



## We Save You Money

Contact us today; we provide *independent* advice on Energy savings and renewable technology selection.

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Yes please contact me to talk about Energy savings or Renewable Energy technologies;

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Address; \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Tel; \_\_\_\_\_

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## Energy, Money and Carbon Savings

**E**nergy and money savings. As an *independent* consultancy we will provide you with the help you need to manage and monitor your energy costs, carbon emissions and new technology selection—all at the right price.

**N**otable expertise and experience. Our staff and associates are amongst the most experienced in their field in the UK. Since 2001 we have had major involvement with many large schemes resulting in massive running cost and carbon emission savings for clients.

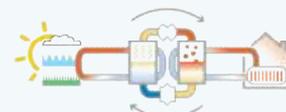
**E**ffective management and monitoring of energy is key to success in business today. Minimising energy use, and carbon emissions, will reduce your exposure to the volatility of oil and gas prices—and ultimately provide you with energy security.

**R**enewable Energy is very much on the agenda for business today. We have been closely involved with its growth for over ten years and have seen many changes. We understand where it is applicable—and where it is not. We will always act in your best interests.

**G**round source heating/cooling; Very few people know more about GSHC in the UK than we do! With over ten years experience, we provide the full range of services from viability through to design and management of construction. We advise on all other renewable heat and power technologies as well.

**Y**es, we can help you with all areas of energy & carbon management and monitoring;

- Site specific Renewable technology selection
  - \* Ground source heat, Biomass, Photovoltaic (PV) and Solar thermal. We have expertise to specify the best technology —from domestic to large commercial scale
  - \* Quantify the benefits to you of FIT and RHI tariffs
- Energy, efficiency carbon auditing and offsetting
- Access to funds to help you invest in energy saving technologies
- Monitoring and management of Energy and Water



## Case study; Ground Source Heating for Social Housing

Client; Wales & West Housing Association, Gibson STS  
Suppliers; Apex Drilling, Vaillant, Carbon Zero Consulting  
Locations; South, Mid and North Wales  
Input; Borehole array design and Thermal Response Testing  
Date; February to May 2012

Carbon Zero Consulting were contracted to provide Ground Source Heating (GSHC) design advice for a project to replace oil boilers with ground source heat pumps on 3 social housing estates. Ground source heating was specified as the technology of choice in preference to air source – as greater long term efficiency and quiet operation were seen as 2 particular benefits.

Wales & West Housing Association and their service provider; Gibson STS, were keen to obtain *independent* design input to provide confidence that the borehole ground arrays would be subject to sound engineering principles to ensure efficient, long term operation. A total of 28 houses and 6 apartments were refurbished including replacement of oil boilers.

### Site visit and preparation

An energy assessment was performed on each house. The first stage of energy efficiency improvement was to increase the level of internal insulation where necessary. This information was then used by Vaillant to specify and provide heat pumps of the required heat output to replace existing boilers using MIS3005 guidelines.

### Borehole design and geological advice

Carbon Zero Consulting undertook all geological and ground source design works. A CZC 'Georeport' was prepared for each of the 3 sites. A 'desktop' value for formation thermal conductivity ( $\lambda$ ) was derived using our knowledge of the underlying geology and hydrogeology. The Georeport calculated a unique borehole length taking into account the geology,  $\lambda$  and individual heating requirement of each house. Advice was given on drilling risks such as mining and presence of groundwater. Boreholes were drilled for each property; some required 2 boreholes or a single deep (> 150m) borehole.

### Thermal Response Testing (TRT)

Following completion of the drilling of the first borehole on each site, a Thermal Response Test (TRT) was performed utilizing 6.5kW of electrical heat injection over a period of 50 hours.

The result of each TRT provided a *measured* value for  $\lambda$  – and borehole thermal resistance. The measured  $\lambda$  value was then used to re-calculate borehole lengths.

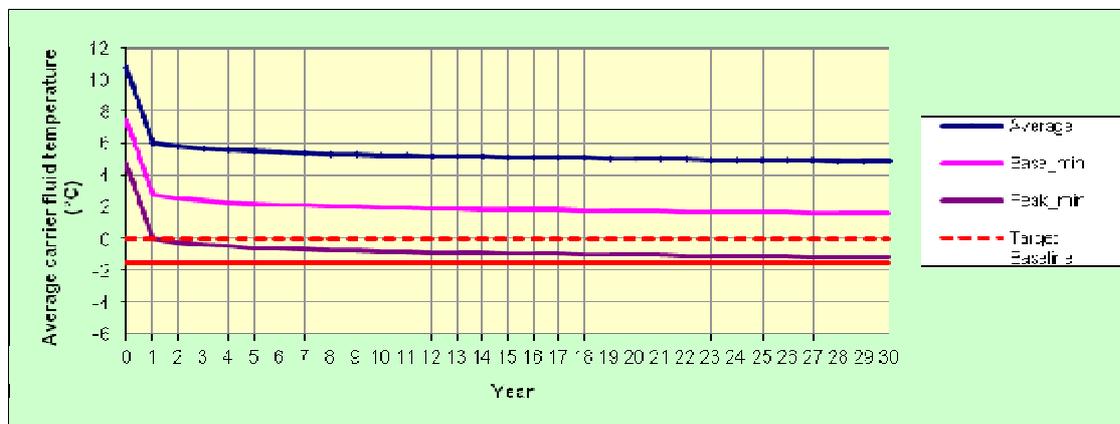


Figure 1. Example output from DCLB showing loop temperature design over 30 year period.