

Observations on Biomass in Scotland

Discussion Paper to Forestry Policy Group

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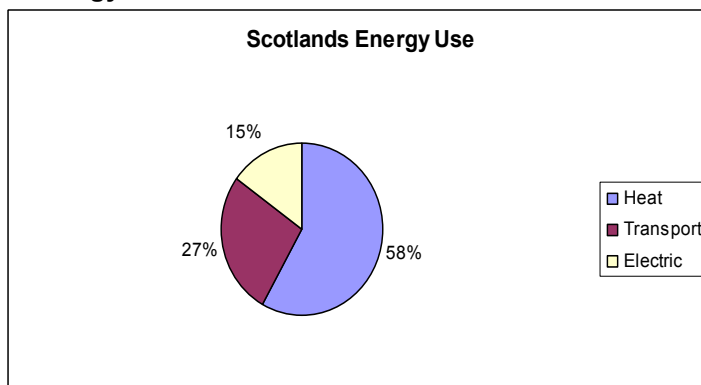
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Summary

There is an increasing awareness of the importance of renewable heating in contributing to our vision of a low carbon economy. The current state of policy is examined and some pointers given to the future. Beyond the novelty of a few pilot installations, heating requires a distributed and decentralised energy network, and as such major public investment.

In terms of forestry there are threats and opportunities. Some discussion is given on the Green House Gas (GHG) reduction potential of using bioenergy, and on the 'conflict' of bioenergy with other land management choices. In balance we can draw on the experience of every other northern European country where using wood for heating is well established.

1. Energy – an overview



Graph 1- Scotland's Energy Use (source: Scottish Renewables 2007)

Energy Sector	Sector % of Overall Energy	Target (% of sector being renewable)	Renewable Target as % of overall energy	Target Progress as % met (Jan 07)
Electricity	15	40	6	20
Transport	27	5	1.4	1
Heat	58	No target (5%??- to follow)	3	1.8?

Table 1- Summary of current Scottish Government objectives against actual delivery.

Up to now it has been common for observers to have confused energy and electricity. As actual analysis of energy by nation, region, community, business and household alike is becoming more common, a clearer understanding is emerging. It is clear from graph 1 that heat must factor in any energy/carbon policy. Table 1 shows the current level of market penetration and government

targets by sector. In Scotland it has been mooted that a 5% renewable heat target may be adopted. In England it was suggested that a 7-14% would be realistic (Biomass Task Force 2005). We await a 'FREDS'¹ report soon on renewable heating which may elucidate on heat targets.

2. Biomass support in Scotland

It has been said that, of any renewable technology available today, using biomass for heating gives the greatest public benefit, the most cost-effective carbon savings, and is the closest to being economic without subsidy (CT et al, 2005; FCE, 2007).

Essentially the picture is as in Table 2 – there are grants (if minimal and sporadic). The revenue support and obligation side that is accelerating renewable electricity and transport is missing from heat. This leads to market distortions, illustrated by the following example.

Energy Sector	Grant	Revenue Support/ obligation
Electricity	Y	ROCs
Transport	Y	RTFO
Heat	Y	??

Table 2- Availability of government support for renewables².

The Eon Plant at Lockerbie (44MW- burning wood to make electricity) received £18m of lottery funding. The whole project cost is £90m. All profits go to shareholders, who now get double subsidy for biomass ROCs. As an electricity plant, it is 30% efficient. Thus it has to use a greater proportion of fuel for the same output energy– in this case 500,000t/yr wood.

By comparison £18m of support could have funded 45MW of small to medium projects without match funding. That would mean 2-3 schools per local authority for 'free'. This is also a sufficient installation size to develop local clusters of wood fuel (ie around 1000t/yr needed per LA). It would have the added benefit of using only 45,000 to 90,000t/yr wood- as heat only plant is 90% efficient. Profits could have gone to local business and/or reduced public sector cost.

To be fair there has been recognition of sorts in the Scottish Parliament of the benefit of the small is beautiful approach to wood fuel. This translated into a flurry of activity in the last year with the Scottish Biomass Support Scheme (SBSS) with £7-10m allocated to biomass –of which 50% went on supply projects and 50% to renewable heating.

If revenue support for heat (the so called "hot roc") was to be added to public subsidy mix then adverse affects would be felt to the business of other end-users of wood fibre.

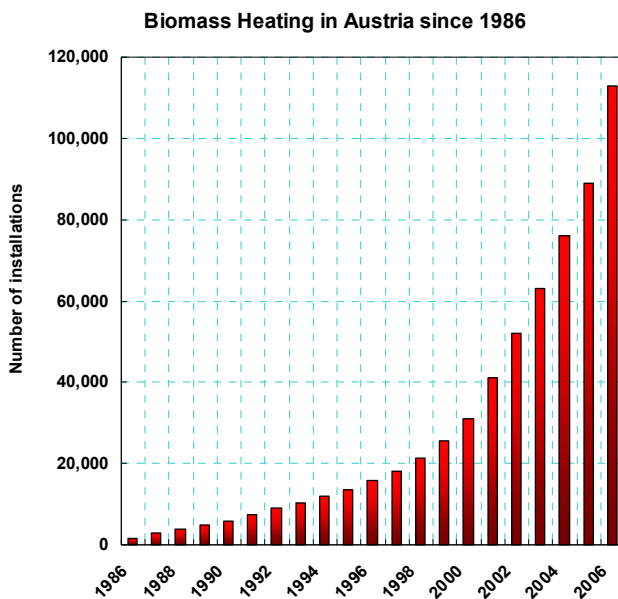
3. Route to market

There is a lot of talk of 'chicken and egg', i.e. the demand needs the supply and the supply won't come unless the demand is there. It has been well recognised that in Europe that there is a strong demand 'pull' for adopting automated woodchip heating (i.e. put the boilers in and the supply can be found). It is crucial step for a few local public buildings to opt for biomass – this gives a critical mass of projects to make it economically viable to allow the local forestry businesses to diversify. In my experience this is about 1MW (around 1000t/yr). When looking at pellets the opposite is true and it is a supply 'push' that persuades people to buy pellet boilers. Thus, in short, in promoting biomass, capital support should go to putting boilers and pellet suppliers on the ground.

¹ Forum for Renewable Energy Development in Scotland

² ROCs = Renewable Obligation Certificates , RTFO = Renewable Transport Fuel Obligation

If your objective is to kick start the market it also follows that using established well proven technology will expedite results. In the UK there has been a fascination with experimental technologies (i.e. ARBRE Project 8MW plant) which are long in planning and carry risk.



Graph 3- expansion of biomass in Austria

By contrast in Austria biomass has gone from strength to strength. They have identified biomass district heating as providing maximum benefits at a policy level and support is targeted to such enterprises. Support is long term (10-year funding program). Heating requires a distributed and decentralised energy network, and these often do not make commercial sense. Thus it often requires major public investment to put in this infrastructure- in the same way that transmission wires or gas network was publicly funded.

In Austria district heating plants in rural areas have become quite common and often are owned and operated by the local 'citizen forest enterprise' -and provides renewable heat to public buildings and private households and commercial enterprises from one centralized plant. The project helps to bring local forests into active management, thus providing additional benefits for the woodland.

Community heating schemes are becoming more common in the UK- see example below. As an added benefit it is introducing a public to forestry directly - i.e. maybe starting the steps towards a forest culture. An analogy would be the farmers market connecting people to more local food production and thus giving a greater understanding of the land.

Case Study- Penmorfa - Ceredigion CC

- **County Council Offices**
- **Sheltered Housing**
- **Nursing Home**
- **Small district heating loop**
- **fuelled by 550kW wood boiler**



3. The role of biomass in GHG reduction and land management?

There are press reports that bioenergy and other options for land use are in conflict, especially for food production. It is true that there is a limited availability of land, however, the market conditions do not support bioenergy production on prime farmland in the same way that all arable land is not converted for timber. Between UKWAS and GAEC regulation it is difficult to see how exotic methods and stock can be introduced. The role for SRC Willow should not be discounted – it is far more environmentally benign than intensive arable farming and has a positive net effect on biodiversity. It will always be managed as a mosaic in the landscape, and is regulated under the Forestry Act.

In terms of bioenergy from forestry, there is no conflict even in countries with intensive biomass sectors with timber. When the tree is used – the quality stemwood can go for higher value markets for timber, and the residues used for energy. The 'Achilles heel' of forestry – pre-commercial thinnings – are ideal for energy markets and offer exciting opportunities to improve woodlands commercially (by thinning you could improve the value of the timber by 20%) and ecologically. In addition it should be possible to introduce more diverse mix of species – such as pine/ spruce in an alder or birch matrix that can be managed for either timber or bioenergy depending on market conditions. I would note that the board sector who traditionally takes low value fiber should be worried about the competition from large plants. There is much worry about wood resource (for the best estimate- see Clegg, 2006) but note each estimate stacks existing use on top of each other, rather than letting the market price compete for resource.

The sustained displacement of fossil fuels repeatedly offers net carbon benefits over time (see Box 1).

Scenario 1-

1MW factory on oil emits 1000t CO₂ per year. Converts to woodfuel => it's net CO₂ emissions = zero.

To be sustainable in perpetuity it needs 125ha of mixed broadleaf wood land (say YC=8). Lifetime Cost saving = £8m (discount rate 6%).

Scenario 2-

1MW factory on oil emits 1000t CO₂ per year. Offsets emissions by afforestation => it's net emissions = zero. It has to plant 8ha of mixed broadleaf woodland every year. It needs 640ha to be set-aside for it for 80 years. Lifetime extra cost = £8m (discount rate 6%).

Box 1. Comparison of afforestation and substitution of fossil fuels by woodland.

Thus the CO₂ mitigation benefit is threefold:

- First, substituting energy-intensive products (e.g. concrete, steel) leads to indirect replacement of fossil fuels.
- Secondly, the use of biomass can substitute fossil fuel CO₂ emissions to the atmosphere. In any lifecycle analysis this is by far the major benefit.
- Third, wood products can be re-used or used as bioenergy at the end of their life cycle, additionally displacing the use of fossil fuel, and additionally preventing landfill.

Scientifically speaking if existing forests are managed for production they are likely to contain less carbon than if protected. The extraction can result in reduced biotic and soil carbon in the short term, but this recovers during the rotation to new equilibrium in the long term, if managed in a sustainable way. That said the displacement of fossil fuel far exceeds this loss.

4. What policy is needed?

Scotland is the only northern European country without a significant biomass industry. Most other countries have achieved good results in 10 years – but it needs significant vision and long term support. The following are given as a few suggestions to stimulate debate.

Forestry Commission

- Continuing ban on use of indigenous forestry for co-firing. It is a very bad use of fiber.
- FE and other bodies (Woodland Trust) to adopt more flexible planting to allow bioenergy as well as timber products and demonstrate best practice.
- Forest expansion to at least 25% cover must be pursued vigorously.
- Shift funding from SRC establishment - look at thinning for bioenergy grant particularly form under-managed woodland.
- Support community woodfuel initiatives- e.g. allow CWA to buy equipment etc.
- Faster adoption of Woodfuel heating in all offices and visitor centers

Scottish Government

- Renewable heat obligation of at least 5%. Should be 10% for the public estate in the short term rising to 20% later.
- Continue Scottish Biomass Support Scheme for 2-3 years (£5-10m needed per year). This is of sufficient level to mainstream the industry. At this point the market is strong enough to allow LAs to proscribe biomass heating in developments.
- Each local authority to be obliged to put in 1MW of wood fuel now. This will mean the whole country is on the road to being covered by a good network of suppliers.
- Planning authorities to only grant application to plant with >60% efficiency for CHP and >85% for Heat.
- Level the playing field with respect to ROCs.
- Position statement on the importance of renewable heat and wider benefits of biomass.

Forestry Policy Group

- Write an open letter to FCS with recommendations, write it in layman's terms, make it just a little bit challenging beyond what they are already doing, stress the importance and press release it
- Feed the recommendations into the Scottish Forestry Forum and SFS Implementation Plans to move wood energy up the agenda.

References

Carbon Trust, Paul Arwas Associates and Black & Veatch Ltd. (2005) *Biomass Sector Review for the Carbon Trust*. Carbon Trust: London.

Clegg, J. (2006) Forecast Availability & Demand For Coniferous Roundwood & Sawmill Co-Products In Scotland & Northern England To 2016. Available: www.confor.org.uk

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