
EXECUTIVE SUMMARY

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1. Climate change is one of the greatest global threats we face. Addressing it is vital but, in doing so, it also presents one of our society's greatest opportunities. We believe that the transition to a low carbon society is an essential investment for the people of Scotland, our environment, and for future generations. It is also an important contribution that Scotland can make as a good global citizen to a global challenge. Simply put, a low carbon Scotland is a better Scotland.
2. This is the Scottish Government's second report on proposals and policies (RPP2) for meeting its climate change targets. It sets out how Scotland can deliver its statutory annual targets for reductions in greenhouse gas emissions for the period 2013–2027 set through the Climate Change (Scotland) Act 2009.
3. The Climate Change (Scotland) Act is the most ambitious piece of climate change legislation anywhere in the world and remains an inspiration to many. The Act sets a world leading target of at least 42% emissions reductions by 2020, compared to the equivalent UK target of 34%. And, unlike the UK Act, Scotland's framework includes annual targets. Unlike the position in Wales, our targets also cover our whole economy and not just those areas where legislative power is devolved. To our knowledge, the Scottish Government is the only government that is held to account by its legislature in each and every year.

Our role in the world and how we compare with other countries

4. Current global pledges for emissions cuts will not be enough to limit global warming to 2°C, so raising worldwide ambition remains a high priority for the Scottish Government and this has been a focus of our international engagement. We have played an active role as part of UK efforts for higher EU ambition on climate change targets for 2020 and beyond. In so doing, we have argued that levels of emissions reduction across the EU are already deeper than expected, and that the costs of moving beyond 20% are now lower, and the benefits now higher, than had been anticipated.
5. Scotland is at the top of the European league table for emissions reductions. Based on 2011 data, between 1990 and 2011 direct emissions in Scotland fell by 29.6%. This is the largest reduction among the EU-15 Member States, and higher than the EU-27 Member State average of 17.1%, when emissions from international aviation

and shipping and land use, land use change and forestry sectors are factored in.

6. We are leading the way to a low carbon society. By 2011, Scotland's emissions, including international shipping and aviation, had fallen 25.7% from 1990, over half way to meeting the 42% 2020 target set in the Climate Change (Scotland) Act. However, we know that the challenge remains an ambitious one and we need to continue looking for new opportunities to accelerate our society's transition to a low carbon future.

Our vision

7. Our vision is for a largely decarbonised electricity generation sector by 2030, using renewable sources for electricity generation with other electricity generation from fossil-fuelled plants utilising carbon capture and storage. To date, the carbon intensity of electricity generation has fallen from 347 gCO₂/kWh in 2010 to 289 gCO₂/kWh in 2011 and we are on track to a further 83% reduction in carbon intensity by 2030. We are also looking forward to a largely decarbonised heat sector with significant progress by 2030, through a combination of reduced demand and energy efficiency, together with a massive increase in the use of renewable or low carbon heating.
8. We are aiming for almost complete decarbonisation of road transport by 2050, with significant progress by 2030 through wholesale adoption of electric cars and vans, as well as significant further modal shift towards public transport and active travel, and significant decarbonisation of rail services.
9. By 2030 there will be a step-change in provision of energy efficient homes to 2030 through retrofit of existing housing and improved building regulations for new build homes. We will also have made significant progress in transforming energy use in industry, business and the public sectors by 2027, through energy efficiency, the use of low carbon electricity and our ambition in Scotland for a largely decarbonised heat sector by 2050, with significant progress by 2030.
10. We have already made significant progress in reducing greenhouse gas emissions from the waste management sector. By 2025 at least 70% of all Scotland's waste will be recycled and by 2050, waste as we know it now will have been effectively designed out of our economy.

11. By 2027 land managers will have further optimised the productive use of natural resources, producing food and delivering public goods, such as protecting the natural environment and reducing greenhouse gas emissions. We will also have enhanced natural carbon capture through an expansion of our woodland and significantly more conservation of our peatlands.

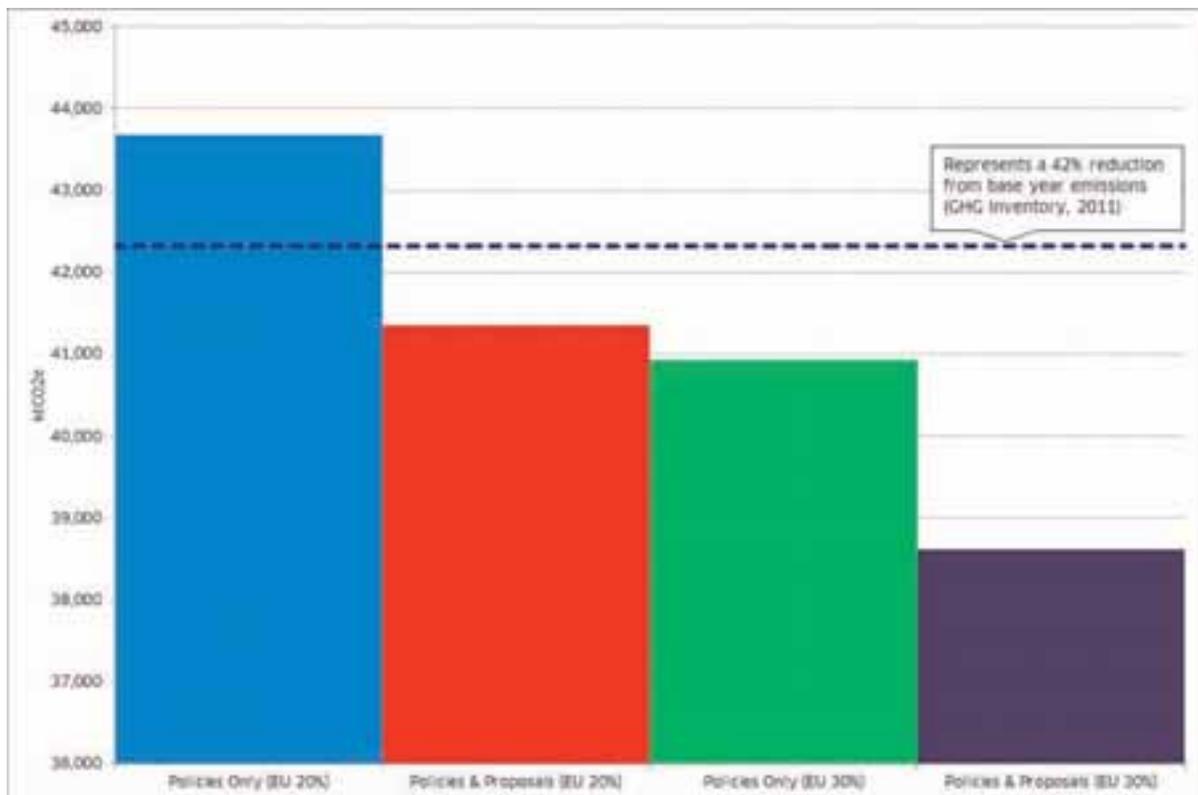
Our approach

12. We want to ensure our approach to reducing greenhouse gas emissions both includes and benefits the people of Scotland. To this end, we have a set of guiding principles to help us, i.e. that our approach should be: sustainable; cost effective; inclusive; fair; transparent and deploy diverse technologies.
13. Participation is paramount. We are grateful to all the people and organisations that contributed to RPP2-related consultation events and processes, to those who submitted comments and or gave evidence as part of the Parliamentary scrutiny period in early 2013, and to those who continue to support us in delivery of the world's most ambitious climate change targets.
14. Scotland's targets from 2013–2027 are expressed in tonnes of carbon dioxide equivalent (CO₂e). The baseline for the targets is continually under review and, when the Scottish Greenhouse Gas Inventory is published annually, Scotland's 1990/1995 baseline is updated.
15. Importantly, the total quantity of emissions that needs to be abated to meet the annual targets can vary depending on the baseline. For example, when the targets were set based on 2008 data, the absolute 2020 target was a 42% reduction against the 1990-1995 base year. Based on the 2011 data, with a revised figure for the base year, the required effort has increased to 44.2%. Put another way, the revisions of the data have resulted in emissions in the 1990 baseline, and in almost every year since the annual targets were set, being revised up by more than 2 MtCO₂e. This has increased our challenge significantly.
16. In addition, the EU 2020 climate change target for 2020 remains at 20%. When the Scottish Parliament was considering the Climate Change (Scotland) Bill in 2009, the expectation among those scrutinising the Bill was that the EU would strengthen its 2020 target to require a 30% reduction in greenhouse gas emissions.

17. The number of emissions allowances in the EU Emissions Trading Scheme would be reduced as a consequence and this would provide a greater incentive for accelerated action on emissions from large emitters in Scotland such as electricity generation and heavy industry. However, stalling international climate change negotiations have so far limited further progress in Europe and constrained the contribution that the so-called 'traded sector' is making to cutting emissions in Scotland.
18. Despite the good progress in reducing Scotland's greenhouse gas emissions, challenges such as the continued baseline revisions described above, exacerbated by the historically cold weather in 2010, contributed to Scotland missing the emissions targets that had been set for 2010 and 2011.
19. Clearly, the outturn in relation to both targets has been disappointing, but we should not lose sight of the clear progress that has been achieved in comparison with benchmark countries across the EU-15 and the fact that, in percentage terms, emissions in Scotland had fallen by 25.7% by 2011, in comparison with a projected 23.9% for that year. The Scottish Government remains focussed on the downward trajectory in emissions and is committed to delivering the low carbon transition required to meet our international responsibilities, to ensure the sustainability of our economy and society and to maximise the impact of domestic effort. We also aim, where possible, to over-achieve against future annual targets to recover the difference by which the earlier targets were missed.
20. A full year-by-year breakdown of the estimated emissions impact of our policies and proposals in four scenarios is contained in the annexes. A '**policy**' is a course of action which has already been wholly or largely decided upon. A '**proposal**' is a suggested course of action, the details of which might change as this course of action is explored further. Each sector in this report, aside from Energy, contains both policies and proposals for reducing emissions. The two EU scenarios we set out envisage the EU maintaining a 20% climate change target for 2020 (the status quo); and the EU moving to higher ambition, with a target for 2020 of 30% emissions reductions (our policy position):
 - **If we implement our policies only and the EU stays at 20%, we project that Scottish emissions will have fallen by 40.1% in 2020 and by 47.0% in 2027.**
 - **If we implement both our policies and proposals and the EU stays at 20%, we project that Scottish emissions will have fallen by 43.3% in 2020 and by 57.8% in 2027.**

- If we implement our policies only and the EU moves to 30%, we project that Scottish emissions will have fallen by 43.9% in 2020 and by 47.0% in 2027.
- If we implement both our policies and proposals and the EU moves to 30%, we project that Scottish emissions will have fallen by 47.1% in 2020 and by 57.8% in 2027.

Net Emissions in the Four Scenarios Compared to a 42% Reduction in Emissions in 2020



21. The policies and proposals in this report create **benefits and costs** for government, business and households. Scottish Government funding for climate change activities is less than the costs outlined in this document because the costs (and benefits) are to society as a whole, rather than to the Scottish Government alone. We estimate the costs of implementing the measures to be, on average, £1.6 billion per annum (or 1% of GDP) while the average benefits are estimated to amount to £1.2 billion (2011 prices) per annum.

22. There are a number of important **additional benefits** that are not included in these figures – for example co-benefits including job creation, health improvement, local air quality improvement and biodiversity protection and enhancement. In addition, the cost figures

do not include transformational investments in the electricity sector or where estimates for some proposals are not available at this stage.

23. As the wide range of policies and proposals in this report show, the Scottish Government cannot and should not meet the climate change targets alone. Local government has a pivotal role, alongside businesses, third sector organisations, communities, families and individuals. We are working in partnership, building capacity and facilitating Scotland-wide action to make the low carbon transition a reality.

Understanding and achieving transformation

24. We know that transformation to a low carbon Scotland will be challenging. It will involve more than just focusing on particular sectors. For this reason, we have identified five cross-cutting themes that apply to all six sectors in this report.
25. The first theme is understanding external factors that are driving the pace of change. This includes an exploration of **different futures** – not as predictions – but in recognition that we need to understand different forward operating environments that might come to pass. These help us understand the need to be adaptive and flexible as we move forward in the transition.
26. The second theme is the transition to the **low carbon economy**. Based on the new strategic priority in our updated 2011 *Government Economic Strategy*, and our earlier *Low Carbon Economic Strategy for Scotland*, we emphasise the central importance of low carbon activity to Scotland’s future economic success. There is a sound economic basis for our actions. Scotland’s abundant natural resources are the basis for a revolution in renewable energy supported by energy infrastructure and skills in our oil and gas industries.
27. Our support for the low carbon economy is provided through six channels: long term legal and institutional certainty; expanding renewable energy production; improvements in energy and resource efficiency in households and industry; transition of transport to a lower carbon basis; expansion of renewable sources of heat; and sustainable land use.

28. The third theme outlines the wide range of **funding and financing** options available for climate change mitigation measures. Our principles for funding and financing climate change are: cost effectiveness; consideration of whole life cycle costs; preventative spend or ‘spend to save’; efficiency; and maximising wider economic benefits. Funding and financing mechanisms are available for large public and private organisations as well as households and small businesses. They range, for example, from the Green Investment Bank and the Green Deal, through to traditional capital finance and tax incremental financing.
29. The fourth theme addresses the critical role that **understanding and influencing behaviour** has in the majority of policies and proposals in this report. Our *Low Carbon Scotland: Behaviours Framework* sets out our strategic framework to encourage low carbon behaviours amongst Scotland’s businesses and households. This includes ten, evidence-based, household behaviours that are key to reducing greenhouse gas emissions: installing a more energy efficient energy system; keeping the heat in; better heating management; saving electricity; walking, cycling, using public transport and or car sharing; avoiding food waste; eating a healthy diet in season where we live; and reducing and reusing, in addition to the efforts we already make on recycling.
30. The ISM approach shows that **individual, social and material** contexts influence behaviours. Our use of the ISM tool, based on theory and evidence, combined with ten insights for effectively influencing behaviours, will also help us and others build stronger policies and programmes to meet the challenge of changing the way we live, work and travel.
31. The final of the five cross-cutting themes is the critical role of the **planning system**, which is used to make decisions about the future development and use of land in our towns, cities and countryside. Our *National Planning Framework, Scottish Planning Policy*, planning advice, and strategic and local development plans all play important roles in supporting the transition to a low carbon future.

The Energy sector

32. Energy supply in Scotland emitted 16.93 MtCO₂e in 2011, or 33% of Scotland's total. Emissions in this sector are dominated by installations in the EU Emissions Trading Scheme and are therefore in the traded sector.
33. Our energy emissions, largely from electricity generation, are addressed through our new ambitious target to decarbonise electricity alongside reducing our demand for energy. Our decarbonisation target is a carbon intensity of 50 gCO₂/kWh by 2030. This is in line with the Committee on Climate Change's recommendations for the UK Government.
34. Our policy for electricity generation is set out in our *Electricity Generation Policy Statement*. This states that Scotland's electricity generation mix should deliver: a secure source of electricity supply; at an affordable cost to consumers; which can be largely decarbonised by 2030; and which achieves the greatest possible economic advantage to Scotland, including opportunities for community ownership and community benefits.
35. Progressing our thematic energy aims and targets is critical to achieving our decarbonisation target to: meet at least 30% overall energy demand from renewables by 2020; reduce final energy demand in Scotland by 12% by 2020 covering all fuels and sectors; deliver the equivalent of at least 100% of gross electricity consumption from renewables by 2020 with an interim target of the equivalent of 50% of gross electricity consumption from renewables by 2015; enable local and community ownership of at least 500 MW of renewable energy by 2020; demonstrate carbon capture and storage at commercial scale in Scotland by 2020, with full retrofit across conventional power stations thereafter by 2025-30; and to seek transmission system upgrades and increased interconnection capable of supporting the projected growth in renewable capacity.
36. The way in which energy markets and energy generation, transmission and supply is regulated is vital to our decarbonisation plans. This is why we retain a profound interest in the UK's Electricity Market Reform proposals. We are working closely with our UK counterparts on the UK Energy Bill.

37. We are making excellent progress across our energy targets. For example, provisional data for 2012 showed that almost **39% of Scotland's electricity** came from renewables.
38. In the longer term, we are confident that investing now in a low carbon future is an economically viable and necessary thing to do. As electricity generating assets reach the end of their operational life, they will need to be replaced with a diverse mix of generating technologies. Alternative and innovative methods of generation will replace traditional technologies' reliance on carbon intensive fuels. Our aim is to ensure that these costs are as low as possible, and affordable to consumers. The Committee on Climate Change highlights that, if gas prices were to continue to rise, reliance on fossil fuels could result in the average annual gas bill being as much as £600 higher in 2050 than it might be in a low carbon system.

The Homes and Communities sector

39. **The residential sector in Scotland emitted 6.58 MtCO₂e in 2011, or 12.8% of Scotland's total. These reported emissions are almost exclusively from our use of gas for heating and cooking.**
40. Our *Sustainable Housing Strategy* sets out our vision for warm, high quality, low carbon homes and a housing sector that helps to establish a low carbon economy for Scotland. The Strategy aims to: make sure no-one in Scotland has to live in fuel poverty, as far as practicable, by 2016; deliver a step-change in provision of energy efficient homes to 2030 through retrofit of existing housing and improved building regulations for new build homes; make a full contribution to the Climate Change (Scotland) Act targets; and enable the refurbishment and house building sectors to contribute to and benefit from Scotland's low carbon economy.
41. Emissions in this sector are addressed through fabric improvement and heating efficiency; building standards; the decarbonisation of heat; and information measures such as smart meters. Our policies include smart meters (UK); domestic building energy standards new build properties (2010 – Scottish); Renewable Heat Incentive (UK); Energy Company Obligation and Green Deal (UK); Home Energy Efficiency Programmes Scotland (Scottish); and the Warm Homes Fund (Scottish).

42. Our Scottish proposals in this sector include: domestic building energy standards new build properties (2014); regulation of private and social housing; continuation of Home Energy Efficiency Programmes Scotland; low carbon heat (domestic); and additional technical abatement through improvements to carbon efficiency of the housing stock.
43. Our enabling measures support this activity. For example, we have invested in the network of Energy Saving Scotland Advice Centres which provide free advice to, amongst others, householders and communities. Our Climate Challenge Fund has also made more than 500 awards to over 400 communities since 2008, with many projects supporting energy efficiency at a local level, as well as cycling and allotment activities.
44. We are making excellent progress. For example, since 2008, loft and cavity wall insulation has been professionally installed in over 540,000 homes through the Carbon Emissions Reduction Target scheme assisted by Scottish Government programmes.
45. There are significant benefits stemming from our approach. For example, consumers could save an estimated £2.4 billion on their energy bills between 2013 and 2027 as a result of energy efficiency measures in existing homes.

The Business, Industry and Public sectors

46. **The business, industry and public sectors in Scotland emitted 9.98 MtCO₂e in 2011, or 19.5 % of Scotland's total. These reported emissions are largely from buildings, some industrial processes and include some traded emissions.**
47. Emissions in this sector, sometimes known as the 'non-domestic' sector, are addressed through energy and resource efficiency measures, the decarbonisation of electricity, and the decarbonisation of heat. Our policies in this sector include smart meters (UK); Carbon Reduction Commitment energy efficiency scheme (UK/Scottish); buildings energy standards - new build properties (2010 Scottish); Green Deal (UK); EU products policy (EU); and the non-domestic Renewable Heat Incentive (UK).

48. Our Scottish proposals include: non-domestic buildings new-build energy standards (2014); assessment of energy performance and emissions regulations (non-domestic buildings); public sector additional potential; and non-domestic low carbon heat.
49. Important enabling measures in this sector include our new Resource Efficient Scotland 'one stop shop' advice and support programme. This service provides important support to businesses, third sector and public sector organisations to cut carbon and reduce overheads.
50. We are making excellent progress in this sector. For example, we estimate that the potential lifetime savings of our investment in the Carbon Trust programme, now replaced by Resource Efficient Scotland, could be up to £920 million and 10.2 MtCO_{2e}.
51. There are significant benefits stemming from our approach. A recent UK study estimated that around 2.3% of GDP could be saved from straightforward resource efficiency measures. In 2010, this would have meant £2.9 billion savings to the Scottish economy.

The Transport sector

52. **The transport sector in Scotland produced 12.96 MtCO_{2e} in 2011, or 25.3 % of Scotland's total in 2011. These emissions include international aviation and shipping.**
53. We are addressing transport emissions through four packages: decarbonising vehicles; road network efficiencies; sustainable communities including modal shift to walking, cycling and public transport; and business engagement around sustainable transport.
54. Our decarbonising vehicles package includes: EU legislation on vehicle emissions standards and biofuels; and Scottish proposals that involve: fleet conversion to electric vehicles in the public sector, supporting electric vehicle charging infrastructure, the E-cosse Partnership, our Green Bus Fund and supporting hydrogen bus projects.
55. Our road network efficiencies package complements our work on promoting low carbon vehicles through congestion management and efficient driving. Intelligent Transport Systems in this package include variable speed limits and ramp metering and are complemented by deployment of average speed cameras.

56. Our sustainable communities package aims to help people understand their options and use more carbon friendly modes of travel, for example travel planning, walking and cycling, and the use of car clubs. The Climate Challenge Fund complements this work, through provision of funding opportunities for communities to progress local cycling projects. Improvements in integrated public transport, such as smart ticketing and park-and-ride facilities, and bus quality contracts and statutory bus partnerships are important aspects of this approach.
57. Our business engagement on sustainable transport package contains a range of measures including the provision of support for workplace travel planning and advice to encourage fleet efficiency improvements, including fuel efficient driver training.
58. A further proposal considers lower emission potential in transport – reflecting current uncertainties in traffic growth, and possible future scope to manage reductions in use of the road network in favour of public transport and active travel.
59. Important enabling measures in the transport sector include our significant investment in public transport as well as opportunities to reduce travel through the implementation of our *Digital Strategy*. For example, in 2012 we announced a £5 billion package of funding and investment in Scotland’s railways between 2014 and 2019.
60. Highlights of our progress to date include: supporting the purchase of around 270 public sector low carbon vehicles and the installation of approximately 300 charging points; the purchase of more than 90 low carbon buses through the Green Bus Fund; and the opening of Scotland’s first cycling/rail hub at Stirling railway station.
61. There are significant financial benefits stemming from our approach. In addition to these, most of the measures will bring other important benefits such as improved health, improved air quality, less congestion and noise pollution and enhanced biodiversity. The decarbonisation agenda also offers Scottish companies opportunities in the global market for low carbon vehicles and vessels. A growth in cycling could also mean an increase in jobs in local bicycle shops, supply chains and tourism outlets.

The Waste and Resource Efficiency sector

62. The waste sector in Scotland produced 2.17 MtCO₂e in 2011, or 4.2 % of Scotland's total.
63. When organic materials break down in landfill sites they produce potent greenhouse gases - mainly methane, which is approximately 25 times more potent than carbon dioxide. Over 92% of territorial emissions in the waste sector arise from landfill.
64. Our *Zero Waste Plan* (2010) sets out our vision for a zero waste society in which waste is a valuable resource, landfill is phased out, and increasing amounts of materials are reused or recycled, leaving only limited amounts to be treated. Targets relating to the proportion of household waste subsequently recycled, composted and or prepared for re-use are: 40% by 2010, 50% by 2013, 60% by 2020 and 70% by 2025 respectively; recycling 70% of all waste (including commercial and industrial waste) by 2025; and reducing the proportion of total waste sent to landfill to a maximum of 5% of all waste by 2025.
65. Emissions in this sector are addressed through the EU's Waste Framework and Landfill directives, the UK Landfill Tax while Scottish policies are contained within the *Zero Waste Plan*. The key policy is a ban on biodegradable municipal waste going to landfill from 2021. This ban was introduced by the Waste (Scotland) regulation 2012.
66. Our proposal for further abatement is to examine opportunities to capture methane emitted from closed or inactive landfill sites.
67. We are making excellent progress. 28% of households now receive a food waste collection service from their local authority and we expect this proportion to increase to 46% by the end of 2013. In 2012-13, £850,000 was invested through local authorities, land owners and facilities managers to install new recycling facilities in some of Scotland's busiest public places.
68. There are also other important benefits stemming from our approach. The overall cost of managing the implementation of the *Zero Waste Plan*, and the Waste (Scotland) Regulations 2012, will be significantly lower than the current cost of dealing with Scotland's waste. The net saving is of the order of £17 million per annum, rising to over £21 million per annum by 2025.

The Rural Land Use sector

69. The rural land use sector in Scotland produced a net total of 2.66 MtCO₂e in 2011, or 5.2 % of Scotland's total in 2011. These figures include carbon sinks from forestry.
70. Rural land use covers agriculture and related land use, peatland restoration and forestry. Emissions in these sectors come from livestock, agricultural soils, animal wastes and certain land use changes. Importantly, some biological processes also have the capacity to absorb CO₂.
71. Rural land use emissions and sequestration are addressed through a combination of improved agricultural practice, woodland creation and management, and peatland restoration.
72. Our Scottish policies to address these emissions are: Farming For a Better Climate; and an increase in our afforestation rate, planting 100,000 trees over ten years.
73. Our Scottish proposals are: 90% uptake of fertiliser efficiency measures; developments in agricultural technology post-2020; accelerated restoration of degraded peatland, targeting up to 21,000 hectares a year; the Wood First timber construction programme; and additional technical potential from peatland and woodland.
74. Progress through the Farming For a Better Climate programme and focus farms is well underway with around 2,000 farmers participating in events. Between 2009-10 and 2010-11, new woodland creation rose from 2,700 hectares to 5,100 hectares annually while in 2011-12, 9,000 hectares of new woodland were created.
75. Farming For a Better Climate is estimated to save farm businesses around £240 million (undiscounted over the period to 2027). Improvements to water and air quality, as well as biodiversity and longer-term sustainability will also be achieved, while restored peatland has many benefits for our ecosystems, including improved biodiversity and natural flood management.
76. Investment (largely private sector) in new cross-laminated timber production facilities using Scottish timber could offer significant market development and business opportunities.

The Scottish Government's Low Carbon Management System

77. The Climate Change Delivery Board has responsibility for monitoring Scottish Government progress on climate change mitigation and adaptation. In terms of mitigation, its purpose is to ensure delivery of the programme of policies and proposals in this report, and subsequent RPPs, to meet our statutory greenhouse gas emission reductions targets. The Board includes two non-executive members.
78. We are continuing to develop robust accountability and monitoring mechanisms to help us track progress. We publish details of the Board's meeting agendas, notes and our Carbon Reduction Activity Reports.
79. Strong and visible leadership is important in driving forward the climate change agenda. We are therefore setting up a Public Sector Climate Leaders Forum to be chaired by the Minister for Environment. The Convention of Scottish Local Authorities will also play a key role and membership will include leaders from across the public sector.
80. Since the publication of RPP1, a number of independent reports have been published. These include a report by Audit Scotland in 2011 and two statutory progress reports by the Committee on Climate Change. The Scottish Government is required to publish RPPs after setting batches of annual emissions reductions targets. The next batch, for 2028-2032, must be set by October 2016.