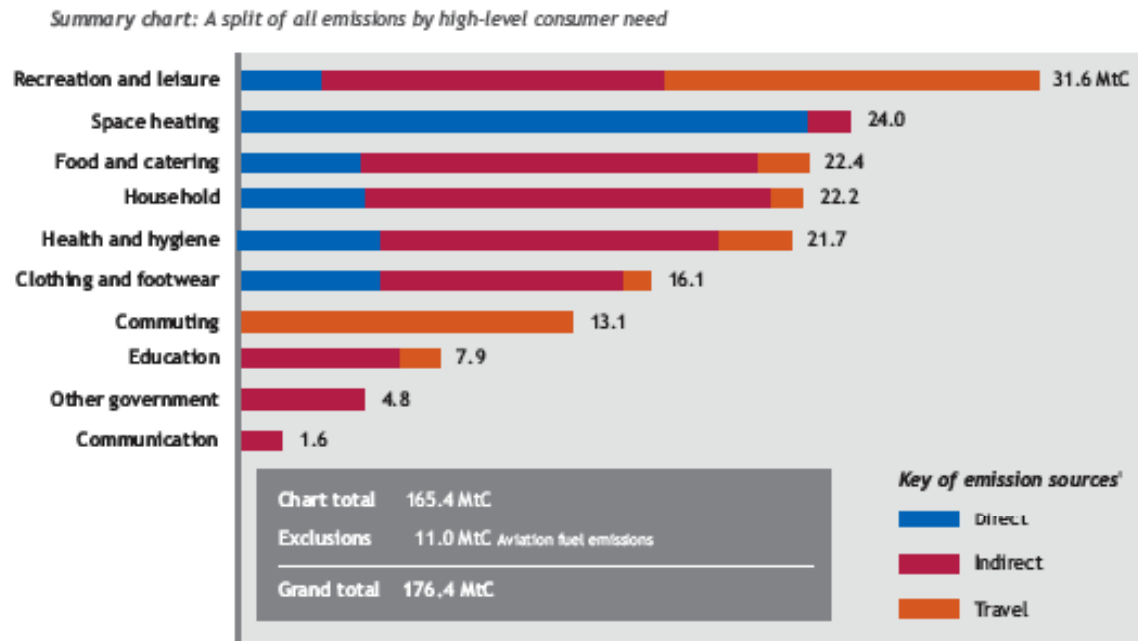


## Climate Change and Sustainable Energy Sources Bisley-with -Lypiatt going Carbon Neutral: a discussion paper

The Parish Council has started thinking about how Bisley-with-Lypiatt parish could become carbon neutral in respect of energy – that is, matching production of carbon to the consumption of carbon. The government has started to look at the way parish councils can address local carbon dioxide emissions in their Climate Change and Sustainable Energy Act 2006. Gloucestershire produces only about 9 MW of renewable electrical energy at present (Glos Energy Strategy). A further 30/40 MW needs to be produced to meet the county's 2010 target.

With the passing of time it is becoming evident that there will be an end to fossil fuel abundance so we should consider this, and examine how the transition from a carbon-based economy to a more sustainable and resilient economy can take place. Climate change and the 'end of oil' – very different topics - are now being considered as problems with a common solution. Another point not directly considered by this paper is community resilience in the face of global pressures on energy. This may be due to supply source distance, politics or just price, but it will affect this community. For a glimpse of this look at [www.transitiontowns.org](http://www.transitiontowns.org)

Recent Carbon Trust reports are starting to link carbon emissions to all that we produce and consume (see [www.thecarbontrust.co.uk](http://www.thecarbontrust.co.uk) ). The summary chart is copied below. It is likely that soon there will be some type of carbon accounting.



Source: UK Carbon Attribution Model, Centre for Environmental Strategy, University of Surrey, 2005

Waste is being addressed with kerbside and locally centralised recycling

facilities, and recently B-w-L Community Composting Scheme has begun to deal with parish green waste. The Bisley Composting Scheme has many advantages: reducing transport costs for waste disposal, reducing pollution, keeping the village fertility within the village, and, not least, reducing infrastructure cost with responsibility devolved to local and volunteer labour. Bisley-with-Lypiatt Parish Council has a waste consultation document out at present.

Energy is a more difficult issue because it involves wellbeing and lifestyle. It is something that is taken for granted and unlike waste is something that people want, not want to get rid of, and they want it conveniently without a change in comfort, or standard of living. They also want it without any visual intrusion to their immediate surroundings, their house, their environment, or the surrounding countryside.

Being realistic: this is not achievable. The design and appearance of buildings will have to change to reduce their energy use, and perhaps each building will have to produce some, or all of its own energy. In the long term energy generation must become CO2 neutral.

In my view, the best way to gain early results is to reduce the type of problem being tackled down to something that is able to be understood by individuals, and then transform it into something that is recognisably achievable. So for a start we on the Parish Council are proposing to consider just the energy problem in the parish. This makes the subject more comprehensible, connects it to the parishioners – through both its benefits and drawbacks - and makes individuals aware of their responsibility for their own energy use. A possible solution is also postulated.

#### What is meant by 'energy'?

When the word 'energy' is used most people just think of electricity, but in fact that is only a small part of the whole meaning. It includes all heat, and all transport fuel, and all energy involved in the production of all things. In fact the electric part of all energy supplied is small: 25% (DTI 2004) including use by industry and transport. This electrical energy is produced from many sources and when it comes to consumption, the electric proportion used in domestic houses is less than 0.13% of the total energy supplied (DTI 2004). The DTI gives a figure of 30% as the electric portion of total domestic energy. Another figure of interest is that 56.6% (DTI 2004) of the energy going into electric generation is lost in conversion. The split that is often quoted is that in this country one-third of all energy is used by industry, one-third by transport and one-third by domestic users. This is broadly speaking correct. Electricity is responsible for the largest portion of CO2 emissions in the UK: 24,000,000 tons of carbon. For each kilowatt of electricity generated 0.43Kg CO2 is produced. For heating, the equivalent CO2 emission from using natural gas would 0.19Kg.

### Centralised or decentralised generation?

Electrical energy generation has traditionally always been centralised (a few big power stations). Many people are suggesting that this old way is not the way for the future. Decentralised generation (local power stations supplying local needs) is being increasingly proposed, partly to avoid the huge detrimental impact a large power station makes on one place and partly to avoid the tremendous energy losses involved in centralised generation.

### Energy needs

Energy can be separated into energy needed for heating both space (central heating) and water - this is typically about 70-80% of the energy coming into the household - and energy needed for lighting, home entertainment, fridges etc - considered to be about 20-25% of the total energy entering the household.

### **UK household carbon emissions by end use: DTI Energy Consumption Tables, 2006**

Space Heating 53%

Hot water 21%

Consumer electronics 6%

Cold appliances 5%

Lighting 5%

Wet appliances 4%

Cooking 3%

Miscellaneous 3%

Heating and hot water could be considered as contributory to the wellbeing of people and the rest could be considered as lifestyle.

The majority of heating in buildings is fossil-fuelled (oil and gas), though some may be from biomass (wood -CO<sub>2</sub> neutral) and some from electricity (made from burning fossil fuels, or nuclear, or renewables). Ground source heat is included in this method of generation. Most energy use in the 'lifestyle' category is broadly speaking electric, except perhaps cooking (which can be done with fossil fuels, wood or electricity) and lighting which usually electric.

This paper deals with everything on a household level and has not considered businesses, schools or community buildings.

Grid-supplied electricity, because of generating and transmission losses, is responsible for about 2.5 – 3.5 times the CO<sub>2</sub> emissions for every kilowatt of energy supplied (see CHP). This is not the case for electricity generated from renewables, particularly if a local 'private wire' system is employed. Nuclear energy is considered along with the fossil fuel centralised heat-inefficient generation.

### Energy conservation

The first, easiest and most cost-effective method of saving both carbon emissions and money is energy conservation. The simple things like fitting low-energy light bulbs, sealing off draughts, and insulating lofts, are not as interesting as, say, a wind generator or a solar panel, but they are the most cost-effective actions. These things are easy to do and should be the place to start.

### How can Bisley be CO2 neutral?

We have to state at the outset that Bisley and Eastcombe have conservation areas, and the whole parish is in the Cotswold Area of Outstanding Natural Beauty, so Planning issues have not been considered in this paper. Financial incentives and grants have also not been considered in the price guides, although as they are now significant in some cases they are mentioned.

### Energy generation and conservation on every building

All houses could add extra insulation inside the lofts, and in cavity walls. Many houses being Cotswold stone will not have cavities, so perhaps external insulation could be considered. This would change the external appearance of the buildings and might not be immediately acceptable to parishioners and planners. Internal insulation would make the rooms smaller and put the thermal mass (the stone/plaster that stores heat or cold) on the outside of the insulation, giving a faster heating response but less ability to store heat. All buildings could have solar panels on the roof, using the sun's energy to heat water or produce electricity. Typically, solar thermal (heating water) would need two to four square metres of collector on the roof. If support for space heating (central heating) is added the collector size would increase to about six to eight square metres. Producing electricity needs photovoltaic panels and typically seven square metres will produce about 1.0kw peak. Except for in the Bisley and Eastcombe conservation areas where systems cannot be positioned on the front elevation, and for listed buildings, planning permission is not required for this. See [www.opsi.gov.uk/si/si2008/pdf/uksi\\_20080675\\_en.pdf](http://www.opsi.gov.uk/si/si2008/pdf/uksi_20080675_en.pdf)

Micro wind generators are much in the press at the moment but in reality their efficiency will depend on the position of the house, the trees and other buildings around. They do not produce as much power as the advertising claims, so more development will be needed here. Their position on the rooftops of buildings may not be acceptable to some. Small wind turbines, pole mounted where needed, can contribute more energy on the right site but again they may not be acceptable to some people.

Biomass (burning natural material such as wood, woodchips, wood pellets, straw etc) is close to CO2 neutral, so central heating boilers could be changed to biomass systems. Of the fossil fuels, natural gas is the most efficient and cheapest and therefore oil and LPG systems should be replaced first.

Hydro/water power is an old technology and can now be obtained from very low

head and low-flow water courses. It is a resource available in some parts of the parish. Output depends very much on water flow and is more reliable in the winter, perhaps matching increased winter demand for power. 15kw is more than a typical house would use but when flows are low generation is much lower. This would be a limited but contributory source of energy with little or no visual intrusion. A report was commissioned by Gloucestershire County Council in 1994 which considered only a few potential sites and indicated that 1.3Mw could be produced with little or no visual impact. See [www.greenshopgroup.co.uk/hydroreport](http://www.greenshopgroup.co.uk/hydroreport) This was updated in 2007 with more in-detail, site-specific design.

To summarise (assuming existing house efficiency with no improvements).

- Insulation within the building will reduce the energy consumption of the building. Cavity wall insulation is included in this, but whereas a high proportion of the houses in our parish can put insulation within the roof they do not have cavity walls and therefore wall insulation would have to be inside or outside. Inside insulation would reduce the interior dimensions of the rooms and outside insulation could change the appearance of the building. Typical cost for roof insulation is £200-£400. Typical cost for cavity wall insulation £500-£2000. **Grants are available – see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)**
- Exterior cladding is a good system for reducing the energy consumed by solid wall buildings. This has the advantage of keeping thermal mass on the inside of the insulation, thereby enabling the building to store any heat input in the walls and keep a more stable internal temperature. Typical cost for exterior cladding insulation is £1000-plus, depending on appearance required. Payback could be very short - typically a year for simple additions to a poorly insulated house. Some visual impact depends on situation. Little or no carbon implication. **Grants are available – see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)**
- Airtightness in buildings means controlling the air changes that take place in the building. In old buildings this means draught-proofing to keep the heat from escaping. In new buildings this means controlling the number of air changes in the building to reduce the heat loss. A good modern house would aim for three or four controlled air changes per hour, but draughty older buildings may have more than 50 air changes per hour, effectively heating the rooms 50 times every hour. Efficient buildings could achieve further improvement by a heat recovery system on the controlled extracted air.
- Low-energy light bulbs and appliances will give a reduction in carbon produced. Low-energy light bulbs will save about 20% of the total electricity consumed (80% saving for each light bulb changed), cost will be £2-£10 for each light bulb and each light will save the householder about £9.00 a year(EST). LED lighting is much more efficient though the light colour is not quite the same - but technical advances are quickly

addressing this issue and warm colours are now available at a slightly higher price.

- Solar thermal devices producing hot water will reduce annual hot water energy demand by 60-70%, most of this in spring, summer and autumn. Typical cost is £3000-£5,000. Some visual impact depends on situation. Pay back time is 5-15yrs depending on the fuel displaced. Little or no carbon implication.
- Solar thermal devices with space heating support will reduce total house energy demand by more than 30%, again the majority in spring, summer and autumn. Typical cost is £6000-£15000. Typical payback time can be 6-15yrs, and this will depend on the energy efficiency of the house and the fuel displaced (electricity can be 10 times the cost of gas or wood fuel). Some visual impact depends on situation. Little or no carbon implication.

Grants are available –

see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)

- Solar photovoltaic devices (about 8-10 square metres) will supply about 15-25% of your electrical energy needs, but obviously the majority will be in the summer, during daylight hours. Also the time of demand will not necessarily match the time of supply so grid connection would enable surplus to be supplied to the national network and deficits drawn when required. Typical cost is about £7000/kw (decreasing with quantity) and would produce about 1100kwh/yr in our parish. Some visual impact depends on situation. Little or no carbon implication.

Grants are available –

see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)

- Micro wind (building mounted) supply depends on the position of the house and surrounding buildings and trees. Typical supply might meet between 5% and 20% of household electrical demand - which is about 2-6% of the total energy demand. Typical cost £1500-£3000. Visual 'statement' on a building, but little or no carbon implication. Using the Green Shop as an example (windy position!) – wind speed 3.8m/s will produce 100kwhr/yr saving £8.54 and 0.04t of CO2 – not a good prospect at present but further development will take place. May have some noise implication within the building. Building structure may need to be checked before installation. Grants are available - see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)
- Small wind, which is not mounted on a building can be efficient on the right site. Typically wind turbines are 2.5-15kw and are pole mounted, they emit little noise and can contribute to the site demand being grid connected or stand alone. Some carbon saving, some visual implication locally.

Grants are available –

see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)

- Biomass boilers could replace fossil fuel boilers. This could take place gradually as the boilers become due for replacement anyway. Many of these systems can be fully automatic, replacing the oil tank with a pellet or

woodchip tank with an automatic feed to the boiler - or just ordinary logs can be burnt to heat a tank creating a 'thermal store'. No visual difference to a building. Cost is comparable to conventional boilers, but extra may need to be allowed for storage/automatic feeding systems, typically £5000-£25000. Little or no carbon implication. Wood is a relatively untapped resource that the parish has, and it could look to developing or promoting this as a sustainable fuel for the future.

Grants are available –

see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)

- Hydropower could be installed in suitable mill buildings in the parish. These generators would need maintenance and depend on water flow. They have little or no visual intrusion. Little or no carbon implication. Typical cost for a low head scheme (5 to 20 metres' head) would be £3000-£4000/kw, so a 10kw scheme would cost £30-£40,000. In our parish the energy generation is likely to be better in the winter due to greater water flow.
- Ground source and air source and lake/river source heating systems are systems that use heat pumps (fridge technology) to obtain heat energy from the groundwater and 'amplify' it, usually using electricity, to supply heat energy to a building. Ground source systems 'amplify' the heat energy gained by about 3:1, and air source by about 2:1 to generate a low temperature heat. Typical cost: ground source about £8000-£15000, and air source about £2000-£5000. Air source is cheaper to install but not so efficient, particularly when air temperatures are low. No visual appearance to the building but involves visual appearance 'somewhere else' where the electricity is generated and carbon implication depends on how the electricity is generated. Cost saving depends on the displaced energy source. The house electricity supply will often need to be up-rated to three phase because of the extra power needed. Note - there is much informed discussion on the 'green' or 'renewable' credentials of these systems because of the carbon emissions associated with electricity. Independent and specific advice should be obtained before proceeding with a system.

Grants are available –

see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)

All of these renewable energy systems could affect visual appearance of the building, but do reduce the energy consumption of the building. A lot of the systems are new technology so there may be problems with public knowledge and perception, the availability of necessary installer skills and the supply of the products being able to meet demand.

### **Larger-scale or community energy production.**

Combined Heat and Power (CHP) – Natural Gas – Biomass.

- Can be done on any building, but more often on larger buildings. The driver for these schemes is energy efficiency, when fuel is burnt to

generate electricity about 40% of the energy produced is electricity and the remaining energy produced is heat. This heat can be used in buildings. These systems can be installed on individual buildings, groups or larger estates, and the electricity sold to the grid. This is common in Europe and becoming more common in the UK. Often no visual difference to a building. The system is sized on the heat requirement and the electricity is a bonus **Grants are available** - see [www.swea.co.uk](http://www.swea.co.uk) and [www.stroud.gov.uk/docs/environment.asp](http://www.stroud.gov.uk/docs/environment.asp)

#### District Heating Systems – Natural Gas – Biomass.

- Suitable only where buildings are close together and need to be developed as part of an overall scheme probably with a local authority, typically a local council. Can be financed and run by a local company or local authority. An ESCo or Energy Services Company, is the usual financial vehicle for this – see Woking Council for an example. No visual impact.

#### Large Scale Wind

- Can be carried out as a commercial scheme, a local community shareholder scheme or as a community scheme using an ESCo. If a 'private wire' scheme was used (see - [www.publications.parliament.uk/pa/ld200304/ldselect/ldsctech/126/12619.htm](http://www.publications.parliament.uk/pa/ld200304/ldselect/ldsctech/126/12619.htm) - 17k - and many others) the parish would actually use the electricity. This would give more energy security as well as cheaper energy. On a parish scale, Bisley Parish would need about 1MW to be CO2 neutral (for electrical energy only) (about 1000 households) at a 30% efficiency ratio (the usual efficiency ratio considered) although the industry experts consider this area to be better. No visual appearance change to buildings, but large-scale visual impact (like them or loathe them) on the landscape. Installation cost £700,000-£850,000. (1MWx24hrsx365=8760mwhrs max. Income from electricity generated (at current prices & 30% efficiency) £170,820/yr. Estimated cost of service, maintenance and land rent £34,164/yr. Borrowing 100% would require a payback of approx £125,000 over ten years - Net income to the parish £11,000/yr (about 1/3 of the precept) over the first ten years. Net income to the Parish after ten years £136,000/yr! All these figures are based on figures collated in November 2006, energy costs have risen considerably since then and continue to rise steadily. At present most community schemes are via an ESCo. Most Wind developers like to own their wind farm for obvious reasons. (All figures are estimates from Triodos Bank but give a rough indication) The industry experts' suggestion would be a new generation 2MW machine which would be only physically a little bigger (output increases as a cube of the size increase) and improve the energy output and the profit margin even further! Wind turbines in this class have a life expectancy of about 25 years.

*(If this sort of scheme was community owned through an ESCo it would raise a whole lot of issues – the electricity profits should benefit the parishioners - off the precept? In year 10 this would be considerably more than the parish precept, then what? A local electricity supply? Statistics give average household consumption as 4,600kwhrs/household this gives B-w-L total parish consumption at 4,600Mwhrs still only half the estimated output of a 1Mw turbine- then what? What about people living near the turbine, do they get an extra benefit? As a responsible PC should we consider all the options? The way forward could be to form a relationship with a commercial operator for the operation and maintenance and perhaps form an ESCo, or operating company. We could partner with other parishes and make a district generator making a considerable energy difference.*

The Governments December 2006 statement from DCLG relevant to Parish Councils contains the following:-

**Parish councils and community councils: powers in relation to local energy saving measures**

- (1) A parish council or community council may encourage or promote any of the following-
- (a) microgeneration within their area;
  - (b) the use within their area of electricity generated, or heat produced, by microgeneration;
  - (c) efficiency in the use, by persons in their area, of electricity, heat, gas, fuel and other descriptions or sources of energy;
  - (d) reductions in the amounts of such energy, or sources of energy, used by persons in their area;
  - (e) production in their area of-
    - (i) biomass, or
    - (ii) any fuel derived from biomass;
  - (f) use in their area of, or of electricity generated, or heat produced, from biomass or any such fuel.
- (2) The power conferred by subsection (1) includes, in particular, power-
- (a) on application, to provide information about goods or services available within their area (whether offered or provided by public authorities or by any other persons), or
  - (b) to provide advice or assistance, for the purpose of encouraging or facilitating any of the matters mentioned in that subsection.

Following is a chart showing energy cost depending on the fuel source, a price comparison to gas and the carbon implication.

JOHN WILLOUGHBY'S		DOMESTIC FUEL PRICE GUIDE No 33				Apr-08		
FUEL	PRICE	p/kWh	£/GJ	Quarterly Stand. Chg	Relative to Gas	Rank	kg CO2 / kWh	
GAS	6.46 p/kWh \$	6.46	17.96					
	2.71 p/kWh \$\$	2.71	7.53	£ 25.13++	1.00	4	0.19	
ELECTRICITY (on-peak)	14.70 p/kWh**	14.70	40.87		5.42			
	13.64 p/kWh***	13.64	37.92	£ 1.93++	5.03	11	0.42	
ELECTRICITY (Economy 7) night rate	22.26 p/kWh**	22.26	61.88		8.21			
	14.69 p/kWh***	14.69	40.84	£ 13.78++	5.42	12	0.42	
	4.79 p/kWh	4.79	13.32		1.77	7	0.42	
OIL (35 sec)	59.27 p/litre*	5.63	15.65		2.08	10	0.27	
OIL (28 sec)	53.50 p/litre*	5.56	15.47		2.05	9	0.27	
COAL	£ 175.00 /tonne +	2.10	5.84		0.77	1	0.29	
ANTHRACITE	£ 201.00 /tonne +	2.21	6.15		0.82	3	0.32	
LPG	38.90 p/litre*	5.45	15.14	£ 14.69	2.01	8	0.23	
Wood Pellets	£ 235.00 /tonne@	4.45	12.37		1.64	6	0.03	
Wood Pellets	£ 148.09 /tonne	2.80	7.79		1.03	5	0.03	
Logs (B'leaf)	£ 70.00 /load@@	2.12	5.90		0.78	2	0.03	
\$ based on B Gas DD price for first 7.3 kWh/day				Prices obtained from nPower, B Gas, Welsh Biofuels, Brookridge and 'best price' from local suppliers. Thanks to Alan Clarke for logs' cost				
\$\$ based on B Gas DD price for over 7.3 kWh/day								
** based on nPower first 182 kWh/q								
*** based on nPower for over 182 kWh/q								
* based on 1000 litre delivery								
+ based on 1 tonne delivery								
@ 15 kg bags. 1 tonne + delivery (£49+VAT)				Price relative to gas now distorted by new two tier tariffs and no standing charges.				
bulk delivery (10 tonne 80 miles)								
@@ cost in Lydney. Stacking ratio 0.56, 9 GJ/m <sup>3</sup>				Second tier used for relative prices.				
All prices include VAT at 5%				++If consumption over first tier you can use 2nd tier price plus equivalent stdg chg.				
CO <sub>2</sub> figures from SAP 2005								
COMMENTS	Since May 07 - Electricity up 32% E7 day up 27% night up 9%							
	Gas up 32%							
	OIL 35s up 62%, 28s up 72%							
	Coal up 20%, Anthracite dwn 9%							
	LPG Previous prices (b4 Apr 04) turn out to be 'introductory offers'							
	This is a more realistic price from rural Sutherland up 7%							
	Wood Pellet - nc (nb error on May 07 price)							
	Logs - up 8%							

The following chart is showing energy, use/displacement, carbon implication, local resource, impact, whether the impact is at the point of use or remote, cost implication, and whether the cost is direct to the householder or tied to an energy supply (capital or 'cost of living'). Also it indicates whether it has an effect on the local economy.

Energy Source	Energy Displaced	Visual Impact	V/Impact Place	Cost to house	CO2 saving Implication	CO2 Amount	Local Work	Annual Saving	Security/ Responsibility
Insulation internal	Gas/Oil	No	N/A	£200-£500	yes		Yes	£200-£300	Local/ Householder
External Insulation	Gas/Oil	Yes	Local On site	£1000 plus	Yes		Yes	£200-£300	Local/ Householder
Air tightness	Gas/oil	No	N/A	????	Yes		Yes	????	Local/ Householder
Low energy Lighting	Electricity	No	Yes	£2-£5 each	Yes		Yes	£9/bulb	Local/ Householder
Solar Thermal	Gas/Oil Electricity	Yes	Local On site	£3000 £5000	Yes	0.5tonnes / year	Yes	£200-£400	Local/ Householder
Solar T Space heating	Gas/Oil Electricity	Yes	Local On site	£6000 £15000	Yes	0.8tonnes / year	Yes	£200-£600	Local/ Householder
Solar PV	Electricity	Yes	Local On site	£7000-£14000	Yes		Yes		Local/ Householder
Micro Wind On building	Electricity	Yes	Local On site	£1500-£3000	Yes	0.04tonne / year	Yes	£8 -£10	Local/ Householder
Small wind On site	Electricity	Yes	Local On site	£2500-£8000	Yes		Yes		Local/ Householder
Micro-Hydropower	Electricity	Small	Local On site		Yes		Yes		Local/ Householder
Ground Source Heat pump	Gas/Oil Electricity	No	Not on site remote power generation	£8000-£15000	Depends on supply Source		Yes	Depends On fuel displaced	Local/ Householder
Air source Heat pump	Gas/Oil Electricity	Small	Not on site remote power generation	£2000-£5000	Depends on supply Source				
CHP	Gas/Oil Electricity	No	N/A	£5-8k or ESCo	Yes		Yes		Local/ Householder/ Community
District heat	Gas/Oil Electricity	No	N/A	ESCo	Yes		Yes		Local/ Householder/ Community
Large scale Wind	Electricity	Yes	Local or Remote	ESCo	Yes		Yes		Local/ Community
Centralised Nuclear Gas/coal		Yes	Some where else	?	?		?		Not local / some where else/ possibly not even national

## **The way forward**

### **Energy saving**

All new buildings should be LZC (low or zero carbon buildings), this is starting to become an accepted standard, although there are many different “standards” they are all trying to achieve the same result, see the governments standard, Code for Sustainable Homes at [www.planningportal.gov.uk/england/professionals/en/1115314116927.html](http://www.planningportal.gov.uk/england/professionals/en/1115314116927.html) also two other more prescriptive standards at [www.aecb.org.uk](http://www.aecb.org.uk) and [www.passivhaus.org.uk](http://www.passivhaus.org.uk) The government has stated in December 2006 that all new houses should be zero carbon from 2016.

Insulation can and should be installed in all buildings, this will be easier in some buildings than others. Airtightness (draught exclusion) should also be addressed.

Low-energy lighting is easy and cheap to instal and the payback period is considered to be less than a year.

Low energy and A+ rated appliances should be considered when replacement is due.

Check the fuel consumption of all goods ESPECIALLY when on standby. Cheap but efficient power measuring systems can be loaned from the Green Shop (or from Bisley-w-Lypiatt PC) to do this if required.

Consideration should be given to cutting down on outside lighting.

Grants and guidance can be obtained from Stroud District Council - 01453 766321 and Severn Wye Energy Agency - 0800 512 012 or at the websites given above.

### **Resources we have in the community for energy**

Firstly we have to recognise that Bisley-with-Lypiatt is a rural parish and only a small percentage of the houses have a natural gas supply available. Given that natural gas is probably the lowest carbon emission/kilowatt of the fossil fuels but is not available to a high percentage of the parish we have to look at what energy sources are present and easily accessible to the parish. This will probably be totally different for each of the parishes around us, and possibly for each village. Part of Bisley is called Windyridge and there is a reason for this: we obviously have a wind resource but mainly on the hilltop. Wind is considered the most mature and efficient of the alternative sources for electrical energy generation, and because of the possibilities of significant generation a link with neighbouring parishes could be made. The majority of the traditional houses shelter below the

hilltop so building-mounted wind generators may need research to be evaluated. We have farmland and woodland, both of which can provide biomass in many forms. Wood, wood pellets, wood chips, straw, grain, oil seeds or any recycled timber can be used, again many websites will give the energy values. Look at [www.johnwilloughby.co.uk](http://www.johnwilloughby.co.uk) for domestic fuel (copied above) comparison prices and CO2 savings.

We have sunshine. About 1100kwhrs/m<sup>2</sup> of solar energy fall on Bisley-with-Lypiatt every year, so this could be collected and used in solar thermal (heat) and photovoltaic (electricity) systems to provide carbon-neutral and cash free energy. We have rainfall but being on high ground our energy resource from flowing water is limited to a few mills in our parish. All will be 'winterbournes' and produce energy only when the water flow is sufficient, more likely to be better in winter. It would also make sense to link solar thermal to any system to reduce emissions and human effort in biomass systems, due to summer hot water requirement. Efficient CHP could be installed on the larger buildings when system replacement is required, this could run off natural gas or biomass.

Bisley Parish already has examples of hydro power, solar PV, solar thermal, micro-wind and probably many other the energy-saving solutions which parishioners are not aware of.

Look at [www.woking.gov.uk/environment/Greeninitiatives](http://www.woking.gov.uk/environment/Greeninitiatives) for an example of what council leading can promote. Stroud is starting on this route as shown by the grants and the Environmental Paper, which proposes many good ideas and policies as a basis to move towards a zero-carbon future.