



Scotland's energy future

Report of the Scottish Liberal Democrat Energy Commission
March 2010

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Introduction



It is no exaggeration to say that the threat and consequences of climate change are potentially catastrophic. The time for equivocation is over: scientific, political and social consensus on the need for action is now overwhelming.

Dealing with the climate change phenomenon will demand a radical response from individuals, businesses, communities and society as a whole, changing the way we live our lives and the use we make of the world's scarce resources. Some of these changes will be minor and easy to embrace. Others will be more challenging and will doubtless meet with some resistance.

With its contribution to harmful greenhouse gas emissions and its traditional reliance on finite fuel sources, energy is at the forefront of the climate change debate. The further and significant challenges we face of energy security and soaring fuel costs provide a clear direction towards a future where decentralised, low-carbon sources of energy provide the majority of our energy requirements. How, where and when we generate, distribute and use our energy requires a fundamental and immediate overhaul.

Yet by making greater use of energy as a lever for economic development, Scotland can seize the opportunity to develop new supplies, invest and apply new technologies and capture the financial and environmental benefits that will come with spearheading the energy efficiency and renewables revolution.

This will encourage innovation and a new generation of green-collar jobs, giving industry an extra incentive to retain or locate operations in Scotland. With modernised infrastructure and networks, increased storage capacity and a transition towards a smart grid, Scotland can also be at the forefront of reducing costs to businesses and households alike.

It is our view that any discussion of new nuclear power undermines the total commitment that is needed to advance safe, renewable energy. New nuclear build would distract investment from genuine clean energy development while leaving Scotland with a longer and costlier legacy of waste disposal. We are committed to a carbon-free, nuclear-free energy future for Scotland.

Scottish Liberal Democrats are proud of our track record in government on energy and energy efficiency, but we recognise the changing nature of the challenges ahead. Our Green Energy Commission of respected and independent experts has considered these issues and this policy paper sets out our vision for Scotland's energy future and the key steps needed to secure our objectives.

I am grateful to the Commission members for their considerable commitment and expertise, which provides a solid platform for informing the party's policy direction in the years to come.

Liam McArthur MSP
March 2010

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Energy efficiency

Energy efficiency and conservation can no longer be considered the Cinderella of the energy debate. Punitive and rising power prices demand action on the energy efficiency agenda as never before.

Energy efficiency measures and intelligently managed demand provide the most cost-effective way of reducing emissions and constraining costs for consumers. They can also offset the need for new power plants and energy imports, give greater flexibility about preferred sources of energy production and make achieving the challenging targets for renewable energy generation and adaptation feasible.

In effect, without the 'quick wins' that a concerted programme of energy efficiency initiatives offers, not only will attempts to tackle the scourge of fuel poverty be undermined, so too will our ability to deliver the early cuts in greenhouse gas emissions essential to achieving an 80% reduction by 2050.

With heat, and to a lesser extent electricity, the challenge in reducing energy use lies in the retro-fit of existing buildings. Establishing a target for energy use reduction in existing buildings should receive as high a priority as the present focus of Scottish Ministers on improving building standards for sustainable development.

To demonstrate that it is serious about this issue, the Scottish Government must commit to publishing its Energy Efficiency Strategy at the earliest opportunity. The following actions are also necessary to make a major contribution to energy efficiency:

1. merge the Energy Savings Trust and the Carbon Trust to establish a single and streamlined UK Renewable and Energy Efficiency Delivery Authority to create the strategic vision for meeting renewable and energy efficiency targets, plan for increased industrial capacity, encourage research & development and make sure there are no skills or supply chain gaps, supplying specific sectoral advice where required;

2. introduce a comprehensive finance scheme to boost take-up of energy saving measures, including: an eco-cash back scheme for those who install energy efficient home improvements and small energy generation projects; boiler and window scrappage schemes; 'energy mortgages' loans paid back through savings in energy bills; and VAT reductions to incentivise renovations and repairs;
3. expand the Home Insulation Scheme on an area-based, targeted basis, with appropriate provision for Scotland's remote and rural areas and concentrations of urban fuel poverty, a programme of home visits to provide advice and a deadline for complete roll-out of the scheme across Scotland by 2020;
4. accelerate the planned provision of smart meters to every household, including the effective dissemination of information to ensure individuals and businesses make best use of the technology;
5. develop a road map to zero carbon buildings by 2016 which meets the challenges of Scotland's building stock and the needs of off-grid and remote households, including: full implementation of the Sullivan Report recommendations; tougher and progressively increasing mandatory energy performance standards for public and private buildings with robust enforcement and penalties for non-compliance; reformed planning guidance to promote higher insulation standards, and greater use of Energy Service Companies (ESCOs) as a means of advancing energy efficiency;
6. ensure that the public sector is at the vanguard of the energy efficiency movement by introducing a rolling programme of insulation for all public sector buildings, reforming procurement guidelines to require the highest possible energy efficiency standards for all public sector buildings and equipment, and requiring all public companies to report annually with quality energy consumption data and targets for improvement;
7. provide greater support and incentives for the industrial and commercial sector to improve its energy efficiency performance;
8. identify the skills needed to deliver energy efficiency roll-out and ensure the required training and accreditation provision is in place, and integrated into appropriate licensing regimes;
9. local authorities to allocate a proportion of the community fund money collected from renewable development for energy efficiency and renewable energy education

programmes, helping people to understand fully the impact their actions can have on energy demand and consumption rates; and

10. set tough new energy efficiency requirements for products, using the well understood A–G labelling scheme, and reflecting improvements in technology.

Energy efficiency - Acharacle Primary School

Acharacle Primary School, in Lochaber, is said to be the most energy efficient school in Scotland. Constructed predominantly from timber and utilising triple-glazing technology, the air-tight building is heavily insulated and designed to be heated by the warmth of the school's pupils, teachers and computers alone. Rain water is also collected and used to flush the building's toilets, while a nearby wind turbine generates the electricity required to provide hot water for the school's 48 primary and 14 nursery pupils.

Renewables renaissance

Blessed with excellent natural resources, notably the waves and tides around our shores, as well as world leading skills and research capabilities, there can be no excuse for Scotland not capturing the economic, social and environmental benefits that will come with spearheading the renewables revolution.

Of course, achieving our energy and climate change goals will require, amongst other things, a broad mix of renewables technologies. While incentives will be needed to develop this healthy mix, care should be taken to avoid investment being spread too thinly.

In the short to medium term, onshore wind and hydro will continue to contribute the lion's share of our renewable electricity needs. Retaining confidence in the onshore wind sector is vital to delivering sizeable early reductions in emissions and safeguarding future investment in other developing technologies, such as marine.

Development of wave and tidal energy technology is at a critical stage. Despite some marine energy technology companies locating in Scotland thanks to our natural resources and the former availability of grant support through the Wave and Tidal Energy Support scheme (WATES), we cannot rest on our laurels. We must continue to encourage marine energy technology companies to locate research and development here and help them and utility developers to get devices into the water, scale up projects and, at the same time, be reassured that the regulatory regime and infrastructure is fit-for-purpose.

The potential for expansion of other renewable technologies is also considerable. Hydro power, for example, currently provides nearly 10% of our electricity needs, with capacity for significant further growth. Our forestry resources can help drive a successful Scottish bioenergy industry, playing a key role in developing renewable heat and transport, while use of geothermal energy is currently largely untapped outwith the Highlands and Islands.

The Grid and Infrastructure section explores some of the actions required to address current failings and future needs in relation to grid and infrastructure. However, for Scotland to achieve our ambition of becoming a global renewables powerhouse we also need:

1. a clear market framework that enables companies to invest in low carbon and renewables developments in Scotland with confidence, including a long term strategic policy framework to provide certainty about public policy and consistency with UK marketing and consenting regimes to avoid unnecessary barriers for operators with projects within Scotland;
2. specific and sufficient grant support for new technologies and research and development, including a second round of the WATES scheme, over a set number of years, well-publicised and with recognition that development stage renewables require distinctive financial assistance and that the full economic benefits for Scotland of renewable technologies will be realised only if research and development is based here;
3. support for UK plans to amend the Renewables Obligation to allow varying levels of support to different technologies and thus drive the development of less mature technologies, maintaining regular reviews of RO bands to ensure that the cost to the consumer is kept to a minimum and that the promotion of the development of renewable technologies is as effective as possible, extension of the RO to 2030 to ensure investor confidence in renewable assets, removing marginal ROC qualifying technologies and re-investing the money in new technology and establishing parity in Scotland between wave and tidal energy at 5 ROCs per MWh;
4. reformed transmission charging methodologies which are fair to all of Britain's market participants, removing additional financial barriers to renewables investment in Scotland currently caused by inflexible locational and capacity pricing in the current charging scheme to maximise the use of Scotland's generation and renewable resources within an EU market;
5. investment to renovate and adapt the facilities in key North Sea ports which offer the potential for Scotland to become an established location for the manufacturing and construction of offshore wind turbine and marine devices, creating jobs and building a high quality and competitive business environment for renewable energy companies in Scotland;

6. strategic investment in network infrastructures available when generation investments and demand require it [see Grid and Infrastructure section];
7. greater connectivity of Scotland with Europe, including European offshore infrastructure, with enhanced export and import opportunities [see Grid and Infrastructure section];
8. a sound policy basis for the appropriate siting of renewables with minimal environmental impact through an efficient and streamlined planning, consenting and licensing regime, with well-resourced planning departments and authorities, predictable timescales and outcomes, a presumption in favour of development and better alignment between energy policy and related policies such as water, environmental and local planning;
9. a functional occupational mapping exercise of the renewables sector to identify any skills shortages and predict the likely labour force demand over the next twenty years, and subsequent action to provide an appropriately skilled workforce to support the renewable energy industry through new or re-aligned qualifications in schools, colleges, universities and the workplace, improved availability, quantity and consistency of labour market information and intelligence across Scotland, investment in training and testing facilities, including at universities that specialise in energy engineering research, reskilling of existing workers in declining sections of the economy and raised awareness of emerging employment opportunities;
10. support for companies in the oil and gas industry to diversify into the growing low carbon economy, utilising their existing technologies and skills bases to match the core capabilities and competencies of the growing renewables industry;
11. the public sector to take the lead through radical reform of procurement guidelines to allow for joined-up, collaborative procurement of renewable energy for the whole of the sector, access to renewable generation sources and opportunities to sell green electricity back to the grid; and
12. a significant boost to public engagement in renewable energy generation, including: an increase in buy-in opportunities for proposed developments to allow local people and communities to garner the maximum economic benefit; the promotion of best practice in planning and local engagement to ensure greatest possible public involvement; and local authorities to have an enhanced role by establishing local energy plans which encourage greater awareness of energy use and the need for energy reduction

and stimulate demand for more creative solutions for meeting our energy needs at a local level.

Larger-scale renewables - Denmark

Denmark is considered by many as a world-leader in wind power. Wind turbines – both off and on-shore - now generate more than 19% of the country's electricity; nearly twice the amount of other leading European nations, such as Portugal or Spain. The Danish wind turbine industry also has a 40 per cent share of the global market, with the sector employing more than 20,000 Danes. Much of this success has been attributed to the Danish Government's commitment to renewable energy – an approach witnessed as early as 1979 – and the provision of state-lead subsidies and loan guarantees.

Energy storage and CCS

Even with the policy actions we propose, the transformation of an energy system based primarily on non-renewable sources to one that is completely based on renewables will take time. Technologies that allow that transition to be made are therefore required.

Carbon capture and storage (CCS) offers scope to reduce significantly the effect of fossil fuels whilst renewables are commercialised. It may also be an intermediate step towards a 'hydrogen economy', which could enable further renewable development. The technology has been successfully pioneered in Norway, but more work must be done to establish its viability on a commercial scale.

According to the Intergovernmental Panel on Climate Change (IPCC), CCS could reduce carbon dioxide emissions from fossil fuel power stations by as much as 90 per cent. Given that it allows continued use of gas and coal-fired power stations, which are flexible in output, CCS is ideal to use in conjunction with some forms of renewable energy, such as wind power. Its value in reducing emissions in coal-dependent economies such as China and India could be immense, as could the commercial opportunities associated with exporting the technology. The immediate challenge for the UK, however, is to demonstrate use of CCS on a commercial scale.

Although hydrogen offers significant potential as a carrier of energy, neither hydrogen itself nor the associated fuel cell technologies are sources of energy in themselves. Nevertheless, the combination of renewable technologies and hydrogen is of considerable interest to those seeking alternatives to fossil fuels.

Hydrogen can be produced from natural gas, or from electricity. This is particularly interesting to the Highlands and Islands, where in the long term there is the opportunity of creating hydrogen using renewable electricity.

Although still in its infancy, significant progress is being made in developing hydrogen fuel cells.

In order to make best use of energy storage and CCS for our clean energy future, we need:

1. a UK Emissions Performance Standard to ensure that new coal-fired power generation plants must make full use of carbon capture and storage (CCS) technology, with a CCS regime phased in for all industrial emissions from 2020;
2. incentive schemes at national and EU level to facilitate quick and commercially viable deployment of CCS and development of most cost-effective capture technologies;
3. a clear and consistent public policy framework highlighting the importance of CCS to the future economy;
4. adequate funding for the current CCS pilot scheme at Longannet coal-fired power station, which has already demonstrated a cut of around a third in the energy requirement for its improved process, and an assurance that the deadline of 2014 for the awarding of the UK Government's Carbon Capture Pilot Scheme cannot be delayed even by an incoming administration;
5. a co-ordinated government and industry approach to hydrogen and fuel cell sector, including the implementation of the recommended actions to develop hydrogen and fuel cell capabilities in Scotland from the Forum for Renewable Energy Development in Scotland (FREDS);
6. a dedicated grant-based scheme to support hydrogen demonstration project(s) in remote or off-grid communities in Scotland;
7. an extension of the Energy Saving Scotland Home Renewables grant scheme to encourage take up of hydrogen and fuel cell technologies in communities and households;
8. a Scottish inter-university research centre to create fuel cell and hydrogen-based Intellectual Property for future exploitation within Scotland, enabling applications of hydrogen technologies and fuel cells to be demonstrated commercially;
9. continued support for fuel cells in vehicles via a "Powershift" mechanism;
10. initial zero VAT rating of renewably produced hydrogen as a vehicle fuel, with a commitment that if it is subsequently increased it will always be at a significantly lower rate than hydrocarbon fuels;

11. adaptation of the Renewable Transport Fuel Obligation, under sustainability safeguards, to boost demand for renewable fuels [see Transport section]; and
12. action to spur the development of large-scale pumped storage schemes in Scotland, with greater interconnection with Norway to facilitate the exchange of excess energy.

CCS - Schwarze Pumpe power station

The Schwarze Pumpe power station, located in northern Germany, is the first example power plant system in the world to capture and store its own CO₂ emissions. Opened in September, 2008, and operated by Vattenfall – Europe’s fifth largest electricity generator – the 70 million Euro, pilot-scale oxy-fuel boiler plant is capable of operating at 30MW and is designed to capture 95% of emitted CO₂. In September, 2009 – a year after the plant’s inauguration – Vattenfall indicated a desire to reach CO₂ capture levels of 98% in the future.

Decentralisation

Our current energy networks were designed for a time when large power plants, generally located near urban areas consuming most energy, delivered energy through transmission and distribution networks. This centralised system faces a number of challenges when integrating renewable energy, the best sources of which are invariably found in remote locations, with limited grid connections.

Electricity from the national grid meets only part of our energy demands and considerable carbon reductions could be made from microgeneration.

A decentralised energy system would see everyday buildings playing host to devices such as solar panels, small wind turbines and combined heat and power boilers, which generate electricity as well as providing heat and hot water. The electricity created would be used directly by the house or workplace, and any surplus fed into a local network for local distribution.

Such a system would open up opportunities for a range of technologies which are more carbon efficient, waste less heat and avoid transmission losses. It would also give greater control to individuals and communities. To begin the transition towards a decentralised energy future, we need:

1. to develop a network of community scale generation plants close to the point of demand, through streamlining planning regulations, including extended permitted development rights; provision of accessible and effective support schemes and guidance; extension of existing UK microgeneration certification scheme; and ensuring Distribution Network Operators (DNOs) are rewarded for connecting more distributed generation, without charging excessive amounts to connect small-scale generators to the grid;
2. to review Ofgem's remit so that its primary duties include the promotion and facilitation of renewable and decentralised energy production and ensure onerous conditions are not imposed on microgenerators;
3. to introduce attractive feed-in tariffs which require utility companies to pay preferential prices for electricity produced

by small-scale generators, with uncomplicated and universal access and minimum bureaucracy for applications;

4. an automatic right for any individual or organisation using an accredited professional to install a small-scale microgeneration appliance to sell all generated electricity to their existing electricity supplier for the set feed-in tariff;
5. an obligation on energy suppliers to buy surplus energy at a fair price and provide homeowners with grid connection to enable this;
6. to reform planning and building regulations to introduce an 'escalator' percentage for microgeneration in new-build properties to achieve net zero-carbon new building by 2016;
7. to prioritise development of supply chain opportunities for microgeneration and microrenewables, including increase in training opportunities for installation and maintenance of such technologies;
8. further tax breaks for microgeneration installations, for example the exemption from income tax of surplus electricity generated from installations for personal use;
9. the development of a dynamic 'smart grid' that can better connect and integrate new, clean and decentralised energy technologies, with the roll-out of pilots of smart energy systems [see Grid and Infrastructure section]; and
10. a study into benefits of establishing new 'decentralised energy' towns in areas with substantial renewable energy resources, including the necessary infrastructure for industrial development and skills training.

Decentralisation – Samsø, Denmark

The island community of Samsø, in Denmark, has received world-wide acclaim for its decentralised approach to energy generation. After winning a Government-backed competition to become a model renewable energy community, and a concerted 10 year effort, the 4,000 strong community now generates 100% of its electricity, and 70% of its heating, from renewable sources. 21 locally owned wind turbines (11 on-shore; 10 off-shore) provide the island's population with renewable electricity, while straw-fired district heating plants and microgeneration technologies (solar, biomass, heat pumps) supply homes with heating

and hot water. In addition to satisfying the community's own needs, the resulting electricity from the island's wind turbines is now also being sold and exported to the mainland, and plans for a locally-owned biogas facility – to run on pig slurry – are currently in development.

Grid and infrastructure

Our energy infrastructure is increasingly antiquated and inadequate to meet the needs of our economy and our communities. It also works against the successful exploitation of our new renewable sources of energy.

Overall experience of the renewables sector to date shows that the current regulatory framework cannot easily respond to provision of new grid capacity, and market signals are particularly weak in peripheral areas such as the Scottish islands.

In part, this means that many proposed developments now under consideration in the Highlands & Islands are unlikely to connect until sometime between 2014 and 2018. There is now recognition from industry, grid companies and the regulator that new connection and management controls are needed. As yet, however, no agreement has been reached on an acceptable formula.

Delays in investing and approving new grid upgrades are preventing potentially viable renewable electricity projects from connecting. Consequently, risks and therefore costs have increased for renewables projects connecting to the transmission network, and the likelihood of finding investment has decreased.

Between 2010 and 2020, the UK Government must also decide how to support evolution of the grid, and what signals to send via regulation and market mechanisms. If we are to have a more decentralised network the shift will need to begin over this decade, though we may not see major change until after 2020. Providing the correct market signals will ensure that, as more embedded generation technologies such as renewables connect onto the network, the network can adapt and respond efficiently, thus ensuring reliability of supply to households and businesses.

To make progress towards the modernisation of Scotland's grid and infrastructure, we need:

1. timely and positive decisions on grid network investment, including east coast interconnector proposals, ensuring investment in energy infrastructure minimises the cost of accommodating further generation capacity and prevents carbon lock-in;
2. a complete strategic assessment of long term grid infrastructure, including replacement, upgrade and need for new overland, underground and subsea transmission lines;
3. urgent clarity on plans for the Beaulieu to Denny electricity transmission line upgrade, including project timescale, necessary planning permissions and environmental mitigation measures;
4. to reform rules governing use of the transmission network to allow projects stalled in the grid queue to move forward more quickly, and ensure transmission charging doesn't discriminate against long distance supply;
5. Scotland's close involvement in the construction of a sensible and well-planned offshore grid to develop wind, wave and tidal resources and create the environment for ports across Scotland to compete to win business and economic benefit;
6. to improve island connections through more active distribution management, provision of upgraded distribution and transmission connections, and different connection standards to incentivise better use of capacity;
7. to provide prompt grid access to early-stage wave and tidal projects to maximise opportunities for scaling-up, testing and access to markets;
8. active management by network operators at the point where distribution meets transmission to establish what capacity is needed for embedded generation and avoid punitive regulatory hurdles and costs wherever possible;
9. to improve access management to ensure existing capacity can be utilised more effectively, with higher connection percentages given to more variable types of generator;
10. high priority given to transition to a dynamic and sophisticated 'smart grid', incorporating consumer equipment and behaviour in grid design, operation, and communication technologies; and
11. to encourage location of energy intensive activity, such as data centres, to parts of Scotland capable of producing significant renewable energy, thereby offering economic

opportunities for remote areas and giving companies the prospect of locating in a potentially safe region with secure natural energy resources.

Heat

Winter weather conditions, which often include a high wind chill factor, combined with poorly insulated homes, mean that heating costs are a significant household expenditure in Scotland. Furthermore, our geography, with many small communities widely dispersed, means there may be no gas network locally, and travel distances to shopping centres and for other activities can be substantial.

Electricity provides only 15-20% of Scottish energy use, with a quarter of this used to heat homes. A further 53% of the energy consumed in Scotland is for heating purposes, while that used by transport is 29% of the total delivered energy.

The renewable heat take-up in Scotland is in its infancy and there is a long way to go before reaching the levels enjoyed in countries like Denmark and Austria. Consumers expect heat to be cheap, convenient and clean. We have not reached this stage in terms of all renewable heat technologies and must address this if renewable heat is to take off.

The small scale and fragmented nature of renewable heat markets in Scotland, and the obstacles to development resulting from the economies of scale and infrastructure enjoyed by the incumbent fossil technologies, mean that there is a very strong case for intervention and support to enable fair competition for renewable heat. There are, however, particular opportunities in Scotland because of the extent of areas off the gas grid and the existence of clusters of potential heat demand and existing waste heat or potential renewable heat sources which offer great potential.

To boost the development of a vibrant renewable heat sector in Scotland, we need:

1. to implement the recommendations of the report by the Forum for Renewable Energy Development in Scotland, including setting an ambitious target of at least 20% of heat to come from a mix of renewable technologies by 2020;
2. government recognition of wider range of fuels and technologies, including animal and human wastes, landfill gas, heat source pumps, incineration, wind and tidal turbines, in addition to bioenergy crops, for powering

renewable heat networks, factoring in seasonality of demand and supply;

3. to use planning consents to accelerate the take up of district heating associated with power stations by requiring new power stations to use their waste heat either through such technologies or in some form of localised heat network;
4. to identify the regulatory and financial barriers deterring development of renewable heat networks, and reform of the planning system to deliver developer-led funding of community and business-scale infrastructure, through ESCOs and MUSCOs, and emphasise the benefits of CHP and community heating;
5. the introduction of heat incentives modelled on Renewable Obligation Certificates and financial incentives, including local taxation or domestic rate rebates, for renewable heat installations;
6. incentives for infrastructure development, including purchase and installation of pipework, metering systems, CHP engines, wood and pellet boilers and burners, through enhanced capital allowances, feed-in tariffs, and ROCs, and reductions in VAT for equipment installed during initial development of a renewable heat energy scheme;
7. to adapt initiatives such as the Energy Efficiency Commitment and housing grants to incentivise installation of renewable forms of space and water heating measures in households, with measures consistent with those for electricity and transport;
8. to provide appropriate guidance on renewable heating developments and networks and encouragement for local authorities to consider the wider impact of such projects in contributing to employment and sustainable development, with identification and support for the necessary supply chain and manufacturing opportunities;
9. fossil fuel generators to provide renewable heat networks from existing power plants as proposed in the Institution of Civil Engineers' 2009 report, 'Why Waste Heat?';
10. a consistent approach across UK on heat support mechanism schemes, preventing duplication and conflict in policy and encouraging market growth;
11. clear guidance on regulation of outputs from anaerobic digestion, and other treatment processes used in the generation of fuels for renewable heat, with revision of

existing legislation if necessary to support re-use and recycling of wastes; and

12. to develop and implement a robust sustainability scheme for bioenergy (including biofuels and biomass for heat and electricity) addressing relevant potential environmental and social impacts, including indirect land use changes.

Heat -The Targoviste District Heating System

Targoviste is situated in the south central region of Romania and has a population of nearly 90,000. The local district heating (DH) system supplies thermal energy to approximately 16,000 homes and 270 businesses, schools and nurseries. The heat is created as part of a combined-power-and-heat (CPH) system, with the electricity that is generated being delivered to utilities owned by the municipality via the national grid. At a cost of over 3 million Euros, it is estimated that the heating system will result in CO₂ emission reductions of approximately 300,000 tonnes a year.

Transport

Addressing the need to reduce the energy and time spent on transport, be it for goods or people, forms an essential part of our strategy. Opportunities for teleconferencing and homeworking, improved public transport, sharing of transport, should first be considered. The use of incentives, training, and the planning system, can all support these aims.

Within the transport sector, there are several technologies which can have an immediate impact on reducing vehicle emissions. There are, however, a number of barriers to entry or at least widespread use, including limited initial demand and high capital costs.

The potential for batteries installed in electric vehicles as a means of smoothing demand and supply across the grid and addressing any issues of intermittency must be considered. The majority of vehicles are used for less than 30 minutes daily and can offer a reservoir of stored energy through the use of sophisticated smart charging and discharging technologies, as demonstrated by the University of Delaware's Vehicle-to-Grid (V2G) programme.

The Renewable Transport Fuel Obligation (RTFO) sets a target for 2010 of 5% of all road fuels from suppliers to be provided by biofuels. However, without imports, this is unlikely to be met due to a lack of refinery capacity within the UK. Weak targets set by the UK Government for the early stages of the Obligation have failed to incentivise the development of the supply chain. Consequently, the UK Government's target for 5 per cent of road transport fuels from renewable sources by 2010 may not be met.

To help reduce transport costs and emissions we need:

1. financial incentives for research, development, and commercialisation of low-energy transport solutions, utilising engineering, IT, and other relevant skills currently available in Scotland;
2. to introduce and, where appropriate, restore train and light rail services focused on integrated transport hubs with access prioritised for pedestrians, cyclists, car sharing and bus services and including bicycle storage, rental and repair services, showering and storage facilities, similar to those in Freiburg (Germany) and in other EU countries;

3. a requirement that all buses in Scotland should be hybrid, LPG, hydrogen or electric by 2030, supported by a bus scrappage scheme to stimulate the manufacturing industry and encourage bus companies to upgrade their fleet;
4. the development and creation of car-sharing lanes into/from city and town centres, including on motorways, to reduce pollution and congestion, and supported by online sourcing services such as Liftshare, or local equivalent;
5. incentives for moving freight by means of lowest-carbon technologies available, ensuring by 2050 all freight vehicles are running on electricity, hydrogen or other renewable fuels, extending use of zero-carbon urban delivery vehicles and support for redevelopment and opening of canals and other waterways in Scotland;
6. amendments to planning regulations to ensure new business developments include cycling facilities within retail, commercial and industrial sites; and incentivise existing developments to incorporate such facilities;
7. planning permission for new dwellings to be dependent upon inclusion of storage facilities for cycles and where appropriate, mobility scooters, and the development of neighbourhoods which encourage walking and cycling, with a network of continuous cycle routes and good quality walking routes to key destinations, mixed land use, and higher density development with variety of facilities within 10 minutes walk;
8. to promote provision of electric car charging points and hydrogen generating and refilling stations at the roadside;
9. to cut pollution from Scotland's ferry services through support for new technology, including improvements to current propulsion systems, methods to improve movement through the water, and action to identify and put into place new and improved fuels and best available retrofit technologies, with incentives for new fuel-efficient ferries and the dissemination of technical and operational best practice guidelines;
10. to increase the Renewable Transport Fuel Obligation (RTFO), following EU agreement on a full, robust certification scheme for all sources of biomass and biofuels to ensure sustainability, to require at least 10 per cent of all fuel sold on UK forecourts to come from sustainable renewable sources, including hydrogen, by 2015 and implement the EU Strategy for Biofuels;

11. to kick start demand for LPG, electric and hydrogen through procurement in public sector vehicle fleets, targets for annual emissions reductions in public sector transport contracts and robust reporting requirements; and
12. mandatory requirements to limit average emissions from all new cars placed on the EU single market to 120g CO₂/km by 2015 and 95g CO₂/km by 2020 through technical improvements, with a target of zero carbon for all new cars by 2040 and an effective system of penalties and incentives to ensure compliance and curb tendency to build fuel-inefficient vehicles.

Transport – Vauban, Freiburg, Germany

Vauban – a suburb of Freiburg, in Germany – is a leading example of a community which has embraced the concept of sustainable transport. While private car ownership is technically allowed, drivers are forbidden from parking on most of the area's residential streets, and instead must purchase a parking space in one of the dedicated multi-story car parks located on the periphery of the community. As of 2009, 70% of households did not have a car. Within Vauban itself, walking and cycling are the predominant modes of travel, while all homes have quick and easy access to regular tram services which travel into the centre of Freiburg. Where private cars are required, many Vauban residents take advantage of the communal, city-wide 'car club'.

Conclusion

Scottish Liberal Democrats are proud of our record in leading the debate on how to manage and meet our energy needs. We recognise that Scotland has a considerable advantage in terms of our natural resources, skilled workforce and pioneering technology, and the possibilities these present as levers for economic development.

We also acknowledge the opportunity, as we move away from the traditional model of large-scale, centralised energy generation and wasteful distribution networks, to empower individuals and communities to be more engaged in meeting their energy needs.

Now is the time for a green energy revolution. In setting out our proposals for prudent energy use, world-leading skills and technology and a modernised and decentralised energy infrastructure, we will show how Scotland can build a competitive low-carbon economy that will meet our environmental, economic and social objectives, today and for the future.

Glossary

CCS: Carbon Capture and Storage: usually means the capture, compression and permanent storage of CO₂ underground in spent oil or gas fields; this process is not energy free as the compression takes considerable energy, increasing the cost of fossil fuel based generation.

CHP: Combined Heat and Power: makes use for space heating of the otherwise wasted heat produced while generating electricity; only about 40% of the heat energy can be converted to electricity, the remaining 60% going up the chimney in conventional power stations.

DNO: Distribution Network Operator: a company licensed to connect customers to the electricity grid in the UK.

ESCO: Energy Service Company: performs an in-depth analysis of a property, designs an energy efficient solution, installs the required elements, and maintains the system to ensure energy savings during the payback period.

FREDS: Forum for Renewable Energy Development in Scotland.

IPCC: Intergovernmental Panel on Climate Change: publishes special reports on topics relevant to the implementation of the UN Framework Convention on Climate Change, an international treaty that acknowledges the possibility of harmful climate change.

LPG: Liquefied petroleum gas: a mixture of hydrocarbon gases used as a fuel in heating appliances and vehicles.

MUSCO: Multi-Utility Services Company: provides a variety of utility services and can ensure strongly joined-up service infrastructure and a highly efficient customer interface.

RO: Renewables Obligation: a requirement in the UK for all electricity suppliers who supply electricity to end consumers to supply a set proportion of their electricity from eligible renewable energy sources. The proportion must legally increase annually, achieving 20% by 2020.

ROC: Renewables Obligation Certificate: the currency used in the UK to meet the Renewables Obligation; electricity suppliers must present to government sufficient ROCs to meet their Renewables Obligation for the current year; if they have insufficient they must

buy more ROCs, which are traded at a fixed price (index linked) per MWh.

RTFO: Renewable Transport Fuel Obligation: a UK requirement on transport fuel suppliers to ensure that 5% of all road vehicle fuel is supplied is from sustainable renewable sources by 2010.

V2G: Vehicle-to-Grid: a system in which electric or plug-in hybrid vehicles communicate with the electricity grid to sell demand response services either by delivering electricity into the grid or by reducing their charging rate.

WATES: Wave and Tidal Energy Support scheme.

Commission membership

Participation in the work of the Commission was undertaken by its members in a personal capacity and does not necessarily indicate support for the Liberal Democrats. The findings of the Commission do not necessarily represent the views of the members' professional organisations.

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