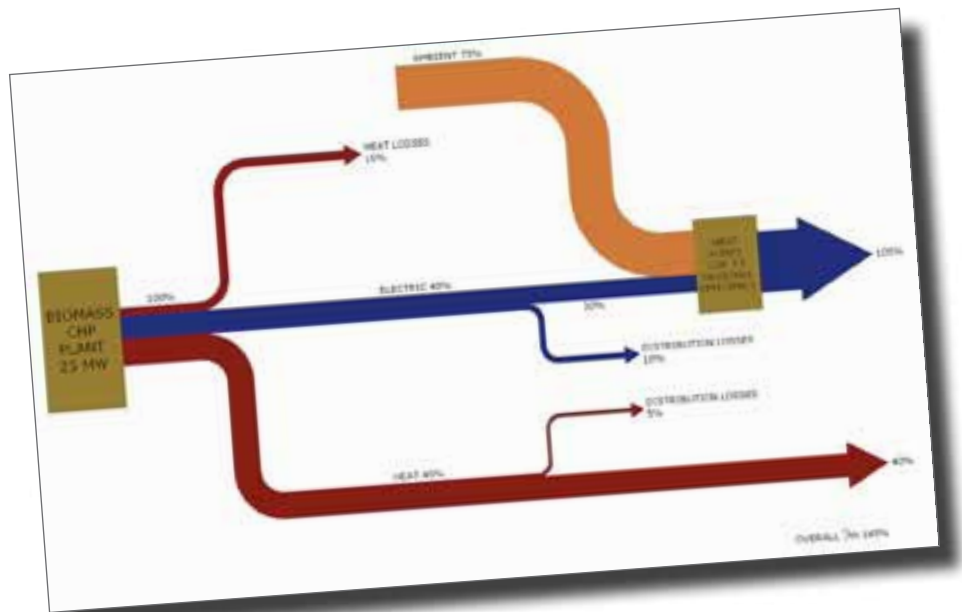
As a member of the Renewables Advisory Board I was asked to carry out a final audit of the paper before it was published earlier this year, to make sure there were no technical errors in the document.

Government's RES Consultation asks a range of questions concerning its assessment of renewable heat and CHP potentials, and how to optimise the energy use of biomass and waste resources. My view, and that of the Board is that the deployment of large numbers of small-scale biomass units in the built environment has a number of inherent problems, especially the control of emissions.

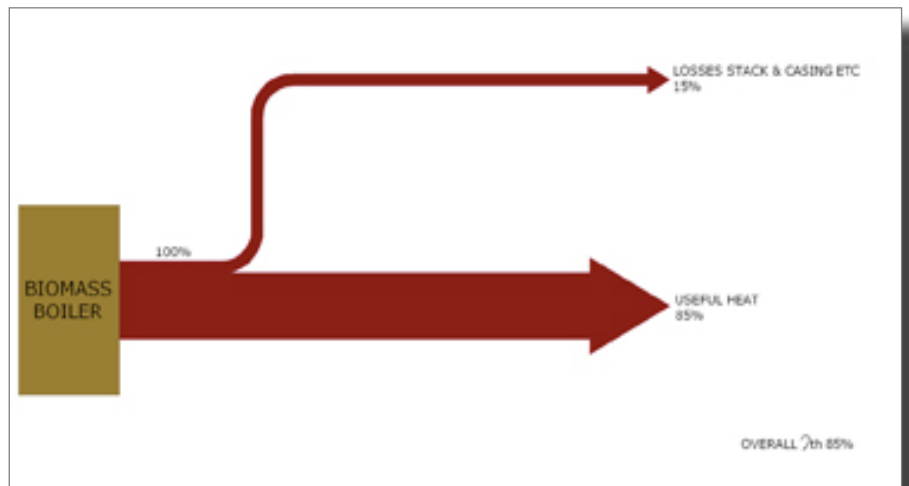
The UK is facing an uphill struggle to meet its legal obligations to increase the amount of energy it creates from renewable sources. I would like to see the use of larger-scale community CHP meeting the heat requirements of new 'zero-carbon' buildings (through the use of heat pumps) as well as the heat requirements of existing buildings through new district heating networks.

We see six key principles supporting this vision:

- The delivery of the maximum amount of renewable energy from a given input of biomass fuel.
- The enablement of funding for district heating networks.
- The delivery of zero carbon homes and commercial buildings without uneconomic and technically difficult on-site generation.
- Leaving home and business users free to shop for their energy in the commercial market..
- Reusing brownfield sites with existing good grid connections.
- Ensuring maximisation of community benefit from the construction of renewable energy facilities.



These two Sankey diagrams use the thickness of the arrows to denote the size of the energy flow, while the differing colours denote different types of energy. The top diagram shows how a municipal CHP biomass system allied to heat pumps generates huge additional efficiencies over a small standalone system, see below.



Our proposal is that biomass fuel both in its wood and SRF (solid fuel created from processed waste) should be directed towards municipal scale generation, typically with a power output of 30 to 50 mW.

The Code for Sustainable Homes, introduced as a legal requirement in May, sets out standards for the energy efficiency and environmental impact of homes in England. Code 6 is the highest level of efficiency under the scheme and its Zero Carbon Definition requires the either on-site generation or connection by private wire of sufficient power to make the entire development carbon neutral including the

appliance load.

The experience of prototype projects developed for English Partnership's Carbon Challenge Programme has shown how exceedingly difficult and costly this is.

This problem is further compounded by the lack of availability of biomass CHP technology in the sub one mW range, unless one uses liquid fuels. This is due to the technical difficulties regarding the thermal dynamics of steam generation at less than one mW.. Furthermore the requirement for road transport to be 10 per cent renewable by 2020 is also

‘The numbers involved make for a compelling argument in favour of the kind of integrated approach that comes from joined-up thinking.’

likely to place the deployment of liquid biofuels in this sector as a priority, with a consequent upward pressure on prices. Our proposal is to require developers of new build residential and non-residential to continue to build buildings to higher standards of energy efficiency and air leakage and, as appropriate, to install micro generation technology such as ground or air to water heat pumps, solar thermal energy or photovoltaic cells to the extent that is practically possible within a given development.

However, for a true zero carbon definition, a proportion of the energy requirements, typically the electrical appliance load of the building and a residual proportion of the building energy load will be uneconomic or technically impossible to cater for in or on the development - a fact recognised in the latest Government consultation paper on the definition of zero carbon homes. This load would then effectively be offset by way of payment.

The payment would be collected by community infrastructure levy, or CIL, via the planning process. The calculation for payment would be based on the level of carbon neutrality that was being achieved by the developer and payment would be set to ensure that it was still preferable for the developer to do what is practically possible on the development and not just opt out entirely by way of payment.

The local authority in each area would be required to produce a full Energy Strategy that would identify appropriate locations for the construction of biomass CHP plants. Typical locations would include former brownfield sites with grid connections that once housed manufacturing facilities or locations next to high heat sources such as swimming pools, hospitals and town centres,

and areas with large-scale poor quality social housing.

Within the Energy Strategy each location would be properly assessed and a cost plan developed for the plant and most importantly for a heat network off the plant.

The cost of the heat network could be used to set the tariff for the CIL infrastructure payment. It is not anticipated that the CIL payment would be needed to cover the costs of the CHP plant, as the plants themselves are commercially viable given the level of government subsidy under the Renewables Obligation Certificate scheme.

Local Authorities could become joint venture partners with commercial operators and retain a financial interest or they could simply outsource the provision. Arrangements could also include splitting the ownership of the plant and the connected heat network.

These plants are commercially viable without any value for the heat being sold. As such it should be possible to enter into highly beneficial financial arrangements for the provision of the heat at a price attractive when compared with the alternative provision of heat generated by other means.

The consultation paper includes proposals for some form of incentive for the creation of heat from biomass plants. This money could be used exclusively to help with the funding requirements of the heat network. Subsidies would go a long way towards the installation of a heat network.

Our proposal would ensure that the heat from the biomass energy network is not wasted. The value of the biomass fuel would be maximised by being used to generate

electricity. This would then be used within the built environment with either ground or air-to-water heat pumps. These can be used to produce further heat because heat pumps generate four and a half kilowatts of heat for each kilowatt of energy they consume. Engineers refer to this as a COP, or Coefficient of Performance, of 3.5.

As the graphics below show, this approach is far more efficient than small-scale combustion where there is no connected heat network and no heat pump system.

Additionally, the waste heat would then be delivered to those parts of the community which could achieve maximum benefit such as hospitals, schools, swimming pools and to social housing where there is a risk of fuel poverty.

It would turn SRF, which is currently a problem for local authorities, into a valuable fuel source by recycling it to reduce their own running costs and alleviating local fuel poverty. It would also enable commercial developers to develop to a zero-carbon standard sensibly and economically whilst still achieving carbon neutrality.

The Sankey diagrams demonstrate that for 100 units of biomass burnt within a wood chip boiler the likely output would be 85 useful units of heat whilst for 100 units of biomass burnt in the model outlined above the heat output would be 145 useful units, an increase of 70%. At the same time, larger CHP units offset proportionally higher amounts of carbon for the same amount of fuel burned when they are used to run heat pumps and power local heat networks. The numbers involved make for a compelling argument in favour of the kind of integrated approach that comes from joined-up thinking. It makes you wonder what all the fuss was about down in Ambridge.



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