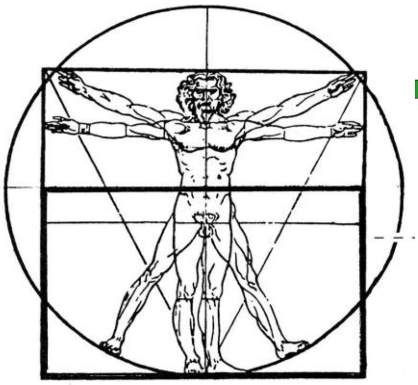
Omega Institute

Office 135 Regency House
91 Western Road
Brighton BN1 2NW

Phone: 01273-381825 (voicemail)
Mob: 07891-132574
Email: info@omega-institute.org
Website: www.omega-institute.org



Saturday 21st October 2006

by: Jim Adams, Graham Ennis

Version Ω 1.5

ENERGY SAVING AND SUSTAINABILITY PROJECTS.

INTRODUCTION.

We have been asked to provide a list of ideas (we have provided sixteen) by which Brighton & Hove City Council might enable a more sustainable environment, which we have evaluated on the grounds of practicality. Some of the ideas have significant cost benefits. Some are visionary.

We would like to thank the many members of the Labour Party and others, whose analysis, insight and constructive criticism have enhanced our efforts considerably. In particular we would like to thank Teddy Brett for suggesting projects 14 and 15, and pointing us to information on biodigesters, Tim Small for independent informal conversations leading to the appendix on wind turbines, and Roger Goodwin for sourcing extra material on photovoltaics.

We wish to begin by making some general observations and analysis in a different direction.

In our opinion, some aspects of the activities of the Environmental and Sustainability local government management of Brighton & Hove City Council have developed in dysfunctional ways.

Rather than reacting in a proactive manner to the multifaceted challenges of climate change, the increasing resources of the local government administration appear largely directed to enhancing a regulatory regime for modifying planning applications in a sustainable direction. In the environmental and sustainable circumstances concerning planning applications, this is of itself necessary, but it is *not* we believe the sole intention of the local political government, which is concerned about an active anticipatory agenda for obtaining sustainable environmental solutions, not just because of national government and EU legislation, but also because of the general perception that we are entering a period of long-term environmental crisis.

As a consequence, the politically led encouragement of democratic decision-making has sometimes been distorted by and directed towards the involvement of the public in *bureaucratic* procedures of a technical nature, rather than in the formation of goal-based decision-making and action. The public needs entry to the decision-making process, and the mode of working of local government management needs to change. Vision and innovation are lacking, and there do not appear to be procedures in place by which its formation might be enabled. Simultaneously, scientific technical expertise in local government by which such processes might be evaluated is largely absent.

The consequence is that strategic decisions taken by Brighton & Hove City Council, with its large budget, are not proactively and technically investigated to the highest standards.

We mention later in this article Allan Jones of the London based Climate Change Agency as an example to follow. He says: “I can do policy and strategy, but the advantage of having me in an organisation is that if you want it to happen, it will happen. If what is required is a paperchase, then I am not your man”.

PROJECTS.

We now present our outline (third version) attempt at a list of energy saving and sustainability projects for the city of Brighton & Hove.

<u>List of Projects.</u>

1. *Generate Some City Electricity with Powerful Wind Turbines.*
2. *Install Combined Heat and Power, as in Woking.*
3. *Install Photovoltaics, as in Woking.*
4. *Purchase Electric Vehicles for Council Business.*
5. *Minimise Street Parking Charges for Electric, Honda Prius, Lexus or Similar Hybrid Vehicles.*
6. *Structure the Streetlight Contract for Energy Efficiency Incentives.*
7. *Control Streetlights as is Implemented in Oslo.*
8. *Prepare and Implement a Business Plan for LED Traffic Lights.*
9. *Investigate the Installation of District Heating.*
10. *Install Heat Pumps in Council Flats.*
11. *Purchase a Small Bio-digester to Process School Waste.*
12. *Install Energy Efficient Light Bulbs in All Council Properties.*
13. *Install Solar Heating Panels.*
14. *An Energy Review of Public Buildings.*
15. *A Council Energy Advice Unit.*
16. *Install Swimming Pool Covers.*

1. *<u>Project:</u> Generate Some City Electricity with Powerful Wind Turbines.* Brighton & Hove City Council purchases its electricity from renewable resources. However, this is an indirect accounting exercise in which electricity is derived from non-renewable sources via the old and inefficient centralised power generation of the national grid, but the cost and payment is allocated elsewhere. It is feasible, given the political will, for the Council to purchase 'off the shelf' a Danish 850 kW Vestas V52 wind turbine and install it at the Marina together with a Sustainability Centre for visitors. Vestas engineers provide advice on the suitability and siting of their wind turbines as an integral part of their service. The cost of such a generator is about £1 million, fundable from public trusts. The generator could be connected to a local private wire Council network, as in Woking. Alternatively, now that by law EDF must allow connection for input of electricity to the grid, direct connection can be implemented. This would supply electricity needs for some of the following: local NHS hospitals, Council buildings, schools, swimming pools, libraries and other facilities, and street and traffic lights in the City of Brighton & Hove. We calculate that over 30 years this should provide £50,000 per annum in revenue to the Council. (£1.50 million.) It would also be possible at a Shoreham Harbour site to install sufficient 1.5 MW Vestas V82, or 1.8 or 2.0 MW Vestas V80 or V90 wind turbines, or, more efficiently, the 6.50 MW model, and supply all of the previously mentioned electricity consumption. If an *alternative site* were proposed, between telecommunications transmitters and receivers, which in practice is often avoided during the planning phase, if interference occurs it is relatively easily rectified by technical means. It is important to realise that most of the turbine cost is fundable from Central Government sources, via special environmental funding. Some market funding is also available, via doing the project from a public interest company, contracted to the Council, which could access these funds. The key point is that it does NOT require any drain on Council funds, but the opposite; it will contribute substantial cost savings on energy to the Council (see appendix).

2. *<u>Project:</u> Install Combined Heat and Power, as in Woking.* Combined Heat and Power (CHP) is the simultaneous generation of heat and power in a single process. It is a highly fuel-efficient technology that uses the heat – produced as a by-product of energy generation – that would normally be wasted to the environment. As promoted in Woking by Allan Jones, CHP heat-fired absorption chiller systems provide clean, cheap heating, hot water, air conditioning and electricity to its civic offices. Woking saw the installation of private-wire residential CHP systems and the first local sustainable community energy system. It also introduced a gauging network which ensured that if a building was too warm, fresh air would be allowed in automatically rather than resorting to air conditioners. The council obtained grant funding of more than half a million pounds for CHP from the Energy Saving Trust. Jones has now been taken up by Ken Livingstone in London to drive environmental issues in the Climate Change Agency. Brighton & Hove should seek out and copy these examples as provided in Woking and now London by Jones.

3. *<u>Project:</u> Install Photovoltaics, as in Woking.* Photovoltaics (PVs) are a rapidly developing technology. Allan Jones has his Woking blueprint to fall back on. His projects saw electricity generated from thousands of PV cells on roofs across the borough. Around 10% of PV cells in Britain were installed by Jones in Woking. Woking, with solar-powered parking ticket machines and wind-powered street-lamps, was lauded as the most energy efficient local authority in the UK. (see appendix).

4. *<u>Project:</u> Purchase Electric Vehicles for Council Business.* The Council has a number of small vehicles, which are used in its motor transport fleet to shuttle officials and key workers around the city. We are surprised that the Council administration does not possess a single electric vehicle. Forty years ago, Brighton council ran a completely electric trolley-bus service over the town, plus a small fleet of electric dustcarts. Vehicles such as electric milk floats were also a common sight. Brighton Council has regressed technically since then. At present, there are a number of highly efficient commercial electric vehicles available, such as the Smart EV model, which has a fuel efficiency equivalent to that of a petrol vehicle with an economy of 300 miles per gallon (see appendix). It should be Council policy to introduce a rolling program of vehicle replacement, by all electric vehicles. Public grant money is available and substantial financial savings are possible.

5. *<u>Project:</u> Minimise Street Parking Charges for Electric, Honda Prius, Lexus or Similar Hybrid Vehicles.* The council has no policy in place, as a specific project, to encourage electric vehicle usage in Brighton. Such a policy is fundamental to a Council with pretence to "green credentials". We propose (implementation by October, 2006) a project of reservation of key parking spaces in central Brighton, for sole use of all-electric and hybrid electric vehicles. The modalities of this scheme can be discussed to optimise it. We recommend, as a starter phase, 20 parking spaces, clearly painted and demarcated as for these vehicles only. We recommend they be distributed through central Brighton in pairs, on existing parking locations. All electric vehicles would be exempt from parking charges, and hybrid vehicles would get a 50% discount. Costs would be negligible, but would demonstrate green thinking by the Council.

6. *<u>Project:</u> Structure the Streetlight Contract for Energy Efficiency Incentives.* The Omega Institute is involved in detailed studies on street lighting in Brighton & Hove, and at this juncture intends to publish a report on this subject in early November. One important issue which we have not at this stage been able to resolve because of commercial confidentiality, is to inspect the street lighting contract. We believe that work should be started to ensure this contract is structured to encourage the efficient use of electricity in street lighting, and to provide incentives for an appropriate lantern and lamp replacement programme which benefits energy efficiency, reduces environmental pollution, and encourages the tapping of appropriate funding streams for this purpose. We note that Bristol City Council has investigated a 'spend to save mechanism' for streetlights. In particular, one

solution we would suggest (which requires further investigation on our part for the forthcoming report) is to replace mercury vapour streetlights by either pulsed or ceramic metal halide ones. We recommend further technical and policy proposals. Cost reductions in street lighting are possible. Public funding from special environmental funds is available.

7. *Project: Control Streetlights as is Implemented in Oslo.* Our streetlight report will contain a substantial section on the timed brightness control of streetlights, as implemented in various councils in the UK, and in particular also the '*Echelon*' computer controlled dimming system as implemented in Oslo and elsewhere, which conforms to the EU open systems *E-Streets* initiative on street lighting. We recommend this type of system for reducing streetlight energy consumption from 30% up to 50%, as in Oslo. Note that British street lighting uses extensive energy efficient low-pressure sodium lamps (which have poor illumination properties), whereas these are much less used elsewhere in Europe. The percentage scope for energy reduction is therefore probably less than in Oslo. The Oslo system reduces costs, despite the cost of the sophisticated computer system and replacement of on-off switches in streetlights by dimmable ones.

8. *Project: Prepare and Implement a Business Plan for LED Traffic Lights.* In order to progress to energy efficient LED Traffic lights as suggested in our 'Advisory Note' of 10th May 2006, a cost and carbon audit of traffic lights in Brighton & Hove is desirable, a full outline of all LED traffic light costs and suppliers needs to be obtained, and resources and personnel need to be allocated to prepare a proper business case, including savings on maintenance and including investigation of an appropriate funding model.

9. *Project: Investigate the Installation of District Heating.* We are of the opinion that a district heating scheme can be implemented in Brighton. It would require a complex set of consultancy studies, but would yield very substantial cost savings, overall. Municipal buildings would benefit. Brighton Council rejected a district heating scheme previously, proposed by Woking Council, for the Brighton Station and New England House redevelopment scheme. The University of Sussex is installing a modern, efficient 'district heating' system in its campus. The old boiler system took two days to alter the temperature for the whole of the campus to adjusted levels, making quick response to changes in the weather impossible. The new insulated pipe system is much more responsive.

10. *Project: Install Heat Pumps in Council Flats.* Modern heat pumps are about five times more effective than conventional heating, as per 'energy efficiency' (see appendix). Large cost savings can be made. Brighton officials appear to be unaware of this technology, and indifferent to its application in Brighton. Large sums of public money are therefore being wasted.

11. _Project:_ *Purchase a Small Bio-digester to Process School Waste.* Waste from schools is serviced by a separate contract. A bio-digester, (available off-the-shelf) could be bought. Also, on a larger scale, a bioreactor (see the Omega Institute Report: Brighton & Hove City Council PFI Contract with Veolia Environmental Services) could be purchased to service these and other waste disposal contracts. We note that bioreactors are scaleable, and bio-digesters are 70-year-old technology. An immediately available bio-digester would provide a substantial supply of composts for the City Parks and Gardens Department. They also supply heating gas, for school boilers (see appendix).

12. _Project:_ *Install Energy Efficient Light Bulbs in All Council Properties.* We recommend that Brighton & Hove City Council advertises 'green' solutions in its website and in various ways in which it publicises its activities, such as in *City News*, in a continuously updated manner. Promoting, for example, the use of energy efficient light bulbs, continues to be warranted, especially amongst older people, who are less likely to adopt changed energy-efficient solutions, even where there are cost benefits. It is desirable that the Council programme which provides help, for example, in changing light bulbs for pensioners, stipulates that light bulbs should *not* be replaced by filament ones. Where justified, financial assistance could additionally be provided for such replacements. Central Government finance is available.

13. _Project:_ *Install Solar Heating Panels.* The sun provides Earth with as much energy every hour as human civilisation uses every year. Brighton is warm and southerly, and solar heating panels are cost effective compared to gas at current prices.
    Solar panels delivering hot water are now reliable, simple, offer environmental benefits, and do not have excessive capital and running costs. They can be freeze-tolerant (thereby eliminating the need for antifreeze), self-regulating, and free of concerns about high-pressure piping, mains voltages (by eliminating mains electricity) and large smashable glass panels or tubes. A strong case can be made for the encouragement of this technology, and its installation on Council properties, and also, through extension of the current system of grants, in private households.
    A practical corollary of this would be for the Council to push City College to train local plumbers to do the installation work.

14. _Project:_ *An Energy Review of Public Buildings.* A review investigating improved glazing and insulation, and reducing energy use by switching off machinery automatically when not in use would cost a little money, but pay-backs are incredible! Many offices and schools can reduce energy consumption by more than 50% with a simple review of this kind, and the measures that are implemented mostly pay for themselves in 2-4 years.

15. _Project:_ *A Council Energy Advice Unit.* We would like to see a Council Energy Advice Unit to give systematic advice to people who would like to make the maximum investment in energy saving. They could charge a small (means tested) fee to cover some of the costs. They could also possibly

provide access to cheap credit to do so. On most of these investments the rate of return is above the rates charged by Building Societies, so householders would in effect be getting interest-free money if they made the investment.

16. *Project:* *Install Swimming Pool Covers.* This should be top of our list in terms of simplicity: *Install pool covers in swimming pools*. We were surprised to learn that Prince Regent Swimming Pool does not employ such covers. They can have a significant impact in maintaining the temperature of the water when it is not in use, thereby reducing heating bills. The cost savings, compared to the town budget, are somewhat symbolic, but very visible to the public. It is very important that large numbers of these small-scale projects are implemented, as soon as possible, for this reason.

APPENDICES.

WIND TURBINES.

The scale of the problem of climate change is so large, and the costs of solving it so immense, that it is essential that the most cost-effective means of tackling the problem are chosen. We sketch CO_2 saving and cost comparisons between *small-scale*, and inherently more efficient *large-scale* wind turbines, and note the difference between *onshore* and *offshore* sites.

Investing £2,000 in *commercial scale* wind turbine schemes will yield a greenhouse saving of approximately one tonne of CO_2 per year (I picked a recent commercial development in Perthshire for this calculation). The turbine will pay back the 'embodied' CO_2, emitted during manufacture and install, in approximately six months. Payback on investment is approximately two to three years.

In Brighton & Hove, where average wind speed is 5 metres per second, investing £10,000 in three *rooftop* wind turbines will also yield a greenhouse saving of approximately one tonne of CO_2 per year, and the turbines will pay back the embodied energy of manufacture and install in a minimum of three years. Payback on investment is more than 15 years (which I would anticipate is about the maximum life of most of these type of products). This is based on the 'Airdolphin Mark Zero', and uses manufacturer and reseller figures.

In London (wind speed 4 m/s), you would need to invest £20,000 (6 turbines), giving CO_2 payback in ~ 6 years, and payback on investment in over 30 years, certainly longer than the lifetime of the machine.

Given the massive potential in the UK for deployment of *large-scale* wind turbines, e.g. offshore, it seems crazy to invest in rooftop turbines, when you can get 5 times the benefit from investing in large-scale turbines. Not only this, but with large-scale turbines, you get all of your money back in three years, and you can then build another one!

The physics of wind turbines are such that large-scale just works better. Unfortunately, I think that the development of offshore wind is likely to be at best sluggish, unless the government invests the money to extend the electricity grid offshore, e.g. using long-distance DC loops, so that wind farm developers can come along and plug themselves into it, without having to build a more expensive network of *ad hoc* HV-AC farm-to-shore links. At the very least, the government could agree to foot part of the money for transmission, if the developer builds in room for expansion – in locations where this looks likely.

The UK is a very windy place (I believe we have more wind energy available than any other European country). With wind turbines, the machines are already close to their theoretical maximum efficiency, and the manufacturing process is unlikely to undergo any revolutionary changes. Pretty much all of the technologies involved – blades, bearings, generators – have direct equivalents in the motor, aviation and electrical industries, where R&D money has already been spent. In comparison, photovoltaics (see next section) is a dynamically changing technology where costs are reducing, but costs do not currently compare well with large-scale wind energy. I don't think small-scale wind will ever be as cost effective as large-scale.

According to the DTI's renewable energy atlas, the wind energy density is around 8 times higher 10 miles off the coast of Brighton. Power generation depends a lot on location, since wind energy varies with the cube of wind speed. The water 10 miles offshore from Brighton is less than 50 metres deep … or it is at the moment, at least!

PHOTOVOLTAICS (PVs).

There are various types of PV solar cells: for example crystalline silicon, and thin films consisting of amorphous silicon, copper indium diselenide, or cadmium telluride. There are other types.
In June 2006 Nanosolar started executing its $100 million plan to build a volume PV cell production factory with a total annual cell output, once fully built, of 430MW, or approximately 200 million cells per year. As well as Nanosolar, other US companies and Wurth Solar in Germany are developing CIGS (copper, indium, gallium, selenium) thin films. CIGS thin films convert 15% of incoming solar energy to outgoing electrical current. Costs are currently falling by about 4% a year.
Even if all the other companies manage to make solar cells a great deal cheaper, it will only be the beginning. Manufacturing the cells accounts for just half the roughly present $6 per watt it costs to get a solar cell up and running. The remaining cost is needed to put them into a protective, mountable module, tune their output from direct current to alternating current, and install them. This is why Nanosolar and almost all the other recent solar start-ups take a strong interest in new ways of mounting their cells – ways that take advantage of their light weight or flexibility. Chris Eberspacher, Nanosolar's vice-president of engineering hopes, for example, that such light-weight systems could be used on Nanosolar's own roof, which is too flimsy to take the load from a traditional array.
The ultimate aim is to integrate the cells straight into building materials of all sorts. New houses need roofs anyway. PV tiles could be wired into the house from the start. Heliovolt's printing process is meant to make integrating PVs as a cost-effective coating possible. And Konarka talks of adding its dye-based 'Power Plastic' to more or less anything from windows (it would just cream off a bit of the light) to wind sheeters.
None of these technologies, however cleverly mounted, will get the costs of generating electricity low enough for solar power to compete directly with coal, gas, wind or nuclear. But because solar panels are inherently easily decentralised, they do not have to compete with the cost of generating electricity; they just have to compete with the price consumers pay for it. This is four or five times more than the cost of

generation, because of the power companies' need to pay for transmission networks, build new plants and please shareholders.
So the industry's aim is to get significantly below 'grid parity'. This is the point at which the cost of borrowing the money to buy and install a solar-power system is more than covered by savings on your electricity bill. At the moment, grid parity is not quite within reach; in most places with a lot of solar cells there is or has been a great deal of government subsidy. In Germany, a particularly powerful subsidy is a government requirement that electric utilities be willing to buy electricity generated by small photovoltaic installations, such as those in homes and small businesses, at more than 50 cents a kWhr. It is a costly subsidy. In its favour is popularity with the electorate – and, of course, with Germany's producers of solar cells.
Reaching grid parity is not enough, but when a mixture of much cheaper cells and adaptable, easily installed modules brings down the total cost of installation by a factor of three, solar energy will start to look very prudent.
The "energy payback" gives how long a PV system operates to recover the energy – and associated generation of pollution and CO_2 – that went into the system in the first place. For thin films, it has been calculated, assuming 6% conversion efficiency in standard conditions and 1,700 kWh/m^2 per year of available sunlight energy, the payback period is about three years for current systems with frames, less for amorphous silicon. $CuInSe_2$ and CdTe modules are already being sold in the 9%-12% efficiency range, so the energy payback may be less than a year already. For CIGS modules the payback period will be a matter of months.

ELECTRICAL VEHICLES.

The UK has been chosen for a market trial of an electric car that has the performance to keep up with the rest of the traffic.
The Smart EV is an electric variant of the Smart ForTwo. Unveiled in London last July at the British International Motor Show, Daimler-Chrysler's Smart EV (electric vehicle) has a top speed of 70 mph and is said to offer better in-town performance than its petrol powered sister, achieving 0-30 mph in 6.5 seconds and going uphill at speeds that won't frustrate following vehicles. However, a range of 72 miles between charges limits its use.
Up to 200 of the two-seater cars will be leased to selected corporate customers from November this year. Jeremy Simpson, a consultant with Daimler-Chrysler UK, points out that the EV has energy costs equivalent to achieving 300 mpg on petrol, and is exempt from both vehicle excise duty and the London congestion charge, so it is possible to achieve a positive business case as well as presenting a 'green' corporate image. Users must agree to purchase electricity from renewable resources.
The EV features a highly integrated electric drivetrain developed in Britain by automotive technology business Zytek, which will also assemble the vehicle at its new production facility in Staffordshire.
Zytek group sales and marketing manager Steve Tremble says that

collaboration with Smart engineers helped Zytek interface with the vehicle architecture – producing a drivetrain that fits onto existing engine mountings, requiring only connections for HV, LV and cooling water. The complete package weighs 70 kg, including the motor, gearbox, inverter and control electronics.
Power is provided by a Zebra liquid sodium nickel chloride battery, mounted under the floor below the driver's seat. This keeps the car's centre of gravity low, making it easier to handle. Recharging is just a matter of plugging a connecting cable into a standard 13 A socket, and the electronics ensure that partial charging will not damage the battery.
The drivetrain can achieve an output of 55 kW in other applications, but for the EV it is currently limited to 30 kW by the battery capability. Zytek has also developed a 70 kW drivetrain for trucks.
Although Smart GmbH has partnered with Zytek for a number of years, it was Daimler-Chrysler UK that was the catalyst for this first market trial. Simpson explains: "We have the highest fuel price in the EU, and we have congestion charging and air quality targets beginning to appear in planning consents. Also, Zytek is here, and we have already sold 40,000 Smart cars in the UK, so the product is trusted".
Who wants it? The market trial has attracted a number of corporate partners with a variety of needs. (1) London estate agency Knight Frank is leasing 10 of the vehicles for its staff to use when taking clients to view properties. (2) Lloyds Pharmacy head office staff will be able to use the cars for journeys in Coventry, including travel to the airport. (3) Traditional sash window specialist Refurb-a-Sash is replacing its existing Smarts with EVs as part of its overall environmental policy. (4) CityCarClub plans to place Smart EVs in prestige residential developments in central London. (5) Smarts Brentford workshop is replacing three of its petrol powered courtesy cars with the electric vehicles, and will ask their customer's opinions about them.

HEAT PUMPS.

Refrigerators, air conditioners and some heating systems are all common applications of heat pumps. The principles by which heat pumps operate are as follows.
Imagine the heat in a given space – say the volume of a football – has 100 units of heat. The air in the football is then compressed to the size of a ping-pong ball. It still contains 100 units of heat, but the heat is much more concentrated and thus the average heat per unit of volume is much higher. In other words, the temperature of the air in the ball will have increased. Now the walls of the ping-pong ball will become hotter, and therefore heat will start to flow out of it faster than before. To transfer this heat somewhere else, we can move the ping-pong ball to a cooling area, and the ball will gradually adjust its temperature to match it. By the time the temperature has equalised, it may have transferred 50 units of heat to the cooling area. After the ball has cooled a bit, move it back to the source area and allow it to expand. Since it has lost a lot of heat, once it expands the temperature will be lower than it was at the start of the

whole process. The ball will now be cooler and can absorb energy to cool the surrounding input area.
Heat pump efficiency is measured by the *coefficient of performance* (COP), which is used to describe the ratio of heat output to electrical energy input. When used for heating on a mild day, a typical heat pump has a COP of three to four, whereas a typical resistive electric heater has a COP of one. That is, one joule of electrical energy will cause a conventional heater to give off one joule of warmth, while under ideal conditions one joule of electrical energy can cause a heat pump to move more than one joule of heat from a cooler place to a warmer place. Heat pumps are typically somewhat more efficient for heating than for cooling. Commercial heat pump technologies are currently in a stage of rapid improvement: the COP for commercially available heat pumps has risen in the last five years from 3 to 4 and even (in a few cases) 5. As a result heat pumps are becoming popular choices for home heating. Two common types of heat pumps are air-source and ground-source heat pumps depending on whether heat is transferred from the air or from the ground. Ground-source heat pumps have a higher COP than air-sourced heat pumps. The penalty for this improvement in performance is that ground-source heat pumps are significantly more expensive to install than air-source heat pumps.

BIO-DIGESTERS.

Greenfinch were awarded a DTI grant in 1998 to design, build and operate a demonstration digester to recycle kitchen waste from 1200 households in the Ludlow area of South Shropshire, which was successfully completed in 2001.
South Shropshire District Council funded the collection, which was carried out using a 7.5 tonne vehicle.
Participating households were issued with a 15 litre bucket and lid, and plastic bin liners. Kitchen waste was left on the kerbside for collection once per week.
A number of important conclusions were made from the project. The biogas plant was able to mechanically handle the kitchen waste and the process worked well biologically. The average amount of kitchen waste collected was 4.2 kg per household per week, and 80% of the volatile matter was transformed to biogas. The digestate production was ideal for re-use as a liquid fertiliser.
In a later (to March 2003) project in partnership with Southampton University, Greenfinch used the kitchen waste to investigate pathogen destruction in a mesophilic (37 ºC) and a thermophilic (56 ºC) digester. With the additional process stage of pasteurisation at 70 ºC for one hour, salmonella, e.coli and f.streptococci were eradicated, meeting the standards in the EU Animal By-Products Regulation.
Since January 2006, in partnership with South Shropshire District Council, and using Defra funding, a Greenfinch biogas plant is redirecting 5,000 tonnes per year of source-separated kitchen and garden waste from landfill.