Scottish Wildlife Trust

Policy

Energy and nature conservation

Scope of this policy

1. Energy is a complex policy area which encompasses not only electricity generation but also the direct use of a variety of sources of energy for transport, heating and other domestic and industrial purposes. This policy considers all these areas in relation to nature conservation in Scotland. It also includes the important issues of energy consumption (by end users) and energy efficiency.

2. It is beyond the scope of this policy to explore *all* the factors requiring consideration when formulating a strategic energy policy. Instead, it focuses primarily on both the direct and indirect impacts of energy policy on Scotland's wildlife (species, habitats and the landscapes in which they exist), and advocates policies which the SWT believes will help mitigate such impacts. It is also mindful that energy policy decisions made in Scotland affect wildlife on a UK, European and global level as energy is both exported from, and imported into, Scotland.

3. This policy is based on the currently available information and will be need to be revised as our knowledge of emerging renewable and other technologies develops.

Policy Statement

Overview

4. Energy utilisation can impact both directly and indirectly on wildlife, at local, national and global levels. Direct impacts include the loss or severe modification of habitats and ecosystems through pollution and through infrastructure developments, including power stations, the transmission infrastructure, renewable energy devices and installations, transportation systems and the mining of raw materials. The main indirect impact is from increased greenhouse gas (GHG) emissions leading to climate change.

5. To tackle these impacts, Scotland has to balance the aim of progressing rapidly towards a low carbon economy with the need to safeguard ecosystems already under pressure from climate change. SWT therefore supports targets of *at least* a 30% reduction in carbon emissions in Scotland and across the European Union by 2020, and *at least* an 80% reduction in Scotland by 2050[1]. However, these targets should not be achieved at the expense of biodiversity loss.

6. SWT believes that a substantial reduction in energy demand and consumption must be the first priority of Government energy policy in Scotland; just as it should be in other countries. Only in

[1] The baseline for these figures is the 1990 levels (the 'Kyoto baseline')

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this way can the severe and irreversible impacts of climate change on biodiversity and ecosystem functioning at local, national and global scales be mitigated.

7. SWT believes Scotland needs to rapidly develop a more diverse energy portfolio, which should include a range of current and emerging renewable technologies (see Annex 1). By combining a drive to reduce energy demand with the development of renewables, particularly offshore wind energy, Scotland should be able to progress towards a truly sustainable energy model by the middle of the century.

8. SWT believes that in dramatically cutting its carbon emissions, Scotland will send a positive message to other countries which may then be encouraged to act in a similar way. In moving towards a greener energy base, Scotland will be at the forefront in the development of pioneering new technologies which if exported could help reduce harmful carbon emissions globally.

Reducing overall energy consumption and improving efficiency

9. SWT believes that reducing Scotland's energy consumption and increasing energy efficiency should be one of the first priorities of Government policy and legislation on energy issues. A new Energy Efficiency Agency for Scotland (EEAS) should be set up to deliver a coherent suite of energy efficiency policies under a comprehensive energy efficiency strategy for Scotland. Included in this suite should be financial incentives and regulation, educational initiatives, best practice guidance, encouragement of new technologies and information sharing. Policies devised by the EEAS should draw on current successful initiatives[2] in Scotland and elsewhere and cover business, household, transport and public sectors.

10. SWT believes that individuals and organisations have a direct responsibility to reduce their energy consumption; Government should help make this as easy as possible, for example through policies which incentivise both producers and consumers to switch to maximum efficiency domestic appliances, phasing out the stand-by function on new appliances and making smart metering and real-time energy use displays available to everyone.

11. SWT notes that around 29%[3] of Scotland's energy demand and 17% of GHG emissions[4] arise from transportation and that impact from this sector is continuing to increase. Rigorous policy efforts by Government will be required to reduce these figures in line with emissions targets. SWT believes that policy priorities for Government must include:
    - using policy and financial instruments to encourage a fundamental shift in modes of transport from roads to rail and other forms of public transport;
    - decreasing year on year the distance travelled by both people and goods in Scotland;
    - increasing investment to develop new cleaner vehicle technologies including hybrid vehicles;
    - incentivising the rapid replacement of traditional vehicles with maximum fuel efficiency models;
    - setting and delivering ambitious targets for increasing the number of local journeys made by cycling and walking;
    - setting and delivering ambitious targets for reducing carbon emissions from the aviation industry;
    - improving strategic transport planning.

[2] For an innovative housing example see A' Chrannag Tower in Glasgow http://www.rias.org.uk/content/default.asp?page=s27_5
[3] 2002 figure quoted in Scottish Executive (2006) Scottish Energy Study: summary report.
[4] Scottish Executive (2006) Changing Our Ways: Scotland's Climate Change Programme. The 17% figure excludes emissions from aviation which make up around 2% of UK GHG emissions.

12. SWT notes that other European countries with a similar climate to Scotland have buildings that are significantly more energy efficient. Raising building standards to German or Scandinavian levels alone could save around 20% of domestic energy consumption[5]. SWT also advocates significantly improved and properly enforced Building Regulations at local authority level to improve energy efficiency.

13. SWT believes there are energy efficiencies to be gained from introducing measures to reduce low occupancy private car use and increase the number of people travelling in high occupancy private vehicles.

14. SWT believes that there are also substantial energy efficiencies to be gained from utilising energy which is currently wasted as heat from industrial processes, including electricity generating stations. Government policies should ensure that industry utilises as much waste energy as possible. New small and medium scale plants should be designed in a way that enables heat as well as power to be distributed efficiently to end users.

15. SWT notes that the amount of electricity lost in transmission increases with transmission distance. The amount of transmission infrastructure required also increases when large-scale electricity generation schemes are sited in areas remote from main centres of demand. SWT therefore proposes that, in most circumstances, large-scale generating capacity (including larger onshore windfarms) should be sited close to Scotland's larger towns and cities. In the case of remote offshore windfarms, subsea transmission cables should usually be the first option.

The electricity generating portfolio

16. SWT believes that Scotland should move quickly towards an electricity generating portfolio which sharply reduces carbon emissions and at the same time has low, or negligible, ecological impacts. To achieve this, SWT recommends a phasing out of polluting coal and nuclear fission technologies and the development an energy portfolio based on offshore and onshore wind and wave power, clean natural gas, existing hydro power, new small scale hydro developments and decentralised energy systems.

17. SWT does not therefore support any replacement to Scotland's nuclear power plants at Hunterston B and Torness[6], nor the principal coal and co-fired fired power stations at Longannet and Cockenzie unless proven, truly clean coal technologies are rapidly developed.

18. SWT does support the continued generation of electricity from natural gas at Peterhead as this will help with baseload requirements and is a cleaner option than coal. However, all gas power stations in Scotland should be fitted with carbon capture and storage technologies as soon as practicable.

19. SWT believes that given effective political leadership and financial support, the electricity generated in Scotland could largely be sourced from renewables as early as 2025 (see Table 1 and Graphs 1 and 2 in Annex 1 for an example of a potential future energy portfolio based largely on renewables). Further policy positions on the various sources for electricity generation are provided elsewhere in this paper.

[5] Royal Society of Edinburgh (2006) Inquiry into Energy Issues; summary report.
[6] Torness is due to close in 2023 and Hunterston B in 2011

20. SWT recognises that shifting towards a renewables based portfolio could result in a greater chance of an intermittent electricity supply. We believe this can be mitigated through a range of measures including:
    - siting offshore wind and wave facilities in a range of different geographical areas,
    - importing energy from England and Northern Ireland through the national grid when demand is high and generation is low (and exporting when generating capacity is high),
    - retaining a large gas power facility at Peterhead,
    - exploring the potential to develop new hydro based pump storage stations which use surplus wind and wave generated electricity,
    - maintaining the strategic reserve at the coal fired power station in Methil.

Nuclear power

21. SWT recognises that the two currently operational nuclear power plants at Torness and Hunterston B supply over one third of Scotland's electricity generating capacity. These plants are likely to remain key contributors to Scotland's energy portfolio until they are eventually decommissioned in 2011 and 2023 respectively. After decommissioning, SWT believes that no further nuclear power stations should be built in Scotland because there will be numerous other energy options available which will have less impact on both biodiversity and the wider environment. The biodiversity impacts of building and decommissioning new nuclear power facilities are often hidden with the lifecycle of the plant but can be significant and include direct impacts of uranium mining, quarrying and transportation of building materials, localised water abstraction and thermal discharges. There are also indirect impacts from GHG emissions over the lifecycle of the plant to consider. These are generally higher than renewable alternatives[7], particularly if energy-hungry uranium enrichment is required. On balance, based on the direct and indirect impacts to biodiversity, SWT advocates the replacement of Scotland's nuclear power plants with lower impact renewable energy alternatives.

Bioenergy

22. SWT cautiously supports the carefully considered and strategic use of bioenergy as a small contributor to Scotland's energy portfolio. SWT proposes that the three main sources of bioenergy in Scotland (wood based fuels, conventional crops[8] and agricultural wastes[9]) can all make a contribution, but particularly the utilisation of forestry residues and low grade timber for small scale combined heat and power in those parts of Scotland with extensive woodlands. However, it is essential that any expansion of bioenergy does not impact on areas of existing biodiversity value, whether these are designated sites, Local Nature Conservation Sites or simply patches of surviving semi-natural habitat.

23. SWT does not support the setting of binding targets at national or European levels for the amount of bioenergy to be used in petrol and diesel as this is likely to result in significant loss of valuable wildlife habitats and current carbon sinks in other parts of the world. Of critical concern is deforestation in Malaysia and Indonesia for palm oil plantations. SWT believes that arbitrary targets could also potentially cause wildlife loss in Scotland if bioenergy crops are extensively planted without careful planning that takes account of biodiversity.

24. SWT therefore urges that both the scale and methods of bioenergy generation at local and national levels should be planned strategically and designed sustainably to ensure *real* GHG

[7] W. Krewitt, P. Mayerhofer, R. Friedrich, A. Trukenmüller, T. Heck, A. Greßmann, F. Raptis, F. Kaspar, J. Sachau, K. Rennings, J. Diekmann, B. Praetorius (1998) *ExternE - Externalities of Energy. National Implementation in Germany*; IER, Stuttgart.
[8] Includes sugar beet, cereal crops, sorghum, oil seed rape, linseed and sunflowers.
[9] Includes cow and pig slurry and poultry litter.

emissions savings are being made. Most importantly, this means minimising the use of inorganic and organic fertilisers and other energy expended in the production pathway.

25. SWT believes that the location of bioenergy crops must avoid areas where:
    - a net increase in GHG emissions results either from release of stored carbon and/or from the production and transportation of fertilizers and pesticides;
    - terrestrial and aquatic biodiversity is adversely affected; and
    - soil structure and function is adversely affected or erosion and sedimentation are increased.

26. SWT supports the development of minimum environmental standards and best practice guidelines for all bioenergy crops to ensure that terrestrial and aquatic biodiversity is enhanced rather than depleted as a result of bioenergy developments. These standards should be linked to conditions of agri-environment and forestry measures and grants. For wood based bioenergy they should comply with the UK Forestry Standard and the UK Woodland Assurance Standard where relevant. This would help ensure the appropriate species choice, location, design and management of bioenergy woodlands. In particular, it is vitally important that ecologically valuable deadwood within existing woodland is not depleted and that opportunities for the creation of habitat networks or for large-scale re-wilding and landscape restoration projects are not threatened.

27. SWT advocates that planting of wood based bioenergy should wherever possible increase the functional connectivity between habitats within landscapes through buffering, extending and re-connecting vulnerable semi-natural habitats.

28. SWT supports the use of recycled cooking oil and tallow as a source of bioenergy.

29. SWT does not support the use of peat for bioenergy under any circumstances.

Onshore wind

30. SWT recognises that onshore wind farms are amongst the most established of renewable technologies and supports their development as part of Scotland's energy portfolio. But they must avoid sites where there would be unacceptable modification, loss or fragmentation of important species, habitats or ecosystems, in line with the criteria set out in our policy on The Planning System 2006. SWT remains concerned that certain current wind farm proposals, if consented, could have severe impacts on nationally important wildlife areas[10].

31. SWT believes that wind farms should preferably be sited in areas where management access is already established and levels of current and/or historical anthropogenic disturbance to wildlife are already high.

32. SWT will not support wind farms where the cumulative impacts of several adjacent developments close together results in a loss in the integrity of an ecosystem through, for example, displacement of key species, habitat fragmentation and direct habitat loss.

33. SWT believes that although certain parts of the country may be more strategically suited to wind farm development, each individual application should be carefully assessed for its potential environmental impact before consent is granted. To minimise the need for additional transmission infrastructure, we also recommend that where possible wind farms should be located relatively close to large centres of population.

[10] See for example SWT's objection to the Lewis Wind Farm proposal http://www.swt.org.uk/Downloads/03_d_LewisObjectionLetter.pdf

34. SWT suggests that habitat enhancement measures should be a requirement of all planning consents either through conditions or legal agreements. In addition, all wind farm operators should be strongly encouraged to enhance the surrounding landscape for wildlife, for example through the creation of functional habitat networks.

Hydro power

35. SWT believes the opportunities for the construction of new large-scale hydro plants (including pumped storage facilities) are probably limited, given their potential to seriously alter the ecology of freshwater systems and their catchments. However, some new developments may be ecologically acceptable in a few carefully selected areas. Any proposals would require rigorous assessments of site and catchment suitability before proceeding beyond the feasibility stage.

36. SWT supports sensitively designed and located small-scale hydro electrical generation schemes for mainly local supply. Developers should demonstrate they have considered and solved mitigation issues relating to disruption of seasonal river flows, sedimentation/deposition or erosion, river temperature patterns and the passage of migratory organisms and pollutants (both up and down stream). New small-scale hydroelectric schemes should be planned strategically to avoid cumulative impacts on wider river basin ecology and management. Ideally, such developments should only proceed once an integrated catchment management plan is in place.

Offshore wind

37. SWT believes there are significant environmental and economic opportunities for Scotland if it utilises its pre-eminent position as one of the most favourable environments for offshore wind power generation in the Europe. SWT notes that the estimated potential exploitable capacity for offshore wind exceeds 25 gigawatts[11]. Even if only half this capacity were to be exploited, offshore wind could potentially contribute over 40,000 gigawatt hours per year, more than the projected electricity demand for the whole of Scotland by 2020[12] even without factoring in savings from reducing energy demand. Government should encourage investment in offshore wind power through an ambitious range of policy measures and adjustments to economic instruments.

38. SWT believes that subject to the adoption of rigorous best practice, electricity generation from offshore wind could be amongst the least ecologically damaging of all renewable technologies. We note there may even be positive effects on marine biodiversity through the creation of 'artificial reefs' on turbine substructures. However, SWT urges that detailed and objective environmental impact assessments should always be made prior to consent, particularly in areas of high seabed biodiversity or where there are important migratory or resident sea bird populations. Potential impacts on the marine ecosystem which need to be fully assessed prior to development include:
    - the direct habitat loss associated with pile construction and cable laying on biodiverse areas of the sea bed;
    - changes in sedimentation patterns;
    - changes in turbidity and suspended sediments, particularly during construction;
    - the impact of noise, vibration, lighting and electromagnetic effects on marine mammals and larger fishes; and

[11] Garrad Hassan (2001a). *Scotland's Renewable Resource 2001: Volume I - The Analysis*, Garrad Hassan and Partners Ltd.
[12] Scottish Executive (2006) Academic Study: Matching Renewable Electricity Generation with Demand: Full Report

- bird strikes.

39. SWT advocates a sustained increase in investment in research and development of offshore wind technology, including the testing of large turbines (3 megawatt plus) located in deep water and distant from shore.

Wave power

40. SWT supports the development of wave energy devices and believes they can play a significant part in delivering Scotland's renewable energy portfolio. As with offshore wind, the exploitable capacity of wave power in Scotland is potentially very high at around14 gigawatts or 45,700 gigawatt hours per year[13] and recent technological advances[14] are promising. Although on current knowledge the environmental impacts of wave power appear slight, SWT believes that more research on potential impacts should be carried out before large-scale developments are permitted.

Tidal barrages, impoundments and tidal stream devices

41. At the present time, SWT does not support the deployment of tidal barrages, impoundments or tidal stream devices in Scotland because the potential impact on marine biodiversity of tidal rapids (a UK BAP habitat) is unacceptably high. Impacts on species and ecosystems could include:
    - creation of a physical barrier to marine mammals, fish and other aquatic life;
    - collisions of marine mammals, fish, diving birds and other aquatic life with turbines;
    - changes in water levels and possible flooding affecting both aquatic and shoreline ecosystems;
    - changes to the quality of the water in the basin or estuary including increased sediment, and loading affecting turbidity of the water and causing ecosystem instability.

42. SWT advocates continued research into these potential technologies, particularly tidal stream devices which, if the environmental impacts are proven to be within acceptable limits, could in the near future contribute significantly to Scotland's renewables portfolio.

Hydrogen

43. SWT believes that there are significant technological and economic hurdles to be surmounted before hydrogen can be considered as a major contributor to Scotland's energy portfolio. These hurdles are unlikely to be surmounted on a sufficient scale within the time frame required to tackle global climate change. In the long term, if Scotland goes on to develop surplus energy from renewable sources, some of this energy could be used to produce hydrogen in order to 'store' transportable power.

Geothermal

44. SWT notes that ground source heat pumps (GSHPs) are a clean, reliable, proven[15], cost effective and very efficient alternative to other forms of heating in domestic and commercial premises. GSHPs have very limited impact on biodiversity and so are therefore strongly supported by SWT. Around 80% of our household energy use goes to space and water

[13] Scottish Executive (2006) Academic Study: Matching Renewable Electricity Generation with Demand: Full Report
[14] For example the *Pelamis* wave energy device. See http://news.bbc.co.uk/2/hi/uk_news/scotland/3514259.stm
[15] Sweden has over 230,000 GSHPs, the US over 600,000 as compared to only 300 in the UK. Monbiot, G (2006) Heat. Penguin Books.

heating yet in Scotland the current contribution of geothermal power is negligible[16]. SWT believes the Government should develop and implement targeted policies, advice and incentives to encourage GSHP schemes in the majority of new domestic and commercial buildings in Scotland.

Small-scale decentralised systems

45. SWT supports the development of small electricity generating technologies such as solar photovoltaics, passive solar heating systems, individually and community owned wind turbines (where they have been proven to function well) and district and micro combined heat and power (CHP) systems. The direct impacts of CHP systems on wildlife tend to be very low where little or no new land is developed and transmission infrastructures are low impact and local in scale. Futhermore, CHP systems are often at least twice as efficient as large-scale power stations. SWT believes there is huge potential for building in such systems to both new and existing housing and commercial developments and that Government should strengthen policy and legislation to encourage this.

SWT priorities for action

46. SWT will continue to advocate the principles outlined in this policy statement to Government, the business sector, the wider public and other key stakeholders to promote less ecologically damaging and more environmentally sustainable energy policies.

47. SWT will cut its own energy usage and improve efficiency across the business as part of the implementation of a wider 'greening' initiative currently being developed for the organisation.

Cross-reference to other related SWT policies

The Planning System (2006)

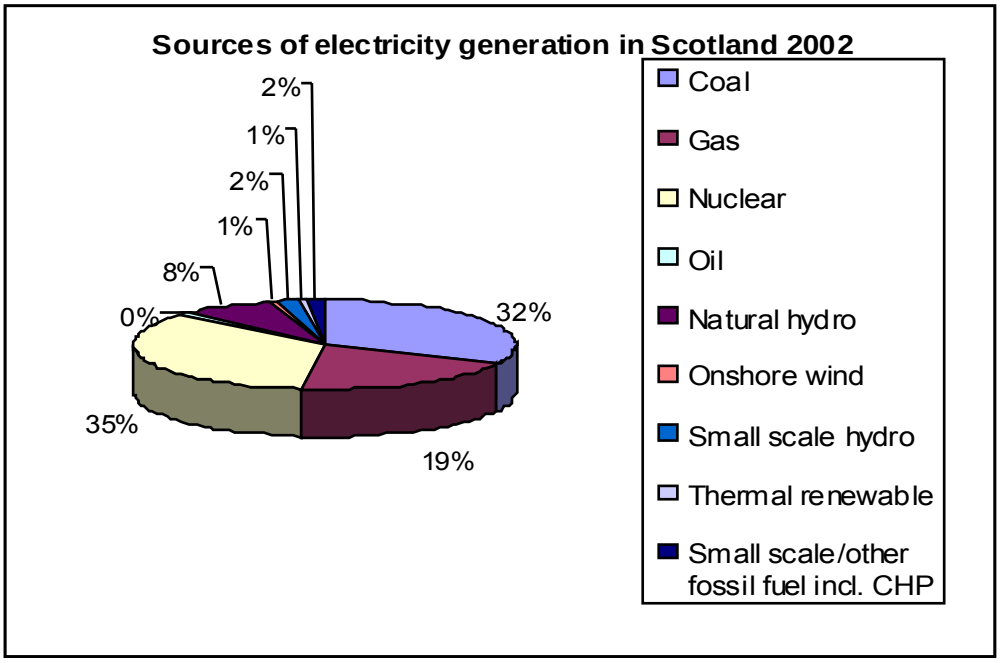
[16] McLoughlin, N (2006) SPICE Briefing on Geothermal Heat in Scotland. Scottish Parliament. http://www.scottish.parliament.uk/business/research/briefings-06/SB06-54.pdf

Annex 1: An Electricity Portfolio for 2025 that would protect biodiversity

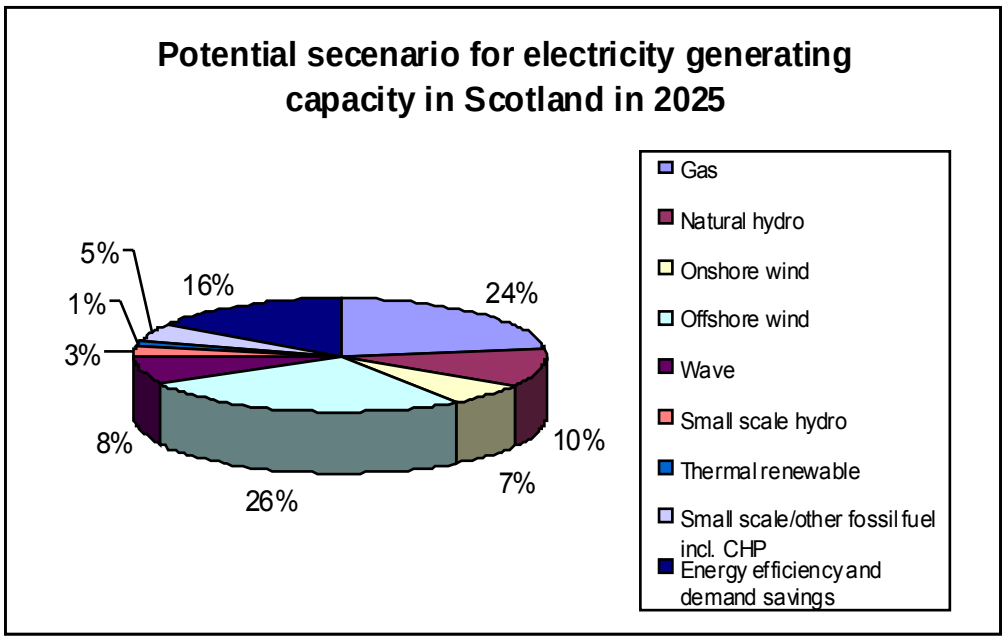
Note the following Table is one example potential scenario only. These figures are likely to change as technologies develop and our understanding of baseload requirements improves as the use of renewables increases.

Table 1	Electricity generating output portfolio 2002 Gigawatt hours	SWT 2025 portfolio(approximate) Gigawatt hours	Notes
Coal	14,776	0	Could be possible to continue with coal fired stations if proven, truly clean coal technologies are developed.
Gas	8,847	9,000	Required to help with 'baseload' capacity. Preferable that clean technologies should be developed including carbon capture and storage
Nuclear	15,863	0	
Oil	186	0	
Natural hydro	3,693	3,800	
Onshore wind	406	2,000 - 3,000	Conservative estimates given environmental and social constraints
Offshore wind	0	8,000 - 12,000	Estimated future capacity is much higher but deep water technologies still in development. Will require Government incentives to be economically competitive.
Wave	0	2,000 - 3,000	Technologies looking increasingly promising but will require Government incentives to be economically competitive.
Small scale hydro	762	1,000	
Thermal renewable	237	500+	Includes solar photovoltaics and ground source heat pumps
Small scale/ incl. CHP	747	2,000+	Conservative estimate which could be significantly more given strong Government policy incentives
Energy efficiency and demand savings	0	6,000+	Demand to 2025 is actually set to increase but with climate change a pressing issue there is an imperative that cuts in demand are made
Total	**45,517**	**37,900**	
Pumped hydro	622	622	New pumped storage facilities could be developed to help with potential intermittency problems
Electricity to pump water	-829	-829	
Other losses…	-5,208	-5,000	Very approximate as difficult to predict due to multiple factors
Saleable elec	**40,102**	**32,693**	
Exported	-8,034	-625	This scenario projects that Scotland will still be a net exporter of energy. England and NI may need to 'top up' the baseload requirements of Scotland if offshore wind proves too intermittent.
Consumed in Scotland	**32,068**	**32,068**	

Graph 1.



Graph 2



Policy to be reviewed 2009