

Royal Society of Edinburgh Energy Enquiry

Written Submission by The Buccleuch Estates Limited

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Summary

The main points that are raised by this consultation response are summarised as follows:

- The production of electricity is only a small part of the UK energy efficiency and supply equation. To concentrate renewable and efficiency efforts primarily in this sector will not produce significant outcomes.
- A strong reliance on imported gas could result in the UK becoming an “energy hostage”.
- The large scale move towards wind power should not be regarded as being the solution to future requirements given the environmental impacts and inefficiency of wind turbines.
- Renewable energy sources and energy efficiency should be more readily catered for in the Planning and PFI legislation.
- Scotland can, and should be a market leader in the generation and use of renewable energy, but with solutions that are more efficient and varied than simply wind power.

Introduction

Initially in this paper we have sought to consider the wider energy sustainability issues, then moving on to focus on the specific stakeholder questions.

Scotland’s energy needs can essentially be broken down into four areas:

1. Electricity
2. Transport
3. Process Heat (Heat energy required for manufacturing processes)
4. Domestic Heating and Hot water

These areas each have their own particular mechanisms and problems. To date the majority of effort and government attention to combat energy security and climate change has focussed on the electricity market. This does however, account for only about 17% of primary energy production and is the smallest of the four areas above. If 100% of our electricity came from renewables, it would only have the effect of reducing our carbon output by around 20% (electricity producing more carbon per KWh than the other three).

However, to take these four areas separately:

1. Electricity

Regarding electricity production in the UK, it is probably worth putting it in some context following the White Paper produced by the DTI in 2004:

- All existing power stations (coal, nuclear and gas), with the exception of Sizewell B nuclear station, will close by 2020, with many of the coal and nuclear going off line by 2015.
- This is as a result of their differing working lives ending in a similar period. (Coal fired stations =40-50 years, nuclear=40 years and gas 25 years).
- Coal and nuclear have been abandoned as energy sources and the DTI's prognosis is that by 2025 some 80% of UK electricity will come from gas and the rest from renewable energy, mainly wind power.
- The gas is proposed to be 90% imported, primarily from Russia via pipelines that have not yet been built.

There are several serious concerns about this scenario, not least the security and cost of the gas supply.

In addition, many of the UK's major utilities are now either owned or strongly affiliated to foreign suppliers and are also in the private sector (with a greater emphasis on profit). The Electricity Act of 2000 started the New Electricity Trading Arrangement system for energy trading and established OFGEM to control prices. Since then a number of coal and nuclear plants have closed and excess capacity has been reduced from 30% to below 10%. The coal and gas stations that have been closed are being dismantled rather than mothballed and soon the UK is likely to either face hikes in energy costs or shortfalls in energy supply. Consequently this has left the UK government with some fairly blunt instruments with which to encourage foreign private sector utilities to invest in new plant, such as gas-fired power stations. Unfortunately so far there have been no takers.

Traditionally, the UK has had an enviable balance of different energy sources that will soon disappear and be replaced with a significant dependency on supplies of foreign gas.

2. Transport

All transport fuels are fossil fuel based and there are no mechanisms in place, nor targets for reduction or acceptable alternative technology to replace this scenario in the near or medium term. This market is just under 30% of our primary energy use.

3. Process Heat

Process heat is normally created using fossil fuels (with possibly the exception of aluminium production). Each process is different and large plants are often committed to carbon reduction measures either through the EU Energy Trading Scheme

(EUETS) or specific Climate Change Arrangements traded against a reduction in the Climate Change Levy. Mechanisms therefore are in place for reduction of carbon in these single, generally very large plants with the EUETS already making a significant impact with Emission Reduction Units. These are trading at around 20 Euros which is proving to be enough to trigger carbon reduction measures on behalf of the producer.

4. Domestic Heating and Hot water

There are no targets for reduction in the space heating and domestic hot water market specifically. Energy efficiency measures are promoted and there are ad hoc schemes to promote the use of renewables in houses and/or energy efficiency measures. Domestic Heating and Hot water and the Process Heating market accounts for around 55 – 60% of the primary energy use in Scotland.

Consequently, this situation would suggest that the focus of a government strategy for the reduction in carbon emissions and for the greater production of renewable energy should be concentrated firstly on the Domestic Heating and Hot Water Market, followed by Process Heat and then Transportation.

Stakeholder Consultation Questions

How should Scotland provide for its energy needs over the next 5, 15, 30, 45 years in the context of the likely UK, European and global energy environment?

Electricity

Reliance on any one form of energy production would be unwise in terms of protecting the energy supply chain. The United Kingdom should seek to develop as wide a range of options as possible with generation types including small nuclear, hydro, biomass, wind and wave. This will allow a gradual phasing out of fossil fuels.

Sight should not be lost, however, of the need to protect the integrity of the natural environment when seeking to establish environmentally-friendly renewable energy production facilities. The inappropriate location or scale of wind or wave generators can result in a degradation of the visual quality of an area, together with degradation of the local biodiversity. Given the very low energy efficiency rates of these systems, the negative impact does not need to be very significant before the loss to the environment locally outweighs the “green credentials” of the plant.

Transport

This is perhaps the most difficult market to find alternatives for. Towards 2050, it is likely that hydrogen based fuel systems will be in operation, but a sea change will have to take place before then, both in terms of acceptable technical alternatives and user perception. Taxation of road usage may make public transport more attractive. The greater use of public transport systems may stimulate investment into the infrastructure to perpetuate their use (E.g. Singapore, Hong Kong, Kuala Lumpur, Shanghai etc)

Process Heat

The EUETS will have a significant impact on the carbon emissions from even the original group of industries specified in the scheme, who account for 50% of the Europe’s carbon output. The extension of this scheme to cover more diverse and complex areas will invariably have a further impact. Planning law and taxation may be brought in to require producers of waste heat to seek users of this heat before planning can be given. This mirrors successful mechanisms already in place in Scandinavia (E.g. Copenhagen district heating scheme which uses a combination of power station waste heat and process waste heat to provide heating to around 80% of all Copenhagen’s buildings). The climate change levy and its consequent agreements can be extended to promote further carbon reductions. These mechanisms have been shown to work and need only be expanded to make better use of resources and reward highly efficient processes and penalise those that are not. With moderate changes to these mechanisms, this area of energy use can provide greater savings with little or no public funding compared to the combined resources currently being spent to promote renewable energy.

Example: Waste heat from distilleries to heat local homes, hospitals and schools (E.g. Wick). Power producers should be taxed or penalised for not using waste heat. It does not make sense to us that the Lockerbie wood fired power station will generate 45MW of electricity, but 135MW of heat is simply being wasted.

Heating of Premises

Please refer to the “40% House” Report by the Environmental Change Institute of the University of Oxford (www.eci.ox.ac.uk/lowercf/40house.html#report). This sets out a simple mechanism for the reduction of carbon emissions from households by more than 60% (a greater effect than having 100% provision of electricity from renewables). In addition to this, there should be the promotion of wood fuel as a short and medium term solution for heating of large new build premises and any large new housing development. For instance, the new PPP and PFI contracts, worth billions of pounds, are unable to promote the use of renewables in their construction due to the way that the legislation is fixed. This should be changed so that any new build public building should have a requirement to at least evaluate their heating requirements using with some form of renewable energy (wood, ground source heat pumps, waste heat from local processes, small scale wind, solar, etc). All this technology is available, is cost effective and requires no direct public funding if stipulated in the PPP or PFI documentation.

If planning laws were changed to require all developers to use energy efficient district heating in any development of more than 6 houses or to show 30% renewables involvement, as is required in Sweden, then there would be similar development of highly energy efficient systems. This would also act as a catalyst for developers and process heat users to work together wherever possible.

Should Scotland aim to be self-sufficient in energy in general, and in electricity in particular, despite trends towards interdependence within Europe?

There is little possibility of us becoming self sufficient in transportation fuels and electricity. Scotland must have a sensible balance of renewables and nuclear. However, there are significant changes that can be made in our use of energy in the home, in the use of waste heat and in the reduction of energy use for process industry. This will reduce the reliance on gas and make us far less energy dependent. The North Sea oil production is sufficient to cover our reliance on transport fuels for the present and with more stringent building regulation, the energy use per house in Scotland should strive not to exceed 5,000KWh of energy per annum. This is consumed mainly by heating and hot water and is equivalent to 1.5 tons of dry wood. Scotland grows in excess of 6,000,000 dry tons of timber sustainably each year and this is sufficient to heat and provide domestic hot water to every single home and premises in Scotland. This is before we include energy crops.

In terms of renewable electricity, Scotland has the potential to be a major contributor to the UK renewables pot given the abundance of natural resources. The incredible geographical and population diversity of the country dictates that no one supply solution will suit all applications, and assessing local solutions will be an essential part of any successful strategy.

What are the possible implications and consequences for Scotland, and the UK, of becoming increasingly reliant on imported oil and gas for their energy needs?

As outlined in our introduction, there is a risk that the United Kingdom could become energy hostages in terms of supply and cost. Increases in global terrorism and a continuing move towards independence for states within the former Soviet Republic are destabilising factors that are already impacting on UK energy production costs. A dependency on Russian gas is not a firm foundation for a G8 member nation to base its future prosperity on.

What are the likely trends, and uncertainties, in the availability and cost of energy sources over the next 20/45 years?

It is without doubt that energy costs will rise ahead of inflation, as it is an indispensable commodity for which demand is ever increasing, yet the primary production factors (fossil fuels) are decreasing in availability. The replacement production options (renewable fuels) have higher production costs per unit of energy given their relative inefficiencies.

In terms of fossil fuel replacement though, small scale renewables should not become more expensive. For example, ground source heat pumps are very efficient, requiring only a third of the energy required in the home to operate them and the resource is endless. Wood and household waste will also become an energy commodity. Solar arrays may well be common place (as they are in Denmark), with large arrays heating whole townships. As the cost of fuels rise (promoted by the inevitable energy shock when we are held energy captive for the first time) then simple economics will dictate that it is cheaper to install a solar panel and a ground source heat pump than it is to burn oil or gas. In addition, gradually there will be less use of cars as fuel becomes too expensive or in short supply and a move towards public transport.

What are the key issues surrounding the development of Scotland's bulk electricity transmission and local distribution systems?

The perception certainly is that they are old and insufficient to carry the increasing load and demand, and that there will certainly need to be some upgrading. Consideration also needs to be given to some simple procedures and facilities for plugging local and small scale electricity producers into any grid system, to better account for the diversity of supply needs and power production possibilities within Scotland.

What will the impact of energy availability and price be on the demand for energy by commerce and industry in Scotland?

Energy, as a percentage of unit cost of production in Scotland, is likely to be far less than it is in low labour cost production facilities in the Far East where more than 60% of all products are now manufactured in some way shape or form. The Far East is also energy dependent and we are not. The low cost advantage of the Far East will

therefore be lost. For this reason, Scotland with a sensible application of its renewable resource, could find its products more on a par with those produced in other countries. There will also be more local production and manufacturing due to the cost and availability of shipping.

Part of the solution is for Scotland to develop a thriving alternative/renewable energy market, which will reduce the reliance on fossil fuels for processing and manufacturing, and enable industry to remain competitive. In particular, attention should be given to wood fuel which is the only fuel which is manufactured (in the loosest sense of the word) through the processing of the timber. The employment creation and sustainability this would generate in one of Scotland's primary industries would help to put a firm base into the production and manufacturing sector. Our home grown material is sufficient to heat every single household in Scotland - and domestic heating accounts for around 40% of our entire primary energy use.

What are the likely trends in the domestic demand for energy for space heating and other purposes? What would need to be done to achieve major savings? What are the investment costs?

Generally there is an increasing demand for new homes in Scotland as the population grows, combined with the continuing move towards more fragmented family units as detailed in the 40% House Report. However, as the vast majority of these homes will be new-build, the increased number of houses will be somewhat balanced against the greater efficiencies and lower energy requirements being built into new properties following revisions in the technical standards. However, there are still a great many energy inefficient properties that will be difficult and costly to improve and there are even some that may never be tackled given complications around their design or construction methods. This is particularly relevant in the case of many of Scotland's Listed Buildings. However, the combination of good thermal insulation and design to maximise solar gain as well as the vast range of renewable products available to households to heat these premises will mean that this is one of the areas which is easily tackled.

As mentioned above, the real way to achieve major savings is to provide legislative change to PPP and PFI contracts requiring them to install renewable energy systems. The other is to create a system of Hot ROCs (obligation for renewables for heat). This mechanism could be easily introduced. By registering or accrediting providers of metered hot water (as one has to do for Clear Skies or SCHRI installations), the provider then meters energy and provides a carbon audit (similar to trading Carbon Offsets or Emission Reduction Units). The Climate Change Levy provides money into HM Customs and Excise for the provision of carbon reduction schemes and it would be possible to bid into the CCL pot for the anticipated Emission Reduction Units for that year. The CCL would provide a certain amount of money for this scheme and the number of units bid into this pot would determine the number of pence per KWh that the accredited party receives. The CCL legislation is written to allow this sort of scheme and the other mechanisms are already in place to provide precedence.

Alternatively, a change to planning legislation would be required for developers to show massive carbon savings in anything but very small developments. This is

possible to achieve using district heating schemes, renewables and waste heat systems.

What are the likely trends in the demand for energy for transportation in Scotland? What is the likely time-scale and scope for substituting other power sources for fossil fuels? What are the likely investment costs?

The low population density of Scotland, its rural nature and the relative lack of motorways, public transport and general infrastructure are likely to keep transportation costs at a high (and increasing) level, especially given the price pressures currently affecting fuel.

The technology for bio fuels and biodiesel is well advanced on the Continent (and to a limited extent in the south of England from oil seed rape). It is a matter of time before it becomes more widely available, but this process could be advanced significantly if a political will was attributed to its development and roll-out. Left to the oil companies, progress will be slow given the direct competition it represents to their current core products on the forecourt. Fiscal policies and fuel taxation will also play an important role.

What are the environmental concerns that need to be taken into account, in terms of the impact on ecological and other natural resources, as well as waste management and impacts on the landscape?

The potential landscape impacts from renewable developments are paramount, particularly from large wind farm developments. The suggestion that wind farms provide power free of greenhouse gas pollution is severely undermined by the visual pollution and degradation of the rural environment. This, together with the fiscal and energy costs of their construction, the inefficiency of their energy production and the issue of dismantling and disposal at the end of the working life severely dents their green credentials.

Other carbon reducing measures are less controversial in terms of any environmental concerns. The current use of waste heat systems and district heating schemes is virtually non-existent, as are heat pumps and small biomass systems, yet these are no more visually intrusive than a LPG tank. Waste incineration rather than landfill would also be more visually acceptable with the waste heat being used to lower our carbon footprint.

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