

Economic Development Committee

EDC 02-02(p3)

Date: 16 January 2002
Time: 14.00 - 17.00
Venue: Committee Room 3, National Assembly Building, Cardiff Bay
Title: A Vision for Bioenergy in Wales

A Vision for Bioenergy in Wales

This short paper sets out the background and key drivers for consideration during the development of the new planning guidelines for renewable energy. The paper’s primary focus is on the prospects for bioenergy.

Energy Markets in Transition

Energy markets are in transition with the markets playing out the final phase of the fossil fuel era. The exploitation of fossil fuels can be characterised by three major waves, coal followed by oil and now finally gas.



World energy market share image

Source

Shell and CREST

As the chart above shows global energy supply is now firmly in the transition zone with global gas supply projected to peak in 2020. Whilst many may question the precise nature of the forward projections the overall implications for all parts of the UK is a period of rapid and significant change in the nature and form of energy supply.

If climate change is included in the above analysis the rate of change will receive greater impetus from the emerging policy initiatives. Eg Kyoto treaty commitments requires a 12.5% reduction in GHG emissions by 2010, Labour Party policy is a 20% reduction in a similar period and Royal Commission on Environmental Pollution recommends a 60% reduction by 2050.

Energy in the UK

To date the development of renewable energy resources has concentrated on electricity generation, however the reality is that electricity comprises only about a third of the UK energy market.

UK energy market 2000

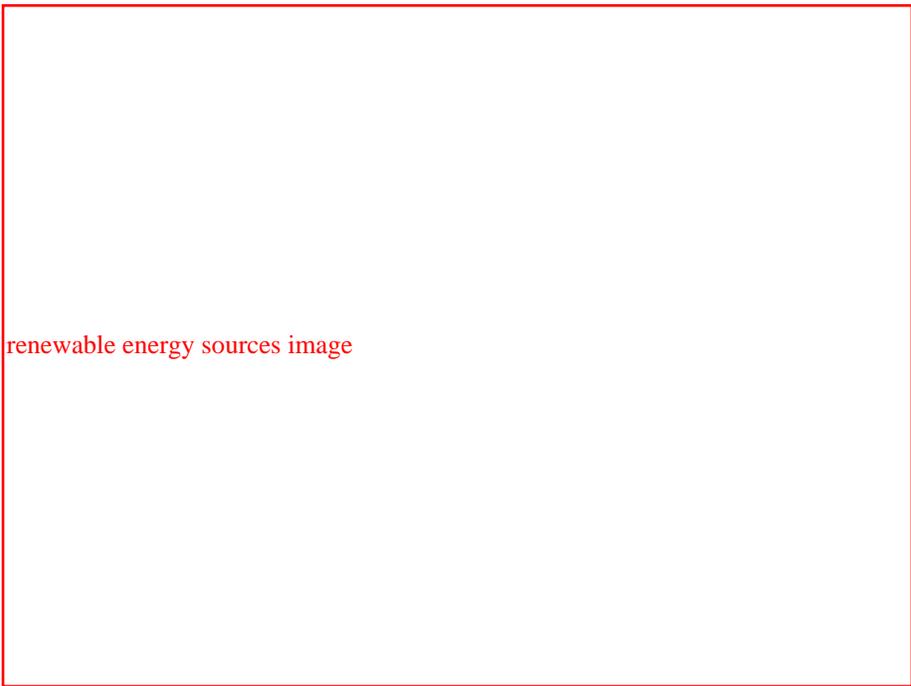
Heat and CHP 45%

Electricity 32%

Transport Fuel 23%

Source DTI

Similarly, there are many misconceptions about renewable energy supply. The following chart shows the current market shares of the various resources.



renewable energy sources image

Source DTI 2000

Wood as a fuel is the most important source of renewable energy in the UK and according the recent studies now accounts for in excess of 1 million tonnes of oil equivalent. This fuel is used for heating, combined heat and power and electricity generation. This wide market coverage is the prime reason for its dominant role in the renewable energy market.

As a result of the recent budget and the Green Fuel Challenge biomass including wood will now be developed as a transport fuel.

The impetus to develop bioenergy to replace fossil equivalents has been considerably increased over the last two months as a result of recent Government announcements. Government policy has now been extended to encourage heat, CHP and transport applications of bioenergy. Allied to other factors such as price competitiveness with gas (as a result of recent rises in gas prices and the Climate Change Levy wood as a fuel is now broadly competitive with gas and considerably cheaper than oil, lpg and electric resistance heating.) the pace of market development will gain momentum.

What are the Implications for Wales.

The types of developments we envisage for Wales can be summarised under the following headings.

Domestic Heat

Domestic heat installations fuelled by processed wood pellets and utilising automatic high efficiency boilers are already under development. A Government scheme to provide capital grants for conversion to this technology will be announced later this year.

Planning Issues

Sites for local wood fuel pellet production. Installation impact largely none.

Industrial Heat and CHP

The replacement of oil fired heat and steam raising plant with modern wood fired plant will be an important competitiveness issue for Welsh Rural Industry. The dairy and meat processing industry as well as sawmilling and wood processing are the prime target markets. Often there is an opportunity to improve the visual impact of these sites when converting to wood as well as improving local air quality emissions.

Planning Issues

Positive- Direct jobs in plant and fuel supply. Energy expenditure recycled in the locality. Improvement in overall site emissions.

Negative -Some traffic impact.

Community Heat and CHP

Many local authorities, Government agency's and health and education facilities are now converting to wood for heat and sometimes CHP. Installations will take a variety of forms including village scale district heating and there is considerable interest from new build where an emphasis on sustainable energy supply is taking hold. Again announcements are expected regarding the form of the capital grant scheme to assist deployment announced earlier this year.

Planning Issues

Positive - Fuel poverty alleviation. Jobs and recycling impact

Negative -Sites for fuel processing. Traffic, visual

Electricity Generation

Biomass electricity generation is not resource constrained and flexible in location and scale. Furthermore being fuel based the electricity product is dispatchable. This means that the location of the generating plant can be governed by a host of factors most of which have nothing to do with resource. These factors can be

- Network considerations (eg. need for reinforcement)
- Co-location with an existing or new industrial activity
- Opportunity for heat sales (eg WDA industrial park)
- Co-firing with coal or gas at an existing fossil plant.
- Co-location with a transport fuel plant (Bio-refinery)

It must be clearly stated here that there have been many misconceptions and much misinformation about the size of bioenergy plant with a myth being propagated that only plant in excess of 30MW were economically viable. The size range of bioenergy plant currently successfully operating in the UK is between 100Kw and 38MW. The technology is fully size flexible and includes combustion, gasification and pyrolysis as well as anaerobic digestion. Future developments will be based on market need and since profitability is greatly improved with heat sales the market model which gives the firmest likely indication of size profile is the current CHP market where 83% of all installations are below 1MW and 95% of installations are below 10MW.

Planning Issues

Positive- jobs in fuel supply, impact on local agriculture and forestry

Negative- Visual,

Transport Fuels

UK transport fuels are vulnerable to external cost pressures and a major source of GHG emissions. This has prompted the Government to initiate the Green Fuel Challenge to encourage the development of alternatives to petrol and diesel and to prepare the way for the switch to fuel cells. The two most important renewable transport fuels are biodiesel and bioethanol. Bioethanol is the fuel that is most relevant to UK because it can be manufactured from all types of biomass including a significant element of the municipal waste stream. The bioenergy industry is currently

developing in conjunction with the DETR a strategy to launch E10 (10% bioethanol and 90% petrol) onto the UK market. This will offer consumers a product which not only cuts their GHG emissions by 10% but also significantly improves urban air quality (bioethanol adds oxygen to the fuel mix thereby improving combustion efficiency) and offers the Government a mechanism to reduce transport GHG emissions significantly over time by increasing the blend rate. The Ford plant at Bridgend already produces an engine for export which enables blend rates of up to 85% bioethanol.

This additional market for biomass will encourage the development of the biorefinery concept where electricity generation can be co-located with bioethanol production the latter consuming the surplus heat from the generation plant.

Planning issues

Positive - strong market pressure, jobs, local air quality

Negatives - transport, possibly scale

Resource Productivity and Land Use

The fuel for bioenergy – biomass is stored solar energy which is obtained from current cropping, forestry and various other plant or animal derived waste streams. For every tonne of food crop we grow in the UK about ½ tonne is a biomass residue. Similarly trees grown for harvest yield no more than 50% utilisable wood. The scale of this resource

ETSU (Energy Technology Support Unit) assessment of total available resource for Biomass energy cropping in UK is 194TWh, of which 139 lie in England & Wales, 23 in Scotland and 32 in N. Ireland.

This represents biomass cropping on 5m ha of land, and might be achieved by 2025.

This is about 27% of the land used for farming in the UK, or about the same area as is currently sown to cereal crops.

This is the maximum theoretical potential, which would provide about half the total current UK electricity consumption (both business and residential) of 350TWh. This amount of local electricity supply, if linked to Combined Heat and Power, would transform the market for heat as well. Like in continental Europe, there would be potential for district heating schemes, with cheap heat piped underground to consumers, replacing natural gas and oil fired central heating, and providing heat for business as well.

It would transform the ecology and landscape of the UK, creating a patchwork of small woods in regular cycles of production, linked by areas of miscanthus and other long grasses. Such a landscape would be teeming with wildlife, as biomass crops do not require intensive chemical inputs after establishment, and provide valuable habitat for a wide range of UK species, including birds, butterflies and beetles.