

Draft Report
on
Sustainable Energy
in the
Rhondda Valley

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Introduction

The main source of the energy we use today comes from the inefficient and environmentally unfriendly burning of fossil fuels. Not only does this process release harmful emissions into the atmosphere including carbon and sulphur dioxides (which contribute to climatic changes and acid rainfall) but the fuels used are from limited unrennewable resources.

Through concerns about the environment and of the limited supply of these fossil fuels, more focus has been given in recent years to the developments of cleaner renewable energy for both industrial and commercial use.

Currently just over 2% of the UK's electricity comes from renewable resources. The government have set targets to increase this value to 5% by the year 2010. There have been predictions that the amount of electricity from renewable resources will be as high as 50% by the year 2050.

1. Overview of the Considered Sources of Renewable Energy

It has been decided to focus our efforts on the most feasible forms of renewable energy available to us in the Mid Rhondda Valley. These include foremost solar power, combined heat and power and biomass but attention will also be given to hydropower, fuel cells, geothermal energy and short rotation coppice as possible renewable energy sources to consider.

1.1 Solar Power

There are three forms of utilising solar energy; passive solar, solar water heating and photovoltaic cells.

1.1.1 Passive solar

About 14% of space heating in an ordinary British home comes from solar energy through walls and windows - this is referred to as passive solar energy. Recently new buildings are being built with passive solar in mind - by incorporating passive solar into the design of new buildings annual fuel bills can be cut by a third - this is an important achievement considering over 25% of the UK's primary energy goes towards heating buildings. The integration of passive solar designs in buildings also reduces CO₂ emissions (which in turn helps reduce global warming), and the increased daylight through the addition of extra windows leads to a reduction in the need for additional electric lighting.

Factors influencing the effect of passive solar include the orientation of the building, size and position of glazed areas, density of buildings in the area and materials used for the remainder of the structure.

Studies conducted on houses in Milton Keynes have shown that low cost passive solar designs along with draught proofing and insulation measures reduced heating bills by 40%; the substantial savings made paid back the cost of implementing these features in only two years.

1.1.2 Solar water heating

Solar powered water heating systems are the most popular form of solar energy used in the UK. The solar panels are installed on a south-facing roof (west to south west or east to south east will suffice). The panel is angled to the horizontal between 10° and 60° and then connected to the water system.

Solar heating systems can provide the majority of a household's hot water needs throughout the summer months, and they actively contribute to a reduction in CO₂ emissions. There are now over 50,000 solar water-heating systems installed in the UK.

The installation cost of these systems ranges from £500 -£1500 for a DIY system, and from £2500 -£4500 for a commercially installed system.

1.1.3 Photovoltaic (PV) cells.

PV or solar electric generates electricity in a clean, quiet and renewable way. PV cells use solar radiation to generate electricity, reducing CO₂ emissions. Each solar cell produces around half a volt; large modules of cells are used to generate power for the grid. PV arrays are typically mounted on a roof and feed power via an inverter used to convert 12v direct current (DC) into 240v alternating current (AC).

One kW of PV generates enough energy to save one tonne of carbon dioxide emissions every year in the UK. In half an hour, enough of the sun's energy is received by the earth to power humankind's activities for a whole year.

Though fossil fuels are used in the creation of PV cells, the installed systems emit no gaseous or liquid pollutants when in normal operation. PV arrays last around 20-30 years; there are safe methods of disposal and recycling available. New designs are being manufactured to enhance the aesthetics of the systems, ensuring they blend into roofs better.

The cost of PV equipment can take many years before being paid back through savings in the system. However in remote areas where grid connection is expensive, PV can be the most cost effective power source.

The European Commission has set a target of 1 million roofs clad with PV by the year 2010. As the scale of production increases the cost of PV systems will ultimately fall and PV will become more commonplace.

1.2 CHP - Combined Heat and Power

CHP is an efficient technology that generates heat and electricity together. A CHP plant comprises of, basically, one or more prime movers that drive electrical generators - the heat generated in the process is harnessed via heat recovery equipment for use in industry, the community and for space heating. Because the generated heat is utilised and due to the avoidance of transmission losses because electricity is generated on site, CHP typically achieves a 35% reduction in primary energy usage compared to power stations and heat only boilers. In comparison with energy generation from coal-fired power stations CHP boasts a reduction of over 30% in CO₂ emissions (this has increased to over 50% with the newest CHP installations), and over 10% compared with gas fired combined cycle gas turbines.

It is estimated that the total number of sites with CHP in the UK in 2001 was 1,573 with a total installed capacity of 4,801 MWe. Of these, 429 sites (93.2% of capacity) are in the industrial sector and 1,144 sites (6.8% of capacity) are in the commercial, public and residential sectors.

1.3 Biomass

Biomass is the process of using wood, crops and agricultural and municipal waste as renewable sources of fuels.

1.3.1 Energy from wood

Wood bought as a fuel should be derived from a sustainable source, for example from a conventional forestry management where wood is either coppiced or replanted in a sustainable cycle, or through the recovery of wood waste. When purchased wood should be dry to ensure clean and efficient burning.

About half the fuel value of wood is gases; hot air flowing through the wood stoves allows the gases to be burned off, increasing efficiency and reducing emissions.

1.3.2 Energy from waste

The UK produces about 46 million tonnes of municipal, industrial and agricultural waste per year; these waste products need to be minimised or recycled wherever possible, though there will always be some requirement for disposal. These wastes can be used to generate electricity and heat with environmental benefits provided the energy from waste is as a substitute for that from fossil fuel sources; however care has to be taken with the emissions and residues to ensure no pollution is caused.

1.3.3 Energy from Crops

The modern production of crops for energy is looking at the growth of agricultural crops to be used for fuel in an efficient manner. Fast growing trees such as Willow and Poplar are being developed for use as a cheap and reliable fuel source for conversion to electricity and heat; these can be grown and harvested locally and their yield used as fuel in local energy production plants. This process is called short rotation coppice or SRC; the technique used maximises the yield of dry matter, which can then be combusted or gasified to produce heat and electricity. The crops are harvested on a three-year cycle and the trees used are good for 20-30 years before needing to be replanted.

1.4 Hydropower

Small-scale hydropower or 'micro-hydro' is being reconsidered as an efficient means of generating electricity since improvements in small generator technology; it is now feasible to produce a few tens of kilowatts of electricity from even the lowest water heads of 2-3 metres. Estimations show that there is potential in the UK for around 200MW of installed capacity at this level.

Hydropower technology converts the kinetic energy of falling water into useable energy by means of a turbine. A rough cost of a micro-hydro installation is between £200 and £3000 per kW capacity. Hydro projects need various consents and licences available from the environment agency and local planning authorities.

1.5 Fuel Cells

Fuel cells are electrochemical devices that utilise the electric power, heat and water generated from the combination of fuels such as hydrogen and oxygen. This process involves no burning, simply the electrochemical combination of the fuel with the oxygen in the air.

These cells appear to be one of the most promising energy conversion technologies in development, being quiet, fuel flexible and suitable for CHP production among other uses. Fuel cells operate with higher energy efficiency than conventional thermal energies (40% to 60%) and release less harmful emissions.

This fuel cell technology is therefore applicable not only to increase efficiencies of fossil fuels but also for increased effect of renewable fuels such as landfill gas, AD biogas and biomass gasification gases.

1.6 Geothermal

Geothermal energy utilises the heat present beneath the earth's surface for space and water heating in domestic use. The process currently used to harness the heat is a Groundsource Heat Pump; this system comprises of a coiled pipe filled with water and antifreeze buried in a horizontal trench or a vertical bore hole. The heat beneath the earth heats the water in the pipe, and the water is pumped into the building either for underfloor heating or space heating through radiators.

For every unit of electricity used to pump the water through the pipes, three to four units of heat are produced. Professionally installed systems cost between £800 to £1200 per kW of peak heat output; this excludes the cost of the distribution system.

2. The Potential of Using Biomass as a Fuel for CHP

The efficiency of energy generation can benefit from CHP systems that utilise the heat produced as a product of the engine or turbine. Therefore, biomass generation technology with an assumed electrical efficiency of 25% - 30% could also produce up to 50% - 60% heat. For biomass combustion systems the total heat efficiency can be in the order of 70% - 85%.

As stated above, CHP comprises basically of a prime mover to drive an electric generator - as well as the electricity generated, the heat produced by the generator is harnessed and used in the industry, the community and for general space heating.

The prime movers need to be fuelled by some means; renewable energy sources are obviously a far more considerable fuel to use. Energy from biomass can be used to generate both heat and electricity. Biomass can produce both primary and secondary fuels; primary being in the form of logs, woodchips or sawdust, wood briquettes or wood pellets. Advanced thermal conversion of biomass produces the secondary fuels such as biogas and bio-oil which can be efficiently used to fire boilers, engines or turbines.

2.1 The Availability of Biomass

The total conifer resource in Wales is 185, 000ha; 78,000ha of this resource is managed privately, whilst the remainder is overseen by the Forest Enterprise for the NafW. The broadleaf resource in Wales is 74.000ha with the majority of this managed privately.

70% of felled forestry is left on the forest floor following primary processing, although this can be used for energy generation in the form of logs or woodchip or processed into secondary bio-oil or biogas fuels. Wales, however, has a limited forestry resource in comparison to some Scandinavian countries, with a forestry capacity of approximately 0.11 ha/capita in Wales compared to 4.62 in Finland. The higher-grade secondary fuels could also be considered as a renewable fuel source for CHID.

Another source for biomass is residue from the wood manufacturing industry; furniture factory waste, wood-packaging wastes, construction industry wastes, wood panels waste and demolition waste.

Of the total timber volume that enters a sawmill 45% - 50% ends up as sawmill residues consisting of chips, sawdust and off cuts. Of approximately 700,000 gt of sawn logs produced in Wales each year, 300,000 gt of sawmill residues from this process could constitute potential biomass feedback.

This resource produces both clean wood waste and wood that has been treated with preservatives or chemicals. Treated wood waste is not suitable for small-scale combustion as the usable yield is low, although it is suitable for large-scale combustion and advanced thermal processes. Clean wood waste can be used for energy in the form of woodchips, processed by extrusion into high-density wood pellets or wood briquettes or converted into secondary biogas or bio-oil.

2.2 Sources and Transport of Biomass Products

By locating biomass plants close to resource the transport of the low energy feedstock is minimised. All areas of conifer and broadleaf forestry are within a 40km radius of a 33kV substation; transport of biomass within Wales is suitable for smaller sub-regional biomass plants and these could potentially enable all of the potential resource in Wales to be utilised.

Large concentrations of clean wood waste are centred around the furniture manufacturing industry in South Wales. An investigation into the area around Bridgend has identified at least 20, 000 dry tonnes of available clean wood waste.

The transport of fuels from source to site of use is one of the major barriers to the development of larger biomass plants. The low energy density of wood fuel leads to increased levels of transportation to deliver fuel feedstocks to large centralised electrical generation plants. The transport infrastructure in Wales is not well suited for movement of biomass by road and rail in rural areas (where the biomass resource largely lies).

Transport impacts could be minimised by the installation of a larger number of smaller biomass plants (<5Mwe), the placement of biomass production and local generation in industrial areas of Wales and the embedding of small-scale biomass CHP.

2.3 Local Manufacture of Wood Pellets - SRC

Recent studies on energy crops within Wales have identified SRC willow as the most suitable plant for biomass energy generation; willow can be grown commercially on a large scale and harvested on a cyclic basis to provide wood chips and pellets for fuel uses. Since willow can be grown on relatively low-quality soil the Rhondda area should have no problem developing healthy crops providing there is enough land available to make SRC feasible - in England, grants for SRC development are only provided to areas greater than 3 hectares, though the land can be split into smaller sections if necessary and need not be provided as a single area of 3 hectares in size.

Given the current issues with transport conditions in the Rhondda it would be a huge advantage and possibly even a necessary requirement to have the SRC site, the site of production of the wood chips and the site of use of the fuel within a close radius; this will cut down on the number of frequent lorry loads that would be needed to transport the SRC harvest to the chipping area and then the chips themselves to the power generator. The grants given in England have a condition that the site of use for the chips must be within a 30-mile radius of the SRC site.

3. Solar Panels for Production of Heat and Electricity

Studies have shown that active solar heating systems can be installed in 50% of the existing housing stock in Wales and could be installed in 75% of new housing in Wales built between 2000 and 2010. The average energy consumption per household active solar water heating system is 1,000kWh. The full potential therefore for active solar heating technology in the housing sector in Wales would contribute 665GWh per year by 2010.

An active solar water heating system for an existing house costs around £2000 to £3000, this is reduced to the region of £1000 to £1500 for installation into new houses. The cost of active solar water heating systems therefore provides more of a constraint on the installation of systems into existing households than into new houses.

Lack of capital/budget available to housing associations, and lack of capital and/or unwillingness by developers to allocate capital to active solar heating systems within new housing projects provides a significant constraint on realising the potential for active solar heating technology in Wales.

- Environmental and planning constraints to the use of active solar heating systems are small in relation to other renewable energy technologies; however planning permission is specifically required for listed buildings.

It has been assumed that the principal application for PV in Wales could be for the supply of base load electricity through the installation of 500Wp systems in existing and new houses. The full potential has been estimated on the basis that not all houses will be technically suitable for the installation of PV systems due to inappropriate orientation or shading. PV systems, as with active solar heating systems, can be installed on 50% of existing houses in Wales and on 75% of new houses built between 2000 and 2010. The average energy contribution per household PV system is 350kWh. The full potential for PV technology in Wales could contribute 233Gwh per year by 2010.

There will be additional opportunities for PV to be used to clad office buildings, to provide electricity for recharging batteries for off-grid streetlights and for other remote equipment. A 500Wp PV system for an existing house costs around £3500.

3.1 Use of Solar Energy at the Bwlfa Project

As well as in the housing sector there will be opportunities for active solar heating to be used to heat water for swimming pools, hotels, campsites and farms. The Bwlfa Project will involve the construction of many new buildings including an area of overnight cabins. The cost of running such a large-scale project will undoubtedly be huge with regards to heating and electricity supplies; any measures that can be taken to cut down on these costs should be considered.

Passive solar measures could be looked into in further detail for incorporation into the design of new buildings built on the site of the Bwlfa Project. If feasible, the use of each of these solar systems (passive, active solar heating and PV) could dramatically reduce the heating and electricity bills, thus freeing funds and lowering the overall running cost of the project.

3.2 Development of Solar Energy into a Landmark Project

A programme to stimulate demonstration systems would provide positive publicity that would contribute towards RCT's efforts to become a global showcase for renewable energy technology. There could also be opportunities to provide a very visible statement of a region's commitment to renewable energy to the general public. Demonstration projects of this nature would also provide a small domestic market that would help Wales' indigenous PV manufacturing base to grow and to pursue export markets as well as to prepare for the potential greater use of PV in Wales in the longer term.

Not only would the inclusion of solar energy systems help lower the running costs of the Bwlfa Project, but if displayed and advertised correctly the systems could be used as a showcase into the uses of renewable energy and the Bwlfa Project could become a local landmark for renewable energy developments. Solar displays incorporated into the buildings and functioning normally could be utilised as a tourist attraction, both drawing customers into the project and promoting the awareness of the growing importance of renewable energy in Wales.

4. Small Scale Hydropower

The topography of Wales makes it relatively favourable for hydropower development. In addition to the 160MW presently installed it is estimated that there is 200MW rated capacity of full potential for hydropower capacity in Wales, with an average energy yield of over 730 GWh per annum. These will mostly be run-of-river schemes, and small reservoirs may be viable in some cases to smooth daily output.

Hydropower is a mature technology and the resource is well understood. Although the overall resource is modest, the schemes are small and can be implemented on a local community scale with corresponding local benefits. In addition to the use of bi-level reservoirs connected with water pumps, run-of-river projects utilise the energy from the flow of the river to turn small turbines/water wheels that in turn provide power to generators.

The reservoir system provides a constant output of energy so long as the level of water in the upper reservoir is maintained. Run-of-river systems can be produced on a smaller scale which may be more suitable for use in the Rhondda, however this method does not provide a constant output of energy - the flow of the river depends much on the weather; during the high summer months output could be generally small but with the high rainfall content of the Rhondda and the reasonably constant risk of flooding, output could reach considerably high levels when the rivers are full.

Very small-scale farm diversification and domestic schemes have high direct and indirect benefits per kW installed and could benefit from catalyst funding in the form of capital grants. A 30% to 50% grant could make many community hydro schemes in the sub of 350kW range viable. This could be considered under Objective One funding.

Small schemes are generally not commercially viable to a large utility developer, but may be developed by smaller entrepreneurs; land owning farmers and community groups. These small schemes lend themselves very well to community developments.

5. Micro-CHP

CHP is a well established and energy efficient technology, which is capable of reducing both heat and energy bills for customers and emissions to the environment. Estimations show that over 40% of the total UK demand for heat is associated with residential space heating and hot water. Recent developments in CHP mean that the technology for individual homes (micro-CHP) will be feasible in the near future.

Micro-CHP also has synergies with renewable energy solutions; the availability of heat and power from micro-CHP is complementary to that from active solar heating and PV systems - micro-CHP generating most during winter evenings and solar technologies generating most during summer daytime. Micro-CHP also has the potential to operate from biomass derived oil and gas, which is especially significant in rural areas that are remote from the gas network.

With modern communications technology it is possible to centrally control a large population of micro-CHP appliances, creating a 'virtual power station' embedded in the local electricity distribution network. This could be a highly efficient, flexible and less capital intensive means of replacing obsolete central power generating plants.

Though micro-CHP systems will cost more than an equivalent conventional boiler (which the CHID system would ultimately aim to replace), the total household energy bill could be reduced by several hundred pounds.

Modern CHP schemes provide reliable, energy efficient and affordable energy services to residents and a wide range of public and private sector customers. Community CHP can deliver well-being to local communities through the provision of affordable warmth tackling fuel poverty, urban and economic regeneration through reduced energy costs and carbon emission reductions.

Community CHP draws on waste energy from energy generation plants and transports this excess energy through a pipeline system to buildings where it is used for space heating or cooling and to heat domestic hot water.

6. Energy in Terms of Economic Development In Wales

Implementation of the achievable potential of hydropower by 2010 would create 300 to 600 person years' of installation labour. Jobs involved with operations and maintenance could increase from 100 to 115 by 2010. There is little scope of job creation from the export of hydropower technology.

Realisation of the achievable potential of biomass in Wales by 2010 would create approximately 1,000 jobs, initially in the heat market installing domestic and small commercial heating systems. The development of small to medium scale power generation plants will provide jobs in construction, operation and maintenance and facilitate the development of a biomass fuel supply infrastructure, which will provide jobs in rural areas.

Realisation of the achievable potential of active solar heating installations in Wales by 2010 would create approximately 230 jobs of which 80 would be in manufacturing and 90 in installation. The implementation of PV in Wales by 2010 could lead to the creation of approximately 50 jobs.

7. The Scotch Powerhouse and its Possible Role in Renewable Energy in the Rhondda

The Scotch Powerhouse is a large, centrally located building in the Mid-Rhondda area. It could be used as an excellent opportunity for generation and harnessing of renewable energies, in particular biomass, solar and CHP; its vast space could quite easily house a small-scale power generation plant using locally produced biomass as a fuel source. In addition the building could be used as a visitor's centre to increase awareness of renewable energy and its role in the community, and as a local advice centre providing advice on local renewable energy projects, the details of renewable energies and funding information.

8. Availability of Local Funding and Support

Currently the main sources of funding in this area are for CHP and solar installation projects. CHIP funding is available from the Energy Saving Trust in collaboration with the Carbon Trust for capital and development grants; however this grant may not be available to us as a community business. Solar grants are available from the Energy in Sustainable Development in collaboration with the Department of Trade and Industry. Grants are available for both small-scale and medium/large-scale applications.

Grants for biomass and SRC may be available in the near future as awareness of these projects increases, especially in this area where materials are readily available. The projects could also be incorporated into non-specific Community Development grants such as those available from the European Union, the Welsh Assembly, Awards for All Wales and WCVA.

9. Case Study

Beddington Zero Energy Development (BedZED)

BedZED is Britain's largest eco-friendly residential property development. It is a highly co-ordinated development of 82 live/work terraces built on the site of a former sewage plant with two key principles at the core of the whole design - zero energy and zero carbon emissions.

Installed at the site is a fully automated 130kWe wood-fuelled CHP unit based on a Swedish wood gasification technology and a six year research and development programme in Northern Ireland and Sweden which has led to the world's first zero-liquid waste, fully automated small-scale biomass CHP unit. The wood for the CHP unit is to be obtained from tree surgery operations in the London area. The BedZED energy supply will therefore be carbon neutral and energy sustainable.

BedZED only uses renewable energy and emission saving applications on site, including an external super insulation of 300mm 'overcoat' to roofs, walls and floors; each dwelling and workspace having over-sized domestic hot water cylinder that is permanently charged by district heating main; a CHP plant fuelled from wood chips using an on-site gasifier and the installation 770m² of PV panels to the buildings.

Summary and Recommendations

- The most feasible sources of sustainable energy to consider in the Mid-Rhondda area are Biomass, Solar Power and Combined Heat and Power.
- There are a generous number of local resources available as biomass fuel in the area, many of which (including SRC) can be developed locally promoting awareness of sustainable energy and economically enhancing the community through the creation of jobs. The only foreseeable constraint regarding biomass at the moment is transportation between sites of source and use of the fuel, but if the distance between these locations is small and local the problem is only a small one.
- Solar systems can be installed in a large number of both old and new houses in the area with considerable gain - though the initial cost of installation and product may seem unfavourable, the savings produced through lower heat and electricity bills in merely a couple of years will cover these costs.
- The topography of Wales makes it relatively favourable for hydropower development. Though the overall resource is modest, the schemes are small and can be implemented locally with benefits for the community.
- Recent developments of CHP technology have allowed CHP to be used in a smaller, community-based scale. The fuel for local CHP installations can be locally produced from Biomass resources_ CHP schemes implemented domestically can reduce total energy bills by several hundred pounds.
- Each of these energy schemes can be instigated locally with local production of the energy source and local use of the fuel. In this way, money that is at the moment spent on a national scale for the purchase of heat and electricity could be used to purchase locally produced energy, thus keeping our money in the community. The eventual production of these energy schemes will also create local jobs that could easily be maintained on a long-term as the demand for and awareness of sustainable energy inevitably grows.
- The Scotch Powerhouse is a large, centrally located building that is at the moment standing empty and rapidly falling into disrepair. The building is of excellent structure and location for housing a community-scale energy production unit drawing on sources of sustainable energy. The building's size will also make it feasible for use as a sustainable energy display and advice centre; there are no projects of this kind that offer working displays of sustainable energy combined with an information and advice centre in the whole of the Rhondda Valley.
- There is little available funding in the Rhondda at the moment other than for solar energy. However with the growing importance of sustainable energy sources of funding will become more common for biomass, SRC and hydropower developments.

This report covers only the basic concepts and the bare details of sustainable energy and its' applications relevant to the local community. Each source of renewable energy should be investigated to a greater extent with specific regard to the Mid Rhondda area including relevant facts and figures, possibilities of application in the area and the affects (both positive and negative) that implementation of these projects will have on the local community.

As focus increases on sustainable energy, large organisations such as the Carbon Trust and the Sustainable Energy organisation will organise and release funding for community developments regarding sustainable energy developments; these progressions in available funding should be monitored closely.

Organisations that have a local effect on energy in the community and that could possibly have an involvement in future community energy developments should be contacted and their views on providing support to our organisation and developments obtained; organisations such as the Forestry Commission and the Local Authority obviously have a role to play in sustainable energy in the community be it from potential provision of fuels to the publication of action plans, reports and reviews on the subject.

Prepared by Delyth Williams for Rhondda Community Business Initiatives Ltd

July 2003

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Appendix 1- An example of good practice by Woking Borough Council

UK's Largest PV Installation for Elderly Residents

UK-2003-013

Project start date: *1st March 2001*

Entry Last Changed: *26th March 2003*

Summary

Woking Borough Council has installed a photovoltaic (PV) roof on a residential development for the elderly in Woking. BP Solar was the manufacturer and installer for this project. This is currently the UK's largest domestic PV installation on a single residential building, and the first to use solar PV and combined heat and power (CHP) energy together. Woking Borough Council has a vigorous strategy on renewable and sustainable energy on private wire networks.

Woking Borough Council and BP Solar have worked closely together on this and several other projects, where the unique combination of PV and CHP technologies on private wire networks produces complementary summer/winter reverse profiles. Maximum electricity generation is provided by the PV in the summer and by the CHP in the winter, achieving in excess of 100% sustainability in electricity (i.e. with no input from the grid and able to operate independently in island generation mode).

Aims

To increase the amount of green energy generation, reduce CO₂ emissions, tackle fuel poverty and contribute to Woking's local sustainable community energy systems, Energy Efficiency Policy and Climate Change Strategy.

Summary of Results

Woking is unique in that it is the only local authority generating, distributing and supplying electricity, heat and cooling on private wire district energy networks to public, private and non residential customers.

The Woking system has a number of exempt island generation private wire networks throughout the Borough. These are interconnected by the local distribution network operator (DNO) public wires system which, through an enabling agreement for exempt supplier operation provides its own balancing, standby and top up between its island generation sites, with the aim of not importing from or exporting to the grid. This is to achieve security of supply and independence of the grid.

The enabling agreement for exempt supplier operation enables the island generation sites to trade with each other outside of the New Electricity Trading Arrangements (NETA).

The Brockhill integrated PV/CHP project is just one of the projects in the Woking Local Sustainable Community Energy System that is self sufficient in electricity as well as providing standby and top up electricity to other island generation sites and vice-versa.

The private wire approach to PV enables the Council to extract the true value of green energy from PV/CHP by not selling electricity to the grid at a bargain price but by selling electricity and heat directly to local residents at a much higher price but still lower than the competitive deregulated energy market. This enables the Council to take sheltered housing residents out of fuel poverty as part of its Tackling Fuel Poverty Strategy.

This is achieved by displacing the transmission and distribution losses and use of system charges and the NETA imbalance penalty charges risk which for example, can account for over 80% of the electricity price to residents. It is this price gap and the inefficiency of centralised power stations/national grid system that the Woking system takes advantage of in being able to supply green electricity on private wire networks at a lower price than electricity from conventional brown energy systems.

Planning Time

Conception to completion in one year.

Planning Issues

Planning permission was required for the Brockhill PV roof.

Brockhill PV roof was the first project to receive planning permission but before permission was applied for, planners were educated in sustainable energy and the role of solar PV. Also, articles appeared in the local press and on radio paving the way for the planning application.

Some years earlier energy efficiency, CHP and renewable energy were incorporated in the Woking Borough Local Plan which was of great advantage to the Brockhill PV roof project.

The aesthetic issues were handled by submitting coloured photo montages as well as planning drawings that together with the education of planning officers led to a recommendation for approval. There were no objections from Councillors or members of the public, although there was lengthy debate at the Planning Committee meetings.

Incorporating the above resources in the planning application for the Brockhill PV roof project enabled the whole issue to be widely debated and subsequently supported. This facilitated the planning application and approval process for the PV projects that followed.

Financing

The project was financed partly from the Council's Housing Investment Programme and partly from the Council's public/private joint venture Energy Services Company - Thamesway Energy Ltd. The capital investment is recovered from the income generated from the ESCO contract over 25 years.

Phase 1 also benefited from a GBP 75,000 (where GBP is the UK pound) Seeboard grant under the statutory Energy Efficiency Standards of Performance (EESoP) scheme.

Feasibility Study

Woking Borough Council carried out its own feasibility study.