Towards a Low Carbon Economy for Scotland: comments on the Scottish Government's discussion paper.

Advice paper 10-09

Summary

- *The Scottish Government's paper "Towards a Low Carbon Economy for Scotland" is a necessary step in policy development if Scotland is to meet the ambitious carbon emissions reduction targets set out in the Climate Change (Scotland) Act 2009.*

- *The paper as it stands, however, lacks a degree of realism. It also fails to connect the strategy to the wider policy context. Ultimately the goal must be to develop a low carbon society, embracing all economic, social and environmental components.*

- *There is a distinction between the strategy for economic growth and the low carbon agenda. There will be actions that must be taken to drive forward the latter that do not contribute to economic growth. There are a number of pressing issues that lie outwith the economic growth agenda, including efficient use of resources, energy security and a healthier environment, that may justify action.*

- *The move to a low carbon economy will be necessary if Scotland is to achieve its emissions targets, and there is a moral argument for using natural resources in a sustainable manner. Being an early mover could also bring opportunities for Scotland's nascent renewable industries.*

- *Nevertheless, if the transition to the low carbon economy is to be linked to economic growth, the inherent risks and uncertainties must also be recognised. The strategy relies heavily on the emergence of international markets for renewable technologies. It may also lead to increased energy costs in the short term that could impact on the competitiveness of Scotland's industries.*

- *If Scotland is to make the most of the opportunities the transition presents, there must be a clear analysis of where its competitive advantages lie. It is not enough to have advantages in natural resources, there must also be access to engineering expertise, a skilled workforce, finance, infrastructure and a supportive regulatory environment.*

- *Furthermore, a decision on where Scotland's development focus should lie must be based on quantitative data, outlining the investment needed to stimulate growth in different energy sectors and estimating the potential economic benefits each sector can create.*

- *Innovative finance mechanisms that combine public and private investment must be developed if the capital needed to expand Scotland's energy industries is to be made available.*

- *Decision-making on Scotland's energy future must also be based on a realistic evaluation of its future energy needs, balanced with an understanding of the capacity of the various options*

to meet those needs, within the limitations of capital and timescales available. No energy source should be ruled out until a certainty of supply can be ensured.

- *The RSE is concerned by the lack of discussion in the paper on managing energy demand. Although changing the behaviour of individuals and organisations in respect of their energy use is difficult, reduced consumption must be a fundamental pillar of a low carbon society. The strategy should take account of lessons learned from previous attempts to engage with communities and set out specific actions that will ensure that people have a stake in the low carbon economy.*

- *The public sector can lead this behavioural shift by making prominent changes to its own energy use. Local authorities will also have a pivotal role to play both in acting as an intermediary between parties involved in community-based initiatives for decentralised heat and energy provision, and in part-financing such projects when they can be shown to deliver energy-savings or an income stream.*

- *Ultimately, a successful and sustainable transition will depend on the ability of Scotland's population to adapt. This will require a public sector-led drive to raise awareness, through both the formal education system and by informal methods, to produce a workforce with the skills needed in the developing energy sectors and, more widely, citizens who can lead productive lives in a low carbon economy.*

Introduction

1. The Royal Society of Edinburgh, Scotland's National Academy, welcomes the opportunity to comment on the Scottish Government's consultation paper "*Towards a Low Carbon Economy for Scotland*". In the context of the groundbreaking Climate Change (Scotland) Act 2009, this paper is a tentative a step towards the policies that will be needed if Scotland is to meet the world-leading emissions reduction targets to which it is already committed. The breadth of expertise within the RSE's Fellowship, including in the areas of energy, engineering, environmental management, industry and economics, make it well placed to contribute to this important discussion.

2. The paper "*Towards a Low Carbon Economy for Scotland*" sets out the Scottish Government's vision of how the transition to a low carbon economy will drive growth for Scotland. While providing a basis for discussion, the paper's broad-brush, high level approach lacks realism and fails to consider the wider context of such a transition. The move to a low carbon economy will be the biggest challenge our society has faced. It will only be achievable if policies in all areas, the economy, environment, energy, education, housing, and transport, are properly integrated and focussed on achieving the same goal. We consider that goal to be a ***low carbon society*** which embraces economic, social and environmental components in an integrated whole. This approach would also allow for consideration of Scotland's other natural resources, including its water resources and its ecological systems, in the shaping of Scotland's future.

3. In the body of this response, the RSE comments in detail on the strategy set out in the discussion paper, raising the key issues that remain to be considered. The RSE's responses to the questions posed by the discussion paper are set out more briefly in Appendix A.

The transition to a low carbon economy: a high risk strategy?

4. The paper makes an assumption that the transition to a low carbon economy will drive economic growth in Scotland. Indeed it is claimed that this strategy will deliver the Scottish Government's objective of growing Scotland's economy at a faster rate than that of the UK and of other comparable countries. We note that Scotland's performance has consistently lagged behind that of the UK as a whole. The paper sets out a positive view of expanding markets for low carbon and environmental goods, and makes optimistic estimates of job

creation in renewable energy sectors. However, it fails to recognise that there is a high degree of risk and uncertainty involved in being an early mover in making such a transition. Unless the strategy is developed with steely realism that takes uncertainties into account, it could be challenged as a mere grand gesture, that selects an optimistic scenario and ignores the difficulties.

5. The strategy deals with two completely separate issues: how to drive economic growth in Scotland and how Scotland should meet its statutory emissions targets. It is likely that a number of actions taken in connection with the latter will not contribute to economic growth.

6. The RSE is of the view that explicitly recognising the risks involved in leading the transition to a low carbon economy and then balancing these with the reasons why Scotland should take on this role is the starting point from which the rest of the strategy should follow. The strategy proposed in this paper depends on the successful development of Scotland's renewable and low carbon sectors, but this success is in turn dependent on the policies adopted elsewhere. If other countries do not decide to move quickly towards a low carbon economy then markets for Scotland's technologies will not be of sufficient scale to drive growth. Meanwhile, the cost of energy in Scotland, with a growing proportion of energy needs being met from renewable sources, could rise in absolute and/or relative terms, potentially making the Scottish economy less competitive rather than more.

7. The strategy must demonstrate that these risks have been properly considered if it is to win the support of stakeholders. It must set out a strong, cogent case as to why the Scottish Government is pressing forward with the transition to a low carbon economy. The potential rewards of making the move early are great, positioning Scotland as a world leader and giving our nascent low-carbon industries a first-mover advantage. An economic argument might be that because of Scotland's favourable access to renewable energy sources, we can reduce emissions more cheaply than other countries, making the economic cost of meeting ambitious targets lower. A moral argument might be that Scotland should use its natural resources to demonstrate to the world that the move to a low carbon economy is possible, encouraging others to follow.

8. Uncertainty can be considered as much an imperative to act as to do nothing. There is a degree of international consensus that economies will have to be fundamentally restructured, both in response to climate change and in order to conserve natural resources. When the wider context is considered, there are a number of other agendas leading in the same direction. The more efficient use of resources is an obvious issue, but other examples include energy security, waste reduction, a cleaner environment, better housing and a growing drive towards "localism".

9. Bearing in mind the foregoing remarks on the risks and potential gains of the transition to the low carbon economy, the RSE recognises that the Scottish Government has a duty to meet the carbon emission targets set out in the Climate Change (Scotland) Act 2009 and that it will align its strategy to do so with its overarching purpose of sustainable economic growth. We now comment, therefore, on the strategy for the transition to a low carbon economy as set out in the discussion paper.

The low carbon economy and economic growth

10. In order for the transition to contribute to economic growth, it is essential to have a clear analysis of where Scotland's comparative advantages lie in the low-carbon sector. It cannot be assumed that the building blocks for renewables industries will fall into place simply because the natural resources are available. The development of these industries will also rely on access to engineering expertise; finance for research, development and demonstration; appropriate infrastructure and a supportive regulatory environment. This will be particularly important if Scotland is to attract investors, inventors and innovators from elsewhere.

11. In areas where Scotland is at the cutting edge of technology development and where the above-mentioned factors are in place, there will be significant opportunities for growth as global markets emerge. Of course, the strategy should aim to place Scotland in the strongest possible position to take full advantage of "*economic opportunities in new technology*" so that it can "*secure a substantial share of new global markets*"[1]. What is needed is a much clearer analysis of the specific areas in which Scotland has the potential to be world-leading, including quantitative data on the required investment and costs involved in stimulating the growth of these sectors and realistic estimates of job creation and the economic contribution each sector can make.

12. It is only when this data is made available that well-informed decisions can be taken on where Scotland's priority sectors for growth lie. Choices will have to be made. Constrained public sector spending, and a more cautious approach by the private sector to investment, will require difficult decisions on how the capital that is available will be spent. The discussion paper lacks meaningful analysis of what the costs involved in the transition to a low carbon economy will be, or how the transition will be financed. The RSE is of the view that the Scottish Government must provide a much clearer picture of the cost implications of this strategy, from investment in R D & D, installation of the required infrastructure and subsidies to stimulate market growth, to increased energy costs for consumers. It must win the hearts and minds of those whose collaboration will be needed for a successful strategy, which will depend on the clarity and rigour of its analysis rather than its rhetorical flourishes.

13. The RSE recognises that the Scottish Government alone cannot deliver the transition to a low carbon economy or provide the capital needed. The role of the Scottish Government, or where an issue is reserved, the UK Government, is to create an enabling environment. Fiscal policy, financing, statutory planning, procurement policy and many other factors will play an important role in facilitating the low carbon transition. At present, there are numerous examples of where existing regulations, designed prior to the emergence of the low-carbon agenda, currently prevent steps from being taken to lower carbon emissions. Regulations concerned with the treatment of waste water is one example; while standards have been set high for laudable reasons, the benefits of this must now be weighed against the carbon implications. Ultimately, the aim must be for the lifecycle carbon impact of decisions and activities to be central to decision making.

14. In order to stimulate the investment required, government at all levels needs to develop innovative finance mechanisms: finding new ways of combining public and private sector funding and incentives that will attract investment. It must also consider streams of finance that will allow businesses and individuals to play their part in lowering carbon emissions. There are a growing number of social enterprise and other organisations operating in this field, for example Salix Finance[2] which provides funding for proven technologies that are cost effective in saving CO_2 and will enable any further energy saving technologies to work at their best. It should be kept in mind, however, that in the case of providing assistance to individuals and businesses it is not always more money that is needed, but ensuring that the programmes available are easy to understand and simple to access.

15. Changing the shape of Scotland's economy and driving forward growth of renewable and low-carbon technology sectors will only be possible if Scotland's work force is equipped with the skills these sectors require. The discussion paper notes that the "*identification, articulation and development of appropriate skills for the Low Carbon Economy must be a priority*"[3] and that Skills Development Scotland is currently working to produce a Skills Investment Plan. The RSE would like to emphasise the importance that this thinking is properly reflected in the shaping of Higher Education and Further Education funding priorities and strategies. The

1 Scottish Government "*Towards a Low Carbon Economy for Scotland*", p17
2 http://www.salixfinance.co.uk/home.html
3 Scottish Government "*Towards a Low Carbon Economy for Scotland*" p63

development of skills does however create a dilemma. We need to develop the skills with a tempo that is in phase with the tempo of industry development. Otherwise, there are either an excess of skilled people unable to find employment for their skills, or companies who cannot find the skills when and where they need them.

16. In many industrially successful countries, such major developmental strategies are integrated to ensure that all the individual components that will contribute to a major industrial shift are lined up appropriately.

Energy policy for a low carbon economy

17. The transformation of Scotland's energy sector must be designed to not only contribute to economic growth through the development of cutting edge technologies and generation of power that can be exported, but also to meet Scotland's own energy needs with a reliable, affordable, and sustainable supply. Further, this transformation will require major changes to the infrastructure that supports energy generation and distribution.

18. The discussion paper focuses almost entirely on the development of renewables to supply energy, predominantly electricity, for Scotland. It also recognises that Scotland is well placed in the carbon capture and storage sector, both in terms of storage capacity and of expertise. Clearly, Scotland does have natural advantages in its wind and wave resources. However, the discussion of these energy sources is overly general and the paper lacks quantitative discussion of the technical aspects of the various options. How much energy will Scotland need in the low carbon economy? What is the generation capacity of different options? How reliable will each option be? What are the costs involved both in developing technology to a stage from which it can be rolled out at commercial scale and in installing or upgrading the infrastructure required? More fundamentally, the paper considers these issues purely from the supply side, and fails to adequately consider the demand for energy from different sectors. This is a major weakness. All of this information is needed before decisions can be taken on what energy sources should be included, or ruled out.

19. There must also be a clear picture of the stage of development of the various technologies. Onshore wind, for example, is now well developed at a commercial scale, although Scotland is not at the cutting edge of this sector which is dominated by Denmark, Germany and Spain. Offshore wind in the UK as a whole has recently seen a step change, with the allocation in January 2010 of nine development zones potentially yielding 32 GW, including 3,500 MW in the Firth of Forth and 1,300 MW in the Moray Firth. The sector is still emerging and Scotland's ability to draw on the offshore expertise within the oil industry gives it a good opportunity to position itself as a world-leader. However, huge investment is needed to get the sector off the ground. The same is true for other forms of renewable energy, such as wave and tidal, that are currently in their infancy.

20. The levels of investment, including subsidies, that will be required in the coming years and the high costs of producing energy through methods that are still developing, clearly lead to concerns over the cost of energy for individuals and businesses in Scotland. This cost should be recognised in the strategy, along with details on how the impacts on fuel poverty and competitiveness will be addressed. Innovations to reduce the cost of renewables, including cost reductions in plant build, operations and lifecycle, and the development of low cost energy storage technologies, will be vitally important to change the economics of the renewables industry and make renewable energy cost competitive. A study carried out by PB Power for The Royal Academy of Engineering[4] suggests that at present the cost of generating electricity from traditional fossil fuels and nuclear ranges from 2 to 3 pence per kWh. For onshore and offshore wind, and wave and marine technologies, this rises to between 5 and 7 pence per kWh, including, where appropriate, the provision of adequate

[4] PB Power for the Royal Academy of Engineering "The cost of generating electricity", March 2004 http://www.raeng.org.uk/news/publications/list/reports/Cost_Generation_Commentary.pdf

standby generation. However, these calculations do not include the cost of CO_2 emissions. It is also likely that the costs of renewable energy will decrease in the longer term while the price of oil is very unstable, so it is difficult to predict future competitiveness.

21. In addition to high cost, questions have also been raised over the security and continuity of energy supplied from renewable sources. Estimates of the base load required to back up wind energy are up to 90% of capacity, while there are particular concerns about the seasonal nature of wind power and whether levels of generation would drop in winter when demand for energy increases (renewable generation during the coldest of last winter's months fell back significantly compared with earlier years). Sites for renewable energy production are often remotely located and difficulties with grid connection, combined with limitations on grid capacity and the impact on landscape and the natural environment, still need to be addressed.

22. These concerns raise the question of the role of nuclear power in Scotland's low carbon economy. The paper makes almost no reference to nuclear power, presenting the vision of a low carbon future from the perspective of a Scottish Government that has ruled out this option. The RSE offers no opinion on whether nuclear power should be part of Scotland's future low-carbon energy mix, but it does support the full consideration of all energy generation options in a realistic and unbiased manner outside the political arena. It is for this reason that we call for a full analysis of Scotland's future energy needs and realistic estimates of the extent to which renewable sources, within the limits of capital available and timescales set by the targets, will be able to meet these needs. Options to cover any shortfall must be put forward: industries need certainty of supply to guarantee operations or we will face severe health, social, economic and political consequences. The development of carbon capture and storage would allow continued use of fossil-fuel burning power stations to provide base load, but a more complete picture is needed of the viability of this technology and the costs and timescales involved.

Infrastructure

23. While recognising that energy generation and distribution networks will have to undergo fundamental change to deliver a low carbon economy, consideration must also be given to the infrastructure that supports water supply, waste water, transport and waste management. Existing networks and the way they are utilised are currently amongst the largest sources of emissions. An integrated systems approach must be taken to allow for a successful transition to a low carbon economy. Engineers, utilities, operators and investors will need to understand the carbon implications of interactions between assets, people and machines. This integrated approach will require greater knowledge sharing and joint working between engineering and built environment professionals of all disciplines, and between professions and government[5].

Managing energy demand: changing behaviour for a low carbon society

24. The RSE is concerned with the emphasis that the paper places on energy supply at the expense of addressing energy demand. Seeking to change behaviour of individuals, communities, businesses and organisations is a very complex activity and one to which the Scottish Government gives inadequate attention. Whilst securing an energy sector that is capable of generating power with no or low carbon emissions is undoubtedly fundamental to a low carbon economy, managing demand and improving energy efficiency has the capacity to deliver reductions in carbon emissions quickly and cost-effectively. The paper suggests that some form of market mechanism will deliver this demand management, but the issue is more complex than merely assuming that individuals and businesses will consume less

5 Institute of Chartered Engineers "*The state of the nation: low carbon infrastructure*" http://www.ice.org.uk/knowledge/specialist_document_details.asp?Docu_id=2381&FacultyID=2 .

energy as it becomes more expensive. Price elasticity for energy could prove to be very large.

25. Firstly, initiatives to reduce demand will be cost-effective in the long term, but there will often be up-front costs that people are unwilling, or unable, to pay. As previously mentioned, subsidies and other incentives are necessary to overcome this barrier, but as important is that these assistance programmes are comprehensible and accessible to consumers.

26. Secondly, reducing energy consumption in any meaningful way will require a significant change in the way Scotland's citizens live their lives. Such behavioural change is very difficult to drive from the top-down. The current strategy is short on civil society, communities, local groups and households, and specific actions to ensure that people have a stake in a low carbon economy. The current draft conveys a sense that the strategy will unfold without this kind of engagement, and with a degree of passivity. We do not consider that this is credible when public attitudes suggest, for example, an unwillingness to pay more for clean energy, and resistance to measures such as congestion charging for road use. Both formal and informal education should be used to raise awareness of the issues and what can be done in practice. Learning from best practice how to convince society that changes could be beneficial to them is sorely needed. The paper is silent on these aspects. Also lessons need to be learned from the failures to reduce energy consumption through the many schemes and incentives over recent decades. These should be analysed and new approaches focussed on individual, community and corporate behaviours developed to refocus from the top down approach used unsuccessfully in the past.

27. The Scottish Government and public sector could lead by example through key prominent changes to its own energy use. The role of local authorities is likely to be critical as a catalyst and as a source of political and practical leadership. Local authorities can act as intermediaries in establishing trust between the parties involved in creating district heating/CHP and decentralised energy provision. They could be enabled to part-finance such projects where these can be shown to deliver energy-savings and generate an income stream for the local authority.

28. In industry, Scotland's professionals and managers will have to take an entrepreneurial approach to changing the way they do business, including finding innovative ways to encourage employees to work in a low-carbon manner. National Grid plc, for example, tied carbon targets to the bonuses of decision makers, resulting in major behavioural change throughout the whole organisation. The public sector has a role in supporting and developing an environment in which should entrepreneurship and creative thinking can flourish.

Wider implications of the low carbon transition

29. The transition to a low carbon economy will depend not only on pursuing the right energy and economic policies but on every aspect of Scotland's society being reshaped to reduce emissions and to operate in a sustainable, efficient manner. The discussion paper gives little recognition to the need to consider and integrate economic and energy issues with policies on, for example, education, housing, health and land use.

30. To be successful, the transition will also require a determined and sustained drive to raise awareness of the low carbon agenda across Scotland's population. This includes incorporating teaching of the issues throughout primary and secondary education, particularly with the introduction of the Curriculum for Excellence. It requires universities and further education institutions to produce graduates with the skills and expertise needed for the high growth energy sectors and to install the equipment and changing infrastructure the transition requires. However, it also requires consideration of the informal education of society, developing people who can live a productive life in a low carbon economy.

Appendix A

Responses to the questions posed by the paper "Towards a Low Carbon Economy"

1. ***Does this document sufficiently communicate the vision, drivers and implications of a low carbon Scottish economy? How could this be improved?***

    - The vision set out in the discussion paper lacks realism and fails to consider the wider context in which a low carbon economy will operate. The risk and uncertainty that come with being a first-mover in the transition to a low carbon economy, particularly that the strategy depends on the adoption of renewable technologies internationally to create the necessary global markets, should be explicitly recognised. A much more coherent argument as to why Scotland should pursue such a move despite the risks is needed, outlining the economic case and moral interests, and recognising that many agendas, for example the need to conserve finite natural resources, are pressing in the same direction.

    - The document lacks comprehensive, quantitative analysis of where Scotland's comparative advantages lie, what Scotland's future energy needs will be, the investment required to develop different energy options and what each option can realistically contribute both in terms of generation capacity and economic benefits. Only once this information is known can decisions be taken on what Scotland's priorities for growth and development should be. We suggest that nuclear power should not be ruled out until the full picture of Scotland's energy needs and the capacity of renewables technologies, within the restrictions of capital and timescales available, to meet those needs is known.

    - The Scottish Government's Low Carbon Strategy must bring together not only economic and energy policies but also integrate these with policies in a wider context: the environment, education, housing, health and transport. The strategy must aim to build a **low carbon society**, which will require serious consideration of behavioural change at individual, household, community and organisational levels.

2. ***Section 2 identifies a range of low carbon economic opportunities based on Scotland's key strengths and opportunities and aligned with growing global market opportunities and domestic regulatory and legislative drivers.***

    a) ***are there significant additional opportunities that should be addressed by the Low Carbon Strategy?***

        - As outlined above, a full, realistic, quantitative analysis is needed to identify where opportunities for Scotland lie. This must include identifying at what stage of development different technologies currently stand, the investment needed to grow the sector, the timeframes in which this will be possible and the potential markets for each technology.

        - Considering the wider context of a low carbon economy will likely identify additional opportunities that are not directly related to the development of new energy technologies. Land use and agriculture, for example, are areas in which Scotland has expertise that if properly developed could bring economic, as well as environmental and societal, benefits to Scotland.

    b) ***In light of the Government's objectives of accelerating Scotland's rates of productivity and economic growth, which are the opportunities of greatest economic potential within a global context? Which opportunities should we focus on in the short- to medium-term?***

- While taking the lead in the move to a low carbon economy does present opportunities to aggressively expand our renewables and low carbon sectors and positioning Scotland as a world leader in emerging markets, the inherent risks and uncertainties cannot be ignored. These sectors can only drive economic growth if such technologies are indeed adopted elsewhere, relying on decision makers in other governments to accept the need for a move to the low carbon economy and to quickly drive this forward. Further, relying on renewable power to meet the energy needs of Scotland's economy could lead to a rise in energy costs, at least in the short term, impacting on the competitiveness of our industries.

- While re-iterating the need for proper evaluation of the technologies and opportunities available, we would draw attention to Scotland's significant research strength in fuel cell technology; the work of the Energy Technology Partnership which is leading some thinking on how nuclear might be part of the global solution, including in the area of nuclear waste; and the significant knowledge, oil industry experience and potential that Scotland can apply to new carbon capture and storage ventures. If international economies do make the move to a low carbon economy, CCS will become essential as countries such as China and India will have no option but to continue burning fossil fuels to meet their energy needs for the foreseeable future. This will result in potentially huge economic benefits in both exporting technology and providing storage facilities.

3. Already, many sectors and businesses are actively exploiting low carbon market opportunities. But an effective transition towards a low carbon economy requires much greater awareness, activity and collaboration. How should the Scottish Government and wider public sector join up to best support business to exploit low carbon opportunities?

- An integrated approach with the single goal of delivering a low carbon society is fundamental to a successful transition. At present there are numerous blockages and restrictions caused by policies, legislation and regulation designed prior to the emergence of the low carbon agenda. The lack of a spatial strategy for renewable energy hinders the proper development of onshore, coastal and marine areas in line with a low carbon future. Current incentive schemes meant to encourage individuals and businesses to reduce their carbon footprints are hugely complex and difficult to access. All such policies and legislation must be reconsidered to ensure that they do not needlessly hinder Scotland's citizens and organisations from lowering their own carbon emissions and exploiting opportunities to profit from the move to a low carbon economy.

- Consistent messages from the public sector and a clear commitment to the long term development of particular technologies, backed up with public sector investment and the creation of an enabling environment for such development, will be key to stimulating private sector activity and investment.

- Public sector procurement can be a powerful tool in supporting businesses by providing markets for developing technologies, particularly in Scotland where the public sector is disproportionately large. The Climate Change (Scotland) Act makes a move towards ensuring that whole-life carbon emissions implications of public sector activity will be central to decision making, providing a driver for reviewing procurement policies.

- The Scottish Government and public sector also have a significant role to play in raising the profile of energy efficiency. While issues around behavioural change are discussed in the body of this response, the RSE suggests that the public sector must lead by example, providing high profile case studies that will stimulate action from industry, communities

and individuals. These case studies can showcase the technology and equipment available to enhance energy efficiency.

4. ***Building on the National Economic Forum discussion, how should the Scottish Government, in partnership with the wider public sector, research base and investment community, help increase the level of innovation, investment and skills support to match the scale of opportunity in low carbon markets?***
And:
5. ***How should the Scottish Government and its partners coordinate their activities to ensure that innovation, investment and skills support is aligned effectively?***

- It is clear that the upfront investment needed to facilitate the transition to a low carbon economy will be a key issue. While accepting that government alone cannot provide the capital needed, serious consideration will have to be given to innovative finance mechanisms that combine public and private sector capital to invest in research, development and deployment, and in the infrastructure that will be required. As noted above, the public sector must also convince the private sector that it is committed to the development of these sectors in the long term if it is to instil the confidence that is needed for private sector investment.

- Skills will be a hugely important factor in determining the success of the transition to the low carbon economy. Clearly, Scotland's workforce will need to have the expertise to develop, deploy and maintain new energy technologies. Our tradesmen will need to be able to install new heating systems, advanced forms of insulation and micro-generation equipment. The Scottish Government must work closely with higher and further education institutions to identify skills needs, gaps and the training that should be made available, as well as linking these outcomes to HEI/FEI budget priorities. Education on the low carbon agenda must begin in schools, and thought should be given to this as the Curriculum for Excellence develops. However, re-educating the population in such a way as to develop citizens who can be productive in a low carbon economy will call for much wider engagement than merely through the formal education system.