Renewable energy

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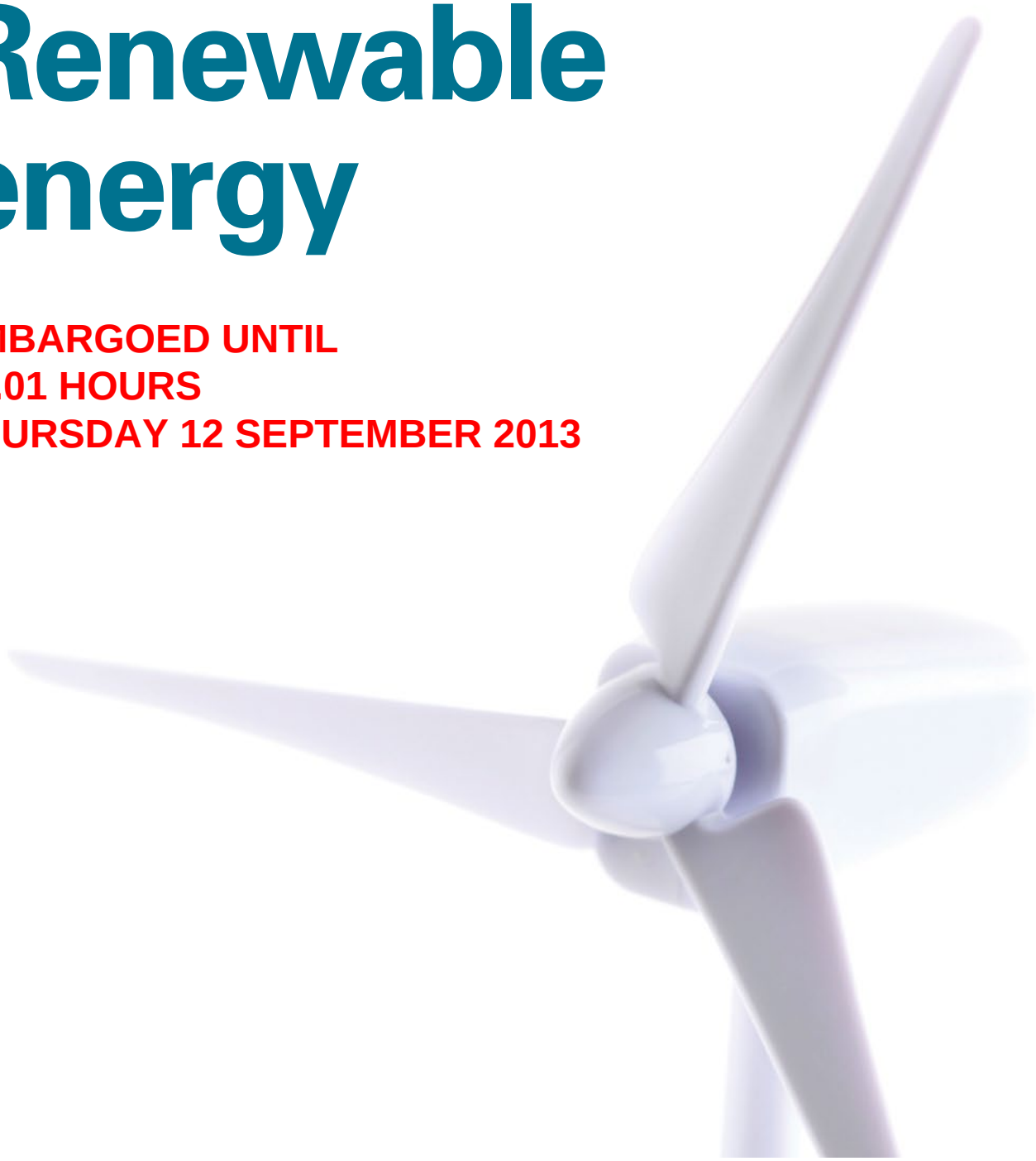

AUDITOR GENERAL

Prepared by Audit Scotland
September 2013

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Exhibit data

When viewing this report online, you can access background data by clicking on the graph icon. The data file will open in a new window.

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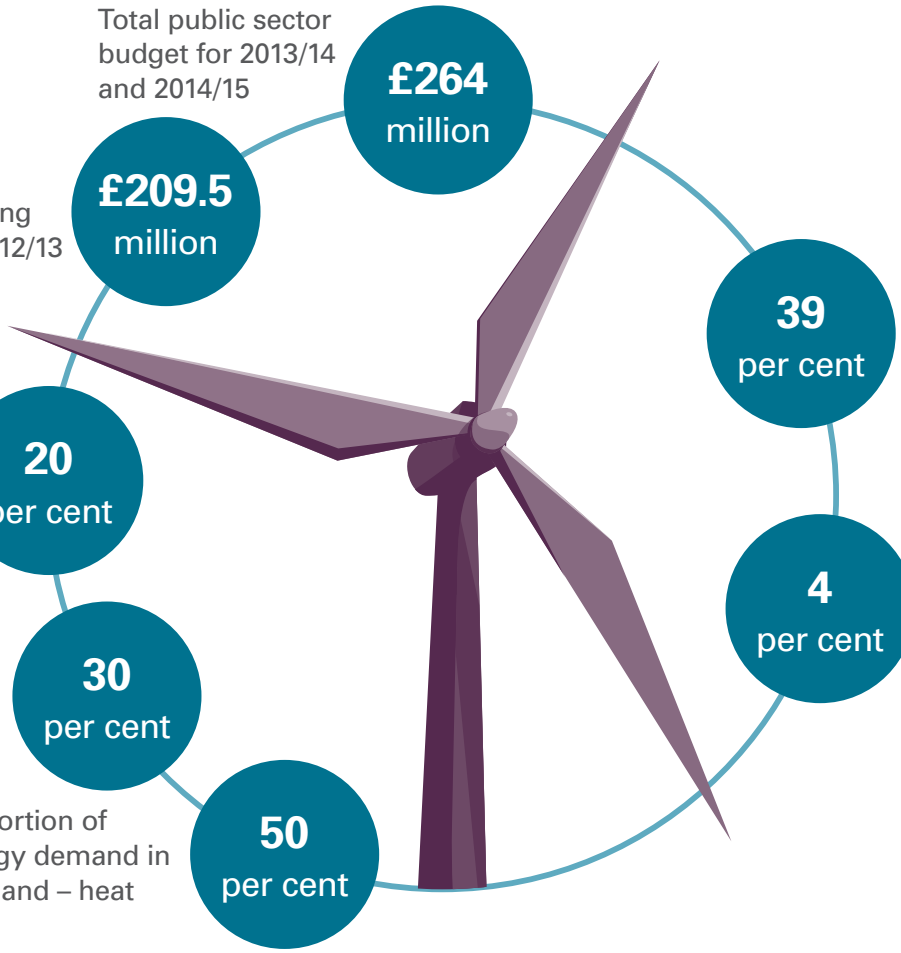


Key messages

1 The Scottish Government has a clear strategic vision for developing renewable energy, which is reflected across other policy areas. It has targets and plans to deliver this vision, although it needs to do more to raise the profile of renewable heat.

2 The Scottish Government has made steady progress towards its renewable energy targets for 2020. However, achieving these targets will be challenging. We estimate that to meet the renewable electricity target alone, average annual increases in installed capacity need to double.

3 The public sector spent over £209 million on developing the renewable energy sector in the 11 years to 2012/13, and funding is increasing. The total combined budget for 2013/14 and 2014/15 will be £264 million. However, renewable energy projects are progressing more slowly than anticipated due to factors such as the current economic climate and changes in UK energy policy. As a result, public bodies are experiencing delays in spending the money available to develop the sector.

4 The Scottish Government estimates that renewable energy could deliver up to £30 billion investment and 40,000 jobs by 2020. The total amount of private sector investment resulting from public funding is not collated at a national level. It is difficult to identify the number of jobs in the renewable energy sector and projections of future employment are optimistic.

Recommendations

The Scottish Government should:

- set out how it aims to develop renewable energy beyond 2020 and develop targets to reflect this
- clarify the role of renewable heat within its wider vision for Scotland's future energy mix in its heat-generation policy statement, due to be published by the end of 2013
- use its revised methodology for measuring progress towards the renewable heat target to set a realistic interim milestone for 2017
- agree a methodology to monitor its target for overall energy demand and start reporting progress against it by the end of 2014
- estimate the range of public sector funding that may be needed beyond 2014/15 to attract private sector investment and meet its objectives for renewable energy by 2020
- work with Scottish Enterprise and Highlands and Islands Enterprise to collate and report at a national level the total amount of private sector investment in renewable energy projects that have received public funding.

The Scottish Government, Scottish Enterprise and Highlands and Islands Enterprise should:

- identify what additional steps they can take to accelerate the development of infrastructure to support the offshore wind industry
- work with Skills Development Scotland and the Scottish Energy Advisory Board's industry leadership groups to ensure employment projections in the revised energy skills investment plan, due by the end of 2013, are realistic.

Part 1

Background

1. Renewable energy comes from sources that cannot be depleted (such as the sun, the wind or the sea) or that can be replaced (such as wood). Renewable sources can generate electricity, provide heat and fuel transport. Scotland has major renewable resources, in particular wind, tides and waves. The Scottish Government wants Scotland to be a world leader in renewable energy and for renewable sources to meet 30 per cent of Scotland's total energy consumption by 2020.

2. Realising Scotland's renewable energy potential is central to the Scottish Government's economic strategy and achieving its goal of sustainable economic growth.[1] However, the development of renewable energy largely relies on investment from the private sector. The Scottish Government and the wider Scottish public sector are seeking to enable and encourage investment in renewable energy, which requires:

- striking a balance across a range of economic, environmental and social policies at national, local and community levels
- recognising and negotiating the distinct responsibilities of the UK and Scottish Governments for energy
- reflecting that different renewable energy technologies are at different stages of development.

realising Scotland's renewable energy potential is central to the Scottish Government's economic strategy

3. The challenge for the public sector is to maximise the potential economic advantage of developing renewable energy, while ensuring the associated costs and benefits – both financial and non-financial – are distributed effectively and fairly. This emphasises the importance of consultation and transparency in decision-making, and requires seeking the best possible balance between:

- National ambitions and targets – the Scottish Government estimates that developing renewable energy could attract £30 billion investment to the Scottish economy by 2020 and create 40,000 jobs.[2]
- The sensitivities and interests of local communities – the Scottish Government's draft national planning framework notes that although there is broad public support for renewable energy, there can be local concerns about the location and scale of particular renewable energy developments.[3]
- The interests of local businesses – developing a network of Scottish companies that can support the renewable energy industry may help to create jobs and investment in local economies. These companies may also be able to export Scottish expertise and technology in renewable energy to other countries.

- The interests of consumers – at present, consumers pay a small premium for renewable energy. The Office of Gas and Electricity Markets estimates that the two main UK-wide incentives for renewable energy, the Renewables Obligation and the Feed-In Tariff scheme, account for five per cent of average household electricity bills.[4]

- The needs of the environment – by reducing Scotland's use of fossil fuels such as oil and coal, the Scottish Government expects renewable energy to contribute to reducing greenhouse gas emissions.

4. The challenge of finding this balance may be illustrated by the approach Forestry Commission Scotland took to deliver the Scottish Government's aim to develop renewable energy projects on the national forest estate (Case study 1).

Case study 1

Developing onshore wind and hydroelectric schemes on the national forest estate

The Scottish Government aims to deliver renewable electricity projects on the national forest estate to contribute to its national target. To deliver this aim, Forestry Commission Scotland sought to find a balanced approach that would both maximise financial returns to it and offer local communities and smaller companies the opportunity to benefit from these projects.

After considering various options, it invited commercial developers to explore the potential for renewable energy projects on the forest estate. It decided to divide the estate into six areas, specifically to encourage smaller companies to apply.

Concerns had been raised that this approach did not offer enough opportunity for local ownership. In February 2012, Audit Scotland examined the process Forestry Commission Scotland went through to award these contracts to energy developers, and concluded they were reasonable.

Through this approach, developers will provide revenue to Forestry Commission Scotland and financial benefits to local communities. It also gives communities the opportunity to invest in these renewable energy schemes or to develop their own projects on the forest estate.

All renewable energy developments on the national forest estate have to apply for planning consent, which involves scrutiny of their impact on the environment and local communities.

Source: *Forestry Commission Scotland: Complaints investigation – Briefing note*, Audit Scotland, February 2012

5. The UK Government is responsible for energy policy, and must reflect European Union requirements. It is currently reforming the UK-wide electricity market, which will change existing financial incentives for generating renewable electricity. Access to the national grid, which is essential for transferring energy from where it is generated to where it is used, is controlled and regulated at a UK level. The Crown Estate manages the rights to the seabed around the UK. It can allow developers to

investigate the potential of specific areas of the seabed for offshore wind and marine projects and, if appropriate, to build and operate them.[5] In 2012, the UK Government established the Green Investment Bank, with £3 billion of public money. It provides capital for infrastructure projects, including renewable energy, across the UK.

6. The Scottish Government does not have direct control over energy policy or the national grid. However, it can promote and enable the development of renewable energy through its responsibilities for economic development and through its oversight of the planning system. Local planning authorities make decisions on most individual applications to develop renewable energy on land.[6] Consent is required from Scottish ministers for large-scale developments on land, including power lines, and all developments offshore.[7]

7. The main sources of renewable energy in Scotland are set out in Exhibit 1. Some renewable energy technologies are well established, while others are still developing. Scotland has a long history of generating hydroelectricity, and onshore wind has expanded considerably over the last two decades. Offshore wind is in the earliest stages of development on a commercial scale. By contrast, wave and tidal energy are still at the research and development stage. This means that the cost of technologies varies, and there is uncertainty over future costs. Electricity generated by offshore wind is currently a third more expensive than onshore wind. Wave energy currently costs about three times as much as offshore wind, and tidal energy about twice as much.[8]

Exhibit 1

The main sources of renewable energy in Scotland

Hydroelectricity and onshore wind are the main sources of renewable electricity in Scotland.

Hydroelectricity

Moving water is used to drive turbines that generate electricity.

Onshore wind

Wind turbines located on land generate electricity.

Offshore wind

Wind turbines located in the sea generate electricity.

Marine (wave and tidal)

Electricity is generated by capturing the energy from waves and tidal streams (still in the development and testing stage).

Biomass

Organic materials such as wood are burnt to generate electricity and to heat buildings and water.

Biofuels

Transport fuels are produced from organic materials, such as wheat, sugar cane and vegetable oils.

Source: Audit Scotland

8. In future, there is likely to be a mix of renewable energy technologies in Scotland and the balance between them may change over time. It is difficult to forecast how, and at what pace, different technologies will develop and what the most appropriate

mix will be. Some renewable energy projects are progressing more slowly than anticipated. The current financial climate is making potential investors more cautious. Uncertainty over reforms to UK energy policy, the cost and reliability of new technologies, and access to the national grid are also delaying investment decisions.[9]

About our audit

9. A wide range of activity takes place across different parts of the Scottish public sector to encourage and develop renewable energy in the most effective way. Given renewable energy's importance to the Scottish Government's economic strategy, our audit focused on activity and investment by the Scottish Government and its two enterprise agencies: Scottish Enterprise and Highlands and Islands Enterprise (HIE). It looked at:

- the action taken to encourage and develop renewable energy
- the investment made in developing renewable energy
- what has been delivered to date.

10. During our audit we:

- assessed the leadership and direction provided by the Scottish Government
- examined what the public sector is doing to deliver the Scottish Government's objectives and targets
- identified how much the Scottish Government, Scottish Enterprise and HIE spent up to the end of 2012/13 on developing renewable energy
- identified how much these organisations have budgeted to the end of the current spending review period (2014/15)
- evaluated performance against national targets
- examined how many jobs and how much private sector investment has been delivered.

11. We did not examine the role of the planning system or consents process in assessing applications for renewable energy projects. We recognise that access to the national grid and changes in UK energy policy are very important factors in developing the renewable energy sector. However, we did not examine these issues as they are reserved to the UK Government. For the same reason, we did not assess the financial impact of developing renewable energy on energy bills.

12. Evidence for this audit is based on desk research, data analysis and interviews. Appendix 1 sets out more details of our methodology.

13. Our report has three main parts:

- Leadership (Part 2)
- Funding (Part 3)
- Performance (Part 4).

Part 2

Leadership

Key messages

1 The Scottish Government has a clear strategic vision for developing renewable energy, which is reflected across other policy areas. It has targets and plans to deliver this vision, although it needs to do more to raise the profile of renewable heat.

2 The Scottish Government is effectively coordinating work across the public and private sectors to promote and develop the renewable energy sector.

The Scottish Government has a clear and consistent strategy for developing renewable energy

14. The key factors that influence private sector investment in renewable energy are consistency of public sector policy and government commitment.[10] The Scottish Government's renewable energy strategy provides clear, consistent direction for the sector to 2020.[11] Other Scottish Government strategies and policies reflect the vision, objectives and targets for renewable energy (Exhibit 2, page 12). For example, national housing strategies highlight the importance of renewable technologies for improving energy efficiency.[12] The national planning framework identifies proposed developments to support the renewable energy sector, for example by upgrading the electricity grid.[13]

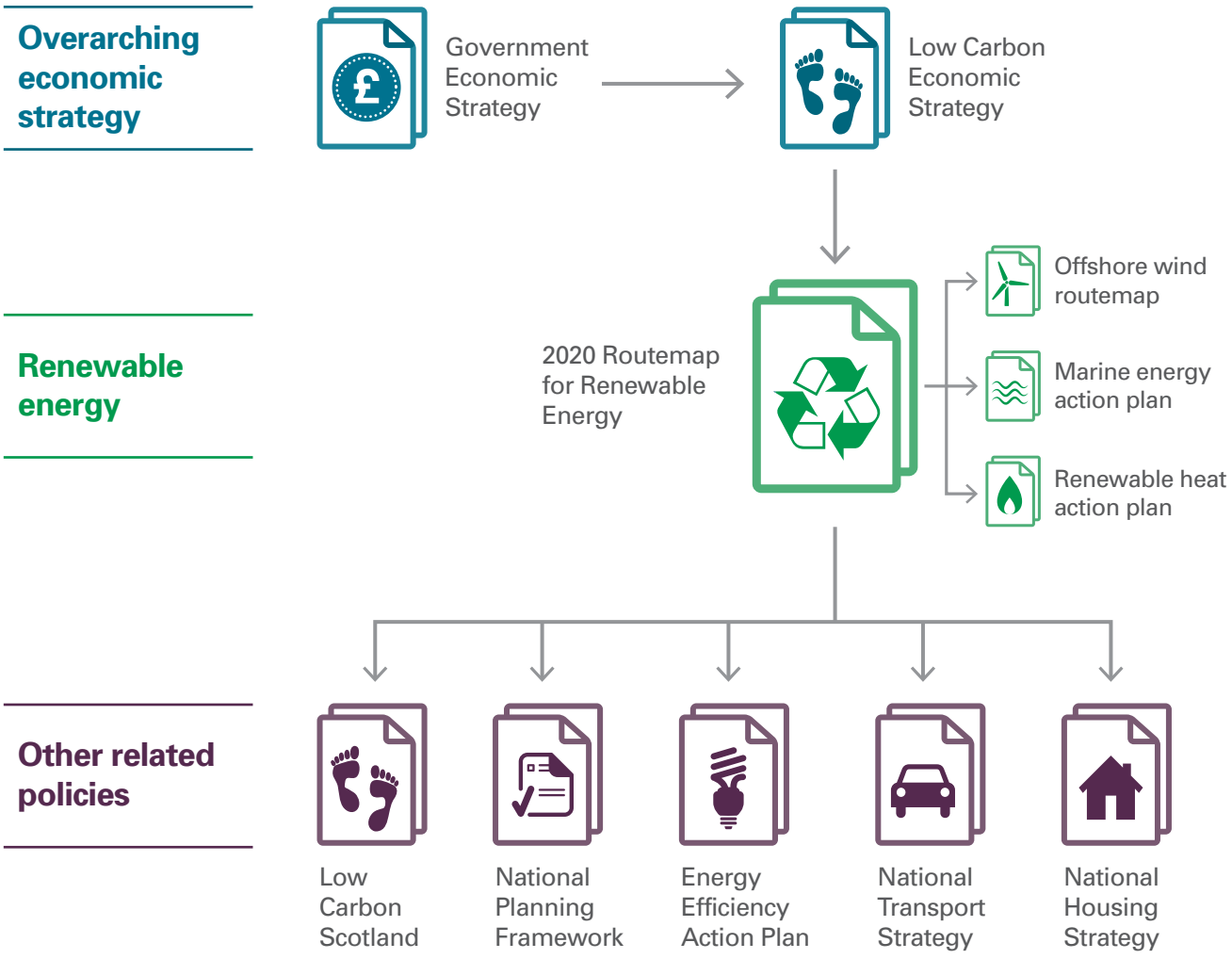
the priorities in the Scottish Government's renewable energy strategy are reflected in the strategies of relevant public bodies

More needs to be done to raise the profile of renewable heat

15. Although electricity accounts for only 20 per cent of Scotland's energy use, it has a high profile within the Scottish Government's strategy for renewable energy. The Scottish Government expects to realise the biggest economic benefits through the development of the renewable electricity sector.

16. Half of Scotland's total energy use is for heating homes and non-domestic buildings such as offices. The supply and use of heat affects many Scottish Government policies, including housing and fuel poverty, energy efficiency, and climate change. Compared with renewable electricity, renewable heat has a lower profile, but the Scottish Government is starting to raise this within the context of its wider heat policy. In January 2013, it clarified its policies on both renewable and non-renewable heat in domestic and non-domestic settings.[14] In May 2013, the Scottish Government published an action plan setting out how it will work with the public and private sectors to develop district heating networks, some of which may use renewable energy sources.[15] It plans to set out its long-term objectives for the supply and use of heat until 2050, by the end of 2013.

Exhibit 2
Scottish Government strategies and policies relating to renewable energy
The Scottish Government's objectives for developing renewable energy are reflected in other key policies and strategies.



Source: Audit Scotland

17. Transport accounts for almost 30 per cent of Scotland's total energy use. The Scottish Government aims to cut almost all emissions from road transport by 2050, for example by increasing the use of electric vehicles and promoting public transport. The use of renewable transport fuels may contribute to meeting this aim. Decisions on renewable transport fuels are reserved to the UK Government, and do not feature highly in the Scottish Government's vision for renewable energy.[16] Transport Scotland is working with the UK Department of Energy and Climate Change (DECC) and the Department for Transport to increase the use of renewable transport fuels across the UK.

The Scottish Government's targets demonstrate its commitment and ambition for renewable energy

18. The Scottish Government's ambitions for renewable energy are set within the wider context of its targets to:

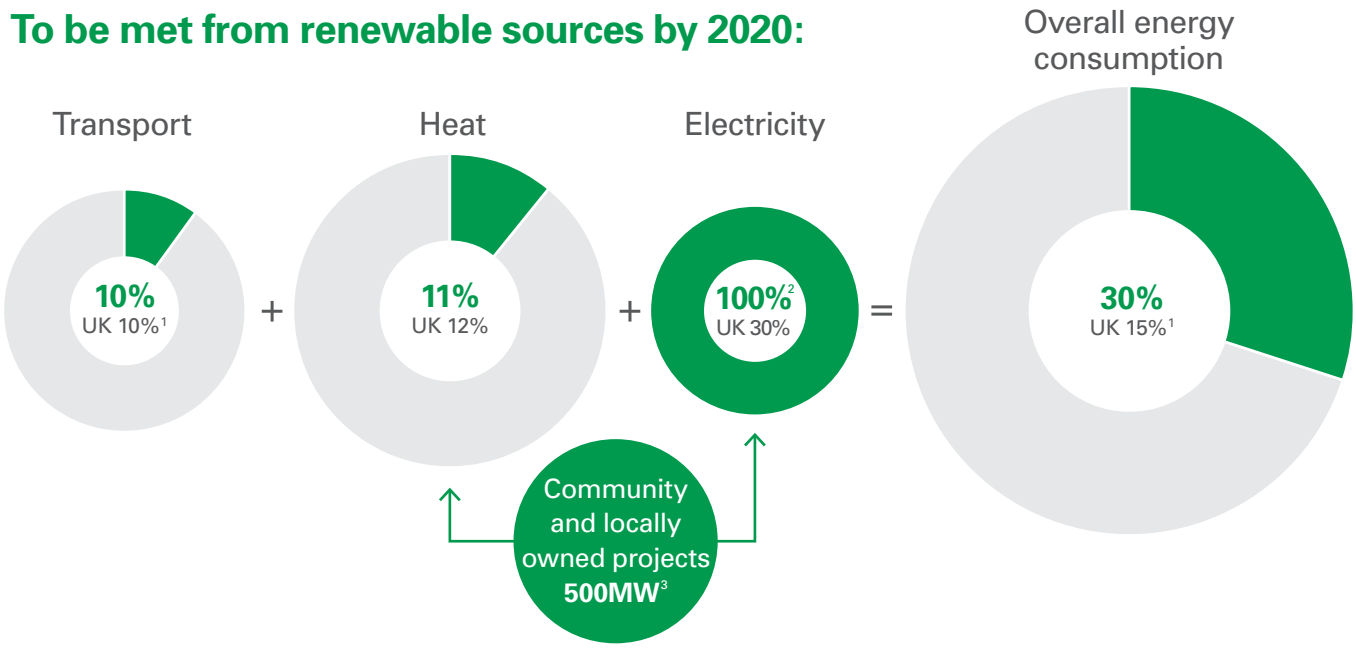
- reduce greenhouse gas emissions by 42 per cent by 2020 and 80 per cent by 2050 (1990 baseline)
- reduce energy consumption by 12 per cent by 2020 (2005-07 baseline).

19. The Scottish Government has set five targets specifically for renewable energy for 2020, two of which are higher than those set by the UK Government (Exhibit 3). The Scottish Government expects public sector activity and investment to help meet these targets, with the aim of delivering wider economic benefits. In January 2013, the Scottish Government set a target to cut carbon emissions from electricity generation by 85 per cent by 2030.[17] Renewable energy will contribute to achieving this wider longer-term target. There is no equivalent target for the UK. The Scottish Government's 2020 targets demonstrate its commitment to renewable energy, and it now needs to consider its longer-term ambitions for renewable energy beyond 2020.

Exhibit 3

Scottish Government targets for renewable energy

The Scottish Government's targets for renewable transport fuels, heat and electricity contribute to its target for 30 per cent of overall energy consumption to be met from renewable sources.



Notes:
1. The UK targets for transport fuels and overall energy consumption are mandatory European Union targets.
2. The Scottish Government's target for electricity is to generate the equivalent of 100 per cent of gross annual electricity consumption from renewable sources by 2020. This does not mean that all of Scotland's electricity will be from renewable sources in 2020. There will continue to be a mix of energy sources, for example from coal-fired power stations, as some of the electricity generated from renewable sources will be exported.
3. MW = megawatt.

Source: Audit Scotland

20. The Scottish Government has set increasingly ambitious targets for renewable electricity. In 2007, it set a target to generate the equivalent of 50 per cent of gross electricity demand from renewable sources by 2020. It increased this target to 80 per cent in 2010 and to 100 per cent in 2011. In October 2012, the Scottish Government set an interim target to generate 50 per cent of electricity demand from renewable sources by 2015. This is five years earlier than its original target for 2020.

Activity to develop renewable energy among public bodies and the private sector is coordinated effectively

21. Developing the renewable energy sector requires coordination across the public and private sectors. The main Scottish public sector bodies involved in promoting and delivering renewable energy are:

- Scottish Enterprise and HIE work with other public sector bodies and local businesses to realise economic development opportunities in the renewable energy sector, with a particular focus on offshore wind and marine energy. They aim to secure private sector investment, strengthen the local supply chain and encourage research and development. HIE also works with communities to help them develop their own renewable energy projects.

- Scottish Development International aims to attract investment in Scotland from overseas and help Scottish companies identify opportunities for international trade and export. It promotes Scotland as a prime location for renewable energy developments.

- Skills Development Scotland (SDS) works with the Scottish Funding Council, colleges, universities and training providers to help ensure the renewable energy industry has access to an appropriately skilled workforce.

- Marine Scotland is a directorate of the Scottish Government and is responsible for the integrated management of Scotland's seas. This includes dealing with licensing for offshore wind, wave and tidal projects.

- Forestry Commission Scotland manages Scotland's national forest estate on behalf of Scottish Ministers, with a wide range of objectives including the supply of wood for the timber processing sector. It has granted leases for small parts of the national forest estate to energy companies in order to develop renewable energy projects.

- Transport Scotland works with the UK Government to develop alternative transport fuels, including biofuels.

- Scottish Water is developing renewable electricity projects at some of its sites, to help meet its energy demands and reduce energy costs.

22. The priorities in the Scottish Government's renewable energy strategy are clearly reflected in the strategies and activities of relevant public bodies. This provides a consistent framework across public bodies and assures potential investors of the public sector's commitment to developing renewable energy. For example:

- Renewable energy is one of Scottish Enterprise's five strategic priorities and spans all of HIE's priorities.[18]

- Renewable energy is one of Forestry Commission Scotland's eight work programmes.[19] It provides opportunities for commercial developers and community groups to develop renewable energy projects on the national forest estate (Case study 1, page 8). Between 2009 and 2011, it awarded contracts to five wind energy developers and to two hydroelectric developers to explore the potential for renewable energy projects in parts of the national forest estate.

- One of Scottish Water's five strategic goals is to be sustainable, which includes developing renewable energy projects.[20] It installed ten onshore wind turbines in Stornoway, which can generate a quarter of the power needed for the waste water treatment works there. Scottish Water generates about six per cent of the electricity it consumes through its own renewable energy projects.[21] This may help to reduce its energy costs, which were over £37 million in 2011/12.[22]

23. The Scottish Government is coordinating public sector activity to encourage public bodies to work together as efficiently and effectively as possible. For example, before 2011, applications for licences to develop in the marine environment and for consent to generate electricity went through several organisations. Since April 2011, Marine Scotland has provided a single point of contact for applications for both licences and consents. It aims to decide on all applications within nine months, subject to their complexity and content. The Scottish Government expects this to make Scotland more attractive to developers by reducing costs and providing a quicker decision on their application.

24. The Scottish Government established the Scottish Energy Advisory Board in 2009. The board and its industry-led subgroups provide an effective structure to coordinate activity across public bodies and the private sector (Exhibit 4, page 16). The five subgroups include the Renewable Industry Advisory Group. This group provides a clear framework for public bodies and industry to work together, with the aim of realising the economic benefits offered by the renewable energy sector. The transport fuels sector is not represented on the group. However, the Scottish Energy Advisory Board established the Scottish Biofuels Taskforce as a short-term working group in November 2012. Its remit is to assess the potential for the development of a biofuels industry in Scotland. It is chaired by Scottish Enterprise, and includes representatives from the public sector and industry.

Recommendations

The Scottish Government should:

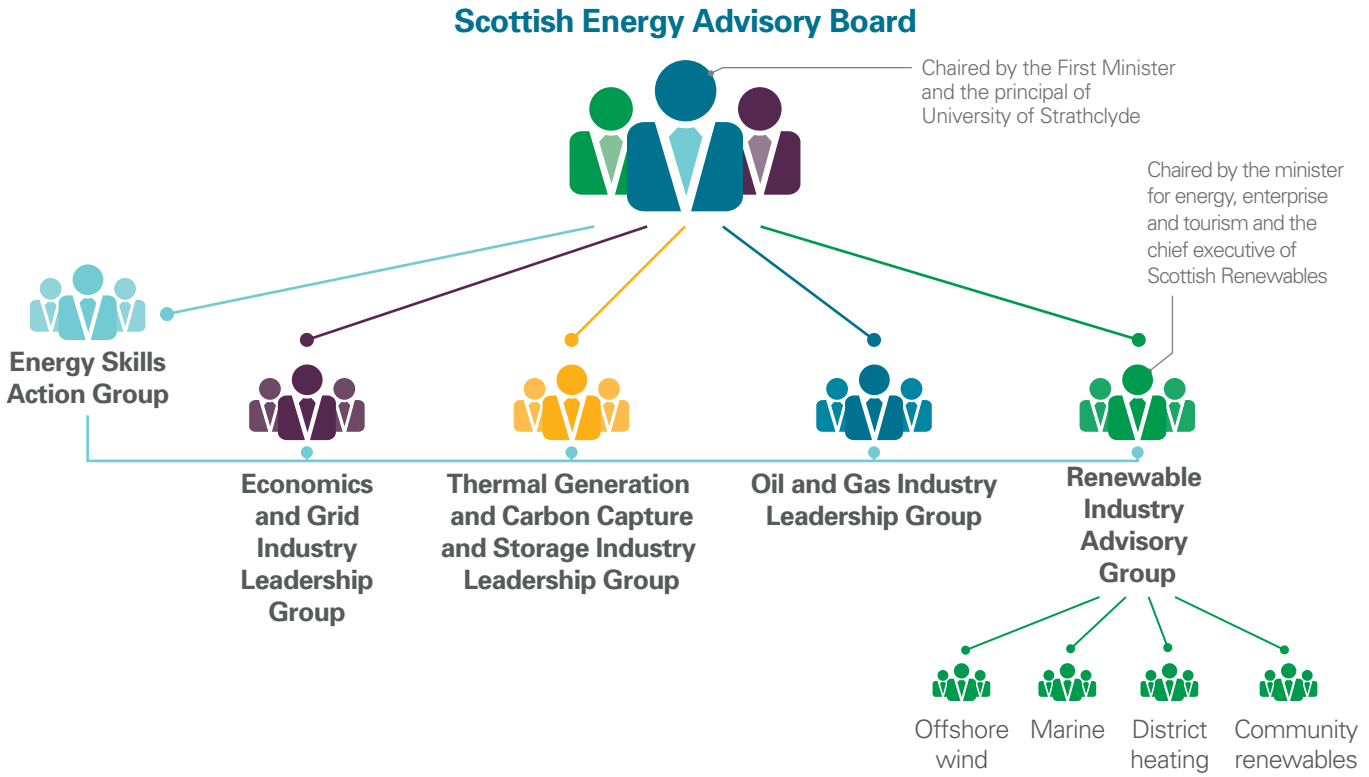
- set out how it aims to develop renewable energy beyond 2020 and develop targets to reflect this

- clarify the role of renewable heat within its wider vision for Scotland's future energy mix in its heat-generation policy statement, due to be published by the end of 2013.

Exhibit 4

The Scottish Energy Advisory Board and its subgroups

The Renewable Industry Advisory Group reports to the Scottish Energy Advisory Board.



Note: Scottish Renewables is a representative body for organisations involved in the renewable energy sector.

Source: Audit Scotland

Part 3
Funding

Key messages

1 The Scottish Government relies mainly on private sector investment to meet its targets for renewable energy. Multiple sources of public sector funding are available to attract and encourage this investment.

2 The public sector spent over £209 million on developing the renewable energy sector in the 11 years to 2012/13, and funding is increasing. The total combined budget for 2013/14 and 2014/15 will be £264 million.

3 Renewable energy projects are progressing more slowly than anticipated due to factors such as the current economic climate and changes in UK energy policy. As a result, public bodies are experiencing delays in spending the money available to develop the sector. This is increasing the pressure on the level of activity and investment needed to deliver the Scottish Government's objectives for renewable energy by 2020.

public sector funding for renewable energy will increase significantly over the next two years

The public sector has spent over £209 million on developing the renewable energy sector

25. Developing renewable energy on the scale required to meet the Scottish Government's targets relies mainly on investment by the private sector. Public sector funding for renewable energy is comparatively small (about £58 million in 2012/13), but is intended to attract and encourage billions of pounds of private sector investment.

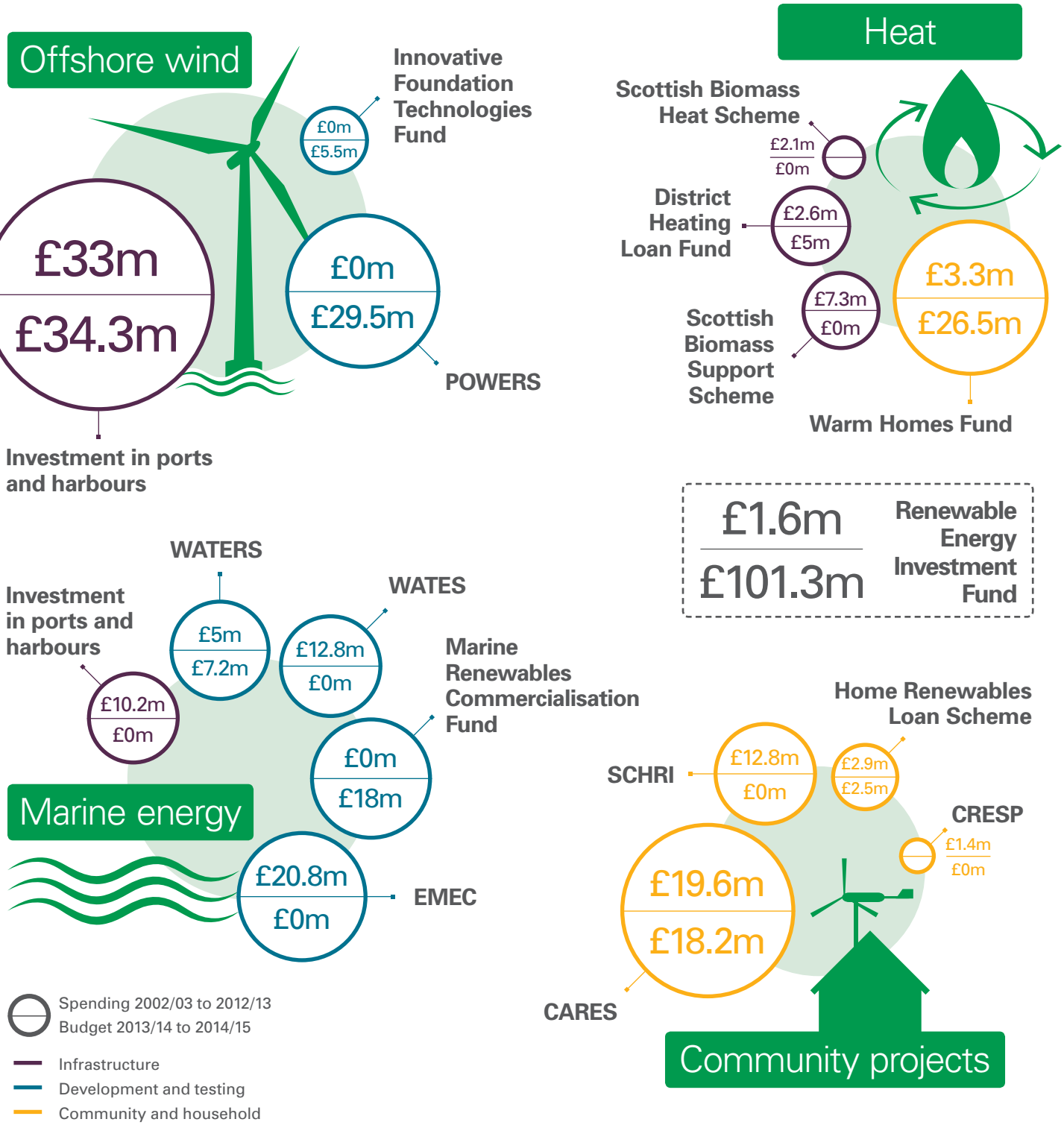
26. The Scottish Government, Scottish Enterprise and HIE are investing in the renewable energy sector though a variety of funding schemes (Exhibit 5, page 18). In the 11 years between 2002/03 and 2012/13, they spent £209.5 million.[23] This investment is contributing to the development of port and harbour facilities, supporting research and development of new technologies, and installing renewable energy technology in communities and homes. As well as specific funding schemes, Scottish Enterprise and HIE provide financial support to individual companies that deliver services to the renewable energy sector. For example, engineering and manufacturing companies and technology developers.

27. Funding to develop renewable energy in Scotland is also available from the UK Government, the UK Green Investment Bank, and the European Union.[24]

Exhibit 5

Public sector funding for renewable energy

The Scottish Government, Scottish Enterprise and HIE provide a variety of funding for different aspects of the renewable energy sector.



Note: Spending is in 2012/13 prices. The Renewable Energy Investment Fund is for marine energy, renewable heat and community projects. The exhibit does not include spending on individual company support (£49.6 million), individual projects that cover more than one area of renewable energy (£24.1 million), or individual funding streams worth less than £0.15 million each (£0.3 million). It does not include budgets for individual company support (£4.8 million) or for individual projects that cover more than one area of renewable energy (£11.1 million).

Source: Scottish Government, Scottish Enterprise and Highlands and Islands Enterprise

Public sector funding for renewable energy is increasing

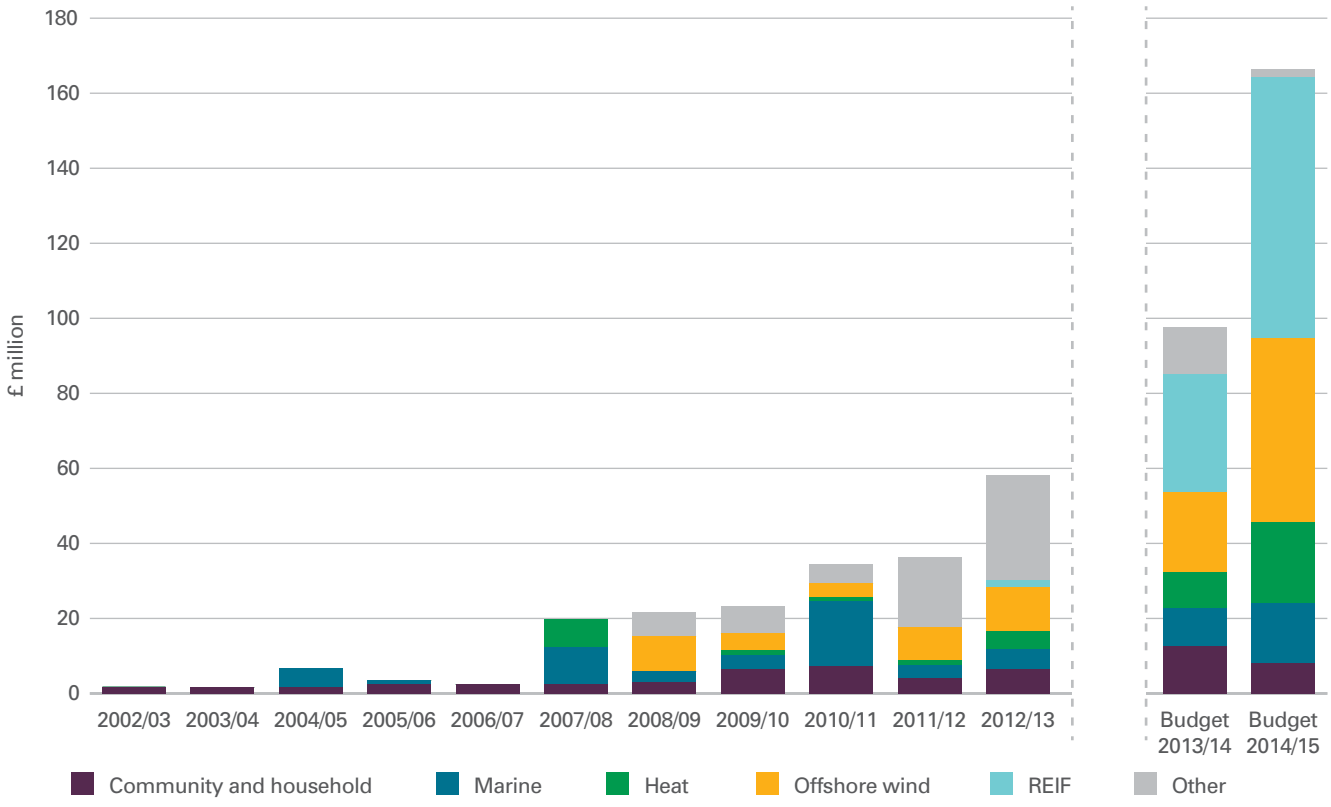
28. Of the £209.5 million that the Scottish Government, Scottish Enterprise and HIE spent in the 11 years to 2012/13 (Exhibit 6):

- almost a quarter (£49 million) was spent on the marine energy sector. Marine energy is in the early stages of development and public sector funding helps companies develop and test wave and tidal energy technologies to try and assist them in becoming commercially viable
- almost a fifth (£40 million) was spent on supporting community and household projects
- a similar amount (£38 million) was spent on developing the offshore wind sector
- over £15 million was spent on renewable heat
- £67 million was for a variety of renewable energy projects and individual company support.

Exhibit 6

Public sector spending on renewable energy and future budget

Over the next two years, public sector funding for renewable energy will increase significantly.



Note: Spending is in 2012/13 prices. REIF is the Renewable Energy Investment Fund for marine energy, renewable heat and community projects. 'Other' includes individual company support from Scottish Enterprise and HIE and investment in projects that cover more than one area of renewable energy.

Source: Audit Scotland

29. Over 90 per cent of the total spent (£193 million) was in the six years from 2007/08 to 2012/13; an average of £32.2 million a year.

30. Public sector funding will increase significantly over the next two years. The Scottish Government, Scottish Enterprise and HIE have budgeted for a further £264 million investment in renewable energy between 2013/14 and 2014/15. This is an annual average budget of £132 million – four times the average annual spending of the previous six years.

31. Nearly 40 per cent of the budget for 2013/14 and 2014/15 is the Renewable Energy Investment Fund (REIF) (£101 million). The Scottish Government launched this fund in October 2012, with money from the Fossil Fuel Levy.[25] It offers loans, equity investments and guarantees for renewable energy projects to fill funding gaps that have secured some private sector investment.[26] Initial priorities for investment are marine energy, renewable heat and community projects.

32. Over a quarter of the budget for 2013/14 to 2014/15 is for the offshore wind sector (£70 million). This reflects the need for investment in this area, if the Scottish Government is to meet its 2020 target for renewable electricity and realise the wider economic benefits it expects the sector to deliver. Half of the budget for the offshore wind sector is for investment in infrastructure, which Scottish Enterprise and HIE also expect to support the marine sector over the longer term. The rest of the budget is for renewable heat (£31.5 million), marine energy (£26 million), community and household projects (£21 million), and funding for more general renewable energy projects (£14.5 million).

Some projects are progressing more slowly than anticipated, delaying public sector spending

33. Some renewable energy projects that are eligible for public funding are progressing more slowly than anticipated, owing to the factors identified in (paragraph 8, page 9). As a result, public bodies are experiencing delays and difficulties in spending some of the money available for renewable energy projects. For example, the Scottish Government initially expected to spend £16 million of its REIF in 2012/13. However, it spent only £1.6 million because few projects were in a position to spend any money by the end of March 2013. Subject to parliamentary approval, the Scottish Government plans to re-profile the remaining budget. It now expects to spend £31 million in 2013/14, with most of the money being spent in the final year (£70 million in 2014/15).

34. One of the Scottish Government's funding schemes for community and locally owned renewable energy projects, CARES, started as a fund providing grants in 2009/10. To comply with European Union regulations, it became a loan scheme in 2011/12 when the UK Government introduced feed-in tariffs.[27] The Scottish Government loans attract ten per cent interest a year from the day they are paid out, and must be repaid in full once commercial finance to build the project has been secured. On average, it takes five years to develop a project to the point it secures finance.[28] This has resulted in some successful applicants delaying claiming their loans to avoid paying interest over the entire length of the project development stage.

35. The Scottish Government has taken steps to refine the CARES loan scheme, reviewing it during its first year. As a result, it changed the scheme to make it more attractive to applicants, for example by reducing the financial contribution

needed from the applicant from ten per cent of costs to five per cent, and removing a limit on the size of projects eligible for funding. However, there are still delays in spending the money available. The Scottish Government appointed a new organisation to deliver CARES from August 2013.[29] As part of this new contract, the organisation is reviewing the delivery of CARES and identifying ways to minimise delays. It will present its findings and recommendations to the Scottish Government in late 2013.

36. There are valid reasons for public sector funding not being spent as quickly as the Scottish Government expected. However, it increases the pressure on the level of investment and activity needed to deliver the Scottish Government's objectives for renewable energy by 2020.

37. The Scottish Government has not done any work to assess the scale of public sector investment needed beyond 2014/15 to meet its objectives for renewable energy by 2020. We appreciate that long-term planning can be difficult, given the three-year spending review timescale, annual budgeting, and the need for flexibility to respond to developments and changes in the industry. However, overall public sector budgets are falling and demand for public services is increasing.[30] Given the financial pressures on the public sector budget as a whole, the Scottish Government needs to assess where public sector investment could be best targeted to meet its objectives. As the development of renewable energy relies on private sector investment, this may involve considering a range of scenarios for the future development of the sector to estimate how much public sector funding may be needed to attract the necessary private sector investment beyond 2014/15.

Investment in port and harbour infrastructure for the offshore wind sector has been much slower than expected

38. The National Renewables Infrastructure Plan (NRIP) identifies 11 ports and harbours in Scotland that Scottish Enterprise and HIE assessed as suitable locations for the offshore wind industry to develop.[31] When the plan was published in 2010, the owners of these 11 sites (for example, port authorities) estimated that they would need to invest a total of £223 million by 2013/14 to make the sites suitable to support the offshore wind industry. The port owners at two sites have since revised their estimates, increasing the estimated total investment needed to £253 million.[32]

39. These initial estimates were based on early assumptions of what the offshore industry will need from ports and harbours and the potential use of each site. They will be revised as the requirements of offshore wind developers and investors are clarified. Scottish Enterprise and HIE are continually working with the port owners to refine the estimates. This involves:

- identifying what the exact needs of the offshore wind industry are for each site and the infrastructure developments needed to meet these needs
- carrying out feasibility studies and site surveys to determine more accurate costs of the work required
- developing a business case for each site setting out the work needed, how much it will cost, and how it will be funded.

40. Investment in the 11 sites identified in the NRIP is expected to be primarily from the private sector, although public sector funding is available from Scottish Enterprise and HIE. The scale and rate of investment by the public and private sectors has been lower and slower than expected, owing to uncertainty over where and when the offshore wind industry intends to invest (Exhibit 7, page 23):

- Initial estimates suggested that the six sites covered by Scottish Enterprise required £164 million investment. Scottish Enterprise has a £70 million fund that is being used to develop these sites, and aims to attract up to £150 million of private sector investment by 2016.[33, 34] By June 2013, Scottish Enterprise had spent £6.2 million of this fund and committed a further £10.8 million in four of the six sites.[35] The private sector has not yet invested in any of these sites, although some planned investments have been announced. For example, Scottish Enterprise has committed up to £4.3 million for an offshore turbine test centre at Hunterston, with an additional £15 million investment by the private sector. Scottish Enterprise expects to spend most of its £70 million fund in 2014/15 and 2015/16.

- Initial estimates suggested that the five sites covered by HIE needed £88.5 million investment. In the three years since the NRIP was published, HIE has invested a total of £5.2 million in these sites and committed a further £2.8 million. The private sector has invested £15.3 million.

Recommendations

The Scottish Government should:

- estimate the range of public sector funding that may be needed beyond 2014/15 to attract private sector investment and meet its objectives for renewable energy by 2020.

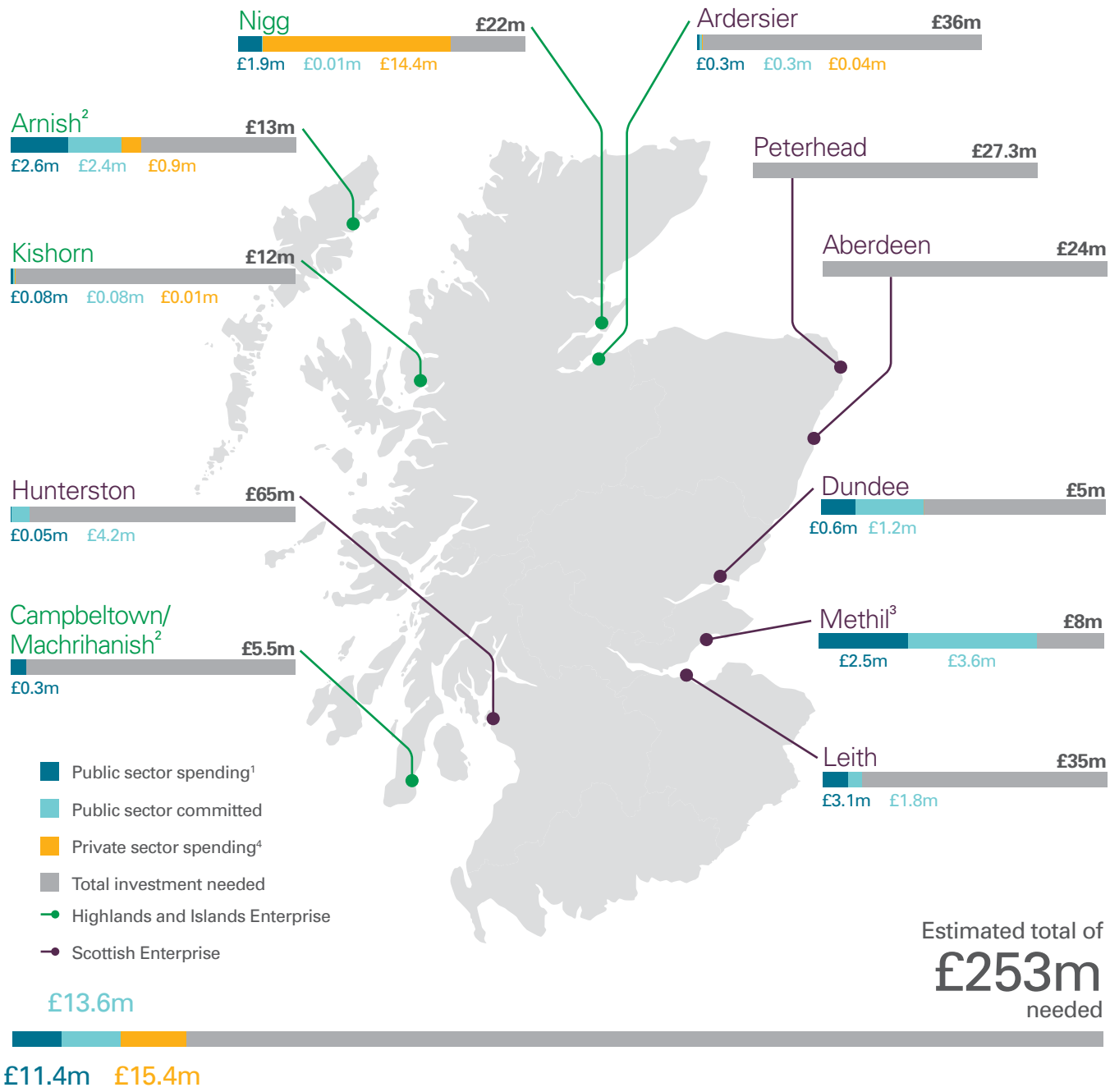
The Scottish Government, Scottish Enterprise and HIE should:

- identify what additional steps they can take to accelerate the development of infrastructure to support the offshore wind industry.

Exhibit 7

Public and private sector investment in ports and harbours to support the offshore wind industry since 2010/11

Initial estimates in the NRIP suggest that about £253 million investment is needed in 11 sites. Scottish Enterprise and HIE have invested £11.4 million in nine of the 11 sites and committed a further £13.6 million. The private sector has invested £15.4 million.



Notes:
1. Spending is in 2012/13 prices.
2. HIE spent an additional £6 million in Campbeltown/Machrihanish and a further £0.2 million in Arnish, before the NRIP was published in 2010.
3. Scottish Enterprise has spent an additional £15.4 million on infrastructure at the Methil site, from funding approved before the NRIP was published.
4. This does not include planned investments by the private sector that have been announced but not made.

Source: Highlands and Islands Enterprise and Scottish Enterprise

Part 4

Performance

Key messages

1 The Scottish Government has made steady progress towards its renewable energy targets for 2020. However, achieving these targets will be challenging and depends on significant activity and investment by the public and private sector. We estimate that to meet the renewable electricity target alone, average annual increases in installed capacity need to double. Progress against the Scottish targets for transport fuels and overall energy demand is difficult to assess.

2 The Scottish Government estimates that renewable energy could deliver up to £30 billion investment and 40,000 jobs by 2020. The total amount of private sector investment resulting from public funding is not collated at a national level. It is difficult to identify the number of jobs in the renewable energy sector and projections of future employment are optimistic.

economic benefits from renewable energy may not be realised as quickly as originally anticipated

The Scottish Government has made steady progress towards its renewable energy targets for 2020

41. The Scottish Government has set five targets specifically for renewable energy for 2020 (Exhibit 3, page 13). By the end of 2012, it was two-fifths of the way towards achieving its targets for electricity and community and locally owned projects, and a third of the way towards achieving its target for heat (Exhibit 8, page 25). Its target for transport fuels is measured at a UK level, and it does not currently report progress towards its target for overall energy demand (paragraphs 61–62, page 30). Achieving the targets by 2020 will require a significant increase in activity and investment. In 2012, the Scottish Parliament's Economy, Energy and Tourism Committee conducted an inquiry into the Scottish Government's targets for renewable energy. It concluded that the target for electricity generation is achievable, if issues relating to finance, infrastructure development, planning and skills are addressed. However, it noted a risk that the renewable heat target may not be met.[36]

Meeting the renewable electricity target by 2020 relies on the continued expansion of wind technology

To meet the 2020 target, average annual increases in installed capacity need to double

42. Electricity generated from renewable sources has increased from 12 per cent of Scotland's total annual electricity consumption in 2000, to 39 per cent in

Exhibit 8

Performance against the Scottish Government's renewable energy targets

The Scottish Government has made steady progress towards achieving its targets for electricity, heat and community and locally owned projects.

Target (by 2020)	Performance 2012	Performance 2020
Equivalent of 100 per cent of Scotland's gross electricity consumption from renewable sources (50 per cent by 2015)[1]	39.2%	100%
11 per cent of Scotland's heat demand from renewable sources[2]	4.1%	11%
500 megawatts (MW) of community and locally owned energy from renewable sources	204MW	500MW
10 per cent of transport fuels from renewable sources[3]	3.2%	10%
30 per cent of overall energy demand from renewable sources	Not currently reported	

Notes:
1. Performance against the renewable electricity target assumes that total electricity consumption in 2012 was the same as in 2011.
2. The renewable heat target is measured against currently estimated heat demand in 2020.
3. Performance against the renewable transport fuel target is measured at a UK level.

Source: Scottish Government and UK Department for Transport

2012. The rest of Scotland's electricity is generated from nuclear power, coal, gas and oil. The Scottish Government exceeded its target to generate 31 per cent of electricity from renewable sources by 2011, achieving 36 per cent.

43. To meet the 2020 target, the Scottish Government estimates that renewable electricity projects with a total installed capacity of between 14,000 and 16,000 megawatts (MW) are needed. Installed capacity is the maximum amount of power that a source of renewable electricity can generate under ideal conditions. To illustrate the scale of this, an average commercial onshore wind turbine in Scotland has an installed capacity of 2.3MW. Assuming normal weather conditions, one turbine could generate enough electricity over a year to power 1,200 homes.[37]

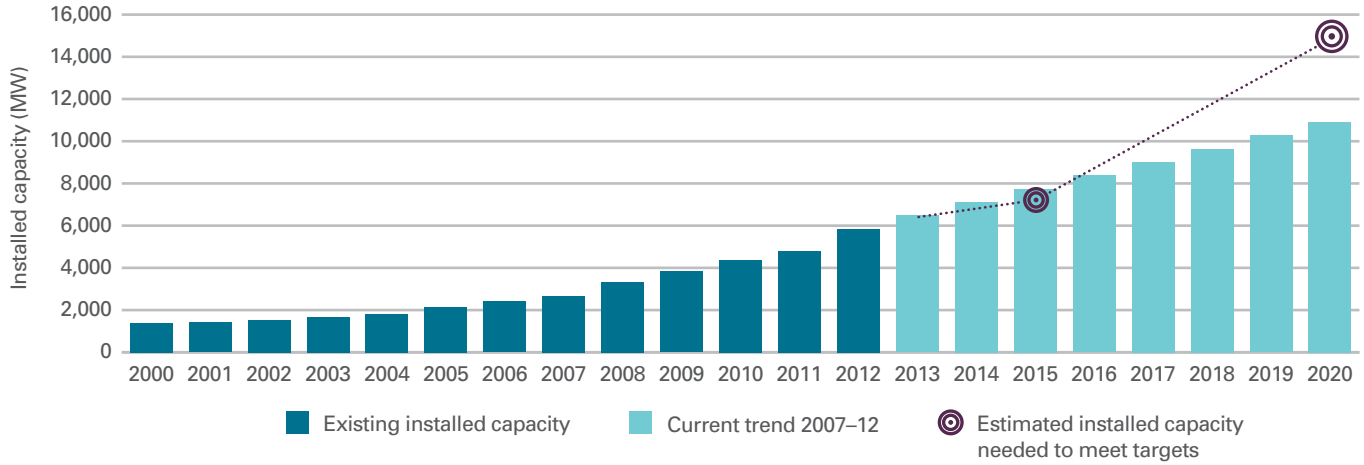
44. By the end of 2012, renewable electricity projects in Scotland had a total installed capacity of 5,843MW.[38] The majority of this installed capacity was provided by onshore wind turbines (65 per cent) and hydroelectric schemes (26 per cent). The remaining nine per cent was provided by sources such as biomass and solar panels.

45. Between 2000 and 2012, the average annual increase in the installed capacity of renewable electricity projects was 371MW. However, installed capacity has increased more rapidly in recent years. The average annual increase in the five years to 2012 was 634MW. If it continues to increase at the rate it has over the last five years, we estimate that there will be enough installed capacity in 2015 to generate the renewable electricity needed to meet the Scottish Government's interim target of 50 per cent of electricity demand from renewable sources (Exhibit 9). However, that growth rate will deliver only about 10,900MW of installed capacity by 2020, which is at least 3,100MW short of what is required to meet the 2020 target. Achieving the 2020 target requires average annual increases in installed capacity of at least 1,250MW between 2015 and 2020 – double the rate achieved over the last five years.

Exhibit 9

Progress against the Scottish Government's targets for renewable electricity generation

Delivering the 14,000 to 16,000MW of installed capacity necessary to meet the 2020 target will require a significant increase in installed capacity each year, in particular after 2015.



Note: The purple dots indicate estimates of the range of installed capacity required to generate enough renewable electricity to meet the Scottish Government's targets for 2015 and 2020, depending on electricity demand, the mix of renewable technologies and weather conditions.

Source: Scottish Government energy statistics database, March 2013; and Audit Scotland

It is not yet clear what will be the balance between onshore and offshore wind

46. Even if all of the 293 renewable electricity projects under construction or with planning permission at March 2013 go ahead, meeting the 2020 target will require at least a further 3,733MW of installed capacity.[39] At March 2013, there were a further 369 proposed projects, with a total installed capacity of 8,639MW. However, it is unlikely that all of these projects will proceed, as they may fail to secure planning permission or finance.

47. Most of this additional capacity will be delivered by wind turbines, both on land and at sea. The amount of installed capacity from onshore wind needed to meet the 2020 target will depend on how quickly the offshore wind sector develops. Individual offshore wind developments could provide much more

installed capacity than individual onshore wind projects. The smallest proposed offshore wind project is of a similar installed capacity to the largest existing onshore wind farm in Scotland. Therefore, a small number of offshore wind developments will rapidly accelerate the rate of increase in installed capacity.

48. Offshore wind projects with a total installed capacity of 190MW are currently operational in Scotland. The Scottish Government expects this sector to grow significantly over the next decade. However, successfully developing, testing and building offshore wind projects to be operational by 2020 will be challenging. It is a new industry that requires billions of pounds of investment from the private sector. The current financial climate, and other factors identified in paragraph 8, page 9, are delaying investment decisions.

Meeting the renewable heat target is demanding, as projects need to be developed at a local level

49. Progress towards the Scottish Government's target for renewable heat (11 per cent by 2020) is measured against estimated non-electrical heat demand in 2020. In 2012, enough heat was produced from renewable sources to meet 4.1 per cent of the estimated demand in 2020.[40] However, data published by the UK Department of Energy and Climate Change (DECC) at the end of 2012 suggests that the Scottish Government's estimate of total heat demand in 2020 could be up to a third too low.

50. The Scottish Government is working with DECC to develop a more accurate annual measure of renewable heat. It plans to monitor progress against actual annual heat demand, rather than estimated demand in 2020. The Scottish Government acknowledges that this revised methodology will result in performance against the target being lower and that meeting the target will be even more challenging. Data on actual heat demand in 2012 will not be available until December 2014, so we cannot report progress against the target in 2012 using the new methodology. Based on actual heat demand in 2010, which is the most recent data available, performance against the target in 2010 would have been 1.9 per cent rather than 2.8 per cent.

51. Most of the renewable heat produced in 2012 came from large developments such as combined heat and power projects, which burn wood to generate electricity and use the heat produced as a by-product to heat buildings or water. Unlike electricity and gas, there is no national network for transporting heat and it cannot be transported over long distances. Renewable heat projects must be developed locally. This can take a number of years as the success of a project depends on:

- identifying a suitable user for the heat, for example a school, housing estate or swimming pool
- getting agreement to change the heat supply from all of the parties affected
- building the infrastructure necessary to transport heat to local users.

52. In 2012, existing renewable heat projects and those under construction had the capacity to meet 5.6 per cent of currently estimated heat demand in 2020. In addition, there are projects that have received planning consent but have not started construction, and others which are applying for planning consent. If all of

these projects go ahead and are completed by 2020, 9.6 per cent of estimated heat demand could be met by renewable sources in 2020 – this is short of the 11 per cent target. Given that estimates of heat demand in 2020 may be too low, meeting the target will be even more challenging.

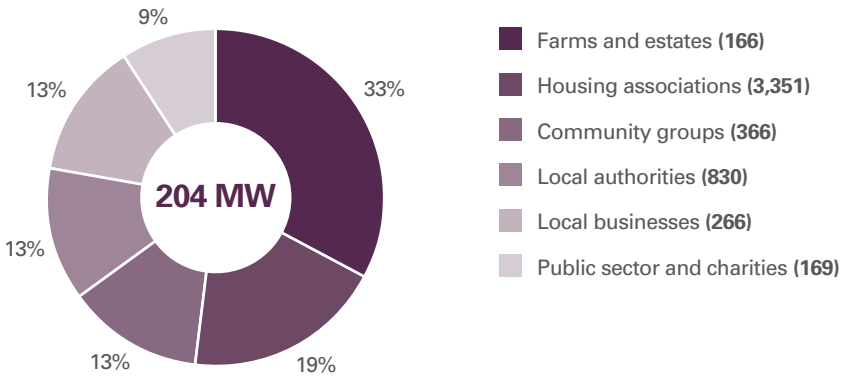
Enough community renewable projects are planned to meet the 2020 target but financing them may be difficult

53. Scotland is the only country in the UK with a target for renewable energy generated through community and locally owned projects. In June 2012, there were over 5,000 community and locally owned renewable energy projects, with an estimated total installed capacity of 204MW (Exhibit 10).[41] To meet the 2020 target of 500MW, all of the community and locally owned projects currently under construction, and at least 86 per cent of those that have received planning consent but have not started being built, need to be operational by 2020. Realising this will be challenging, as access to commercial finance is a major barrier to the development of local renewable energy projects.

Exhibit 10

Ownership of community and locally owned renewable energy projects

Farms and estates have the smallest number of renewable energy projects but they account for a third of the total installed capacity.



Note: The numbers in brackets indicate the number of projects owned by each group.

Source: *Community and locally owned renewable energy in Scotland*, Energy Saving Trust, April 2013

54. The Scottish Government's CARES programme provides financial support to community groups and rural businesses to develop renewable energy projects up to the point of applying for planning consent. This stage of a project can incur costs of over £100,000, for example for environmental impact assessments and feasibility studies. There is also a risk that the project may not receive planning consent. CARES offers loans of up to £150,000, which may be written off if the application for planning consent is unsuccessful. Of the £7.1 million of CARES loans provided in 2011/12 and 2012/13, loans totalling £0.1 million for five projects have been written off. There have been delays in spending the money available for CARES. The Scottish Government is reviewing the loan scheme, to identify ways to improve the way it is delivered (paragraph 35, page 20).

55. Accessing finance to build a project once it has received consent is more difficult, as it relies on commercial finance, such as a bank loan. The Scottish Government's REIF offers loans and equity finance for community projects, to fill any funding gap of up to 20 per cent of the total cost of the project that will not be met from commercial finance.

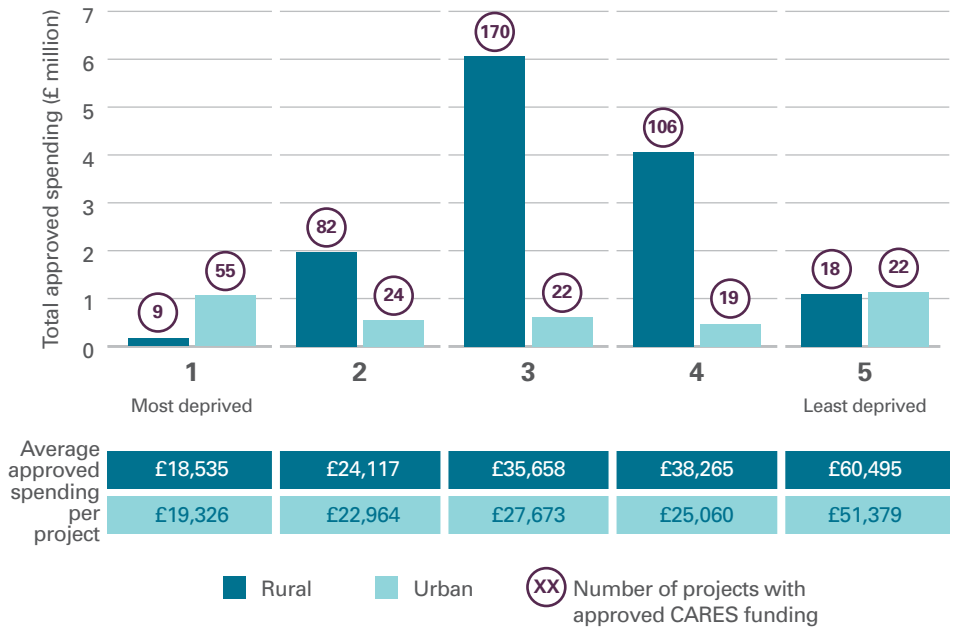
56. Since 2009, the CARES programme has approved grants and loans for about 600 projects. Of these projects:

- 65 per cent (385) are in rural areas, which account for over three-quarters of the approved CARES funding (£13.4 million) (Exhibit 11)
- 24 per cent (142) are in urban areas, which received funding of £3.8 million
- 11 per cent (65 projects) do not have available information on location or funding.

Exhibit 11

Total approved CARES funding for renewable energy projects by location, level of deprivation and number of projects

The majority of approved CARES funding to date is for projects in less deprived rural areas.



Note: Information on location or the amount of approved CARES funding is not available for a further 65 projects.

Source: Community Energy Scotland; and Scottish Index of Multiple Deprivation data for 2012

57. The high proportion of projects in rural areas may be due to a range of factors:

- The CARES programme targets rural businesses.
- Community Energy Scotland, the charity that delivered CARES funding until the end of July 2013, was based in the Highlands and Islands when it was established in 2007. It only began to offer advice and support to the rest of Scotland in 2009.
- Rural areas tend to have more space to install large renewable technologies such as wind turbines.

58. The majority of approved CARES funding is for projects in less deprived rural communities (Exhibit 11, page 29). One per cent of funding in rural areas is for projects in the most deprived communities, compared to 28 per cent of funding in urban areas. The CARES loan scheme does not target specific areas or communities for funding. However, the Scottish Government provided a total of £0.7 million over 2011/12 and 2012/13, specifically to help disadvantaged groups and communities in urban areas to develop renewable energy projects. This programme helped to fund 19 renewable energy projects. In 2013/14, the Scottish Government extended the programme to include all deprived areas across urban and rural Scotland.

The private sector is investing in communities

59. The Scottish Government encourages developers of large-scale onshore wind projects to offer benefits to local communities affected by the development. Most of these community benefits are a single or annual cash payment, based on the wind farm's installed capacity. The Scottish Government encourages developers to pay at least £5,000 per MW in community benefit payments that communities can then spend on local priorities. The average community benefit payment is £1,750 per MW, although payments range from £370 to £5,555 per MW. To encourage transparency, the Scottish Government has established a publicly available register of community benefit schemes. The register includes details of payments and how they are administered and distributed in the community. As at April 2013, the register included details of over 90 community benefit schemes, dating back to 1996.

60. The Scottish Government is also encouraging developers to give communities the opportunity to invest in renewable energy projects. For example, developers building wind and hydroelectric schemes on the national forest estate must give communities (and Forestry Commission Scotland) the opportunity to invest up to 49 per cent of the equity in these schemes.

Progress against the Scottish targets for transport fuels and overall energy demand is not clear

61. The Scottish Government has adopted the mandatory EU target for the UK, for ten per cent of transport fuels to come from renewable sources by 2020. Transport fuel is supplied to the UK as a whole, and decisions on it are reserved to the UK Government (paragraph 17, page 12). Data on renewable transport fuels is only reported at a UK level. Biofuels, which are from a renewable source, accounted for 3.2 per cent of road transport fuels used in the UK in 2012.[42] The Scottish Government assumes that the UK's performance against the target reflects Scotland's performance.

62. The Scottish Government estimates that its target for overall energy demand will be met if its targets for renewable electricity, heat and transport fuels are met by 2020. However, it does not currently report progress against the overall energy demand target owing to difficulties monitoring the renewable heat and transport fuels targets.

The Scottish Government estimates that renewable energy could deliver £30 billion investment and 40,000 jobs but this may take longer than originally anticipated

63. The Scottish Government estimates that the renewable energy industry could provide £30 billion investment to the Scottish economy and up to 40,000 jobs by 2020, although it has not set any national targets for this.[43] It expects the offshore wind industry to deliver the majority of these economic benefits. However, they may not be realised as quickly as originally anticipated. Although manufacturing, engineering and utilities companies have made commitments to locate and invest in Scotland, the majority of actual investment will be after 2015.[44] Industry is waiting for clarity on issues such as UK energy policy, access to the national grid, and technology costs and reliability, before it invests.[45]

64. To ensure sustained economic benefits, there needs to be a network of Scottish companies capable of supporting the renewable energy sector (a supply chain). The supply chain for the renewable energy sector includes companies involved in the three stages of project development and operation:

- Design and development – companies involved in environmental assessment and monitoring, feasibility studies and site surveys, project design and management.
- Construction and installation – companies involved in manufacturing renewable energy technology, laying cables or pipes and connecting them to the energy network, installing equipment, and providing sea-based support such as specialist boats and divers.
- Operation and maintenance – companies involved in running and repairing renewable energy devices.

65. Locating these companies in Scotland will help to create jobs and investment in the economy. The European Marine Energy Centre in Orkney has established a local supply chain, which has delivered economic benefits to Orkney and Scotland more widely (Case study 2, page 32). As well as supporting the sector in the UK, there is the opportunity to export goods and services to other countries.

66. Public sector funding for renewable energy seeks to attract private sector investment. For example, the Scottish Government aims to attract £80 million of private sector investment through its £35 million fund for the production of new types of offshore wind turbines (POWERS). Scottish Enterprise and HIE individually monitor how much the private sector has invested in the projects they fund, for example investments in port and harbour infrastructure to support the offshore wind industry (Exhibit 7, page 23). However, the Scottish Government does not collate or report at a national level the total amount of private sector investment in projects that have received public funding.

Case study 2

Economic benefits of the European Marine Energy Centre (EMEC) in Orkney

EMEC, the wave and tidal energy testing facility in Orkney, opened in 2004. A local supply chain has built up around EMEC, including environmental consultancy firms, metal fabrication and manufacturing companies, and sea support services such as boats and divers. EMEC directly employs 22 people but has created much wider economic benefits.

In the nine years between 2003 and 2011, EMEC has provided:

- an average of 119 full-time equivalent jobs a year in Orkney, and a further 96 in the rest of Scotland
- £57 million gross value added[1] in Orkney, and a further £60 million in the rest of Scotland.

Wider benefits include:

- EMEC and the marine energy sector provide a source of relatively highly paid jobs in Orkney. This can help encourage young people to stay or return to Orkney and the northern Highlands.
- The development of Orkney's harbours to support the marine energy sector has improved facilities for importing and exporting products. It may also help to attract larger cruise liners, which will boost the local tourism industry.
- The presence of EMEC and the marine renewable energy sector is helping the University of Highlands and Islands and Heriot-Watt University's International Centre for Island Technology in Orkney to attract students and increase research funding.

Note: 1. Gross value added is the sum of salaries, other employment costs and profit, excluding depreciation.

Source: *European Marine Energy Centre economic impact assessment*, Highlands and Islands Enterprise, May 2012

67. Total investment in the Scottish economy by the renewable energy industry is not monitored. However, Scottish Renewables estimates that renewable electricity projects with a total capital cost of £2.3 billion were commissioned in Scotland during 2011 and 2012.[46, 47] The amount invested in projects doubled over the two years, from £757 million in 2011 to £1,547 million in 2012. This provides an estimate of the capital cost of renewable electricity projects located in Scotland. It does not indicate how much of this investment benefited the Scottish economy and Scottish companies.

68. The private sector also invests during project design and development, for example in environmental surveys, engineering surveys and project demonstrations. Scottish Renewables estimates that six offshore wind developers have invested £164.5 million in Scottish companies, in advance of any projects getting planning consent.[48] More than a third of this investment (£64 million) was in 2012.

Public sector activity to develop a skilled workforce is targeted at the wider energy sector

69. The Scottish Government anticipates that the renewable energy industry could provide up to 40,000 jobs by 2020. The skills required by the renewable energy industry are largely the same as those required by the wider energy sector. The public sector is working with training providers and employers to help ensure the energy industry has access to an appropriately skilled workforce in Scotland. This work is led by Skills Development Scotland (SDS), the Scottish Funding Council and two partnerships of colleges and universities: the Energy Skills Partnership and the Energy Technology Partnership.

70. Public sector funding available for the wider energy sector can help to develop the renewable energy sector. However, it is not possible to identify how much of this funding is spent directly on developing jobs for the renewable energy sector. For example:

- The Scottish Government's £2 million Energy Challenge Fund (including the Low Carbon Skills Fund, see below) is managed by SDS. It aims to create an additional 1,000 training places to help people get jobs in the energy sector. Between October 2012 and May 2013, it created more than 900 training places (Case study 3, page 34).

- The Scottish Government's Low Carbon Skills Fund provides employers with match funding of up to £12,500 towards employee training costs, including training in renewable energy. Since 2010, over 2,100 people have received training through this fund.

- The Scottish Government has committed to provide 500 modern apprenticeships specifically in the energy sector each year, between 2011/12 and 2014/15.[49] SDS provides funding of up to £9,000 towards each apprenticeship. In the first two years, there were a total of 1,279 modern apprenticeship starts.

71. Two manufacturing companies involved in the energy sector have established skills academies, with funding from the public sector, to meet their needs for a skilled workforce:

- Nigg Skills Academy was launched in March 2012 to meet Global Energy Group's need for skilled workers by 2015. The academy offers practical, on-the-job training in skills suitable for the renewable energy and oil and gas sectors, such as welding, pipe fitting and metal cutting. HIE, SDS and the Scottish Funding Council invested a total of £915,000 in the Academy. It aims to train up to 3,000 people by 2015. Since 2012, it has trained 600 people and provided 100 modern apprenticeships.

- Steel Engineering Ltd opened The Renewable Energy Skills Training Academy (TRESTA) in Renfrew in August 2012. It is designed to fill the gap in skills required by the offshore wind, wave and tidal energy sectors by providing training in the latest metal working and welding procedures. TRESTA received financial support from the public and private sectors, including £30,000 from Scottish Enterprise and £26,000 from SDS. It aims to train 120 people in its first two years. As of June 2013, 50 people have completed training.

Case study 3
The Energy Challenge Fund

The Scottish Government's £2 million Energy Challenge Fund, launched in August 2012, has funded ten training providers to deliver tailored courses designed to fast-track people into jobs in the energy sector. The training is aimed at recent graduates or people who have transferrable skills and experience, for example in construction, manufacturing or project management.

Seven of the training providers are offering courses that could help people seek employment in the renewable energy sector:

- **Wise Group** offers a ten-day course designed to provide an understanding of the basic standards and procedures of work in the renewable energy sector.
- **Orkney College** offers a deck safety awareness programme, geared towards people in the marine energy sector who have no experience of working on boats.
- **The Professional Diving Academy** and **Underwater Centre** both provide commercial diver training, which can be used in the renewable energy and oil and gas sectors.
- **Subsea UK** offers a five-week conversion course, to enable existing engineers and project managers to work in the subsea sector (ie, designing or installing equipment and structures under the sea).
- **Fife Partnership** (Fife College and Fife Council) provides training for people seeking employment in Fife's energy sector. This includes the Energy Park at Methil, one of the sites identified in the National Renewables Infrastructure Plan.
- **Energy and Utility Skills** helps employers in the energy sector to recruit retiring armed forces personnel and unemployed graduates with relevant skills.

The remaining three providers, **Dundee College**, **Edinburgh College** and **OPITO**, focus on helping people transfer their existing engineering skills and experience to the oil and gas sector.

Source: Skills Development Scotland

Existing assumptions used to estimate employment opportunities to 2020 are optimistic

72. In 2011, the energy sector as a whole directly employed nearly 65,000 people in Scotland.[50] However, the number of jobs specifically in the renewable energy sector is not monitored or reported. Many jobs associated with renewable energy are in industries that also provide services to other sectors, for example manufacturing, engineering, diving services and environmental consultancy. It is therefore difficult to collect accurate information on employment in the sector.

73. Scottish Renewables used information supplied by the renewable energy industry to estimate the number of jobs in the renewable energy sector in Scotland, although it did not verify these figures. Based on this information, Scottish Renewables estimates that, in March 2012, there were 11,136 full-time equivalent posts in renewable energy in Scotland.[51] The figure includes 757 jobs in universities and colleges and 152 public sector employees. Scottish Renewables plans to repeat the exercise every year.

74. In 2011, SDS published a skills investment plan for the energy sector on behalf of the Scottish Energy Advisory Board.[52] The plan estimates there could be up to 40,000 jobs in the renewable energy industry by 2020. Members of the advisory board's industry leadership groups provided these estimates based on existing published modelling work.[53] They used the most optimistic scenario of 40,000 jobs, but the least optimistic scenarios suggest that potential employment opportunities could be a third of this (13,000).

75. The energy skills investment plan identifies the potential for up to 28,000 jobs in the offshore wind industry alone by 2020. However, this assumes that projects with a total installed capacity of 10,600MW will be operating by 2020.[54] A less optimistic assumption that projects with a total installed capacity of 5,300MW will be operating by 2020 identifies the potential for up to 19,000 jobs in the sector. This is more compatible with industry estimates that offshore wind projects with an installed capacity of 3,000MW will be operational by 2018 and construction will have started on projects with a further 2,000MW of installed capacity.[55]

76. The energy skills investment plan acknowledges that uncertainties surround the employment estimates, in particular for offshore wind. It notes that the scale of potential job opportunities may not be realised by 2020, as it relies on the development of a small number of large-scale projects. SDS is updating the energy skills investment plan during 2013. It is working with the Scottish Energy Advisory Board's industry leadership groups to gather information on future skills needs. This will help to identify any gaps in providing skills and training, and will inform a review of employment projections for the sector. However, because of uncertainty in the industry about when and where renewable energy projects will be developed, identifying the timing and volume of future skills demand and employment opportunities may be challenging.

Recommendations

The Scottish Government should:

- use its revised methodology for measuring progress towards the renewable heat target to set a realistic interim milestone for 2017
- agree a methodology to monitor its target for overall energy demand and start reporting progress against it by the end of 2014
- work with Scottish Enterprise and HIE to collate and report at a national level the total amount of private sector investment in renewable energy projects that have received public funding.

The Scottish Government, Scottish Enterprise, and HIE should:

- work with SDS and the Scottish Energy Advisory Board's industry leadership groups to ensure employment projections in the revised energy skills investment plan, due by the end of 2013, are realistic.

Endnotes

1 *The Government economic strategy*, Scottish Government, September 2011.

2 *2020 routemap for renewable energy in Scotland*, Scottish Government, July 2011.

3 *Scotland's third national planning framework: main issues report and draft framework*, Scottish Government, April 2013.

4 *Updated household energy bills explained*, Office of Gas and Electricity Markets, February 2013. The Renewables Obligation requires electricity suppliers to deliver an increasing proportion of electricity from renewable sources. The Feed-In Tariff scheme requires energy suppliers to pay householders, businesses and community groups a fee for generating electricity from small renewable or low carbon sources.

5 In Scotland, since 2000, The Crown Estate has awarded exclusivity agreements, zone development agreements, agreements for lease and, in a small number of cases, leases to developers, allowing them to investigate the potential for renewable energy projects in specific areas of the seabed. In 2012/13, The Crown Estate in Scotland invested £5.9 million in its energy and infrastructure portfolio, which includes renewable energy. *Scotland Report 2013,* The Crown Estate, 2013.

6 There are 38 planning authorities: 32 councils, four strategic development planning authorities and two national park authorities.

7 Consent is required from Scottish ministers to build and operate onshore wind farms over 50 megawatts of installed capacity and hydro-electric developments over one megawatt.

8 *Accelerating marine energy: the potential for cost reduction*, Carbon Trust, July 2011.

9 *UK offshore wind market study,* The Crown Estate, October 2012 and *Next steps on electricity market reform: securing the benefits of low-carbon investment*, Committee on Climate Change, May 2013.

10 *Scotland's place in the renewable energy world*, Pinsent Masons, January 2013.

11 *2020 routemap for renewable energy in Scotland*, Scottish Government, July 2011.

12 *Homes fit for the 21st century*, Scottish Government, February 2011 and *Scotland's sustainable housing strategy*, Scottish Government, June 2013.

13 *Scotland's third national planning framework: main issues report and draft framework*, Scottish Government, April 2013.

14 *Outline for a draft heat vision*, Scottish Government, January 2013.

15 *District heating action plan*, Scottish Government, May 2013. District heating is the supply of heat to a number of buildings through a network of underground pipes carrying hot water.

16 The supply of renewable transport fuels, known as biofuels, is managed through the UK Renewable Transport Fuel Obligation order. This requires fossil fuel suppliers to demonstrate to the UK Department for Transport that a percentage of fuels supplied in the UK for road transport comes from renewable sources, or to pay a substitute amount of money.

17 The target is to reduce emissions of carbon dioxide from electricity generation from 347g per kilowatt hour in 2010 to 50g in 2030 (a reduction of 85.5 per cent).

18 *Scottish Enterprise business plan 2013-16* and *Highlands and Islands Enterprise operating plan 2012-15*.

19 *Corporate plan 2012-15*, Forestry Commission Scotland, March 2012.

20 *Second draft business plan*, Scottish Water, May 2012.

21 *Annual report and accounts 2012/13*, Scottish Water, June 2013.

22 *Sustainability report 2012*, Scottish Water, June 2013.

23 All spending figures are in 2012/13 prices.

24 The UK Green Investment Bank has four priority areas for investment including offshore wind. In addition, it can also invest in marine renewable energy, renewable heat, biomass power and biofuels.

25 The UK Government introduced the Fossil Fuel Levy in Scotland in 1996. Non-renewable electricity suppliers pay the levy with any surplus being held by Ofgem in the Scottish Fossil Fuel Levy fund. In 2011, the UK Government and Scottish Government reached an agreement enabling the Scottish Government to spend half of the £200 million Scottish Fossil Fuel Levy fund. The other half was used to help capitalise the UK Green Investment Bank.

26 The Renewable Energy Investment Fund is managed by the Scottish Investment Bank, which is a division of Scottish Enterprise.

27 European Union regulations prevent the Scottish Government from providing grants to projects that receive a fee through the feed-in tariff scheme for generating electricity from a small-scale renewable or low carbon source.

28 *Scottish Government community and renewable energy loan scheme: guidance*, Scottish Government.

29 To the end of July 2013, Community Energy Scotland was contracted by the Scottish Government to deliver CARES. Since August 2013, this contract has been delivered by Local Energy Scotland, a consortium led by the Energy Saving Trust.

30 *Scotland's public finances: addressing the challenges* (PDF) Audit Scotland, August 2011.

31 *National Renewables Infrastructure Plan: Stage 2*, Scottish Enterprise and Highlands and Islands Enterprise, July 2010.

32 Port owners have increased their estimates of the investment needed in Kishorn (from £2.8 to £12 million) and Ardersier (from £15 to £36 million).

33 *Scottish Enterprise business plan 2013-16.*

34 This funding is also available for other ports and harbours to accelerate the development of manufacturing and testing facilities for the offshore wind sector.

35 Scottish Enterprise has not invested any money in Peterhead harbour to date. The development of Aberdeen harbour is now being progressed by Aberdeen Harbour Board without any public sector support.

36 *Economy, Energy and Tourism Committee: Report on the achievability of the Scottish Government's renewable energy targets*, Scottish Parliament, November 2012.

37 The equivalent number of homes supplied by an onshore wind turbine is based on average annual domestic household electricity consumption in Scotland in 2011 (4,709kWh) and the average load factor for onshore wind in Scotland between 2000 and 2011 (28 per cent). The load factor is the actual power produced over a period of time expressed as a percentage of the power that may have been produced if the turbine was running at full power for that period.

38 *Renewable electricity capacity and generation quarterly statistics*, Department of Energy and Climate Change, June 2013.

39 At March 2013, there were enough renewable electricity projects under construction or with planning permission to provide 10,267MW of total installed capacity. *Renewable energy planning database*, Department of Energy and Climate Change, April 2013.

40 *Renewable heat in Scotland 2012*, Energy Saving Trust, June 2013.

41 *Community and locally owned renewable energy in Scotland*, Energy Saving Trust, April 2013. The number of installations includes the total number of wind turbines in a multi-turbine project.

42 *Renewable transport fuel obligation statistics*, UK Department for Transport, May 2013.

43 *2020 routemap for renewable energy in Scotland*, Scottish Government, July 2011.

44 *Examples of recent announcements of intended investments in offshore renewables,* Scottish Enterprise, Highlands and Islands Enterprise and Scottish Development International, April 2013.

45 *UK offshore wind market study,* The Crown Estate, October 2012 and *Next steps on electricity market reform: securing the benefits of low-carbon investment*, Committee on Climate Change, May 2013.

46 Scottish Renewables is a representative body for organisations involved in the renewable energy sector.

47 Scottish Renewables estimated the total capital cost of renewable electricity projects in Scotland by multiplying the additional installed capacity operational in 2011 and 2012 (*Energy trends,* Department of Energy and Climate Change, June 2013) by the estimated capital cost per MW (*Costs of low carbon generation technologies,* Mott McDonald, May 2011).

48 *Offshore wind: investing in Scotland*, Scottish Renewables, January 2013.

49 Audit Scotland's work programme for 2013/14 includes a performance audit of the modern apprenticeship programme.

50 *Business register and employment survey 2011,* Office for National Statistics, December 2012.

51 *Delivering the ambition: employment in renewable energy in Scotland*, Scottish Renewables, March 2012.

52 *Skills investment plan for the energy sector*, Skills Development Scotland, March 2011.

53 *Scottish offshore wind: creating an industry*, Scottish Renewables, August 2010; *The employment potential of Scotland's hydro resource*, Nick Forrest Associates, September 2009; *Marine energy road map*, FREDS Marine Energy Group, August 2009; and *Renewable heat in Scotland: 2020 vision*, Scottish Renewables, April 2009.

54 *Scottish offshore wind: creating an industry*, Scottish Renewables, August 2010.

55 *Scotland's offshore wind routemap*, Offshore Wind Industry Group, January 2013.

Appendix 1

Audit methodology

Desk research

We reviewed published information and data to inform our audit, including:

- relevant public sector policies, strategies and action plans
- Scottish Government spending reviews and budgets
- reports by the Energy Saving Trust on renewable heat projects and community and locally owned renewable energy projects
- energy statistics published by the UK Department of Energy and Climate Change, the UK Department of Transport and the Scottish Government
- relevant published research and analysis, including Scottish Renewables' papers on investment and employment in the renewable energy sector.

Data analysis

We analysed published information on the installed capacity of existing renewable energy projects in Scotland, and those in the planning stages. We used this information to assess progress towards the Scottish Government's renewable energy targets for electricity, heat and community and locally owned projects.

We analysed spend and budget information from the Scottish Government, Scottish Enterprise and Highlands and Islands Enterprise. We calculated real terms spending in 2012/13 prices using the GDP deflator.

We matched information on community renewable energy projects from Community Energy Scotland with the Scottish Government's Scottish Index of Multiple Deprivation (2012). We used this information to identify the proportion of projects in urban, rural and deprived communities.

Interviews

We carried out interviews with representatives from a range of organisations:

- Community Energy Scotland
- Highlands and Islands Enterprise
- Scottish Development International

- Scottish Enterprise and Scottish Investment Bank
- Scottish Government (including Marine Scotland)
- Scottish Renewables
- Skills Development Scotland
- Transport Scotland.

Appendix 2

Membership of the advisory group

Audit Scotland would like to thank members of the advisory group for their input and advice throughout the audit.

Member	Organisation
Calum Davidson	Director of Energy and Low Carbon, Highlands and Islands Enterprise
Nicholas Gubbins	Chief Executive, Community Energy Scotland
Jenny Hogan	Director of Policy, Scottish Renewables
Sue Kearns	Head of Renewables Routemap, Scottish Government
Andy McDonald	Director of Renewable Energy and Low Carbon Technologies, Scottish Enterprise
Andrew Scott	Senior Project Development Manager, Pelamis Wave Power

Note: Members of the advisory group sat in an advisory capacity only. The content and conclusions of this report are the sole responsibility of Audit Scotland.

Renewable energy

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