



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 Scottish Wildlife Trust (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 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. 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 this way can the severe and irreversible impacts of climate change on biodiversity and ecosystem functioning at local, national and global scales be mitigated.
6. By focusing on reducing energy demand, Scotland should be able to move rapidly towards a low carbon economy whilst at the same time safeguarding ecosystems already under pressure from climate change. SWT supports the Climate Change (Scotland) Act targets of at least a 42% reduction in carbon emissions in Scotland by 2020, and at least an 80% reduction in Scotland by 2050. However, these targets should not be achieved at the expense of biodiversity loss, either in Scotland, or in other parts of the world.

7. SWT believes Scotland needs to rapidly develop a more diverse energy portfolio, which should include a range of current and emerging renewable technologies. By combining a drive to reduce energy demand with the development of renewables, particularly offshore wind, wave and tidal energy, Scotland should be able to progress towards a truly sustainable energy model before 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 and approaches 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 the top priority of Government energy policy. Reducing overall demand, particularly at 'peak' times is the cheapest and most effective way to reduce emissions and will help smooth out peaks and troughs in energy demand.
10. SWT believes that although 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.

Cutting energy use transportation and heat

11. SWT notes that around 80% of Scotland's energy use arises from transportation and heating and that impact from these sectors 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:
 - developing electric vehicle technology and charging and / or battery networks
 - using policy and financial instruments to encourage a fundamental shift in modes of transport from roads to rail and other forms of public transport
 - setting and delivering ambitious targets on 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
 - 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
 - rapidly developing anaerobic digestion to produce biogas¹
 - deploying more combined heat and power systems which also plug into the grid to help manage intermittency

¹ The National Grid (2009) in their report 'The potential for renewable gas in the UK' estimated that enough biogas could be produced from AD to supply 18% of total UK residential heating demand.

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. 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.

The electricity generating portfolio

15. 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 of an energy portfolio based on marine renewables supplemented with some onshore wind, clean natural gas, existing hydro power, new small scale hydro developments and decentralised energy systems. We support the ambition made in 2011 by the Scottish National Party in their manifesto to increase the target for renewable energy generation to 100% by 2020.
16. SWT does not therefore support any replacement to Scotland's nuclear power plants at Hunterston B and Torness, nor the principal coal and co-fired power stations at Longannet and Cockerzie unless proven, truly clean coal technologies are rapidly developed.
17. 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 facilities in Scotland should be fitted with carbon capture and storage technologies as soon as practicable.
18. SWT believes that given effective political leadership and financial support, the electricity generated in Scotland could largely be sourced from renewables as early as 2020. Further policy positions on the various sources for electricity generation are provided elsewhere in this paper.
19. 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, tidal and wave facilities in a range of different geographical areas
 - importing energy from England, Northern Ireland and, in the longer term, Europe, through the national grid and any future European super-grid when demand is high and generation is low
 - retaining a large gas power facility at Peterhead in the medium term
 - exploring the potential to develop new hydro based pump storage stations and other forms of energy storage such as new battery technology and hydrogen
 - maintaining a strategic reserve at the coal fired power station in Methil

20. 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.

Nuclear power

21. SWT recognises that the two currently operational nuclear power plants at Torness and Hunterston B supply over a quarter of Scotland's electricity generating capacity. These plants are likely to remain key contributors to Scotland's energy portfolio until they are eventually decommissioned².
22. The biodiversity impacts of building and decommissioning new nuclear power facilities are often hidden within 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 alternatives³, 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, though we will keep this under review.

Unsustainable imported energy

23. As a general principle, SWT does not support importation of energy from unsustainable sources in other parts of the world. Scotland should not therefore buy in energy which has been generated at the expense of biodiversity and / or has created unnecessary pollution, including carbon pollution, as this simply exports our environmental impact abroad.

Bioenergy

24. 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 and agricultural wastes) 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 Biodiversity Sites or simply patches of surviving semi-natural habitat.
25. 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.
26. 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

² Hunterston B was due to be decommissioned in 2011 but its life may be extended and Torness is due for decommissioning in 2023

³ 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.

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.

27. 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
 - soil structure and function is adversely affected or erosion and sedimentation are increased
28. 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.
29. 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.
30. SWT supports the use of recycled cooking oil and tallow as a source of bioenergy.
31. SWT supports anaerobic digestion for production of biogas.
32. SWT does not support the use of peat for bioenergy under any circumstances and peat should never be considered a 'renewable' energy source.

Energy from waste

33. SWT does not support energy generation from general waste incineration at this stage due to pollution problems which can harm wildlife and people, and because burning waste can discourage efforts towards waste reduction and recycling. We do however recognise that cleaner technologies are developing all the time and will keep this position under regular review.

Onshore wind

34. 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 important biodiversity through direct habitat loss (roads and turbine infrastructure), modifications to hydrogeomorphology and therefore habitat integrity, and direct impacts on species populations e.g. bird strikes and bat mortality
35. Windfarms located on deep peat blanket bogs for example are unacceptable in terms of their impacts on both biodiversity and carbon loss (from erosion and oxidation of peat). Shallower peats on 'wet heath' habitats can also be important but need to be assessed on a case by

case basis as habitat quality varies considerably and in some cases mitigation measures could enhance species populations and habitat quality. Similarly, mitigation measures for windfarms within non native plantations could enhance habitat quality leading to net biodiversity gains but ancient woodland sites should be avoided.

36. 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.
37. 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.
38. 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.
39. 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, peatland restoration and sensitive restoration of planted ancient woodland sites (PAWS).

Hydro power

40. 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.
41. 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 and impacts on protected species (e.g. otter *Lutra lutra* and freshwater pearl mussel *Margaritifera margaritifera*) have been fully assessed.

Offshore wind

42. 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 marine power generation in the Europe. SWT's position on marine renewables is detailed in Policy Futures 2 'Living Seas: towards sustainable marine renewables in Scotland'.
43. SWT believes that subject to the adoption of rigorous best practice, electricity generation from marine renewables (principally wind, wave and tidal stream) 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
 - bird strikes
 - bird population displacement
44. SWT advocates a sustained increase in investment in research and development of offshore wind technology, including the testing of large turbines located in deep water and distant from shore.

Wave and tidal stream devices⁴

45. SWT supports the development of wave energy and tidal stream devices and believes they will play a significant part in delivering Scotland's renewable energy portfolio in the coming decades. As with offshore wind, the exploitable capacity of wave and tidal power in Scotland is potentially very high. Although on current knowledge the environmental impacts of wave and tidal devices appear slight, SWT believes that more research on potential impacts should be carried out before large-scale developments are permitted (the so called 'deploy and monitor' approach). There are for example uncertainties as to what impact taking substantial amounts of energy out of the physical marine system may have on the biological elements of the marine environment, for example the littoral zone in Scotland depends on powerful tidal energy to support a range of characteristic species assemblages within the terrestrial / marine ecotone.

Tidal barrages and impoundments

46. At the present time, SWT does not support the deployment of tidal barrages and impoundments in Scotland because the potential impact on marine biodiversity of tidal rapids (a UK BAP habitat) is unacceptably risky. Impacts on species and ecosystems could include:
- creation of a physical barrier to marine mammals, fish and other aquatic life
 - 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
47. SWT advocates continued research into these potential technologies, which, if the environmental impacts are proven to be within acceptable limits, could in the near future contribute to Scotland's renewables portfolio.

Hydrogen

48. SWT believes that there are significant technological and economic hurdles to be

⁴ More information on SWT's policy in marine renewables is contained within our policy on the subject at http://www.swt.org.uk/docs/002_008_general_Marine_Renewables_Policy_June_2010_1277466656.pdf

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. However, in the longer 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

49. SWT notes that ground source heat pumps (GSHPs) are a clean, reliable, proven⁵, 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 heating yet in Scotland the current contribution of geothermal power is negligible.⁶ 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

50. 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. Furthermore, 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.

SWT priorities for action

51. 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.
52. 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 implemented for the organisation.

Cross-reference to other related SWT policies:

1. The Planning System (2006)
2. Marine Renewables (2010)
3. Boyd, B, Hughes, J & King T (2010) Living Seas: towards sustainable marine renewables in Scotland. SWT Policy Futures II. Cramond, Edinburgh.

Approved by Council June 2011

⁵ 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.

⁶ McLoughlin, N (2006) SPICE Briefing on Geothermal Heat in Scotland. Scottish Parliament. <http://www.scottish.parliament.uk/business/research/briefings-06/SB06-54.pdf>