Issues for Scotland's energy supply
Royal Society of Edinburgy Inquiry

Response from Friends of the Earth Scotland

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?

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

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?

Friends of the Earth Scotland (FoES) welcomes the opportunity to contribute to this Inquiry. Our submission is framed very much in the context of climate change and the urgent need to change patterns of energy generation and use in order to reduce climate change emissions.

The Royal Commission on Environmental Pollution recommend that the UK government take steps to cut carbon emissions by 60% by 2050[i]. The UK Government Energy White Paper took on board this recommendation. It is essential that Scotland makes an equitable contribution to the UK government's commitment under Kyoto to reduce greenhouse gas emissions by 12.5% against 1990 levels by 2008-2012. The Government also made a manifesto commitment to reducing greenhouse gas emissions by 20% by 2010, which it is aiming to honour.

To date Scotland has achieved a reduction of just 4.9% in greenhouse gas emissions since 1990 (less than half the 12.8% average achieved by the UK as a whole)[ii] and is not on track to deliver our share of the UK commitment of a 20% reduction by 2010 or 60% by 2050. The urgency with which we take action to reduce climate change emissions should not be underestimated; for every year that we fail to address the challenge, the scale of the resulting threat increases.

Emissions from the energy sector in Scotland comprise 34% of Scotland's total emissions and have risen by 27% between 1990 and 2000. In order to meet climate change targets, securing a significant proportion of energy supplied from clean renewable sources is essential. This must be coupled with setting

greenhouse gas emissions reductions targets for Scotland. The Scottish Parliament Environment Committee echoed this in its recent Climate Change Inquiry. FoES is calling for a target of 3% year on year reductions of greenhouse gases.

By 2020 there will be significant changes to the mix of generation plant in Scotland, with the expected closures of Cockenzie, Longannet and Hunterston power plants. This should be seen as a great opportunity to switch from centralised, non-sustainable fossil and nuclear sources of power to a full mix of renewable energy technologies on a variety of scales (from domestic micro-generation to large scale offshore wind farms) backed up by an ambitious national programme of energy efficiency across all sectors.

Friends of the Earth believes that there is no case for new nuclear power generation in Scotland; on economic, safety, liability or environmental grounds, and that there must be a planned phase-out of fossil fuels in order to combat climate change.

A very high priority must be given to demand side management. Energy efficiency and conservation programmes are widely recognised as the most immediate, most economically efficient and least environmentally damaging means of mitigating greenhouse gas emissions. They make economic, environmental and social sense. Reducing energy demand cuts all the emissions associated with energy. On a social level, without greater energy efficiency the eradication of fuel poverty would involve substantial increases in energy consumption and CO2 emissions. To the extent that it is cost effective, energy efficiency and conservation contribute to improved economic efficiency, reduce household energy bills and improve business competitiveness. Manufacturing and installing energy efficiency measures creates more jobs than supplying the energy in the first place[iii]. Reducing energy consumption enhances energy security and increases flexibility.

Furthermore, it is widely accepted that more than half of the greenhouse gas savings that are necessary for the UK to meet its various targets will have to come from improving our energy efficiency. Every scenario in the UK Energy White Paper ascribes at least twice as much carbon saving to improving energy efficiency compared with renewable sources of electricity: in one scenario the difference is 4:1. In order to meet these aspirations we need a halving of rates of our energy intensity (energy consumption/GDP). If the UK, and Scotland, are serious about energy efficiency, it is unacceptable that the UK languishes in 14th place in an OECD “top twenty” list of countries graded on energy intensity levels.

Friends of the Earth Scotland believes that the energy efficiency target of a 20% increase in efficiency by 2010, and doubled by 2020, as recommended by the UK Government Performance and Innovation Unit (now known as the Strategy Unit)

should be adopted in Scotland and that the operation of the Home Energy Conservation Act (HECA) must be reformed.

A combination of energy efficiency and a diversified energy generation system based on renewable technologies would have very many benefits for Scotland. Renewable energy is a relatively labour intensive way of generating energy, giving the potential for job-creation. Generating energy closer to its end use means less lost in transmission and would help overcome some of the current inequities in geographical spread of energy generation and use. Renewable energy would give Scotland more self-sufficiency in production, leaving us less vulnerable to the geo-politics of energy and price rises over which we have little control. Overall, a future energy policy based solidly on energy use reduction combined with renewable energy production would be a positive step for Scotland's economy, population and environment.

Energy Supply

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

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

As our introduction states, FoES believes that Scotland's future enegy needs should be met with a combination of energy demand reduction plus a full mix of renewable energy sources. There is no case to be made for new nuclear power stations. Nuclear power has been suggested as a solution to climate change and energy security. FoES believes that it is neither. A recent report from the New Economics Foundation (NEF) found no substance to claims that nuclear power might be poised to make a come-back[iv]. The timescale required to build new nuclear power stations is incompatible with the need to act to curb climate change emissions. NEF's report also found that the UK nuclear industry has systematically underestimated the cost of new nuclear power – by almost a factor of three – and finds attracting investment on the open market almost impossible. The issue of management of radioactive waste has yet to be resolved (if indeed it ever is). The combination of these factors, plus its public unpopularity makes it a non-starter.

Coal plant without abatement equipment will be forced to close by, at the latest, 2015 by the Large Combustion Plant Directive. Stricter emission restrictions on the power sector to enable the UK to meet 2010 targets for the National Emissions Ceiling Directive will also come into force. Loss of capacity in nuclear and old coal can be compensated for by increased renewables and Combined Heat and Power, together with cleaner, more efficient gasification plant. Gasification technology also allows 'dirtier' forms of coal to be used, meaning

domestic coal can once again compete with imported low-sulphur coal with positive benefits for security of supply. Gasification technology should be viewed as bridging the energy gap in the short term while renewable energy technologies come to full commercialisation.

Scottish targets for renewable energy generation should be extended and toughened. Existing targets of 18% of electricity by 2010 and 40% by 2020 should be revised upwards to 25% by 2010 and 50% by 2020 and supported by strong strategic planning guidance and measures to stimulate further private sector investment in the mix of renewables necessary to deliver a sustainable energy future.

With around 23% of the total European wind energy resource, a very large part of the UK's marine energy resource and opportunities for biomass, the potential for renewable energy development in Scotland is enormous. A Scottish Executive commissioned report by Garrad Hassan estimated that Scotland could generate more than its total electricity use from renewable sources without damaging any designated nature conservation areas. Using up-to-date information on each resource, modelled against economic, environmental, planning and technical constraints, the study estimates the renewable energy potential both on and off-shore Scotland to be 75% of the UK totalled installed capacity (59 of 79 GW)[v]. Scotland currently generates just 13% of its energy needs from renewable sources, the majority of which comes from hydro[vi].

Garrad Hassan have identified onshore wind as one of the cheapest of the renewable energy technologies with the "available" 11.5 GW (i.e. over twice the consumption of electricity in Scotland) modelled at under 3 p/kWh in 2010. They also note the huge marine potential from offshore wind, wave and tidal (46.5 GW at under 5-6 p/kWh in 2010).

A report produced in June 2005 by the Forum for Renewable Energy Development in Scotland (FREDS), advisors to the Scottish Executive, outlined Scotland's renewable energy potential particularly in relation to reaching the Executive's aspiration of reaching 40% of electricity generated by renewables by 2020. If this paper has not been submitted to the RSE Inquiry, Friends of the Earth Scotland would highly recommend that a copy is sought and taken into consideration[vii]. One of the conclusions in the report was that there are no technical constraints to the achievement of the 2020 renewable electricity target. The report stated that: "Scotland is well placed to meet its renewables targets, perhaps before 2020, and could aspire to a greater renewables capacity if that we considered desirable."

The report from Garrad Hassan to the Scottish Executive, mentioned above, lists the potential of the main renewable energy technologies, giving an indication of the size of the resource and, where possible, an estimate of costs p/kWh for 2010 (at an 8% discount rate). This is attached as an annex to this submission.

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

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

FREDS has recommended to the Scottish Executive that 6GW renewable installed capacity is needed in order to reach the target of 40% renewable electricity by 2020. In its report, FREDS states that: "It is technically feasible for the amount of renewable generation that we recommend to be contained on the electricity without threat to security of supply."[viii] A further conclusion of the report is that: "up to 4.8GW of installed renewable capacity, over and above what has already been installed and consented, could be achieved from the transmission upgrades for which Ofgem has already proposed a funding mechanism. However, further upgrades may be required depending on the locations where generation is consented or to accommodate additional generation and/or to reduce constraint costs." Some grid investment will be necessary to ensure that communities in rural Scotland can benefit from renewable energy developments and that offshore wind and wave energy schemes are facilitated.

Energy Demand

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

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?

The residential sector is responsible for 27% of UK emissions by final user[ix]. The average SAP for the existing housing stock is a SAP of 45 compared to approximately SAP 95 for new build housing[x]. Best practice reaches SAP 115 on a scale that goes up to 120. House builders still need to be driven to further improve standards in new buildings, while the largest absolute potential for emissions savings is in existing buildings.

The principal piece of legislation on the statute book in Scotland relating to energy efficiency is the Home Energy Conservation Act. This Act should be reviewed at its current half way stage since most local authorities are failing to meet both the original and renegotiated (mainly reduced) aspirational targets which the Act set. The latest figures released from Communities Scotland[xi] show that:

• two thirds of local authorities are not on course to reach their own energy efficiency improvement targets;
• four authorities (Borders, East Dunbartonshire, East Lothian and Highland) are not even a third of the way to their targets;
• of the ten local authorities on track to meet their targets, half (Dumfries & Galloway, East Renfrewshire, North Ayrshire, North Lanarkshire, Perth and Kinross) had their original target reduced by half or more, and so the remaining target is unambitious.

The EU Directive on the Energy Performance of Buildings requires, among other aspects, that whenever a building is constructed, sold, or rented out, a certificate detailing its energy performance must be made available. The aim of the Directive is to improve awareness of energy use in buildings, and thereby encourage investment in energy saving. In order to facilitate comparison between buildings the certificate must include reference values and must also include recommendations for cost effective changes to improve energy performance. The Directive also requires prominent labeling of 'buildings visited regularly by the public'. The Scottish Executive should take a lead in ensuring the widest possible application of this provision to help raise public awareness of energy efficiency, and indeed to help highlight where enterprises are wasting money and passing this on to customers.

The Directive must be in place in member states by 4 January 2006. Member states have the option, however, of derogating the Directive for three years if they believe there are insufficient qualified or accredited experts (in the whole of Europe) to carry out the certification. Despite the fact that the Directive needs to be in place in member states by January next year we are still to see details of any firm plans as to how the Executive will implement these requirements. We are highly concerned that the energy certification requirements will likely be derogated since we believe that this will delay rather than resolve the issue: it is highly unlikely that people will undergo or establish training until there is a job for them to do. The Scottish Executive has been aware of the Directive for several years now and has not brought forward means to resolve the training issue. Energy certification provisions should be included in the Private Housing Bill and implemented as soon as possible.

Friends of the Earth Scotland would also like to see the introduction of sanctions for breach of the energy certification and labeling requirements (eg similar to the fines associated with failing to tax or insure your car) and a means of gathering and recording energy certification information on a local authority and national basis. The latter would provide far more accurate and extensive information on the Scottish housing stock, particularly private housing, and enable the adaptation of policies on the basis of this.

In addition to the measures above we are looking to the Scottish Executive to include various measures within the forthcoming Housing Bill. This Bill would be the ideal mechanism to introduce the aims mentioned above of a 20% improvement in energy efficiency in the domestic sector by 2010 and a further 20% by 2020. We would also support the introduction of a requirement for landlords to self certify, or provide evidence in the form of their energy certificate, that they meet certain thermal efficiency levels, at the very least that they meet the requirements of the recently amended Tolerable Standard, and over time that they also meet the Scottish Housing Quality Standard. In terms of the Tolerable Standard we have concerns that the thermal efficiency component is going to be set at NHER 2. Only 8% of the stock is currently at NHER 2 or less, at this level many cost effective improvements would be lacking, and thus a higher tolerable standard should be adopted in the interests of emissions cuts and environmental justice.

FoES acknowledges that the current Part J of the Building Standards require some of the most demanding levels of thermal insulation for building fabric in the UK, and have more recently included minimum requirements on services like boiler and lighting efficiency. Over the next few years the aim should be to ensure that Scotland has building regulations on a par with the most rigorous in Europe. The next review of Building Regulations, due in 2007, should take the opportunity specifically to more fully extend building regulations to refurbishments, and to incorporate renewable generation technologies. We recognize the need to avoid creating a disincentive to refurbishment, but believe that where refurbishment is carried out the Building Standards should be applied to the whole building to stimulate uptake of cost-effective efficiency measures. Serious consideration should be given to other means to incentivise improvement of the existing stock, including interest-free loans (particularly marketed to those buying or renting property), and embedding Building Standards for existing property such that upgrades are required at change of ownership.

Nine tenths of existing houses fail to meet current new build building standards, and at the current rate of building it will take 100 years until the Scottish Housing Stock is up to the current standard for new build. The average SAP of existing houses is 45, and of new build 95. The aim should be for building standards to be repeatedly strengthened to encourage house builders to develop low, or even zero, carbon homes. Studies have shown that there is also a need for better training of builders installing insulation since much insulation is being installed to a sub standard[xii].

If appropriate incentives and time frames are factored into the process, there is no reason why building regulations should not be raised to the most rigorous European levels, and extended to ensure introduction of household renewables and microgeneration widely across the building stock.

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?

The transport sector accounts for 14% of Scotland's greenhouse gas emissions and 23% of climate changing carbon dioxide emissions. Emissions from the transport sector have increased by 8% in Scotland since 1990[xiii]. 17 Road traffic is the second fastest growing sources of greenhouse gas emissions and the Scottish Executive's Transport Delivery Report produced in March 2002 acknowledges that "action is required now to prevent rising carbon dioxide emissions from road transport." Indeed the UK Climate Change Strategy requires that the transport sector delivers 40% of the UK's proposed reduction of CO2 levels by 2010.

Despite a commitment from the Scottish Executive to stabilise road traffic levels by 2021 at 2001 levels there is no strategy to do this and no interim targets and without action traffic levels are forecast to grow by 27% over the 20 years to 2021[xiv]. In practice traffic levels rose by 4.9% in the first two years after 2001. It is essential that the stabilization target date be brought forward.

Although alternative fuels and more efficient vehicles can help limit transport sector emissions, it is essential that traffic volumes are controlled if absolute emissions levels are to fall. Friends of the Earth Scotland sees some potential in development of biofuels and hydrogen fuelled vehicles, but only if hydrogen can be derived from renewable sources. The Executive could provide greater leadership on vehicle efficiency by mandating public procurement practices across the public sector.

Executive transport policies are predicated on a false assumption that growth in transport, and investment in transport infrastructure – especially to support road and air traffic – is beneficial to the economy. This is an item of faith which is no longer valid. In particular, further investments in road capacity, rather than traffic management and congestion charging, simply redistribute economic activity – and tend to do so to the detriment of already disadvantaged locations.

Aviation is the fastest growing source of climate change gases and it has been predicted that by 2030, 25% of the UK's carbon emissions would come from air travel alonehttp://www.scottish.parliament.uk/business/committees/environment/reports-05/rar05-05-vol01-03.htm - _ftn11. The Scottish Executive is subsidising this industry through the Route Development Fund. The Route Development Fund has been set up to increase the number of direct flights to Scotland. The UK Government's leading environmental advisory body, the Royal Commission on Environmental Pollution (RCEP) highlighted the inconsistency of facilitating growth in air transport with climate change and sustainable development. The RCEP concluded that the failure for the air transport industry to pay for its

external costs through an aviation fuel tax or an emissions charge represents a "large subsidy at the expense of other modes of transport."

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?

As stated at the beginning of this submission, climate change must be the overriding factor in making decisions about energy supply in Scotland. However, other environmental impacts of energy generating technologies must also be taken into account. Nuclear power brings with it the intractable problem of radioactive waste. Radioactive waste can harm people and the environment. Nuclear waste remains dangerous for thousands of years and some waste will remain lethal for millions of years. High levels of radioactivity will kill, while lower levels can lead to cancer and birth defects. There are around 470,000 cubic metres of radioactive wastes in the UK for which there is currently no long term solution. This amount will increase as nuclear power stations reach the end of their lives and are decommissioned. FoES believes that no new nuclear reactors should be built.

There are concerns in Scotland about the siting of windfarms. 20% of Scotland's electricity needs could be produced by on-shore wind over an area less than 2% of Scotland. Scottish Natural Heritage has devised a set of 'locational guidelines' for the siting of wind farms to ensure that they do not encroach onto designated natural sites. It is important that there is strategic guidance from the Scottish Executive to provide a clear framework within which renewable energy developments take place, in order to protect Scotland's wider environment. FoES has no reason to believe that, were this to be the case, then Scotland's electricity needs could be met without threat to its natural heritage.

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?

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

The development of renewable energy provides excellent economic pportunities for job creation and the exporting of new technologies. The European Commission estimates that a doubling of energy from renewables from 6% to 12% could create between 500,000 and 800,000 new jobs. The UK, and Scotland in particular, is ideally placed to capture many of these jobs. Scotland has skill bases in both the traditional heavy industry and new hi-tech sectors that would be necessary to develop and manufacture renewable technologies. The

NOI Scotland factory in Kirkcaldy currently employs 90 people to manufacture wind turbine blades and the Danish wind turbine manufacturer Vestas currently employs over 100 people at Campbeltown in Kintyre.

Ocean Power Delivery (Scottish developers of wave power technology now operating on a commercial scale in Portugal) estimate that a significant wave power installation programme in Scotland would lead to around150 long-term direct jobs for each 10 MW/year of installed capacity[xv] and potentially it is estimated that between 750 and 1000 direct jobs per 100 MW/year of export sales could result[xvi].

A recent report produced for WWF Scotland 'A Smart, Successful, Sustainable Scotland: the potential for green enterprise and green jobs' estimated that over 24,000 jobs could be created from investing in wave power and solar water heating [xvii]. The UK Renewables Advisory Board has recently suggested that up to 35,000 new jobs would be available in the UK renewable energy sector by 2020 as a result of a viable, long term renewable energy industry[xviii].

ANNEX

SCOTLAND'S RENEWABLE RESOURCE
2001 – EXECUTIVE SUMMARY
produced by Garrad Hassan for the Scottish Executive

KEY CONCLUSIONS

A stacked cost-energy curve for the Base Case scenarios modelled is shown overleaf. It shows costs for 2010 at 8% discount rate. Key conclusions are as follows:

• **Onshore wind**: the resource is widespread and is the cheapest of the renewable energy technologies considered, with the "available" 11.5 GW modelled at under 3 p/kWh *in 2010 at 8% discount rate, and excluding certain network costs*, and under 4 p/kWh at a 15 % discount rate. On the basis of cost, it can be expected to contribute to the bulk of near-term government targets. This 11.5 GW is modelled in just under 2% of the area of Scotland. Analysis shows that while any one constraint may not compromise policy targets, their *cumulative* effect is significant.

• **Marine technologies** (offshore wind, wave, tidal): the resource is very large – a total of 46.5 GW were modelled at under 5-6 p/kWh in 2010 at 8% discount rate (and about 1.5 p/kWh higher at 15%). The grid on the West and the North coast is a severe limitation to exploitation – local network constraints limit the total available to around 7 % of the total without network reinforcement . Constraints to development are less well understood for these technologies, as are costs. More work needs to be undertaken to understand and avoid unnecessary conflicts. Demonstration schemes are required to improve cost estimates for wave and tidal.

• **Small hydro**: also a relatively small resource, and mostly in SSE's area. Costs are more widely spread than for other technologies and were modelled at up to 7 p/kWh. Nonetheless there are rural development benefits to be gained from exploitation. Environmental and regulatory pressures could restrict development of the resource identified.

• **Landfill Gas**: also a relatively small resource, but cost-competitive in the near-term with modelled costs all under 3 p/kWh. There is a strong environmental rationale for its exploitation and can provide baseload output.

• **Biomass** (forestry residues, energy crops, agricultural wastes): individual resources arerelatively small, but could be increased by expanding and combining fuel sources. The modelled resource totalled 0.63 GW, but due to the lack of data, not all potential sources were considered. Opportunities for energy crop cultivation hinge on the relative economics of alternative land use options. There are economic benefits, particularly in the forestry and agricultural sectors, to be gained from biomass exploitation, and it can provide baseload output.

• **MSW**: again, a relatively small resource with the potential very much contingent on waste management policy developed at the Waste Strategy Area level. For both biomass and energy-from-waste, new gasification and pyrolysis technologies promise improved efficiencies, greater flexibility and (of relevance to

MSW) lower environmental mitigation costs.

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[iii] SiD (1999), Green Jobs: Sustainable Job Creation in the European Union
[iv] New Economics Foundation: Mirage and Oasis; choices in an age of global warming – the trouble with nuclear power and the potential for renewable energy. June 2005.
[v] Garrad Hassan 2001. Scotland's Renewable Resource 2001. Report produced for the Scottish Executive.
[vi] Scottish Executive – Electricity Generating Companies – Key Scottish Environment Statistics 2002.
[vii] Forum for Renewable Energy Development in Scotland, Future Generation Sub-Group. Scotland's Renewable Energy Potential: realising the 2020 target. Scottish Executive, June 2005.
[viii] Ibid
[ix] Scottish Executive, 2004, Review of the Scottish Climate Change Programme
[x] Buildings Research Establishment (BRE), 2005, Submission to Environment and Rural Development
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[xi] Communities Scotland / Scottish Executive (2005), Third HECA Progress Report for the Scottish Parliament
[xii] Buildings Research Establishment (BRE), 2005, Submission to Environment and Rural Development
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[xiii] Scottish Executive, 2004. Review of the Scottish Climate Change Programme, A Consultation.
[xiv] Scottish Executive, 2002. Scotland's Transport: Delivering Improvements.
[xv] OPD estimates based on quoted costs. Figures are comparable to those of early Danish wind energy industry.
[xvi] OPD estimates based on quoted costs and realistic work share between local and remote sites. Figures are comparable to a mature Danish wind energy industry.
[xvii] A Smart Successful Scotland, the potential for green enterprise and green jobs prepared for WWF Scotland by CAG Consultants. 2003.
[xviii] UK Renewables Advisory Board (2004). 'Renewables Supply Chain Gap Analysis' http://www.dti.gov.uk/energy/renewables/renewables_uk/publications.shtml