

Nuclear Free Local Authorities

briefing



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No.89

Subject: Realising the Scottish 'Renewables Revolution' in energy policy

1. Background to briefing

This briefing has been developed by the NFLA Scotland Policy Advisor Pete Roche with some additional input by the NFLA Secretary Sean Morris. It is an update of NFLA Policy Briefing 76 and should be read as one in a series of four reports looking at future energy policy in Scotland, England, Ireland and Wales. It promotes the NFLA's approved policy that a combination of a wide renewable energy mix, microgeneration and energy efficiency can provide the energy needs for each country without recourse to new nuclear power generation.

2. Introduction

In July 2010, Nuclear Free Local Authorities published briefing No.76 entitled "Scotland's electricity needs – can they be met from renewables without recourse to nuclear?" (1) This concluded that, with sufficient political will from the Scottish Government, and supported by local authorities, Scotland could produce 100% of its electricity requirements from renewable sources. In fact from plans at the time for offshore and onshore wind, wave and tidal power it appeared likely that Scotland would be able to generate 179% of its electricity requirements soon after 2020.

Since then a lot has happened – for instance the Scottish Government has decided to increase its target for renewable electricity in 2020 from 50% - first to 80% in September 2010 (2) and then to 100% in May 2011. (3) This briefing looks at developments since July 2010, but should be read in conjunction with the earlier briefing and in parallel with other national briefings. (4)

In December 2010, Friends of the Earth Scotland (FoES), the Royal Society for the Protection of Birds (RSPB) Scotland and WWF Scotland jointly published research by leading energy consultants, Garrad Hassan, called "*The Power of Scotland Secured*". This showed that Scotland could phase out all conventional fossil fuel and nuclear power stations by 2030, produce 185% of Scotland's electricity needs, maintain a secure electricity supply, and generate revenue from renewable exports. (5) The report also shows that, contrary to popular myth, the variability of renewable power need not pose a threat to the reliability of supply in Scotland. The transmission infrastructure required to keep the lights on at times of low renewable output will be easily justified by the value of exports made possible at times of high output. Costs to consumers are unlikely to exceed those in other future scenarios.

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Despite the Garrad Hassan report, the feasibility of the 100% renewables target was a major election issue in the May 2011 Scottish Parliamentary elections. The target was attacked by various people including business leaders mostly on the grounds of intermittency. But this ‘campaign’ was rather undermined when the 100% target was endorsed by seven leading industry figures. (6) Ignacio Galan, chairman and chief executive of Scottish Power’s parent company, Iberdola, described the renewables goal as "entirely credible". (7) Rick Eggleston, the managing director of wind turbine manufacturer RE power, also threw his weight behind the 100% target. (8)

Niall Stuart, Chief Executive of the trade body, ‘Scottish Renewables’ also said that nobody is arguing that Scotland would not continue to have other forms of generation alongside a significantly expanded renewables sector. Greater renewables capacity, as part of a balanced mix of technologies, would allow Scotland to meet more of its own needs from sustainable, low-carbon generation and grow its electricity exports to other parts of the UK and Europe. It would also create wealth and employment in Scotland. The target is ambitious, but not beyond reach. It will require concerted action to build the right market frameworks and grid infrastructure, and to maintain the right balance in the planning system, but the renewable energy industry and new technology have developed rapidly over the last few years and only a proportion of existing plans and commitments for wind, wave, tidal, biomass and hydro are required to hit the target. (9)

3. Scottish Route Map

An action plan to drive forward Scotland's renewables revolution, and meet targets, was launched by Scottish Energy Minister Fergus Ewing in June 2011. The ‘Renewables Route Map’ outlines the steps needed to meet ambitious targets, including supplying 100% of electricity demand equivalent from renewables by 2020. (10) It also sets out plans for achieving renewables targets for heat and transport and sets a new target to meet 30% of total energy (as opposed to just electricity) demand from renewables by 2020, up from the previous target of 20%. This puts Scotland on a par with leading European countries – this target is double the UK target. The roadmap also sets a new target to deliver 500MW of community and locally owned renewable energy by 2020, and outlines a commitment to develop strategies for microgeneration and agri-renewables. (11)

4. Route Map in Numbers

Installed Capacity required	~ 16 GW (Gigawatts)
Current renewable installed capacity	4.2 GW
Under construction	1.2 GW
Consented	2.1 GW
In planning	4.1 GW
In Scoping	15.4 GW
Total	27 GW
For comparison Torness is rated at	1.2 GW

The Route Map argues the electricity target should not be considered in isolation from other energy and climate change targets, all of which create a degree of interdependency. In particular it highlights the interrelationship between electricity and heat targets and the need to ensure that the limited resource of woody biomass is deployed in the most efficient manner, namely as heat or CHP which demonstrate 90% and 50-70% efficiencies respectively, rather than as electricity-only generation which is 30% efficient. To achieve 100MW installed capacity of biomass electricity requires a million green tonnes – equivalent to a sixth of the Scottish timber harvest, whereas, the same volume of woody biomass, could fuel 250 MW to 600 MW of heat capacity.

A growth in the use of heat pumps (to replace oil-fired central heating for example) may increase demand for electricity. Similarly if Scotland achieves 10% market penetration of electric vehicles by 2020 as suggested by WWF Scotland in their report "Watt Car", May 2010,

an additional 1TWh (1,000 GWh) of additional electricity production will be required. As well as having a 2020 target of 10% of transport fuels from renewables, the Scottish Government is committed to achieving complete decarbonisation of road transport by 2050, with significant progress by 2030 through wholesale adoption of low and ultra low carbon vehicles. A full exposition of Scottish Government policy to promote low carbon transport is being developed and will be published later in 2011.

5. Other Route Map Highlights

- The Scottish Government is determined that the proposed High Voltage Direct Current (HVDC) links to the Western and Northern Isles must go ahead – and within a timescale that will allow these areas to contribute their enormous potential resources towards renewable energy targets.
- The Scottish Government strongly supports the concept of an integrated European grid, incorporating offshore renewable generation. Scotland has remarkable potential, with an estimated offshore resource of 206 GW. This is of European significance, and its exploitation has been recognised as crucial to the ability of Scotland, the UK and the EU to meet their 2020 and 2050 carbon reduction targets.

6. Sectoral Route Maps

Sector	Route Map	Current	Planned
Offshore Wind	Offshore Wind Industry Group, Sept 2010 - http://www.scotland.gov.uk/Publications/2010/09/28115850/0	185MW	10 GW
Onshore Wind		3.4 GW installed or under construct	2 GW consented 3.5 GW awaiting decision 3.9 GW scoping
Wave & Tidal	Marine Scotland Report - http://www.scotland.gov.uk/Topics/marine/marinenergy This report shows how the Scottish Government will be taking forward development of a Sectoral Marine Plan for Marine Renewables in Scotland's Renewable Energy Zone during 2011.	3.25MW + 5.9 MW over next 12 months	1.6GW
Renewable Heat	Renewable Heat Action Plan for Scotland - http://www.scotland.gov.uk/Resource/Doc/290657/0089337.pdf Scottish Government November 2009. http://www.energysavingtrust.org.uk/Content/download/1988038/6665493/file/EST_renewable_heat_in_Scotland.pdf A Progress Report by Energy Saving Trust, March 2011. The Scottish Government will publish shortly results of a study by AEA Technology into the potential to recover “waste” heat from fossil fuel power stations in Scotland. The Scottish Government is also committed to funding heat mapping for local authorities.	2.8% 1696 GWh	11% by 2020 1504 under construction or planned
Bioenergy & EfW	Includes Anaerobic Digestion – plans to start food waste collections and encourage farm waste AD take-up		
Hydro	Scotland's undeveloped hydro potential is now estimated at 1.2GW in a new Scottish Government report (http://www.scotland.gov.uk/Resource/Doc/299322/0093327.pdf) compared with previous estimate of 657MW		An extra 1.2GW
Micro-	Micro-generation Strategy for Scotland planned by end 2011	1322	Target

generation		installs = 7.5MW electricity 2500 installs for heat = 53MW	could be 15% of electricity by 2020
Energy Storage	AEA's Energy Storage and Management Study for the Scottish Government, October 2010. http://www.scotland.gov.uk/Publications/2010/10/28091356/0		
Geothermal	Scottish Government National Planning Guidance (http://www.scotland.gov.uk/Resource/Doc/212607/0113805.pdf) now includes a section on Geothermal Energy		
Community Renewables	A Community and Landowner Renewable Energy Loan Fund Feasibility Study. http://www.scotland.gov.uk/Publications/2010/10/01105500/9	CARES helped 105 schemes = 53MW	500 MW target for 2020
Energy Efficiency	Conserve and Save: The Energy Efficiency Action Plan for Scotland, October 2010, http://www.scotland.gov.uk/Resource/Doc/326979/0105437.pdf		Reduce final energy consumption by 12% by 2020

7. Route Map - Some Disappointments

The Route Map makes clear the Scottish Government is aiming for an output *equivalent* to 100% of Scotland's demand for electricity to be met from renewable sources. This does not mean Scotland will be 100% dependent on renewables: renewable energy will be part of a wider electricity mix. This means, for example, that despite saying in May that Scotland is ideally placed to follow a similar route to Germany (12), where eight nuclear reactors which were opened between 1975 and 1984 were closed following the Fukushima disaster, Energy Minister Fergus Ewing told the Scottish Parliament in June there was a "*rational case*" for extending the life of Scotland's two nuclear plants, and that the government was "*perfectly open*" to the continued use of Hunterston and Torness to ensure security of supply. (13) Hunterston B, was opened in 1976, so is older than most of the reactors closed in Germany.

Whilst the Route Map says Scottish Government policy is to phase out nuclear power as existing stations reach the end of their useful lives, the policy of supporting life extensions makes this effectively meaningless. (14) EDF Energy is already preparing its case for a second life extension for Hunterston B from 2016 to 2021. (15) If Torness were to achieve similar life extensions it could still be open in 2033.

WWF Scotland expressed disappointment about the plans for heating and transport. (16) It said Scotland could secure at least 50% of total energy needs from renewables by 2030 by implementing an ambitious energy efficiency programme. Scotland looks set to beat the current target of generating 11% of heat from renewables, so that target should be reset to at least 20% by 2020 to help drive this sector forward. WWF also want to see a clear commitment to secure at least 300,000 electric vehicles by 2020, including the publication of the long-awaited action plan to ensure coordinated delivery.

The Association for the Conservation of Energy pointed out that the Scottish Government's plans allows for a 7% increase in electricity demand by 2020 (whilst aiming for a 12% decrease in energy demand by 2020) compared with Germany's plans to reduce electricity demand by 25% by 2050. Germany has compared the costs and benefits of new renewable generation with energy saving measures, and concluded that the latter make far better economic, social and environmental sense. (17) They are therefore investing more than €1.3 billion per year into energy-saving measures, whereas the Scottish Government has slashed energy saving investment by a third in its 2011-12 budget. (18)

8. Power of Scotland Secured

The Garrad Hassan report - “*The Power of Scotland Secured*” - sets out how Scotland could guarantee security of supply, while decarbonising half its total energy (i.e. not just electricity but also heat and transport) needs by 2030. Scotland could generate 185% of its electricity from renewables by 2030. (19)

9. Scottish Electricity in numbers

Scottish Electricity Demand in 2030 (but energy efficiency improvements could be much better)	35,1800 – 45,900 Gigawatt hours (GWh = 1 million kilowatt hours)
Replace some cars and gas heating + 20 to 25%	44,000 – 57,000 GWh
Renewable supply 2030 (low & high growth)	43,000 – 67,000 GWh
Community and household renewables not included.	7,000 GWh

Clearly the quantity of electricity supplied over a year is not a problem, but one of the main arguments against the 100% renewables target, and for retaining nuclear and fossil fuelled generating capacity on top of 100% renewables, hinges around security of supply. i.e. not how much electricity you can produce over the course of a year, but whether you have enough electricity at any given moment to meet demand. This leads some people to argue that we need “base-load” fossil fuel or nuclear stations to back up renewable sources when the wind doesn’t blow or the sun doesn’t shine.

But there are several other ways of making sure we have a secure electricity supply. Smart meters will be installed in homes and businesses across the UK by 2020. These can work in conjunction with smart appliances, such as freezers, which can turn themselves down or off when electricity demand is high and come on again later. If our buildings and hot-water systems are well insulated they would also be able to vary their power use according to the availability of electricity. The same is true for electric cars.

Another way to manage variability is to store energy. This can be done using “pumped storage” hydro schemes. We already have 740MW of pumped storage capacity in Scotland and there are plans for another 600MW. (Peak demand in Scotland is 6,000MW.) The batteries of electric vehicles could also be used. Combined Heat and Power plants can also help by being built along with heat stores. The successful combination of CHP and renewables is attracting increased attention across Europe. (20)

Finally improving grid connections between Scotland and the rest of the UK or even mainland Europe will help to reduce variation in demand and supply – if the wind is not blowing in Scotland we can be fairly sure there will be plenty of power somewhere else.

The overall costs of the system outlined in ‘Power of Scotland Secured’ are likely to be similar to the costs of maintaining a secure supply with a more “business as usual” approach. In fact the price of fossil fuels is likely to rise while the costs of renewables are likely to fall. And renewables and efficiency are the best options when it comes to creating jobs. (22)

Beth Stratford, energy campaigner for Friends of the Earth Scotland, says: “*The important thing is to put this in perspective. The possibility of wind output varying by 7-8 per cent from year to year is rather less worrying than the possibility of an enormous power station like Sizewell B having to shut down in an emergency and not reopen for six months, as it did last year. In terms of resilience and reliability, a decentralised energy system based on a broad variety of renewables wins hands down over a centralised system which relies on a handful of enormous power stations, which could fail with no warning whatsoever.*” (23)

10. **The differences between the ‘Garrad Hassan plan’ and ‘The Scottish Route Map’.**

The Garrad Hassan scenarios show the feasibility of phasing out of all conventional thermal generation capacity before 2030 (fossil fuel and nuclear). Although the report recommends a deadline of 100% renewable electricity generation by 2030 (not just 100% of Scottish consumption) it does allow for the possibility of using Carbon Capture and Storage (CCS) on existing fossil fuelled power stations – but argues against building new ones to trial CCS.

The Scottish Government’s plan, on the other hand only looks as far as 2020, but it allows for the possibility of new fossil fuel capacity being built provided it includes some Carbon Capture and Storage (but potentially threatening large increases in carbon emissions), and also allows for the possibility of nuclear stations still being open beyond 2030.

11. **Fuel Poverty – a major problem across Scotland**

The Scottish Government is required by the Housing (Scotland) Act 2001 to end fuel poverty, as far as is practicable, by 2016. The most recent figures from the Scottish House Condition Survey show that 677,000 households were living in fuel poverty in 2009, representing 29% of the total. (24) According to some estimates this figure has now risen to 40% of Scottish households. (25)

At the same time, Ofgem has estimated that renewing infrastructure and meeting carbon targets is likely to require an investment of up to £200 billion which will mean significant increases in domestic energy bills of between 14% and 25% by 2020. (26) Clearly fuel poverty needs to be central to climate and energy policy. Without an integrated strategy for both there is a danger that climate policy will end up worsening the situation with regard to fuel poverty. There are concerns about the achievability of the 2016 target with numbers of those suffering still growing, so policies which focus on energy efficiency for the fuel poor, including insulation and appliances are necessary and urgent. (27)

It is areas such as energy efficiency, microgeneration and district heating which will have the most direct impact on fuel poverty and yet these are the areas where the Scottish Government’s plans are weakest.

A WWF Scotland report shows how Scotland’s existing homes can be transformed into low carbon homes and emissions from the domestic sector cut by 80%. (28) A very broad range of physical measures needs to be employed in any retrofit strategy in order to make the required substantial improvements in the energy performance of existing housing. This will include much wider use of solid wall, external insulation for example. Physical measures will need to be combined with consumer behaviour change, improved standards of domestic appliances, and there will need to be a significant introduction of low and zero carbon technologies including microgeneration.

WWF Scotland also wants the Scottish Government to establish a clear road map to make sure all homes sold or rented meet the band ‘E’ rating on the Energy Performance Certificate scale (A-G), matched with the necessary financial packages. It says for every £1 spent on keeping our houses warm, the NHS can save 42 pence on health costs. This is a ‘win-win’ for the environment and the public purse. (29)

12. **Microgeneration**

The Route Map states that the Scottish Government is committed to developing new strategies for microgeneration and for agri-renewables, to reflect the growing significance of small scale generation and opportunities for local and rural ownership of energy. The ‘Power of Scotland Secured’ report says that, based on estimates by the Energy Saving Trust, microgeneration could supply 7,000 GWh of Scotland’s electricity by 2030 – equivalent to around 15% of demand. The Government has been criticised in the past for dragging its feet on microgeneration. (30)

Given the steep rises in fuel bills expected this winter the Government needs to start implementing some of its strategies on microgeneration. It could, for example, support Dundee City Council's plan to solarise council buildings, including potentially thousands of council homes. (31)

Birmingham City Council has developed a financial model so that it can install solar panels on up to 10,000 council-owned homes – jointly funded by the Council, energy suppliers and commercial banks. This follows two successful pilot schemes conducted in the City. Under the scheme consumers will pay a levy on their energy bills to repay the loans but should still be paying lower bills after the retrofit. A second phase will involve using the proceeds from the first 10,000 retrofits for a refinancing of the scheme to deliver funding of £2bn, enough to refurbish 200,000 homes. (30) On 30th June 2011 the Energy Minister Fergus Ewing MSP was asked if he would look at the Birmingham City Council model. Whilst he failed to commit to doing so, his reply did say there was a consonance of objectives in the Parliament. (32)

13. **Combined Heat and Power (CHP) and District Heating**

NFLA Policy Briefing No.76 highlighted three district heating schemes run by Aberdeen Heat and Power Co Ltd – an independent, not-for-profit company established to develop and manage the CHP schemes. There are also schemes in Clydebank and Edinburgh University. Plans have since been unveiled for a biomass-powered scheme which will heat hundreds of homes in Cardenden owned by Ore Valley Housing Association and Fife Council. (33)

The Energy Efficiency Plan committed the Scottish Government to appointing a dedicated district heating officer. The Renewable Route Map says the Scottish Government also plans to roll out heat mapping across local authorities and plans to build on the current study on recovery of heat from fossil fuel power stations, and set up an expert commission into the development of district heating to ensure a major move to district heating in Scotland. Until recommendations and further financial support is established, the recently launched District Heating Loan scheme will be an important resource for taking this forward. The Government also says it will ensure the best use of biomass – using it for heat only or for CHP, not using it for electricity only generation.

14. **Some other examples of Scottish Councils developing innovative energy solutions**

Councils across Scotland are helping to develop innovative energy solutions to promote renewable energy, develop local microgeneration projects and encourage households to become energy efficient. Here are just a few examples:

a) **Edinburgh:** The City of Edinburgh Council is considering rolling out a major new scheme to install solar panels in council homes across Edinburgh. A new feasibility study will be carried out into fitting advanced solar photo voltaic panels on houses and flats, along with schools, offices and care homes. (34)

b) **Stirling:** A report has been presented to a meeting of Stirling Council's Executive Committee outlining how the authority could generate renewable power. Council buildings - including offices and schools - will be part of a pilot project. If this is successful the scheme could be rolled out to other properties - including council houses. (35)

c) **Fife:** Work on a £35 million renewable energy project to provide cheaper heat and hot water to hundreds of homes in Cardenden could start in mid 2012. Ore Valley Housing Association and Fife Council are the principal stakeholders in the 4.5 megawatt CHAP (Cardenden Heat and Power) biomass plant. Ore Valley has 350 tenants in Cardenden, while the council has 700. (36)

Carnegie Primary School in Fife is also thought to be among the most environmentally sustainable in Scotland. The £7m school, built as part of Fife Council's Building Fife's Future

programme, has its own wind turbine, rainwater harvesting and a combined heat and power plant. (37)

d) **Dundee:** Dundee City Council has approved a plan that could see electricity-generating solar panels placed on its buildings including thousands of homes. The council will seek a commercial partner to install and maintain the equipment over its 25-year lifespan. (38)

e) **Glasgow:** The Sustainable Glasgow Framework looks at the city in a new way and takes a holistic view of the city and its opportunities – and proposed energy systems are designed so that they support each other, as part of a wider framework, rather than as a series of opportunistic small-scale changes to existing systems. The Sustainable Glasgow report proposes a new Energy Framework which has been integrated and designed for sympathetic retro-fitting on a large scale into an existing city. The city will harness cleaner energy sources and use more efficient systems to deliver carbon emission reductions. The proposals include new low carbon energy systems which process the city's sewage and municipal waste in anaerobic digesters to produce biogas which can fuel buses and generate heat and power for the city; harvest timber from the new urban woodlands and from forests around Glasgow which can be used to generate heat and power for the city in biomass energy centres; district heating systems which use underground insulated hot water pipes to take the heat from these low carbon energy sources to businesses and communities for heating buildings and providing hot water; the use of waste heat and other waste materials from industrial and commercial premises; wind and microgeneration technologies such as solar power; Smart grids to integrate low carbon technologies and manage energy demand; new energy efficiency measures and energy management systems implemented in homes, public buildings, and businesses to improve the efficiency of energy use. (39)

f) **Shetland Islands:** The Shetland Heat Energy and Power Company, supported by the Council's innovative Energy Unit, has been serving district heating to house and businesses in Lerwick since 1998. Hot water is pumped through underground insulated pipes and enters properties through a heat exchanger, supplying heat and hot water needs. There are over 1200 houses under the scheme. (40)

g) **Perth and Kinross:** The Council are leading a two-year collaborative project in association with Aberdeenshire Council, Angus Council, Fife Council and East Lothian Council under the East Coast Renewables Alliance to support rural businesses participate in the low carbon economy and take advantage of renewable opportunities. The scheme will provide opportunities for rural businesses to meet and exchange ideas, promote and develop their products and services, and exploit the expanding global renewable and low carbon economy markets with a particular focus on the small scale generation of renewable energy. (41)

h) **Western Isles:** The Western Isles Council has established the Western Isles Alternative and Renewable Energy Partnership which has, for over 20 years, developed a number of imaginative energy projects. Examples include the 'European Energy Network for Peripheral Islands' - an islands' network comprising Western Isles, Madeira, Shetland, Orkney and the Azores; TEAS, a local energy agency partly supported by the European Commission SAVE Programme, Scottish Hydro-Electric, Western Isles Enterprise and Western Isles Council and which carries out a range of energy saving related promotional work including presentations to school children and delivering energy efficient fridges to households at a subsidised cost; the development of a 60kW wind turbine at Liniclate School, Benbecula; and the development of solar assisted houses across the Outer Hebrides. (42)

14. **Conclusions and Recommendations.**

There is much to be welcomed in the Scottish Government's Renewables Route Map, but it is also disappointingly vague when it comes to energy efficiency, micro-generation and district heating. Cuts in the energy efficiency budget, delays in getting small-scale renewable energy installed particularly on social housing, and lack of progress on district heating schemes where

feasibility studies have already shown them to be viable will be frustrating for many Scottish local authorities.

In the NFLA's view, the Scottish Government should:-

- Drop its support for nuclear reactor life extensions.
- Set a target to produce 100% of electricity generated in Scotland from renewables by 2030
- Increase the target for renewable heat by 2020 from 11% to 20%
- Aim to produce 50% of Scotland's energy from renewable sources by 2030
- Reverse the cuts made to energy efficiency budgets and start thinking big with regard to retrofitting houses across the country in co-operation with local authorities.
- Investigate how Germany can plan for a 25% decrease in electricity demand by 2050 whereas the Scottish Government is expecting a 7% increase by 2020.
- It should investigate the Birmingham City Council financial model as a matter of urgency and start working with local authorities so that a policy of developing solar panels and other small-scale renewables appearing on social housing become a matter of course.
- It needs to increase the £2.5 million district heating loan fund to at least £25m. The two schemes in Granton and Muirhouse (where there is no gas supply) investigated by the City of Edinburgh Council and found to be feasible would cost £10m each for example.

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