



## **Report to Policy Review Scrutiny Committee**

**Subject: Reducing Gedling Borough Council's Carbon Footprint**

**Date: 7<sup>TH</sup> Dec 2010**

**Author: Councillor C. Pratt, working group chairman**

### **1. Purpose of the Report**

To communicate the findings and recommendations of the working group set up to look at what Gedling is doing to reduce our Carbon Footprint

### **2. Background**

- 2.1 The review was prompted by a debate about our response to climate change at full Council, and also as a follow up to the review into sustainable energy systems undertaken in 2006. Members took the opportunity to examine the progress of previous recommendations as well as to examine the viability of new initiatives that could be considered now and in the future, especially with regard to transport planning, housing strategy and in the promotion of schemes to the public.
- 2.2 The group comprised of Councillors C. Pratt (Chair), P. Andrews, V. Bradley, G. Tunnicliffe, S. Mason Kempster and C. Powell. Member of the public B. Collis joined the working group at the reporting stage.
- 2.3 The working group received support and information from Councillor Carol Pepper, Portfolio holder for Safe and Sustainable Communities, P. Baguley, Head of Environment and Planning Services, S. Wiseman, Building Services Manager Joanna Gray, Planning Policy Manager, and Jane Ansell, Scrutiny Officer.

### **3. Scope of the review**

3.1 The working group set out to achieve the following aims:

- Follow up the report and recommendations of the Sustainable Energy Review carried out in 2006.
- Examine what Gedling Borough Council is presently doing to reduce its Carbon Footprint, and how that work might be supported by Scrutiny.
- Establish an awareness of the technicalities involved in progressing energy conservation in both Planning procedures and Transport management.
- Identify opportunities for environmental sustainability schemes in partnership with other agencies and authorities, to maximise their take up.

**The scope is attached: Appendix 1.**

### **4. Information gathering**

4.1 After scoping the review, members met with Councillor Carol Pepper, Portfolio Holder for Safe and Sustainable Neighbourhoods, and Peter Baguley, Head of Planning and Environment to receive details of current plans for carbon reduction initiatives and to establish where the review could add value to current work.

4.2 A presentation was given by Jo Gray, Planning Policy Manager, highlighting the main strands and implications of the Aligned Core Strategy and its' sustainability strand.

4.3 A further presentation was given by Mr Simon Fanshawe, who is developing an air sourced heat pump for commercial production, targeting older properties with 3 to 4 bedrooms.

4.4 The group then carried out internet based research to identify transport and travel, housing and alternative energy production initiatives. Projects investigated were:

- Plugged in places: Electric Vehicles
- The Retrofit zero carbon housing initiative
- Travel planning: Car pooling, bus pass loan schemes ...
- Ground and Air Source Heat pumps
- Feed in Tariffs
- Affordable warmth energy grants to housing benefit properties

**Scheme summaries are attached: Appendix 2**

4.5 Members became familiar with the 10:10 Campaign, which urged organisations and individuals to reduce their Carbon emissions by 10% in

2010, the Carbon Reduction Commitment Energy Efficiency Scheme and the Nottingham Declaration, a voluntary pledge by Local Authorities undertaken in 2006 to contribute to the delivery at local level of the UK Climate Change Agreement, to which Gedling has signed up.

4.6 The group were informed that as part of the Local Area Agreement Gedling Borough Council has responsibility for two targets:

- **NI 185 – Percentage CO2 reduction from LA operations**

Under National Indicator NI 185, local authorities are required to calculate the carbon emissions of their buildings and services on a yearly basis and report the results to DEFRA

- **NI 186 – Per Capita CO2 emissions in the local area**

Under National Indicator NI 186, local authorities are expected to raise awareness and support carbon emission reduction strategies for the local area.

4.7 Members identified a number of groups working in Gedling to promote and drive forward Carbon Reduction initiatives:

- **The Gedling Climate Change Group:** This is a voluntary group of interested parties that meets periodically at the Civic Centre to exchange information on current initiatives, arrange visits to eco projects and promote the climate change agenda.
- **The Environment Steering Group:** This is a Gedling Borough Council group of nominated representatives from each department within Gedling Borough Council that promotes energy reduction and recycling initiatives amongst staff.
- **Gedling ECO Teams: Netherfield N.E.E.T and Transition Arnold and Gedling** were funded initially by the Gedling Partnership to take forward the local delivery of the Global Action Plan. The groups are volunteer led and provide training and awareness in the community of green initiatives and good practice.

4.8 In the light of the recommendations of the working group, a final meeting held with Peter Baguley at the reporting stage of the review considered a newly drafted Energy Policy and plan, associated risk management and market change plans.

## **5.0 Findings**

5.1 The Committee noted the corporate priority “**A place where we take care of our environment**” under which a comprehensive Energy Policy has been adopted.

- 5.2 Since the previous review in 2006, which had precipitated the Council commissioning the Carbon Trust to conduct an assessment of energy saving opportunities in 2008, the group were pleased with progress made in reducing energy usage in Council buildings.
- 5.3 The subsequent implementation of various energy and water saving measures in the Council's buildings has resulted in a demonstrable reduction in the Councils' Carbon Footprint since 2008.
- 5.4 Members are aware that proposals made by the 2006 review for investment in alternative energy production, i.e. Air and Ground Sourced Heat pumps or wind turbines, have not been progressed, due to cost and viability at the time.
- 5.5 The meeting with the Portfolio Holder and Head of Service focussed mainly on the need to increase take up of energy saving grants by those eligible in the Borough, as 50% of emissions in Gedling are domestic
- 5.6 A second meeting with P. Baguley at the end of the review focussed upon a draft Energy Policy and Plan, Risk management and changing markets resulting from climate change.

#### **5.7 Follow up of 2006 Sustainable Energy Review recommendations**

The working group revisited the recommendations made by a similar review in 2006, which proposed:

##### **Budgetary commitments to progress the following:**

- To request resources to carry out an environmental audit of the Council

##### **Action taken: Audit completed in 2008**

- To request resources for consultants to produce proposals for sustainable energy saving measures.

**Action taken: An Energy efficiency** audit was carried out by Carbon Trust in 2008. Some recommendations were taken up and some were deemed unviable at that stage.

- To submit a Capital programme bid to implement proposals for sustainable energy saving measures.

**Action taken:** Partially done – building alterations and equipment replaced in Council buildings, especially Leisure Centres.

To request a £5,000 budget for energy saving measures within the Council.

**Action taken:** Unsure

- Cabinet considers making a commitment to an on-going programme of energy saving, to reduce greenhouse gases and to the introduction of sustainable energy generation systems wherever they prove cost-effective.

**Action taken:** An Energy Policy is now in place and a number of initiatives are underway, i.e. the cycle to work scheme, low energy lighting in buildings and outdoor lighting columns, car free days, paper and organic rubbish recycling schemes. There has been to date no formal environmental action plan in place, although an Energy Officer group has been set up. This group has Member representation and will contribute to the Energy Plan process in 2010/11. A draft Energy Plan was presented to members at the end of the current review that reflects what is currently taking place and sets out future developments.

- That the Planning Committee considers ways in which planning development policy can be amended to facilitate householder initiatives on sustainable energy production and energy saving schemes, including potential fee reduction incentives and to ask the Chair of Planning Committee to report back to this Committee on the outcome.

Action taken: carried over to this review for consideration in respect of Planning Policy, as this is not the remit of the Planning Committee.

## 5.8 Current Energy reduction Steering Groups, promotional activity and Leadership

- The Gedling LSP funded the establishment of local community Eco - teams in 2007, of which 2 still remain: Netherfield Eco-team and Arnold/Gedling Transition group. These groups mentor and promote energy initiatives in the community.
- An Environment steering group made up of officers from individual Council Departments has been in existence for over 5 years and promotes energy saving measures in departments.
- The Gedling Climate Change Group meets regularly at the Civic Centre and is a voluntary network of interested residents that arranges visits, identifies and promotes eco initiatives.
- These groups do communicate informally with each other but have no formal action plan other than to promote and share good practice. None have any ongoing funding resource.
- Peter Baguley is the Gedling Partnership Lead for the corporate theme “**A place where we take care of our environment.**” An Energy group has been established to audit current activity and will provide a baseline for forward development, but no is action plan available as yet.

- **The One Stop Shop** displays a range of leaflets in the foyer along with leaflets that our County Council colleagues also provide. These include information about Warm Front grants, Recycle week, Cycling around Nottinghamshire, Permits for the household waste recycling centre, timetables and leaflets about local buses and routes, Nottingham's waterside car free route and the "Envirogrant" scheme. The foyer is made available for anybody wanting to use the space for special events or particular displays, i.e. free light bulb give away, fair trade stand.

## 6. Recommendations

**The 2010 review makes the following recommendations to Cabinet and to Councillor Carol Pepper, Portfolio holder for Safe and Sustainable Communities:**

### 6.1 Energy project Planning, Management and co-ordination

- A comprehensive Energy Policy and Plan is adopted under Core Priority Theme "**A place where we take care of our environment**" that incorporates clear links to the recommendations of this working group and takes up suggestions contained in the final report, and also maximises emerging national initiatives.
- That those proposals set out in the 2008 Carbon Trust Audit of Gedling Borough Council buildings that were not taken up at the time, due to cost and viability, are now revisited by the Energy Officers Group.
- Maximise funding opportunities presented by the new Government's "Green Bank".
- That a designated officer is made responsible for monitoring national funding initiatives, to enable Gedling to proactively seek out funding for feasibility studies and innovations. – **examples of funding schemes attached: Appendix 3.**
- That funding is sought and a detailed Travel Plan is developed to pursue schemes such as a bus pass loan scheme, online cycling and walking route directory, car share, car pool and electric car initiatives, where possible in partnership with neighbouring authorities – see example at: **Appendix 2: Potential Carbon Reduction Projects and Costs**
- That a target percentage figure for Carbon Reduction is set and stated in the Council Plan by the end of 2012. In the interim period, that milestones are put in place around the 6 key themes in the Energy plan and progress against these is subject to our standard performance monitoring requirements.

- That a system of Energy Impact Assessment is implemented at Gedling Borough Council

## **6.2 Improved walking and Cycle routes and (online) guides for the public**

- As part of travel planning, that we seek to separate cycling from car traffic as far as possible; identify and improve access to cycle routes and promote these in terms of Commuter cycle pathways and Leisure Cycle pathways.
- Maximise use of our Website with E maps and route guides.

Sample routes:

- Gedling, Carlton into Arnold
- Newstead through Linby into Arnold
- Along the River Trent

## **6.3 Energy reduction in Council Buildings**

- That the Council pursues the “**Feed in Tariff**” opportunity to generate and sell back its own energy, potentially by deploying a Ground Source Heat pump and drawing energy from the lake, as well as by investing in solar panel technology.
- Consider using solar power to heat our swimming pools, especially in the light of feed in tariffs.

## **6.4 Housing and Planning Strategy**

- That we align our sustainability strategy with those of Rushcliffe and Broxtowe as part of the Aligned Core Strategy second stage.
- That in supplementary planning documents we aim to include a requirement that building applications include the installation of the preliminaries for alternative energy/heating systems, and also specify as far as we are able within current legislation that new build must be carbon neutral.
- That the principles and practices of “Retrofit” are applied to new housing schemes and neighbourhood renewal projects i.e. plans for older housing in Newstead and Netherfield.
- That abbreviated and more relaxed planning regulations are pursued to make it easier for householders and businesses to install eco technology.

## **6.5 Energy Promotion**

- That the One Stop seeks to promote more multi agency public energy reduction schemes including the issue of energy use monitoring devices for loan and individual signposting to the local Eco team, and that the reception area is maximised for the promotion of eco schemes
- Promote Energy Reduction schemes and incentives to businesses through the Business Breakfast and via the work of the Economic Development Officer
- That Gedling Borough Council enhances its' Energy Advising activity to the public, to businesses and amongst partners and utilises as many ways possible to promote and advise on new Government incentives and grants to increase business and household carbon neutrality.
- That Gedling Borough Council acts as an agent for recycling schemes of external agencies, i.e. NCC Composting Scheme.
- That GBC actively promotes the use of locally grown produce by local shops and households, encouraging Farmers markets in partnership with Nottinghamshire County Council as part of the town centres strategy as well as other eco promotion.
- Produce E - Guidance on our website and through the One Stop Shop, with reference to the householder advice summary provided at **appendix 4**.

## **6.6 Recycling**

- Monitor and respond to the impact of the closure of Gedling Recycling Centre and the effectiveness of schemes to prevent fly tipping and to encourage household recycling
- That the worm composting system currently used by Direct Services department is utilised/ replicated throughout the council
- Consider the feasibility of using anaerobic digestion composting systems for composted waste.

## **6.7 Partnership Development and joint projects**

- Explore energy initiatives and joint opportunities with our twinned town of Rotenberg or other European towns and cities.



- Streamline the work of the various Environment steering groups listed in our findings and incorporate identifiable roles and tasks for each group in the Energy Policy and plan.
- The Gedling Partnership to pursue innovative joint work on sustainability with partners, i.e. with the Health Authority, Water Authority (water turbine use) and neighbouring authorities, to progress a “South Nottinghamshire Corridor” blueprint for sustainable development.
- That wherever there are large expanses of water or urban public spaces, the opportunity for the installation of Ground Sourced Heat pumps is maximised, and that Gedling Homes and Communities are encouraged to drive such initiatives by forming social companies, accessing grants and taking advantage of the feed in tariff opportunity. I.e. Netherfield Lagoons, Newstead pit tips and ponds, Colwick Park. Killisick Court, Killisick Park
- That the Council actively encourages the use of current allotment sites, and seeks out opportunities for the development of new sites in the Borough, for example the Lepool allotments – 103 allotments on the A60. The land to the rear is owned by a developer, from whom it could be leased on a long term basis by a community eco enterprise to extend the existing allotments.

#### **6.8 Continuous review**

- That a formal mechanism with elected member involvement is put into place for the mainstreaming and continuous review of the Energy Policy and Action Plan in Gedling, through the Gedling Partnership, the standard performance reporting to Committees and by the Energy Officer Group.

**6.9 Acknowledgements:** The working group wishes to the following officers and advisors who provided information and support to this review:

**Councillor C. Pepper** – Portfolio Holder for Safe and Sustainable Communities  
**P. Baguley** – Head of Planning and Environment  
**Joanna Gray** – Planning Policy Manager  
**S. Fanshawe** – Alternative energy development

## Scope

Scrutiny committee: Policy Review

Working Group:

**What is being done to reduce Gedling Borough Council's Carbon Footprint?**

Chair of group: Councillor C. Pratt

Working group members: Councillors, P. Andrews, V. Bradley, S. Mason-Kempster, C. Powell, and G. Tunnicliffe.

Portfolio holder: Councillor C. Pepper

### **(1) Scope**

Follow up the report and recommendations of the Sustainable Energy Review of 2006.

Examine what Gedling Borough Council is presently doing to reduce its Carbon Footprint, and how that work might be supported by Scrutiny.

Establish an awareness of the technicalities involved in progressing energy conservation in both Planning procedures and Transport management.

Identify opportunities for environmental sustainability schemes in partnership with other agencies and authorities, to maximise sustainable energy initiatives.

### **(2) Aims**

Investigate whether regulations and processes that are applied to Planning and Transport could be improved to achieve greater sustainability in the Borough.

Explore potential schemes for carbon footprint reduction that are cost effective and help to address the Vision 2026 core priority 3 "A place where we take care of our environment".

Consider what more could be done to promote good practice and influence individual attitudes and behaviour, both amongst staff and the wider public.

### **(3) Timetable**

The review will commence in Jan 2010. Timescale for reporting back will be identified at a later date. Milestones will be established at a future meeting.

Frequency of meetings: The working group will meet on a 6 weekly basis

### **(4) Information gathering and consulters**

The working group has requested the following information:

- Gedling Borough Council Policy information, energy audit reports and delivery plans relating to the Carbon Footprint agenda
- Scrutiny Reports: Cycle Routes, Performance Scrutiny Planning and Environment report 2010
- Expertise on specific sustainable energy initiatives, (i.e. Water Turbines, Fuel)
- Internet research to identify examples of good practice.

### **(5) Consulters**

- Severn Trent Water Authority
- Energy Providers
- Nottinghamshire County Council
- Peter Baguley, Steve Wiseman, Housing Strategy officer
- Mark Kimberley
- Gedling Eco – teams
- Centre for Alternative Technology

### **(6) What are the main questions to be asked and of what parties?**

- What energy conservation initiatives are underway and what is the potential positive impact?
- What opportunities exist to do more?
- How might new initiatives be resourced?
- What are the business implications?

The working group will be inviting the following persons/organisations to one or more meetings to help with the review:

The Portfolio Holder for Safe and Sustainable Communities will be invited to the next meeting of the working group.

**(7) Visits**

The working group might need to consider a visit to: Boots Co. PLC – an organisation that runs a successful pool car initiative.

**(8) How the community will be consulted, informed and involved**

The working group wishes to consult through: Contacts Magazine, Eco Teams, and Gedling Borough Website.

**(9) Resources**

The working group is supported by: J. Ansell, Scrutiny Officer

**(10) How the effectiveness of the review will be measured**

After the initial review the working group will submit their report to the Council executive and other stakeholders and partners. The response to the report will be monitored through the Overarching Scrutiny Committee.

A 6 month review point to be included in the Scrutiny work programme

## **Appendix 2: Potential Carbon reduction projects**

### **Feed in Tariffs**

This scheme now allows Local Authorities, households and businesses to generate their own electricity and sell it back to the energy suppliers. Feed-In Tariffs are payments to ordinary energy users for the renewable electricity they generate

Feed-In Tariffs (also known as FITs) are the electricity part of what some people call Clean Energy Cash back, a scheme that pays people for creating their own "green electricity". The second part of the scheme is the [Renewable Heat Incentive](#), a similar measure for heat.

The tariffs have been introduced by the Government to help increase the level of renewable energy in the UK towards our legally binding target of 15% of total energy from renewables by 2020 (up from under 2% in 2009).

#### ***How do the Feed-In Tariffs help?***

The Tariffs give three financial benefits:

- A payment for all the electricity you produce, even if you use it yourself
- Additional bonus payments for electricity you export into the grid
- A reduction on your standard electricity bill, from using energy you produce yourself

Local Authorities have now been given Government permission to enter the scheme. Peter Baguley will present Gedling's proposals at the next meeting.

### **Ground/Air Sourced Heat pumps**

#### **Ground Source Heat Pumps (GSHP)**

The Ground Source Heat Pump (GSHP) is a system that extracts heat from the ground, upgrades it to a higher temperature and releases it where required for space and water heating. The GSHP function can be reversed for cooling purposes.

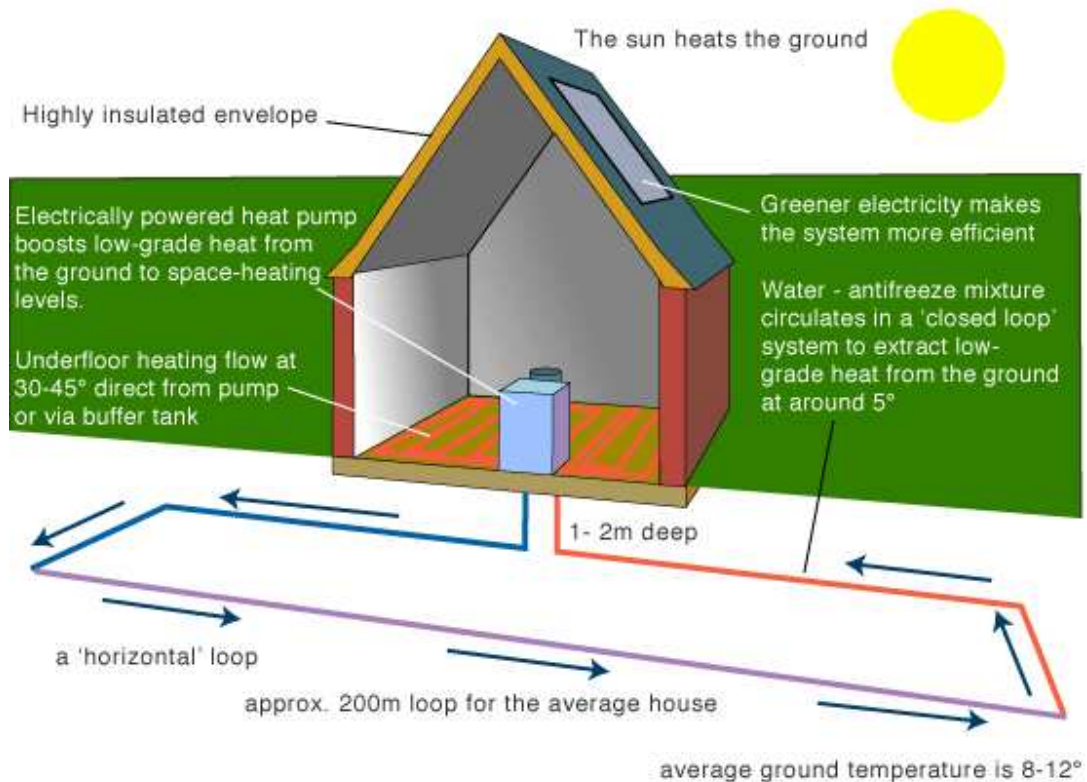
A GSHP can be a highly efficient form of space heater, particularly where deployed in conjunction with a low energy heating system such as under floor heating. Manufacturers claim (but see above) that for each kW of electricity used to run the heat pump some 3 – 4 kW of heat are typically produced.

The more usual 'closed loop' GSHP installation comprises of plastic piping buried in the ground and connected to a heat pump. A water or water-antifreeze mixture is passed around the looped pipe where it absorbs heat from the ground. The

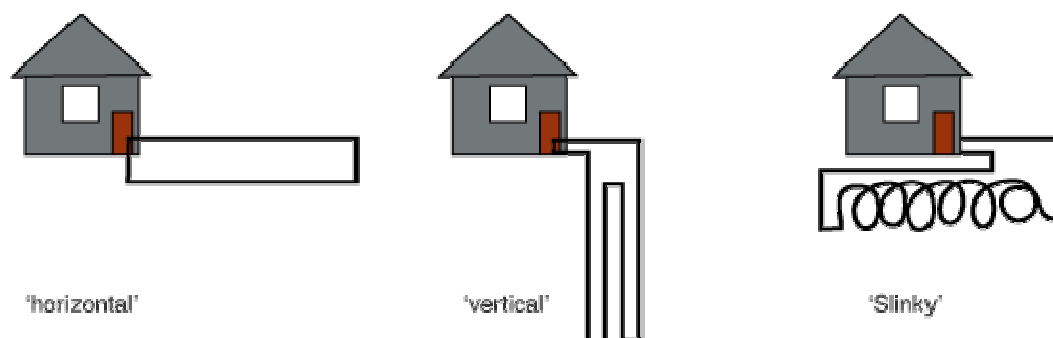
fluid flows into an electrically powered heat pump, comprising a compressor and a pair of heat exchangers before discharging back to the underground loop.

The upgraded heat from the GSHP can be used for space heating and / or water heating.

### An example of a GHSP powered space heating system



### Ground loop configurations



### 'Horizontal loops'

Piping is installed horizontally in trenches. The depth of the trenches will vary according to the design and soil characteristics, but is generally 1.5 – 2m deep. Horizontal loops require much more surface area than vertical loops. Around 200m of pipe work is generally required for a single dwelling.

### 'Vertical loops'

Most commercial and institutional projects using GSHPs use 'Vertical loop' systems. The advantage of a vertical loop system, which consists of pipe inserted into vertical bore holes, is less space is required. Holes are spaced at around 5m intervals and can vary between 15m and 60m according to the design and soil characteristics.

### 'Slinky coils'

The 'Slinky' is a variation of the 'Horizontal loop'. Slinky coils are flattened coils of overlapping piping, which are spread out and laid either horizontally or vertically. Their ability to focus the area of heat transfer into small volume reduces the length of the trenches and hence the quantity of land needed. A 10m long trench laid with a 'Slinky' coil will typically supply 1kW of heating load.

### Pond



🏠 12-ton pond loop system being sunk to the bottom of a pond

A closed pond loop is not common because it depends on proximity to a body of water, where an open loop system is usually preferable. A pond loop may be advantageous where poor water quality precludes an open loop, or where the system heat load is small. A pond loop consists of coils of pipe similar to a slinky loop attached to a frame and located at the bottom of an appropriately sized pond or water source.

### ***Heating***

#### **Space heating**

Because GSHPs raise the temperature to around 40° they are most suitable for under floor heating systems or low-temperature radiators, which require temperatures of between 30° and 35°. Higher outputs, such as to conventional radiators requiring higher temperatures of around 60° to 80° can be obtained through use of the GSHP in combination with a conventional boiler or immersion heater.

### Water heating

The GSHP system is inadequate in itself for directly heating hot water output. Hot water for taps needs to be stored at 60° whereas for domestic GSHPs the maximum water storage temperature obtainable is 50°. A water heating strategy can be designed where the incoming water supply is preheated by the GSHP before reaching an ancillary heating source. However, it might be determined that an immersion heater working off off-peak electricity is more economical.

### ***Environmental impact***








#### **CO<sub>2</sub> emissions**

<b>System</b>	<b>Primary Energy Efficiency (%)</b>	<b>CO<sub>2</sub> emissions (kg CO<sub>2</sub>/kWh heat)</b>
Oil fired boiler	60 - 65	0.45 – 0.48
Gas fired boiler	70 - 80	0.26 – 0.31
Condensing Gas Boiler + low temperature system	100	0.21
Electrical heating	36	0.9
Conventional electricity + GHSP	120 - 160	0.27 – 0.20
Green electricity + GHSP	300 - 400	<b>0.00</b>

### Refrigerants

Refrigerants are present in GSHP systems and so present the threat of HCFCs and toxicity. However, new types and blends of refrigerant (some using CO<sub>2</sub>) with minimal negative impacts are approaching the market.

#### **Pros & Cons**

-  Efficient renewable heating and cooling systems
-  Carbon savings currently appear to be marginal, but positive if systems are driven by renewable electricity.
-  Life expectancy of 40+ years
-  Relatively high installation cost
-  Electricity drives the heat pump
-  If heating hot water, an ancillary electrical coil is required.
-  Large site area required for horizontal pipe installation



🚫 The use of refrigerants

🚫 Manufacturers' claims of CoPs (Coefficient of Performance) of 3-4 are not generally being realised in practice, where CoPs of around 2 are more common

## Costs

### Capital

The cost of a system for a domestic dwelling stands at around £3, 000. The installed cost of a GSHP ranges from about £800-£1,200 per kW of peak heat output, excluding the cost of the distribution system. Trench systems are cheaper so tend to be at the lower end of this range. Capital costs are known to benefit from economies of scale, particularly for open loop systems, so they are more cost-effective for larger commercial buildings and harsher climates. The initial cost can be two to five times that of a conventional heating system in most residential applications, new construction or existing.

In retrofits, the cost of installation is affected by the size of living area, the home's age, insulation characteristics, the geology of the area, and location of the home/property. Proper duct system design and mechanical air exchange should be considered in the initial system cost.

### Running

The efficiency of a GSHP system is measured by the coefficient of performance (CoP). This is the ratio of units of heat output for each unit of electricity used to drive the compressor and pump for the ground loop. Typical CoPs range from 2.5 to 4. The higher end of this range is for under-floor heating, because it works at a lower temperature (30-35 °C) than radiators.

Based on current fuel prices, assuming a CoP of 3-4, a GSHP can be a cheaper form of space heating than oil, LPG and electric storage heaters. It is however marginally more expensive than mains gas. If grid electricity is used for the compressor and pump, then an economy 7 tariff usually gives the lowest running costs.

### Air Sourced Heat Pump

Air source heat pumps absorb heat from the outside air. This is usually used to heat radiators, under floor heating systems, or warm air convectors and hot water in your home.

#### How do air source heat pumps work?

An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside temperature is as low as minus 15° C.

Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground, air, or water is constantly being renewed naturally.

Unlike gas or oil boilers, heat pumps deliver heat at lower temperatures over much longer periods. This means that during the winter they may need to be left on 24/7 to heat your home efficiently. It also means that radiators should never feel as hot to the touch as they would do when using a gas or oil boiler.

There are two main types of air source heat pump system:

- **An air-to-water system** distributes heat via your wet central heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. So they are more suitable for under floor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time.
- **An air-to-air system** produces warm air which is circulated by fans to heat your home. They are unlikely to provide you with hot water as well.

Heat from the air is absorbed into a fluid which is pumped through a heat exchanger in the heat pump. Low grade heat is then extracted by the refrigeration system and, after passing through the heat pump compressor, is concentrated into a higher temperature useful heat capable of heating water for the heating and hot water circuits of the house.

### **The benefits of air source heat pumps**

- Can lower fuel bills, especially if you are using conventional electric heating.
- Can reduce your carbon footprint: heat pumps can lower your home's carbon emissions, depending on which fuel you are replacing.
- No fuel deliveries required.
- Can provide space heating and hot water
- It's often classed as a 'fit and forget' technology because it needs little maintenance.
- Can be easier to install than a ground source heat pump, but efficiencies can be lower.

### **Costs and savings**

**Costs** for installing a typical system suitable for a detached home range from about £6,000 to £10,000 including installation. Running costs will vary depending on a number of factors - including the size of building and how well insulated it is.

**Savings** - will vary depending on many factors. It is important that the system is controlled appropriately to need. Actual savings figures will depend on exact fuel prices

- **The heat distribution system:** Under floor heating can provide greater efficiencies than radiators because the water doesn't need to be heated to such a high temperature. If under floor heating isn't possible, then use the largest radiators you can.
- **Fuel costs:** you will still have to pay fuel bills with a heat pump because they are powered by electricity. The saving you achieve can be affected by the price of the fuel you are replacing and the price of the electricity for the heat pump.
- **Efficiency of old and new system:** the efficiency of the old heating system will affect how much you spent on heating bills previously. If the old heating system was inefficient heating bills could have been high and the difference between the new running costs and the old running costs will be greater, therefore providing a greater saving.
- **Hot water:** if the system is providing hot water as well as space heating: the provision of hot water can lower system efficiencies, therefore making running costs higher.
- **Temperature setting:** if you heat your building to much higher temperatures with a new heat pump system than you did with an old heating system then your home will be warmer, but heating bills could be higher than if you continued with the same heating pattern. It's a good idea to set thermostats to around 18 to 21 degrees centigrade.

The Energy Saving Trust has just completed field trials of ground and air source heat pumps, in order to get a better idea of how they perform, and the saving they achieve, in real life environments. Read the final report [Getting warmer: a field trial of heat pumps](#).

Using typical system efficiencies from the field trial the following savings have been modelled when replacing an existing heating system in a 3 bed semi detached home.

		Air source heat pumps	
		Savings from typical performing system 220%	Savings from good performing system 300%
Gas	£/yr	-£130	£70
	kgCO <sub>2</sub> /yr	-105	750
Electric	£/yr	£330	£530
	kgCO <sub>2</sub> /yr	4,600	5,455
Oil	£/yr	-£40	£160
	kgCO <sub>2</sub> /yr	700	1560
Solid	£/yr	£175	£370
	kgCO <sub>2</sub> /yr	4,475	5,330

The data above assumes replacing stock average boiler efficiency for each fuel type.

## Plugged in places: Electric Cars

Government funding of 30m was allocated this year for 3 pilot projects in a consortium – London, Milton Keynes and the North East. There will be a second round in the West midlands, Cornwall and Greater Manchester

Allows Local Authority partnerships to deliver the scheme, which provides 25% subsidy on purchase of electric vehicles, capped at £ 5, 000 and the provision of charging points at key locations.

Greening the fleets – Allows discounted charging points to taxi firms, car hire companies and pool car companies

Greening Businesses – Discounted charging points to other organisations in their car parks for employees and/or customers

Eco tourism and leisure – installing charging points at high volume visitor attractions, i.e. retail centres, leisure sites.

### Costs

Nissan Leaf – £23, 250 after subsidy

Cost of a public charging point: £3, 000 Installation: £2, 000

Average fuel costs – £400 – £500 pa for 10, 000 m, compared to £1, 200 standard car

## **Retrofitting**

**Retrofitting** refers to the addition of new technology or features to existing housing stock to reduce energy consumption. The UK Government sees retrofitting existing homes as a key tool to achieving its 80% CO2 emissions reduction goal for 2050, with housing the single biggest contributor to the nation's CO2 emissions. However, the challenge is huge, with the Department of Energy and Climate Change proposing that we need to be delivering a comprehensive package of measures at a rate of 1.8 million per year by 2020 in order to get the entire housing stock operating more efficiently by 2030 in order to meet targets.

## **Travel Planning**

A travel plan is typically a package of practical measures to encourage staff to choose alternatives to the car. Employers are encouraged to develop travel plans, aimed at reducing car use for travel to work and for travel for business

Apart from the intended benefits for the environment a travel plan offers benefits to the organisation, its employees and the local community. It may help to relieve an on-site parking or congestion problem, or it may help to improve public transport services where there was previously a deficiency. In turn it may relieve stress on employees by improving their health by walking or cycling, or through the opportunity to reduce the amount they travel, perhaps by working at home.

A plan should be site specific and include a range of measures which will make a positive impact at that site, e.g. setting up a car sharing or car pool scheme; providing cycle facilities; negotiating improved bus services or bus pass loan schemes for staff; offering attractive flexible-working practices. The concept is to make the alternatives more feasible and more attractive to employees.

A successful travel plan will be based on partnerships such as the SignPOST Travel Forum, informed by a staff survey and regular monitoring. An effective travel plan is one which is supported by senior management who recognise the added value of bringing together key parts of the organisation internally (for example, building managers, fleet managers, personnel managers, business managers). In addition, working with local transport operators is important if effective changes are to be made. Finally, teaming up with neighbouring organisations will give value to many of the measures introduced in your plan.

A travel plan need not cost much money and it may help to save money while helping to improve the environment. Travel plans will help address wider problems of social exclusion and crime and safety at the same time as improving costs to society of delays, individual's health, and the local community.

## **Appendix 3: Examples of Funding for Schemes**

### **For Energy reduction refurbishment**

#### **Salix LTD**

Salix is an independent company funded by the Carbon Trust to work with the public sector to reduce carbon emissions by investing in energy efficiency measures. Salix provides both grant funding and expertise. A project manager is assigned.

#### **Ring Fenced Fund**

Salix provides grants of typically £250,000 and up to £500,000 in some cases to kick-start an energy efficiency drive affecting all components of the recipient's estate. There is a focus on cost effective projects with high carbon reduction impact. The Fund is designed to stimulate investment and reduce energy bills. The local authority will be required to match fund any funding provided by Salix.

#### **Energy Efficiency Loan Scheme**

£50 million has been made available by Salix finance and additional funding from Government to support an interest free loans schemes for public sector organisations. The loans are available to cover the full cost of installing energy efficiency products. All public sector organisations in England are eligible to apply for the loan which will be interest free and requires no match funding. Repayments of the loan are expected to be covered using the energy savings achieved by the projects.

#### **Eligibility criteria:**

Projects must comply with the following criteria:

- Maximum 5 year payback period and £100/tCO<sub>2</sub> lifetime basis, for energy efficiency projects;
- Maximum 7.5 year payback period for projects with lifetime £/tCO<sub>2</sub> =<£50, for approved energy efficiency and renewable projects.

#### **Eligible expenditure:**

A range of measures are eligible for funding including: insulation, heating upgrades, heating controls and office equipment improvements. Salix will work with its partners to help prioritise projects that have the biggest impact in terms of cost, energy and therefore carbon dioxide (CO<sub>2</sub>).

## **For Renewable Heat installations**

The Department for Energy and Climate Change (DECC) have announced that the Renewable Heat Incentive (RHI) is expected to be launched in April 2011. It is designed to provide financial support to encourage the uptake of renewable and low carbon heat technologies like heat pumps. It is currently in a planning stage and no final decisions have yet been made by DECC.

## **To support those in Fuel Poverty**

### **Scottish Power**

The Scottish Power Energy People Trust invites not-for-profit organisations and groups that assist those in fuel poverty to apply for much-needed funds.

### **Eligibility criteria:**

Applications are accepted for projects from not-for-profit organisations and groups (such as children's charities, local authorities and housing associations, local community groups and others).

Priority will be given to projects aimed at helping families with young children and young people.

### **Eligible expenditure:**

Organisations and groups can apply for funding to support projects or schemes covering:

- crisis funding, such as emergency accommodation;
- benefits health checks or income maximisation;
- energy efficiency measures and advice;
- Research; for example into the link between fuel poverty and health.

Or any combination of the above. Priority will be given to projects aimed at helping families with young children and young people.

## **For sustainable development linked to parks and public spaces**

### **Sustainable Development Fund**

(On hold until after the Comprehensive Spending Review)

### Funding available for:

All energy efficiency  
Any measures

Heat recovery ventilation units  
Heat recovery ventilation units & radiator panels  
Heating systems inc. controls  
Insulation  
Renewable/sustainable construction  
Transport

This scheme is funded by the Department for Environment, Food and Rural Affairs (Defra) and the Welsh Assembly and is managed by the National Parks Authority. The fund supports sustainable development within all national parks and Areas of Outstanding Natural Beauty in England and Wales.

**Eligibility criteria:**

This grant scheme encourages individuals and communities to find sustainable ways of living and working, whilst enhancing and conserving the local culture, wildlife and landscape. The fund is open to any individual or organisation from the public, private or voluntary sectors, or a collective of these. Applicants can be located within or outside the National Park boundaries.

**Eligible expenditure:**

They are looking for projects that show some of the following things:

- Environmental, social and economic sustainability
- Conservation and understanding of the National Park
- Explore models or best practice for sustainable living through innovative ideas
- Creates new partnerships that have no access to alternative public funding
- Support or involvement of local communities
- Involve action by young people
- Encourage links with urban groups and visitors



## **Appendix 4: Householder Guidance**

Produced by Bob Collis, working group member

### **A return to a sustainable life-style**

#### **What can I do to get ready for a lower energy life?**

We can all start to make preparations for a 'low energy' lifestyle which IS coming.

Anything that can be done to use less energy – directly and indirectly – will help get you ready and in the longer term save you money.

Every little bit helps. It is not just 'A drop in the ocean.'

All our activities have an impact on our energy use and consequential global warming.

The following will hopefully give you and your family some ideas about where you can make changes.

**Section 1. Energy at home.**

**Section 2. Personal transport.**

**Section 3. Food, goods and services**

**Section 4. Reuse, Recycle, Renew**

**Section 5. Useful Links**

## **Section 1. Energy at home.**

Grants are available for some of this, but you need to make enquiries.

### **Conserve**

#### **Loft insulation**

- A minimum of 250 mm (10 inches) is recommended. More is better.
- If you don't have any, or it is too thin, top up and save energy and money

#### **Cavity wall insulation**

- An easy retro-fit if you have cavity walls.

#### **Solid Walls**

- A more difficult and expensive problem
- .three possible solutions:
  1. Fit an insulating layer to the outside of the building, needs to be waterproofed, windows and doorways will be more recessed into the wall, and the top edge of the insulation requires special attention to ensure it is weatherproof.
  2. Build another skin of brick and insulate between the two layers – similar problems to above, but roof will need extending to cover new wall.
  3. Strip plaster from inside walls, insulate and dry line. Messy, fairly expensive unless doing major renovations, and reduces room size.

#### **Double glazing**

- If you need to replace windows, this is a MUST.
- If not, then secondary double glazing should be fitted if at all possible.
- Start in the rooms you live in most or keep warmest.

#### **Draught exclusion**

- Seal around draughty windows and doors
- Don't forget to seal around internal doors

- Fill any gaps between the skirting board and wooden floors.
- Fill gaps between planks.
- NOTE: if you have open fires- solid fuels or gas, there MUST be an adequate supply of fresh air for safe combustion.

### **Unused chimneys**

- These can be capped and blocked off; however, they MUST be vented to prevent damp building up.
- If a fire place is used occasionally, then when not in use, plug it temporarily.
- REMEMBER to unblock it again before lighting a fire.

## **Reduce**

### **Low energy light bulbs**

- Replace existing filament lamps with these as soon as possible.
- There are alternatives to mini-spotlights which are also more energy efficient

### **LED lighting**

- This technology is very efficient (better than 95%) but it is early days and only recently on the market – expect to pay £20-£30 for one lamp.

### **Energy rated appliances**

- When replacing white goods it is more sensible to go for the highest energy rated appliances A\*\*\*

### **Stand-by**

- Switch off appliances when not in use - only use “stand by” when absolutely essential.

### **Central heating controls**

- Make sure you have individual thermostats on all radiators and that the system thermostat is in a place where the temperature is likely to be most stable.
- Reduce the setting and wear more clothing to keep comfortable.

## **Home Heating**

- If your boiler is more than 10 years old it is likely to be up to 30% less efficient than a modern one – consider replacing it.
- Look at alternatives to your existing heating methods.
- Look at both the source of energy and the method of heating your home.

## **Renewable Energy Installations**

Consider fitting one or more of the following to produce some of your own energy - they tend to be fairly expensive to install and maintain, some have a limited life and many have a long payback time. Costs will probably come down as more people fit them, or if better grants become available.

- **Solar heating**
- **Photovoltaics (PV)**
- **Wind power**
- **Wood burning stoves**
- **Boilers and stoves fuelled by wood pellets**
- **Geothermal energy – Ground source heat pumps**
- **Air source heat pumps**

Everyone's circumstances are different, so investigate carefully before committing yourself.

*See Appendix 1 for more Information*

## **Section 2. Personal transport.**

- Walk where possible – it also keeps you fitter!!
- Use public transport more.
- Drive more conservatively – fierce accelerating and braking use much more energy
- Car share – give and get lifts.
- Use the train rather than plane where possible.
- Think carefully before taking any long haul flights.
- When changing your car, look at the fuel, mpg, cost, pollution, maintenance before making a choice. The choice is continually changing, so take expert advice – not just the salesman!!

### **Section 3. Food, goods and services**

- Grow as much of your own food as possible. Even if you are in a small flat, you can still grow some things on your windowsills. If you can, get an allotment
- Support local trades-people.
- Buy locally produced food and goods when possible.

### **Section 4. Reuse, Recycle, Renew**

- When you decide to change something, is the change necessary, can the item be reused elsewhere in your home, or renovated to give it a new lease of life either for yourself or someone else.
- Do you really need the latest fashion or technological innovation or will your existing item still give you useful service.
- If you decide you need to change an item, could it be just what someone else is looking for – don't throw it, recycle it – a notice in your window, a local shop or on the web at "freecycle" could give it a new lease of life.
- Remember, your 'junk' could be really useful to someone else.

## Section 5. Useful Links and Contacts

- Find out about the “Transition Town Initiative” <http://transitiontowns.org/>  
This site has many useful links.
- Find out how green your office is <http://www.green-office.org.uk/>
- Calculate your carbon footprint here  
<http://actonco2.direct.gov.uk/index.html>
- Calculate your carbon footprint and access other information  
<http://www.energysavingtrust.org.uk/>
- Find out facts about health and environment here  
<http://www.greenfacts.org/>
- Get advice on making your office  
<http://www.rpsb.org.uk/advice/green/do/office.asp>
- Find our tips for greener life <http://www.wwf.org.uk/>
- Get daily green tips from <http://www.foe.co.uk/>
- Get help & advice on cutting your carbon emission  
<http://www.carbontrust.co.uk/>
- Plan your travel by bike <http://www.sustransco.uk/>
- Find car sharing friends <http://www.liftshare.com/>
- Get local seasonal vegetables delivered to your door  
<http://www.alotoforganics.co.uk/>
- Get local milk delivered in returnable bottles  
[www.milkdeliveries.co.uk/doorstep/](http://www.milkdeliveries.co.uk/doorstep/)
- Convert to green electricity and compare prices  
<http://www.greenenergy.uk.com/>
- Find out how to recycle locally <http://www.recyclenmore.co.uk/>
- Find a new home for unwanted furniture and equipment  
<http://www.freecycle.org/>
- Offset your travel pollution <http://www.climatecare.org/>
- Volunteer to protect your local environment  
<http://www.volunteering.org.uk/>
- Green energy supplier <http://www.greenenergy.uk.com/>
- Low carbon buildings programme  
<http://www.lowcarbonbuildings.org.uk/home/>
- Information about renewable energy <http://www.r-e-a.net/REA>
- Recycling & Environment, Alternative Energy, Ethical Investment, Environmental Education, Composting and more  
<http://www.envocare.co.uk/index.html>
- A source of “green” products  
<http://www.allthingsgreen.net/marketplace/index.php>
- Access to a range of information on energy conservation  
<http://www.deadirect.co.uk/>
- NGO concerned with home energy efficiency  
<http://www.carbonactionnetwork.org.uk/index.php>

- For information about boreholes for water and ground heat pumps  
<http://www.synergyboreholes.co.uk/>
- Information about energy conservation – mainly for industry  
<http://www.energ.co.uk/>
- <http://www.energysavingtrust.org.uk/Generate-your-own-energy/Getting-planning-permission>
- Find a grant to help with the costs of installing renewable and low carbon technologies - visit the BERR-funded  
<http://www.lowcarbonbuildings.org.uk/home/>
- To be eligible for a grant you will need to use a certified installer and products.
- Use this link to help you find more information about energy saving products  
<http://www.energysavingtrust.org.uk/Energy-saving-products>
- For information about wind powered generation, go to  
<http://www.bwea.com/index.html>
- To find out more about the 'Low Carbon Building programme' grants that are available for domestic solar photovoltaic installations, go to  
<http://www.lowcarbonbuildings.org.uk/about/hfaq>

**If you would like an electronic version of this document, send an email request to**

**[bob.collis@ntlworld.com](mailto:bob.collis@ntlworld.com)**

## ***Appendix 1***

### **Renewable Energy Installations**

#### **Solar heating**

Solar water heating systems use solar panels, called collectors, fitted to your roof. These collect heat from the sun and use it to warm water which is stored in a hot water cylinder.

A boiler or immersion heater can then heat this water further until it reaches the temperature set by the cylinder's thermostat.

Costs for a typical solar water heating system range from £3,000 to £5,000.

Savings are moderate - a solar water heating system can provide about a third of your hot water needs, reducing your water heating bill by between £55 and £95 per year. It will also save up to 645kg of CO<sub>2</sub> emissions, depending on what fuel you will be replacing.

Maintenance costs are very low. Most solar water heating systems come with a 5-10 year warranty and require little maintenance. You should take a look at your panels every year and have them checked more thoroughly by a professional installer every 3-5 years.

#### **Photovoltaics (PV)**

Photovoltaic panels allow the conversion of light into electricity. PV modules are connected together to form an array and the array supplies electricity to a battery store or, more commonly nowadays, to the local electricity grid. Recent government subsidies have brought the solar photovoltaic industry to life. Fifty percent subsidies on installations have made this technology affordable and now domestic electricity generation is becoming a widespread reality. It is now possible to generate clean, green electricity from an array of solar panels mounted on your roof or in your garden and sell it back to your supplier.

Solar panels are usually roof mounted and their ability to generate electricity is obviously dependant on the aspect of your property with south facing roofs being the most suitable. It is now also possible to ground mount solar panels on a motorised frame that tracks the sun to optimise performance.



- **Wind power**

Wind turbines harness the power of the wind and use it to generate electricity. Small systems known as "microwind" turbines can produce enough electricity for the lights and electrical appliances in a typical home.

40% of all the wind energy in Europe blows over the UK, making it an ideal country for microwind turbines.

Wind turbines use large blades to catch the wind. When the wind blows the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized microwind turbine:

Roof mounted: these are smaller than mast mounted systems and can be installed on the roof of a home. Costs for a roof mounted microwind system start at about £1,500

Mast mounted: these are free standing and are erected in a suitably exposed position. . Larger mast mounted systems cost between £11,000 and £19,000, including installation. These provide enough electricity for lighting and appliances in a typical home

If your microwind system is connected to the National Grid then you can make money by selling any generated electricity to an electricity supply company.

If the turbine is not connected to the electricity grid then unused electricity can be stored in a battery for use when there is no wind.

In the UK we have 40% of Europe's total wind energy

Microwind turbines work best in exposed locations, without turbulence caused by these type of obstacles

Ideally, you should undertake a professional assessment of the local windspeed for a full year at the exact location where you plan to install a turbine.

To make the electricity you produce go further:

Invest in energy efficient appliances

Use energy when the wind is blowing - do your laundry on a windy day to take advantage of the free electricity

Charge up your batteries whenever you have excess electricity

Microwind systems normally do require permission from your local authority, so check before you purchase and install a system.

Savings: At the moment there is not enough data from existing wind turbine installations to provide a figure. Maintenance checks are necessary every few years, and a well-maintained turbine should last over 20 years. Battery storage life is typically between 6 and 10 years.

- **Wood burning stoves**

They're very energy efficient

Everyone likes an open fire, but the efficiency of burning logs in a grate is very low. An open fire has to suck a lot of the (warm) air out of the room, and it is replaced by cold air from outside.

An open fire is estimated to be only about 20-25 per cent efficient, but it can be much lower, even falling into negative efficiency, potentially making your room colder than before you started!

A modern wood-burning stove can run at over 80 per cent efficiency. So if you put your logs in a stove instead of on a fire you will benefit from at least three times the amount of heat.

Wood is the original carbon-neutral fuel. True, it releases carbon dioxide when it's burnt, but the amount given off is the same as was stored by the tree when it was growing.

If the tree were left to rot in the woods it would produce the same amount of carbon emissions as are released by burning it.

Most firewood in this country comes from sustainable sources, so for every tree cut down another is planted, and the carbon released from the felled tree will be absorbed by another tree.

With the aid of new technology, a wood-burning stove can be even greener.

With the cleanburn or cleanheat system the gases created when the wood is burnt are circulated back into the stove and burnt off. This increases heat and reduces emissions.

And if the stove has self-cleaning air wash glass a clear view of flickering flames is guaranteed.

As for the emissions, many stoves are now clean enough to be legally used in urban smoke-free zones.

- **Boilers and stoves fuelled by wood pellets**

Pellet boilers are designed to be a central part of a normal hot water system, using the same plumbing and controls. They are able to heat an entire home or small commercial

building, and unlike conventional wood burning stoves can be controlled by an ordinary thermostat and turned on and off at the touch of a button.

The boilers use pellets made from by-products of sawmills and wood processing plants. The sawdust and wood chips are compressed and reduced to a pulp before being shaped into cylinders. The pellets are very dense and therefore require less storage space than logs or wood chips. No chemical substances are used in the production of the pellets and by using waste wood no extra trees are felled.

Most units use an automatic hopper-feed system which is controlled by a timer. A full hopper will usually hold enough pellets to last about half a week in winter, and the ashtray only needs emptying once every two weeks.

Pellet boilers are carbon neutral as the carbon dioxide they produce is offset by that absorbed in during the growth of the trees used to produce them.

- **Geothermal energy – Ground source heat pumps**

Ground source heat pumps provide a clean way of heating buildings in the UK. They make use of renewable energy stored in the ground, providing one of the most energy-efficient ways of heating buildings. They are suitable for a wide variety of building types and are particularly appropriate for low environmental impact projects.

They do not require hot rocks (geothermal energy) and can be installed in most of the UK, using a borehole or shallow trenches or, less commonly, by extracting heat from a pond or lake. Heat collecting pipes in a closed loop, containing water (with a little antifreeze) are used to extract this stored energy, which can then be used to provide space heating and domestic hot water. In some applications, the pump can be reversed in summer to provide an element of cooling, but these systems are **not currently eligible for UK grants**.

The only energy used by Ground Source Heat Pump systems is electricity to power the pumps. Typically, a Ground Source Heat Pump will deliver 3 or 4 times as much thermal energy (heat) as is used in electrical energy to drive the system. For a particularly environmental solution, green electricity can be purchased.

Ground Source Heat Pump systems have been widely used in other parts of the world, including North America and Europe, for many years. Typically they cost more to install than conventional systems; however, they have very low

maintenance costs and can be expected to provide reliable and environmentally friendly heating for in excess of 20 years.

Ground Source Heat Pumps work best with heating systems which are optimised to run at a lower water temperature than is commonly used in UK boiler and radiator systems. As such, they make an ideal partner for under floor heating systems.