

POLICY SUBMISSION

SCOTTISH COUNCIL FOR DEVELOPMENT AND INDUSTRY (SCDI)
RESPONSE TO:

SCOTTISH GOVERNMENT AND FORUM FOR RENEWABLE ENERGY
DEVELOPMENT IN SCOTLAND (FREDS)

FRAMEWORK FOR THE DEVELOPMENT AND DEPLOYMENT OF RENEWABLES IN
SCOTLAND

November 2008

SCDI is an independent and inclusive economic development network which seeks to influence and inspire government and key stakeholders with our ambitious vision to create shared sustainable economic prosperity for Scotland.

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Introduction

1. SCDI is an independent membership network that strengthens Scotland's competitiveness by formulating policies to encourage sustainable economic prosperity. Its membership is drawn from businesses, local authorities, trades unions, educational institutions and the voluntary sector across Scotland.
2. Energy is at present a top public policy priority for many organisations in SCDI's wide membership. SCDI recently organised a major conference in Edinburgh with high-profile speakers and over 260 delegates from the energy industry, and the wider business and economic community. Key subjects for discussion were how Scotland, the UK and Europe could reach their respective renewable electricity, renewable energy and climate change targets. SCDI's response to this consultation has been informed by all their contributions. Further information can be found at: <http://www.scdi.org.uk/energy/index.html>. SCDI has also commissioned a major independent study from Wood Mackenzie which will look at future supply and demand of electricity, and the likelihood of Scotland hitting its target of 50 per cent of consumption coming from renewable sources by 2020. This will be published before the end of the year and SCDI believes that it should both inform the Scottish Renewable Energy Framework and the wider energy debate. SCDI welcomes the greater priority for heat and transport in this consultation. In recognition of the importance of these areas and the comparative lack of attention which they have so far received, SCDI organised Focus Groups on renewable heat and sustainable transport to inform its consultation response.
3. SCDI recognises the importance of the consultation on the draft Scottish Renewable Energy Framework in meeting the key energy policy challenges. But discussions with members have revealed significant frustration with the plethora of inquiries, reviews and consultations in recent years. The Scottish Renewable Energy Framework should deliver immediate action and long term clarity.

Energy Efficiency

4. While there is a chapter on energy efficiency in the draft Scottish Renewable Energy Framework, policy is being developed separately and there are no questions on the subject. SCDI agrees that it should have the highest priority and would, 18 months after the consultation closed, urge the Scottish Government to now bring forward its Energy Efficiency and Microgeneration Strategy. However, it would note that speakers at SCDI's Energy Conference generally predicted that, even with energy efficiency measures, the demand for electricity will grow significantly as the economy recovers and expands over the period to 2020, not least because it is likely to be increasingly used in heating and transport. Energy efficiency will be particularly important in relation to heat because if the demand for heat could be reduced it would be easier to hit its renewables target.
5. Energy efficient street lighting could save local authorities approximately 25 to 30% of their energy costs, with a payback time on the initial installation of between 18 months and 2 years. SCDI welcomes the announcement by Fife Council of four pilot areas. However, local authorities have generally been slow to take advantage of this proven technology and continue to use less efficient and higher carbon conventional lighting. The reason given can be safety concerns. SCDI would therefore recommend that national and local government immediately set up several pilot schemes to establish appropriate guidelines and public acceptance for installation of the technology prior to a nationwide roll-out. Energy saving light bulbs are now competitively priced and should become standard as soon as is practicable. While SCDI notes that the UK Government has a voluntary agreement which aims to phase out incandescent light bulbs by 2011, it believes that the UK Government should introduce legislation to prohibit them.

Sustainable Transport

6. SCDI supports the introduction of a UK-wide road pricing system which would replace fuel duty. This would reduce congestion and carbon emissions, and benefit rural areas of Scotland and the UK where public transport is less available. Softer measures in workplace and communities such as providing more information on travel options have been shown to work without imposing a heavier burden on vehicle usage which in some areas is a necessity, not a luxury.
7. Flexible working and home working should be promoted through better access to ICT, video conferencing, and workplace travel plans. Ofcom has just published an action plan to encourage further investment and competition to deliver super-fast broadband to UK homes and businesses, and BT has said that its fibre-based broadband will become available for up to 10 million UK homes by 2010. The planning system can also discourage locating new housing where commuting and access to services and amenities is only achievable by lengthy car journeys.

From now to 2020: Achieving 20% of energy consumption from renewable sources

- **Do consultees agree that we should aim at 20% to meet the 2020 target and that progress should be made in all three sectors of electricity, heat and transport?**
 - **If not – why not?**
8. SCDI has set the following objectives for energy policy:
 - **Security of Supply**
 - **Decarbonising Supply**
 - **Affordability of Supply**
 - **Optimising Economic Benefit**
 9. In addressing these overall challenges, SCDI believes that it will be important to maximise the exploitation and responsible use of indigenous resources and existing technologies for sustainable economic benefit, while accelerating new technology development. New technology and infrastructure may then be deployed alongside existing low carbon technologies, to harness the resources available to achieve our sustainable economic growth and climate change targets.
 10. SCDI is supportive of the significant expansion of renewable energy and progress in all three sectors of electricity, heat and transport. It believes that a target for Scotland of 20% by 2020 can be achieved and, indeed, exceeded. While acknowledging that the proposed Scottish target aligns with the overall European Union approach, SCDI members have, however, expressed a number of concerns:
 - The draft Scottish Renewable Energy Framework takes a top-down approach from the 20% target, rather than working up from the range of potential renewable resources to set a stretching, but achievable target. Companies in electricity, heat and transport believe that it is possible to go further than the sectoral targets. For example, the renewable share of Scottish electricity demand is on track to exceed 50% by 2020. However, concern has also been expressed that the sectors will find themselves competing for the same resources which will limit their opportunities. A bottom-up approach to the target would begin addressing these issues.
 - The draft Framework does not compare alternative potential energy mixes. For instance, it is possible that the rapid deployment of carbon capture and storage

(with the expansion of renewable electricity to a level below 50%) could produce lower carbon emissions and more economic benefit for Scotland than simply increasing renewable sources to 50% or above.

- The draft Framework ignores the issue of affordability of supply to consumers and businesses. The increasing costs of energy and price volatility are major concerns to households, businesses and the public sector. The UK Renewable Energy Strategy and the Committee on Climate Change have both said that measures to cut greenhouse gas emissions - such as subsidies for renewable energy projects, new grid infrastructure and the costs of system balancing - will significantly impact on the price of electricity and gas. The Scottish manufacturing industry has found it increasingly hard to remain competitive and continued investment in Scotland compared to other locations has been made more difficult to justify for some companies. The Committee has said that the number of fuel-poor households will increase by 1.7 million in 2022. These are consequences which must be explained, debated and minimised.
- The draft Framework is based on far greater financial commitment to new power generation in Scotland than has been made in recent years. It is recognised that it was published before the impact on renewable energy of the credit crunch, economic downturn and fall in the price of oil became apparent. Since then, SCDI understands that renewable energy companies have experienced serious difficulties in financing projects and the economic case for investment in renewable energy has, aside from proven technologies, all but collapsed. NEX, an index that tracks renewable energy technology stocks globally has fallen faster than the market as a whole. New Energy Finance has calculated that the amount of project finance devoted to clean energy projects around the world fell by almost 25% in the third quarter (to \$18bn) and will fall further by the end of the year. The final Framework must address this issue, explore options for finance and explain how Government, with public finances exceptionally stretched, can correct this market failure which threatens its policies.

11. The Scottish Renewable Energy Framework is focused on the period up to 2020. However, Scottish Government energy policy must also look beyond 2020. While the precise dates are uncertain, it is known that further nuclear and coal-fired plants will close in this decade and Scotland will lose more base load generation. The level of variable generation on the network by the 2020s is likely to need significant back-up. In evidence to the UK Parliament's Environmental Audit Committee, E.ON UK has suggested that if the UK needs around 40000MW renewable electricity to meet the EU renewable energy target, 36400MW of conventional supply will also be needed to ensure that winter peak demand can be met. The uncertainty and higher costs associated with renewable development does underline the need for the Scottish and UK Governments to pursue an energy policy which supports a balanced energy mix with a diversity of low carbon supply. If Scotland is to remain energy independent, new base load capacity will therefore be required. SCDI believes that new nuclear generation and low carbon fossil fuels plants, which it believes are needed to ensure security and affordability of supply, and hit climate change targets, should all be considered as part of the mix. The recovery of North Sea oil and gas need to be maximised. Greater certainty on energy policy, including renewables, and a more competitive fiscal regime, are essential to promote investment in upstream and downstream infrastructure.

Renewable Electricity

- **Are the expectations for each technology reasonable?**
12. SCDI supports a balanced mix for electricity generation in Scotland to meet the objectives of security, lower carbon and affordable energy. The UK Renewables Advisory Board's latest report states that nearly half of the target for increased provision from

renewable energy will need to come from bulk electricity. The Scottish Government's target to generate 50% of Scotland's electricity from renewables by 2020 is essential to achieve the UK's renewable energy target.

13. The UK context is important. Access to the wider UK market is essential for the development of renewable electricity in Scotland and, indeed, the whole Scottish electricity industry. It must be able to compete with English-based generators.
14. SCDI accepts the draft Renewable Energy Framework's projections for onshore wind and biomass. However, a more cautious view is taken of the potential over the period to 2020 for hydro, offshore wind and wave and tidal technologies. SCDI suggests that onshore wind generation will increase by 5.4GW, while offshore wind developments account for a further 500MW and other renewables, combining biomass, marine and hydro sources, c. 650MW of additional capacity.

Mature Technologies

15. **Hydro** – The FREDS study suggesting the potential to provide a total of 657MW of new generation is not the first such study to be carried out in Scotland. Previous reports suggested the potential scope for additional generation to be between 270 and 1,000MW. Even if the planning issues which have limited development are overcome, there are reasons to conclude that this potential is unlikely to be fully realised. Many schemes would be located in the North West of the country and grid capacity is therefore a barrier. Investors and developers are more likely to favour new wind generation projects than hydro because it is currently the first choice technology, there are advantages of scale and the level of incentives from the existing Renewables Obligation arrangements are the same. It seems likely that any further increase in hydro generation capacity will be fairly gradual and much lower by 2020 than the potential outlined in the FREDS study.
16. **Pumped Storage** – SCDI assumes that Scotland's two pumped storage installations, totalling 0.7GW of capacity, will remain in operation beyond 2020.
17. **Onshore Wind** – National Grid's 2008 GB Seven Year Statement is a reasonable guide of the general market interest in each technology and locations. It anticipates that new wind generation will be 9.6GW of the 10.2GW increase in renewable capacity (over 90%) in Scotland and all but 1GW will be located onshore. The UK Government expects that around one third of renewable capacity will come from onshore wind and a large proportion of this development will take place in Scotland. These estimates are broadly consistent with the onshore wind generation in construction, with planning consents, at planning stage or in scoping. Scotland continues to provide significant opportunities for onshore wind farm developers, having both a good wind resource and large number of attractive sites. Onshore wind is probably the cheapest and most accessible form of renewable power. Exploiting this resource is important if Scotland is to achieve the renewable energy targets in as affordable a way as possible. The average load factor for onshore wind varies in Scotland between 30 and 40%, with over 40% achieved on the Northern Isles. A geographically diverse portfolio of wind and good mix of renewables can smooth the effect across the country and should be supported in planning. Given the distance between the most suitable locations and the centres of demand, the rate of development will depend in part on access to the grid from a widely dispersed range of relatively small developments and the capacity of the transmission network capacity.

Developing Technologies

18. **Biomass** – SCDI agrees with the Scottish Government's relatively cautious expectations of new biomass capacity in Scotland for renewable electricity. We would imagine some modest development involving fairly small scale projects situated to take advantage of

local fuel resources and by-products. Large biomass developments of over 100MW would probably depend upon imported fuel supplies and, therefore, SCDI does not foresee any significant prospect of them.

19. **Offshore Wind** – SCDI welcomes the level of interest from companies wishing to be considered by the Crown Estate for developing offshore wind generation within Scottish territorial waters, and the Scottish Government's intention to complete within one year a Strategic Environmental Assessment for offshore wind to ensure that the resource is developed in a strategic and coordinated manner. However, while it is likely to be the case over the period to 2020 that there will be a noticeable shift from onshore to offshore wind development in the UK, SCDI believes that it will be substantially less marked in Scotland. Offshore wind is particularly attractive in the southern part of England because electricity generation can be located closer to the centres of demand and the sites are generally more accessible for construction. Without the completion of significant and costly offshore transmission networks, offshore wind in Scotland will be constrained over the period to 2020 by competing for use of the same infrastructure as onshore wind. Construction in the comparatively deep Scottish waters will be a greater challenge and it also seems likely that offshore wind projects and transmission networks will prove more environmentally contentious than hitherto seen, perhaps even more so in Scotland's relatively unexploited waters. Investment in offshore wind is likely to be concentrated, therefore, in the south, and development in Scottish waters is likely to be slower than estimated.

Emerging Technologies

20. The differences between demonstration of new technology, small scale deployment and large scale commercial deployment, and the lengthy timescales between each stage, should be understood and much more clearly stated.
21. **Marine** - Scotland has significant potential for marine energy developments and has been at the forefront of the development of marine energy technology. SCDI welcomes the announcements by ScottishPower and Wavegen of projects, and by the Crown Estate of the application and consent procedure for the Pentland Firth. However, the current level of generation from wave and tidal sources is negligible and the technology remains in the pre-commercial stage. While some small marine energy projects will make a contribution towards the 2020 target, and the banding of the Renewables Obligation may bring forward investment more quickly, the technology is still in its infancy, connections to the onshore grid will be a challenge and capital costs are likely to be double those of onshore wind. SCDI therefore takes a more cautious view than the Scottish Government of its generation potential over the period until 2020. It believes that the policy priority should be to firmly establish Scotland and the UK as the home of the marine industry and scale it up to make a much more substantial contribution from 2020.
 - **Have the main constraints to development been identified?**
22. This pace of renewable electricity development will require a major commitment on the part of developers, grid companies and regulators, and a stable, attractive and reliable market environment for projects. There is a pressing need to join up policy and delivery on transmission, generation, regulation and planning.

Grid Security

23. Greater variability of the power supply to the grid network will mean that the system needs constant balancing. Pump storage technologies can help address this variability, providing significant quantities of power at very short notice. However, one barrier to the development of pump storage is that it is currently treated and charged as electricity

generation. It should be regarded as storage. Extra variable power could be used for electric and fossil hybrid vehicles.

24. The grid's character will have to change. A smart grid is needed to go with smart metering. As generation becomes less controllable, it will have to be more controllable. Customer load will have to adapt to supply capability, for example demand from electrical appliances could be remotely turned down at times of lower supply. There is also the potential for more decentralised networks.

Grid development: onshore and offshore

25. Achieving the renewable electricity targets will depend on investment in the expansion transmission capacity on a scale which has not been delivered for many years. The UK's draft 2008 Renewable Energy Strategy (RES) found that the transmission system in Scotland had very limited potential to accommodate new generation without further system reinforcement. An increase of new transmission capacity of 8GW in Scotland is projected as needed. Offshore and onshore transmission networks must be developed and strengthened in time. Any delay could temporarily sterilise the development potential of large areas of the country, which might otherwise provide suitable sites for new generation severely restricting Scotland's renewable energy potential. Alternative, less visually intrusive system reinforcement options may exist, but are prohibitively expensive.
26. In particular, the upgrade of the Beaulay-Denny line is simply essential on any potential pathway towards the targets. It is the only practical and affordable way to proceed, and its completion will also unlock the upgradeable potential of the rest of the northern Scotland transmission network through relatively uncontroversial reconductoring on existing routes and towers, without the need for new overhead transmission routes. Any delay would be likely to halt development in large areas of the country with the best renewable resource.
27. The average time between planning application and completion of the construction of major infrastructure seems to be over ten years. The UK will not be able to meet its energy objectives if such projects are not fast-tracked. SCDI welcomes the inclusion of electricity grid reinforcements as a national priority within the Scottish Government's new National Planning Framework and the proposals for a National Policy Statement in the UK Government's Planning Bill.
28. The RES stated that the scale of network reinforcement needed for onshore projects, over and above current investment plans, may be relatively modest. So eventual completion of the network upgrades already planned or underway should make a substantial contribution to alleviating existing onshore grid constraints. However, the RES noted that if all the upgrades do go ahead, consideration would need to be given for a further upgrade of the Scotland-England interconnector.
29. The RES noted that the prospect of significant new offshore wind farm developments introduced a new challenge - the development of an offshore electricity grid. Further significant infrastructure upgrades will also have to be made if the full potential of generation on Scotland's islands and marine energy is to be realised in the longer term. There is a lack of onshore capacity in the grid in the north of Scotland which is a disincentive to investment. SCDI believes that the expansion of offshore wind and marine in Scotland will be slower than anticipated in the draft Scottish Renewable Energy Framework. However, National Grid considers that subsea cables - from Hunterston and Peterhead to England - may become necessary for onshore and offshore wind towards the end of the next decade. The east coast cable could form part of a European super-grid. SCDI welcomes the proposals for offshore grids, especially the Crown Estate's for an East Coast Grid Transmission network and the study by the Scottish and Irish

- Governments into a connection between Ireland and the west coast of Scotland, and the concept of a European super-grid which would be developed incrementally over 30 years. If these subsea cables are to be realised, work needs to start now on surveying the seabed, planning, overcoming technical challenges and resolving how they would be funded and regulated, who would be licensed to build them in the UK, and how European projects will be co-ordinated. The offshore regime must work together in a co-ordinated way around the UK and there is some concern about a lack of clarity on decision-making regarding the various proposals. Developing an offshore grid will be a major challenge which calls for regular review and also increase the need to strengthen the onshore grid.
30. The island authorities would prefer the development of 'bootlaces' around the coasts of Scotland to take the power they generate to the population centres. It will be important that Government supports sufficient generation capacity on the islands and offshore in order that investors have confidence in these proposals.

Transmission Access and Charging

31. The current grid connection system was established to allow for the connection of a relatively small number of very large generation projects, often with long lead times available. Renewables projects can currently wait for 10 years for access to the grid and the Transmission Access Review 2008 found that "fundamental changes to the codes that govern access to the grid" are required. Grid access arrangements need to be improved and a more holistic approach taken to cost. A flexible and responsive network connection regime needs to be put in place. SCDI is encouraged by the on-going work on the Transmission Access Review and GB Security and Quality of Supply Standard, including the consideration by the UK Government and Ofgem of interim arrangements to allow for the immediate connection of new capacity. SCDI welcomes recent moves by National Grid to reduce delays and more speedily connect projects before major transmission reinforcements are made. However, it has been made aware of some concern in the industry that the 'Connect and Management' form proposed in the Transmission Access Review will limit its applicability in Scotland, and may remove any potential benefit and discourage investment in renewable energy.
32. The UK's system of transmission charging results in higher and less predictable charges for Scottish based generators and is a particular disadvantage to those developing renewable energy projects in the Highlands and Islands where there is the best resource. The industry believes that this will increasingly become a barrier to renewable development as growing global demand for turbines drives up the cost of projects and the margin of financial return is squeezed, and will disincentivise investment in extending the life of and constructing new thermal plants to back up the variable power supply from renewables. The additional locational costs for generators in the north compared to the south amounts to 15% of their total costs and appears to run contrary to Scottish and UK Government energy and climate change policy, by making it harder to finance projects in optimal, but peripheral locations. The Kingsnorth controversy shows the potential difficulty of locating new generation close to the population centres in the south east. SCDI has called for a fundamental review of locational charging. It is supportive of the proposals by the Scottish Government, ScottishPower, Scottish and Southern Energy, and the Scottish Renewables Forum for a new methodology in which there is a level-playing field with generators using the UK transmission network being levied at a uniform rate for each unit of energy that enters the system, irrespective of its location. This would appear a simpler, more predictable and fairer system, which is more aligned with Government policy objectives and would not impose extra costs on National Grid or the consumer. Locational signals could be provided in other ways under consideration by the industry. While National Grid believes that the biggest barrier to new generation, renewable or otherwise, is the current planning regime and not transmission charges, SCDI welcomes its constructive approach to considering these proposals.

33. The load factor for wind energy in the Northern Isles, Western Isles, the Highlands and Argyll and Bute is generally much higher than in other areas of the UK, reaching as high as 40% in the Northern Isles. Island generation is therefore a more reliable source of power for the UK, as well as creating socio-economic benefits for the communities. SCDI has long supported the capping of transmission charges from the islands and is very disappointed that the UK Government appears to have rejected it. There is a case for the higher banding of ROCs for generation on the islands if this will unlock more potential projects.
34. ROCs have been a success, but, as the consultation says, there is a danger that the investment may falter between 2010 and 2015 then grind to a halt. SCDI supports the extension of their duration beyond 2027, possibly by another 20 years. Commercially viable wave and tidal devices are not yet in operation and a higher banding for ROCs will not help develop the technology to the point when the ROCs would make it more attractive for investment by utility companies. Additional financial stimulus is necessary to deliver commercial projects. In the long term the industry should aim for returns which do not require more ROCs.
35. Planning and consents constraints are addressed by SCDI later in this submission.
 - **Bearing in mind the need for costs to be taken into account, are there further actions which need to be taken by relevant parties in order to release renewables potential?**
36. The regulatory regime has served its purpose. Ofgem's remit now needs to be more strategic, supporting transmission reinforcements, and considering the total costs to consumers now and in the future, including the costs of climate change.
37. If marine energy becomes a commercial technology and grid infrastructure is put in place, Scotland will be a very attractive location for investment. This in itself would benefit the Scottish and UK economies, but it is not on the same scale of opportunity as becoming the world leader in research, development, expertise and manufacturing. Npower and Wavegen have submitted plans for the first commercial wave power station at Siadar, Lewis, and SCDI trusts that it will be supported. But the technologies are still at least five to 10 years away from scale commercial deployment and the priority is the step beyond single devices and test sites to a complete commercial scale deployment. It will be a challenge to develop follow-up projects until the initial projects have been demonstrated at a reasonable scale, but there is a need for more early projects to maintain the marine industry's centre of gravity in Scotland. The creation of EMEC in Orkney was welcome and the Saltire Prize is a laudable attempt by the Scottish Government to leverage in private sector funding. Scottish-based developers still have a technical lead, but the Spanish, Portuguese and Irish are working hard to catch up. The U.S. Department of Energy has recently announced the first companies and groups that have been awarded grants through its Water Power Competitive Grant Solicitation. The UK's total planned investment also pales next to the long-term Danish investment in wind technology and has largely been spent on facilities.
38. SCDI understands that the marine industry is likely to develop in a similar way to other energy industries, with locally-based companies developing the technology and installing demonstration devices themselves, before partnering with larger utility companies which would finance and construct full-scale power plants there and around the world. This has been the process through which ScottishPower Renewables and other utilities are now developing wave and tidal projects. For this process to be centred on Scotland and not elsewhere, it must remain an attractive location for technology companies. Currently there is a critical gap at the pre-commercial deployment phase where there is no

appropriate funding mechanism in place. While SCDI applauds the intent behind the banding of ROCs for emerging technologies, two ROCs on their own are wholly inadequate and need to be augmented by both additional revenue support and capital grants. Scotland's Marine Supply Obligation has state aid clearance. It is seen as the benchmark mechanism, but could be increased to reflect inflation in the industry since it was costed in 2005. The Institution of Mechanical Engineers has recommended a £40million fund to help bridge the gap between the development of prototypes and commercialisation, the precedent being the first round of UK wind projects. Sources are available. The £42m UK Marine Renewables Deployment Fund is still unspent because no device has reached the required stage of technological readiness. The application of the rules on eligibility could also be more flexible to provide support to the industry. The Scottish Government's Wave and Tidal Energy Support Scheme, which was used to kick-start marine energy R&D, could be re-opened. Funding from the Scottish Renewables Obligation is currently held by HM Treasury and could be made available to spend in Scotland. £98m earmarked for renewable energy in Scotland sits unspent in the Fossil Fuel Levy. Such a fund could make a real difference to capital support for the early development of projects. An appropriate balance would need to be struck between support for getting devices in the water and continuous technological innovation. Possible approaches include one-off grants which would maintain Scotland's leading position over the next two or three years; a new rolling scheme which could sustain investment by R&D companies indefinitely; and match funding from Government for money companies raise on the market or privately. There may be a case for developers in nascent sectors to opt to receive a lower ROC in exchange for a capital grant for R&D, demonstration and deployment. Any changes must not reduce or disrupt funding.

39. A report by Greentech Media estimated that the marine energy industry could be worth more than \$500m annually in 6 years. It found that technology transfer had allowed companies to move rapidly into R&D and that the development bottleneck often occurs in the scaling-up stage and not the device design stage.

Renewable Heat

- **Do consultees agree that we should work towards a target of 11% for renewable heat?**
40. SCDI believes that this target for renewable heat is achievable by 2020 and, if it is set, should be regarded as a minimum. Indeed, Scottish Renewables Forum believes that a higher target of 14% is in fact needed to achieve the proposed overall 20% target for renewable energy. It is acknowledged that working towards either target will not be easy because Scotland is starting from level of less than 1% renewable heat, the policy is still developing and heat is decentralised compared to electricity generation. However, there is no shortage of opportunities and SCDI members consider that target-setting is less important than a comprehensive study of them to establishing their value. It will be important to have a balance of technologies and select the appropriate one depending on the economics in the geographical location. Industrial and commercial heat as represents 50% of heat use and the opportunities need to be fully explored.
 41. SCDI welcomes the separate consideration which the Scottish Government is giving to the issue of waste heat. This should examine the scope to introduce financial incentives for companies to connect to local distributed energy schemes.
 42. Highly distributed power systems are opportunities for billions of pounds of investment in brownfield sites, but will take time and mean changing social structures and attitudes. It is important to remember that in a more densely populated area or with a significant off-taker, CHP does not have to be renewable. Even gas fired would bring about carbon reduction benefits. SCDI believes that all future small thermal generating plants near

- population centres should have specific arrangements for the use of waste heat. It must be ensured that new public procurement framework agreements do not exclude CHP because it will never be practicable everywhere. Mechanisms should be put in place to provide reassurance to early adopters regarding supply, maintenance and competition.
43. The draft Framework understates the potential for geothermal energy. The technologies are already in widespread use in the United States and several new power plants are coming online in Germany. SCDI understands that granite rocks are ideal for Hot-Dry-Rock and the North Sea has great potential for aquifer based schemes. Ground Source Heatpumps (GSHPs) are a viable option for community based district heating schemes. The technology is proven and cost effective when employed at scale. The industry is aiming to sell 100,000 GSHPs per annum. With appropriate financial incentives, GSHPs can be competitive with traditional forms of heating at all scales, especially if renewable cooling is also included.
- **What more could we or other parties do to encourage renewable heat deployment specifically with regard to: air quality, awareness raising, planning, other areas?**
44. SCDI understands that local authorities are at present treating 1.7m tonnes of organic waste per year, most of which is composted. If this was converted into biogas, 2/3 TW of biogas could be created. It is possible to envisage a network of thousands of small Anaerobic Digestion plants in the UK to process organic waste, farm waste and purpose grown crops, with embedded methane production sites for injection into the gas grid. Problems which have been identified as stalling the creation of this market include a reluctance to enter into the length of contracts which would enable investment in the infrastructure and CSR policies in industry which are seen as preventing the productive re-use for organic waste.
45. A number of distillers are investing in or exploring opportunities to convert distilling co-products as alternative fuels rather than animal feeds. This would supply cleaner heat and electricity for the distillery, reduce heat and electricity use by the animal feed plants and remove the carbon emissions from the transport of the by-products. The whisky industry has been concerned the reuse and recycling of biomass waste is prioritised over its use as a renewable fuel. In the case of converting distillery co-products this may be interpreted as favouring the reuse or recycling of biomass in animal feeds over their potential use as a renewable energy form. This would be a barrier to improving the industry's sustainability.
46. The industry has also flagged-up concerns that, due to the increasingly narrow interpretation adopted by the UK, the Scottish Environment Protection Agency may have to consider distillers' by-product for heat energy as "wastes", which would then make them subject to waste legislation, increasing costs to the industry. Commercial imperatives would as a result force companies to abandon their investment plans for converting distilling co-products into alternative fuels, use less sustainable fuel sources onsite and use more energy offsite in continuing to convert the co-products into animal feeds. SCDI would support the call for the adoption of a definition of by-products which would support rather than threaten the sustainable energy projects which are being developed by the industry.

Awareness Raising

47. A lack of understanding of the various technologies, within Government and among potential developers, planning authorities, consultants and consumers, is a barrier to their deployment. SCDI welcomes the support for Scottish Renewables to produce a consumer information pack and the development by the Scottish Government of case studies showing best practice in Scotland and internationally.

48. Better informing consultants is important e.g. demonstrating to them the benefits, efficiency and reliability of GSHP equipment is a key to unlocking its potential.

Fuel Poverty

49. The installation of standard boilers rather than heat pumps in the Scottish Government's central heating programme has been a missed opportunity. The Carbon Trust offers interest free loans over 4 years for installation by businesses. SCDI would recommend that the Scottish Government considers the practicality and affordability of extending similar interest free loans to all households.
50. SCDI understands that high levels of fuel poverty in off grid locations in the North of Scotland are likely to be a deep concern this winter. This problem will need to be addressed urgently with Government support, and affordable, low carbon or renewable heating technologies surely form part of the solution. Here is an opportunity for greater penetration of renewable heat and the work would create demand for installers and a supply chain which would boost the economy.

Building Standards

51. Building regulations could require the installation of renewable heat technologies when significant refurbishment takes place and they could include a Simple Pay Back calculation to demonstrate the long-term viability of each technology.

Air Quality

52. The possible environmental policy conflict between the carbon reduction benefits of biomass production and the effect on air quality from the particulates caused by burning biomass was an issue which was discussed at the SCDI Energy Conference. Particle control mechanisms will be necessary on boilers to address this issue, but it was also highlighted that newer technologies can lower levels. A study by AEA has found that proposed biomass installations are compatible with air quality targets. There is a need for guidance for environmental health officers and local planners on particulate emissions to promote greater confidence.

Planning

53. There is a need to change the mindset of the planning authorities. Awareness and understanding must be increased of the various technologies and their potential. There is a need to persuade planners that the risk is relatively low in most cases as there are many successful case studies on their implementation in other countries.
54. Requirements for biomass installations are not clearly set out in a succinct and easy to follow manner under Scottish building regulations, making them open to different interpretations in the planning process. A short summary for biomass systems is required that is cascaded top-down to all Local Authority Planning Departments to enable fast-track applications and response for such installations.
55. Large scale district GSHP installations, operating at higher efficiencies and lower temperatures, are easy to site and, with no local emissions, attract little opposition.

Regulatory and Financial Incentives

56. There is a need to reduce the installation costs of the various technologies. Distributed Energy and Community Based Schemes could be encouraged through grant schemes for social housing. This would help to develop the supply chain.
57. SCDI welcomes the intention to run another round of the Scottish Biomass Support Scheme specifically to encourage renewable heat by businesses and in district heating demonstrators. However, the likely overall funds and individual awards seem too low. Larger biomass CHP schemes with housing, commercial and community facilities take a couple of years to research, plan, build and commission. Therefore, support scheme needs to be open for longer and be better funded. The North Banchory Company is proposing to build the UK's first commercial biomass boiler supplying heat to private householders in the UK and the first using Organic Ranking Cycle. It has found that none of the potential funding programmes in Scotland - the Scottish Biomass Support Scheme, the Low Carbon Buildings Programme, the Scottish Community and Householder Renewable Initiative and the Scottish Rural Development Programme – would meet its needs. Nor will supply chain infrastructure be included, but this is an essential component to enable more rapid development of the woodfuel sector.
58. Removing rates on District Heating pipes would help to improve revenues. Private operators do not receive support for capital costs, while charities and communities do. SCDI understands that a waste incineration scheme in Lerwick received support for a connection. A similar approach to biomass could work.
59. SCDI understands that enquiries about biomass boilers are high, but only a small fraction of them are translating into orders. Small householders have found SCHRI grants for single building biomass installations are inadequate and don't take account of the total potential project cost to the customer (i.e. the boiler, fuel feed system, flue, building warrant). The installed costs are typically £10-15k, making payback impossible over the lifetime of the boiler at current prices. Customers are typically looking for 5-10 year payback. To achieve this, banding may be more appropriate, with grants of up to 50% for smaller installations, retaining grants of 30% for larger installations where fuel cost savings are greater.
60. Injecting biomethane into the gas network can reduce its carbon intensity. SCDI believes that it should be made at least as attractive to introduce it into the gas distribution system as to burn it on-site. SCDI is also aware of market research by the industry which indicated that there is sufficient organic waste from agriculture, local authorities and the commercial and industrial sectors to generate at least 3tWhrs of biomethane. At present, biogas is used to generate electricity, but it suffers 30% transmission losses on the grid and, as there are often no heat users in proximity, the heat is wasted. While some of this organic waste could be used onsite or locally - as set out above in the case of distilleries – there is also the potential to produce a significant amount of bioenergy for transport in the national grid. One proposal is that if biomethane is injected into the gas network in one location, a Combined Heat and Power plant in another location should be able to take out an equivalent volume of natural gas for use where it is needed and still receive the ROCs given as if the CHP was immediately beside the biogas plant. This would mean that the biogas plants could remain in rural locations close to where the waste is sourced (avoiding carbon emissions through vehicle transport) and away from population centres where they may be planning difficulties, the digestate can easily be spread on the land as high quality fertiliser and there would be more renewable heat on the grid. Such a system already works at the 10mW biogas plant in Schwandorf in Germany which will inject biomethane at natural gas standards into the gas network. SCDI consider that this proposal is worthy of further investigation and consideration by the Scottish and UK Governments.

Skills and Training

61. The competition for skills between the renewable heat technologies is a problem. This is exacerbated because Government and the education system are not always aware of the differences between them. For example, there is a clear lack of understanding as to how to correctly design and install a GSHP installation.
 62. The new accreditation scheme for installation of heat pumps which has been introduced by the UK Government has caused fury in the Scottish industry because of the higher, multiple costs to installers, and additional bureaucracy. It costs £3,600 to gain accreditation under the SCHRI, which is hard for small businesses to absorb and is a disincentive to getting involved, especially in rural areas. Following consultation, this accreditation system should be replaced.
 63. There is a dearth of qualified installers for wood chip boilers. SCDI has been informed that only 4 people are registered in Scotland and it costs £15k to qualify.
- **Do consultees agree that renewable heat should be promoted through a regulatory incentive mechanism? Do consultees consider that there are Scotland specific issues in the choice between a RHI and RHO?**
64. Yes, a regulatory incentive mechanism is needed as current mechanisms will not achieve the necessary growth. SCDI has been informed that a heat ROC or RHI equivalent to £40mWhr would transform the investment proposition for biomass CHP and district heating systems and stimulate the market. SCDI believe that whether the RHI or RHO is chosen, it should be carefully introduced, be technology neutral and not be set at a level which leads to more fuel poverty.
 65. There are differing views within SCDI's membership on this choice. SCDI has been made aware of evidence which shows that the success of renewable heat projects in Germany is due to its planning system, not feed-in tariffs. This would suggest that a RHI should be supported for smaller projects in this country, but with an upper threshold above which an RHO would be more beneficial. As regards Scottish-specific issues, there is an expectation with the RHO scheme that energy suppliers will pass through the cost of compliance to the end user but this will not always be possible and one example involves whisky distillers located in remoter areas of the Highland and Islands. Those interested in using renewable energy would not be able to and would, therefore, face increased production costs. Extra incentives and assistance should be available to help the smaller distilleries in remoter areas to investigate the potential use of renewable energy forms.
 66. According to the consultancy Manor Lane Energy Ltd, on average, converting the co-products of one distillery through anaerobic digestion could supply it with up to two-thirds of its primary energy requirements for steam. However, the current ROC system incentivises converting the biogas into electricity and, as five times more is generated than can be used onsite, a grid connection must be sought and there will be transmission losses on the electricity. This position would change if a heat, steam or biomethane ROC was introduced and, set at the equivalent to the £40mWhr. Apart from distilling, other industries producing organic waste, including abattoirs, breweries, fish processors and bakeries, would also benefit.

Distributed Energy and Community Based Schemes

- **How can distributed energy systems be promoted in Scotland?**

67. The Energy Savings Trust has estimated that microrenewables could potentially supply as much as 30-40% of the UK's total electricity demand by 2050. In the short-term, Government needs to support the industry in the current economic downturn by helping to maintain orders and removing the planning barriers in order that it can contribute towards the 2020 target and build towards 2050. Government should take a longer-term view in considering mechanisms for support. One model for the new electricity networks would include more large-scale renewables, local self-sufficient networks and some commercial micro-generation. This would mean that suppliers need to look at new business models to maintain their revenues and there would be new, different regulatory pressures.
68. SCDI believes that everyone (including Government, planners, consultants, media and the public) now needs clearer information on energy efficiency and microgeneration to increase awareness and improve advice, guidance and design. Installers need confidence to offer renewables in their products. Communities need to understand the benefits of schemes and individuals the benefits of microgeneration. This should be underpinned with further consumer incentives for early adoption to alleviate costs. There should be a review of funding mechanisms to ensure effective targeting of resources and that consumers are not confused. The public sector can show leadership and establish the supply chain, while it has been demonstrated in Norway that retailers can make major energy savings by installing renewables and showcase the technologies to customers.
69. Higher and more rigorously enforced standards are needed for new houses. But the credit crunch has resulted in a major contraction of the house building industry, with cutbacks to skilled staff and the supply chain. SCDI understands that even if growth returns to 5% per annum in the near future, re-building the industry to the levels achieved before the credit crunch is likely to take decades. It is predicted that this will lead to more pre-fabricated construction. To support its recovery, it will be important that the Government does not impose unrealistic burdens and agrees with the industry what can be delivered in the new market conditions. Even at pre-credit crunch levels of development only 1% of the housing stock was new every year. If the expectation is that far fewer houses will be built, then, in addressing sustainable development and climate change, the need to focus more on the energy efficiency of the existing stock will be all the greater, and the planning system will need to be more supportive of microgeneration.
70. Incentives for better insulation are a particular priority for the existing stock. SCDI believes that the UK Government should reduce stamp duty and the Scottish Government should enable the council tax rebates which are already available in England. There is also a need to consider more ambitious loan schemes for all. Smart metering would improve consumer information and may change habits. Following the ongoing pilot, its roll-out must be mandated by the UK government for within 10 years from the passing of legislation. SCDI anticipates that this will lead to new tariffs which will include a much wider range of options e.g. price v. supplier-controlled appliances, price v. security of supply.
71. While offshore grids for marine energy in the north of Scotland are being planned and constructed, a temporary solution would be possible if a smartgrid is piloted for decentralised energy in the area. This would involve the electricity generated from these variable power sources supplying local consumers and industries when it is available and the national grid supplying the electricity when it is not. This would enable the Government and National Grid to test the impact of more unpredictable power on the network and help to develop larger smartgrids.
- **Do you agree with the Scottish Government's proposed measures for maximising community benefit from renewables, including the production of guidance and the development of an improved grants scheme?**

72. The increased grants and financial incentives for microgeneration from the Scottish and UK Government have been welcome, but they are still comparatively small and SCDI agrees that it would be appropriate to go further. Having weighed up the arguments, it would favour feed-in tariffs with an upper capacity limit at a level which is complementary to the ROCs system and does not undermine investor confidence in it. SCDI believes that feed-in tariffs could better support an expansion of smaller scale and decentralised renewable electricity schemes including domestic microgeneration, onsite and community owned renewables. It recognises the strong case for front-loading this support to stimulate demand.
73. It is important that grant schemes and financial incentives should have criteria for measuring the likely carbon savings to ensure they save reasonable amounts. A recent study by the Carbon Trust and Met Office found that wind turbine technology can often be inefficient in urban and suburban environments. SCDI welcomes the acknowledgement in the consultation that too little attention has been paid thus far to more community and business collaboration on small-scale microgeneration as the focus has been on schemes for individual buildings. This collaboration should be encouraged through finance, clearer and more consistent advice, and planning reforms e.g. General Permitted Development Rights. In England, area-based schemes are promoted through council tax reductions. This increases awareness among householders and makes them more cost effective.
74. With new house-building down by as much as 50% across Scotland and the likelihood that it will take many years for the industry to recover to pre-credit crunch level, retrofit becomes even more important. So the Scottish Government should at least achieve the level of permitted development for single and small scale granted in England. The Scottish Government's proposed distance criterion for wind turbines and air source heat pumps will effectively render these technologies unusable in urban areas. Ministers should review this 100 metre distance criteria and consider an alternative approach. The biggest barrier is often the availability of contractors. There is an urgent need to create capacity with more approved installers. The Carbon Trust is building up greater knowledge base on conversance with technologies and the public sector also has significant role.

What role can social landlords play in developing local renewable energy schemes and what is the best way of supporting and enabling this?

75. Social landlords can be at the vanguard of developing local renewable energy schemes, creating the supply chain and the cultural shift which is required to become a low carbon society. They have responsibility for a range of often tightly-grouped properties where people are more likely to suffer from fuel poverty and they can demonstrate to the wider community that measures in new and existing houses lead to warmer homes, cheaper bills and reduced emissions. Grants and loans are needed for the installation costs as otherwise landlords will have no direct interest in making the investment. It is the tenant who benefits.
76. Local government had a key role to play. As large housing landlords, local authorities are able to exert influence over energy consumption in housing and help to create job opportunities in retrofit instillation. Green targets can help to drive economic growth and provide additional opportunities in social justice. For instance, Fife Council is currently supporting projects which would result in a reduction of around 1 million tonnes of emissions per year (around one third of the total). It is intended that the first green business park will be built in Fife.

Bioenergy

- **Do consultees agree that there is significant potential for developing bioenergy through wood and recyclable waste?**

77. The European Environment Agency has estimated that bioenergy could deliver almost half of the EU's 2020 renewables target and cut carbon emissions by 8%.

78. One of the great benefits of biomass is that it is not subject to variability issues like some other renewable sources. The claims made for it can therefore be regarded as more certain. The UK lags behind other countries in developing this resource and SCDI would like further incentivisation. In Scotland, there is scope for some modest development of biomass capacity through fairly small scale projects taking advantage of local fuel resource and by-products. For instance, there is growing interest among farmers in agricultural waste to heat energy. SCDI would highlight one example in the Scotch whisky industry, Diageo's plans to expand the Cameronbridge Distillery in Fife, including a bioenergy plant. This would reduce carbon dioxide emissions by 95% and involve substantial generation of Bio-electricity, Bio-Steam and Recovered Site Water. It could also provide heat to a local hospital and it is intended to achieve zero landfill. If it would otherwise be landfilled, waste incineration for heat energy is preferable, providing it is ensured that it is pre-treated and emissions are tightly controlled.

- **Is there anything more that can be done to encourage next generation bioenergy, including marine biomass?**

79. The Scottish Government should offer further support for R&D in marine biomass and research into the potential economic and environmental impact. It should ensure that the forthcoming Scottish Marine Bill enables the sustainable harvesting of seaweed for this work and, eventually, for production. With the Crown Estate and power companies, it should look for opportunities to produce the biofuel from the electricity which may be generated from marine renewables.

Sustainable Transport

- **How can we best incentivise renewable and low carbon transport in a sustainable and cost effective way in Scotland?**

80. The scope for decarbonising transport fuel in the short to medium term appears to be more limited than electricity and heat. However, with the IMF forecasting that the number of cars in the world will rise from 600m in 2005 to 2.9bn in 2050, it is important that European countries take the lead in this process and make inroads in the period up to 2020. While SCDI considers that the EU's target of 10% for renewable energy in transport is challenging, it also believes that it is achievable. Even if biofuels reach only the lower end of the 4.5 – 8% energy range which the Gallagher Review concluded is appropriate at this stage, others technologies are available or nearing readiness which can more than make up for this shortfall. However, on current trends and without specific incentives, Scotland is unlikely to reach even 4.5% of transport fuel from renewable energy and it will lag well behind the rest of the UK. Speeding up deployment is therefore the key challenge.

81. High fuel costs earlier this year encouraged increasing sales of more fuel efficient and hybrid cars, and more conversions to LPG. But the unprecedented decline in the price of oil in recent months, the uncertain outlook and the increasing cost of finance, have seriously affected technology companies and the economics of investment in renewable transport fuel. In view of the economic and climate change policy objectives, government

- intervention is required. Risk and reward will need to be shared with the private sector to provide a more conducive climate for low carbon transport, with investment from the transport budget and other sources, such as the European Investment Bank, which could bridge the funding gaps. The UK Government's £100m Low Carbon Vehicle Innovation Platform, which will be launched in January, should be a boost. SCDI understands that Glasgow City Council will receive funding for electric and hydrogen vehicles.
82. SCDI's preference would be for government to establish fiscal incentives for renewable transport, with the market determining the appropriate technologies.
 83. Government can also play an important role in improving information and encouraging vehicle buyers to consider their options. Studies have shown that drivers currently do not have confidence in battery powered cars for longer journeys. SCDI has been informed that many fleet managers, for instance in local government, do not have a full understanding of the opportunities. It is said that previous experiences with poorly performing LPG vehicles are hindering interest in renewable technologies. Government could provide them with more data. It could also look at the role of procurement. Decisions on fleets are long-term commitments. However, it would appear that they only become an issue when the next contracts are to be negotiated and that, at present, environmental sustainability is a minor aspect. There is a need to change attitudes before decisions are being considered and look at the introduction of targets for procurement of low carbon and renewable transport. This would help to establish the necessary infrastructure for these vehicles and Government must now resolve the regulatory and planning issues around its development to enable deployment.
 84. Government must be careful that its policies do not impact on economic competitiveness and the cost of living - especially in rural areas where driving is a necessity not a luxury – and do not have unintended environmental consequences.
 85. SCDI believes that these technologies should be introduced alongside more demand management. It is supportive of the UK Government's plans to introduce a nationwide scheme of road-pricing to replace fuel duty, which it believes would reduce congestion in the cities and especially benefit rural areas of Scotland.

Combustion Engines

86. Improvements to the combustion engine, producing large fuel savings of over 20% and fewer carbon emissions, are being made. UK companies are testing smaller engines, some of which could work with hybrids or plug-in hybrids. These will be capable of breaking the 100mpg barrier and their whole-life environmental performance will compare very favourably with today's hybrids.

Compressed Natural Gas (CNG)

87. The number of natural gas vehicles in the world has more than doubled since 2004 and there are now more than 9.1m on the road, including cars, heavy good vehicles and buses. In Germany, CNG-generated vehicles are expected to increase to two million units of motor-transport by the year 2020. There are currently 90 CNG filling stations available to the public in Sweden, with another 70-80 CNG filling stations are under construction or in a late stage of planning. Next year, new CNG models will be introduced which offer higher performance engines, improved range and further carbon emission reductions. Government could provide fiscal incentives and financial support for CNG vehicles and filling stations, and promote the conversion of local government vehicles and buses.

Biofuels

88. Biofuels will clearly be important if the EU Renewable Directive for the transport sector is to be met. Evidence has been presented that use of first generation biofuels would reduce agricultural production for food and biodiversity in Europe and the developing world and increase food prices. SCDI believes that more biofuels will be needed over time and in Scotland biodiesel from the waste oil market or straight vegetable oil may offer particular environmental benefits. But appropriate environmental safeguards need to be introduced and the Gallagher Review was correct to conclude that 4.5 – 8% for biofuels is a more appropriate target at this stage, but that it could be raised later if sufficient controls are enforced globally and new evidence gives more confidence on sustainability.
89. A new report by Experian for HITRANS, the regional transport partnership for the Highlands and Islands, has found that the increased use of biogasoline in conventional petrol as a result of the Renewable Transport Fuel Obligation may have unintended consequences in the Highlands and Islands. INEOS has been due to end production of conventional gasoline at the Grangemouth refinery once its new biogasoline facility is completed. Due to its character, biogasoline cannot be shipped north from Grangemouth because the existing marine vessels are unable to handle it. Nor can it be stored in forecourt tanks at petrol stations without modifications costing up to £3,000, which is outwith the resources of smaller operators. It is also likely that it will be too expensive to construct blending plants on the islands or even in the Highlands. A new distribution network would therefore be needed and a “green” policy would therefore result in significantly increased carbon emissions from Grangemouth-based tankers travelling around the Highlands and Islands, with implications for security of supply and congestion on the roads. The region could, uniquely in the UK, also face much higher costs for fuel. The Gallagher Review has recommended that the introduction of biogasoline is delayed. Before it is introduced, there is a need to ensure that the infrastructure is put in place in the Highlands and Islands. The Scottish and UK Governments, and the fuel supply industry, must find a workable solution to the issues surrounding the introduction of biogasoline in the region as soon as possible, and before the national introduction of biogasoline, to remove uncertainty for the industry and consumers, and to provide sufficient time for industry to make the investments required to ensure continuity of petrol supply.
90. Biomethane vehicles are being produced in increasingly large numbers and it has by far the highest fuel yield of any biofuel as a diesel equivalent. There is sufficient organic waste in Scotland to produce 3tWh of biomethane per annum, which, if it was all used as a transport fuel, would provide 5.5% of Scotland's transport energy from renewables by 2020. Financial support for biomethane and financial support and tax allowances for Anaerobic Digestion plants would be required. The Scottish Government could also encourage local authorities to divert organic waste to Anaerobic Digestion, and put pressure on the Department for Energy and Climate Change to set a firm date for when biomethane can be injected into the grid and for fiscal incentives. It is estimated that biomethane would require financial support of 4p/kWh to be comparable to natural gas.
91. SCDI would like further support for R&D of second and third generation biofuels, especially non-crop based biofuels. While marine biomass is unlikely to make a significant contribution in the period to 2020, SCDI is surprised that it is not mentioned in this chapter as Scotland has a good resource and is at the forefront of research. The Scottish Association for Marine Science (SAMS) is investigating the potential and practicality of using micro- and macroalgae, and the possibility that the excess electricity which will eventually be generated from marine renewables in the Pentland Firth could be used to produce renewable fuel from micro-algae. SAMS is committed to considering the

potential economic and environmental impacts of these fuels at the same time, which is important.

Hydrogen

92. Hydrogen fuel cell cars are being developed and the technology has huge potential. Converting surplus or off-peak green electricity into hydrogen fuel for transport is completely carbon neutral and 1mWe wind turbine could produce enough hydrogen to power over 150 cars per year. However, hydrogen fuel cell cars are presently unproven and too costly for the mass market, with commercial production years away. As hydrogen is currently commonly produced from fossil fuels, overall carbon emissions may be higher than from a conventional engine. The development of a hydrogen grid would be very expensive, although storage may make this less critical. In light of the longer term potential, the Scottish Government should support their development, but SCDI is not convinced that they will make a significant contribution to the 2020 renewable transport target.
93. Financial support and procurement could encourage the introduction of hydrogen fuel cell public transport and fleet vehicles. One of the biggest obstacles is the lack of hydrogen fuelling stations. Financial support and tax allowances could be offered for electrolyser plants and hydrogen filling stations in Scotland.

Public Transport

94. The Strategic Transport Projects Review should provide clarity about the Scottish Government's plans for rail electrification and public transport projects.
95. Overall carbon emissions from trains are a small part of the total from transport, reflecting the relatively small number of passenger km compared to cars. However, electrification would help with the economic and environmental sustainability of the railway network and clarity needed on which lines can be electrified. Only 39% of the UK rail network is electrified. New diesel trains emit at least double the carbon dioxide per mile of a standard electric train. SCDI welcomes the Scottish Government's commitment to 350km of electrification and Network Rail's feasibility study into five possible high-speed rail lines. SCDI hopes that, following its review, the UK Government will later this year reverse its opposition and initiate a phased electrification of the network in the investment programme from 2014. According to the Department for Transport, high-speed rail increases energy consumption by 90% at top speeds. However, the environmental benefits compared to domestic air travel are still considerable and SCDI supports the Greengauge 21 campaign for a UK high-speed rail network. Hybrid or hydrogen-fuelled trains may become an option for rural and local rail lines in Scotland where electrification cannot be economically justified.
96. SCDI has supported the development of a tram network in Edinburgh. Trams produce zero carbon emissions and have proven to be very successful in attracting people onto public transport. SCDI believes that the planned line should be extended and a network created, including the possibility of expansion over the new Forth Crossing. Consideration should be given to funding this from the Scottish Futures Trust. Tram-trains could also be used on the city's rail network.
97. SCDI would recommend that the feasibility of Personal Rapid Transit systems is investigated. These are driverless four-seater pods which run on rails powered by electricity rather than fossil fuels, and may prove a cost-effective way of improving public transport in, for example, the Clyde Gateway project.

Transport Infrastructure

98. There are other opportunities to reduce energy use and improve sustainability in the transport network. For instance, the lights used on trunk road network could be more energy efficient and powered using renewable electricity supply.

Ferries and Aviation

99. Decisions are being taken over the next two years as part of the Scottish Government's Ferries Review on ship technology for the Scottish ferries network over next thirty years. While measures will indeed have to be "proportionate, incremental and affordable" and are unlikely to make a significant contribution to the 2020 target, the draft Framework does not highlight that these procurement decisions will be taken in the short-term which will effectively lock-in carbon emissions probably to the Scottish Government's 2050 climate change target. In the shipping sector, the large vessels required for safe and comfortable travel on longer and exposed routes in the Scottish ferry network have high energy costs per passenger and rising fuel costs are having a serious impact on operators. There are upcoming opportunities to introduce energy efficiency measures. Caledonian Maritime Assets Ltd, which owns the ferries, ports and harbours and infrastructure for the ferry services serving the West of Scotland and the Clyde Estuary, estimates that a £200m investment will be needed in new vessels over the next decade. Norway is currently allowing hydrogen-powered engines on vessels as part of a joint fuel system. New paint technology can reduce fuel use by 5%. SCDI believes that higher fuel efficiency and new engine technology must be priority considerations for the Scottish Government in procuring the new ships.

100. The Scottish Government has little influence over aviation technologies and viable options are not expected by 2020. SCDI believes that renewable and low carbon fuel development will, however, be driven by commercial pressures.

- **What potential is there for the introduction of vehicles powered through the electricity grid in Scotland? What impact would the widespread introduction of these kinds of vehicles have on**
 - o **Energy demand and carbon emissions**
 - o **Providing distributed storage capacity**
 - o **Smoothing levels of electricity demand on the grid?**

101. Electric vehicles (EVs) are already available in Scotland. Scotland has a technological lead in EV batteries and vehicles. Glasgow-based Allied Vehicles will shortly produce the first of a new generation of a minimum of 1000 more fuel efficient minibuses, taxis and vans using batteries from Dundee based Axeon Holdings. Interest in the vehicles has been expressed from around the UK and Europe. Given the range of major energy and public transport companies headquartered in Scotland, it is well placed to drive technology development.

102. Axeon Holdings has calculated that 5000 electric light good vans would result in carbon emissions reductions of 43,585 tons per year and increase electricity demand by 29,190 mWh (or 54,987mWh for heavier box vans). The introduction of more EVs will probably not cause problems in electricity supply in the short term. Early adopters are likely to be light good vehicles and they can be charged overnight. This would result in no significant extra demand on the grid and smooth demand. Smart metering and new tariffs could be needed to make efficient use of electricity and avoid overloading the grid, especially if Plug-In Hybrid Electric Vehicles (PHEVs) prove popular following their introduction. Fast charging would place significant demands on the grid: overnight is better.

103. EVs produce zero carbon emissions at the point of use. The extent to which these vehicles contribute to renewable energy and carbon reduction targets will depend in part on the rate of the decarbonisation of electricity generation. However, even if their power comes from coal-fired power stations, the overall emissions produced by EVs could be half of today's combustion engine cars. It is estimated that PHEVs could achieve an 85% reduction in carbon emissions.

104. Rigorous analysis is required of the whole-life environmental costs of EV and hybrid electric vehicle (HEV) technology in comparison with the fuel efficient internal combustion engine cars in development. The evidence is disputed. Some studies claim that established technologies use much less energy in manufacture, transport, replacement and disposal, making the environmental costs lower than HEV over the whole life-cycle. At present, conventional vehicles have the advantage of more shared parts, greater economies of scale, production closer to the point-of-sale and longer lives. But there is evidence that HEVs are now retaining guide values in US car sales better than the average vehicle.

105. HEVs do not place any demand on the grid. This technology is most suitable for buses, in which it can reduce exhaust pollutants and greenhouse gases by 30%. Vehicles are produced in Falkirk for global export by Alexander Dennis.

• **What factors might affect the scale and timing of these impacts?**

106. Barriers to the widespread adoption of such vehicles in the UK are:

- Cost
- Proof of reliability and durability
- Lack of known residual values
- Lack of public charging infrastructure – there are only two locations in Scotland, both in Glasgow
- Need for 3 phase supply for most vehicle charging

107. Insufficient progress has been made by Government in sorting out the regulatory issues. Clarity is required urgently on a range of points:

- How the electricity supply infrastructure will be developed and charged for e.g. public ownership/ public good or competitive market
- Planning policy and a built environment for charging of private vehicles
- Smart metering requirements to get best value from current electricity generation
- Support for consumer confidence when purchasing EVs and PHEVs e.g. standards for safe electricity connections to vehicles

108. One specific barrier which has been identified in relation to new EV taxis in the UK is that some local authorities still have antiquated bylaws covering turning circles which were originally drawn up for horse drawn carriages.

109. Building critical mass would accelerate adoption. It:

- Enables supply chain to gain scale, prove reliability, durability and reduce costs
- Enables infrastructure providers to invest in charging stations
- Enables fleet and private vehicle operators to buy with certainty of being able to operate vehicles, charge vehicles, get replacements and have expectation of residual value

- **Over what timescales do you think electric vehicles could contribute to our renewable energy and carbon reduction targets and what could the Scottish Government do to accelerate the introduction of these vehicles in Scotland in a cost effective way?**
110. EV and HEV vehicles are growing in popularity. PHEVs are probably 3-5 years away. All the major car manufacturers are currently working on PHEV models. SCDI therefore believes that, as set out above, they can make an important contribution to the 2020 renewable transport fuel target, especially if the growth of biofuels has to be slowed, and a very significant one in the post-2020 period. Accelerating their introduction could be done most effectively through:
- Public support for product development and reliability/ durability proving
 - Public procurement of municipal EV vehicles: minibuses, delivery, works vehicles
 - Charging infrastructure for larger vehicles is readily available in commercial and council depots, but a grant or rebate scheme could be offered for organisations buying more than a certain number of vehicles to pay for their recharging station
 - Scottish Government could mandate that a certain percentage of all public transport is electric and local authorities do the same with their fleets
 - Integrate into local business travel plans and car clubs
 - Public support for a network of charging points for domestic vehicles. Cars can be charged from electric sockets, but not everyone in high-density housing can access them. There could be a grant or rebate scheme for purpose built charging points on streets where requested, and publicly-subsidised charging points on streets and in car parks
 - More flexible planning rules for the installation of street furniture, including charging points. Local authorities could grant public land for the development of charging stations. Planning could require charging stations on new roads, retail or leisure developments
 - Public subsidy and policy plan for EV city bus, HEV bus and EV taxi
 - Public subsidy, such as grants or rebates to reduce costs and encourage conversion, and policy plan for private operators of EVs
 - Allowing electric vehicles to drive in bus lanes, free parking for electric vehicles in city and town centres where parking is traditionally metered or ticketed, free parking for residents who own an electric vehicle
111. Axion has proposed that the Scottish Government subsidises 5000 EV vehicles over three years at a cost of £1000 per vehicle and a total cost of £15m. This should be considered. Local government can play a major role in promoting the use of zero-emission electric vehicles, by adopting such vehicles for their own fleets. Such fleets, if powered by renewable energy, could significantly reduce regional carbon emissions. Local government could also help to provide more plug-in points for electric cars, possibly in conjunction with major shopping centres as has already happened in some cities. Scotland has an ideal opportunity to showcase this technology in the vehicle fleets for the Commonwealth Games.
112. Scotland's island authorities are developing major onshore and offshore renewable electricity projects and until such a point as subsea cables are constructed to the mainland will have excess capacity for their own demands. Fuel costs are significantly higher on the islands and are a barrier to economic growth. Cars may not range as far given the confines of the island. It may, therefore, be worth testing charging infrastructure there, for example on Lewis.

Planning and Consents

- **How can developers be encouraged to work closely with planning authorities and local communities to improve the quality of applications?**

113. It is in developers' interests to engage with planning authorities early in the planning process and to make new approaches to public consultation work in reflecting the interests of all sections of the community. They will be further encouraged to do so if this engagement is reciprocated by the planning authorities and the front-loading of consultation is shown to create a more efficient process.

114. Planning authorities should demonstrate a consistency of approach regarding expectations of pre-application consultation by developers. There should be guidance to applicants on the content of any Pre-Application Consultation Report and a list should be provided of all relevant stakeholders with which applicants would be expected to consult. The creation and maintenance of a database by planning authorities that enables all contacts with consultees to be tracked would be vital in ensuring that effective community engagement occurs.

115. In addition to providing the support and training for community groups and community councillors on the planning process, it may be beneficial to provide information, where relevant and applicable, on specific types of development. For example, windfarms or CHP to improve understanding of why these developments are necessary and what role they play in the economy.

116. The goal of achieving improved and more effective community engagement in planning depends on all stakeholders looking at ways to make it work, rather than whether it will protect or compromise their immediate interests.

- **Can more be done to develop joint working between central Government, planning authorities and statutory and non statutory consultees in pursuit of the Government's ambitions on renewable energy?**

117. The planning system is currently a barrier rather than a stimulus to development in all types of renewables. Delays put the 2020 target at risk and may lead to companies developing existing and emerging technologies investing in countries where there is a more supportive regime. SCDI welcomes the New Planning Advice Note for local authorities and national park authorities if it helps them prepare guidance on areas where proposals are likely to be supported and reduce the likelihood of Scottish Natural Heritage objecting to planning applications. It must be hoped that this will have a significant impact on projects.

118. All technological energy solutions have environmental drawbacks. Policy-makers need to balance those against their top priority of sustainable economic growth and the greatest global challenge of climate change. The rejection of the Lewis windfarm project was a major disappointment as significant onshore wind generation would justify the investment in an interconnector which would unlock the vast marine potential. There is a feeling that European environmental designations are being too strictly applied in Scotland and concern that this will in due course affect the marine industry. There is a need for greater clarity in resolving conflicts between, on one hand, green energy and climate change targets, and socio-economic benefit, and, on the other hand, conservation. SNH should be able to work with developers to advise how schemes could be compatible with wildlife and conservation designations. Statutory consultees in the planning process need to be resourced to respond swiftly. The Scottish and UK Governments should demonstrate leadership and consistency in decision-making on major projects and infrastructure, not hide behind EU regulations.

119. A culture change is needed. Government, the industry and NGOs must work together to inform the public on the infrastructure needed for future energy supply. Sufficient resources should be given to planning departments and statutory consultees in order that they are able to engage with developers at an early stage and increase their efficiency. The shortage of qualified planners remains a problem. Increases in planning fees were supposed to address this, but there is no evidence of it. Any further increase in fees must improve the service.
120. Designated zones for offshore and marine renewables developments would improve certainty for investors and National Grid, and would also help to reassure existing industries, protect natural habitats and speed deployment. Where areas are designated as suitable for onshore renewable energy developments, developers need to speak with the planning authority at an early stage to identify whether their proposals fit within them. Government could be even bolder and set targets for approvals for the planning system and for all public bodies. This would increase certainty for developers which would encourage more local procurement.
121. SCDI has noticed in some recent draft Local Plans that there is increasing support for the expansion and greater use of renewable electricity, recognition of the investment opportunities and a commitment to make more progress on energy efficiency. However, it would seem apparent that elected members and officials are much less aware of the opportunities in renewable heat and transport. As Scotland's planning system is reformed and new style Structure Plans and Local Plans are introduced, it is important that more priority is given to these areas.
122. SCDI has supported the creation of a marine planning system in the Scottish Marine Bill, including the National Marine Plan, Scottish Marine Regions and Marine Scotland. It believes that promoting sustainable economic growth must be the foremost purpose of the marine planning system. The Scottish Government should make this national objective explicit to those involved at every stage of the reform process. The National Marine Plan needs to set a structure that will inform the entire planning hierarchy and provide a strong direction to Regional Marine Plans. SCDI would expect that the National Marine Plan will be prepared and agreed with the input of key stakeholders, including the renewables industry. The Scottish Marine Regions model should be genuinely representative of those involved in sustainable economic development at the sub-Scotland level. They must focus on and support the local delivery of the National Marine Plan, not become additional forums in which to block development.
123. SCDI supports a single impacts licence for environmental, navigation safety and human health concerns. It would endorse the system which has been proposed by the Scottish Renewables Forum i.e. Marine Scotland should grant the single impacts licence, the Energy Consents Unit should issue the consent for project development and the Crown Estate should lease use of the sea bed. Marine Scotland should act as a front door for the first two of these applications and oversee the process, including ensuring that regulators submit timely responses.
124. The decisions and actions of the Crown Estate will clearly have a pivotal role in the development of marine energy. SCDI welcomes the integration of the proposed National Marine Plan into the National Planning Framework. Details are needed on how the new Scottish and UK marine legislation will be co-ordinated.
125. SCDI welcomes the work of the Marine Energy Policy Group on locational guidance. It must take a pragmatic approach to balancing the positive economic and environmental benefits of offshore renewables and any environmental impact. SCDI supports early designation of development zones for marine energy to speed up

deployment. The Crown Estate has been considering how it will proceed with leasing wave and tidal energy sites, and has outlined the application and consent procedure for the Pentland Firth. SCDI believes that the Crown Estate should recognise that it will be impossible to leap from the single scale energy devices which are being tested at locations including EMEC to a full-scale power plant of 200-300MW. Smaller demonstration commercial power plants of perhaps between 5 and 25 MW will be needed to demonstrate to utility companies considering significant investment the reliability, efficiency and environmental impact of such farms. SCDI is aware that the industry believes the Crown Estate's intention is for five year leases in nursery areas within these sites. There is concern that the substantial investment required for the construction, operation, monitoring and decommissioning of these demonstration plants could not be justified for such a short year lease. The companies recommend that there are intermediary areas within these zones between the nursery areas and full-scale power plants, with leases available for at least 20 years, for demonstration plants, which could be extended into larger generating capacity. Another suggestion might be rolling five years leases which operate on a 'use it or lose it' basis.

126. SCDI believes that the Crown Estate should, with the industry, identify a small number of further areas for the licensing of wave and tidal projects. In determining offshore Renewable Energy Zones it will be important that the Crown Estate and the Scottish Governments work closely together with the marine energy and shipping industries to ensure that they can safely co-exist.

127. SCDI sees a positive role for community windfarms in winning greater acceptance for onshore wind. Co-operatives - with priority for local people - bring long-term local economic benefits and can help in planning applications. These models should be encouraged and local authorities should make faster progress in approving these and other smaller schemes in the planning system. SCDI is not convinced that proposals for a compulsory Community Infrastructure Levy would be a benefit. It would simply be an extra tax which would discourage investment.

- **Given the growing number of issues connected with aviation and radar and wind farm development, especially in Southern Scotland, is there scope for cooperation between developers and aviation interests to promote a regional solution to complement the overall UK approach?**

128. The discussions between civil aviation bodies, Ministry of Defence and the industry on aviation and radar issues leading to the Aviation Memorandum of Understanding were a step forward. But action needs to be driven harder and backed by sufficient resources. Co-ordination on solutions around the UK is critical. The Scottish Government can ensure that this is the case through the Aviation Management Board, support the development of new guidance and facilitate a regional rather than a development-by-development approach in Southern Scotland. Technological solutions are also being developed, for example, holographic-infill radar. The Scottish Government could attract or offer to help build a full-sized demonstration system in Southern Scotland. http://www.economist.com/science/displaystory.cfm?story_id=12551574 .

Research, development and demonstration

- **How can we promote a strategic approach to research and development of renewable energy so that Scotland capitalises on its current strengths and becomes a European and world leader?**

129. A proliferation of "centres of excellence" should be avoided. The Energy Technologies Institute (ETI) and – in Scotland - ITI Energy should lead work on these emerging technologies with university and private sector partnerships. The Energy

Technology Partnership could help to pool developers' experiences of the technical challenges with these nascent technologies and help to find solutions.

130. Scotland and the UK must continue to offer support for marine R&D which is competitive with the funding announced earlier this year by Ireland. In parallel with support for pre-commercial projects technology developers need continued support for ongoing R&D. At present no funding is available for marine energy from the Technology Strategy Board and the alternative funding sources either do not offer sufficient support or – for reasons such as the requirement to surrender licensing right to Intellectual Property for seven years to the ETI - are unattractive. This means that there are no longer significant financial incentives for technology companies to base themselves in Scotland and the UK.
131. To prepare consumers for greater variability of power on the grid and electric cars, and encourage energy efficiency and more distributed energy and community based schemes, social research is needed on behavioural change.
- **How can we make sure that partnerships with European and world bodies act to promote Scottish and wider interests in this area?**
132. SCDI understands that the Energy Technology Perspectives 2008 launched at the G8 summit in Tokyo in June and the European Strategic Energy Technology Plan presented by the European Commission in November show that deep emission cuts are technically achievable. Next generation technologies have been identified, but further research and development is required. A European Technology Map to 2030 has been produced. This shows that, on the energy supply side, Carbon Dioxide Capture and Storage is the main technology option, followed by renewables. On the energy demand-side, energy efficiency will play a major role. Electricity networks to enable future technology developments have been mapped out but they will need to be implemented. While not losing sight of the 10-15 year challenge, there is also a need to support research into technologies which may only be developed and commercially deployed further into the future.
133. Scotland has comparative advantages in marine energy resources and innovation, offshore wind resource, bioenergy resource and marine biomass innovation. It should seek to get involved in international R&D in these areas.

Supply chain and skills

- **How can Scottish industry seize the opportunities this renewed commitment to renewable energy at Scottish, UK and European level brings to develop a large and prosperous renewable energy sector making a significant contribution to sustainable economic growth in Scotland and providing a wide range of skilled jobs?**
134. The economic opportunity for Scotland is significant. Renewable energy can build on the country's strengths in energy, revitalise manufacturing as financial and business services retrench, and create a long-term, world-leading industry, with particular potential benefits to regeneration priority coastal areas. But nor should it be overstated. Recent research by the Financial Times and Bain and Company estimates that the numbers of jobs which will be created in the renewables industry are substantially less than stated by the UK Government.
135. Scottish industry is well placed to capitalise on their natural resources and offshore expertise to accelerate technology leads in several key areas. SCDI welcomes the work by Scottish Enterprise, Highlands and Islands Enterprise, Scottish Development

International and trade associations to support the industry. Particular opportunities in Scotland which SCDI would highlight include the Fife Energy Park; the 'Energetica' initiative in North East Scotland which business has identified as potentially offering the opportunity for a £1.5bn strategic investment, which would generate £500m per annum for the local economy; and the potential re-development of the Nigg Fabrication Yard in the Highlands and Islands which would supply and service the offshore wind and marine energy industries. Productive partnerships must be sought with the offshore oil and gas industry. On a smaller scale, there are opportunities in batteries, biomass and microgeneration.

136. The UK's lost lead with onshore wind energy is a lesson which cannot be forgotten. While it is a proven technology, efforts continue to attract more manufacturing related to the supply chain into Scotland. A major problem is the lack of guaranteed work. REpower had concluded an agreement with the supply chain in the Highlands and Islands to source parts from local companies but withdrew following the Scottish Government's decision to reject the Lewis Windfarm proposal. The Arnish Yard on the Western Isles has yet to receive a single order from the UK, but supplies developers overseas. It is perhaps the case more attention should be paid to supplying parts of devices, not necessarily the whole. The offshore wind market - where turbine manufacture is a key constraint and the Scotland and the UK have a lead - offers greater promise in terms of developing a wider indigenous supply chain. Marine energy is another major opportunity. The aim should be not simply to exploit the resource, but to create the world's leading technological hub. The announcement by ScottishPower Renewables that a new company is to be established in order to manufacture tidal turbine devices in Scotland is especially welcome in this respect. However, the support mechanisms for early deployment of new technologies are a persistent and significant challenge, and there is still a lack of support from Government for Scottish manufacturing. This is demonstrated by the business failure rate.
137. Biomass production is a job intensive process so it can stimulate employment opportunities. Manufacture of biomass boilers should become possible in Scotland to replace imports, as happened in Ireland. Demand to stimulate investment is important to the process, but it is felt that there is no co-ordination to help drive this process forward. Consumers and producers of "low grade" heat need to come together or be brought together by the enterprise bodies.
138. A key technical challenge for the marine industry is connectivity to the grid. A secure, economical cable supplier would be beneficial, but there is no manufacturer left in the UK. SCDI believes that the Scottish and UK Governments and Energy Technologies Institute should invest and work with the industry to agree a standard cable and try to re-establish a cable manufacturer in the UK. This would also bring opportunities to export equipment. For example, China's domestic production of offshore cabling currently does not meet demand.
139. The investment in renewable energy offers the opportunity to be innovative and bring wider economic benefits. For instance, the current lack of grid infrastructure to transmit the electricity generated by marine and wind energy in the north of Scotland to the population centres has already been highlighted as a barrier to its development. One potential solution with spin-off employment benefits in what is a regeneration priority area would be to attract a high-energy using industry, such as a data centre. Such an investment may prove particularly attractive given the opportunity for a multinational company to be associated with a world-leading green energy development, along with the greater security and cooler climate of this remote location. Another example would be in ports infrastructure. It is estimated that £100m will need to be spent in the Clyde and Hebrides in the next ten years. There is the opportunity to construct wave power stations during this redevelopment, as is currently being done in northern Spain.

140. Renewable energy is huge investment opportunity in which the Scottish financial services industry should be well-placed to benefit. The Renewables Advisory Board suggests a £100bn capital investment is expected by 2020.
141. Skills gaps and shortages have been highlighted by the Scottish Renewables Forum as one of the three greatest challenges facing the industry. There is, in fact, a global skills shortage for renewable energy technologies. SCDI supports a comprehensive survey of labour and skills requirements in the sector.
142. SCDI welcomes the initiatives which are now taking place within Scottish schools, such as Careers Scotland's 'The Path is Green' and the increased number of relevant university and college courses which can familiarise people with the industry. Such initiatives come too late, however, to hit the 2020 UK renewable energy target. Renewables will need to employ skilled workers from other industries if it is to be achieved. There appears to be no shortage of people keen to enter the industry, but one issue which was discussed at SCDI's energy conference is a disconnect between the skills supply and the 'demand pull' from industry. It was suggested that the industry has often been reluctant to accept graduates due to a lack of business experience or workers with transferable skills.
143. Possible solutions suggested included:
- An adult modern apprenticeship to bridge the gap
 - Collaboration with the oil and gas industry on skills utilisation and crossover both ways would be mutually beneficial
 - Fast-tracking recruitment from other industries and countries. The UK immigration system should seek to attract high calibre, skilled people rather than act – and be presented - as a barrier, and retain the talent from overseas who are studying in our universities and colleges
 - Promoting and facilitating the locations with the renewables resource as attractive places to live and work. There is a need to improve connectivity and provide high quality, affordable housing in Highlands and Islands
 - Retraining and upskilling a generally ageing workforce for existing and emerging technologies. The skills challenge is not always a shortage of numbers. Training for plumbers, electricians and building professionals to be microrenewables installers is inadequate and does not meet demand
 - Bringing the economically inactive back into the labour market, for example by working with social enterprises and local authorities
144. In education, there is a continuing need to increase participation in science, technology, engineering and maths in schools and in tertiary education. SCDI welcomes the plans in the Scottish Government's Science Strategy. Universities and colleges which offer quality courses in relevant subjects in Scotland need to be given sufficient resources to meet the demand. Some colleges are turning away young people from technical subjects due to funding limitations.
145. Along with technology, there is major economic opportunity for Scottish companies in international consultancy. For instance, China witnessed \$10 billion of investment in renewables in 2007. With 6GW of installed capacity, the 2020 target is for 30GW, although it is widely expected that more will be achieved. China currently lacks the expertise in renewables to grow at their desired rates and this is particularly true in relation to offshore wind. Local staff with local knowledge of the business environment are key for successful investors. This should be supported by Scottish Development International's overseas offices.

- **What can be done in the short term to promote more effective collaboration in local sourcing and procurement?**

146. SCDI has some concerns that the centralisation and aggregation of public sector procurement may potentially have an impact on decentralised supply of heat and power, and on the creation of markets for supply of electric vehicle.
147. A project is being developed on Speyside which plans to utilise co-products from a number of nearby whisky distilleries to produce bioenergy. Remote distilleries tend to be smaller in size and have the potential to harness the energy embodied in the distilling co-products is considerably reduced. Incentives and assistance should be made available to help operators in remote areas to investigate the potential use of renewable energy forms – perhaps through incentivising the creation of business consortia to achieve economies of scale.
148. Public policy relating to renewable energy and the delivery of that policy in Scotland is the responsibility of a plethora of different administrations, government organisations, regulators, and private companies. While there is a lot of good work going on, it can at times seem as though it is not joined up and that not all these organisations are fully aligned with the priority and support which the Scottish Government has for renewable development in national policy. If effective collaboration in local sourcing and procurement, and the renewable energy target, are to be achieved, renewables policy must be 'mainstreamed'.

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