RSE Inquiry into Scotland's Energy Supply until 2050

In answering these questions, we have attempted to concentrate on a Scottish focus. However, given that energy is largely a reserved matter, with Scotland having devolved powers over aspects such as planning and energy efficiency, it is often hard to consider Scotland in isolation from the UK. The Scottish Green Party believes that Scotland should have control over its own energy policy.

1. 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?

Scotland, and indeed all developed nations, should first focus upon reducing energy demand, particularly by reducing the energy used in transport and increasing the energy efficiency of buildings and industrial processes. We believe the principles of Contraction & Convergence, whereby the developed nations reduce their emissions drastically while developing countries are permitted a modest increase. This should result in energy equity at vastly reduced global levels.

We should aim to produce all of the energy we require from a diverse mix of renewable sources - solar, hydro, wind, tide, wave, geothermal and biomass - ending our current dependence on fossil fuels. We do not believe that nuclear power is necessary or desirable as part of the transition away from fossil fuels.

We also have to move away from the centralised electricity transmission structure that we currently rely on. The domestic sector should be encouraged to install a minimum proportion of micro-generation, perhaps using 2-way metering as a means of encouragement. New housing schemes should be built around district heating systems and business can move to more efficient, local means of electricity generation, such as combined heat and power (CHP).

To date, much of the focus on renewable 'energy' has been on electricity, which is only responsible for one-fifth of our energy needs. For the reasons given below, we believe that a 50% reduction in electricity use by 2020 (30% by 2015) is achievable and necessary for UK renewables to supply 100% of the UK's electricity. We also believe that targets should be set to chart progress.

Transport accounts for around three-quarters of our energy demand and is much more important to deal with in light of climate change and rising oil prices. Transport policy in Scotland is currently focused on facilitating economic growth at all costs, and supporting ever increasing private car use and aviation. This must change.

<u>Electricity</u>

According to Shetland Islands Council (press release, 6 July 2005), a "600 MW windfarm in Shetland (based on a very prudent 45% load factor) would produce 2,365 GWh of electricity. This would be enough to fulfil the domestic needs of more than 1.2 million people, or around 22% of Scotland's population. This is equivalent to 6.6% of the UK's 2010 renewable energy target and would result in an annual saving of over 2 million tonnes of CO2 from being released into the atmosphere". While this might be a large windfarm, when considered alongside efficiency and the mix mentioned above, it is clear that renewables can be made to work. However, we believe that windfarms should be smaller and more local and we hope to see a move away from very large windfarms, such as those proposed for Lewis and Shetland. The key to making renewables work is to develop a mix of locally-appropriate technologies, designed to meet a reduced demand.

We do not see nuclear energy as a solution to our energy needs. When the Government published its Energy White Paper in February 2003, Energy Minister, Brian Wilson, said: "If renewables and energy efficiency can prove themselves over the next five years there will be no need for new nuclear power stations." Three years on and things aren't looking too promising for renewables. Nuclear power is costly, creates radioactive waste and requires another non-renewable resource - uranium. Unless high-quality uranium ores are used, which by their very nature are in shorter supply than lower grades, the generation of electricity by nuclear power emits as much CO_2 as fossil fuel plants. Yet nuclear power is seen by some sectors as a possible solution to climate change, a viewpoint we do not share.

In 2001, the Scottish Executive said that the renewable potential in Scotland is 59.1GW [1]. This is equivalent to 216 TWh of energy delivered. The grid study commissioned at the same time by the Executive shows that the network can connect around 1GW of new capacity without upgrades. This is more than enough to satisfy the Executive's target for renewables of 18% by 2010. The cost of upgrades required to increase the capacity available is under £200m.

Potential for electricity self-sufficiency (Scottish Executive, 10/12/2001)

In December 2001, Ross Finnie said of the Executive's renewable potential report:
"This hugely significant study outlines the breathtaking scale of Scotland's renewable energy potential and vindicates our strongly held belief that we are ideally placed to benefit from the sustainable energy revolution. The scale of this potential is illustrated by one stunning statistic: there is enough potential energy from onshore wind power alone to meet Scotland's peak winter demand for electricity twice over. In all, the total resource amounts to 75% of the total UK existing generating capacity".

Mr Finnie also announced the publication of a second study examining the Scottish electricity grid. This study confirms that there is enough capacity available at present to allow the Executive's targets for renewable energy to be met. Welcoming the opening of the Green House, Mr Finnie added:

"Natural Power are to be congratulated for the creativity and innovation which we can all see here today. I urge the rest of the Scottish renewables industry to step out of the shadows and join the mainstream of energy production".

The Scottish Executive study indicates that nearly 60GW of new renewable energy generating capacity could be available in and offshore Scotland at under 7p per unit in 2010 (including connection costs but not grid strengthening costs), as shown in the table below. For comparison, the total UK installed generation capacity is around 80GW, while the total amount of electricity supplied in a year is around 390TWh [1].

Gross (2004) says the UK has a practicable potential to meet 230TWh per year using renewable energy [2]. This is a more recent UK study and obviously England & Wales have more renewable electricity potential than 14TWh. However, the levels given in the Gross study assume a constrained build rate and no network reinforcement for onshore wind, and biomass (energy crops) figures are based on conservative assumptions for land availability. So they may be more realistic than the Executive's 2001 figures.

According to Gross [2], UK electricity demand is 320TWh per year and the UK has a practicable potential to meet to 230TWh. Based on these figures, the UK should be aiming to reduce its electricity demand by around 30%, as shown below:

320 (current UK electricity demand) - 230 (UK renewable potential) = 90 / 320 = 0. 28 or **a 28% reduction in current demand to make a realistic renewable supply mix work**.

Renewable alternatives to electricity are more developed and currently more feasible than similar moves to tackle the even bigger transport problem. Therefore, we call for electricity demand cuts of 50% and we believe that, with sufficient investment, this can be achieved by 2020 with a 2015 target of a 30% reduction.

As for baseload, the economically recoverable marine resource for the UK has been estimated by Ocean Power Delivery at 87TWh per year [3], or approx. 25% of current UK demand. This potential could be realised by 2020 with sufficient investment, although we still need to assess the environmental impacts on marine ecosystems. Again, the more local generation the less demand for baseload.

Residential appliances and equipment use 30% of all electricity generated in OECD countries [4]. Assuming that the electricity generation and industry sectors make up a large part of the remaining 70%, while promoting marine renewables for baseload, we also stress the urgency to localise the grid, encourage 2-way metering systems & microgeneration, install district heating, and significantly increase CHP, especially for industrial processes.

<u>Transport</u>
Congestion charging might be good for removing traffic from certain areas, but it does not reduce overall traffic levels. Fuel price rises impact on the poorer sectors of society, especially those in rural areas with no alternatives. Congestion has been estimated by the DTI to cost the UK economy £20 billion per year, as well as causing pollution and health problems [5].

If we are to take our future energy needs seriously, transport is one of the biggest challenges ahead. A sustainable transport system would meet the basic transport needs of every member of society with minimal environmental impact. This not only requires serious investment into public transport, but changes to the planning system to re-introduce local business and high-street shops, better communities where people don't need to travel so far to get to work or school or to buy food.

While this might require significant Government financing, the 5-mile extension to the M74 is estimated to cost £1 billion. The UK government has accepted in the region of £5 billion in financial responsibility for British Energy's liabilities (mostly waste management & decommissioning costs). The new Government body, the Nuclear Decommissioning Authority, which came into being in April, has taken on the liabilities of BNFL and UKAEA, which are thought to amount to some £48 billion [6]. The money could be found if sustainable development were a top priority.

We believe that there should be no new investment in nuclear power, 6-lane motorways or airport runways (with the possible exception of flights serving the Scottish Islands) so we can invest in renewable electricity infrastructure and public transport now. It is clear that we have the resources and it clear that we have to act now to tackle climate change and to better prepare for escalating oil prices and resource depletion.

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

As stated above, Scotland has plentiful renewable energy resources, and should therefore be able to be self-sufficient in electricity and for reasons of security, Scotland and the UK should strive to be self-sufficient in energy. Oil production from the North Sea has peaked and we are fast becoming a net importer of energy (e.g. LPG at Milford Haven). The better a range of indigenous renewable forms of energy the more secure our economy will be. This study looks to 2050 - we do not feel qualified to predict either the state of the climate nor the price of a barrel of oil in 2050.

In addition to the resources, Scotland has the technical and engineering skills to lead the world in renewable energy and efficiency development. This will create employment here, and will help the developing world to develop without falling into the fossil fuel trap as we have done.

3. 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?

The primary implication and consequence of continued or increasing reliance on oil and fuel is the production of emissions that cause climate change, thus threatening our coastal and low-lying areas with flooding, bringing about more frequent and more damaging storms, and causing unpredictable changes to Scotland's ecosystems, thus threatening agriculture, rural livelihoods and the economy. Relying on imported fossil fuels will decrease our ability to buffer against price rises as these resources grow more scarce. Our grandchildren will consider us foolhardy and negligent.

Energy Supply

4. What is the feasibility, availability, reliability, sustainability, efficiency, capacity and risks of the different energy generation technologies?

The use of fossil fuels for energy production is not sustainable. It is an easy and reliable solution in the short term, but as supplies reduce it will become increasingly inefficient. The risks of climate change are high. The only sustainable way forward is to diversify into renewables, and research is needed into the relative benefits, under the criteria listed, of solar, hydro, wind, tide, wave, geothermal and biomass, all of which are likely to be highly geographically variable (for example, the Highlands would d o well to move towards biomass and sustainable forestry, while the more densely populated areas should look to a mix of micro-generation and tidal baseload). We need to adopt a different kind of energy strategy, that is predicated on minimising need, and instead of centralised planning, adopts an approach that facilitates locally appropriate developments of energy generation and use.

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

Fossil fuels will becoming increasingly scarce and expensive. Some renewables will benefit from economies of scale and reduce in unit price, and their relative costs will decrease. Their availability, by definition, will continue irrespective of use. The wind and tides will not run out, the sun will continue to shine, oblivious to our photo-voltaic capacity.

6. What are the economic issues of capital investment in the supply and distribution of energy that need to be considered?

Capital investment needs to be redirected from the few to the many, and from the large to the small. Every means possible should be sought to facilitate individuals, households, communities and small enterprises in taking responsibility for energy production and energy savings. As stated above, large amounts of capital are available for new roads and runways, and despite the costs of our current nuclear liabilities, there are many who see no alternative.

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

As much as possible, electricity should be generated close to where it will be used, reducing the need for transmission with its accompanying losses and inefficiencies. However, most energy use is in the south of the country, whereas a great deal of the windy and wet renewable resources are in the north of the country and around the coast. We should seriously investigate the potential for an undersea 'ring-main' around the coast, into which electricity generation schemes could connect from the west, north and east coasts, the Western and Northern isles and from offshore generation, without requiring huge unsightly pylon developments through the less populated and scenic parts of the country.

Energy Demand

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

Price rises and fiscal measures should be used together to force rapid and ongoing increases in uptake of energy efficiency technologies and reduction in consumption of energy, particularly from non-renewable sources.

9. 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?

Massive investment in building energy efficiency is needed, and legal measures will be needed to enforce maximal energy efficiency (e.g. design for passive solar heating) and energy production (e.g. solar panels) in all new-builds.

10. 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?

If the Scottish Executive continues its current road-building programme, transport energy requirements will continue to increase, and therefore we need a sustainable transport strategy that helps people and goods to transfer from fossil-fuel intensive transport to renewable-energy powered alternatives. These will include the use of renewably generated electric-powered public and private transport, and the use of hydrogen fuel cells and biofuels. We need also to encourage the use of local resources, such as food, to reduce road-miles, and redesign our communities to make it easier and safer to walk and cycle. We need to encourage Scots to holiday here, rather than burning jet-fuel for tourism, and to maximise the use of telematic working to reduce work travel.

Environmental and Social Issues

11. 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?

An energy strategy needs to have a consideration of climate change at its heart, and a recognition that burning fossil fuels is placing an insupportable burden on the active carbon pool in the atmosphere and biosphere. This burden cannot be offset by modifying our management of the biosphere by, for example, trying to increase the rate of carbon sequestration in trees, or by trading carbon allowances with less developed countries. Such approaches risk perpetuating 'business-as-usual' and mask the need for energy demand reduction.

An energy strategy needs to recognise the potential threat of climate change to current ecosystems and, using the precautionary principle, seek to minimise that threat. It should also seek to minimise pollution of air, water courses and soils from the use of any energy source, including the cumulative impact of multiple developments in a given area.

There would be a lot of merit in any strategy which identified what energy we need (after demand reduction), what the environmental impacts are going to be of the technology mix chosen to meet that demand and what the capacity of the environment is to absorb these impacts. Badly planned windfarm applications have alienated sectors of society and led to a back-lash against wind power. We cannot afford for marine energy technologies to face a similar fate.

12. Can the objectives of environment improvement and economic growth both be met without a major increase in energy costs? What steps should be taken to enable an informed debate on the issue?

Avoiding further environmental degradation is just as important as 'environmental improvement'. 'Economic growth' is not a universally held objective, and the nature, geographical distribution and social role of economic growth needs to undergo a huge shift in Scotland: from the few to the many, from the large to the small.

Perhaps rising energy prices will be one way to help to achieve this shift, and so perhaps they are an opportunity as much as a threat. It is true that a wide debate is needed, and the most important voices to be heard in this debate are those of people who suffer fuel poverty and those who are not treated as stakeholders by the energy industry. One step that is needed is a Scottish Energy Strategy, debated in the Scottish Parliament, aiming to give 'power to the people', though a process of reform and restructuring of the energy sector.

Public education and understanding will be a vital part of our future energy strategy. If measures such as carbon rationing are required to tackle climate change and to reduce our dependency on oil, it will be imperative that people understand why such measures are needed.

13. What are the social values and consequences of energy generation and distribution on employment opportunities, health, and energy affordability?

Our core energy values should be that - all energy should be renewable - energy generation and use should be as local as possible, minimising transmission and transport consumption; and - energy distribution and the distribution of its benefits should be egalitarian.

The consequences of these values are that all Scots should have the chance to produce energy and to share in the economic benefits of energy generated within their local community. Maximising small-scale renewable generation, increasing capture of solar power on roofs, for example, would generate a raft of employment opportunities throughout Scotland. The development of marine renewables has been estimated to be able to create

7,000 jobs. The restructuring of transport to maximise cycling and walking would be good for the nations health. Redesigning our communities to maximise availability and use of local energy and other resources such as food, would invigorate them both economically and culturally.

We thank you for the opportunity to take part in this enquiry and confirm that this submission may be made publicly available.

Yours sincerely

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References

[1] From: http://www.scotland.gov.uk/pages/news/2001/12/SE5008.aspx

Technology	**Generation (GW)**	**Energy (TWh)**
Offshore Wind	25	80
Onshore Wind	11.5	45
Wave Energy	14	50
Tidal stream	7.5	33.5
Agricultural wastes	0.4	3.5
Small hydro	0.3	1
Energy Crops	0.14	1.1
Forestry Residues	0.09	0.7
Total	**59.1**	**216**

[2] Gross, R., 'Technologies and innovation for system change in the UK: status, prospects and system requirements of some leading renewable energy options', Energy Policy vol. 32, no. 17, Nov. 2004.

[3] From http://www.oceanpd.com/Resource/default.html

[4] http://carroll.org.uk/archives/2005/05/25/leaked-g8-draft-climate-decisions/2

[5] CBI press release, 27 October 2003 "Government failure on transport is tarnishing UK as a place to do business"; "Road congestion costs up to £20bn each year".

[6] The Independent, Sunday 10 October 2004