Chapter 12: Enterprise and Skills

Part 1: Innovation, Investment & Opportunity

Summary

- **Energy efficiency is rising up the agenda quickly and will continue to do so. It will offer ever greater markets, both at home and abroad, driven by cost and climate change considerations, and the demands of an increasingly aware society and consumers**.
- **In their drive to reduce emissions, countries across the world need not only to reduce their energy use, but to find new ways of doing things across all sectors. This presents Scotland with a clear business opportunity, both to help industry and people save energy, and to become a world leader in new markets, designing and building energy efficient goods and services, modules and homes**.
- **The step-change in levels of innovation required to respond to climate change will necessitate a culture of support for creativity, ideas and experimentation. This is about both new products or services, and becoming more innovative in our systems of transportation, buildings, energy, water, and operations and processes, i.e. the ways in which we produce and consume goods.**
- **Significant potential exists in making materials and basic manufacturing processes more energy efficient.**
- **There will be a key role for low-carbon research, development and deployment, driven forward by both the Energy Efficiency Action Plan and the Government's Renewables Action Plan, Climate Change Delivery Plan, Carbon Capture & Storage Roadmap, and Marine Roadmap.**
- **In order to satisfy the growing energy efficiency agenda, it will be important to get the right quantities of the right skills in the right places in the short term. Current jobs will need to be upgraded, and new jobs and economic activities will be created in sectors where there is opportunity to develop and gain competitive advantage. It is possible that tens-of-thousands of new direct and indirect jobs could be sustained in sectors with high potential environmental impacts, including energy efficiency. For example, in order to take forward the two-year Home Insulation Scheme, we will need to increase the scope of knowledge, skills and confidence to deal with requirements for loft, cavity wall and solid wall insulation.**
- **However, there is no skills group with explicit responsibility for energy efficiency. The Renewable Energy Skills Group (RESG) was set up in response to an increasing awareness that the predicted growth of the renewable energy sector may not be matched by a parallel growth in adequately trained personnel. Some of the results of its work could be applied to energy efficiency.**
- **There is also a need to ensure there are enough trained and accredited operatives to cope with microgeneration installations in new-build housing and the major retrofit programme for existing housing to meet Scottish Government targets**.

Overview

12.1 Up to now, low-carbon investment and innovation have been dominated by renewable energy, as companies have tended to focus on the opportunities in new markets for large-scale renewable energy. However, energy efficiency is rising up the agenda quickly, as evidenced by the Scottish Government's Climate Change (Scotland) Act, the recent Energy Report from the Scottish Parliament's Economy, Energy and Tourism Committee, and the UK Low Carbon Transition Plan. It will continue to do so and to offer ever greater markets at home and abroad, driven by cost and climate change considerations, and the demands of an increasingly aware society and consumers.

12.2 Energy efficiency represents a clear business opportunity. In their drive to reduce emissions, countries across the world need not only to reduce their energy use, but to find new ways of doing things across all sectors, from simple everyday household tasks to complex industrial processes. This presents Scotland with the chance not only to help industry and people to save energy, but also to become a world leader in these new markets, designing and building or manufacturing energy efficient goods and services, homes and modules.

12.3 As we move forward, innovation will inevitably result in a further shift away from 'traditional' production processes. Worldwide, sizable opportunities and markets will develop, creating still further opportunities in new and innovative processes as investment flows towards more energy efficient products, processes, skills and services. Box 12.1 shows how this is happening in the aerospace sector, which has signed up to the challenging Europe-wide ACARE targets of reducing CO_2 and SO_x emissions by 50%, and NO_x emissions by 80%, by 2020.[190]

Box 12.1 Example of opportunities in the aerospace sector

As the aerospace sector looks to reduce its impact on the environment and reduce fuel costs, calls for more fuel efficient components have led to the Aerospace Defence and Marine sector to become actively engaged in R&D and new manufacturing technologies. This has included, for example, the use of composite materials or the increased use of electrical aircraft systems to reduce aircraft weight, and increasing engine efficiency - see e.g. the Next Generation Composite Wing (NGCW) and Power-Up programme, both in the National Aerospace Technology Strategy, as well as the collaborative SAMULET (Strategic Affordable Manufacturing in the UK with Leading Environmental Technology) research and technology programme.

In Scotland, Scottish Enterprise (SE) has supported Spirit AeroSystems in its NGCW research programme. SE and public sector support has been provided for the company's development of a new Composites Development Centre and R&D for its Wing Technology Road Map project. SE has also supported multiple R&D projects for Rolls-Royce in its Compressors division in Scotland to develop new, more fuel efficient components. This has included support for a successful project to develop the manufacturing technology for Rolls-Royce's elliptical blade technology, itself a significant advance in reducing aero-engine specific fuel burn.

12.4 The imperative is for Scotland to respond actively over the next decade and beyond, and to develop the new ideas that will be needed to solve new problems. As Ian Marchant, Chief Executive of Scottish and Southern Energy, has said with reference to Scotland's greenhouse gas emissions reduction target of 42% by 2020:

> The benefits of early action far outweigh the costs of acting too late. Benefits to the environment, definitely, but moreover, the benefits to Scotland's economy are immense. I believe every single percentage point will see more jobs for Scotland. Do we want to miss these opportunities? [191]

12.5 He goes on to say that stretching targets are vital in the current economic climate as private investors take their signals from such targets: 'The more ambitious Scotland is, the more investment will be made here. Think of the target as an incentive for investment as well as common sense.'[192] Innovation will be required to meet both global targets and the Scottish Government's own economic, environmental and social goals, and Scotland must prepare now to benefit from this.

What do we need to do?

12.6 The step-change in the levels of innovation required to respond to climate change will require a culture of support for creativity, ideas and experimentation across Scottish

[190] See www.acare4europe.com/.
[191] Ian Marchant, 'Let's lead the push to get 42% cuts by 2020', *The Scotsman*, 18 June, p. 30.
[192] Ibid.

government, businesses and communities. This is not only about particular new products or services, but also about becoming more innovative in our systems of transportation, buildings, energy, water, and operations and processes, i.e. the ways in which we produce and consume goods.

12.7 A key challenge for Scotland will be to find ways to encourage and equip people from all walks of life to come up with new ideas, to experiment with new approaches and solutions, and to convey their knowledge and experience to others. The Energy Technology Centre, a national centre of excellence based in East Kilbride, provides an example of the support available.

Box 12.2 The Energy Technology Centre

The Energy Technology Centre (ETC) plays a pivotal role in the development, demonstration and commercialisation of low-carbon and renewable energy technologies for sustainable transportation; power generation; and the built environment. It offers an unrivalled opportunity to develop, test, demonstrate and showcase a range of these technologies from proof of concept through to field trials and deployment. Based in central Scotland, the ETC acts as a hub linking technology developers, manufacturers, researchers and end users to a network of expertise and facilities. It has just secured £1m of EU funding to develop the facility as an exemplar of low-carbon refurbishment innovation (see www.scottish-enterprise.com/energytechnologycentre).

What kind of opportunities are there?

12.8 Chapter 8 has already investigated the opportunities for companies to make energy efficiency savings through the fabric of their buildings and processes. If energy efficiency and productivity are to become a cornerstone of our drive to reduce greenhouse gas emissions, then the key business and market opportunities in Scotland will come from focusing on the following broad areas of intervention:

Supply chain management

12.9 Management of the supply chain can play a key role in ensuring that energy efficiency is improved as manufacturers can require their suppliers to follow good environmental practice, of which a focus on energy is one aspect. There is evidence to show that companies that make use of environmental management systems such as ISO14001 are increasingly expecting their suppliers to improve their environmental credentials, and this in turn may impact on the energy efficiency of companies within that supply chain.

12.10 In food and drink, for example, companies can make significant cost and carbon savings through waste management throughout their supply chain, particularly in relation to reducing food waste and using packaging effectively. On 3 September 2009, the Waste and Resources Action Programme (WRAP) announced a series of industry-led partnerships that could considerably reduce waste throughout the food and drink supply chain, including a series of research projects.[193] The Scottish Whisky Association has announced its commitment to work with its supply chain to maximise the use of sustainable practices, including areas not under its direct control (i.e. maltings, glass manufacture, transport and distribution, grain production). This includes one programme to reduce the use of fertilisers, and therefore the energy needed to produce them and the transport required to deliver them.[194] Pressure on our food and drink supply chain with respect to carbon footprinting and high fuel prices will continue to impact on production and transport costs, and increased consumer awareness and demand are likely to further drive a greater focus on food miles and purchasing local produce.

[193] See www.wrap.org.uk/wrap_corporate/news/industry_1.html.
[194] See www.scotch-whisky.org.uk/swa/files/CSSupplychain.pdf.

Process Change – Manufacturing

12.11 Significant potential exists in making basic manufacturing processes more energy efficient, e.g. improving the efficiency of materials and energy in energy intensive industries such as aluminium, chemicals, cement, copper, pulp and paper, and steel. To date, the Scottish Manufacturing Advisory Service (SMAS) has worked with over 250 Scottish manufacturing companies and delivered over £40m of value-added productivity improvements. The Carbon Trust has been working with a number of companies during the pilot phase of its Industrial Energy Efficiency Accelerator (see also paragraph 8.28). With one drinks manufacturer, for example, it installed metering across their energy intensive bottle blow-moulding process in order to measure the energy flow in plastic bottle manufacturing and look for ways that energy use could be substantially reduced. It very quickly became evident that there was significant variability in energy usage even for the same size of bottle made on the same line. The Carbon Trust was able to advise on how to improve the company's operating process and on different technologies available for heating the plastic prior to blowing.

12.12 Once manufacturing processes have been made more efficient, the next tranche of saving opportunities which can lead to energy savings involve a change in companies' main processes. This could be a switch to a new production technology or a form of low-carbon energy. The Carbon Trust has identified opportunities in industrial processes for significant energy and carbon savings. These fall into three categories:

- product strategy – relating to the raw materials, product mix and the supply chain;
- processes – relating to the configuration of the process itself; and
- equipment – relating to upgrades to equipment or new technologies to replace existing items of equipment.

12.13 The Carbon Trust will launch its Industrial Energy Efficiency Accelerator (IEEA) in 2010 to help deliver greater reductions in UK industry CO_2 emissions by identifying and implementing changes to sector-specific manufacturing processes that are not optimised for energy efficiency.

Box 12.3 The three stages of the Carbon Trust's Industrial Energy Efficiency Accelerator

Stage 1 will investigate the sector-specific processes in order to build a detailed picture of process energy use. Information will be collected from process operators, equipment manufacturers and from equipment in use at a representative group of sites. This will lead to identification of practical, cost-effective carbon saving solutions which may include:

- equipment upgrades;
- upgrade of components;
- changes to control settings;
- process optimisation.

Stage 2 will demonstrate the cost-effectiveness and carbon-saving potential of identified solutions. Data will be gathered to provide evidence to support a business case for industry to adopt the solutions more widely.

Stage 3 will aim to replicate the solutions successfully demonstrated in stage 2 more widely across the industry sector, and potentially in other relevant industry sectors.

Having created a body of evidence, the Carbon Trust will put in place a programme to encourage uptake of solutions, in partnership with the relevant trade associations. In the longer term it is intended that the information and energy saving evidence gathered from the IEEA could be used to create a set of on-going, cost-effective services for delivery via Carbon Trust Solutions, offering customised opportunity identification and implementation across a range of sectors.

12.14 There may be benefits to Scottish equipment manufacturers where solutions are identified for sector-specific processes that involve changes in or to equipment. A number of key industrial equipment manufacturers are based in Scotland that could benefit. For

example, one major player in the manufacture of industrial storage tanks (with 75% of UK market share) is based in Glasgow.

12.15 The Scottish Government has not yet decided whether to subscribe to the IEEA and is interested to hear views as to the benefits or otherwise of being part of such an approach. The IEEA is a competitive programme open to all UK industry, and so will not be ring fenced for Scottish industry. Therefore, should the Scottish Government agree to support this programme, it would be important to ensure that Scottish industry is in position to apply successfully for funds. It would also be important to ensure that the programme targets the kinds of industries that operate in Scotland.

12.16 The evidence gathered from stages 1 and 2 of the IEEA will be used to support the business case for adopting innovative technologies or process changes to deliver a step-change reduction in emissions. This information will be disseminated across each industry through trade associations and will allow Scottish companies to benefit from the improved knowledge and understanding of energy use in sector specific processes and to deliver significant CO_2 reductions.

Change the way we use energy at work

12.17 In all of this, engagement by senior management in energy efficient opportunities is a key driver and can reap great benefits. For example, Deutsche Telekom has undertaken various measures, led at Board level, including the replacement of existing heating systems with heat generated from use of various IT products. This netted energy savings of 126 GWh in 2006, equivalent to the energy used by over 5,000 homes in Scotland.[195]

12.18 Even in industries that are not ostensibly energy-intensive, such as IT equipment or financial services, the potential is still significant. For example, Nokia Siemens Networks estimates that its customers, the operators of mobile networks, can save 30% on the electricity used to power base station facilities with virtually no investment.[196] This can be done partly by letting the indoor temperature of base station facilities rise from the current 25°C to 40°C, by shutting down partial equipment during night hours, and by implementing a few software features. Box 12.4 shows how Castle Computer Services has been implementing these types of savings in Scotland.

Box 12.4 Castle Computer Services

Castle Computer Services implemented their VMware software into the Edinburgh Solicitor's Property Centre, and thereby reduced the number of servers being used by the ESPC from 49 to 14. The software allowed them to conduct planned maintenance tasks on their systems during normal office hours, without any disruption to business. More importantly, the consolidation of servers means that ESPC expects electricity savings of around £35,000 per year, with an annual CO_2 emission reduction equivalent to taking 35 cars off the road each year. The return on investment in VMware is almost immediate for most medium-to-large sized organisations that employ multiple servers. Many can see a 30%-70% saving on total cost of ownership.

12.19 There are also clearly savings to be made from switching off general office equipment at night and across the computer-based IT industry. For example, Citigroup has reported that it can save €7.5 per square meter of office space annually by using energy efficiency improvements such as turning off lighting, changing settings on thermostats, and constructing 'living walls' covered with plants to insulate buildings better from summer heat and winter cold (as in its data centre in Frankfurt). Given that Citigroup uses more than 10 million square meters of office space worldwide, this provides savings of €75m annually.

[195] Deutsche Telekom, 'Corporate Responsibility Facts and Figures 2007', quoted in McKinsey Global Institute (MGI), 'Capturing the European energy productivity opportunity', September 2008, p. 26 (www.mckinsey.com/mgi/publications/capture_europe_energy/index.asp).

[196] MGI, 'Capturing the European energy productivity opportunity', September 2008, p. 28.

Even where Scotland's businesses operate on a smaller scale, this can still allow for sizable savings.

12.20 Rising energy costs, environmental concerns, and national and international climate change targets means there is an increased need for sustainable and "green" business IT operations. More than 70% of electricity consumed in the United States is used in office buildings; within the office, lighting and office equipment account for almost 46% of consumption. Furthermore, the US Department of Energy estimates suggest that PCs left on are in use only 9% to 15% of the time.[197]

12.21 Understanding and controlling energy usage are now the focus of businesses worldwide. Cisco® EnergyWise is an innovative architecture, promoting companywide sustainability by reducing energy consumption across an entire corporate infrastructure and affecting more than 50% of global greenhouse gas emissions created by worldwide building infrastructure: a much greater effect than the 2% generated by the IT industry. Cisco EnergyWise enables companies to measure the power consumption of network infrastructure and network-attached devices and to manage power consumption with specific policies, reducing power consumption to realise increased cost savings and potentially affecting any powered device.

12.22 In addition, IT has the potential for helping other sectors make major savings. Traditional building systems consist of siloed networks that are built and maintained as individual systems, e.g. lighting; heating, ventilating, and air conditioning (HVAC); metering; fire; uninterruptible power supplies (UPS); video surveillance; physical access; and others. The duplication of networks for each of these systems results in higher installation, commissioning, and maintenance costs. Many of the systems that consume energy within buildings implement communication protocols and formats, limiting access to important information and building functionality. Proprietary building-automation systems and black boxes provide access to only a subset of the energy consuming systems within a facility. The lack of unification amongst all these disparate building systems and lack of centralised monitoring and control across global operations leads to inefficiencies and increased energy consumption.

12.23 Cisco's Network Building Mediator is an open, any-to-any networked energy, facility, and sustainability platform, developed specifically to connect to the wide range of existing building systems and normalise building system informational data. Using cloud services such as Automated Demand Response (ADR), this data can be correlated across each system at a site, multiple systems at a site, and multiple sites over time. Underperforming sites can be identified and adjusted, resulting in significant energy savings and cost reductions. Through the use of controlled energy systems, it is also possible to participate in an ADR and dynamic-pricing programs from utility companies, potentially gaining additional cost savings. The Network Building Mediator will also provide critical energy usage and forecast information to Smart Grid programs as they become available.

Information, Education & Awareness ("Changing the Mindset")

12.24 In a 2007 survey of the 500 largest publicly traded companies globally, nearly 80% considered climate change – including extreme weather events and the tightening of government regulations – to present a major business risk.[198] This increasing awareness both puts an onus on companies to be more energy efficient themselves, and, combined

[197] Cisco Systems, 'Environmental Sustainability in the Public Sector', (http://www.cisco.com/web/strategy/docs/education/schl_green_wp.pdf).
[198] MGI, 'Capturing the European energy productivity opportunity', September 2008, p. 27.

with wider concerns about the environment and resource security, presents a new market opportunity that they can serve.

12.25 Across all businesses and community organisations, large and small, awareness of environmental issues and the importance of energy efficiency will increase the chances of energy saving initiatives succeeding. For example, pressure to respond to the concerns of employees and customers is leading to a number of larger organisations working towards embedding corporate social responsibility (CSR) objectives into everything they do. Improving energy efficiency can be built into this, to the benefit of both companies themselves and the wider environment.

What are the particular opportunities for Scotland?

12.26 The Scottish Government recognises that energy efficiency is an opportunity which is not just about saving costs. It is also about making positive economic gains – finding areas in which Scottish companies can reap significant business benefits from boosting energy productivity.

12.27 According to 'Global Trends in Sustainable Energy Investment 2007', '*Energy efficiency is a significant, but largely invisible market, which is now attracting an increasing share of the limelight as investors realise its role in addressing growing global energy demand'*. McKinsey add that '*businesses are beginning to see the benefits of higher energy efficiency, in terms not only of future energy savings but also of new markets they can serve'*,[199] and, '*there are business opportunities that European businesses are well-positioned to capture as the energy efficiency standards in their home markets are often higher than those in other regions such as North America, Russia or Asia's emerging markets*.'[200] The opportunity is here now for Scottish research and businesses to take advantage of the activities proposed across all sectors throughout this consultation in order firstly to develop and respond to market requirements here in Scotland, and then to capture the developing international market.

12.28 Scotland has a distinguished energy company base and world-leading technological and research resources in a wide range of specialist energy areas, and should be able to turn these to energy efficiency. The Scottish Government's Energy Key Sector paper outlines both the short- and longer-term opportunities for Scotland to build on and benefit from its competitive advantage.[201] These opportunities are aimed at creating new jobs, reducing emissions, and saving households and businesses money, thereby contributing to economic recovery and growth and addressing climate change.

12.29 In addition, an Environmental and Clean Technologies development partnership, involving Scottish Enterprise, Highlands and Islands Enterprise, SEPA and the Scottish Funding Council has identified significant growth opportunities in five priority environmental and clean technologies sub-sectors.[202] These are: water and waste water treatment; recovery and recycling; environmental monitoring and instrumentation; building technologies; and sustainable transport. Of these, the last three relate directly to energy

[199] UN Environment Programme and New Energy Finance, 'Global Trends in Sustainable Energy Investment 2007: Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency in OECD and Developing Countries', 2007, p.10 (http://new.unep.org/civil_society/GCSF/3_SEFI_Investment_Report_2007.pdf). Quoted MGI, Sept 2008, p. 27.
[200] MGI, 'Capturing the European energy productivity opportunity', September 2008, p. 28.
[201] Scottish Government, 'Energy Key Sector Report, May 2009 (www.scotland.gov.uk/Resource/Doc/917/0081161.pdf).
[202] Scottish Enterprise, Highlands and Islands Enterprise, Scottish Funding Council and Scottish Environmental Protection Agency, 'Environmental and Clean Technologies Action Plan 2009/10', September 2009.

efficiency. Scottish Enterprise has additionally identified building technologies and sustainable transport as having particular opportunities for growth, detailed as follows.

Building technologies

12.30 Low-carbon buildings will be key to meeting carbon emission targets, and 80% of the required reduction will come from existing buildings. There is still scope for Scotland to invest and catch up with the likes of Denmark and Germany, and to co-operate with these countries in capturing global markets. The potential for growth lies in the high demand for retrofit technologies that utilise new technology and new construction ideas, e.g. new material development & smart sensors. There are currently over 300 Scottish companies in this sector, with the UK having a projected market of £8.31bn.[203]

Architectural, Engineering and Design Services

12.31 Scotland has traditional and established strengths in engineering and design, which are already being exported globally. The application of this capability to the problem of developing affordable low-carbon solutions for the built environment is a key opportunity for Scotland. For example, RMJM, a Scottish international architectural practice with over 1000 architects working across the globe, has this year launched a groundbreaking low-carbon building concept for domestic dwellings (see Box 12.5).

Box 12.5 RMJM

RMJM has launched a new affordable housing concept which is designed to avoid the need for artificial heating. The MiLoft concept aims to provide stylish, affordable and eco-friendly housing which needs only body-heat to maintain a liveable temperature. The design is targeted at homeowners who wish to experience loft-style living but are unable to buy a penthouse. It is a response to the urgent need for more affordable housing as people lose their homes due to foreclosure and unemployment. The design uses zero-carbon technology and sustainable materials, combined with an exceptionally high level of air tightness, to reduce running costs and energy use. 'Mechanical Ventilation Heat Recovery' technology harnesses and reuses heat generated within the home – such as body heat and heat from household appliances - to maintain indoor air temperatures at a constant level. This negates the need for a traditional heating system in most urban areas, though it will need to be supplemented in more extreme climate conditions.[204]

Design and modelling methodology and tools

12.32 As the design process for low-carbon buildings becomes more complex, there is a need to support architects and engineers with design tools that can assist them to review alternative design scenarios quickly and assess their low-carbon and energy performance. There is global capability in this area within Scotland's universities, and this area offers real opportunity for future development.[205] Historic Scotland is also currently working with various partners to develop more sophisticated modelling tools for traditionally constructed buildings.

Offsite Modern Methods of Construction (MMC) systems.

12.33 Designing out the requirement for energy is the starting point for low-carbon buildings, and there is a trend towards offsite modular manufactured solutions. The offsite solutions look to provide increased energy efficiency, greater build quality assurance and lower-cost structures through design and production approaches more typical of manufacturing industries. Scotland already has companies active and exporting in this area, for example Wishaw-based Powerwall, Lockerbie-based Build ICF, and Aberdeen-based Stewart Milne Group. This is expected to increase as the home market develops in response to increasingly tight regulation (see Chapter 6). A new Scottish Passivhaus Centre

[203] See Innovas, 'Low Carbon & Environmental Goods & Services: An Industry Analysis', March 2009, (commissioned by BERR) www.berr.gov.uk/whatwedo/sectors/lowcarbon/marketintelligence/page50106.html

[204] See www.worldarchitecturenews.com/index.php?fuseaction=wanappln.projectview&upload_id=11293.

[205] See, e.g. Integrated Environmental Solutions, a Glasgow based building simulation software company, developed out of academic research and recently included in a list of the top 100 European environmental firms (http://www.guardian.co.uk/environment/table/2008/sep/18/cleantech100buildings.cleantechnology100).

has recently been established, with the aim of bringing architects, consultants, product suppliers, installers, developers, housing associations and individual house builders together to exchange information and professional advice regarding Passive Energy Housing.[206]

Box 12.6 Scottish Passivhaus Centre (SPHC)

The SPHC is the only independent Passivhaus certifier in Scotland. It consults and trains the building industry, especially architects, housing associations and builders in highly energy efficient building technologies. It offers detailed energy efficiency and Passivhaus consultation in order to optimise the efficiency of buildings. This includes the specification and design of heat recovery ventilation (MVHR) and heating systems. The SPHC organizes pressure testing and Passivhaus site management to ensure that the designed energy efficiency standards are maintained during the practical building of the house.

A Passivhaus / passive house is an energy-efficient building that has year-round comfort and good indoor climate without the use of active space heating or cooling systems. The space heating requirement is reduced by means of constructive (passive) measures and heat recovery ventilation to the point where there is no longer any need for a conventional heating system. A bench mark of 15kWh/m^2a is set for an optimised thermal performance within a reasonable increase in capital cost.

12.34 The trend towards more energy efficient and sustainable buildings is also increasing the market for innovative technologies and products in individual build components, for example improved insulation, glazing, material utilising recyclates. Fife-based Superglass is the only independent mineral wool insulation producer in the UK, with 80% of its product made from recycled glass.[207] Elgin-based RTC Timber has developed a closed panel timber system in Passivhaus standard, which uses solely local Scottish products for the building envelope. The first passive house using its system in Scotland has now been built in a social housing scheme in Dunoon.

Sustainable Transport

12.35 Scotland has emergent capability and scale in the transport sector. There is a sizable opportunity for growth, which arises from the fact that changing the way we use transport and transport materials will play a key role in helping achieve our climate change targets (see Chapter 11). A significant number of companies and research institutes are already active in this area, with the public and private sectors working together to position Scotland at the forefront of sustainable transport worldwide. Box 12.7 provides two examples.

Box 12.7 Opportunities in transport applications

The Scottish Sustainable Transport Group (SSTG) comprises major utilities, leading bus operators, battery developers and hydraulic transmission companies. It focuses on delivering larger scale solutions in the three key areas of public transportation, movement of resources and the provision of services.

The Energy Technology Centre (see Box 12.2 above) offers a comprehensive facility to develop and assess environmentally-friendly transport applications. A chassis dynamometer is available for vehicle development and testing, complemented by three test cells with dynamometer capacities up to 300 kW for drivetrain development. Vehicle workshop facilities are also available. For vehicles with electric propulsion, the capability to explore low emissions charging and drive systems is a unique feature offered by the centre. For example, combinations of wind power, electrolysis, hydrogen, fuel cells and batteries can be developed as an integrated system for transport applications (see www.scottish-enterprise.com/energytechnologycentre).

12.36 In the area of Low Carbon Vehicle technologies (see also Chapter 11), St Andrews University is at the forefront of the research and commercialisation of hydrogen technology for LCVs. Alexander Dennis Limited (ADL), based in Falkirk, is Britain's leading bus and coach manufacturer, and currently the fastest growing bus and coach producer in Western Europe. ADL currently has hybrid double decker buses in operation in both London and Las Vegas, using the Series Hybrid and Parallel Hybrid technologies. These technologies will reduce fuel consumption and emissions by 30-40%, with expected CO2 savings of 320 tonnes and fuel savings of £48,000 over the lifetime of the vehicle.

[206] See http://www.sphc.co.uk/passivhaus-or-passive-house for more details.
[207] See http://www.superglass.co.uk/.

12.37 Intelligent Transport Systems (ITS) offer carbon reductions of up to 20% as they monitor and manage traffic across the transport network, while at the same time offering travellers real-time information and options on how to make their journeys. In Scotland there are three international companies servicing the global market for ITS: Mott MacDonald, IBI Group and Aktins.

12.38 Scotland is also a world leader in battery and power management for low-carbon vehicles, with companies such as Axeon and Xipower providing the battery technology for a range of electric vehicles to companies across Europe, including Allied Vehicles in Scotland and Modec in England.

Energy services and finance products

12.39 In addition to the above, there is an opportunity for power companies to work in more innovative ways with energy service companies (ESCOs) to help consumers make more informed energy choices and profit from energy savings, e.g. by implementing advanced metering and smart grids that allow consumers to see actual costs of their choice of appliances.

12.40 ESCOs are businesses that operate a type of cash flow-based finance by developing, financing installing and maintaining projects designed to improve the energy efficiency and maintenance costs for facilities, generally over a five- to twenty-year time period. They act as project developers for a wide range of energy-related tasks and assume the technical and performance risk associated with the project.[208] Typically, they:

- develop, design, and finance energy efficiency projects;
- install and maintain the energy efficient equipment involved;
- measure, monitor, and verify the project's energy savings; and
- assume the risk that the project will save the amount of energy guaranteed.

12.41 These services are bundled into the project's cost, and the end-consumer's debts are repaid over the course of the contract period through savings generated by the resulting energy efficiencies. These savings may be achieved through a wide array of cost-effective measures, including high-efficiency lighting, high-efficiency heating and air conditioning, efficient motors and variable speed drives, and centralized energy management systems.

12.42 A key enabler of energy management for both home owners and power suppliers will be 'smart metering', or the availability of real-time information about consumption. At present, about half of industrial and larger commercial customers have real-time metering. However, across the EU and the US, a number of initiatives are underway to roll-out smart metering to domestic and other smaller customers. Scotland will be a part of the UK-wide roll-out of smart metering technology, and the sector offers Scottish companies significant growth potential.

Utilisation of industrial waste heat

12.43 There are already several technologies available that could both save energy across a number of business sectors and reward those that invest with rapid payback times. According to McKinsey and Company, two of the biggest opportunities in industry are the

[208] ESCOs are different from other firms that offer energy efficiency, such as consulting firms and equipment contractors, since they undertake performance-based contracting. When they undertake a project, the company's compensation, and often the project's financing, are directly linked to the amount of energy that is actually saved. The benefit for consumers is that they do not need to pay for new systems up-front, and they can make extensive energy savings without having technical knowledge or expertise. For more information on different types of ESCOs, see 'Making ESCOs work: Guidance and advice on setting up and delivering an ESCO' (www.lep.org.uk/uploads/lep_making_escos_work.pdf).

improved recovery of heat generated in the production of mechanical or electrical power, and improved co-generation. For further discussion of co-generation and district heating, see Chapter 10 (issues that apply across the built environment).

Supporting applied research in Scotland

12.44 There are many areas that will support substantial economic growth in energy efficiency, and R&D will be crucial in developing Scotland's business expertise in these.
.
12.45 As part of the Scottish Government's drive to promote energy efficient and low-carbon economic growth, it will be necessary to work with our agencies, such as Scottish Enterprise, Highlands & Islands Enterprise and the Scottish Funding Council, to support innovation in our universities, research institutes, SMEs and major energy utilities (see Chapter 5, paragraphs 5.30-5.36 for general HE/FE support for energy efficiency and relevant programmes and networks). There will be a key role for low-carbon research, development, demonstration and deployment (RDD&D), driven forward by both the Scottish Government's Energy Efficiency Action Plan, and its Renewables Action Plan, Climate Change Delivery Plan, Carbon Capture & Storage Roadmap, and Marine Roadmap.

12.46 The new Scottish European Green Energy Centre will have a key role in fostering research collaboration between Scotland and other parts of the EU, levering in the significant resources of the EU Framework Programmes, and disseminating Scotland's low-carbon research expertise. It will work closely with the Energy Technology Partnership of Scotland's universities, which pools the world leading research expertise of Scotland's energy researchers. The Energy Technology Partnership also coordinates with other research poolings such as SAGES (Scottish Alliance for Geoscience Environmental Society) to ensure a breadth of low-carbon RDD&D across the fields of technology, policy, social sciences, economics and legal research. Collaborations between these bodies in support of the low-carbon agenda in Scotland offers industry and government a critical mass of expertise to facilitate national actions.

12.47 Wider support for the sector comes through R&D grant support, investment grant support and government risk capital support such as SMART, Proof of Concept and the Co-Investment Fund. Scottish Enterprise, through its dedicated equity investment team (SEI), also focuses on stimulating the risk capital market in Scotland by investing alongside the private sector in high growth companies, thereby encouraging private sector funding whilst allowing for the investment risk to be shared (see Box 12.8 for detail). The Scottish Government is also working to leverage investment into Scotland from UK-wide funding bodies such as the Technology Strategy Board, the Energy Technology Institute, the Research Councils, the Carbon Trust and the Energy Saving Trust. In particular, the Carbon Trust provides a business incubator service for low-carbon energy technology companies to help commercialise the most promising low carbon technologies.

Box 12.8 Scottish Enterprise support for R&D

The Scottish Enterprise R&D Grant Scheme provides support to businesses of any size in Scotland that are undertaking, or planning to undertake, R&D in Scotland to develop new products, processes or services. Awards totalling around £10 million are given each year to help undertake industrial research or experimental development (the application of research knowledge up to a pre-production prototype). The last year has seen an increase in the number of large projects from the energy sector seeking support for R&D projects concerned with renewable devices, particularly marine power, and we would hope to encourage applications for energy efficiency technologies.

Scottish Enterprise's Proof of Concept Programme supports the pre-commercialisation of leading-edge technologies emerging from Scotland's universities, research institutes and NHS Boards. It helps researchers to export their ideas and inventions from the lab to the global marketplace and create new sustainable businesses for Scotland (see www.scottish-enterprise.com/turn-research-into-business)

SEI (Scottish Enterprise's equity investment team) operates three funds (Scottish Seed Fund, Scottish Co-Investment Fund and Scottish Venture Fund) which offer equity investment from £20,000 to £2 million. The funds are designed to address a particular market gap and to target specific stages of company growth in various industry sectors, including energy, life sciences and creative industries. During 2008/9, SEI invested £5 million in environmental and renewable energy technology companies (16% of total investments). In the first four months of 2009/10, it invested £1.5 million in such companies, representing 12% of total investment for that period. Again, we would wish to encourage applications for the development of energy efficiency technologies.

- The Scottish Co-investment Fund (SCF) is a £72 million equity investment fund, partly funded by the European Regional Development Fund (ERDF), that can invest £100,000 - £1 million in company finance deals of up to £2 million. Unlike a standard venture capital (VC) fund or business angel, it does not find and negotiate investment deals on its own; instead it forms contractual partnerships with active VC fund managers, business angels or business angel syndicates from the private sector. The SCF partners find the opportunity, negotiate the terms of the deal and offer to invest their own equity cash. If the opportunity needs more money than the partner can provide, it can call on the SCF to co-invest on equal terms. The SCF partner determines how much the SCF can invest in any new deal; the SCF cannot invest more than the SCF partner (see www.scottish-enterprise.com/sedotcom_home/grow-your-business/find-money-to-grow/equity-funding/funding-grants-coinvestmentfund.htm).
- Scottish Enterprise introduced the Scottish Seed Fund (SSF) to improve the availability of finance for start-up and young growing companies in Scotland. The SSF can invest between £20,000 and £100,000 on an equity basis in early stage businesses that meet SSF criteria and are keen to grow. Priority is given to businesses demonstrating high-growth potential in terms of launching new products, entering new markets and increasing employment (see www.scottish-enterprise.com/sedotcom_home/grow-your-business/find-money-to-grow/equity-funding/funding-grants-seedfund.htm).

12.48 In addition, the Renewables Action Plan commits the Scottish Government to profiling and mapping Scottish funding for low-carbon energy RDD&D across the range of relevant organisations and to undertake a critical analysis and benchmarking of spend against the need to produce recommendations regarding future funding and structures. We will work to ensure that this key package of work, lead by the First Minister's Energy Advisory Board, includes energy efficiency in its considerations.

Q 52: Is the Scottish Government doing enough to help the wider business community in Scotland to focus on changing how energy is used, and in identifying appropriate and effective energy efficiency measures?

Q 53: On what opportunities should business focus it efforts, e.g. finding and using less energy intensive materials and developing low-carbon processes?

Q 54: What more could the Scottish Government do to help drive innovation and to promote technology investment and opportunity across the extended supply-chain and business community in Scotland?

Q 55: Is there adequate support for energy-efficiency related R&D and the commercialisation of energy efficient technologies? How should this be provided?

Q 56: What could be done to support energy efficiency in the Corporate Social Responsibility agenda in Scotland?

Q 57: What needs to be done to promote the role of ESCOs and Energy Performance Contracting in Scotland?

Q 58: Do we need industrial networks which mirror those of the academic research centres? How should they be set up to deal best with the challenges which affect a large number of stakeholders?

Part 2: Developing Skills and Jobs in Energy Efficiency

12.49 Developments in energy efficiency, as outlined in this plan, will require a significant boost to the skills that employers need now and in the future. Awareness of climate change and energy efficiency issues will need to become part of every individual's education, partly through the school curriculum and more general work to change attitudes and behaviours (see Chapter 5). More than this, it will have to become a core element for training and development in many areas, including planning, construction and general enterprise.

Energy efficiency and employment

12.50 As the Scottish economy directs its investment towards meeting ambitious greenhouse gas emission reduction targets, current jobs will need to be upgraded and new jobs and economic activities will be created in those sectors where, as outlined above, there is opportunity to develop and gain competitive advantage in high-value adding markets. It is possible that tens-of-thousands of new direct and indirect jobs could be sustained nationally in sectors with high potential environmental impacts, including energy efficiency. The level of skills demanded is also likely to increase, including in:

- design and construction (in relation to energy and water efficient buildings and infrastructure, renovations and retrofits, and the installation and maintenance of efficient appliances and machinery);
- restructuring the energy system and the expansion of combined heat and power, renewable energy and heat networks;
- developing alternative transport systems; and
- changing the ways in which food is produced and provided.

12.51 For example, re-establishing a local supply chain for building materials, particularly traditional building materials such as local stone and slate, contributes not only to reducing energy demand from transport, but also to ensuring sustainable communities and ensuring that the unique appearance and character of local buildings is maintained and protected. This in turn will reduce the carbon footprint of the construction and manufacturing chain and will create local jobs.

12.52 In making the most of the new opportunities presented by energy efficiency, the Scottish Government wishes to ensure that as many people as possible are given fulfilling jobs or taken out of unemployment. In order to achieve this, our training and education systems must be ready and capable to develop the skills and knowledge that will be required of the work force.

12.53 As the energy efficiency 'sector' is currently relatively disparate, often being a relatively small part of many different jobs, it is difficult for Government to estimate the exact number of equivalent full time jobs resulting from all energy efficiency work carried out in Scotland. A sector by sector analytical approach is necessary to estimate the levels of employment. To take the example of jobs resulting from energy efficiency work in **housing**, recent domestic energy efficiency programmes in Scotland and Britain are estimated to have sustained a significant number of jobs, in many cases in areas of high unemployment. Figure 12.1 below illustrates some estimates of employment (in 'full time equivalent' years/jobs) sustained by a variety of energy efficiency activities. This does not take into account energy efficiency work in the non-domestic or transport sectors, or work carried out by 'influencing' roles, such as designers, planners or policy makers.

Figure 12.1: Estimate of employment (in full time equivalent years/jobs) sustained by energy efficiency activities

Investment Activity or Energy Efficiency Scheme	Employment per £ million of Investment		Measures involved
	FTE Jobs	FTE Years	
SIC code analysis on investment on insulation measures.[209]	15 Direct		Insulation measures
Home Energy Efficiency Scheme (HEES)[210]*		24 Direct 61 Indirect	Draught proofing/Insulation Measures (1991-1997)
Energy Efficiency Standards of Performance (EESoP) predecessor to CERT[211]		11.4 Direct 87 Indirect	Draught proofing/Insulation Measures (1994-1998)
Area Based Home insulation Scheme (HIS)[212]	15 Direct 9 Indirect 5 Induced		Households in area offered energy advice and CERT-subsidized insulation measures (2009-2010)

12.54 If we take a rough estimate using the conservative figures of 11 direct and 60 indirect FTE person-years of employment per £1 million invested,[213] and an estimation of what proportion of CERT measures and spend we hope to capture in Scotland based on previous schemes,[214] this would mean that approximately 1,100 people would be directly employed and a further 6,400 indirectly employed as a result of CERT spend alone.

12.55 Modelling conducted by the Scottish Government on the Scottish domestic sector highlights the considerable need for investment in energy efficiency measures if climate change targets are to be met - with investment levels of £16 billion estimated to be required by 2020.[215]

12.56 It is difficult to forecast with any certainty the number of new jobs in energy efficiency that will be created in the Scottish economy with the level of investment that has been projected as necessary in housing by 2020. This is because the displacement from existing and carbon-intensive industries to newly created low-carbon and energy efficiency markets is difficult to measure. However, with the potential to develop clusters of high value-adding industries and the highly skilled workforce that exists in the Scottish economy, spending of this scale has the potential to create tens-of-thousands of jobs throughout the Scottish economy. This is important particularly given the current economic climate and the impact on redundancies in the construction sector. There may be potential for skilled workers who have been made redundant from traditional construction jobs to move into these new jobs being created in energy efficiency.

[209] Energy Efficiency Partnership for Homes, 'An assessment of the size of the UK household energy efficiency market', 2008 (www.eeph.org.uk/partnership/index.cfm?mode=view&Start=11&category_id=24).
[210] Impetus Consulting Ltd, Report for Greenpeace, 'The case for including energy efficiency investment in the fiscal stimulus package', 2009 (www.greenpeace.org.uk/files/EE_fiscal_stimulus_Impetus_Report.pdf).
[211] Impetus Consulting Ltd, Report for Greenpeace.
[212] Scottish Government, Input-output model, based on £15 million Scottish public sector funding and match external funding, forecast to support around 876 jobs.
[213] Impetus Consulting, Presentation to Energy Efficiency Partnership for Homes, July 2009, based on 'The case for including energy efficiency investment in the fiscal stimulus package'.
[214] See www.scotland.gov.uk/News/Releases/2008/09/16095049; and Scottish Government, 'Securing our share: A CERT Strategy for Scotland', 2009, for estimate of £107 million per year annual CERT investment.
[215] Based on DEMScot Scenarios for the Energy Efficiency Action Plan (see Chapter 6).

Skills and knowledge requirements for energy efficiency

12.57 In order to satisfy this growing energy efficiency agenda, it will be important to get the right quantities of the right skills in the right places in the short term. Our skills and capacity requirements will fall into the following main areas:

- existing jobs – keeping Scotland's workforce competitive in response to market and business requirements by upskilling existing jobs so that people who do existing work do it in a way that reduces overall energy use and thereby meet new energy efficiency demands. This should include trades people, designers, building standards officers, planners (forward and master planners, development control), architects, specialists in regeneration, roads engineers, facilities management, procurement officials, local authority councillors and public sector body senior management. There are many jobs that previously didn't consciously have an energy efficiency role. Now the scale of the task ahead requires that all jobs with an influence over energy efficiency and GHG emissions realise how their work affects this and contribute to increasing overall energy efficiency.
- new jobs – ensuring Scottish business are encouraged and able to take advantage of new and emerging opportunities in the above disciplines, e.g. for planning and building decentralised energy service infrastructure, installing smart meters and other energy saving technologies, and the manufacture and supply chains for energy efficiency goods.
- Increasing demand for numbers working in existing or new areas – A significant step change is required in activity in some areas - examples provided in Chapter 6 relate to energy efficiency measures for housing. It will be important to work with existing businesses to ensure they are able to deliver both the increased supply chain and installation capacity. For example, if we are going to have 625,000 more cavity walls insulated, then we need to ensure we have the people on the ground to be able to do the work so that the prices don't increase sharply. Previous experience suggests this is not a problem if firms are told how much work is coming their way (and ideally they prefer a guarantee that this will not be a short-term requirement before taking on and training new people and buying costly new equipment). This could be factored into tendering and/or procurement arrangements.

12.58 To take an example, there is a considerable way to go in addressing the skills gap in the energy efficiency agenda in traditional buildings. Although there is growing research and guidance on the subject, much more needs to be done. For example, specific training in energy efficiency measures in traditional buildings is required at undergraduate level for architects and surveyors as traditional buildings will play an increasing part in reducing carbon emissions in Scotland.

12.59 These skills requirements will need action in the following areas:

- Understanding the skills requirements of the energy efficiency agenda, including the numbers needed in key job roles and what skills and qualifications will be needed to ensure that Scotland has a skilled workforce.
- Generic skills; basic knowledge and awareness through education from nursery to tertiary (see Chapter 5, Changing Attitudes and Behaviours, for discussion).
- Support for education and training delivery infrastructure to maintain provision for new entrants, and to develop and make available accessible training provision for existing workers. This includes ensuring an appropriate mix of colleges and private training providers.
- Addressing institutional clutter in the skills and training sectors that support the energy industry. The Scottish Parliament's Energy, Enterprise and Tourism Committee is highly

concerned about this and has called on the Scottish Government to spell out how it intends to address this issue and report before summer 2010.[216]

- Incorporating energy efficiency into relevant degree courses (e.g. planning, surveying, architecture, engineering) and as a core element of construction trade training and apprenticeships, facilities management training. For example, SummitSkills leads on microgeneration systems on behalf of the network of Sector Skills Councils, and has developed new National Occupational Standards (NOS) for environmental technology systems. In addition, the theory for these systems has been built into the newly revised SVQ Level 3 qualifications for electrotechnical, plumbing, heating, ventilating, and air conditioning as part of the relevant Modern Apprenticeship frameworks. Energy and Utility Skills are also building these into a new suite of gas apprenticeship programmes. This will ensure that, in future, apprentices completing their training will have a good grounding in microgeneration systems appropriate to their disciplines.
- Working with industry bodies and training organisations to ensure training refreshers are provided and taken up by those already in workforce, incorporated into ongoing enhanced training. As an example, the Royal Town Planning Institute has recently published seven commitments on climate change which include addressing key concerns in terms of the education of planners. This includes ensuring that climate change is included in all RTPI accredited courses and developing their Lifelong Learning and Continuing Professional Development policy to require that all members identify in their Professional Development Programmes how their learning and practice relate effectively to climate change imperatives.[217]

12.60 Addressing these skills requirements will require collaborative working across government and its agencies, as well as with industry associations and employers. Our key partners will be Skills Development Scotland, the Scottish Funding Council, colleges and universities, the employers' federations, Jobcentre Plus, the Enterprise Networks, Sector Skills Councils/Bodies, and training providers. The following section provides an overview of the current skills landscape and activities. We then highlight the key skills issues, and start to suggest the actions that will be required to ensure that Scotland has the energy efficiency awareness and skills it needs now and in the future to lead in this area.

The Scottish Skills Landscape

12.61 Several organisations have a remit for skills and manpower development in Scotland. Box 12.9 provides an overview of the key ones and their roles.

Box 12.9 Skills Landscape Scotland

Skills Development Scotland (SDS)

As Scotland's new skills body, SDS brings together four partner organisations (Careers Scotland, Scottish University for Industry/learndirect Scotland, and key skills elements in Scottish Enterprise and HIE) with a shared vision to drive forward sustained change in Scotland's skills performance. SDS delivers comprehensive information, advice and guidance for careers and learning, as well as extensive support for skills development. SDS is working via Skills Gateways in a number of key sectors to create a partnership with Sector Skills Councils (SSCs) and employers to inform the shape of publicly funded programmes of skills and learning development. Through Skills for Growth, it will review its approaches to funding - including National Training Programmes (NTPs) and Individual Learning Accounts (ILAs) - and demand-led trials to improve skills development for people both joining/or already in the workforce.

Scottish Funding Council (SFC)

The Scottish Funding Council (SFC) distributes more than £1.7 billion to Scotland's 43 colleges and 20 universities for teaching and learning, research and other activities in support of Scottish Government priorities.

[216] Scottish Parliament Economy, Energy and Tourism Committee, 7th Report, 'Determining and delivering on Scotland's energy future', 30 June 2009, para 146 (www.scottish.parliament.uk/s3/committees/eet/reports-09/eer09-07-vol01-01.htm).

[217] Royal Town Planning Institute, 'Planning to live with climate change: Our seven commitments' (www.rtpi.org.uk/download/6440/Sevencommitments.pdf).

Its mission is to invest in developing a coherent college and university system which, through enhanced learning, research and knowledge exchange, leads to improved economic, educational, social, civic and cultural outcomes for the people of Scotland.

Jobcentre Plus (JC+)
Jobcentre Plus is a government agency that supports people of working age from welfare into work, and helps employers to fill their vacancies.

Sector Skills Councils and Bodies (SSC/Bs)
SSCs represent employers' views across the UK, and have increasing levels of influence over skills policy, qualification reform and the way in which learning provision is delivered. A relatively large number of SSCs have a remit covering energy efficiency. The most relevant are Energy and Utility Skills, Asset Skills and Summit Skills:

- SummitSkills, the SSC for building services engineering, covers microgeneration technologies, solar heating, solar photovoltaic, ground source heat pumps, air source heat pumps, CHP, micro CHP, installation, service and maintenance of systems powered by biomass and biofuel appliances, micro/small scale wind, and micro hydro.
- Asset Skills is the SSC for facilities management, housing, property, planning, cleaning and parking. A number of its sectors have a significant role to play in energy efficiency. Facilities managers have responsibility for the management of many of Scotland's largest built sites and therefore for the energy consumption within those sites. Housing managers have opportunity to install microgeneration when constructing new homes and upgrading existing housing. Both have the opportunity and responsibility to re-educate building users in the use of energy. Surveyors and others, such as housing professionals, have responsibility for issuing Energy Performance Certificates and for advising on improving energy efficiency.
- Energy and Utility Skills: the SSC for gas transmission, distribution and utilisation (including micro-renewable technologies), power generation, transmission, and distribution (including large-scale renewables), water industries and waste management industries.

Other key Skills Sector Councils are Construction Skills - the SSC for the Construction sector which includes new build domestic and commercial construction, repair and maintenance, and civil engineering; Lifelong Learning UK; and SEMTA (Science, Engineering and Manufacturing Technologies). Information on what these cover and how they relate to energy efficiency can be found in 'Skills for a Low Carbon London', 2007 (www.lep.org.uk).

Skills Groups

12.62 In late 2008, the Scottish Funding Council (SFC) set up a Renewable Energy Skills Group (RESG) as a sub-group of its Skills Committee. The RESG is a non-executive group whose main focus is to discuss the current evidence base for the skills needs in this developing industry, and to identify opportunities to support skills development for renewable energy. It is intended to be a platform for engagement between colleges and universities and employers and other relevant organisations. Its work plan focuses on three main areas: mapping, brokering and partnerships, and provision.

12.63 The Group's extensive membership includes representatives from the higher and further education sectors, key public sector agencies, Scottish Government, relevant Sector Skills Councils, and representatives from industry. The Group was initially set up to meet throughout 2009 and report to the Funding Council's Skills Committee on its work. The Group will review its workplan towards the end of 2009 to determine whether it can contribute further to the renewable energy skills debate in 2010, with a particular focus on supporting action and strategic development.

12.64 In early 2009, the Scottish Government supported EU Skills to conduct a renewable sector skills and education and training supply analysis for Scotland, in line with the methodology agreed by the SSC collaboration group, the UK Renewable Energy Project Group (UKREPG). It will be important to extend this work to energy efficiency and microgeneration skills, mapping out new job requirements, what jobs will need upskilling, and how many people this involves, so that we can plan the practical training required for people to be able to carry out the work required to achieve our energy efficiency targets.

Skills Issues

12.65 The main issue for energy efficiency in terms of skills and training, as with the renewables sector, is the fact that it is not covered by one SSC. There are up to 14 SSCs

with energy efficiency and renewable occupations within their footprint, and there are six with a particular focus (see Box 12.9 above).

12.66 There are three ways in which SSCs work with employers and training providers to support skills development – through Sector Skills Agreements, the development of qualifications and qualification structures, and National Occupational Standards. Sector Skills Agreements help shape the supply of relevant training and raise employer commitment to skills, and it is important that energy efficiency is included in them. National Occupational Standards set out the level of competence needed for a particular job role and the building blocks for the assessment of training and skills needs. However, energy efficiency is often left unstated in National Occupational Standards.

12.67 Skills shortages for energy efficiency relate primarily to upskilling the existing workforce. In order to meet skills gaps as quickly as possible, there is an immediate need for short-course training programmes. In the longer term, employers' skill requirements need to be incorporated into relevant qualifications programmes, as well as workplace training opportunities such as apprenticeships. This has begun to be addressed by SummitSkills and Energy and Utility Skills, for example through the development of appropriate qualifications/units for use in upskilling the existing workforce, and by incorporating appropriate renewables technologies into the revised qualifications used to underpin the sector's Modern Apprenticeship frameworks. Qualification units are also being developed to address the design aspects of the various microgeneration technology systems. ConstructionSkills' new Modern Apprenticeship framework now includes a range of specialist apprenticeships at Level 2, such as apprenticeships in insulation and building treatments.

12.68 Across the renewables sector, a widespread skills gap has been identified in relation to the planning and use of renewable energy, in particular the use of micro and distributed generation as highlighted in a recent study carried out by Energy and Utility Skills. More needs to be done across all relevant professions in order to realise fully the potential benefits that renewable and decentralised energy systems and energy efficiency offer. For example, housing providers in the north east of Scotland report difficulties in accessing relevant training for taking forward renewable energy implementation work, and the facilities management sector reports gaps in building maintenance knowledge required to operate renewable systems.

12.69 The SSCs' report in October 2008 on Energy Skills Opportunity and Challenge (www.euskills.co.uk/power/consultations) stated that SSCs should combine to develop and resource a strategic skills solution for low-carbon and emerging environmental technologies. It will be necessary to establish a focused delivery group with representatives from all six relevant SSCs to establish how work on energy efficiency can be coordinated in the future.

12.70 The Home Insulation Scheme (see Chapter 6) is expected to create or sustain many jobs over its two years. In order to take this forward, we will need to develop the knowledge, skills and confidence to deal with requirements for, for example, loft, cavity wall and solid wall insulation. The UK Government's HESS consultation in Spring 2009 stated:

> Once we have exhausted the opportunities to take the easier actions, such as insulating lofts and cavity walls, the task will become harder. We will have to make more substantial changes to homes – such as small-scale energy generation and solid wall insulation. So we need to increase our level of ambition, and we need to start building capacity to do this more challenging work now. We aim to help some seven million homes to take up these substantial changes by 2020.[218]

[218] DECC, 'Heat and Energy Saving Strategy Consultation', 2009 (http://hes.decc.gov.uk/).

12.71 Chapter 6 details two scenarios which look at what measures might be necessary to meet the 42% GHG emissions targets that we now have for Scotland (see Figure 6.6). This includes up to 625,000 houses requiring cavity wall insulation, up to 1,550,000 requiring loft insulation, and up 460,000 needing solid wall insulation, with various scenarios showing the different percentages to be met in order to achieve our targets. Given that there are currently less than 20,000 solid wall insulation jobs a year in the UK, this will require a massive concerted effort on the part of the skills sector to supply market requirements.

12.72 In future, there is likely to be a greater demand for provision of Energy Advice to householders by trained and qualified practitioners. Asset Skills has developed National Occupational Standards for Home and Community Energy Advisers for use in England and Wales. These cover both behavioural advice and physical changes to the structure of homes and their building services to reduce CO_2 emissions and save costs. This will require increased skills and customer service training. In addition, the impact of the Energy Performance of Building Directive is likely to mean that rigorous quality assurance of those producing Energy and Performance Certificates will be required.

Action Underway

12.73 Home Energy Efficiency Apprenticeship: A new Home Energy Efficiency Apprenticeship was announced in April 2009. It will support 100 individuals in this year's pilot phase, provided in conjunction with Scottish and Southern Energy, and with support from Energy and Utility Skills. This initiative will build a framework of energy professionals to support companies' long-term ability to contribute to energy efficiency goals. It will create an apprenticeship framework that will develop the skills of individuals and allow them to engage confidently with the public about the importance of reducing emissions. Some of the skills addressed include being able to provide energy efficiency advice, identify customers' requirements and opportunities for energy efficiency, and to resolve energy efficiency problems.

12.74 Microgeneration: There is a need to ensure there are enough trained and accredited operatives to cope with installations in new-build housing and the major retrofit programme for existing housing to meet Scottish Government targets. National Occupational Standards in Microgeneration have been developed by SummitSkills, and work is underway by Summit Skills to embed these skills within the electrotechnical Modern Apprenticeship framework later in 2009, and into the heating, ventilating, air conditioning, refrigeration, plumbing and gas fitting frameworks during 2010. These will also be included in Energy and Utility Skills suite of gas qualifications and apprenticeship frameworks in 2010. The Scottish Government will work with industry and the Sector Skills Council to ensure this work happens as quickly as possible.

12.75 EU Skills is developing a map of current and planned education and training provision for micro-renewables to help identify gaps. The main role of the Funding Council's RESG, other than bringing key people together to discuss the issues, is to help ensure that Scotland has the right provision in the right place. Up to date, evidence-based information about current provision and industry demand will help support this objective. EU Skills and Summit Skills are currently building micro-renewable skills elements into their qualification structures to ensure that renewables become mainstream. SummitSkills is also leading on work with SQA to develop competence-based micro-renewables units for solar and heat pump technologies suitable for use in upskilling existing building services operatives. Energy and Utility Skills have identified the need to develop a similar approach for biomass technologies and are in discussion with the Scottish Qualifications Authority (SQA) to take this forward.

12.76 There is also a need to ensure that related professions, such as architects, planners, and quantity surveyors, are fully aware of the specifications required when installing low- and zero-carbon technologies (as well as water efficiency technologies). Scottish Renewables have carried out an initial gap analysis on microrenewables for the Scottish Government. Follow-up work will be led in the first instance by the FREDS Renewable Heat Group under the Scottish Renewable Heat Action Plan, with recommendations made to the Scottish RESG where appropriate.

12.77 In addition, EU Skills is currently working with employers to develop National Occupational Standards for SMART meters for the gas, electricity and water sectors.

Summary of future action related to Skills

12.78 Our discussion of issues in the skills sector with reference to energy efficiency leads us to identify the following **actions** for Scottish Government:

- To undertake detailed mapping to identify what skills are needed to support energy efficiency in Scotland and what upskilling is required to meet Scotland's challenging climate change targets - in terms of numbers of employees and how much time each individual will have to put in. This will partly be addressed through a part-time secondment from EU Skills to the Scottish Government's Renewable Energy Division, including to assess the gaps in the energy efficiency skills base.
- To identify the roles and tasks of Sector Skills Councils in both mapping skills requirements for energy efficiency and then in working with employers to develop suitable training.
- To discuss with the Renewable Energy Skills Group the possibility of it incorporating in its remit until the end of 2009 responsibility for identifying and considering the response to the skills needs of the energy efficiency sector.
- To take the relevant lessons and actions of the Renewable Energy Skills Group report and apply them to energy efficiency.
- To establish a further delivery-focused group to cover energy efficiency and renewable energy. This would consist of representatives of all relevant SSCs, with a view to identifying an SSC to lead and coordinate activity on energy efficiency. It may be useful to consider extending the remit of the existing Renewable Energy Project Group for this function.
- To consider establishing a tool to help employers and individuals understand and negotiate the training and skills landscape for the energy efficiency and renewables sector.
- To consult with SSCs and industry lead bodies on how and to what timescales they will develop Modern Apprenticeship frameworks to accommodate energy efficiency elements in the future.
- Following proper skills mapping and awareness-raising of forthcoming regulations and requirements, to upskill existing jobs in response to market / business needs and to keep Scotland's workforce competitive and able to meet Scotland's ambitious emissions targets; e.g. trades, designers, building standards officers, planners (forward / master planners and development control), regeneration, roads engineers, facilities management, procurement etc.
- To encourage employees hit by the recession to consider careers related to energy efficiency.
- To investigate the funding implications.

Q 59: How can we ensure Scotland has the skilled workforce needed for the transition to a low-carbon economy?

Q 60: Are the actions outlined above the right ones at this stage?