

Update to the Climate Change Plan

2018 - 2032

Securing a Green Recovery
on a Path to Net Zero



Scottish Government
Riaghaltas na h-Alba
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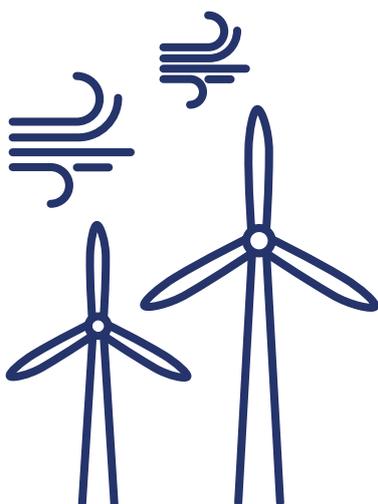
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Ministerial Foreword



When we first set out to update the 2018 Climate Change Plan, to outline the pathway to delivery of our ambitious climate change targets, we never imagined it would be published in the midst of a global pandemic. The impacts of COVID-19 are profound; a public health, economic and social crisis. The challenges we face as a country to recover from it are unprecedented.



In this context, it is clear that the challenge of meeting our emissions reductions targets becomes more difficult. COVID-19 has affected every aspect of our lives, with thousands of people losing their jobs and businesses in distress; and a fundamental shift in how we live and work in our local communities, towns and cities. We are witnessing war-time levels of lending and significant pressure on budgets, especially on devolved budgets where we lack the necessary financial levers.

Amid the enormous challenges of the global pandemic, the climate emergency has not gone away – far from it – and the Scottish Government remains absolutely committed to ending Scotland’s contribution to climate change by 2045 in a just and fair way. Indeed, it is central to our recovery. We have the opportunity to design a better future and, coming out of the pandemic, put things back together differently.

That is why we have committed to a ‘green recovery’ from COVID-19, one which captures the opportunities of our just transition to net zero. That means creating green jobs, developing sustainable skills and nurturing wellbeing. This approach recognises climate change as a human rights issue and the transition to net zero as an opportunity to tackle inequalities. It is an approach that is fundamentally important to the future prosperity of our people and planet.

Put simply, a green recovery is our commitment to transition to net zero emissions in a way that is just, and that delivers a thriving, sustainable economy that works for all of us. Our last two Programmes for Government have committed to delivering a Green New Deal, setting out how the investments we are making will support this holistic and fair transformation of our economy in the coming decades, leading to greater prosperity and social outcomes. This Climate Change Plan update builds on that work and sets out the actions we are taking to make this Deal a reality through our green recovery. The prize of achieving this is a better world – a more equal world, a world of greater opportunities, and a natural environment that is vibrant and diverse.

We have developed our approach based on the advice and contributions received from the Climate Change Committee, Just Transition Commission, Advisory Group on Economic Recovery, Climate Emergency Response Group, Scottish Science Advisory Council and the Sustainable Renewal Advisory Group.

This update to the 2018 Climate Change Plan sets out bold actions, which together chart our pathway to our new emissions reduction targets out to 2032. This journey will not be easy, and will need to be a truly national endeavour with business, communities, and individuals contributing fully. It will require us to be

innovative, to learn as we are going and to utilise new and exciting technologies and ideas. It will also mean supporting individuals and businesses to adapt their choices and behaviours, as set out in our new Public Engagement Strategy: 'Net Zero Nation: Draft Public Engagement Strategy for Climate Change'. This Plan update therefore gives clear signals of where we are going, what the Scottish Government is doing to enable us to get there and how others can contribute.

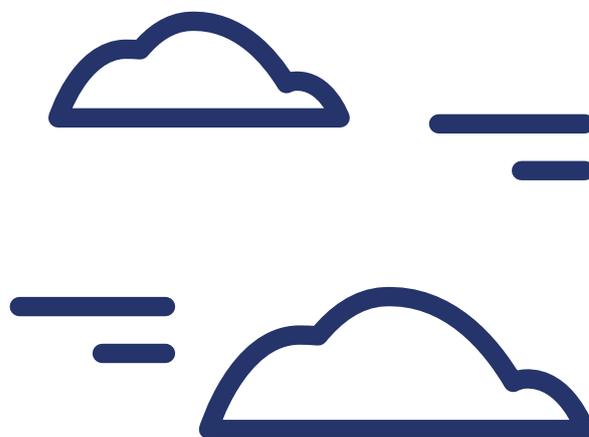
Looking ahead to the UN Climate Conference, COP26, that will take place in Glasgow in 2021, we are also reminded that not only do we need a truly national endeavour, we also need this spirit and commitment to be applied internationally. This plan sets out areas where we are already collaborating with our global partners; but also provides a foundation to strengthen and deepen our engagement with other countries, states and regions around the world.

Over and above the impacts of COVID-19, we are also facing the impacts of EU Exit, a set of circumstances which is not of Scotland's choosing. As we move to a new relationship, we remain committed to a deep and close partnership with the EU, its Member States and other European actors, and indeed to Scotland re-joining the bloc as an independent country. We believe this plan can support that important collaboration.



Glen Affric, Highland

The scale of the challenge ahead, both to rebuild our economy in the wake of COVID-19, and to deliver our world-leading climate change targets, is unprecedented. However, we know the huge opportunities that a transition to a fairer, more sustainable and greener economy can bring for Scotland, including in creating green jobs and wellbeing for everyone. We are therefore determined to grasp these opportunities and transform our country for the better. This Climate Change Plan update is a vital step in this process, ahead of the next full Plan, to be completed by early 2025.





Roseanna Cunningham MSP
Cabinet Secretary for
Environment, Climate Change
and Land Reform



Rt Hon Nicola Sturgeon
First Minister of Scotland



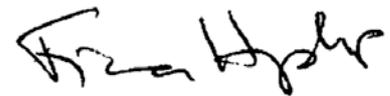
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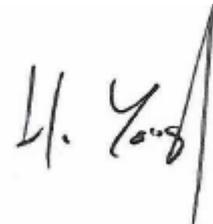
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Executive Summary



This document updates the 2018 Climate Change Plan. Since that Plan we have set new ambitious targets to end our contribution to climate change by 2045. We have committed to reduce emissions by 75% by 2030 (compared with 1990) and to net zero by 2045. COVID-19 does not change our ambitions. As Scotland emerges from COVID-19 we have a chance to rebuild our economy in a way that delivers a greener, fairer and more equal society. This Plan sets out our approach to delivering a green recovery, and sets out a pathway to deliver our world leading climate change targets¹. In line with the 2018 plan, the focus is on the period up to 2032.

You will see from what we have set out here that our approach must be iterative, we must learn by doing. No-one currently has all the answers on how we deliver the transition over the next 25 years or how emerging technologies can be deployed efficiently at scale. Many of the solutions rely on further technological innovation, market development and wider take up and adoption as well as action by others. By monitoring, evaluating, updating and adapting this plan over the coming decade we can be on track to meeting our ambitious targets and capturing the opportunities of the transition. This iterative approach will prepare the ground for the next statutory Climate Change Plan, which is to be completed by early 2025.

Green Recovery

It is essential that our recovery from the pandemic responds to the climate emergency, and puts us on a pathway to deliver our statutory climate change targets and a just transition to net zero, by ensuring our actions in the immediate term are in line with our long-term goals. The Scottish Government has been clear in its commitment to securing a just and green recovery, which prioritises economic, social and environmental wellbeing, and responds to the twin challenges of the climate emergency and biodiversity loss.

In developing our understanding of what a green recovery will mean for Scotland, we have listened to stakeholders from across academia, industry, business, trade unions and environmental organisations and other experts including the Climate Change Committee, Just Transition Commission, Advisory Group on Economic Recovery, Scottish Parliament, Climate Emergency Response Group, Scottish Science Advisory Council and the Sustainable Renewal Advisory Group.

Delivering a green recovery is at the heart of the 2020-2021 Programme for Government. Part 1 of this Update sets out the progress that is being made in delivering these commitments and the further actions we will take to secure a green recovery from the COVID-19 pandemic. Our response is framed around the following key themes which have consistently been highlighted by stakeholders as priorities:

- Recognising the role that both public and private **investment** must play in delivering the transition to net zero. The Programme for Government committed the first tranche of the £2 billion Low Carbon Fund and this update sets out a number of additional investments being made by Government as well as opportunities to leverage in investment from others. The second tranche will deliver:
 - £180 million for an Emerging Energy Technologies Fund, supporting the development of hydrogen and providing impetus to the development of Negative Emissions Technologies (NETs);

1 Targets set in law in the Climate Change (Scotland) Act 2009 (as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019)

- £120 million for Zero Emission Buses, driving forward a fully decarbonised future for Scotland's bus fleet and support the Scottish supply chain;
- £50 million to transform Vacant and Derelict Land, ensuring that this land is utilised for maximum environmental and community benefit
- £50 million to create Active Freeways, providing a sustainable link between our towns, cities and some of our most beloved national landmarks.
- These investments will be critical in laying the foundations for our transition to net-zero.
- At the centre of our approach is a commitment to increase the number of good, **green jobs**, and to enable people to access these jobs **through training and reskilling**. To further align the skills system with the demand resulting from a green recovery and the transition to net zero, the Climate Emergency Skills Action Plan has been published alongside this update.
- The COVID-19 pandemic has proven the importance of embedding resilience and security into our society and economy. **Adaptation and resilience** are key components of our green recovery. The Programme for Government committed to investing an extra £150 million for flood risk management over the next 5 years and £12 million in coastal change adaptation.
- We know the impacts of COVID-19 on people's lives and livelihoods have been enormously difficult. In their advice the CCC recommended that actions to maintain **positive behaviours** in the long term are prioritised and our update sets out the policy measures to embed behaviour change in each of the sectors. Our new Draft Public Engagement Strategy, published alongside this update sets out how we

will continue to engage with citizens in developing and implementing climate policy that has widespread support and encourages action.

- We are also committed to delivering a **place-based approach** to our green recovery working closely with those communities and organisations that need change, are undergoing change or affected by change. Our ongoing planning system reforms will aim to reduce process and procedures so that planning can focus more on places and people and evolving concepts such as 20 minute neighbourhoods will prioritise quality of life and health as well as our net zero ambitions.

The green recovery and transition to net zero present considerable economic opportunities for Scotland. By capitalising on Scotland's strengths in energy, natural capital, innovation and our skilled workforce and universities, we can set Scotland at the forefront of growing global markets. The recent Inward Investment Plan identified Energy Transition and Decarbonisation of Transport as two areas of competitive strengths in Scotland as well as strengths in Digital, Health, Space and Food and Drink which will all contribute to a thriving net zero economy in the future.

Scotland is already harnessing our considerable strengths and expertise in offshore energy to drive our energy transition and develop and deploy new technologies in hydrogen production and use and in Carbon Capture and Storage. This is driving a revolution in our transport system, with new hydrogen bus fleets on the streets of Aberdeen.

Scotland's natural capital is one of our greatest assets and is central to our future net zero economy, developing thriving rural economies based around woodland creation, peatland restoration and biodiversity as well as sustainable tourism, food and drink and energy.

Our Coordinated Approach

The policies and actions in this update to the 2018 Climate Change Plan are set out on a sector-by-sector basis. However, achieving our climate change targets will require us to align and deliver these policies in a joined-up way. This means that some of our policies will involve two or more sectors (for example, the development of renewable energy will support decarbonisation across the whole energy system, including electricity, transport, industry and buildings or land use relates to agriculture, forestry and bioenergy crops), and also means integrating climate change action into all of the decisions we make across government.

For this reason, we have dedicated Part 2 of this update to our 'Coordinated Approach' to meeting our emissions reduction targets. This section looks at how we take a cross-cutting, systems based approach that harnesses opportunities for inclusive jobs, growth and well-being.

A coordinated approach is fundamental to delivering a just transition, given that the transition will transform all parts of our society and economy. Fairness will be at the heart of our climate action, ensuring that individuals and communities are not left behind. Collectively, we must plan and prepare, so that that these transformational changes are harnessed to tackle inequalities, provide good jobs, improve our environment and support a thriving, wellbeing economy. In this update we present a range of policies that will boost social and economic opportunities and, in particular, underpin the importance of equity, engagement and planning. For example:

- improvements for bus priority infrastructure will improve connectivity for people in lower socio-economic groups; and

- investment in heat and energy efficiency creates jobs and includes explicit support for those least able to pay.

We are committed to taking a Whole System Energy Approach, encouraging joined-up and collaborative thinking across sectors, particularly with regards to emerging technologies related to hydrogen, bioenergy and Negative Emissions Technologies. The Scottish Government also recognises the vital importance of innovation in meeting our climate change targets, and this Plan update includes details of our actions to date and plans for the future to support world-leading innovators in Scotland. In 2017 we published Scotland's first Energy Strategy in alignment with the 2018 Plan. This championed a whole system view of energy as one of its three core principles, along with an 'inclusive energy transition' and 'a smarter local energy model'. We will update our energy strategy in 2021 to lay out a coordinated vision for the whole energy system. This will be based on our best understanding of the technologies and options available today, and focused on delivering our economy-wide emissions reduction targets and just transition and wellbeing economy outcomes.

Another area where a coordinated approach is essential is on land use. Not only is our land the cornerstone of our society and bedrock of Scotland's natural capital, but it has many uses. We have a finite amount of land and are making increasing demands upon it. Our upcoming third Land Use Strategy will set out how the various aspects of land use and actions of the Scottish Government come together to deliver on our overarching sustainable land use vision. The Coordinated Approach section also includes details of our approach to a circular economy in Scotland, and our commitment to a Wellbeing Economy.



Cullen Bay, Moray

We also have an excellent opportunity to embed emissions reduction and climate change adaptation into Scotland's long term development strategy through the National Planning Framework 4.

Policies and Proposals: a sector approach

This update includes policies and proposals for each sector that build on those contained in the 2018 Plan. We have also added an eighth sector for this update: Negative Emissions Technologies (NETs).

The key policies which underpin this progress are set out below, as well as in Part 3, and in full at Annex A.

Electricity

In Electricity, the Climate Change Plan update announces further policies to continue the rapid growth in renewable generation over the past twenty years, moving from a low to a zero carbon electricity system, with the potential for NETs to deliver negative emissions. In our **Energy Strategy Update, to be published in 2021**, we will set out in detail the role that electricity generation will have in the wider energy system. We will continue to review our **energy consenting processes**, making further improvements and efficiencies where possible, and we will deliver the actions from our **Offshore Wind Policy Statement** published in October which supports the development of between 8 and 11 GW of offshore wind capacity by 2030.

We **will review and publish an updated Electricity Generation Policy statement by 2022** reflecting the contribution that renewable electricity generation is likely to have to achieving our Net Zero target in line with the CCC recommendation to do so. We will continue our efforts to ensure a **sustainable security of electricity supply**, and in 2021 we will **launch a call for evidence and views on technologies** including energy storage, smart grid technologies and technologies to deliver sustainable security of supply.

There are a number of important actions that affect a number of sectors, including electricity.

We will also take forward actions to develop the role of hydrogen in our energy system. We will build on the outputs of the **Hydrogen Assessment project and publish a Hydrogen Policy statement** this month, and then a **Hydrogen Action Plan** in 2021.

We know that bioenergy will be important in helping us deliver negative emissions, and a key challenge for the early 2020s is to understand the extent to which bioenergy should be used in each of our sectors. In early 2021 we will publish a **Bioenergy Update** and will establish an **Expert Working Group** to consider and identify the most appropriate and sustainable use of bioenergy resources within Scotland. We will publish a **Bioenergy Action Plan** in 2023.

Buildings

In Buildings, we know that around 50% of homes and non-domestic buildings will need to convert to a low or zero carbon heating system by 2030. We will set out a clear, long term vision and policy direction for heat in buildings in the forthcoming Heat in Buildings Strategy. Our approach will be framed around 3 key areas: regulatory change, delivering significant investment and supporting supply chain growth. In this Plan update we've

confirmed our New Build Zero Emissions from Heat Standard will be introduced from 2024 by which point all new builds will have to have zero emissions heating systems. We are seeking evidence on the impact of introducing these requirements earlier than 2024 if feasible. We have also set out a clear approach to **developing a long term regulatory framework, within the limits of our competence, for decarbonising heat in buildings** and ensuring a good level of energy efficiency.

We will **stimulate adoption of zero emissions heating** systems and **pursue expanded investment in zero emissions heating** by developing innovative solutions to leverage private capital. We will bring forward the review of the **existing Energy Efficient Standard for Social Housing to conclude in 2023**. As announced in the Programme for Government, **we will invest £1.6 billion in heat and energy efficiency over the next Parliament, using this to leverage in UK Government and private finance to see, as a minimum, the rate of zero emissions heat installations in new and existing homes and buildings double every year out to 2025**.



Transport

In transport we set out ambitious actions which are aligned with our new National Transport Strategy. There is a key focus on technological advances, but equally on measures to encourage mode-shift and significant societal changes. This update commits to **reduce car kilometres by 20% by 2030**, a truly world-leading aspiration, and we are not aware of any other country that has committed to such an ambitious transformation. Once the pandemic has moved to a phase to allow more certainty regarding future travel demand we will produce a route-map to meet the reduction. Alongside that we will **phase out the need for new petrol and diesel cars and vans by 2030** (bringing this ambition forward from the 2018 plan by 2 years), We will work with **public bodies to lead the way by phasing out the need for new petrol and diesel light commercial vehicles by 2025**.

We will continue to work to establish a **Zero Emission Heavy Duty Vehicle** programme with Scottish Enterprise to support innovation in the Scottish supply chain for HGVs and we will engage with industry to understand how changing technologies and innovations in logistics can help reduce carbon emissions. On aviation, we will **decarbonise scheduled flights within Scotland by 2040** and will work with the sector to encourage sustainable growth post COVID-19. As announced in our Programme for Government we will aim to create the world's **first zero emission aviation region in partnership with Highlands and Islands Airports**.

On public transport, **Scotland's rail services will be decarbonised by 2035** and we will work with the newly formed Bus Decarbonisation Taskforce, comprised of leaders from the bus, energy and finance sectors, to ensure that the majority of new buses purchased from 2024 are zero-emission (brought forward from 2032). On active travel, as announced in the Programme for Government we will **support**

transformational active travel projects with a £500 million investment over 5 years for active travel infrastructure, access to bikes and behaviour change schemes.

Industry

In industry, we know that emissions need to continue to decline significantly whilst ensuring Scottish industry competes on a level playing field and remains globally sustainable. We also know that Scottish industry has much to gain from being at the forefront of the transition to net zero. In this Climate Change Plan update we commit to taking a properly sequenced and strategic approach to Scotland's industrial sector, creating opportunities for Scottish industries and supply chains to expand exports into global markets. Many industrial decarbonisation powers lie with the UK Government and **we will continue to press the UK Government to implement the jointly developed UK ETS and agree a link to the EU ETS** to enable a smooth transition for industry. Carbon capture and storage (CCS) is essential to reach net zero emissions.

We are announcing a new **Emerging Energy Technologies Fund of £180 million** that will support the development of hydrogen and CCS, which will add new impetus to the development of NETs, and we will work with our agencies to develop a **£5 million Carbon Capture and Utilisation Challenge Fund** to boost early stage work and technologies in this area. In these challenging economic conditions, we will continue to develop the conditions for private sector investment by supporting innovation throughout the industry sector: the **Scottish Industrial Energy Transformation Fund** commits £34 million for projects at industrial sites for energy efficiency or deeper decarbonisation and the £26 million **Low Carbon Manufacturing Challenge Fund** will support innovation in low carbon technology, processes and infrastructure. We are investing £100 million to help businesses create new, green jobs via the Green Jobs Fund.



Waste

In waste, Scotland's progress in reducing emissions in the waste and resources sector over the past 20 years has been striking, but we know there is still progress to be made. We will continue to **embed circular economy principles in to the wider green recovery** and take steps to reduce food waste through the **Food Waste Reduction Action Plan** delivering against our ambitious target to reduce food waste by one third by 2025 (against a 2013 baseline). We are committed to **ending landfilling of biodegradable municipal waste by 2025 and recycling 70% of all waste by 2025**. We will develop a route map to outline how we will deliver our waste and recycling targets

in a way that maximises carbon saving potential, and are investing £70 million to make the right option the easy option for household recycling. We are currently consulting on **banning a number of single use plastic items** and will continue to work with the UK Government and other devolved administrations on **reforms to the packaging extended producer responsibility regime**. We will introduce measures to encourage people to shift toward reusable products and encourage more sustainable consumption. **We will work with partners to develop a post 2025 route map** to identify how the waste and resources sector will contribute towards Scotland's journey towards net zero in the period to 2030 and beyond.

Land use, land use change and forestry

Our landscape and natural environment is one of our greatest national assets and has a vital role to play in meeting our ambitious climate change targets. Through significant increases in forestry and widespread peatland restoration in particular, we can reduce greenhouse gases and other pollutants and increase the levels of carbon dioxide being absorbed and locked up in timber products. **We will continue to expand forest cover in Scotland**, building on the success of creating 22,000 hectares of new woodlands in the last two years. We will increase new woodland creation **from the current target level of 12,000 hectares annually in 2020/21 up to 18,000 hectares in 2024/25**. Scottish Forestry and Forestry and Land Scotland will work with investors, carbon buyers, landowners and

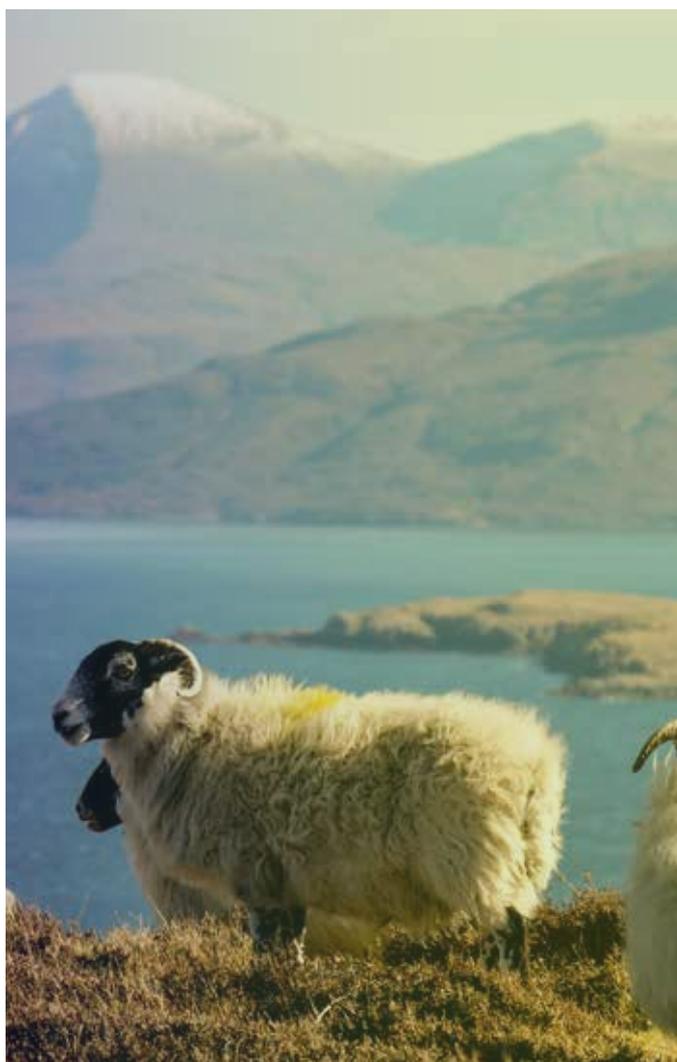
market intermediaries to increase private investment in new woodlands in order **to increase the woodland carbon market by at least 50% by 2025**. As of March 2020 over 25,000 hectares of peatland have been put on the road to restoration, and earlier this year we announced a £250 million ten-year funding package to support the restoration of 250,000 hectares of degraded peat by 2030. **To deliver on the 2032 emissions reduction envelope annual peatland restoration needs to be far higher than the current 20,000 hectare annual target and we will work closely with delivery partners, land owners, managers, farmers and crofters to continue to encourage more restoration of peatland**, both traditional bog but also land that offers the highest emission savings per hectare.



Dumfries and Galloway

Agriculture

In agriculture, we know that we must continue to produce **high quality food**, but also deliver **high environmental standards** and **emissions reductions**. How we use our land will evolve as we respond to climate change with more woodland, restored peatland as well as potential increase in land for growing biomass. We also know it is important that our soils and grasslands are managed appropriately, and that technology is deployed as innovatively as possible to reduce emissions. The Update provides a **route map for agricultural transformation**, having started in 2020 and working in partnership through **farmer led groups**, with the introduction of **environmental conditionality**, piloting **new mechanisms of support** and



Sheep on Ben Tianavaig mountain, Isle of Skye

enhancing advice for farmers, crofters and land managers to meet Scotland's goal of having food production of world leading sustainability. We will ensure that **rural support** enables, encourages and where appropriate requires the shift to low carbon sustainable farming. **We will scale up the Agricultural Transformation Programme** across all policies, including to enable farmers and crofters to purchase equipment that should assist in reducing emissions and support practice change. **We will explore options for land-use change to optimise uses beyond traditional farming and food production** to multi-faceted land use including forestry, peatland restoration and management and for biomass production, including provision of **advice for farmers and crofters** who wish to step back from agricultural businesses by providing an opportunity to consider **alternative land-uses** or **alternative agricultural uses**.

Negative emissions technologies (NETs)

We know that NETs will play an important role in emissions reductions during the 2030s and 40s; this has become clear from the **detailed modelling and evidence building** that we have undertaken to identify pathways to meet our net zero and our interim targets. While this update lays out the scale of the contribution required, we need further work to establish the way in which those emissions might be spread across the sectors to meet our annual targets in the early 2030s. While there are opportunities in several sectors, **establishing the most effective and efficient way to use NETs** will need a focus on developing technologies, identifying options, and the early stage development of potential projects. This update includes urgent measures in this area, designed to ensure that concrete proposals are brought forward in the next few years. **By the time of our next Climate Change Plan, we will be in a position to reallocate negative emissions to specific sectors.**

Route Map to 2032



2020

£500 million investment in active travel projects over five years, £500 million to improve bus priority infrastructure and £9 million Scottish Ultra Low Emission Bus Fund.

£62 million Energy Transition Fund and £34 million Scottish Industrial Energy Transformation Fund (SIETF) launched. Hydrogen Policy Statement published.

£1.6 billion Heat in Buildings fund announced, to be invested over the next Parliament; £6.9m support for H100 hydrogen for domestic heat demonstration; and initiation of Heat pumps cashback schemes.



2022

Updated Electricity Generation Policy Statement reviewed and published.

Carbon Capture and Utilisation Challenge Fund initiated, concluding in 2024.

Implementation of Deposit Return Scheme (DRS) for single use drinks containers.

Legislation to restrict supply of specified single use plastic items comes into force. Consultation launches on a charge on single use disposable beverage cups and legislation to increase the carrier bag minimum charge from 5p to 10p.

£70 million fund to improve local authority recycling collection infrastructure established.

Environmental conditionality introduced to extend requirements to all farmers and crofters to undertake environmental actions.

Energy Strategy Update published.

Hydrogen Action Plan published.

Low Carbon Manufacturing Challenge Fund launched.

At least 20,000 ha of peatland restored annually.

First tranche of funding available from the £180 million Emerging Energy Technologies Fund.

£120 million over the next five years for Zero Emission Buses.

2021

2023

Subject to the passage of the Heat Networks (Scotland) Bill, district and communal heating systems become regulated.



Regional Land Use Frameworks developed.

Bioenergy Action Plan published.

Local Heat and Energy Efficiency Strategies launched across all local authorities.



2030

2032

Need for new petrol and diesel cars and vans phased out and car kilometres reduced by 20%.
At least 250,000 hectares of peatland restored.

Renewable energy generation in Scotland accounts for the equivalent of 50% of our energy demand across electricity, heat and transport.

At least 50% of Scotland's building stock is heated using zero emission systems.
First delivery-scale NETs installations begin operation.

Scotland's passenger rail services considerably decarbonised, with just a few years to go until they are fully decarbonised (in 2035).



2025



4th Climate Change Plan published.
Need for any new petrol and diesel light commercial vehicles in public bodies phased out.

Food waste reduced by 33% from 2013 baseline and 70% of all waste recycled. Landfilling of biodegradable municipal waste has ended.

Zero emissions heating systems account for at least 50% of new systems being installed each year.



2024



18,000 Ha of new woodlands created annually.

New Build Zero Emissions from Heat Standard.

Acorn Project Development begins, concluding with Direct Air Capture and Storage operating from St Fergus Gas Plant in 2026.

Our pathway to 2032: what our policies mean in practice

By 2032, our **energy system** will be in the midst of a major transformation, integrating new ways of producing, transporting and using energy with existing technologies. This transformation will be planned and developed through a **systems-led approach**, ensuring that decisions take account of the benefits across all of the energy sectors as well as the economic and social benefits they create for everyone in Scotland. By 2032, we will generate at least the equivalent of **50% of our energy across heat, transport and electricity demand from renewable sources**. Scotland will have benefitted from the development of new, pioneering infrastructure such as that used for **CCUS, hydrogen and green hydrogen production**. The process of developing this world leading, sustainable energy system will have created secure and well paid jobs, and supported sustainable economic growth across all regions of Scotland.

Our electricity system will have deepened its transformation for the better, with over 100% of Scotland's electricity demand being met by **renewable sources**. More and more households, vehicles, businesses and industrial processes will be powered by renewable electricity, combined with green hydrogen production. There will also be a substantial increase in renewable generation, particularly through new **offshore and onshore wind** capacity. Innovation and new technologies will help ensure and maintain the resilience of our electricity systems, and **local electricity generation** will be commonplace. The

costs and benefits of the growth in our electricity demand and systems will be **shared fairly across all members of society**, with vulnerable groups and fuel poor households protected at every stage.

We will ensure a just and managed transition for Scotland's **industrial sector**, and by 2032 Scotland's industrial sites will be highly competitive, embracing **sustainable growth** and **low carbon technologies**. The necessary infrastructure will be in place to enable the deployment of Carbon Capture, Utilisation and Storage (CCUS), and the production and utilisation of hydrogen. With these evolving technologies will come significant **opportunities for investment** and **employment**, as well as sustainable **industrial innovation**. Decarbonising, diversifying and expanding our industry into a range of low carbon markets, such as technology and sustainable manufacturing, will also mean that we attract **financial investment** and talent from **all over the globe**. We will manage this transition to ensure that Scottish businesses and industries benefit from these opportunities, and our **Climate Emergency Skills Action Plan** will support reskilling and retraining skilled workers so that they can access new, good quality jobs that become available.

We will also deliver a step-change in our **transport system** and how we consider the need to travel. By 2032, there will be **no need to buy a new petrol or diesel car**, and almost all of our **passenger railways will be decarbonised**. Our innovative and well-connected public transport network will mean more individuals choosing sustainable transport as their first choice. We will have **reduced**

the kilometres driven by car by 20%, complemented by our commitment to develop a **Work Local Programme**, supporting flexible, remote and local working to drive the establishment of walkable and liveable 20 minute neighbourhoods. Our **£500 million investment in active travel** will have transformed the way we move around, ensuring accessibility to bikes and e-bikes, and delivering high-quality walking, wheeling and cycling infrastructure.

We will feel the benefits of climate change action in our **homes**, and by 2032 our homes will be better **insulated**, have lower demand for heat, and will be more **energy efficient**. The benefits of our landmark investment of **£1.6 billion in zero emissions heating** will be widely felt, both in our homes and workplaces, and will have levered in the private investment required for roll out across Scotland. We will have made considerable progress to **remove poor energy efficiency as a driver of fuel poverty**, and we will be continuing to work in close partnership with energy retailers to ensure a **good deal for consumers**. Delivering a **just transition** will be at the heart of all of these decisions, and we will seek to ensure that decarbonisation does not disadvantage those already struggling to heat their home.

By 2032, the **natural environment and landscapes** around us will have undergone significant restoration, with a sustainable land use system that prioritises nature and biodiversity. **21% of our land will be covered by forest**, following increased funding of £150 million as well as our target of planting 18,000 hectares per year by 2024/25. We will also have **restored over 250,000 hectares of peatland** with £250 million of investment

over 10 years, protecting this significant carbon store, and restoring wetland habitats. The prioritisation of these “nature-based solutions” and restoration projects will deliver multiple benefits, not only in terms of carbon sequestration, but also enhanced **biodiversity**, improved **air and water quality**, and landscapes and ecosystems that are more resilient to climate change.

Meanwhile, the agricultural sector will have supported these changes in land use, through the use of **appropriate land for afforestation**, including further **integration of woodlands on farms**, and **peatland**, while continuing the important role of **food production**. Farmers and crofters will continue to be supported for their key roles of producing **high quality food and environmental stewardship** while meeting **conditionality** for delivery of **high environmental standards** for emissions reduction and biodiversity. They will be adopting all available **low-emission technologies and practices**, supported by the **introduction of new approaches**, alongside **environmental conditionality**. Through **partnership working** between government and industry, for example through the work of the farmer-led groups and **realigned and enhanced advice**, agricultural businesses will have the **skills and tools** they need to produce food more sustainably, while adopting **new technologies** and **innovative approaches**.

By 2032 we will have transformed our relationship with waste and consumption in Scotland, meaning we'll be well on the way towards a fully **circular economy**. Consequently, our economy will be designed to **reduce, reuse, and repair** materials

and to **recycle** our waste more than ever. By 2025, we will have reduced the percentage of our waste going to landfill to 5%, and 70% of our waste will be recycled. Pending consultation, it's likely that we will have introduced charges for single use items such as disposable cups, as well as a ban on problematic single-use items.

Finally, by 2032 Scotland will benefit from **Negative Emission Technologies** (NETs) underpinned by **developing carbon capture, transport and storage infrastructure**. These world leading projects will deliver clean energy while removing emissions from our atmosphere. A well-developed evidence base will have been combined with learning from trial and demonstration projects which came online during the

2020s to ensure that we are focusing on the most suitable applications and locations for NETs.

Throughout all of these transformations, the Scottish Government's priority will be to ensure that the costs of the transition are **distributed fairly** and that our economy is benefiting from opportunities for the creation of **highly skilled and secure jobs**. Our approach will be led by science and the people and places who are already helping us to generate new and innovative ideas. This place-based and "learning by doing" approach, recommended by the Sustainable Renewal Advisory Group, will ensure that people and communities are involved in the transition and the benefits are shared by all as part of a just transition.



Credit: Peter Cairns

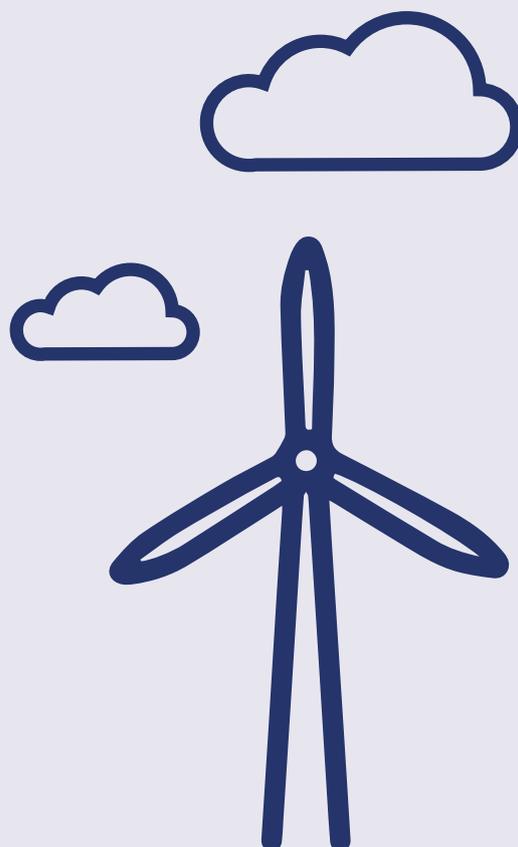
Our vision for 2045

The Scottish Government's vision for 2045 is one of a society that prioritises the environment and the wellbeing of its people². Crucially, we will have reached net zero in a way that is fair and just to all and involves people and communities so everyone can benefit from the widespread, positive changes we will have experienced. These include changes to how we live, work and travel, our energy system, industries, natural environment, our agriculture sector and how we use and process materials. Significant technological advancements, building on current pilot projects, such as negative emissions technologies, zero emissions heat and zero emission vehicles will undoubtedly have helped to accelerate our transition to net zero and for Scotland to benefit from the economic opportunities that these developments bring, including jobs and trade.

It's clear that the impact of our measures will go further than ending our contribution to climate change, with widespread benefits for our citizens, economy and natural environment. A sustainable economy will be built upon innovative green jobs, providing reliable, and skilled, employment for many. Nature and biodiversity will also have benefitted significantly from our transition, with nature-based solutions helping to restore and protect our ecosystems. Our places and communities will support the wellbeing and healthier lifestyles for people, while driving regional inclusive and sustainable economic growth. Changes to how

we heat our homes and how we travel, for example, will have helped to improve wellbeing and tackle fuel poverty alongside wider equalities issues as part of a just transition.

Scotland will continue to be seen as a world leader in climate change mitigation and our low carbon technologies, processes and services mean we'll have been able to attract skills and investment from all over the globe, and create new export and trade opportunities. Even when we've reached net zero, our part in tackling the climate emergency will by no means be over. We will continue to work with other countries, share our practices and drive emissions reduction at a global scale.



2 This will support the 2045 vision of Scotland's Environment Strategy: *By restoring nature and ending Scotland's contribution to climate change, our country is transformed for the better - helping to secure the wellbeing of our people and planet for generations to come.*

Working Together

The transformation of Scotland's society and economy to net zero emissions can by no means be delivered by Government alone. It will require a national effort across all sectors - public, private and third - and from communities and individuals across Scotland. We must therefore ensure that our transition to net zero is **collaborative** and delivered in **partnership**.

Each of the sector chapters in Part 3 set out in detail how we will work with the public sector, individuals, businesses, industry, the UK Government and other countries as we pursue net zero emissions by 2045.

Leadership in the public sector

Scotland's public sector bodies have a strong leadership role in delivering the transition to net zero. Strengthened legislation requires public bodies to report on their targets for achieving zero direct emissions and reducing indirect emissions, and to report how spending aligns with emissions reduction.

COSLA recognises the climate and biodiversity crisis and all 32 of Scotland's local authorities signed Scotland's Climate Change Declaration in 2007. Between 2005 and 2018 end-user CO₂ emissions fell by 35% across all 32 local authorities in Scotland. The NHS in Scotland has cut buildings' emissions by over 60% since 1990 and committed to net zero by 2045. Some public bodies have cut emissions by up to 50%, with Scottish Water and Zero Waste Scotland launching new net zero transition plans in 2020.

The Scottish Government has pledged at least £95 million to decarbonise the public sector estate and will implement a Net Zero Carbon Standard for new public buildings. We are working to decarbonise the public sector car fleet by 2025. We are

mobilising the £12.6 billion of public sector procurement and collaborating across the public sector on tools and guidance to support the green recovery and our wider climate and circular economy ambitions.

We are committed to mobilising the £12.6 billion spent through public procurement to support our net zero ambition and have established the Climate and Procurement Forum to coordinate the procurement effort across the public sector, building on the existing sustainable procurement duties placed on public bodies through the Procurement Reform (Scotland) Act 2014. We have targeted programmes underway to underpin traction on a green recovery and wider climate and circular economy ambitions. This includes collaborating at national and sectoral levels to maximise collective purchasing power, for example to decarbonise buildings and vehicles, and we are also engaging with local leaders as key enablers, ensuring early procurement involvement in projects and working with public procurers to build climate change capability across the procurement community.

Engaging individuals

Public buy-in and behaviour change is key to climate action. CCC research estimates that more than 60% of emissions reductions to meet net zero will need to come from societal change. The 2019 Scottish Household Survey figures indicated that 68% of the Scottish public believe that climate change is an immediate and urgent problem; a steady increase since first inclusion in 2013. In our most recent research, reaching out to a representative sample of 1000 people in October 2020, we found that this figure had further increased to 79%³. This concern will need to be transformed into societal action if we are to achieve our goal to end Scotland's contribution to climate change in a generation.

To help achieve this, we will have developed our 'Net Zero Nation: a Draft Public Engagement Strategy for Climate Change', which has been published alongside this update for public consultation. It sets out our vision and guiding principles for future engagement, while detailing how we will communicate our climate change policies, enable participation in policy design and encourage action. It complements the actions set out in this document that individuals and Scottish households need to take for each sector.

Working with business and industry

We recognise the leadership role that many businesses are already playing and the action they are taking to reduce carbon emissions. Businesses from all sectors and in all parts of Scotland have an integral role to play in the transition. They can join government in investing in skills, infrastructure and innovation to deliver the growth and employment opportunities that a just transition to net zero offers.

An example of this is the Grangemouth Future Industry Board, which will provide a forum that brings together key decision makers across the Scottish Government, Scottish Enterprise and Falkirk Council, with a focus on Scotland's key manufacturing cluster. It will strengthen alignment and co-ordinate activity to ensure the significant opportunities for low carbon economic growth are maximised at Grangemouth. The board will focus on specific and agreed work streams that will inform and shape efforts to unlock potential investment and identify policy levers that can support sustainable growth at Grangemouth, with decarbonisation, longevity, competitiveness and just transition at the heart of the board's efforts.

The move to a net zero economy provides an opportunity to build thriving, competitive Scottish businesses and supply chains and associated employment. Our investment in transformational projects such as the Michelin Scotland Innovation Parc and the National Manufacturing Institute Scotland will support this. Furthermore, the Green Jobs Fund will provide £50 million through our enterprise agencies to help businesses which provide sustainable and/or low carbon products and services to develop, grow and create jobs; and a further £50 million to support businesses and supply chains across sectors to take advantage of public and private investment in low carbon infrastructure.

The Scottish Government will support businesses to set ambitious science-based emissions reduction targets and develop strategic, net zero transition plans to meet these targets. A number of Scottish Businesses are already doing this, for example Scottish Water has set a target for net zero emissions by 2040 by transforming the way they operate and invest, and have set out a route map for how they will achieve this. By Spring 2021, we will have worked with stakeholders across the business community to systematically map business needs in relation to transition planning. This is a an opportunity to demonstrate Scottish private sector ambition and action in the run-up to COP26. We will showcase the best of what Scottish businesses are doing to deliver a just transition alongside opportunities to attract investment to Scotland and promote exports.



Michelin Scotland Innovation Parc, Dundee. Credit MSIP.

Our Net Zero Transition Managers Programme will facilitate new managerial roles into Energy Intensive Industries, tasked with recommending decarbonisation options. We will encourage businesses to take advantage of Scottish Government support to invest in energy efficiency measures and onsite renewable generation. We will support businesses and industry to promote a circular economy and tackle waste across their supply chains, for example by using the circular Economy Investment Fund to stimulate innovation. Support for retraining, upskilling and recruiting employees will be progressed through the Climate Emergency Skills Action Plan and the Fair Work agenda. National Planning Framework 4 will help to identify where new development can be delivered, ensuring that we make best use of our assets and opportunities to support net zero targets and maximise opportunities to draw in private finance. This update covers a number of examples of what Scottish business and industry are doing to promote a shift to net zero within their own organisations.

Working with Green Finance and Investors

Private finance is vital to securing the level of investment required to reach net zero. The transition will in turn create a wealth of opportunities across the Scottish economy. Enhancing Scotland's position as a destination for green investment will be crucial to achieving our targets and capitalising on these opportunities. We will work with institutions like City Of London Corporation and the Green Finance Institute to understand these markets, and with private sector stakeholders to understand and reduce the barriers to further investment. We will also work with regulators at the UK level to ensure that our financial system is resilient to the economic challenges that we face from a changing climate, increasing financial stability and investment in the green economy while protecting businesses and savers.

The Scottish National Investment Bank has been set a principle mission to support a just transition to net zero and will act as a catalyst in de-risking both technology

and early stage roll-outs and crowd in investment. The Green Investment Portfolio, launched in September 2020, identifies low carbon investment opportunities to attract private capital and is built to expand, taking in both private sector-led opportunities around technology, industrial sites and energy generation, as well as public sector led projects around heat networks, electrification of transport, and the use of hydrogen where coordination is needed around supply, demand and regulation. The Scottish Government's Inward Investment Strategy, published in October this year, is aimed at attracting investment from overseas and other parts of the UK and has renewable energy and low carbon transport as priority areas. Our Capital Investment Plan, due in spring 2021, will take a systematic approach to turning our sectoral ambitions into investable projects that can attract finance and deliver net zero living across Scotland.

We are working directly with investors to understand and address barriers to key net zero markets, such as natural capital and biodiversity and will explore and adopt innovative financing approaches to mobilise more private capital into Scotland's net zero transition.

Working with the UK Government

As highlighted by the Committee on Climate Change in their 2020 progress report, UK Government action, in parallel to the decisions of the Scottish Government, is essential if Scotland is to meet its targets. The UK Government holds a number of key powers that will be vital to our net zero transition, including fiscal and pricing elements of emissions trading, decisions on the future of the gas grid, investment in electricity network infrastructure, regulation on energy networks, vehicle standards and regulation of renewable energy investment.

This Plan update sets out our specific requests of the UK Government on a sector-by-sector basis, emphasising the need for still more increased ambition and support as we work towards a green future, particularly as we recover from the COVID-19 pandemic. These asks include:

- reform the Contract for Difference mechanism to deliver specific support for wave and tidal generation and investment and jobs in domestic energy businesses;
- accelerate the development of negative emissions technologies, carbon capture and storage, and hydrogen as essential components of our energy system;
- accelerate demonstration of the technological solutions to cutting emissions from our homes and buildings, and in particular set out clear timescales for taking strategic decisions about the future scale and pace of decarbonisation of the gas network to support delivery of our targets for heat in buildings;
- update energy regulation by giving Ofgem a statutory objective to support the delivery of net zero and interim statutory greenhouse gas emissions targets and address the imbalance in pricing for electricity and gas to better incentivise the deployment of zero emissions heating technologies;
- commit to a UK Emissions Trading Scheme common framework post-Brexit (which would respect the devolution settlement) and rule out implementing a reserved Carbon Emissions Tax over which devolved administrations would have no say; and
- review options on fuel duty and vehicle excise duty to help reduce unsustainable travel.

International action and collaboration

We are facing a global climate emergency, which affects us all. This plan is being published in the midst of a global pandemic. These challenges highlight the enormous importance of international cooperation; Scotland is determined to play its part. Through the COVID-19 crisis, Scotland has collaborated with international partners, using our networks to secure insights into best practice in reducing transmission and the other harms caused by the virus. We will build on this internationally networked approach and work collectively to keep Scotland open, connected and able to make a positive contribution internationally. This is true for both the COVID-19 effort and for climate change.

In 2021, the UK will host the UN Climate Conference, COP26 in Glasgow. Just as COP21 led to the landmark Paris Agreement, this important international event must be a milestone in delivering increased collaboration and action needed for a global transition to net zero in a way that is fair and just. The Scottish Government is committed to working closely with the Glasgow City Council, the UK Government, the European Union, UNFCCC and all other partners to deliver a safe, successful and inclusive summit.

We want to showcase the world-leading work we are doing in Scotland, both by the Scottish Government through, for example, our emissions reduction ambition, our renewable energy delivery and expertise, our knowledge and experience of afforestation and peatland restoration, and our scientific strengths and innovation expertise on nature based solutions; but also the innovation and expertise that exists in our academic institutions, industry and business, communities and people. We also want to work with and learn from others. We do not have all the answers but are committed to being an integral part of the global solution.

The Under2Coalition

The First Minister was recently voted as European co-chair of the Under2 Coalition, a group of more than 220 governments representing over 1.3 billion people and 43% of the global economy. We will use our position as co-chair to:

- mobilise action ahead of COP26;
- work to imbed inclusivity at the heart of the coalition, ensuring that those who are least responsible for the global climate emergency, but are being first and most severely affected by it, are represented and heard;
- and pursue and develop the green recovery agenda with our partners.

We will build on the work to date with the Coalition which includes:

- the peer-learning Industry Transition Platform (ITP), which aims to support participating governments to develop effective policies and strategies to achieve deep emissions cuts in traditionally heavy-emitting industries;
- funding for the Future Fund, which fosters knowledge exchange through secondments between developing and developed regions;
- and taking a leading role in the ZEV Community, a platform for inter-governmental peer learning on zero emission vehicles.



Under2 Coalition Steering Group Meeting, Madrid

Relations with the EU

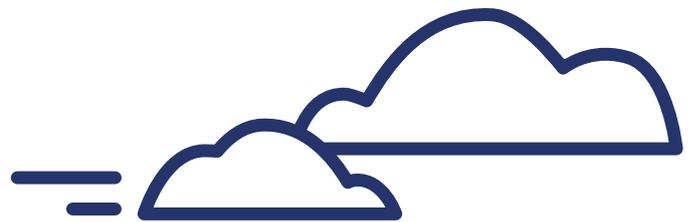
The people of Scotland voted decisively to remain within the European Union and Scottish Ministers continue to believe that EU membership is the best option for Scotland. At the time of writing, despite ongoing negotiations, No Deal remains a real possibility. Even if a deal is secured, the UK Government's approach means it will be a very basic "low deal". The impact on the opportunity to collaborate with other nations and EU programs, such as Horizon 2020, makes it all the more challenging to achieve our shared objectives.

The Scottish Government is committed to maintaining or enhancing environmental standards in Scotland, and to seeking to keep pace with EU Directives and Regulations as far as possible. The Scottish Government's Continuity Bill contains measures to bring EU environmental principles into Scots Law as the "guiding principles on the environment". This will ensure that these principles continue to inform the development of our environmental law and standards. The Bill will also establish an environmental governance body, Environmental Standards Scotland, to secure full and effective implementation of environmental law.

In a crucial year for the Paris Agreement, heading into COP 26 in Glasgow in November 2021, Scotland's voice is more important than ever and we remain committed to collaboration with the EU institutions and at Member State level, across all the sectors covered by this plan and in line with the EU Green Deal. Indeed we also believe it is vital that the UK Government facilitates close collaboration and cooperation with the EU and Member States at every level. Scotland continues to be a committed, open, global actor, as evidenced by our European Co-Chair position on the Under 2 Coalition. This is not only about Scotland's position in Europe, it is also about our ability to work with our friends and neighbours to achieve the targets and policies set out below.

Monitoring framework

This Plan update includes a refresh of the monitoring framework from the 2018 Plan, with a revised set of policy outcome indicators to reflect the new and boosted underlying policies and, where possible, to improve the quality and robustness of the indicators themselves. This updated monitoring framework will form the basis of statutory annual reporting on progress to delivering the Plan, at a sector by sector level, to the Scottish Parliament from May 2021 onwards.



Scottish Parliament, Edinburgh

Introduction



recycle for
Scotland

Recycling Centre

general waste

drinks cans

plastic bottles

paper



How this document relates to the 2018 Climate Change Plan

1. In February 2018, the Scottish Government published the [‘Climate Change Plan: the Third Report on Policies and Proposals: 2018-2032’](#) (the 2018 Plan). In response to the global climate emergency, the Scottish Government brought forward primary legislation to amend Scotland’s emissions reduction targets. In October 2019, the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 received Royal Assent and was commenced in March 2020, setting annual and interim emissions reduction targets for Scotland, on a trajectory to net zero emissions by 2045. These targets include the world-leading interim goal of a 75% reduction in emissions by 2030 (relative to the 1990 baseline). The Scottish Government also committed, in line with recommendations from the Scottish Parliament, to updating the 2018 Plan, in order to account for these new targets. This update to the 2018 Plan fulfils that commitment.
2. We had planned to lay this Plan update before Parliament earlier this year, and were on track for April 2020, however, its progress was necessarily postponed due to the COVID-19 pandemic. In light of the unprecedented circumstances we are faced with, this Plan update now demonstrates not only our pathway to meeting Scotland’s emissions reduction targets over the period to 2032, but is also a strategic document on our green recovery from COVID-19.
3. It’s clear that, at time of publication, we are very much still in the midst of the pandemic and the lasting impact of this virus is not yet quantifiable. Our work on a green recovery will continue to evolve and develop beyond this Plan update towards our longer term vision to deliver a just transition to net zero by 2045.
4. It is also important to note that many elements of the 2018 Plan still stand and this Plan update should be read alongside that document. In addition to the new focus on green recovery, this Plan update:
 - shows which of the emissions reduction policy outcomes, policies and policy proposals within the 2018 Plan will be updated (by ‘boosting’ or accelerating actions), and what new policies have been added since 2018. The sector chapters in Part 3 set out the detail of the new policy package and Annex A provides a complete list of the policies;
 - includes updated emission envelopes for each sector which reflect the pathway to the new emissions reduction targets;
 - includes additional abatement in the updated emissions reduction pathway sufficient to make up the excess emissions of 5.5 MtCO₂e from the 2017 and 2018 annual targets having been missed. As such, the present document also fulfils the requirements of section 36 of the 2009 Act in relation to those targets; and
 - updates the monitoring framework from the 2018 Plan. This will now be used for annual, sector by sector, reporting on progress from May 2021 onwards. See Annex B for more information.



Edinburgh, Scotland

Engagement

5. In Scotland we have a particular approach to policy-making, putting people and organisations at its heart and engaging those who live here in decision-making. Collaborating with stakeholders and the public is especially important when it comes to tackling climate change because of the scale of the challenge we are facing.
6. The changes we make as we decarbonise will transform all our daily lives and this transformation can only be achieved with the endorsement of, and active engagement with, the public.
7. To assess how public opinion on climate change may have changed in light of the pandemic, the Scottish Government commissioned research to address the current evidence gap on public views surrounding potential actions for climate change mitigation and a green recovery in Scotland. When asked specifically about climate change, most respondents (79%) say it is an “immediate and urgent problem”, and the level of concern has increased over time, including since the start of the pandemic. All actions tested with the public received a majority level of support, with respondents highlighting the benefits that tackling climate change can have for jobs and the economy, as well as biodiversity. Actions tested included support for additional charges on the sale or provision of items that are harmful to the environment, reducing personal car travel, as well as regulations requiring low or zero emissions heating and increased investment in low-carbon companies⁴.
8. These latest findings build on and complement those originating from the 2019 Big Climate Conversation, which offered citizens, businesses and public sector organisations the opportunity to have their say on Scotland’s transition to net zero emissions. A number of key themes emerged and these have been reflected in this Plan update, including the importance of a just transition, the need for a systemic approach and the importance of education and skills. The conversations also highlighted a number of policy actions that we are taking forward in this Plan update, including: investment in home energy efficiency improvements; increased tree planting; switching to low-carbon methods of farming; and encouraging the switch from private car use to public transport.

⁴ See ‘Research into public attitudes to climate change policy and a green recovery: report of findings’ as a supporting document here: <https://www.gov.scot/isbn/9781800044302>

Citizens Assembly

The establishment of a citizens' assembly on climate change is part of our commitment to open government, where citizens are facilitated to contribute meaningfully to the policies that affect their lives both now and in the future. Scotland's Climate Assembly is independent of Ministers and operates according to principles of transparency and inclusion. The Assembly comprises of around 100 members selected randomly to be broadly representative of the adult population. The Assembly has begun its meetings online due to current Coronavirus guidance and will meet over six weekends, beginning in November 2020 and concluding in March 2021. The Assembly will provide a report of recommendations following its deliberations. The Scottish Government is required to respond within six months of receiving this final report. More details on the Assembly's operations can be viewed at www.climateassembly.scot.

9. In producing this update we have also engaged closely with experts, advisory bodies, businesses and other organisations. This engagement has come in a number of forms, including the Sustainable Renewal Advisory Group, advice from the Committee on Climate Change, the Scottish Science Advisory Council and the Just Transition Commission, as well as considering the green recovery recommendations of a number of other organisations. In February 2020, the Scottish Government engaged with over 200 stakeholders to consider our

priorities for the Climate Change Plan update and our vision for a net zero Scotland. Covering a wide range of views and interests, those in attendance were generally supportive and positive regarding the level of ambition demonstrated by the Scottish Government. There was acceptance that urgent action is required to meet our targets and maximise the opportunities from emissions reduction, acknowledging that businesses, organisations and the public have a fundamental part to play in this. There were a number of key, cross-cutting, themes identified from these conversations. These remain highly relevant and have helped to inform this Plan update and our green recovery work. They include:

- the importance of prioritising fairness, and a just transition; managing any risks, avoiding exacerbating inequalities, and ensuring that everyone can experience the benefits of a transition to net zero;
- prioritising the wellbeing of citizens when developing and implementing policy;
- the need for a more coordinated and joined up approach, with collaboration between the Scottish Government, local government, business, industry and communities;
- the value of setting clear and accurate standards and targets, (such as waste reduction, energy efficiency and goods production) to help those outside government take action; and
- the importance of influencing behaviours to implement policies and interventions which are effective and successful.

Looking forward to the next full Climate Change Plan

10. The Plan update recognises the continual need for learning by doing, review and further policy development, especially given the limits of devolution, technical complexity of measuring emissions reduction, significant uncertainties and changing markets as well as emerging technologies and how they can be deployed at a commercial scale.
11. As such, this Plan update does not, and cannot, contain all of the answers; it builds upon learning to date from a broad range of sources which are explored further in this document, but also needs to be further updated through future Climate Change Plans and a range of associated national policies and strategies. It has been created with, and aligned to, a range of publications and will be built on and adapted through future strategies and other publications. These include:
 - 'Net Zero Nation: Draft Public Engagement Strategy for Climate Change'
 - National Planning Framework 4
 - Infrastructure Investment Plan
 - [Scottish Government] Housing Strategy
 - Energy Strategy
 - Heat in Buildings Strategy
 - National Transport Strategy Delivery Plan
 - Hydrogen Policy Statement
 - Hydrogen Action Plan
 - Climate Emergency Skills Action Plan
 - Previous monitoring reports on progress to the 2018 Plan
12. The range of strategies and publications with which this Plan update interlinks demonstrates how firmly our climate change targets are embedded in decision-making across the Scottish Government.
13. Scotland's statutory framework on climate change also ensures that strategic planning on emissions reduction will continue to be revisited on a regular basis, with annual monitoring reports on progress each May and the next full statutory Climate Change Plan process due to be completed by early 2025 at the latest.

Just Transition

The transition to net zero emissions will transform our society and economy, therefore the manner of our transition will be crucial. If we plan and prepare, building consensus about our collective future through dialogue and engagement, then we can ensure Scotland benefits from the opportunities of net zero. The transition can realise green jobs, a better environment and a healthy economy that supports our wellbeing. Failure to plan risks abrupt shifts, the loss of key industries and jobs, and deepening inequalities. This is why Scotland has committed to a just transition to net zero.

A just transition puts people, communities and places at the heart of our approach to climate change action. It ensures we work together in order to capture opportunities, tackle existing inequalities and exclusion, whilst anticipating and mitigating risks to those worst impacted so no one is left behind. As the pace of the transformation increases, the need for a collaborative just transition becomes ever more important. This approach is at the heart of Scotland's ambitions to move to a wellbeing economy that prioritises society's wellbeing as the core aim of our economy.

The just transition concept features in the Paris Climate Agreement. It encompasses a range of social interventions to secure workers' jobs and livelihoods and has often been closely aligned with particular industries or regions undergoing transitions, for example coal mining. Scotland's just transition approach and decision to establish an independent Just Transition Commission was informed by the trade union movement as well as private sector, third sector and academia.

In Scotland we have taken a broad approach to just transition, looking across the economy and the whole of Scotland. This recognises that the scale of the net zero transition will impact everyone, but not equally. We need a plan to ensure that the decisions we are making take into account different circumstances and enable everyone to access and benefit from the opportunities of net zero whilst supporting those potentially at risk from an unmanaged shift away from fossil fuels.

The just transition principles in our Climate Change legislation emphasise the importance of taking action to reduce emissions in a way which:

- supports environmentally and socially sustainable jobs;
- supports low-carbon investment and infrastructure;
- develops and maintains social consensus through engagement with workers, trade unions, communities, non-governmental organisations, representatives of the interests of business and industry and such other persons as the Scottish Ministers consider appropriate;
- creates decent, fair and high-value work in a way which does not negatively affect the current workforce and overall economy; and
- contributes to resource efficient and sustainable economic approaches which help to address inequality and poverty.

Part 1: Green Recovery



- 1.0.1 The COVID-19 pandemic has been an unprecedented global crisis which has fundamentally changed every aspect of our lives. While there are many challenges there are also important opportunities in this time of change. In our recovery from COVID-19, we can rebuild our society and economy in a greener, fairer and more sustainable way.
- 1.0.2 To deliver on that opportunity, the Scottish Government has committed to a green recovery from COVID-19: a recovery which sets us on a path to meeting our world-leading emissions reduction targets in a way that is just and improves the outcomes for everyone in Scotland, ensuring no one is left behind. COVID-19 has demonstrated the risks of abrupt, unplanned shifts and how these exacerbate inequalities in our society. However, a green recovery offers opportunities to address these inequalities, create and maintain good, green jobs right across Scotland, and empower people and communities to make decisions about their future through community wealth building. A green recovery drives action to reduce our emissions and protect and restore our natural environment.
- 1.0.3 While recognising the impacts are different, there are lessons to be learned from crises of the past, for example the 2008-10 financial crash. As the International Energy Agency noted earlier this year, a 400 million tonne CO2 reduction in 2009 was followed by a rise of 1.7 billion tonnes in 2010, which is the sharpest upswing in history⁵.
- 1.0.4 Analysis of the impact from COVID-19 on emissions, published in April 2020, suggests the pandemic could result in global emissions reductions this year of around 2 billion tonnes of CO2, or 5.5% of 2019 emissions, which would be the largest ever annual fall in CO2 emissions⁶.
- 1.0.5 However, the resurgence of emissions following the 2008-10 financial crash should make us treat anticipated emissions reductions with caution. Indeed, more recent evidence suggests that at least some of these gains may be temporary. One study tracking global emissions, using fossil fuels and cement production as key indicators, shows an increase of CO2 levels by late April⁷. Another study tracking emissions through consumer expenditure in the UK shows an increase in CO2 emissions between quarter two and quarter three of 2020, likely related to loosening of lockdown policies⁸. It is critical for the future of our planet, and for Scotland's contribution to tackling the climate emergency, that we do not repeat the mistakes of the past. We must secure this opportunity to lock-in as much of the emissions reductions as possible through a just and green recovery, setting us on a pathway to net zero.

5 <https://www.iea.org/commentaries/what-the-2008-financial-crisis-can-teach-us-about-designing-stimulus-packages-today>

6 <https://www.carbonbrief.org/analysis-coronavirus-set-to-cause-largest-ever-annual-fall-in-co2-emissions>

7 <https://www.nature.com/articles/s41597-020-00708-7>

8 <https://www.lloydsbankinggroup.com/globalassets/documents/media/press-releases/lloyds-banking-group/2020/consumers-cut-carbon-with-emissions-down-12-percent-on-20192.pdf>

1.1. Engagement with Stakeholders on a Green Recovery

1.1.1 Our approach to a green recovery is being informed by experts, stakeholders and the public.

Public engagement

1.1.2 Our approach to a green recovery has been informed by the latest public opinions and research, including proposals to embed climate positive behaviour changes we have experienced since March 2020.

1.1.3 The Scottish Government commissioned research on public views for a green recovery in Scotland. The research findings are based on a nationally representative telephone survey of 1,045 adults across Scotland, and provide robust data exploring views on potential actions to reduce carbon emissions and support our recovery. The vast majority of respondents (79%) said climate change is an “immediate and urgent problem” and the number of respondents rating change as “urgent” is significantly higher than in the 2019 Scottish Household Survey. Over a quarter (26%) of respondents said they are more concerned about tackling climate change since the COVID-19 pandemic began, with only 7% saying they are less concerned⁹.

1.1.4 The actions tested with the public received high levels of support and respondents highlighted the benefits that these measures can have for our jobs, the economy and wellbeing, as well as climate change. For example, in terms of actions to deliver a green recovery, a majority would support requirements on homeowners to replace their current gas or oil-fired boiler and radiators with a new type of heating system that is more environmentally friendly, although respondents did not feel homeowners should bear the cost of this. Most respondents also supported investing public money in low carbon companies, noting the co-benefits for the economy and our climate. Furthermore, in line with public attitudes data which shows that people intend to walk and cycle more in the future¹⁰, a majority would be willing to reduce the amount they travel by car. Among the minority opposed to the measures, the most common reasons given were concerns about who might carry the cost, implications on jobs and perceptions of financial risk. We must continue to consider such factors as part of our commitment to a just transition, ensuring we reduce our emissions in a way that is fair.

⁹ See ‘Research into public attitudes to climate change policy and a green recovery: report of findings’ as a supporting document here: <https://www.gov.scot/isbn/9781800044302>

¹⁰ COVID-19 Public Attitudes Survey Data: Wave 10, published 19 November 2020, accessible: <https://www.transport.gov.scot/publication/covid-19-public-attitudes-survey-data-wave-10/>



Workshop at the 2019 Big Climate Conversation

1.1.5 We have also commissioned research via ClimateXchange to better understand how and why behaviours are changing as a result of the pandemic. The research is following a cohort of 30 participants over approximately 8 months to explore participants' experiences of behaviour change, including the factors influencing whether new behaviours are likely to be sustained over time. Participants were selected to represent a mixture of demographics and a variety of attitudes to climate change, allowing for investigation of the factors influencing behaviours for people living in different

circumstances. To complement this in-depth study, we are funding a nationally-representative random household survey of over 1,100 people in Scotland, which will generate quantitative data on post-pandemic attitudes and behaviours relating to net zero and green recovery. There will be two rounds of data collection, with the first wave of results expected in January 2021.

1.1.6 The findings of our public research are a key step to assess how public opinion on climate change and behaviours have changed in light of COVID-19. Despite the challenges we've faced as a result of the pandemic, it's clear that

levels of concern around climate change continue to grow and the public recognises the dual benefits of tackling climate change and an effective green recovery of the economy. We will continue to engage closely with the Scottish public as we deliver upon a

recovery that aligns with our climate ambition. Further public engagement, including the Citizen's Assembly on Climate Change, will provide an opportunity to further our insight into public attitudes, behaviours and recommendations to tackle climate change.

Draft Public Engagement Strategy

Alongside the publication of this document we have also published our *Net Zero Nation: Draft Public Engagement Strategy for Climate Change* for public consultation. This strategy outlines our new overarching framework for engaging the people of Scotland in the national effort required to successfully realise the ambition included within the Climate Change Plan Update.

The draft strategy marks a step change in our approach to public engagement in climate change policy, moving from encouraging incremental changes in attitudes and behaviours, to supporting a society-wide transformation. We want to put people at the heart of everything we do have therefore structured our new approach around three strategic objectives:

- 1.** People are **aware** of the action the Scottish Government is taking to tackle climate change and how it relates to their lives.
- 2.** People actively **participate** in shaping fair and inclusive policies that promote adaptation to and mitigation of climate change.
- 3.** Taking **action** on climate change is normalised and encouraged in communities and places across Scotland.

Delivery of the strategy will require collaboration with a wide range of stakeholders, from community groups to local authorities and delivery bodies. We encourage interested parties to contribute to the consultation, [here](#).

Stakeholder recommendations

1.1.7 In April 2020, the Cabinet Secretary for the Environment, Climate Change and Land Reform, Roseanna Cunningham, requested advice from the Climate Change Committee and established the Sustainable Renewal Advisory Group, recognising the importance of bringing experts together to consider the green recovery from the pandemic.

In response to a request for advice, the Climate Change Committee wrote to the Cabinet Secretary for Environment, Climate Change and Land Reform on 6 May

recommending that the Scottish Government, in partnership with Westminster, prioritises actions according to six principles for a resilient recovery¹¹:

1. Use climate investments to support the economic recovery and jobs
2. Lead a shift towards positive long-term behaviours
3. Tackle the wider ‘resilience deficit’ on climate change
4. Embed fairness as a core principle
5. Ensure the recovery does not ‘lock-in’ greenhouse gas emissions or increased climate risk
6. Strengthen incentives to reduce emissions when considering fiscal changes

1.1.8 The Sustainable Renewal Advisory Group brought together Members of the Scottish Parliament and stakeholders from across academia, industry, business, trade unions and environmental organisations. They were tasked with identifying concrete, deliverable ways of embedding sustainability in Scotland’s recovery from COVID-19, as well as exploring the new challenges and opportunities in achieving our climate change targets. The Cabinet Secretary chaired the group, which met six times from May to November 2020, thoroughly exploring topics around a green recovery and informing this Climate Change Plan update.

1.1.9 The Scottish Government also requested advice on a green recovery from the Just Transition Commission and the Advisory Group on Economic Recovery. Furthermore, we have considered recommendations from a number of organisations, such as the Climate Emergency Response Group (CERG), Stop Climate Chaos Scotland, Scottish Environment Link, WWF Scotland and other environmental organisations; from the Infrastructure Commission for Scotland; and from private sector stakeholders including the Scottish Council for Development and Industry, Scottish Renewables, SSE and EON, among many others.

11 <https://www.theccc.org.uk/publication/letter-building-a-resilient-recovery-from-the-covid-19-crisis-to-roseanna-cunningham-msp/>

Just Transition Commission Recommendations

The Just Transition Commission is an independent Commission tasked with providing Scottish Ministers with practical, realistic, affordable recommendations for action to deliver a just transition to net zero in Scotland. The Commission will run for two years and is expected to deliver its final report in March 2021.

In July 2020 the group's [Recommendations for a Just, Green Recovery](#) advised on immediate priorities in response to the pandemic. The report highlighted four "hot spot" areas that would require particular attention in the near term: (a) the particular risk to young people, (b) the uncertainty around changes in transport use patterns, (c) the rapid, unplanned transition unfolding in the oil and gas sector and (d) the fact that parts of the rural economy had been particularly hard hit. Specific recommendations for action can be summarised as:

1. Boosting measures that will help keep people warm, create jobs and save money for energy consumers
2. Backing buses and boost the supply chain
3. Helping rural Scotland by helping Scotland's nature
4. Maintaining jobs for workers in oil and gas while transitioning into jobs of the future
5. Aligning skills development - for young and old - to the net zero transition
6. Giving business direction and attach conditions to funding

1.1.10 We have conducted an analysis of all of this advice, from which a number of key cross-cutting themes and recommendations have emerged:

- Opportunities for **green job creation**, including reskilling and retraining of the workforce into sustainable, good jobs;
- Delivery of a **just and fair** recovery;
- Use of **green finance and investment** initiatives such as carbon pricing;
- Encompassing **conditionality** into our recovery, ensuring that support for sectors aligns with our commitment to climate change targets and investment in Scotland's natural capital;
- Prioritising **resilience** in our economy to protect it from future crises, such as those caused by climate change;
- Locking in **positive behaviour**, particularly active travel and remote working, and investment in high-speed telecommunications to support working from home; and
- Ensuring that we harness a **place-based approach**, taking actions at a local level to ensure that the benefits are spread widely.

1.1.11 Other recommendations are sector-specific, such as:

- Transport - Further commitment to **green transport**, including investment in electric vehicle infrastructure, increased affordability of public transport, decarbonisation of public transport and prioritisation of active travel.
- Buildings - Emphasis on **sustainable housing**, for example in the delivery of housing retrofits to increase energy efficiency, tackling fuel poverty, and higher carbon standards for new homes.
- Electricity - Increased investment in **renewable energy**, particularly onshore and offshore wind.
- Land Use, Land Use Change and Forestry - Focus on **biodiversity** and '**natural capital**' through the optimisation of land use such as restoration of peatland, tree planting, and "re-wetting" of bog land.

1.1.12 These recommendations have informed our delivery of a green recovery to date. Details on sector specific policies are included within the relevant sector chapters in Part 3; cross sector recommendations are addressed below.

1.2. Delivering a Green Recovery

1.2.1 Across all of the actions in this Climate Change Plan update, we are embedding a just transition, ensuring that we assess how green recovery actions address inequalities and deliver wellbeing outcomes for everyone. A just

transition is key to our focus on good, fair jobs and Community Wealth Building. It also takes a place-based approach to policy development and delivery. We will consider the detailed design of these policies and initiatives to deliver a just transition and examine the costs to ensure they do not disproportionately disadvantage certain groups, places or sectors.

Investing to drive demand in the net zero economy

1.2.2 The transition to net zero will require significant upfront investment in modernised infrastructure and capital projects, preserving and restoring Scotland's natural environment, and modernising our building stock. As stakeholders such as the CCC and CERG have stressed, while government has a crucial role to play, the scale of this transformation cannot be funded by the public purse alone. Mobilising private sector and personal investment in the quantity and at the pace required will put Scotland in prime position to maximise the economic benefits from the low carbon global economy, as well as on the path to meet our emissions targets.

Public investment and stimulus

1.2.3 The fiscal challenges posed by the COVID-19 crisis are considerable, but we have continued to prioritise action to reduce our emissions, demonstrating our commitment to ending Scotland's contribution to climate change. Using public investment to create an environment where new industries, markets and innovations can thrive is key to securing a just transition to net zero by 2045.

1.2.4 Since setting our new emissions targets in the Climate Change (Emissions Reduction) (Scotland) Act 2019, the Scottish Government has made significant spending commitments for net zero initiatives. Our 2020-2021 Budget brought our overall low carbon capital spend to £1.8 billion on an annual basis, while our 2020-2021 Programme for Government and our draft Infrastructure Investment Plan committed an additional £2 billion capital investment to support the green recovery over the life of the next Parliament.

1.2.5 Those investments included the first tranche of the Low Carbon Fund set out in the 2020-2021 Programme for Government and Draft Infrastructure Investment Plan. The Low Carbon Fund was designed to support transformational projects which accelerate our just transition to net zero, provide a level of certainty needed to grow new markets for private investment, and create employment opportunities. The final tranche of the Low Carbon Fund is set out in this Plan update with £180 million for Emerging Energy Technology, including an emphasis on Negative Emissions Technologies (NETs), £120 million to drive forward a fully decarbonised future for buses, £50 million to transform vacant and derelict land to support our climate objectives, and a further £50 million uplift to active travel through the creation of “Active Freeways”. The role of public investment is crucial in helping prove a concept or an approach that could become central to our transition.



1.2.6 The draft Infrastructure Investment Plan for 2021/22 to 2025/26 published in September 2020 details around £24 billion of major projects and national programmes, with more to be confirmed in future years. These investments will provide a near-term stimulus to support Scotland’s economic recovery, and also lay the foundations for long-term green growth. The draft Plan provides a robust pipeline of low carbon projects, creating the conditions for new supply chains to develop, and for the creation of good, green jobs in areas such as construction and building retrofit, nature and environmental projects, and transport and digital infrastructure.

Infrastructure Investment Plan

Infrastructure investment has a vital role to play in helping businesses and communities to adapt and recover from the economic, health and social harm arising from COVID-19. It cuts across all of the sectors included in this Climate Change Plan update, from our energy systems and how we heat our homes, to our transport links and green spaces.

The Scottish Government's investment in publicly-funded infrastructure has a critical role to play in supporting the transition. Committing to multiyear investments in this Plan update sends a clear signal to businesses and supply chains to invest in people and technology, and help us deliver the net zero transition. But it is only a share of the effort, and cannot deliver such targets on its own.

What we are doing: We already invest £1.8 billion of capital each year in low carbon policies and programmes. Scottish Ministers have committed to increasing the level of spending by an additional £2 billion over the next 5 years. New schemes have already been announced in the 2020-2021 Programme for Government that will deploy £1.6 billion of this investment.

Our draft Infrastructure Investment Plan (IIP)¹² was published in September and we are committed to finalising the Plan alongside the forthcoming Budget and Medium Term Financial Strategy.

The IIP is the key delivery programme for the National Infrastructure Mission which represents over £33 billion of Scottish Government investment in the next five years (from April 2021). The draft IIP sets a long-term vision of infrastructure supporting an inclusive, net zero carbon economy in Scotland. It also recognises the vital role that Scotland's natural environment can play in our infrastructure system and highlights climate resilience as a key priority over the coming years. The proposed common infrastructure investment hierarchy emphasises making the most of our existing assets in order to increase sustainability and address the climate emergency.

In passing the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, the Scottish Parliament agreed that a new methodology should be developed in order to assess the contribution made by the infrastructure investment plan to our new climate change targets. In order to respond to this new requirement, and in recognition of the limitations of the current approach, an independent research project was commissioned to explore alternative options. This research was facilitated by ClimateXChange, Scotland's centre for expertise connecting climate research and policy. The Scottish Government plans to consider these research findings carefully and invited views on the approach within the consultation on the draft IIP.

12 A National Mission with Local Impact - draft infrastructure investment plan 2021 2022 to 2025 2026: consultation: <https://www.gov.scot/publications/national-mission-local-impact-draft-infrastructure-investment-plan-scotland-202122-202526/>

- 1.2.7 As we invest in a green recovery, we will work in partnership with businesses to best align business recovery support with our long-term climate, environmental, economic and social goals. This partnership approach to ‘conditionality’ of business support was set out in our response to recommendations from the Advisory Group on Economic Recovery in August 2020¹³. Conditionality might be applied to a wide range of interventions and may carry risks of unintended consequences. For example real (or perceived) threats to business competitiveness can lead to emissions being off-shored as production is moved elsewhere. Therefore, as part of our response to COVID-19, we have taken a bespoke, partnership approach to conditionality. For example, support for high emitters would be expected to be contingent on credible, robust transition plans that align with Scotland’s climate change ambition. In other cases we would expect those seeking support to publicly align with Scottish Government values, particularly those relating to climate and environmental ambition and fair work.
- Mobilising public sector procurement spend**
- 1.2.8 We are mobilising the £12.6 billion of public sector procurement and collaborating across the public sector on tools and guidance to support a green recovery and our wider climate and circular economy ambitions.
- 1.2.9 Our public sector leaders will need to encourage their organisations to work across boundaries to identify opportunities to procure in an environmentally-friendly way, and will need low carbon options to help them make sustainable choices. For example, this will include using the Non-Domestic Energy Efficiency Frameworks that provide public bodies with advice on and a route to retrofit public buildings to improve their energy efficiency.¹⁴
- 1.2.10 The climate emergency is a very clear priority for higher emission products and services with key areas of focus outlined in the within this Climate Change Plan update, including commitments to decarbonise the public sector fleet and heat. There continues to be significant investment in upskilling public procurers to understand and implement the sustainable procurement duty and to deliver on our ambitions. The Scottish Government’s sustainable procurement tools¹⁵, available to all public bodies, already include indicators and guidance to support Scottish public sector buyers to consider and act on climate change considerations. These include the Sustainable Public Procurement Prioritisation Tool, designed to assist strategic planning and prioritisation of economic, environmental and social wellbeing considerations in public procurements to ensure an appropriate focus within organisational and category/ commodity planning. All of this allows us to make best use of existing public procurement policy and law in Scotland.

13 [Economic Recovery Implementation Plan: Scottish Government response to the Advisory Group on Economic Recovery - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/economic-recovery-implementation-plan/pages/2020-08-10-economic-recovery-implementation-plan-response-to-advisory-group-on-economic-recovery-10-august-2020/)

14 For more information, go to the Utilities section at Scottish Government Frameworks and Contracts: www.gov.scot/publications/frameworks-and-contracts/

15 Sustainable procurement tools: <https://sustainableprocurementtools.scot/>

Mobilising private investment and green finance

- 1.2.11 A central objective of Scottish Government investment in a green recovery is to mobilise and attract additional private investment. The transition to net zero presents a considerable opportunity to position Scotland to benefit from increased, global private investment, as well as an opportunity for investors themselves. Demonstrating Scotland's net zero investment opportunities to business and investors, while identifying and reducing barriers to investment in the low carbon transition, will be vital to achieving the emissions targets outlined in this Climate Change Plan update.
- 1.2.12 Scotland's commitment to the net zero transition is already attracting significant investment, such as Scottish Power's pledge to invest over £10 billion in North Sea renewables in the coming decade. The Scottish Government has a role to play in making clear the value of investment in net zero to private actors, and we are working to develop an attractive investment environment in Scotland. By providing clear guidance over future government policy, regulations, and the path of public investment, we are laying the ground for new sustainable markets in net zero products and services that will stimulate private investment over the coming years.
- 1.2.13 For example, to support the shift away from petrol and diesel cars and vans by 2030, we are investing £30 million in an electric vehicle charging network, and we have extended our low carbon transport loans to used vehicles. Combined, these measures not only make investing in an electric vehicle more economically viable for Scottish households, but also provide a level of certainty to the private sector that demand for ULEV-supporting infrastructure will continue to grow, raising the expected return on these investments and crowding in additional finance.
- 1.2.14 The establishment of the Scottish National Investment Bank, and its capitalisation of £2 billion of public money over the next ten years, is central to driving net zero market growth and mobilising private investment for the transition. The Bank's primary mission will be to support a just transition to net zero by 2045, and will work with public, private and third sector partners to channel and crowd in investment. In addition to co-investment, the Bank will also actively seek to develop and introduce further mechanisms to leverage its available capital and catalyse even greater investment in the Scottish economy.

1.2.15 The Scottish National Investment Bank

The Scottish National Investment Bank launched on 23 November 2020. Working in tandem with the business community and public sector partners, the Bank will be at the forefront of shaping an economy with the transition to a net zero economy, fair work, and inclusive growth at its heart. The Scottish Government has committed to capitalising the Bank with £2 billion over 10 years.

As a mission-based investor, the Bank is in a unique position to influence the direction of Scotland's economic recovery and growth. The Bank's primary mission is to support Scotland's climate change ambitions, ensuring the highest possible environmental, economic and social return on its investments. This work will contribute to Scotland's Green New Deal, kick-starting investment and building the momentum needed to make a significant impact on reducing emissions and guaranteeing new, high quality jobs. The Bank will align with, complement, and wherever appropriate, consolidate existing investment activities provided by the Scottish Government and its agencies.

The Bank's missions are:

- ▶ Net Zero Mission: Achieving a Just Transition to net zero carbon emissions by 2045.
- ▶ Place Mission: Extending equality of opportunity through improving places by 2040.
- ▶ People Mission: Harnessing innovation to enable our people to flourish by 2040.

1.2.16 We are also supporting the development of Scotland's green project pipeline and promoting this to investors. The first phase of the Green Investment Portfolio, launched in September 2020, identified ten low carbon investment opportunities with around £1.16 billion of commercially viable propositions. This portfolio is built to expand, taking in both private sector-led opportunities around technology, industrial sites and energy generation, as well as public sector led projects around heat networks, electrification of transport, and the use of hydrogen where coordination is needed around supply, demand and regulation. Our aim remains to find, structure and present £3 billion worth of projects to market in 3 years.

1.2.17 In spring 2021, we will publish a Capital Investment Plan which aims to build market certainty in Scotland's net zero transition. The Capital Investment Plan will build on sector climate change policies and set out investable projects. It will link these to attracting capital and inward investment into Scotland's future competitive opportunities around infrastructure, innovation and net zero. Proactively supporting the greening of the financial sector, including by mainstreaming the EU and UK green investment taxonomies and Taskforce for Climate-related Financial Disclosures (TCFD) reporting standards, will also be key to reinforcing Scotland's status as a place for global green investment.

CASE STUDY: MOSSEND INTERNATIONAL RAILFREIGHT PARK (MIRP)

Scotland is inviting investment into a new Green Investment Portfolio. The range of opportunities within this portfolio will expand over time to include £3 billion of projects ready for green finance investment, covering sectors from environmentally sustainable commercial real estate to low emission transportation and green energy.

Mossend International Railfreight Park is one of 10 market-ready projects featured in the Green Investment Portfolio seeking investment.

A major expansion of Scotland's national railfreight terminal, MIRP is a game-changer for Scotland's railfreight infrastructure and environmental ambitions, and will bring extensive commercial opportunities. MIRP will also take HGV freight off Scotland's roads onto rail, directly contributing to the green agenda.

Additional investment in PD Stirling's Mossend facility will drive ambition to be a leading provider of low carbon logistics, putting Scotland at the forefront of a Europe-wide network and transforming our current logistics system.

David Stirling, Director of Mossend International Railfreight Park operator Peter D Stirling Ltd, said:

"We are fully supportive of the Scottish Government's target to achieve net zero emissions by 2045 and indeed are contributing to this by providing Scotland's largest zero-carbon, multi-modal rail freight park. The Green Investment Portfolio is a valuable tool to help us reach out to global investors.

"With future plans including Scotland's first 775-metre electric rail terminal, we hope to benefit many local businesses as well as those based across Europe and beyond."

Skills and training for good, green jobs

- 1.2.18 At the centre of our green recovery is a commitment to increase the number of good, green jobs and to enable people to access these jobs, including through training and reskilling. This is fundamental to the National Mission for Jobs set out in the 2020-2021 Programme for Government. This approach builds on the recommendations from the Sustainable Renewal Advisory Group, the CCC and the Just Transition Commission while also responding to stakeholder calls for jobs to feature prominently in the green recovery and a just transition to net zero.
- 1.2.19 The 2020-2021 Programme for Government set out the key interventions that the Scottish Government is taking to drive labour market demand for green jobs; for example, our £1.6 billion invested in transforming heat and energy efficiency of buildings will stimulate 3,000-5,000 jobs in the coming years. We also committed to a £100 million Green Jobs Fund to help businesses which provide sustainable, low carbon products and services to grow and support green jobs. As part of the national mission for jobs¹⁶, immediate supply-side interventions have been launched and quickly scaled to support those at risk of unemployment or labour market scarring. This includes the £25 million National Transition Training Fund, which will support those losing their jobs due to COVID-19 to retrain to sustainable careers, and the £60 million Young Person's Guarantee that includes support for green apprenticeships and careers advice.
- 1.2.20 To further align the skills system with the demand resulting from a green recovery and net zero transition, the Climate Emergency Skills Action Plan has been published alongside this Climate Change Plan update. This Action Plan sets out the growing evidence base for the kinds of skills and jobs needed to deliver a just transition to net zero, as well as the actions we are taking in the short and medium term to support these green jobs and skills. It sets out immediate actions to support a green recovery by aligning retraining and skills programmes with immediate green job opportunities. In addition the Action Plan sets out longer term actions to enable the skills system to become more responsive to net zero labour market demands, supporting individuals and employers to access the information and skills or retraining support they need to thrive in the transition to net zero.
- 1.2.21 Key to delivering our ambitious climate change targets and ensuring a just transition is how we transition Scotland's labour market in coming years. The Scottish labour market has world-leading expertise in industries, such as oil and gas, that will be critical to delivering net zero solutions like offshore renewable energy, carbon capture and storage (CCS) and hydrogen, all of which are opportunities in which Scotland is globally competitive. We are working with industry to plan how to support workforces to transition to these new job opportunities, ensuring no one is left behind.

1.2.22 The green recovery offers an opportunity to accelerate that retraining and bring much needed skills and labour into sectors scaling up for the transition to net zero, including where there is immediate demand for skills and labour such as in construction, land-based roles in woodland creation and peatland restoration, and in energy. We will also lay the foundations to support people to shift to opportunities within sectors as part of the transition, such as ecotourism, green finance, project management, law and teaching/training. We must consider where these opportunities are geographically and how to support places to create good, green job opportunities, as the Energy Transition Fund is doing in the North East of Scotland. We must ensure everyone can access these jobs and the training and skills support they need. This means individuals from a wide range of backgrounds having the opportunity to develop careers and access good, green jobs, and ensuring that women, single parents, people with disabilities and people from minority ethnic communities are particularly considered.

1.2.23 Younger generations are at risk of being particularly impacted by the economic downturn from COVID-19. We will do all we can to prevent long-term scarring in this regard and want to help young people go on to reliable, rewarding career pathways. This generation is alive to the dangers of climate change and has the potential to supercharge our transition to net zero. Through initiatives such as the Young Person's Guarantee, we will make sure they are able to access green

job opportunities, providing them with a sustainable, resilient future.

Building our resilience as part of a green recovery

1.2.24 The COVID-19 pandemic has proven the importance of embedding resilience and security into our society and economy; this is also essential for our green recovery. Whilst reducing emissions towards net zero is the focus of the Climate Change Plan update, the Scottish Government also recognises the wider importance of preparing for the climate changes which are already taking place. We are already seeing warming in Scotland, with more extreme weather events, increased rainfall, and rising sea levels. As a nation we must adapt to the changes caused by climate change and ensure that we are prepared for the future.

1.2.25 Adaptation and resilience are therefore also key components of our green recovery from COVID-19. In the 2020-2021 Programme for Government we committed to investing an extra £150 million for flood risk management over the next five years (in addition to the £42 million we spend annually), and £12 million in coastal change adaptation to help us adapt to the threat of sea level rise and protect our natural coastal defences from erosion. Adaptation investment is also a key driver of economic growth and jobs across Scotland and presents opportunities for Scotland to attract inward investment into this area.

1.2.26 Adaptation is key to a just transition as we know the impacts of climate change impact the poorest and most vulnerable in

society first and most acutely. Ensuring we are planning and taking action to adapt to the impacts of climate change is vital in mitigating the risks to people and businesses and ensuring a just transition.

Positive Behaviour Change

- 1.2.27 The impacts of the COVID-19 pandemic on people’s lives and livelihoods have been enormously difficult. The restrictions on travel, work, and leisure necessary to control the virus have been extremely challenging for us all. One unexpected consequence of these restrictions has been to show us some examples of what a net zero future might look like and the benefits of that future. For example, research between March and May 2020 shows that there was a marked drop in air pollution¹⁷, as well as an uptake in active travel¹⁸, and that across the UK there was a reduction in food waste as households chose to cook more meals at home¹⁹.
- 1.2.28 In its green recovery advice, the CCC recommended that actions that maintain these positive behaviours in the long-term are prioritised as part of a green recovery²⁰. In doing so we will consider the impacts of behaviour change on different groups to avoid unintended consequences as part of delivering a just transition. This document therefore sets out the policy measures that we will introduce to embed positive changes, making them the easy and obvious choice as well as the green choice.

1.2.29 Our approach recognises that behaviours are interlinked and context-dependent, and takes account of all of the factors that shape people’s lifestyles: the social, material, and individual. By considering the contextual factors influencing behaviours, we are more likely to implement policies and interventions which are effective and successful.

1.2.30 It is important to recognise that individuals also drive societal change not only through specific behaviours, but also via acceptance and adoption of low-carbon technologies and support for policies. Our Draft Public Engagement Strategy, published alongside this update, sets out how we will continue to engage with citizens in developing and implementing climate policy that has widespread support and encourages action.

Place-based approach

1.2.31 “Place” is where people, location and resources combine to create a sense of identity and purpose. It is at the heart of addressing the needs of communities and realising their potential. In order to prioritise place and local communities, and to encourage better collaboration and community involvement in decision-making, the Scottish Government and COSLA have adopted the “Place Principle”²¹. This principle underlines a commitment to work with local communities in order to improve the lives of people, support

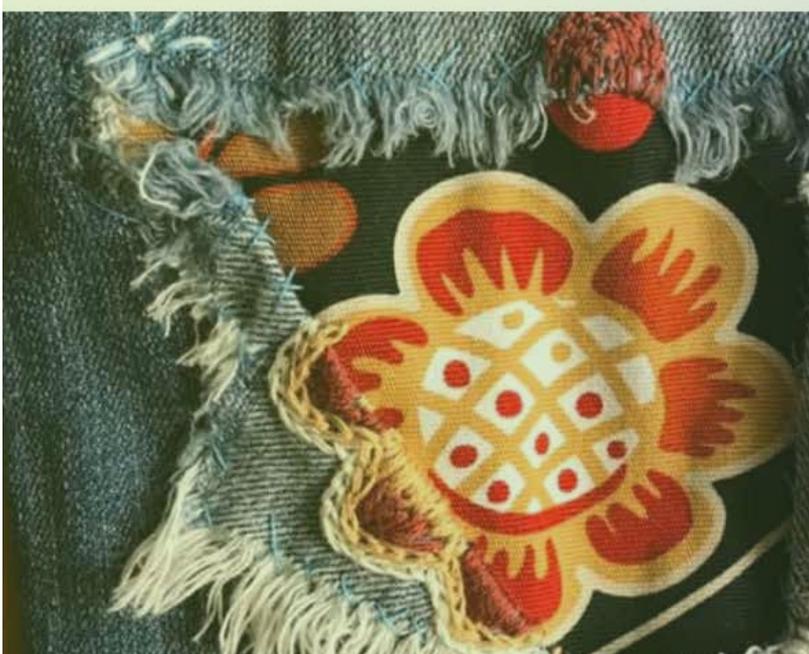
17 <http://www.scottishairquality.scot/assets/documents/news/COVID19%20lockdown%20-%20Time%20Variance%20analysis%20of%20air%20quality%20in%20Scotland%20-%2027-05-2020.html>

18 <https://www.transport.gov.scot/publication/covid-19-transport-trend-data-20-26-april-2020/>

19 <https://www.wrap.org.uk/content/citizens-and-food-covid-19-lockdown>

20 [CCC-to-Cabinet-Secretary-Roseanna-Cunningham-Covid-19-recovery.pdf \(theccc.org.uk\)](https://www.gov.scot/publications/place-principle-introduction/)

21 <https://www.gov.scot/publications/place-principle-introduction/>



Credit, the SHRUB COOP, Edinburgh

inclusive and sustainable economic growth, and create more successful places.

1.2.32 We know that people and communities, particularly those experiencing disadvantage and inequality, face complex and often inter-related challenges. A place-based approach must therefore be at the heart of delivering a green recovery and a just transition to net zero. We are committed to working closely with those communities and organisations in areas that need change, are undergoing change or are affected by change.

1.2.33 Rethinking how our places are lived in, planned, delivered and adapted will help to futureproof our villages, towns, cities and regions from the more extreme and costly impacts of climate change. The development of low carbon and resilient places across Scotland, for example through 20 minute neighbourhoods, will provide ready access to the facilities for our everyday lives, significantly reducing private car dependency and increase walking cycling and public transport use, and supporting the well-being economy. We will support and learn from those places across Scotland which are already taking the

lead in bringing together the key ingredients to create new ways of living and working locally; and in 2021 we will begin to share lessons from several key demonstrator locations, to promote good practice, facilitate conversations, and offer resources and a route map for other places pursue their own climate change goals.

1.2.34 Our Place Based Investment Programme will be implemented in 2021. This will bring together investments in localities, streamlining their delivery and increasing their collective impact. It will provide a framework for ensuring that how we invest in places to deliver national priorities is also framed by local characteristics, needs and opportunities. We will assess the totality of investments' impact on improving the circumstances of peoples' lives, and on key priorities such as reaching net zero emissions. We will build on the good work of communities and their partners on the ground to re-think our places with pace and ambition, To do this we will need to make best use of public resources now, redesign how and where assets and services are provided tomorrow, and facilitate behaviour change for the future.

1.2.35 We will establish a new £50 million Vacant & Derelict Land Investment Programme in recognition that sustained investment and effort is needed to unlock persistent vacant and derelict land for appropriate reuses, and that we should prioritise such sites when seeking opportunities to develop the built environment and tackle climate change. In turn, this will

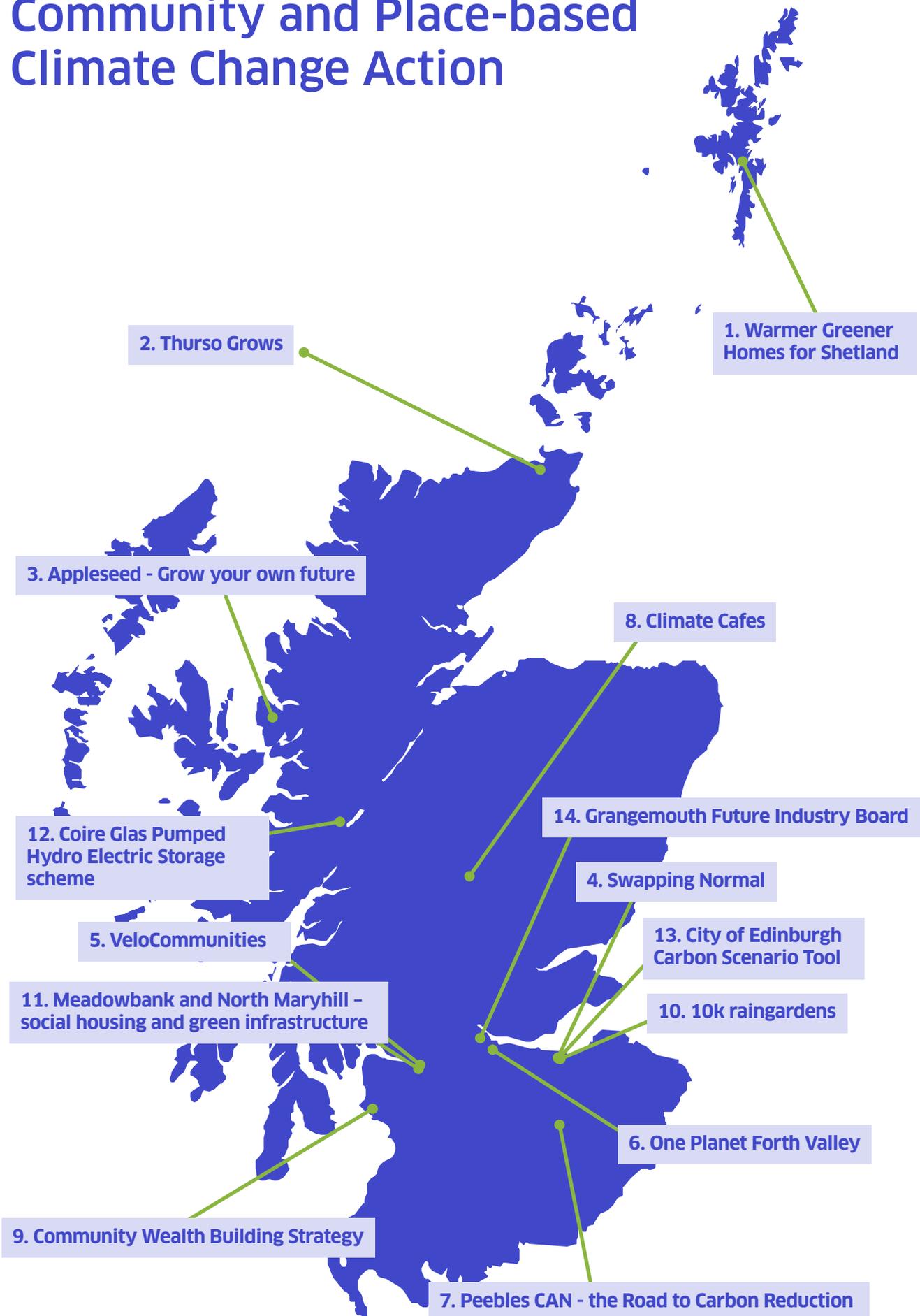
promote the health, wellbeing, and resilience of communities across Scotland, particularly in deprived areas where the blight of vacant and derelict land is most prevalent.

1.2.36 As well as the National Planning Framework 4, new regional spatial strategies and local development plans can guide our future development and help to deliver infrastructure in a way that responds to the challenges of climate change. Established tools such as the Place Standard and emerging local place plans will provide communities with the scope to set out how they see their places develop and improve in the future. Meanwhile, our commitment to working collaboratively across sectors, portfolios and partners to nurture 20 minute neighbourhoods will continue to prioritise quality of life and health, as well as our net zero ambitions.

1.2.37 Further information on the cross-cutting opportunities for the planning system and National Planning Framework 4 to support green recovery are outlined in Part 2 of this Plan update.

1.2.38 We are also aware that rural and island economies are facing particular pressures as a result of the COVID-19 pandemic, given their greater reliance on micro and small businesses and self-employment, as well as availability of access to both export markets and domestic food service markets. Our approach to a green recovery, and the Place Principle, will ensure that we work together with rural and island communities to collectively protect and deliver thriving, resilient communities.

Community and Place-based Climate Change Action



Community and Place-based Climate Change Action Key

- 1. Warmer Greener Homes for Shetland:** This project, run by Shetland Islands Citizens Advice Bureau, is helping Shetlanders to tackle fuel poverty and the climate crisis. Individuals are offered free advice on improving home energy efficiency and opportunities are highlighted for installing renewables.
- 2. Thurso Grows:** Thurso Community Development Trust's Thurso Grows project runs a thriving community garden which educates about food growing and assists the community to reduce food miles. The project also offers support to help the residents of Thurso learn more about how to reduce food waste and the links between food choices and climate change.
- 3. Appleseed - Grow your own future:** Applecross Community Company is developing a community allotment to promote local growing, recycling, healthy eating and minimisation of food waste in Applecross.
- 4. Swapping Normal:** The SHRUB Coop's project offers free support to help Edinburgh residents to rethink their relationship with waste. They run a Swapshop and Food Sharing Hub in their Zero Waste Hub, plus reuse collections, repair workshops and carbon literacy events.
- 5. VeloCommunities:** This project, run by Bike for Good, offers free support to enable people in west and south Glasgow to reduce their use of carbon emitting modes of transport, and instead cycle for short local journeys. Project activities include free access to cycle training, increased access to bikes, route planning rides, bike maintenance training and more.
- 6. One Planet Forth Valley:** This community project, led by the Central Scotland Regional Equality Council, offers free support to help people from the Forth Valley to tackle waste and understand more about how purchasing decisions impact on climate change.
- 7. Peebles CAN - The Road to Carbon Reduction:** Peebles CAN (Community Action Network) are offering free support to people in Peebles and the surrounding area through carbon literacy education and community activities such as Skill Shares, active travel courses, Eco driving courses and community growing workshops.*
- 8. Climate Cafes:** There is a network of Climate Cafes across Scotland, for example in Pitlochry, Birnam & Dunkeld, North Berwick and Aberdeen. Climate Cafes are informal, open spaces where members of the community can come together to have a cup of tea or coffee, chat and take climate action.
- 9. North Ayrshire Community Wealth Building Strategy:** North Ayrshire launched their "build back better" strategy in May 2020, including an emphasis on utilising public land and assets to tackle climate change.
- 10. 10k raingardens:** The 10,000 Raingardens for Scotland campaign is designed to promote and encourage the use of raingardens as a sustainable and natural way to manage water, particularly in urban areas. It will also support the creation of wildlife friendly, accessible greenspace, reduce pollution, and provide attractive places for people to visit. Over 950 raingardens have been recorded so far across Scotland in a range of settings from schools, to residential areas, offices, shopping centres, hotels, to Waverley Station.
- 11. Meadowbank and North Maryhill - social housing and green infrastructure:** These social housing projects are exploring how green roofs could create a sustainable neighbourhood. Green roofs can help to reduce the energy costs of cooling buildings in the Summer, as well as insulation in Winter. They provide greenspace for people and wildlife, and can also slow run-off of rainfall and surface water, helping the neighbourhood cope with extreme rainfall events.

12. Coire Glas Pumped Hydro Electric Storage scheme: This would be the first large-scale pumped storage scheme to be developed in the UK for more than 30 years, and has a potential capacity of up to 1500 MW. Both the construction and operation of this site will bring significant investment and associated job creation to the Scottish Highlands.

13. City of Edinburgh Carbon Scenario Tool: The Council has collaborated with the Edinburgh Centre for Carbon Innovation to develop an open source quantitative emissions calculation tool that enables the Council to better understand the emissions consequences of its decisions across a range of topics. Work has been commissioned to develop this tool further for all Scottish Cities as part of the Scottish Cities Alliance.

14. Grangemouth Future Industry Board: The Grangemouth Future Industry Board (GFIB) has been established both in recognition of the economic strength of the industrial cluster, and in recognition of the fact that it accounts for 30% of industrial emissions in Scotland. A specific focus on Grangemouth is therefore key to delivering a just transition, and to achieving net-zero emissions by 2045.

GFIB activity will take a 'Team Scotland' approach, co-ordinating public sector initiatives for sustainable economic activity across the Grangemouth industrial cluster, whilst supporting its transition to our low-carbon future. Future-proofing this key industrial hub for net-zero will help support a vibrant and sustainable future for the locality, and in turn significantly contribute to Scotland's decarbonisation efforts as a whole.

*Projects 1-7 are some examples of projects funded through the Scottish Government's Climate Challenge Fund (CCF). The full list of currently funded CCF projects is available here: <https://www.keepsotlandbeautiful.org/sustainability-climate-change/climate-challenge-fund/ccf-in-action/>



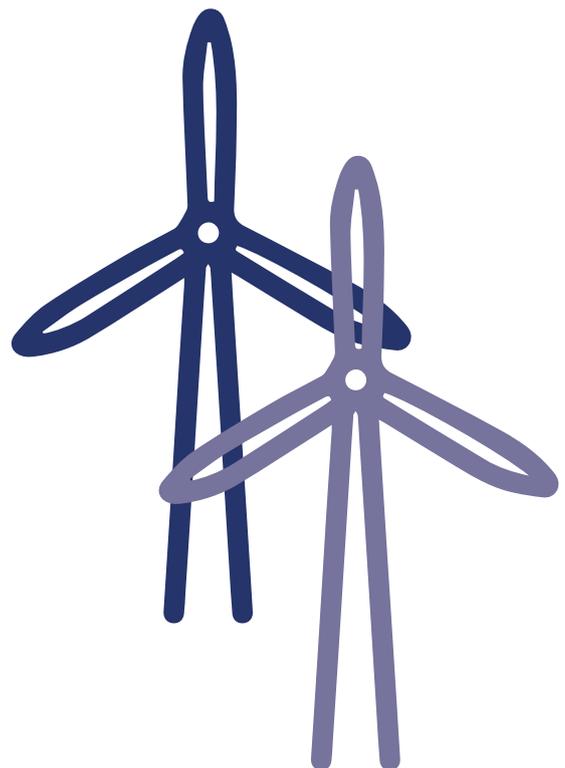
Credit: Peebles CAN - the Road to Carbon Reduction



Credit: Peebles CAN – the Road to Carbon Reduction

1.3. Conclusion

1.3.1 This Climate Change Plan update is the next step in delivering a green recovery from COVID-19. The policies set out here are aimed at driving economic demand in key net zero markets, providing opportunities for Scottish businesses and supply chains, and creating demand for good, green jobs now and in the future. By acting now to deliver a green recovery, we can set Scotland on a pathway to meeting our ambitious climate change targets in a way that is just and delivers opportunities for all.



Part 2: Coordinated Approach



2.0.1 While a sectoral approach is useful in capturing the nuances of each sector, sectors cannot be treated in isolation. There are clear synergies and interdependencies across the sectors in Part 3 of this Plan update; what happens in one sector can have a knock-on effect upon another, and so we need to take a holistic, coordinated approach.

2.0.2 This section summarises some of the ways in which the Scottish Government is taking a cross-cutting, systems-based approach to reducing greenhouse gas emissions, harnessing opportunities for economic development, inclusive growth, jobs and wellbeing. It therefore brings together some of the material from the sector chapters (Part 3 of the Plan update) and sets this out under a series of cross-cutting themes. Many of the actions in this section span beyond the period covered by this Plan update, and our next Climate Change Plan, to be published by early 2025, will include further details of our coordinated approach to policy-making.

2.1. Whole System Energy Approach

2.1.1 Scotland's energy system is central to our economy and society. We believe that everyone in Scotland has the right to an affordable, secure and increasingly low carbon supply of energy. The way energy is produced, transported and used will change dramatically along the pathway to net zero, and in ways that are difficult to predict.

2.1.2 Much of Scotland's electricity generation has been successfully decarbonised over the past decade, with renewable generation in 2019 accounting for the equivalent of more than 90% of our electricity demand. We will need to replicate this success over the coming decades as we decarbonise buildings, transport and industry. We will need to learn from the past, and ensure that we capture the opportunities for a just transition, including high quality green jobs, thriving businesses and supply chains and positioning Scotland to attract private investment into the transition. Navigating this transition successfully will depend on the development of a coordinated approach across the whole energy system to complement our focus on reducing emissions within each sector.

- 2.1.3 We will need to focus on harnessing Scotland's potential, making the most of our vast wind and marine resources, our substantial potential for carbon capture and storage, and our expertise and experience in driving forward innovation. This will mean aligning policy across government in a way that makes the most of these strengths and captures growing market opportunities. We must also bring different sectors of our energy system closer together, and ensure that the ways in which we plan and deliver change take fully into account the impacts that decisions in one sector can have on decarbonisation in others. For example, today's electricity sector is almost wholly independent of the supply of energy to the transport sector, while gas networks deliver the vast majority of energy for heat to the domestic, industry and services sectors. A net zero energy system will see much greater interaction between each of these sectors, driven by the electrification of heat and transport, and the growing opportunities provided by hydrogen.
- 2.1.4 Different low and zero carbon solutions will be appropriate in different sectors and for different communities. Take-up of these solutions will depend in part on technology development, market and consumer preference, as well as on decisions taken by government. We need to see adoption of electricity-based solutions, for example in heat and transport, taking advantage of the large potential for growth of onshore and offshore wind capacity in Scotland. We also need to repurpose parts of the gas network to deliver hydrogen, retaining some of the flexibility afforded by gas. Large-scale green hydrogen production may also be important in balancing generation and demand, providing flexibility that helps integrate the expected large increases in variable renewable generation into our energy systems. Policies and market mechanisms will have to be developed and aligned in ways that reflect this system need.
- 2.1.5 These pathways are not mutually exclusive: when we talk about taking a whole systems approach, we mean that we need to understand and make decisions based on where and when each solution, or combination of these, is most appropriate. A systems approach is also central to delivering a just transition, which takes into the account the different impacts that these decisions will have on individuals, places and sectors, and factors this into policy making. For example, we need to consider the impact that decisions on how we decarbonise domestic heating will have on those in fuel poverty and the delivery of our target of eradicating fuel poverty, as far as is reasonably possible, by 2040.
- 2.1.6 **What we are doing:** In 2017 we published Scotland's first Energy Strategy in alignment with the 2018 Plan. This championed a whole system view of energy as one of its three core principles, along with an 'inclusive energy transition' and 'a smarter local energy model'. We will **update our energy strategy in 2021** to lay out a coordinated vision for the whole energy system. This will be based on our best understanding of the technologies and options available today, and focused on delivering

our economy-wide emissions reduction targets, as well as just transition and wellbeing economy outcomes. The different energy system pathways we can take to net zero mean that we need to develop greater certainty about the options that exist and how to deliver them. We will therefore **develop a set of whole system scenarios** for Scotland during 2021 which will explore the timelines and interdependencies in each of these options.

2.1.7 The following subsections explore some aspects of the energy transition in further detail.

Hydrogen

2.1.8 A combination of improving energy efficiency and greater electrification based on zero-carbon electricity can make a significant contribution to the decarbonisation of Scotland's whole energy system. However, energy efficiency and electrification alone is unlikely to be enough.

2.1.9 Producing hydrogen in zero-carbon and low-carbon ways, and showing that it can be used to meet challenging energy demands (e.g. for heat, transport and industry), will be part of the next stage of Scotland's energy transition.

2.1.10 Hydrogen can be a strong complement to electrification and can provide alternatives to the uses of carbon-based fuels across the energy system, helping to decarbonise high emission sectors such as transport, heat and industry. Hydrogen can provide flexibility to the whole energy system; unlike electricity, it is relatively easy to store, meaning that its production can

be decoupled from its use. This means that hydrogen may provide a sustainable replacement for the energy storage that natural gas and petroleum products currently provide, and a way to capture and store renewable energy from when it is available until when it is needed.

- ▶ **Hydrogen in industry:** hydrogen has an important potential role in the reduction of emissions from industrial heat, especially in specialist processes such as those in furnaces and kilns.
- ▶ **Hydrogen in transport:** hydrogen fuel cells could help decarbonise heavy-duty vehicles (e.g. buses, trains and lorries), ferries, aviation and commercial shipping. The Scottish Government has delivered over £15 million of investment in hydrogen bus fleets and hydrogen infrastructure in Aberdeen over the past few years.
- ▶ **Hydrogen for heat:** depending on the future of the gas grid, hydrogen could provide a heating solution for buildings, displacing natural gas. The Scottish Government has provided £6.9 million towards the H100 hydrogen heat network demonstration in Fife.
- ▶ **Hydrogen in the electricity sector:** there are opportunities for hydrogen to replace the role of natural gas in providing back-up electricity generation, as well as playing an important role in energy storage. Large-scale green hydrogen production could also provide an essential balancing and flexibility function, helping to integrate the expected large increases in offshore wind.

2.1.11 The development of a hydrogen economy is a substantial economic opportunity for Scotland. During 2020, we have carried out a hydrogen assessment project to deepen the evidence base in order to inform our policies on hydrogen. From our assessment, it is clear that hydrogen offers energy and emissions reduction opportunities, and can help develop a sustainable economy in Scotland.

2.1.12 The assessment concludes that Scotland has many of the key natural resources and components necessary to grow a strong hydrogen economy, supporting jobs and GVA growth, and developing new industrial opportunities on a significant scale. By acting now, Scotland can position itself to take advantage of growing global hydrogen markets, driving demand for Scottish businesses and jobs, supporting exports and attracting investment. Scottish hydrogen projects are already securing global green investment and supporting local industry growth.

2.1.13 UK policies, business models and market mechanisms will need to be developed to support hydrogen production and the growth of the hydrogen economy. The UK Government's 10 Point Plan, published in November 2020, set out a target to generate 5 GW of hydrogen production capacity by 2030 for industry, transport, power and homes, with the aim of developing the first town heated entirely by hydrogen by the end of the decade. A full UK Government Hydrogen Strategy is expected in the Spring of 2021.

2.1.14 **What we are doing:** alongside this Plan update we are publishing a Hydrogen Policy Statement, setting out the strategic priorities of the Scottish Government regarding the various applications of hydrogen in our energy system in the context of the global climate emergency. This will be followed in Spring 2021 with a Hydrogen Action Plan.

Bioenergy

2.1.15 Bioenergy is a flexible renewable energy resource that can be used to meet demand for electricity, heat, or to support industrial decarbonisation. This means that it will play an important role in our transition to net zero. Our policy objective to date has been to promote small-scale combined heat and power. However, bioenergy may also be used in future to produce hydrogen, or combined with carbon capture and storage (CCS) to deliver negative emissions. Deploying bioenergy sensibly and sustainably may therefore be an important part of compensating for any residual emissions as we move towards net zero emissions. We explore the role that bioenergy might play in developing negative emissions in Chapter 8 of this Plan update.

2.1.16 Deciding where bioenergy will be most effectively deployed will depend on which sectors will make the best use of the bioenergy feedstocks that we can grow domestically or import. The use of bioenergy resources in the energy system must also be compatible with a sustainable land use policy and our obligations to ensure a sustainable global transition.

Energy Scotland programme and in 2019 we awarded £5 million to Scottish tidal energy projects through the Saltire Tidal Energy Challenge Fund.

2.1.24 In 2020, we announced eight winners of our 'Floating Wind Technology Acceleration Competition'. The eight technologies will receive a share of £1 million from the Scottish Government to address key industry challenge areas in the deployment of innovative floating offshore wind technology.

2.1.25 We work closely with the Energy Technology Partnership (ETP), an alliance of Scotland's world-class academic institutions. Our support of the ETP includes funding for the Knowledge Exchange Network, and the Energy Industry Doctorate Programme, which supports PhD projects tackling innovation challenges across the energy sector.

2.1.26 To date we have made over £85 million of commercial investments in the energy sector through our Energy Investment Fund. This has supported innovative technology companies to develop ideas and deliver projects, alongside support for community energy projects.

2.1.27 As outlined in the Electricity and Buildings chapters in Part 3 of this Plan update, we are developing a new framework of support for energy innovation. To underpin this, we will launch a call for evidence in early 2021 seeking views on how best to maximise Scotland's world-leading research talent and facilities for energy innovation. We will publish details of our new support framework in 2021, setting out details of the funding and support available.



2.2. Land Use, Nature Based Solutions and the link to Biodiversity

2.2.1 Our land is, in many ways, the cornerstone of our society and economy and the Scottish Government is committed to ensuring that it is used sustainably and that its benefits are shared more equitably. Not only is our land the bedrock of Scotland's natural capital, but it provides us with food, timber, renewable energy, bioenergy (see above), climate adaptation (such as nature-based solution to flooding), transport links and our settlements. Our land is also deeply linked to individual/community health and wellbeing; it forms our iconic landscapes, enjoyed for recreational activities, our cultural heritage and our economic prosperity; and it provides us with a range of further benefits, from clean air and drinking water to flood management, tourism and successful pollinator populations.

- 2.2.2 We have a finite amount of land, and are making increasing demands upon it. We need to find the optimal balance between these sometimes competing demands, in particular to find more space for trees, peatland and nature to thrive, if we are to deliver not only our emissions reduction targets but also our wider national priorities for the environment and land use. We need to maintain rural populations, support thriving rural economies and jobs and produce food on suitable land; if we do this by creating more localised and regionalised supply chains and lower food miles, we will be helping to meet the challenge of reducing emissions and producing food more sustainably. Our upcoming third Land Use Strategy will set out how the various aspects of land use and actions of the Scottish Government come together to deliver on our overarching sustainable land use vision. We need to take people with us as our land use changes and we will initiate a conversation with communities, particularly those likely to be most impacted, to ensure people understand what we are doing and why.
- 2.2.3 The Committee on Climate Change suggest that around a fifth of agricultural land in Scotland will be required to change use²³, which may include not farming on peatland or using farmland to plant trees. We must do this in a way that does not lead to 'offshoring'; for example reducing domestic food production could lead to increased imports if domestic consumption (what and how much we eat) and our exports stay the same.
- 2.2.4 Again, ensuring a just transition in this context will be critical to developing a strategic plan that captures future opportunities whilst safeguarding livelihoods and rural economies. Nature-based solutions to climate change, such as high nature value farming, offer a sustainable means of producing the products we all depend on such as food and timber.
- 2.2.4 There is a wealth of evidence both on a global and a local scale that we are now in the midst of a global crisis in terms of biodiversity loss. Biodiversity loss reduces the complexity and resilience of ecosystems, weakening their ability to provide the benefits to people which we rely on and ultimately risking collapse. Our actions to restore biodiversity are intrinsically linked to many of the policies within this Plan update, and our Biodiversity Strategy.
- 2.2.5 Climate change is one of the main drivers of biodiversity loss, and nature-based solutions can also protect, sustainably manage, and help restore ecosystems. These solutions have the potential to enable climate change mitigation, resilience, adaptation and positive social change, providing benefits for both people and biodiversity.
- 2.2.6 **What we are doing:** The Scottish Government is committed to deploying nature-based solutions at scale and in a sustainable and managed way; our work to date on peatland restoration and woodland creation (outlined in Part 3, Chapter 6 of this Plan update) is a prime example. Increased peatland restoration and woodland

creation has been recommended by the CCC, and, when accounting for local ecological and social sensitivities, can bring benefits for carbon sequestration, biodiversity and natural flood risk management and job creation. Nature-based solutions will form a key part of our overall coordinated approach, which aims to bring together climate change, biodiversity, infrastructure, planning, land use, marine and economic strategies.

2.2.7 We are also exploring and developing innovative approaches to financing nature based solutions including increasing the levels of private investment in these areas. This could include a greater use of carbon markets to support projects such as woodland creation and peatland restoration, but might also include a greater emphasis on payments for the benefits or services our environment provides to the economy (such as flood prevention and urban cooling services) which can be brought forward to finance capital investment in nature-based solutions.

2.3. Circular Economy

2.3.1 While Scotland's statutory emissions reduction targets are based on emissions from sources located here in Scotland, our wider carbon footprint associated with the goods and services we import is also very important. Consumption of products and materials accounts for an estimated 74% of Scotland's carbon footprint²⁴. The move towards a circular economy is a crucial part of tackling this, with some studies

estimating that circular actions could eradicate up to almost a fifth of Scotland's carbon footprint by 2050. One simple way to express the concept of a circular economy is that: it is designed to reduce the demand for raw material in products; it encourages reuse and repair of products; and it promotes the manufacture and design of products and materials to last as long as possible. This is relevant across all sectors of the Climate Change Plan update and in wider public procurement.



2.3.2 **What we are doing:** Actions we're taking include encouraging more sustainable consumer purchasing, implementing a deposit return scheme and improving local authority recycling collection infrastructure. More details are included in Chapter 5 of this Plan update.

Food and climate change

The Scottish Government has a long standing commitment to the concept and reality of achieving our vision of Scotland as a Good Food Nation where:

- it is the norm for Scots to take a keen interest in their food, knowing what constitutes good food, valuing it and seeking it out whenever they can;
- people who serve and sell food, from schools to hospitals, retailers, cafes and restaurants are committed to serving and selling good food;
- everyone in Scotland has ready access to the healthy, nutritious food they need;
- dietary-related diseases are in decline, as is the environmental impact of our food consumption; and
- Scottish producers ensure that what they produce is increasingly healthy and environmentally sound.

The Good Food Nation ambitions cut across five key areas of health, social justice, knowledge, environmental sustainability and prosperity, and we are working hard to make a real and positive difference to the lives of the people of Scotland by:

- helping to improve their access to, and understanding of, the benefits of healthy local foods;
- ensuring sustainability of our wonderful food industry;
- ensuring food companies are a thriving feature of the economy and places where people want to work; and
- looking to grow Scotland's reputation as a Good Food Nation from which other countries can learn.

COVID-19 means some work has been delayed, for example the Good Food Nation Bill will not be introduced in this parliamentary session as planned. However, the statutory provisions that were drafted for the Bill will be used to inform the development of a statement of policy on food, which was announced by the Cabinet Secretary for Rural Economy and Tourism on 18 August 2020.

The statement will incorporate the experience gained in response to the COVID-19 pandemic, ongoing work under the umbrella of the Good Food Nation policy and, more widely, work such as the EU Farm to Fork Strategy and the UK Government's National Food Strategy. This work will be led by the Ministerial Working Group on Food to ensure that the cross-cutting approach that is needed to take forward key aspects of national policy is in place.

Food and climate change – Continued

Work is ongoing to achieve other commitments set out in the Programme for Government. This includes working with business, the public and the third sector to develop guidance so that more people are encouraged to eat locally-produced, sustainable and healthy food that supports our aims to tackle climate change, and the development of a Local Food Strategy for Scotland.

Scottish Government also provides support for the Climate Challenge Fund (CCF), allocating over £110 million across all projects in communities across Scotland. Many of these have had a food focus, and in 2019-2020 around a third of projects had food or reducing food waste as their focus. Current CCF projects include Forth Environment Link's 'Climate Kitchen Garden' project and Sustainable Kirriemuir's 'Nourish Kirriemuir'.

2.4. Transport Demand

2.4.1 Transport is Scotland's biggest emitting sector, accounting for 35.6 per cent of emissions in 2018²⁵. It is also a particularly challenging sector to decarbonise, as it is a derived demand: the way people live, work, learn and access goods and services are all key to the need to travel. We are committed to reducing car kilometres by 20% by 2030, but this vision will take a cross-sectoral effort going beyond transport, to reduce people's need to travel with more local access to goods and services. Likewise, digital connectivity and flexible working approaches will play a key role. The Scottish Government is committed to exploring options around encouraging remote working to reduce kilometres driven as part of commuting, which accounted for 23% of journeys in Scotland in 2019²⁶.

2.4.2 **What we are doing:** Alongside our commitments on broadband, for example through the R100 Programme²⁷, the Scottish Government is committed to building on the Place Principle. We will establish a Place-Based Investment Programme to support building sustainable places, local access to goods and services, net zero carbon, and inclusive growth which complements the Localism, Community Wealth Building, Town Centre, Work Local, and 20 minute neighbourhood agendas. Development of the fourth National Planning Framework (NPF4) will also take account of the need to refocus our existing transport policies to specifically draw out how land use planning can build in sustainable travel choices.

25 Scottish Greenhouse Gas Emissions 2018, published 16 June 2020, accessible <https://www.gov.scot/news/scottish-greenhouse-gas-emissions-2018/>

26 Transport and Travel in Scotland 2019: Results from the Scottish Household Survey, accessible <https://www.transport.gov.scot/media/48191/transport-and-travel-in-scotland-2019.pdf>

27 <https://www.gov.scot/publications/reaching-100-superfast-broadband/>

2.5. The Planning System and National Planning Framework 4

- 2.5.1 The National Planning Framework is a long-term plan for Scotland that sets out where development and infrastructure is needed to support sustainable and inclusive growth. We expect to lay a draft of the fourth National Planning Framework (NPF4) in the Scottish Parliament, and for public consultation to be undertaken, from September 2021. We then expect to adopt the finalised NPF4 in 2022.
- 2.5.2 Planning is a key delivery mechanism for many of the policies within this Climate Change Plan update, across all sectors. By making the right choices about where and what development should take place in the future, planning can help to reduce emissions whilst improving the wellbeing of communities and the quality and resilience of places across Scotland.

- 2.5.3 **What we are doing:** An NPF4 Position Statement²⁸ was published this Autumn, setting out the areas of likely key policy change as a foundation from which the draft NPF4 will be prepared. The Position Statement strongly signals a need to have climate change as a guiding principle for all plans and decisions. It signals key outcomes that planning policy can further support: reducing emissions, building resilient communities and supporting the wellbeing economy. From opportunities around 20 minute neighbourhoods and peatland protection, to emissions efficient design and town centres, our preparation of the next generation of planning policy is a significant opportunity to work across the sectors of this Plan update to help deliver it, rapidly providing a coherent vision for carbon conscious places.²⁹



28 <https://www.gov.scot/publications/scotlands-fourth-national-planning-framework-position-statement/>
 National Planning Framework 4 and wider planning and place-based policies will be informed by recent work by Architecture and Design Scotland, 2020, Designing for a Changing Climate: Carbon Conscious Places: <https://www.ads.org.uk/wp-content/uploads/Carbon-Conscious-Places-Main-Report.pdf>

2.6. Wellbeing and National Outcomes

2.6.1 Scotland’s National Performance Framework (NPF) sets an overall purpose and vision for Scotland: it seeks to create a country that’s success is not judged solely on the performance of our economy or on GDP, but instead on a wider range of measures. The NPF is Scotland’s ‘wellbeing framework’, recognising that Scotland becoming ‘a more successful country with opportunities for all to flourish through increased wellbeing’

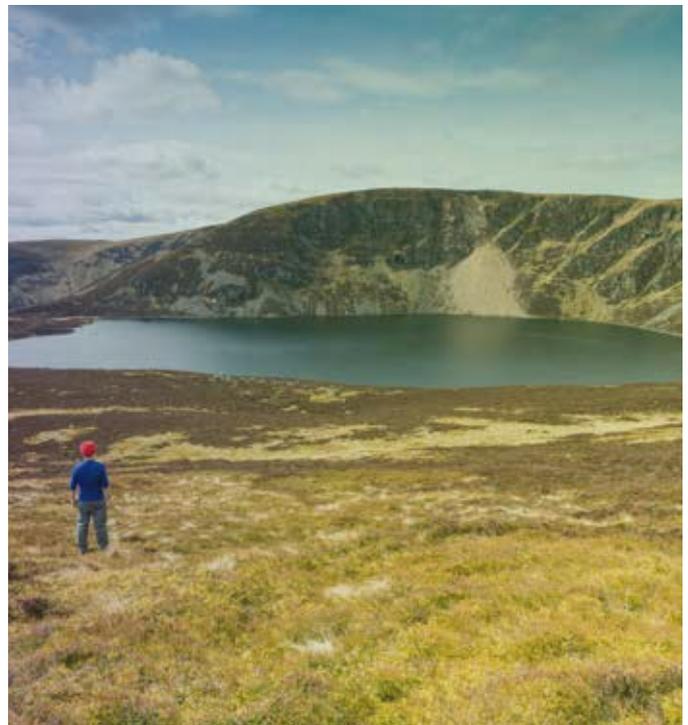
requires progress towards all of the National Outcomes, and application of the NPF values. Societal wellbeing will increase when social outcomes, environmental outcomes, economic outcomes and democratic outcomes are all being delivered and are in balance. Wellbeing can be defined as ‘living well’ both as individuals and collectively, as society. We view ‘living well’ in broad terms and see this as encompassing the key areas which form the focus of our National Outcomes.



2.6.2 The NPF helps us understand, publicly and transparently, the progress we are making as a nation towards realising our long-term vision. Its data helps us understand the challenges in achieving our outcomes and to focus policies, services and resources on tackling those challenges. It brings together data and reporting systematically and objectively across a range of economic, social and environmental indicators. It's clear that policies aimed at tackling climate change can have co-benefits for wellbeing and the delivery of our National Outcomes. The Scottish Government is committed to aligning a green recovery from COVID-19 alongside our transition towards a wellbeing economy. A 'wellbeing economy' is one that has social justice and environmental health as the top priority and asks what sort of economic activity is needed to deliver those goals.

2.6.3 Scotland's new Environment Strategy³⁰ creates an overarching framework for our strategies and plans on the environment and climate change. It sets out a 2045 vision for restoring nature and ending Scotland's contribution to climate change, highlighting the wider benefits this will create for our wellbeing, economy and global citizenship. It maps the significant contribution that our action on climate and the environment will make towards achieving many of the NPF National Outcomes and Scotland's role in delivering the UN Sustainable Development Goals.

2.6.4 **What we are doing:** The Scottish Government's approach to the delivery of a wellbeing economy for Scotland is clearly articulated in our recent [Economic Recovery Implementation Plan](#). In that Plan, we set out commitments to a range of actions that will ensure that our response to the impacts of COVID-19 will help to improve the resilience of our economy, and do so in a way that protects and grows our natural assets. The Plan is underpinned by a focus on equality, in terms of both opportunities and outcomes, and human rights. We continue to develop our understanding of the issues that are central to the delivery of a wellbeing economy through our lead role in the [Wellbeing Economy Governments initiative](#).



Loch Brandy in Glen Clova, one of the Angus Glens

Part 3:

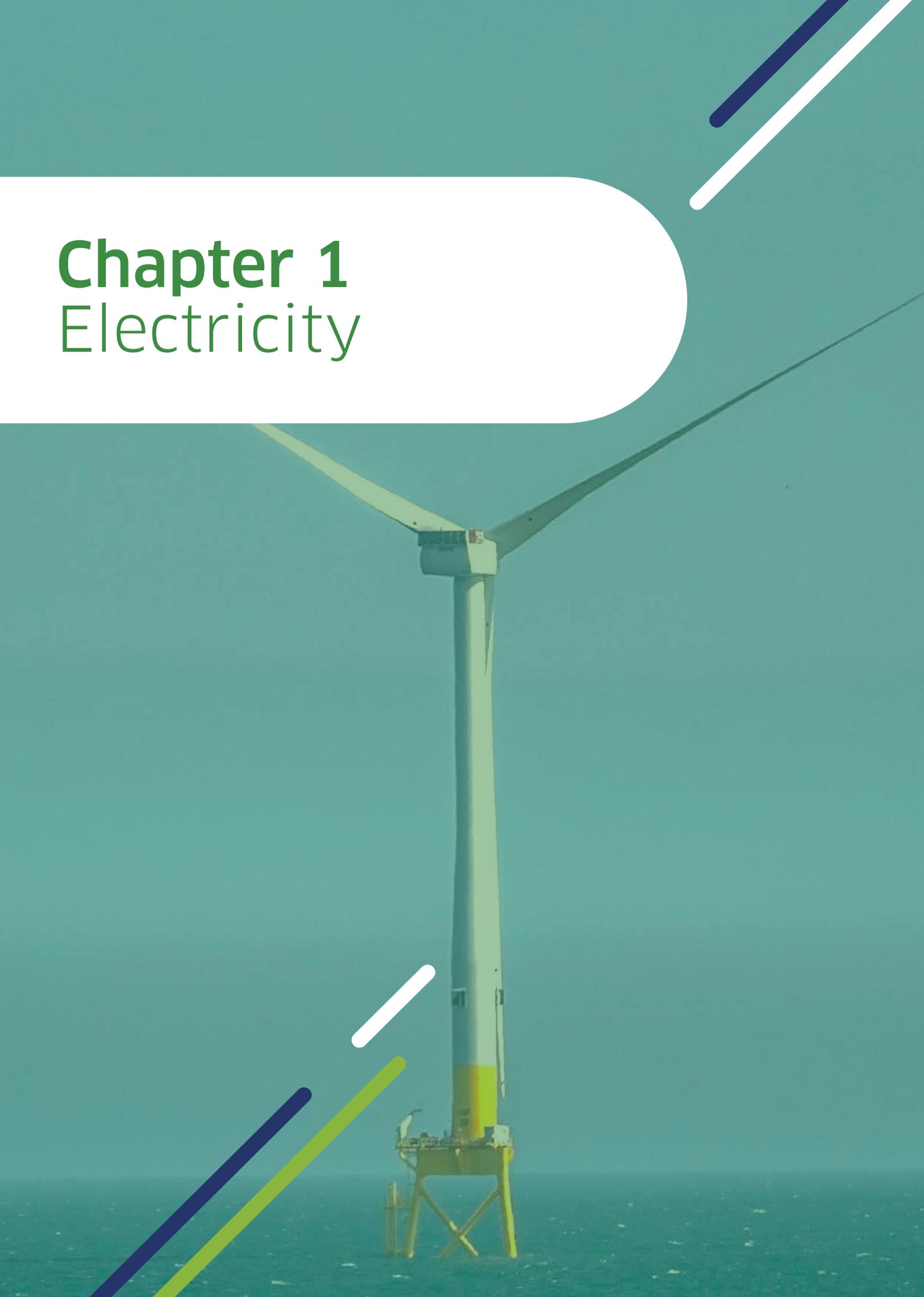
Sector Chapters



- 3.0.1 Having world leading emissions reductions targets means a significant and sustained effort will be needed by all to end our contribution to climate change by 2045. The following sector chapters contain the policies and policy proposals that the Scottish Government are committed to delivering, as well as what actions we need the public sector, private sector, individuals and the UK Government to take.
- 3.0.2 Seven of the eight sectors below relate directly to the seven sector chapters set out in the 2018 'Climate Change Plan: The Third Report on Proposals and Policies 2018-2032'³¹. An additional eighth chapter brings Negative Emissions Technologies (NETs) out of sector chapters and in to its own, allowing us to be transparent with our assumptions of these evolving technologies.
- 3.0.3 As outlined in Annex B: Derivation of Sector Emissions Envelopes, a key element of this update is the presentation of emissions envelopes for each sector, which add up to the annual emissions reductions targets. In the 2018 plan, the Electricity and Industry chapters spoke of Bioenergy and Carbon Capture and Storage, and the sector envelopes contained elements of NETs.
- 3.0.4 Annex A contains the full list of policy outcomes, policies and proposals for each sector. Any policies that are new since the 2018 Climate Change Plan are marked as 'new' and any that have increased in scale or ambition are marked as 'boosted'. In cases where these new or boosted policies are already announced, footnotes point to when this was. Any policies that are unchanged since the 2018 Plan are 'maintained'.
- 3.0.5 The emissions envelopes set out in the chapters below are based upon TIMES modelling with technical refinements made by Scottish Government sector analysts. Though TIMES modelling provides an integrated and consistent approach to the envelopes, there is also inherent uncertainty in areas such as cost, technological development and energy demand. This uncertainty increases over time, and we have therefore accompanied the results of TIMES modelling with other evidence in order to produce the final envelopes included in this Plan update.
- 3.0.6 The combined envelopes are shown below; this shows the relative effort required by each sector to meet the annual emissions reduction targets to 2032.

Chapter 1

Electricity



3.1. Electricity

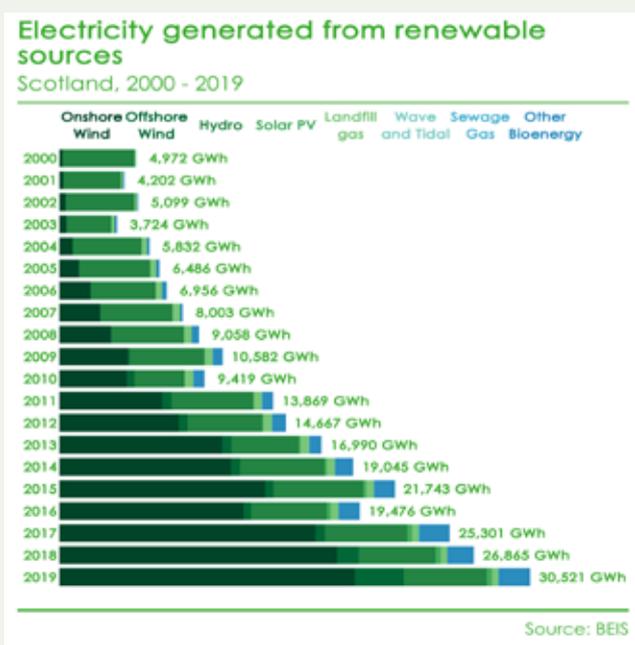
Introduction

3.1.1 Scotland is widely recognised as a world leader in renewable energy. We have an abundance of renewable resources, and our targets and achievements reflect that. More than 83% of the electricity generated in Scotland during 2018 came from renewable or low carbon sources, nearly three times as much as was generated a decade earlier.

3.1.2 Over the same decade, the last two coal stations in Scotland (Cockenzie and Longannet) have closed, with the carbon intensity of Scottish electricity generation falling by close to 90% between 2000 to 2018.

Scotland’s renewable electricity generation has grown rapidly over the last twenty years. In 2019, a record year for renewable electricity generation in Scotland, over six times more electricity - 30.5 TWh - was generated from renewable sources compared to the year 2000. This is the equivalent of powering all households in Scotland for over three years.

There is currently around 12 GW of renewable generation capacity installed across the country, while the carbon intensity of electricity generated in Scotland has fallen to less than 50 g CO₂ /kWh in both 2018 and 2019.



Average greenhouse gas emissions per kilowatt hour of electricity

Scotland, 2000 - 2018



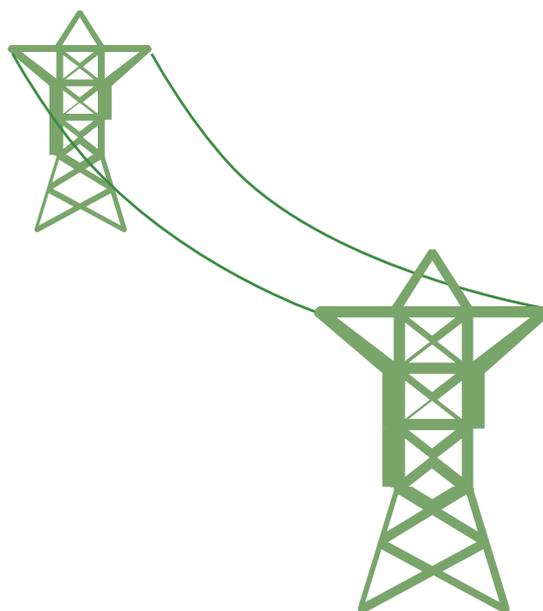
3.1.3 The decarbonisation of Scotland's electricity sector has been driven by our rich natural resources, a supportive approach to planning, a drive to involve local communities in decisions that affect them, supportive market frameworks, and rapidly declining prices of renewable technology globally - with wind and solar now the lowest cost forms of new generation³².

3.1.4 As Scotland transitions to net zero, a growing and increasingly decarbonised electricity sector is critical to enabling other parts of our economy to decarbonise - notably transport, buildings and industry.

3.1.5 We also want Scotland to continue to export large amounts of clean electricity to England, Northern Ireland, Wales and Europe, supporting carbon emissions reductions across the UK and beyond, and maintaining Scotland's position of a net exporter of electricity.

3.1.6 Our climate change targets mean that we need to continue our progress, and move from a low to a zero carbon electricity system, with the potential for Negative Emission Technologies (NETs - see Chapter 8) to deliver negative emissions from our electricity sector, for example through the use of bioenergy for electricity generation combined with carbon capture and storage (BECCS).

3.1.7 In further decarbonising our electricity system, we also need to address the substantial challenges of maintaining security of supply and a resilient electricity system. Operating a zero carbon electricity system will mean finding new ways to provide a range of technical services and qualities currently provided by fossil fuel and nuclear generation. These include inertia, frequency response and voltage support services, which help keep the system stable. Pumped storage also has an important role to play, as it can release stored electricity when the demand is high and the system needs it most (e.g. when there is less wind energy available).



32 Electricity Generation Costs 2020 (UK Government) - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/911817/electricity-generation-cost-report-2020.pdf

Dersalloch Black Start Trial³³



While there has never been a total black-out across the whole country, and the chances of one happening are small, its impact would be substantial. “Black start” services across Britain still rely heavily on fossil fuel power stations, along with some hydro and pumped storage capacity.

The Scottish Government provided £550,000 to support a demonstration project delivered by Scottish Power Renewables at its Dersalloch Wind Farm looking at the potential for delivering black start from wind. The project delivered a **global first** during a test in October 2020 by delivering black start capability from wind power to re-start part of the electricity system.

The project used “virtual synchronous machines” (VSM) to regulate the frequency and voltage of the power from the wind turbines to keep the local electricity system stable and balanced, throughout the process of restoring the part of the system that had been blacked out.

This project shows that Scotland is developing expertise that will be critical to net zero both here and around the world. The Scottish Government will continue to support the development of technologies that can support sustainable security of supply, with renewable generation delivering technical services that currently depend on fossil fuel power stations.

33 Photo of Dersalloch Wind Farm courtesy of Scottish Power Renewables.

3.1.8 Planning has been, and will remain, a critical enabler of rapid renewables deployment in Scotland. The position statement on our fourth National Planning Framework (NPF4), published in November, makes clear the Scottish Government's intention to actively facilitate decarbonised electricity generation and distribution³⁴.

3.1.9 Key energy infrastructure, including electricity generation, large scale storage such as pumped storage hydro, development of the high voltage electricity transmission networks, and a CCS network capable of supporting BECCS are all being considered in the preparation of the fourth National Planning Framework.

3.1.10 However, two of the key levers needed to release Scotland's further renewable energy potential – electricity policy and regulation – are reserved. This means that achieving our targets critically depends on the UK government taking the right decisions and actions and acting urgently.

New context

3.1.11 The electricity sector has continued to operate and ensure a safe, and secure supply of electricity throughout the COVID-19 pandemic.

3.1.12 Meanwhile, the need to invest in renewable generation, networks and related infrastructure to reduce greenhouse gas emissions is also critical to creating good, green jobs as part of our green recovery and longer term energy transition as discussed below.

Green recovery and just transition

3.1.13 A number of stakeholders and advisory bodies, including the Just Transition Commission, the Advisory Group on Economic Recovery, SSE, Scottish Power and Scottish Renewables, have emphasised the importance of renewable technologies in our green recovery. We agree that decarbonising our electricity generation and networks will provide a range of opportunities for existing and new Scottish companies.

3.1.14 In 2018, the low carbon electricity sector directly supported 7,800 full time equivalent jobs across Scotland, and contributed more than £3.6 billion to the Scottish economy. Recent analysis by National Grid estimated that 50,000 jobs in Scotland will be required in the Net Zero Energy Workforce³⁵.

3.1.15 The economic opportunities are huge and wide ranging. Our Offshore Wind Policy Statement³⁶, published in October 2020, sets out our assessment of Scotland's offshore wind capacity to 2030 and, together with the Sectoral Marine Plan and ScotWind leasing rounds, provides the market with an understanding of the available Scottish potential.

3.1.16 Floating wind is an emerging technology, and, with the first large scale floating wind farm off the coast of Peterhead, and Scotland's huge resource potential, there are significant opportunities here, for both development and innovation

34 <https://www.gov.scot/publications/scotlands-fourth-national-planning-framework-position-statement/>

35 <https://www.nationalgrid.com/stories/journey-to-net-zero/net-zero-energy-workforce>

36 <https://www.gov.scot/publications/offshore-wind-policy-statement/pages/1/>

in installation and maintenance. The Carbon Trust's Floating Wind Joint Industry Project, which the Scottish Government has helped fund, published a report³⁷ this summer which forecast that as much as 70 GW of floating wind could be installed by 2040.

- 3.1.17 Offshore wind has an important role to play in supporting the transition from oil and gas to low and zero carbon renewables. Scotland's decades long experience across the oil and gas industry, and the offshore experience and innovation that this has developed, can be brought to bear in the development of offshore renewables and carbon capture and storage. It is also evident that many of the skills, expertise and technologies held within the oil and gas industry will be crucial in the development of net zero solutions at scale. The Scottish Government's £62 million Energy Transition Fund, announced in summer 2020, will aid this process.
- 3.1.18 Approximately £1 billion is spent each year on maintaining and developing electricity networks, leading to substantial work for local supply chains. Both Scottish transmission networks (SSE and Scottish Power) included potential investments totalling around £2.5 billion in their recent business plan submissions to Ofgem – comprising a mixture of new and upgraded networks to help accommodate more renewable generation and investment to maintain the existing network.
- 3.1.19 SSE and Scottish Power, along with National Grid, have also announced plans in November 2020 to take forward a multi-billion subsea link between the east coasts of Scotland and north east England. The 4 GW project is designed to help connect Scotland's huge offshore wind potential, with the companies forecasting that the project could support “hundreds of green jobs” during construction and operation.
- 3.1.20 Recent work from the University of Strathclyde highlights that investing in our electricity system to support the uptake of electric vehicles (EVs) can deliver sustained economic growth and new jobs into our economy³⁸- for example, the report says that there could be up to 3,000 new jobs associated with 20% EV penetration by 2030.
- 3.1.21 We also aim to take full advantage of new and developing technologies. For example, hydrogen can play a major role in a net zero electricity system, directly complementing renewable generation, and providing new ways and opportunities to use, transport and store that energy. This isn't just true for Scotland, but is likely to be part of the global solution to Climate Change. Scotland has the opportunity to be at the forefront of global change, developing and exporting expertise and support new skilled jobs.
- 3.1.22 The Scottish Government has a strong track record for supporting innovation in areas of key competitive advantage, such as wave and tidal power. Recent work

37 <https://www.carbontrust.com/news-and-events/news/floating-wind-joint-industry-project-rd-findings-delivered-to-support-70gw-by>

38 https://strathprints.strath.ac.uk/67741/19/Turner_et_al_CEP_2019_Who_ultimately_pays_for_and_who_gains_from_the_electricity_network_upgrade.pdf

by the Offshore Renewable Energy Catapult³⁹ suggests that the tidal stream industry could generate a net cumulative benefit to the UK of £1.4 billion and support 4,000 jobs by 2030 and wave energy could add a net positive contribution to the UK economy of £4 billion and support 8,100 jobs by 2040. However, both these technologies remain at an early stage of development, with the key levers required to commercialise the technology reserved to the UK Government.

3.1.23 We will continue to do all that we can to maximise the opportunities for Scottish businesses in our green recovery and longer term transition, supporting jobs, skills and enterprise, ensuring that the correct support is in place to strengthen Scotland's renewable electricity supply chains, and supporting investment in the necessary infrastructure.

3.1.24 There is already substantial inward investment in energy infrastructure, including renewables, in Scotland. Our inward investment strategy, published in October this year, has renewable energy and decarbonised transport as two key priority areas and seeks to attract global companies to Scotland from across the UK and overseas.

3.1.25 We collaborate with the energy industry to ensure that we develop and use Scotland's potential and expertise. The First Minister's Scottish Energy Advisory Board (SEAB) and its Strategic Leadership Groups (SLGs) will help us to develop our understanding of the challenges and opportunities on skills and expertise in Scotland,

identifying where and how we need to support our workforce in the transition towards net zero, including supporting delivery of the ongoing work of the Energy Skills Alliance.

3.1.26 The Scottish Government is working closely with the Energy Skills Alliance, a newly created and cross energy collaborative group whose focus is to develop an integrated skills strategy for a strong, net zero energy industry. The work streams include mapping future energy skills demand, taking a phased approach looking out to 2030, and ahead to the 2050 development of the My Energy Career Programme, delivery of an integrated energy apprenticeship scheme by 2022, and longer term development of a roadmap for aligning all energy training and standards. Skills Development Scotland is also progressing a Climate Emergency Skills Action Plan, published alongside this plan update, which will focus on the provision of green skills necessary for our journey to net zero.

3.1.27 In our 2017 Energy Strategy we were clear about the need for a smarter, local energy model, one that supports local solutions to meet local need, and links local generation and use. To support the development of local energy, we will publish a Local Energy Policy Statement that sets out key principles, that the Scottish Government wish to see adopted to ensure an inclusive energy transition - one that has people at its centre - supported by strong partnership working and collaboration at a local level.

39 <https://ore.catapult.org.uk/wp-content/uploads/2018/11/Tidal-Stream-and-Wave-Energy-Cost-Reduction-and-Industrial-Benefit.pdf>

- 3.1.28 We will also ensure that community-led renewables continue to grow as part of the transition, building on the success over recent years of our Community and Renewable Energy Scheme. (CARES).
- 3.1.29 The costs of moving to a fully decarbonised electricity system must be shared fairly and shouldn't fall disproportionately to those who can least afford to meet them. The Scottish Government remains determined to protect vulnerable consumers, consistent with our commitment to ensure that those who are least able to make the transitions are not forced to pay higher costs. We are committed to eradicating fuel poverty, with our statutory and ambitious targets setting out that by 2040 no more than 5% of households are in fuel poverty and no more than 1% in extreme fuel poverty.
- 3.1.30 The independent Energy Consumers Commission has a role as SEAB's consumers SLG, and will continue to advise on how the transition to a decarbonised system, and the costs and opportunities associated with this, can work for all consumers including those in vulnerable circumstances.
- 3.1.31 Many of the levers needed to ensure a fair distribution of costs and access to smarter energy systems are reserved to the UK. We will work with BEIS, Ofgem, consumer groups and industry to push for the changes that will be required for consumers in Scotland.

Our vision for 2032 and 2045

- 3.1.32 Renewable generation will increase substantially between now and 2032, and we expect to see the development of between 11 and 16 GW of capacity during this period, helping to decarbonise our transport and heating energy demand.
- 3.1.33 Our recent Offshore Wind Policy Statement⁴⁰ describes the potential for between 8 and 11 GW of offshore wind capacity to come forward by 2030. Our first Scot Wind leasing round in 2020/21 provides property rights for substantial new offshore wind capacity, with a second round to follow in 2023.
- 3.1.34 This renewables growth will lead to a more diverse and renewable electricity system, with a range of generating technologies and local / community energy developments combining with advances in flexibility and smart networks to ensure that consumers have access to reliable and affordable power.
- 3.1.35 Our current dependence on fossil fuel power stations to ensure system stability and security will change radically over the next decade. By 2030, innovation and trial projects will have demonstrated new ways to deliver sustainable security of supply, with updated market and regulatory mechanisms in place which value and reward these new services.

3.1.36 Renewable electricity will also combine with hydrogen to provide heat and power to households, businesses, large transport fleets and a range of industrial processes. The development of carbon capture and storage (CCS) and NETs will mean that the electricity system in 2032 could potentially deliver negative emissions, compensating for residual emissions elsewhere in the energy system.

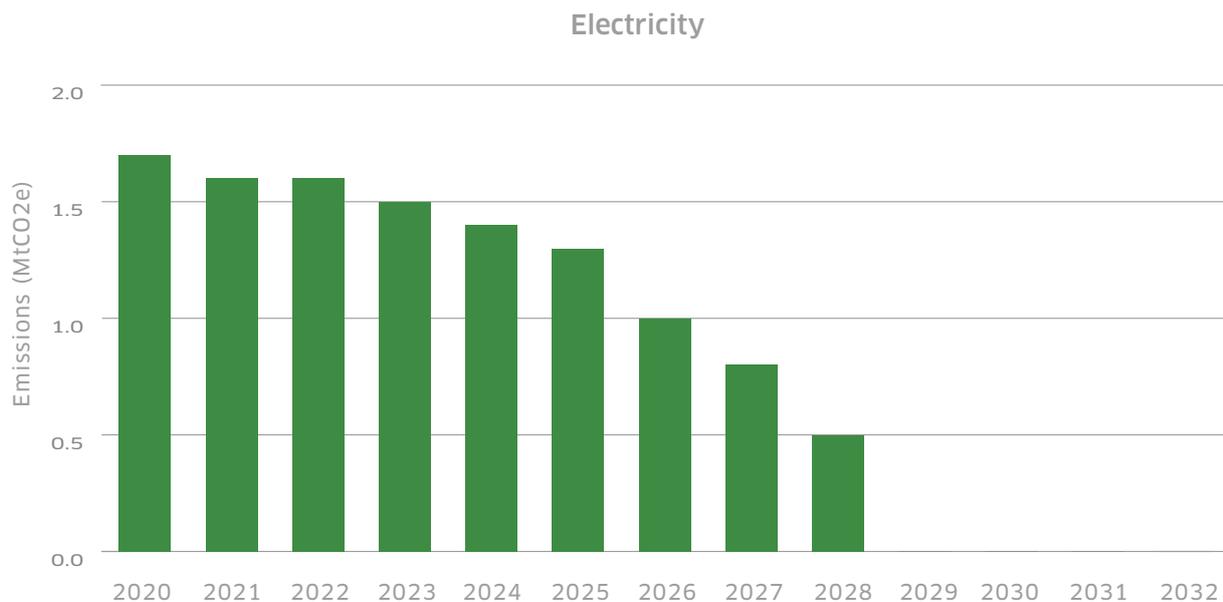
3.1.37 Electricity demand will have grown considerably, with heat pumps and electric vehicles commonplace across Scotland. This means that electricity will play a much greater role across our wider energy system, economy and society than it did in 2020. The costs and benefits will be shared fairly across all members of society, with vulnerable groups and

fuel poor households protected at every stage.

3.1.38 Scotland’s economy will benefit from the growth and manufacture of new renewable generation out to 2045, with a new, skilled and innovative workforce including many who have made a fair and just transition from other parts of today’s energy sector and industries.

3.1.39 Greater interconnection across the rest of the UK and to other parts of Europe will benefit our system and enable the export of renewable electricity across the continent. Consumers of all sizes will be able to support the network, with electric vehicles and other household devices rewarded for consuming and supplying power to the local grid when required.

Emissions Reduction Pathway to 2032



Route map to 2032



2021

We will ensure that both the technology and system challenges of the electricity sector are reflected in our new framework of support for energy research, development and innovation.

Energy Strategy Update published, outlining the role that we envisage the electricity system playing in our wider energy system, considering how it is increasingly used to decarbonise other sectors, including buildings, industry and transport.

First tranche of funding available from the £180 million Emerging Energy Technologies Fund.

ScotWind applications evaluated and option agreements awarded to site developers.

The process of introducing new requirements for developers to include supply chain commitments when applying to the ScotWind leasing process run by Crown Estate Scotland is completed.

2022

An updated Electricity Generation Policy Statement (or "Clean Power Plan") is reviewed and published ahead of the next Climate Change Plan.

Draft National Planning Framework (NPF4) laid in Parliament during Autumn 2021. Full public consultation on the draft NPF4 will run alongside Parliament's consideration, with NPF4 expected to be adopted in Spring/ Summer 2022.



2030

Offshore wind in Scotland has expanded to between 8 and 11 GW, building on the measures laid out in our Offshore Wind Policy Statement.

2017 commitment to ensure all renewable energy accounts for the equivalent of 50% of our energy demand across electricity, heat and transport is successfully delivered.



The actions we are taking

Supporting onshore wind

3.1.40 We will continue to **review our energy consenting processes**, making further improvements and efficiencies where possible, and seeking to reduce determination timescales for complex electricity generation and network infrastructure applications. Faster determinations will enable any projects awarded consent to develop more quickly, which will benefit onshore wind in particular.

3.1.41 The interaction of wind turbines with aviation radar can sometimes present a barrier to development. We will continue to work with

aviation, energy and other stakeholders, exploring best practice for collaboration through our Aviation 2030 Vision Taskforce, tackling the technical, regulatory and financial barriers which will **ensure that all radars are wind turbine tolerant/neutral**, and freeing up much more capacity for development.

Supporting offshore wind

3.1.42 **We will deliver the actions from our Offshore Wind Policy Statement**, published in October⁴¹. These actions, ranging from support for supply chain, planning, innovation and skills, will support the development of between 8 and 11 GW of offshore wind capacity by 2030.

41 Announced in Offshore Wind Policy Statement, October 2020

3.1.43 We will complete the **first ScotWind leasing round**, granting property rights for seabed in Scottish waters for new commercial scale offshore wind energy projects. We expect a second round to follow by 2023.

Clean Power Plan and security of supply

3.1.44 We will review and publish an updated **Electricity Generation Policy Statement (or “Clean Power Plan”) by 2022**. In line with the recent CCC recommendation to do so; this work will reflect an assessment of the contribution that renewable electricity generation is likely to have to making to achieving Scotland’s net zero target.

3.1.45 We will also continue our efforts to ensure a **sustainable security of electricity supply**, enabling renewable electricity to provide vital network services and including this component within future Scottish Government energy innovation funding programmes.

Infrastructure Improvements

3.1.46 We will work with our Enterprise Agencies to support the required infrastructure improvements to our ports and harbours to ensure that **Scotland’s supply chain companies** can benefit from the continued growth of renewable energy.

Support new Pumped Storage Hydro Capacity⁴²

3.1.47 We will continue to fight hard for measures to unlock investment in **Pumped Storage Hydro (PSH)**, following the recent Scottish Government consent for major projects at Coire Glas in the Highlands, and Glenmuckloch in Dumfries and Galloway in south west Scotland. We have asked the UK Government to bring forward mechanisms, potentially similar to those available for interconnectors, which will enable the substantial investment needed to develop PSH; we will work with the developers to ensure that this can deliver sustainable and secure jobs and supply chain benefits to Scotland’s rural areas.

3.1.48 The following policies will benefit all sectors, and are related to the whole system actions described in the Coordinated Approach chapter.

New technology funding

3.1.49 We will launch a call in 2021 for evidence and views on **technologies that can transform our electricity system**, including energy storage, smart grid technologies, and technologies to deliver sustainable security of supply. This will help ensure that our funding and interventions support world leading activity in Scottish based companies.

CASE STUDY: INNOVATION SUPPORT FOR RENEWABLE ELECTRICITY

Scotland is a world leader in marine renewable energy innovation, as a result of consistent and committed funding and support from the Scottish Government. Initiatives such as the Saltire Tidal Energy Challenge Fund and our Wave Energy Scotland programme have supported projects at the cutting-edge of the marine energy sector, demonstrating key innovations while utilising the Scottish supply chain.

In 2019, Orbital Marine Power received £3.4 million of support through our Saltire Tidal Energy Challenge Fund to build and demonstrate the O2 2 MW tidal turbine, due to be launched in 2021 at the European Marine Energy Centre in Orkney. The 72-metre long device uses turbine rotors which can be turned 360 degrees so that power can be extracted from the tide as it moves

in and out. This innovation significantly increases the potential renewable energy generation, with the O2 capable of powering more than 1,700 homes per year. Key parts of the device were fabricated in Fife and Orkney, using steel from Motherwell, and assembled in Dundee.



Carbon Capture and Negative Emissions Technologies

- 3.1.50 We will carry out detailed research, development and analysis during 2021 to improve our understanding of the **potential to deliver negative emissions from the electricity sector**⁴³.

Role of bioenergy in the electricity system

- 3.1.51 The **Bioenergy Update will be** published early next year to be followed by the development of **a Bioenergy Action Plan**⁴⁴. This will consider the role of bioenergy for electricity generation (as well as others sectors) including its potential combination with CCS to deliver negative emissions from the electricity sector, ahead of the next climate change plan in 2024.

Developing Scotland's Hydrogen Economy

- 3.1.52 We will support the development of hydrogen linked to the electricity system during the 2020s, building on the outputs of the **Hydrogen Assessment Project** and hydrogen policy development process⁴⁵. This will identify and develop the opportunities for generating hydrogen from renewable electricity generation in ways that can support the integration of new wind, solar and marine capacity.

Our call to others

The UK Government

- 3.1.53 Electricity policy covering generation, transmission, distribution, supply and regulation is reserved. This means that achieving the electricity sector

policy outcomes contained within this Plan update will depend to a large extent on policy decisions and actions from the UK Government.

- 3.1.54 We are already working with the UK Government to ensure that it understands the scale and context of our ambition for Scotland, as well as the importance of renewable electricity in Scotland for wider UK decarbonisation ambitions.

- 3.1.55 In order to help decarbonise the electricity sector at a pace consistent with the Scottish Government's ambition and targets, we are calling on the UK Government to:

- ▶ **Radically reform the Contract for Difference (CfD) mechanism**
 - this needs to go beyond the confirmed reintroduction of eligibility for onshore wind and solar. The UK Government's recent response to its CfD consultation contains some welcome elements, notably the separation of offshore wind from floating and remote island wind, which we believe will make the latter technologies more competitive in future allocation rounds. However, we continue to press the UK Government to make targeted and effective support available for wave and tidal generation. We have also campaigned hard for changes to the CfD which strengthen the requirement to use Scottish and UK supply chains, with measures on this front now subject to further consultation. We believe there may also be a role for the CfD in supporting the production of green hydrogen from renewable energy sources.

43 Announced in 2020-2021 Programme for Government

44 Announced in Scotland's Energy Strategy, 2017 we would develop a bioenergy action plan

45 Announced in 2020-2021 Programme for Government

- **Fully explore** the options for hydrogen to play a role in direct power generation itself, potentially displacing natural gas as a provider of back-up or baseload power generation.
- **Support and enable the commercialisation of negative emissions technologies, CCS and hydrogen in the electricity sector as well as others** – the electricity sector has substantial potential for these technologies, and support mechanisms such as CfDs have long been used to support developing technologies. The development of CCS urgently requires a stable policy environment comprising suitable incentives, regulatory environment, business model and financial frameworks. The use of electricity support mechanisms needs to combine with a wider framework to develop CCS that will enable negative emission technologies commissioning in the UK from the mid-2020s.
- **Ensure security of supply and operability** – we have asked the UK Government to urgently address the matter of regional security of supply. For example, the GB-wide Capacity Market has no locational element and has failed to deliver investment in new dispatchable electricity generation in or near Scotland. Our decarbonised system will need enhanced black start provision, and to unlock investment in critical ancillary services. This is especially true of pumped storage hydro, where the plans and potential for huge new investments in Scotland will depend on the UK Government delivering a clear route to market.
- **Commit to carbon pricing** – we are calling on the UK Government to commit to a UK ETS (as discussed in more detail in the Industry chapter) that, together with the reserved Carbon Price Support, provides a clear carbon price signal for investment in renewable generation.
- **Deliver better regulation** – we, along with many others, have called on the UK Government to give Ofgem an explicit statutory objective to support the delivery of net zero. This will ensure that its regulatory mechanisms and decisions are fully consistent with binding targets such as Scotland’s 2045 net zero goal, and flexible enough to meet the national and local ambitions across Scotland, as well as in England and Wales.

Scottish public sector organisations

- 3.1.56 In our Vision for Scotland’s Gas and Electricity Networks, we committed to supporting local authorities and other organisations to engage more strategically on issues related to the electricity system. We are working in partnership with local authorities to develop Local Heat and Energy Efficiency Strategies (LHEES), aiming to have these in place across all local authorities by the end of 2023. LHEES will be an important enabler for local authority engagement with electricity network companies on future investment in Scotland’s net zero electricity infrastructure.

3.1.57 We will engage with partners on the new Net Zero Carbon Standard for new public buildings and we are accelerating efforts to use 100% renewable electricity on the Scottish public estate.

3.1.58 We are already seeing ambitious and encouraging leadership in the public sector, and we will support others to follow suit. Scottish Water has committed to become a zero carbon user of electricity by 2040, five years before the national net zero target, while Forestry and Land Scotland has installed over 1 GW of wind and hydro capacity across the land it manages.

Scottish businesses and industry

3.1.59 Scotland has a host of companies with impressive and innovative track records in renewables and network development, as well as in the growing market for flexibility services. We also have a financial sector, which includes the new Scottish National Investment Bank, in place and ready to work with the electricity sector to deliver new and inward investment across Scotland.

3.1.60 The challenges facing Scottish businesses and industry will vary according to an organisation's size, electricity demand and ability to explore or invest in onsite generation or flexibility measures. Changes and investment in the electricity grid, including those which are influenced by

regulatory decisions affecting the way in which charges are levied, have the potential to encourage Scotland's industrial sites to switch towards low carbon and renewable electricity. This makes it all the more urgent that Ofgem's decisions clearly reflect the need to support net zero.

3.1.61 In an electricity system with very high levels of renewable generation, businesses should have more incentives to be flexible. This means considering when they use electricity, for instance, looking for ways to reduce or increase their demand at certain times depending on renewable generation and wider demand across the network. Electricity networks are increasingly providing opportunities for large users who can vary their use at particular times and respond quickly to certain signals / circumstances. These provide opportunities to reduce costs and earn additional revenue, while helping maintain system security.

Individuals/households

3.1.62 The starting point for all of us, as individuals in our households, and across communities, should be to continue to invest in and follow energy efficiency measures and advice, and to reduce our electricity demand. Home Energy Scotland provides advice to all consumers on how to reduce their energy use and improve the energy efficiency of their homes.

3.1.63 Improved networks, renewable generation and smarter local energy systems can provide opportunities for a more flexible and resilient system, offering more attractive choices for consumers, for example, by programming EVs or smart household devices to respond to network and market signals about the need to use more or less energy. Individuals as well as businesses should be able to benefit from being flexible in this way.

3.1.64 We know that these opportunities won't be available or easily accessible to everybody. The Scottish Government and others have a huge part to play in helping promote and increase accessibility amongst the widest possible range of consumers. This is especially true for consumers in vulnerable circumstances who are often more reliant than others on a safe and reliable electricity supply.

3.1.65 The Scottish Government is committed to eradicating fuel poverty, with our statutory and ambitious targets setting out that by 2040 no more than 5% of households are in fuel poverty and no more than 1% in extreme fuel poverty. A key driver of fuel poverty is the cost of energy; the way in which our electricity system develops, in particular how it is paid for, will be central to meeting these targets.

3.1.66 We will continue to work with the UK Government to urge it to reform levies so that they are fairer and that the burden does not fall disproportionately on those in or at risk of fuel poverty. Ofgem, electricity network companies and suppliers also have a crucial role to play in ensuring that changes can help lift households out of fuel poverty across Scotland.

International engagement

3.1.67 Scotland's Energy Strategy identifies internationalisation as a key area, recognising the importance of working with international partners and the contribution that this can make to sustainable economic growth as we transition to a net zero economy. Scotland is renowned as a renewables pioneer, and we will continue to engage with international partners, strengthening existing relationships, maximising opportunities in new innovations and emerging technologies.

3.1.68 We will prioritise activity and collaborations that promote learning and policy exchange, build upon Scotland's reputation and increase our attractiveness to international partners to ensure a flow of new investment.

Chapter 2

Buildings



3.2. Buildings

Introduction

- 3.2.1 The scale and pace of the changes to how we heat our buildings will be nothing short of transformational. Emissions from heating all buildings across Scotland need to reach zero by 2045 and demand for heat in buildings must be significantly reduced, with poor energy efficiency removed as a driver of fuel poverty. Currently, heat in buildings accounts for 20% of Scotland's greenhouse gas emissions⁴⁶. By 2040 our statutory fuel poverty targets require: that no more than 5% of households are fuel poor; that no more than 1% of households are in extreme fuel poverty; and the fuel poverty gap is reduced to £250 (adjusted for 2015 prices). We also have interim targets for 2030 and 2035. Currently 24.6% of households are fuel poor, and 12.4% are in extreme fuel poverty⁴⁷. We will deliver upon these targets in a way that carefully coordinates the dual challenges of decarbonisation and tackling fuel poverty to ensure a fair and just transition.
- 3.2.2 The zero emissions heat transition will involve changing the type of heating used in over 2 million homes and 100,000 non-domestic buildings by 2045, moving from high emissions heating systems, reliant on fossil fuels, to low and zero emissions systems such as heat pumps, heat networks and potentially hydrogen. Our interim statutory target of a 75% emissions reduction by 2030 means we must rapidly accelerate heating system conversions during this decade, from the current rate of around 0.1% of homes converting per year to a rate in the region of 5-10% (over a hundred thousand) homes per year.
- 3.2.3 These changes will involve households and businesses across Scotland becoming familiar with new heating technologies, and seeking to adopt them. The potentially significant costs associated with transforming our heating systems will need to be balanced in a fair way that neither exacerbates fuel poverty rates nor allows the burden of paying for the transition to fall on those least able to pay. Vital to Scotland's transition will also be very significant policy action from the UK Government in key reserved policy areas.
- 3.2.4 We have made good progress on upgrading the energy efficiency of Scotland's building stock, with 45%⁴⁸ of homes now achieving Energy Performance Certificate Band C or better. We are supporting households to install energy efficiency measures and zero emissions heating systems through a range of schemes, as well as supporting an increasing number of heat network projects where these are appropriate and help with our fuel poverty objectives.
- 3.2.5 We still have a considerable challenge ahead in order to deliver a net zero emissions buildings sector. Currently, only around 11% of households have a low carbon heating system and just over half of our non-domestic building stock has heating from low or zero carbon sources.

46 Scottish Energy Statistic Hub: <https://scotland.shinyapps.io/sg-scottish-energy-statistics/>

47 Scottish House Condition Survey, 2019

48 Scottish House Condition Survey, 2019, SAP 2012 (RdSAP v9.93)

- 3.2.6 We will need to see a mass switch away from high emissions heating in homes and buildings (e.g. gas and oil central heating), as well as further expansion of renewable electricity production and stronger electricity grid infrastructure, to support the delivery of highly efficient and affordable electric heating at scale. This transition will also require further development of heat networks and, dependent upon successful demonstration and positive decisions on the future of hydrogen in the gas grid, the development of new hydrogen production, distribution and servicing industries.
- 3.2.7 We estimate that around 50% of homes, or over 1 million households, will need to convert to a low carbon heating system by 2030 to ensure our interim statutory targets are met. Our initial focus will be on off-gas-grid buildings and those most suitable for connection to a heat network. However, we will need to go further with some conversion of the remaining on-gas-grid stock. Furthermore, up to an additional 50% of non-domestic buildings will need to be converted to low and zero emissions heating by 2030.
- 3.2.8 Achieving a good standard of energy efficiency across all buildings will continue to have a critical role to play. This will deliver emissions savings for buildings using fossil fuel heating systems, enable the roll out of low and zero emissions heating systems, and support progress towards our fuel poverty targets.
- 3.2.9 This is a journey that will affect people right across Scotland in their homes and workplaces, and will require rapid growth of our domestic supply chains. There are many local economic opportunities to be captured that will support good quality local jobs, and there is a great deal of potential to improve quality of life, including the health benefits that come with comfortable, well insulated homes. We must also ensure a just transition, allowing consumers to easily access affordable low and zero carbon options.
- New context**
- 3.2.10 The long-term impact of COVID-19 upon the Buildings sector is uncertain, but the pandemic may have a sustained effect on the ways we work and how we use our buildings. Increased homeworking has changed both domestic and workplace heating patterns. We are yet to see whether this trend for homeworking will continue into the future, and how that might affect how buildings are heated. Increased domestic energy use at present, along with reduced incomes for many, has increased the numbers of people at risk of fuel poverty and potentially increased energy debt. We need to mitigate these effects and design decarbonisation policy in a way that does not exacerbate them.

Green recovery and just transition

3.2.11 A number of key stakeholders, including the Climate Emergency Response Group, the Just Transition Commission, and a number of industry stakeholders, have recommended that the Scottish Government prioritises investment in zero emissions buildings as part of a green recovery from COVID-19. Reflecting this, we put investment in decarbonising and modernising our buildings at the core of the green recovery investments announced in the 2020-2021 Programme for Government, with £1.6 billion committed over the course of the next five years.

3.2.12 We will maximise the opportunities that arise from this transition: continuing to address poor building quality and inefficiency as a driver of fuel poverty; driving investment in improved insulation and affordable heating; developing a skilled workforce based on high-quality jobs; and creating a strong domestic supply chain that builds upon the experience and expertise already developed by Energy Efficient Scotland.

3.2.13 Currently, around 13,000 people in Scotland are employed in the low and zero emissions heat and energy efficiency sectors, and of that 8,200 people are estimated to work in the design, manufacture and installation of energy-efficient products such as wall insulation and energy efficient doors and windows⁴⁹. Zero emissions heating system manufacturing alone is estimated to employ around 2,000 in Scotland⁵⁰.



3.2.14 Taken together, our policy interventions and immediate policies and investments, delivered as part of Scotland's green recovery from COVID-19, will build the scale of the zero and low emissions heat market, which should then deliver new jobs, skills and retraining opportunities. We expect to see industry develop expertise, and for costs to reduce through economies of scale and product improvement. This should ultimately bring cost benefits to consumers. We will also prioritise a just transition for the heat sector and tackle fuel poverty: while energy efficiency measures can help to offset some of the increased costs of heating, we need to ensure that decarbonisation does not disadvantage those already struggling to heat their home.

3.2.15 Our policies will deliver very significant expansion of heat pump deployment in the coming years. For example, Scottish Government investment through our enhanced domestic and SME loans and

49 [Low carbon and renewable energy economy, UK - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)

50 Based on Scottish Government understanding of the sector.

cashback schemes, and our advice and support services that leverage funding from UK schemes should boost our domestic manufacturing and installer base.

3.2.16 Our investment in, and regulation of, heat networks will stimulate the development of new heat networks and the extension of existing networks. This will provide high quality, sustainable green jobs across Scotland's towns and cities, such as in specialist design and architecture, equipment manufacturing, civil engineering, and maintenance. Furthermore, our direct investment and regulatory interventions will see increased rates of installation of energy efficiency measures, potentially supporting 1,200 jobs for every £100 million invested⁵¹; our support for further demonstration of hydrogen, smart heating technologies and electricity network innovation will create ripple effects across the wider energy system supply chain; and our targeted support for innovation will support companies with a high growth potential, boosting the economy and creating jobs. Overall, we estimate that as many as 24,000 jobs could be supported in Scotland by the roll out of low and zero emissions heat⁵².

3.2.17 We will publish a Supply Chain Strategy for energy efficiency and heat in buildings in 2021. This will expand our existing programmes of support for skills and retraining, cluster building, funding for demonstrators and business support through the

enterprise agencies, and will maximise the impact of city and sector deals as well as UK Research and Innovation and Challenge Fund funding. We are also working with Skills Development Scotland to ensure that heat and energy efficiency skills sit at the heart of the Climate Emergency Skills Action Plan.

Positive vision for 2032 and 2045

3.2.18 By 2032, through the scaling of targeted support, a substantial majority of Scotland's homes will have achieved a good energy efficiency rating, meaning that they are better insulated and have lower demand for heat. The number of socially rented homes achieving a high energy efficiency rating will be maximised, due to the investment of social landlords. As a result, we will have made significant progress in removing poor energy efficiency as a driver for fuel poverty in the majority of Scotland's homes.

3.2.19 In addition, we will have considerably accelerated the deployment of zero emissions heating, particularly in off gas-grid areas, and we will have seen a significant expansion of low carbon heat networks in heat dense areas. All new homes and buildings consented from 2024 will use zero emissions heating and be highly energy efficient. This process will see Scotland's economy and society benefit from new jobs and skills development.

51 Type 1 construction sector employment effects multiplier from the [Scottish Government input-output tables](#), applied to 2021 prices.

52 The jobs estimate is derived by taking a Scottish household share of the UK capital spend on heat decarbonisation projected by the CCC (P99 of the [CCC's Net Zero Technical report](#)) and applying the type 1 construction sector employment effects multiplier from the [Scottish Government input-output tables](#).

3.2.20 Properties connected to the gas grid will be supported to decarbonise through the electrification of heat and connection to heat networks, and through the significant progress that will have been made to decarbonise the gas network. We will see the emergence of an established zero emissions heating market, with a wide range of companies manufacturing, installing and innovating zero and low emissions heating products. As these companies prosper in this transition, they will be exporting and commercialising their expertise.

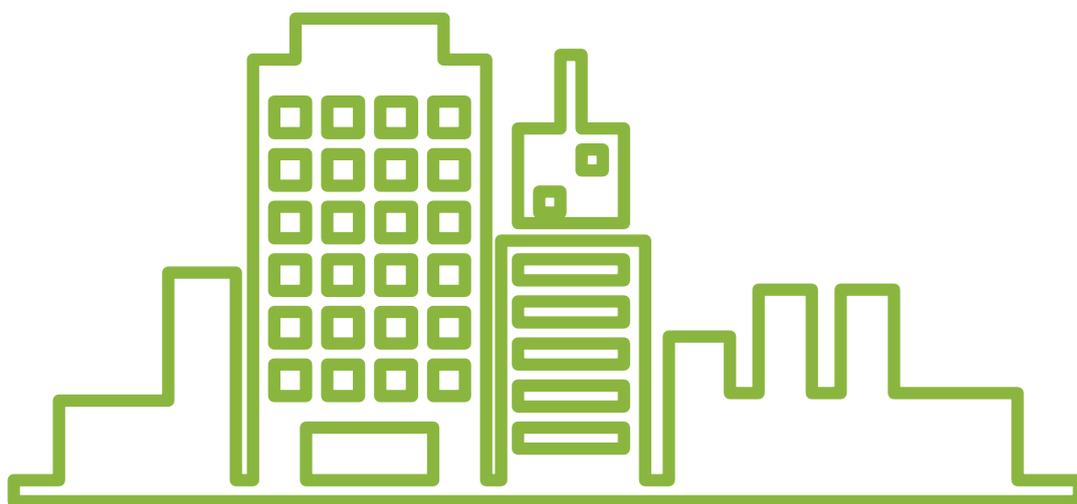
3.2.21 Buildings across Scotland will have been supported to reduce their energy demand, making it easier and more cost effective to install and operate low carbon heating systems. We will seek to ensure that support is coordinated and managed where possible to deliver economies of scale and high quality workmanship.

3.2.22 Through all of this, individuals will be enabled to be active participants in the transition. Where we provide support and advice to the general public, we will do so in an appropriate range of languages and formats to

ensure that everyone is able to understand their energy use. We will seek to put in place robust customer protections and standards, supporting a just transition and reliable market.

3.2.23 Our vision for 2045 is that our buildings will be much greener and more energy efficient. We will have reduced emissions from, and demand for, heat, so that virtually all buildings are zero emissions. Renewable sources of energy will supply our heating, cooling and lighting needs. People will feel comfortable in their homes all year round, and we will have met our statutory targets for fuel poverty.

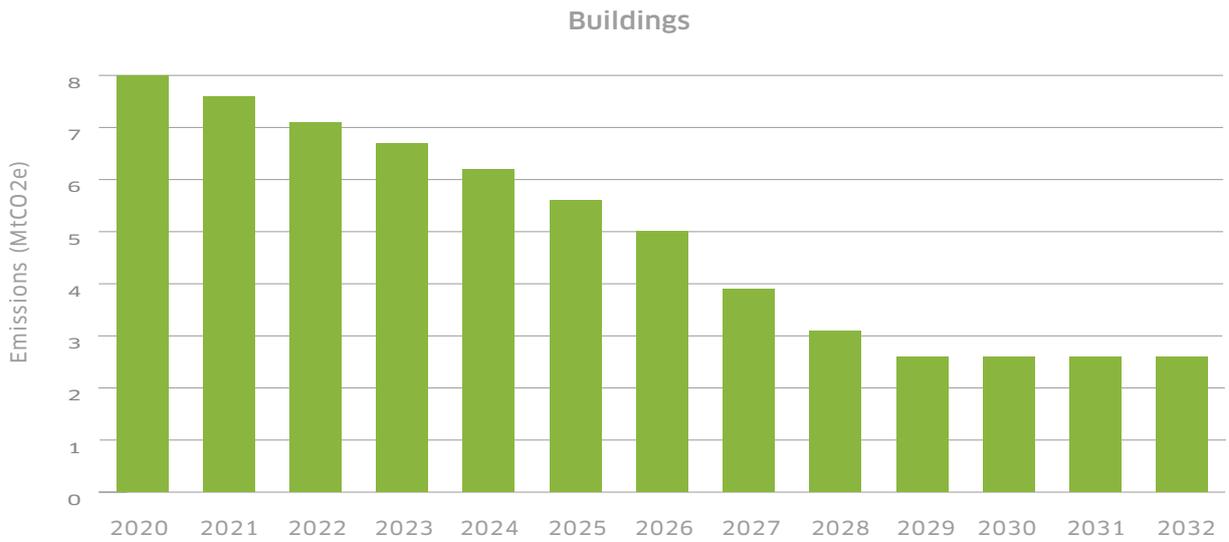
3.2.24 Delivering these changes requires further technology innovation, cost reductions and increased familiarity with and adoption of zero emissions heating technologies by people and businesses. They also mean our wider energy system will have to transform to be able to supply secure and affordable zero emissions electricity at scale. Furthermore, they depend upon the right market and pricing signals and regulations being in place.



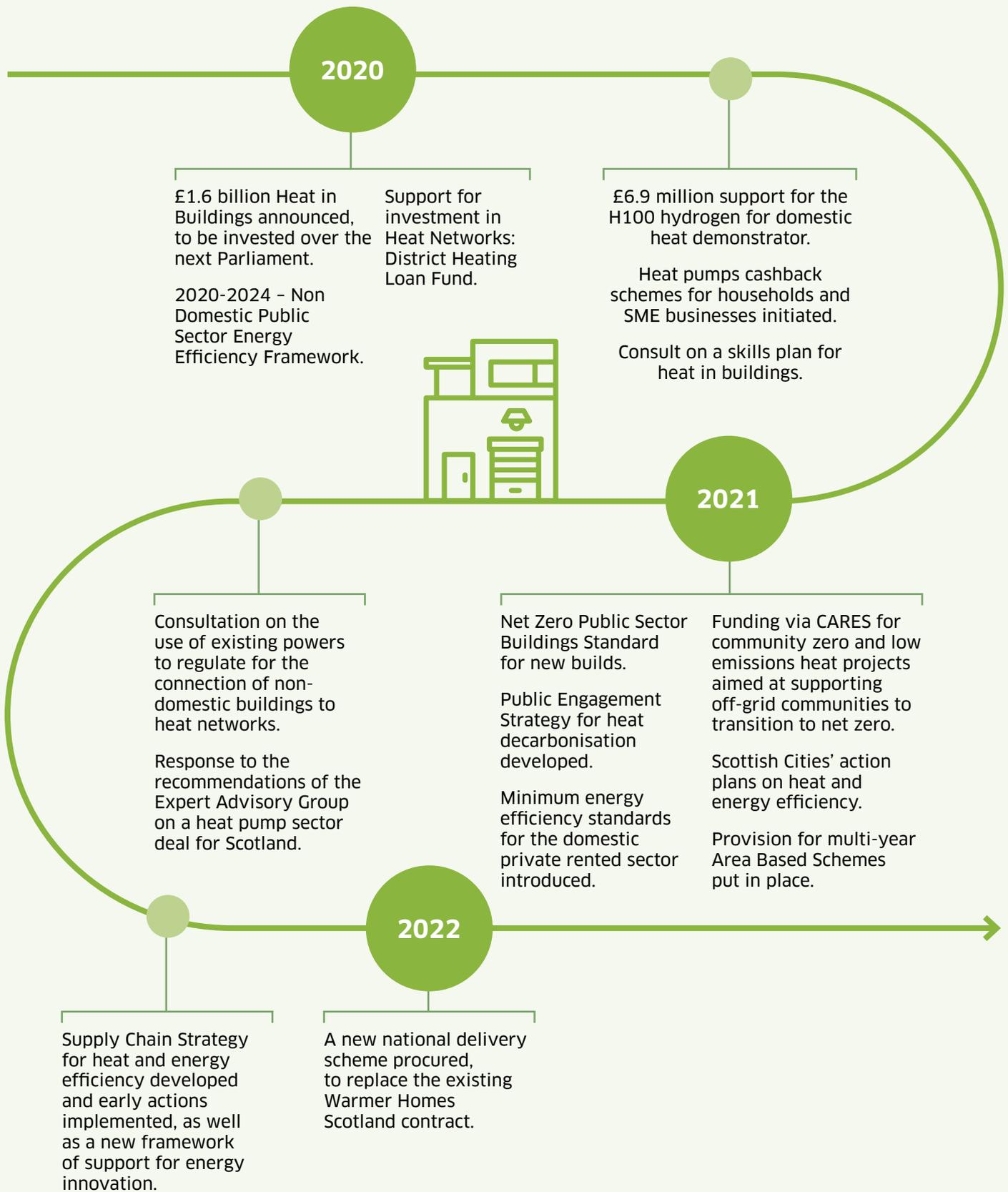


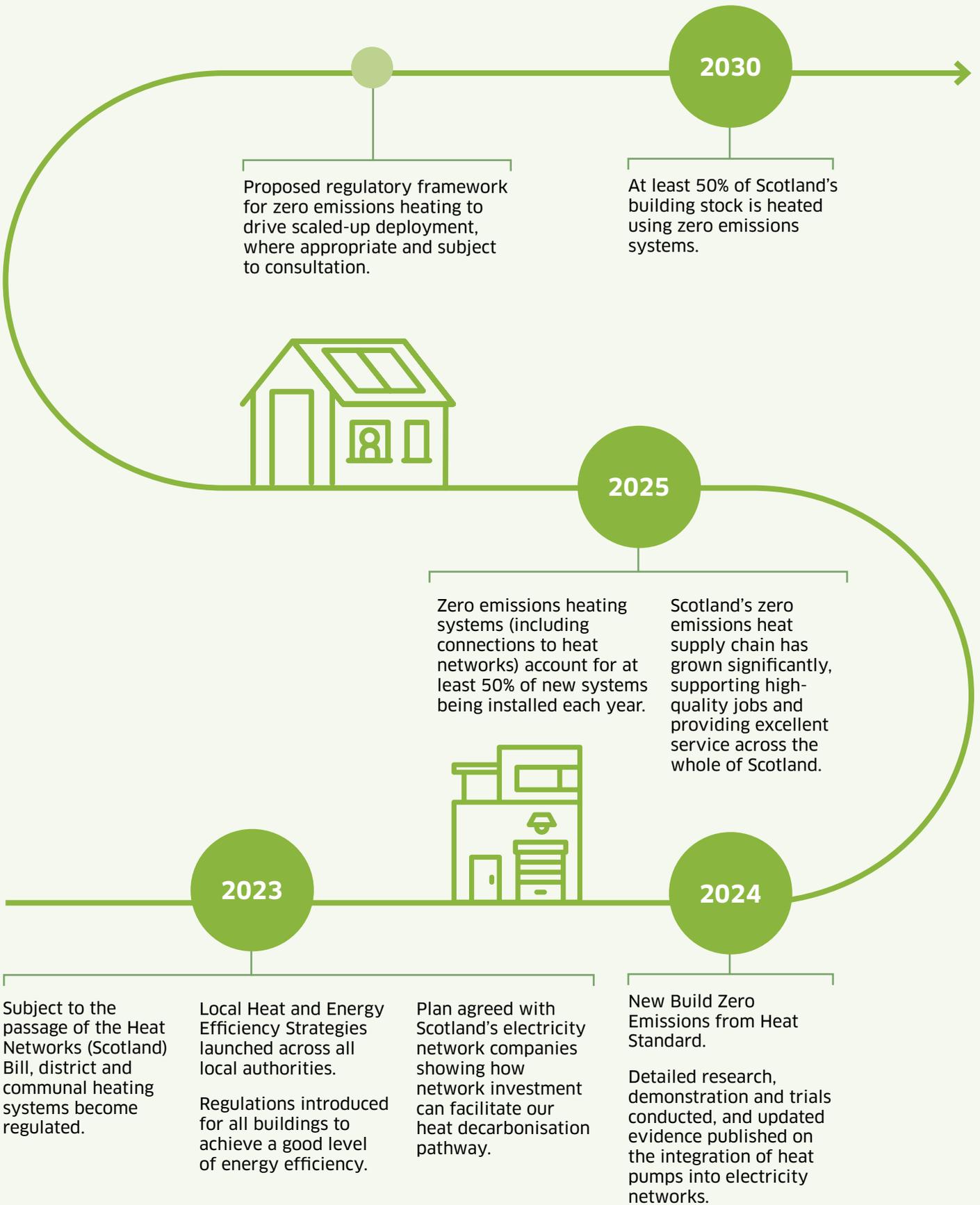
Jordanhill, Glasgow

Emissions Reduction Pathway to 2032



Route Map to 2032





The actions we are taking

3.2.25 As recommended by the Committee on Climate Change (CCC), we will set out a clear, long-term vision and policy direction for heat in buildings in the **Heat in Buildings Strategy**. This will include a comprehensive set of policy actions out to 2025 to significantly scale up deployment of zero emissions heating and energy efficiency in Scotland. This Climate Change Plan update provides a summary of the policies and actions that will be set out in more detail in our Heat in Buildings Strategy. During 2021 we will set out the key elements of how the housing sector will drive towards net zero emissions in the context of the 20 year Housing to 2040 strategy.

3.2.26 Our **early actions to 2025** will focus on increasing deployment rates of zero and low emissions heating through three broad mechanisms:

- A.** standards and regulation;
- B.** significant investment, including scaling up delivery programmes; and
- C.** supply chain support

3.2.27 **Principles** for action include:

- a)** taking a whole systems view;
- b)** protecting consumers and ensuring a just transition, including supporting continued progress towards meeting our targets on fuel poverty;
- c)** working closely with citizens, households and businesses;

d) driving innovation to secure efficiency improvements and cost reductions;

e) exploring innovative finance and service models; and

f) using tax based incentives to drive change.

3.2.28 **Key enablers** will be:

- creating the conditions to secure growth of heat networks in Scotland;
- Local Heat & Energy Efficiency Strategies for all of Scotland by the end of 2023 to ensure a place-based approach; and
- working with the Heat Pump sector.

3.2.29 These key actions, principles and enablers of our approach are outlined below. The Heat in Buildings Strategy will set out in more detail how we will achieve our critical milestones.

A. Standards and regulation

3.2.30 The Heat in Buildings Strategy will update the Energy Efficient Scotland route map⁵³ and will commit to putting in place standards and regulation for heat and energy efficiency, where it is within legal competence, to ensure that all buildings are energy efficient by 2035 and use zero emission heating and cooling systems by 2045.

3.2.31 We will ensure the alignment and coherence of wider policies and regulations so that these support the reduction of emissions from buildings.

3.2.32 As far as is within our legislative competence, we will put in place a new, appropriate framework by 2024-25.

3.2.33 Our initial focus for action before 2025 will be on:

1. new buildings, including introducing a standard requiring all new homes consented from 2024 to use zero emission heating;
2. introducing minimum energy efficiency standards for the domestic private rented sector;
3. introducing regulations for all buildings to achieve a good level of energy efficiency;
4. establishing a new net zero carbon standard for new public buildings; and
5. taking steps to facilitate common works in tenement buildings.

3.2.34 We will also work with social landlords to bring forward the review of the existing Energy Efficiency Standard for Social Housing (EESH2) with a view to strengthening and realigning the standard with net zero requirements.

3.2.35 The forthcoming Heat in Buildings Strategy will set out the steps we will take to develop proposals for a future regulatory framework for zero emissions heating, to be put in place to drive very significant scaling-up in deployment and accelerated market growth from 2025, subject to the limits of the Scotland Acts.

B. Delivering significant early investment

3.2.36 We will invest £1.6 billion⁵⁴ in heat and energy efficiency over the next Parliament. This will leverage additional UK Government funding and private household financing to deliver against our ambition to

see, as a minimum, the rate of zero emissions heat installations in new and existing homes and buildings double every year out to 2025.

3.2.37 The investment will deliver against four themes:

1. Supporting those least able to pay, for example through increased funding for our Area Based Schemes and Warmer Homes Scotland and continuation of the social housing funding stream within the successor to the Low Carbon Infrastructure Transition Programme (LCITP). As running costs for zero emissions systems can in some instances be higher than current fossil fuel equivalents, we will also build in support to ensure people can continue to enjoy warm homes that are affordable to heat.

2. Investing in strategic technologies by making zero emissions heat deployment a priority funding theme in the LCITP successor programme, supporting communities to decarbonise their buildings (through schemes such as CARES, including dedicated support for islands and our most remote communities).

3. Showcasing Net Zero Leadership through early adoption by providing support for decarbonisation of the public sector estate, maximising spend through domestic and small and medium-sized business cashback schemes, and developing a new support programme for the self-funded.

4. Innovation and demonstration: we will promote learning by doing, support technology and business model innovation and maintain innovation and demonstration

as a priority theme within the LCITP successor programme. Furthermore, we will support demonstration in strategic areas such as electrification and hybrid systems, and in the more challenging aspects of decarbonisation such as multi-tenure buildings.

3.2.38 Investment commitments include:

1. £50 million Green Recovery Funding Invitation to support low carbon and zero emissions heat projects in Scotland (already in progress);
2. up to £95 million for heat decarbonisation and energy efficiency of the public estate;
3. £25 million to support zero carbon energy infrastructure and heat networks for residential and commercial premises in the Clyde Mission region⁵⁵;
4. up to £4.5 million over the next six months in a cashback scheme for households, providing 75% cashback for zero emissions heating and 40% for domestic energy efficiency measures, with a total of £13,500 available per home;
5. boosted and strengthened Energy Efficient Scotland delivery schemes to stimulate even greater take up of energy efficiency measures across homes and non-domestic buildings⁵⁶ and a new commitment to increase zero emissions heating installations; and
6. continued support for affordable housing providers who wish to install zero emissions heating supply

ahead of regulatory requirements in 2024, through our Affordable Housing Supply Programme.

3.2.39 We will use our investment to leverage additional UK Government and private investment and target deployment at no and low regret priorities in order to grow the customer base, raise awareness and support supply chain development.

3.2.40 We will:

- increase our support for community low and zero emissions heat projects through our flagship CARES programme; and
- publish a Local Energy Policy Statement which will be underpinned by a set of key principles we wish to see adopted, to ensure a just, inclusive energy transition, that has people at its centre, supported by strong partnership working and collaboration at a local level.

Protecting consumers and ensuring a just transition

3.2.41 We will establish clear principles to underpin our commitment to no one being left behind, ensuring our approach neither increases the fuel poverty rate nor increases the depth of existing fuel poverty. This will include a boosted commitment to effective design and targeting of our fuel poverty and heat in buildings programmes to ensure we manage the heat transition in a way that does not exacerbate fuel poverty, with policies that build in excellent consumer care and

55 Announced in the 2020-2021 Programme for Government, with further commitments included in this Climate Change Plan update.

56 Boosted both in the 2019-2020 Programme for Government, and in the 2020-2021 Programme for Government

boosted collaboration with energy retailers to ensure a good deal for consumers⁵⁷.

3.2.42 While our funding programme for 2021-22 is clear, we will consult in our Heat in Buildings Strategy on specific investment options for our programme over the following four years where it significantly ramps up.

3.2.43 We will design future delivery programmes to ensure significantly accelerated retrofit of buildings, with new programmes to be in place from 2025 in order to secure long term delivery against the 2030 and 2040 targets. We will ensure housing makes its full contribution to our national target of net zero emissions by 2045 by signalling our long-term objectives in Housing to 2040.

C. Supporting supply chain growth

3.2.44 Supply chain growth is essential ahead of the mass-rollout of zero and low emissions heating systems commencing in the mid-2020s.

3.2.45 In the coming 12 months, we will rapidly build a more detailed understanding of the potential for supply chain growth in order to target support effectively and start to ramp up skills requirements and support for colleges.

3.2.46 Specifically we will:

- 1.** Develop a Supply Chain Strategy for energy efficiency and heat decarbonisation in partnership with the enterprise agencies, and including a specific Islands component. This will set out a range of wider actions to support supply chain growth and preparedness ahead of mass-rollout from the middle of the decade.

- 2.** Continue to work closely with Skills Development Scotland to develop the construction sector element of the Climate Emergency Skills Action Plan (CESAP) for energy efficiency and zero emissions heat.

- 3.** Deliver on actions in the CESAP relating to the heat transition, including investment in Scottish Colleges, and the skills development opportunities supported by our recent green recovery announcements, including the National Transition Training Fund, Youth Guarantee and Green Jobs Fund.

- 4.** Set out new skills requirements for installers, designers and retrofit co-ordinators in a Skills Plan for consultation under the CESAP. This will cover: adoption of the installer skills matrix, developed by sector skills bodies and industry, and its integration into PAS 2030 and Microgeneration Certification Scheme (MCS) installer standards; and development of qualifications for other roles in PAS 2035 wider retrofit standards where no qualifications currently exist in Scotland.

- 5.** Provide increased support for Scottish colleges for training and retraining for jobs in the energy efficiency and zero emissions heating sectors, including capital investment for colleges to buy equipment.

- 6.** Bring forward and support demonstrator projects, particularly those testing: hybrids and high temperature heat pumps; the use of hydrogen for space and water heating; projects to understand the impact of heat transition on existing energy networks.

57 For example, through the work of the [Energy Consumers Commission](#)

7. Work with stakeholders to develop an approach to making Scotland a leader in net zero carbon housing. We will build on lessons learned from the ‘Edinburgh Home Demonstrator’ project, which is developing a new business model for affordable housing and using it to build c. 1,000 homes to net zero standards across the Edinburgh City Region.

8. By the end of 2021, we will publish a new Scottish energy technology innovation framework, setting out new support for innovation in heat generation, storage and supply, as well as innovative methods for improving building energy efficiency.

Our approach

a) Taking a whole systems view

3.2.47 The energy system as a whole needs to be readied to support the delivery of an increasing proportion of electrical heat, and to ensure zero emission heating systems are ‘smart’ and can enable system flexibility. We are ensuring a whole system approach through our boosted work with Ofgem and electricity network companies. This work will provide a well-developed evidence base to support network planning, ensuring that we have the networks needed to link electric heating in our buildings to wind farms and other sources of renewable electricity across Scotland.

3.2.48 This includes:

1. the trial and demonstration of the integration of zero emission heating into the electricity system, including through the use of storage and demand management, to better understand the capacity and upgrades required; and,

2. a new Heat Electrification Strategic Partnership to ensure that the Scottish Government can work closely with the electricity network sector to deliver the network capacity needed in the right places across Scotland.

b) Protecting consumers and ensuring a just transition

3.2.49 We will establish clear principles to underpin our commitment to a just transition, ensuring our approach neither increases the fuel poverty rate nor increases the depth of existing fuel poverty. This includes a boosted commitment to effective design and targeting of our fuel poverty and heat in buildings programmes to ensure we manage the heat transition in a way that does not exacerbate fuel poverty, with policies that build in excellent consumer care and boosted collaboration with energy retailers, ensuring a good deal for consumers⁵⁸.

3.2.50 Specifically, we will:

1. Continue delivery of energy efficiency investment to support fuel poor households. This will help remove poor energy efficiency as a driver of fuel poverty by making homes warmer and cheaper to heat by reducing demand. It will be vital that the UK Government acts to reform the system of levies and charges on consumer bills, and promotes innovation in tariffs to remove the disproportionate burden these place on low income consumers.

2. Increase the number of zero emission heating measures funded through our fuel poverty programmes, targeting households who can benefit most from

58 For example, through the work of the [Energy Consumers Commission](#)

decarbonisation, avoiding those where there is a risk of detrimental outcome, and providing uplifted support where necessary to secure fuel poverty objectives.

3. Work with energy retailers to encourage them to: offer tariffs suitable for zero emission heat; to ensure that households are on tariffs suitable for their individual circumstances; and ensure that vulnerable consumers moving to zero emission heat are appropriately identified in network operators' vulnerable customer strategies.

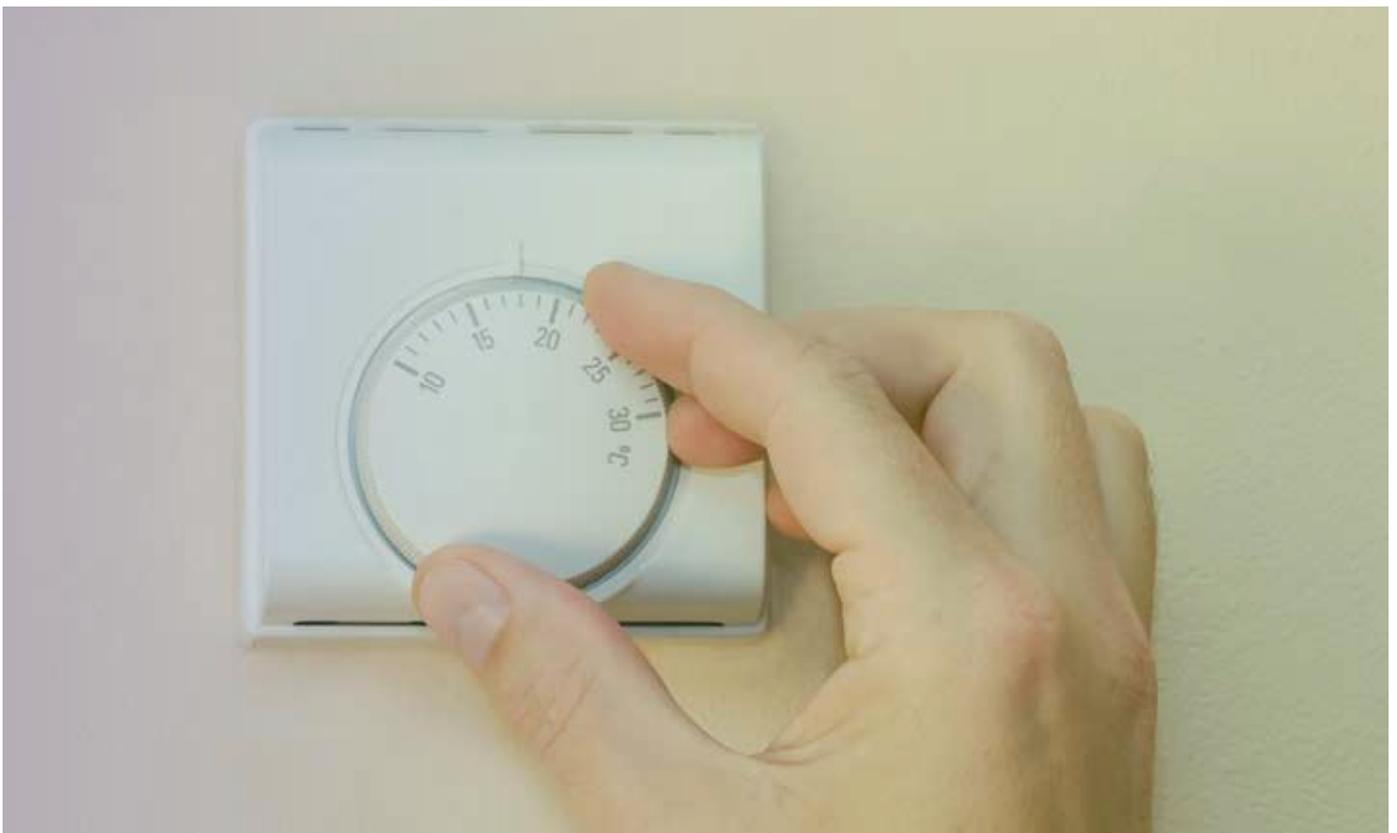
4. Increase Scottish Government programme support for microgeneration (solar/thermal PV) and storage systems, to support households to make maximum use of self-generated electricity.

5. Enable the installation of smart enabled zero emissions heating

systems (and funding of these through Scottish Government programmes) to ensure fuel poor households can take advantage of the potential cost savings from heat pumps working in combination with dynamic energy tariffs. This will require considerable awareness raising and consent.

3.2.51 We will also urge the UK Government to:

- ▶ rebalance environmental and social obligation costs on energy bills to make gas and electric systems relatively more cost comparable; and
- ▶ increase levy funding for social obligations and make changes to how costs are charged to low income and fuel poor households with higher energy costs, to ensure that progress is maintained in reducing fuel poverty.



CASE STUDY: WARMER HOMES SCOTLAND

Warmer Homes Scotland (WHS) is the Scottish Government's national fuel poverty scheme. It is focused on the installation of energy efficiency and microgeneration measures to improve the energy efficiency, warmth and comfort of properties occupied by those living in or at risk of fuel poverty. Since the scheme was launched in September 2015, it has helped more than 20,000 fuel poor households across Scotland become warmer and healthier in their homes,

in addition to saving an average of £300 per year on their energy bills. Warmer Homes Scotland includes an Employment and Skills Action Plan, with targets for job creation, apprenticeships, training and skills. The scheme invests in young people and apprentices across engineering, plumbing, electrical, construction and business administration skills and, as of October 2020, has supported 2,859 jobs and training opportunities.

c) Working with citizens, households and businesses

3.2.52 We will build public support for the heat transition through extensive and sustained engagement with individuals, communities and businesses across Scotland. The Scottish Government's Draft Public Engagement Strategy for Climate Change, published alongside this Plan update, will raise awareness of the ways emissions from buildings can be reduced and secure buy-in to the long-term changes that are required.

3.2.53 Specifically, we will:

1. open up public dialogue and engagement on the heat transition, including through a commitment to develop and implement a Public Engagement Strategy on the heat transition with extensive and sustained engagement with

individuals, communities and businesses across Scotland;

2. develop our digital communications and maximise the impact of our advice and support schemes to build public awareness and understanding of heat decarbonisation and energy efficiency solutions;
3. build public engagement into our demonstration projects;
4. use the development of Local Heat and Energy Efficiency Strategies across all local authorities in Scotland as an opportunity to ensure extensive community engagement on local heat decarbonisation choices; and,
5. increase our support for community low and zero emissions heat projects through our flagship CARES programme.

d) Driving innovation

3.2.54 Our support for innovation in heat generation, storage and supply, as well as innovative methods for improving building energy efficiency will drive significant emissions reductions.

3.2.55 Actions will include:

1. the development of a new framework of support for energy innovation with a strong focus on low carbon heat; and
2. support for demonstration projects, such as SGN's H100 hydrogen project.

e) Support innovative finance and service models

3.2.56 Innovations in finance and heat supply services can leverage and secure low cost financing for zero emissions heat and energy efficiency investment. In this Climate Change Plan update, we are announcing a new commitment to support innovative approaches with a view to these models being deployed from 2025, if appropriate and consistent with the developing wider UK market framework.

3.2.57 There is significant interest and capital available across the private sector to invest in decarbonisation. However, a known barrier to investment relates to the currently low (although growing) demand from building owners for investing in energy efficiency and heat decarbonisation measures. We will continue to promote demand growth through sustained signalling to the market, utilising ongoing capital incentives and support programmes, as well as committing to a phased regulatory framework across the domestic and non-domestic sectors. This

will provide certainty to private investors around long term returns on their investments, as well as demand for finance. The risk and cost of lending should therefore reduce, and the demand for the private (including household) finance increase.

3.2.58 Specifically, we will:

1. Establish a short life working group on finance for the heat transition to consider and provide recommendations on options, including: the use of guarantees with financing institutions to support de-risking of lending, such as guarantees for mortgage top-ups; co-investment funds with private sector institutions that focus on heat decarbonisation investment; potential development of 'heat as a service' business models that promote private sector investment in the supply chain; collaboration and partnership with the private sector and Scottish National Investment Bank to invest long term, patient capital in key strategic projects; and longer term financing options such as green bonds, public-private partnerships and regulated asset base models of financing.

2. Pilot innovative financing approaches that provide additional support for de-risking of institutionally-provided finance, and therefore promote and support early stage 'crowding in' of low cost private sector capital.

3. Commit to taking the recommendations from the working group forward for deployment from 2023 if appropriate and consistent with the developing wider UK market framework.

f) Tax based incentives to drive change

3.2.59 We will consider how our local tax powers, such as council tax and non-domestic rates, could be used to incentivise or encourage the retrofit of buildings. We will commission further analysis to identify potential options, to be implemented from the middle of the decade where appropriate, subject to consultation and public engagement.

Enablers

Creating the conditions to secure growth of Heat Networks in Scotland

3.2.60 Key enablers for the growth of heat networks in Scotland will be the passing of our Heat Networks (Scotland) Bill, the planning system, and the roll out of Local Heat and Energy Efficiency Strategies.

3.2.61 Specifically:

1. Once passed, we will work with local authorities and developers to implement the provisions of the Heat Networks (Scotland) Bill by 2023⁵⁹. This will see the creation of zones suitable for heat networks, within which networks can be developed with assurances over demand, alongside continuing and strengthening the support available to support local authorities and private investors to bring forward projects for investment.
2. Where there is new development, including where infrastructure is required, our planning system will support the heat transition. Heat Network Zoning and development planning will need to work together.



Large-scale heat pump

59 [Heat Networks \(Scotland\) Bill: Financial Memorandum](#), the Scottish Parliament, 3 March 2020. Page 12 sets out the Scottish Government's estimate that it will take two years to implement the secondary legislation resulting from the Bill (i.e. by 2022/23).

3. Through National Planning Framework 4 we will ensure that local development plans take account of where a Heat Network Zone has been identified.

4. We are also exploring how stronger planning policies can help to ensure that future developments connect to heat networks.

5. We will decide whether to extend Permitted Development Rights (that remove the need to apply for planning permission) for zero-emission heat networks and micro-renewable technologies.

Local Heat & Energy Efficiency Strategies for all of Scotland by the end of 2023

3.2.62 These local strategies will identify zones for different preferred heat solutions, to guide building owner decision-making about replacement heating systems, and forming the basis for local delivery plans targeting heat and energy efficiency investment. We are boosting our action by providing a structured methodology for developing Strategies in early 2021, and will consider how to introduce new zoning powers to enable phased action to support regulatory standards, which will be set out in more detail in the Heat in Buildings Strategy.

Working with the Heat Pump sector

3.2.63 We have established a new expert advisory group to make recommendations to Scottish Ministers on the scope of a potential heat pump sector deal for Scotland. The deal will forge an important partnership between the Scottish Government and industry on sector-specific issues, creating opportunities to boost deployment,

employment, innovation and skills. The expert advisory group will report in 2021 and we will respond to its recommendations by Q1 2022.

Our call to others

The UK Government

3.2.64 As set out by the CCC in their 2020 Progress Report, Scotland's success in decarbonising heat is contingent upon urgent action from the UK Government.

3.2.65 We continue to urge UK Government to provide clarity on the steps it will take to ensure rapid gas grid decarbonisation, and we call on the UK Government to address the imbalance in pricing for electricity and gas, to better incentivise the deployment of zero emissions heating technologies.

3.2.66 Whilst recent announcements are a welcome step, the UK Government must significantly increase investment in innovation and research and development, and scale-up its investment in place-based demonstrators for zero emissions heating, including enhanced support for hydrogen demonstration and targeted support for heat pump deployment. We will continue to press the UK Government to amend Ofgem's remit to require the regulator to work to deliver on statutory climate change targets, including those of the Scottish Parliament, in order to secure the investment that is urgently needed in our energy networks.

3.2.67 To protect consumers, we need a UK-wide legislative framework that is fit to deal with the scale of installations required to

decarbonise buildings, protecting customers from unscrupulous installers or poor quality work.

- 3.2.68 We have identified a number of barriers to action to decarbonise heating. To address these, we call on the UK Government to:
1. address the imbalance in pricing for electricity and gas, to better incentivise deployment of zero emissions heating technologies;
 2. accelerate decisions on the future of the gas network and commit to an expanded programme of demonstration for hydrogen and further funding for carbon capture and storage;
 3. amend the Gas Safety Management Regulations 1996 to enable increased blending of green gas in the gas network. This will support transitional steps, such as blends of hydrogen, for decarbonising the gas network;
 4. extend and expand forthcoming GB-wide schemes such as the Green Gas Support scheme and the Clean Homes Grant to be able to flexibly take account of regional differences and the needs of a wide range of households, businesses and building types;
 5. develop improved product standards, for example requiring gas boilers to be hydrogen-ready;
 6. ensure UK primary legislation for heat networks creates powers for the Scottish Government to appoint a regulator to enforce consumer protection requirements in Scotland; and
 7. amend the VAT regime so that all energy efficiency and low emissions/zero emissions heat retrofit receives the 5% reduced rate.

Scottish public sector organisations

- 3.2.69 Public sector organisations can set a strong example of climate action, and we will support them to take steps to reduce emissions. Our fund of at least £95 million for heat decarbonisation and energy efficiency of the public estate will support improvements in energy efficiency, as well as the replacement of existing heating systems with low carbon or renewable alternatives.
- 3.2.70 We will work collaboratively with the public sector to implement a net zero new public sector buildings standard. In alignment with this standard, public sector organisations procuring new buildings should ensure that they are highly energy efficient and that heating is provided using renewable or low carbon systems. Building on the Non-Domestic Energy Efficiency Procurement Framework⁶⁰, we will work collaboratively with partners to facilitate uptake of zero emission heat solutions across the public sector building stock.

Scottish businesses and industry

- 3.2.71 Currently, 50% of non-domestic buildings use zero emissions heat. We need more than half of the remaining stock to transition by 2030.
- 3.2.72 We will support Scottish businesses to take measures to improve the energy efficiency of non-domestic buildings, and to replace existing heating systems with low carbon or renewable alternatives. We will provide enhanced advice and support to businesses through existing programmes such the Energy Efficiency Business Support scheme.

3.2.73 To meet anticipated demand, Scottish businesses involved in the low carbon and energy efficiency supply chain will need to scale up the manufacture and deployment of energy efficiency measures and renewable or low carbon heating systems, as well as investing in the skills and workforce needed to maintain and operate these systems. The rate of acceleration required is somewhere between 40% and 50% year on year for some technologies such as heat pumps.

Individuals/households

3.2.74 CCC research estimates that over 60% of emissions reductions to meet net zero will be predicated on some kind of individual or societal behavioural change. In the buildings sector, higher impact savings from behavioural changes are needed, driven by increased engagement with the public on emissions reduction, particularly due to low levels of awareness and understanding of the connection between buildings and climate change.

3.2.75 We will:

- set out clear messages and support for all building owners and tenants on what delivering a net zero emissions buildings sector by 2045 will mean for them;
- provide enhanced advice and support to households through existing programmes such as Home Energy Scotland; and
- continue to ensure that our programmes particularly support the most vulnerable in society and households in fuel poverty.

3.2.76 The step-change required to meet these emissions reduction targets will see a significant increase in the assessment and improvement of homes, and with this the requirement for robust quality assurance and consumer protection. Clear and effective advice, information and complaints mechanisms are being developed as part of our quality assurance and consumer protection provisions within Energy Efficient Scotland and the Heat Networks Bill.

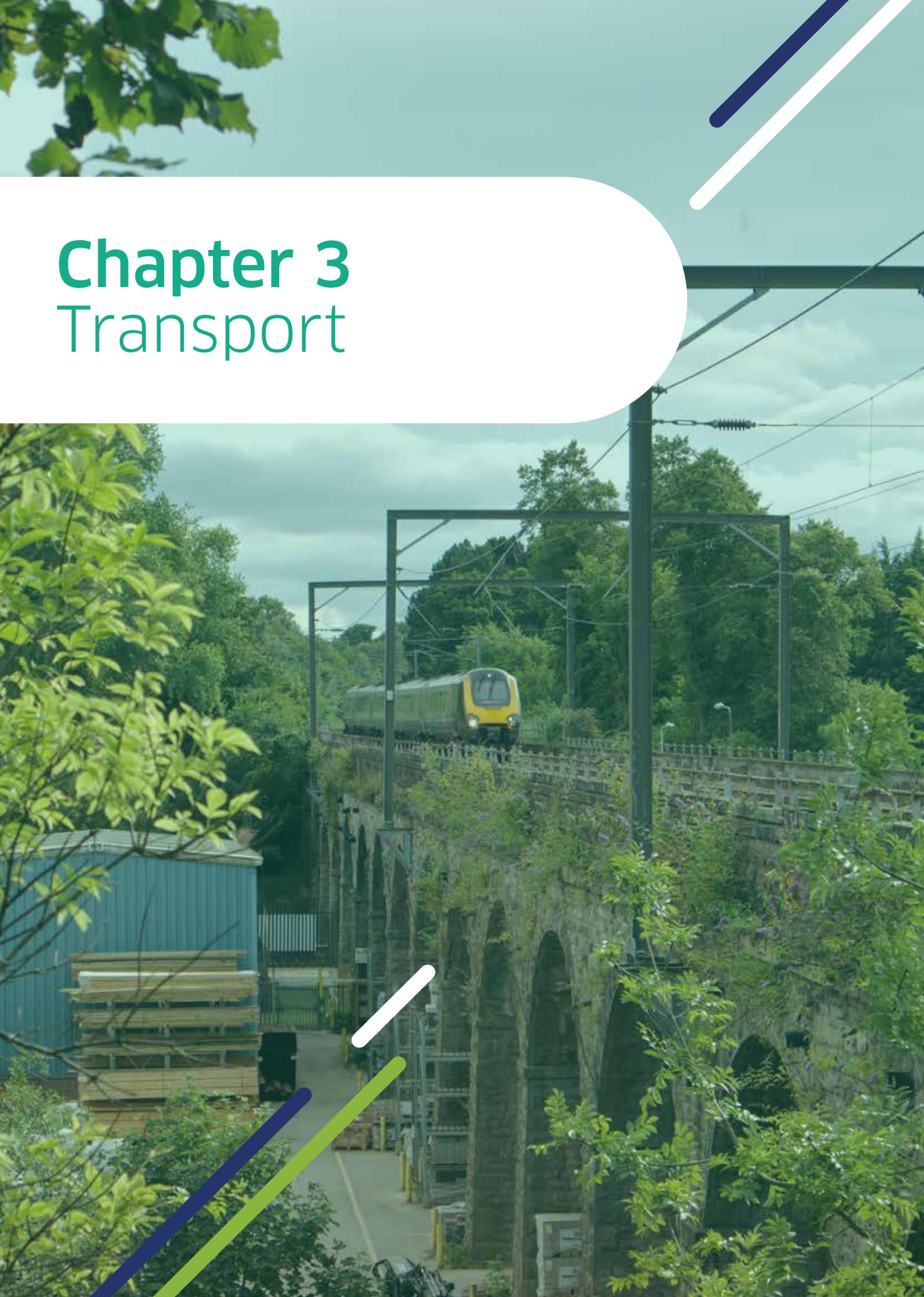
International engagement

3.2.77 The Scottish Government believes strongly in international collaboration and knowledge-sharing: we have already forged a strong partnership with the Danish Government to benchmark our approach on heat and energy efficiency against best practice, with a focus on regulation and deployment of heat networks; and we are active members of the Advisory Council of the European Energy Efficient Mortgages Initiative.

3.2.78 We were one of the first governments to sign the World Green Buildings Council's *Net Zero Carbon Buildings Commitment* in 2018⁶¹; our proposed approach to regulate to require new buildings to use zero or low emissions heat from 2024 is an important step in realising this commitment.

Chapter 3

Transport



3.3. Transport

Introduction

3.3.1 There are unique challenges to reaching net zero emissions in transport. It continues to be Scotland's biggest emitting sector, accounting for 35.6% of emissions in 2018⁶², and will always be essential in enabling people to move around and meet their daily needs. It is a derived demand: where people live, work, learn and access goods and services are all key to the need to travel. Additionally, the technological solutions in certain modes, such as aviation, maritime and heavy goods vehicles, are in the early stages of development, and substantial innovation is required to bring them to market. However, these challenges reflect the fundamental importance of transport and, as a society, we must work through them to enable Scotland to reach net zero emissions by 2045. This target presents an opportunity to continue on the trajectory established by the first fall in transport emissions since 2013⁶³, and reduce emissions while stimulating the economy. It will allow us to instil substantial improvements across society, including for local partners, businesses and individuals, with benefits to health, wellbeing and the economy.

3.3.2 Our National Transport Strategy (NTS2), published on 5 February⁶⁴, sets our direction for Scotland's transport over the next two decades and embeds taking climate action as a core priority while also prioritising reducing inequalities, helping to deliver inclusive economic growth, and improving our health and wellbeing. NTS2 sets out our vision for transport and is clear about the need to reduce unsustainable travel. This strategic aim will guide our actions as we address climate change, respond to the impacts of COVID-19 and ensure a just transition to net zero emissions.

3.3.3 Whilst a key focus will be on technological advances to green vehicles in Scotland, it is self-evident that managing transport demand and embedding behaviour change will also be of vital importance. Cars currently account for almost 40% of transport emissions⁶⁵, therefore, the predominance of car use cannot be overlooked. NTS2 commits us to look beyond technological developments and clearly states that the Scottish Government will not build infrastructure to cater for forecasts of unconstrained increases in traffic volumes. The Committee on Climate Change (CCC) has also recommended that we reduce the demand for less sustainable transport modes and therefore, following the sustainable travel hierarchy, we will continue to promote active travel and a shift to more sustainable modes, while deprioritising single-occupancy car use.

62 National Atmospheric Emissions Inventory 1990-2017 (published 2019)

63 National Atmospheric Emissions Inventory 1990-2017 (published 2019)

64 <https://www.transport.gov.scot/publication/national-transport-strategy-2/>

65 Carbon Account for Scotland (P4) <https://www.transport.gov.scot/media/48199/sct07209535161.pdf>

New context

3.3.4 COVID-19 has had a profound impact on transport. The reasons for how, why and when people travel have been fundamentally changed. Demand for public transport reduced by up to 95% during lockdown in March to June 2020⁶⁶, resulting in significant Scottish Government funding support being required for public transport operators as passenger fare revenues reduced.

3.3.5 Ongoing equalities impact assessments show that certain groups, women and disabled people in particular, have been disproportionately affected by COVID-19 and lockdown measures⁶⁷, and future transport policy needs to ensure these groups are supported.

3.3.6 Additionally, low confidence in public transport, the uncertainty over how long that will last, and the continuing dominance of private car use, present significant challenges. In Transport Scotland's Covid Public Attitude Survey, 75% of people were very or fairly concerned about contracting or spreading the virus while using public transport, and private car or van has continued to be the main mode of transport used across most trip purposes⁶⁸. Transport Scotland will continue to ensure that mitigation measures are in place to reduce the risk of

transmission on public transport, and monitor emerging evidence on the matter. However, we understand that concerns around using public transport are likely to remain alongside continuing uncertainties due to COVID-19.

3.3.7 However, amid the disruption, the pandemic has presented opportunities to live and work differently. There has been a mass shift to home working in some professions. ONS' latest research on homeworking found that 44% of Scotland's workforce were working from home in April 2020 compared to 4% in 2019.⁶⁹ Furthermore, Transport Scotland found that 36% of people agree that they will work from home more often in the future.⁷⁰ This provides an opportunity to consider how remote and flexible working could offer benefits for people in a variety of jobs, while reducing demand for commuter travel. Such trends have been adopted quickly due to the pandemic in certain professions, though evidence is still emerging on the wider implications for some jobs or people's personal circumstances. The Scottish Government will monitor such developments closely, and we are already working across portfolios to ensure consideration is given to the potential for increased use of heating and lighting in homes, and reviewing the health and wellbeing impacts of remote working, as well as the potential

66 Transport Scotland, trends in transport and travel in Scotland for first six months of the COVID-19 pandemic, accessible: <https://www.transport.gov.scot/publications/?q=trend&topic=63625&page=1>

67 Transport Transition Plan Statutory Assessments Interim Update September 2020, published 12 October 2020, accessible <https://www.transport.gov.scot/media/48363/equalities-transport-transition-statutory-assessments-interim-update-september-2020.pdf>

68 COVID-19 Public Attitudes Survey Data: Wave 10, published 19 November 2020, accessible <https://www.transport.gov.scot/publication/covid-19-public-attitudes-survey-data-wave-10/>

69 ONS, *Coronavirus and Home Working in the UK*: April 2020, published July 2020

70 COVID-19 Public Attitudes Survey Data: Wave 10, published 19 November 2020, accessible <https://www.transport.gov.scot/publication/covid-19-public-attitudes-survey-data-wave-10/>

benefits. Sustained remote and local working practices could promote a better work/life balance and result in less exposure to air pollution, while also causing less congestion⁷¹. Reducing congestion, in turn, will allow public transport to run more smoothly and improve safety for active travel. The repurposing of existing buildings in town centres could also help renew local economies, and support a reimagining of city and town landscapes by encouraging more businesses and services to be based there and enabling people to visit.

3.3.8 It is not just passenger transport that has seen shifting trends during COVID-19, the logistics and freight sector has also been affected.

Public messaging around people limiting their movements and their contact with others to reduce the potential for transmission has seen rises in online shopping. The use of e-commerce was already increasing before the COVID-19 pandemic; however, this trend accelerated as lockdown restrictions were imposed during the pandemic⁷², with resultant vehicle movements needed to support it.

3.3.9 We know that the freight sector will have to respond to the increasing need to decarbonise through the use of new technologies and business models, as well as adapting to changing demands of consumers. Technologies and established markets for heavier zero emission vehicles, such as HGVs, are less

developed than for cars, but are developing quickly. However, it is vital that we consider the impacts of recent trends in relation to e-commerce and their legacy as Scotland moves out of the pandemic. Scotland's freight sector is fragmented and privately controlled, and therefore we must work collaboratively to promote solutions. There are ever-developing opportunities to make lower carbon deliveries, such as the introduction of consolidation centres, of pick-up and drop-off points, or the widespread use of e-bikes and cargo bikes. It is key that the Scottish Government, local authorities and the industry review the challenge holistically to develop comprehensive solutions.

3.3.10 We also want to move freight from road to rail where possible. Rail freight has been key in keeping critical goods such as food and medicines on the move during the pandemic, highlighting the role, importance and opportunities of moving freight by rail. In addition, there is increasing interest in the potential to bolster the movement of 'light' or 'express' freight by rail. We will work to maximise all opportunities for rail freight during our recovery from the pandemic.

3.3.11 The Scottish Government has already outlined a variety of measures which promote a place-based agenda and support localism, such as the 20 minute neighbourhood concept and the Work Local Programme (which builds on the Scotland Loves Local initiative). Among

71 Angeliki Karanasiou et al, *Assessment of personal exposure to particulate air pollution during commuting in European cities – Recommendations and policy implications*, Science of the Total Environment, vol 490, 2014, p.785-797, accessed 20 October: <https://www.sciencedirect.com/science/article/abs/pii/S004896971400713X>

72 <https://www.ons.gov.uk/businessindustryandtrade/retailindustry/timeseries/j4mc/drsj>

the benefits of this approach is to increase proximity of where people live, work, learn and access goods and services, reducing distances travelled and the need to travel unsustainably. Moreover, it is key that transport implications are a cornerstone of planning considerations and the fourth National Planning Framework (NPF4) is aimed at radically accelerating emissions reduction, including by directing future development to the right locations. On digital access, the Scottish Government has a host of investments and initiatives to support individuals and businesses to promote digital connectivity (including the Reaching 100% Programme, Scottish 4G Infill Programme), digital adaptation, and to tackle digital exclusion, with the Digital Strategy for Scotland currently out for consultation. The Scottish Government implemented programmes to support a shift to sustainable transport modes via the £39 million Spaces for People Programme to allow people to physically distance, while also keeping them safe from traffic whilst exercising, shopping or commuting. Reduction in car traffic also benefits bus performance through reduced congestion. The £10 million Bus Priority Rapid Deployment Fund has therefore been introduced to maximise the efficiency of available bus operations as traffic levels increased from early lockdown levels. Our 2020-2021 Programme for Government outlines legacy funding to build on the momentum of these investments in future years.

Green recovery and just transition

- 3.3.12 The transport sector can play a key role in delivering Scotland's green recovery from the pandemic and ensuring a just transition. The CCC recommended the Scottish Government leads a shift to positive long-term behaviours, including encouraging home working and providing active travel infrastructure⁷³. Ensuring more people choose active and sustainable travel will not only result in fewer emissions, but can also promote healthier lifestyles and better equality of access to transport connections. Helping to give people access to bikes and e-bikes, particularly in areas of multiple deprivation, can drive equality and promote physical activity, and there are substantial Scottish Government measures already in place for us to build on.
- 3.3.13 People in low income households are more likely to travel by bus, while those in higher income households are more likely to travel by car, a trend that has been exacerbated by COVID-19. The Scottish Government is taking a broad suite of actions to promote bus use and the policies and outcomes in this plan take bold additional steps forward. The Just Transition Commission recommended rapid roll-out of the over £500 million committed on bus priority infrastructure and indeed we have launched the Bus Partnership Fund and are expediting work on reallocation of road space on the motorway network around Glasgow. Bus

73 UKCCC, Letter: Building a resilient recovery from the COVID-19 crisis to Roseanna Cunningham MSP, 6 May 2020, accessed: <https://www.theccc.org.uk/publication/letter-building-a-resilient-recovery-from-the-covid-19-crisis-to-roseanna-cunningham-msp/>

usage also tends to be more active than a car journey as travelling by bus typically involves a walk to or from the bus stop. Therefore the resurgence of a healthy bus network in our recovery from COVID-19 is vital to securing a just transition and delivering our vision for a sustainable, inclusive, safe and accessible transport system.

3.3.14 In terms of job creation, economic development and promoting a green recovery there are opportunities in transport regarding technological innovation. Furthermore, working across the finance, manufacturing and innovation sectors can help utilise market mechanisms to impact positive change in our efforts to decarbonise transport. The Scottish Government's work to promote investment in zero emissions buses is one such example. Moreover, investments such as the Scottish Ultra-Low Emission Bus Scheme can help support domestic manufacturing, with Alexander Dennis Ltd being a significant employer in central Scotland, in what has been a turbulent economic backdrop emanating from the global health pandemic.

3.3.15 The CCC recommended that a long-term vision for hydrogen is set out for Scotland's future. Transport Scotland has launched Scotland's Hydrogen Accelerator Programme, which attracts technical experts to Scotland to scale up the deployment of hydrogen technologies in Scotland. This supports a just transition by growing the Scottish supply chain, encouraging inward investment and creating jobs, while also developing skills and expertise. We are also funding a joint project with Scottish Enterprise and the

University of St Andrews on the application of hydrogen fuel cell technology to rail traction. Additionally, the Just Transition Commission recommended that an enhanced and accelerated national plan for charging infrastructure should be implemented to support the electrification of road transport. The Scottish Government already has a firm foundation of bold action, with the actions of this Plan update taking further strides forward.

Positive vision for 2032 and 2045

3.3.16 In keeping with the National Transport Strategy vision, Scotland's transport system must encourage people to make travel choices that minimise the long-term impacts on our climate and improve the lives of future generations by reducing inequalities and improving health. The derived nature of transport exemplifies how critical it is for climate policies to be firmly embedded within the transport system to enable people to access jobs, services and opportunities with less need to travel or, when they do, to have easily-accessible sustainable options.

3.3.17 By 2032 our roads will contain **no new petrol and diesel cars and vans**; we will have almost completely decarbonised **our passenger railways**; and we will have begun to work to **decarbonise challenging transport modes, such as HGVs, ferries and aviation. Car kilometres will have reduced by 20%**, and sustainable transport will be the instinctive first choice for people. Our **research into biofuels and hydrogen** will have stimulated

private investment and innovation. By 2032, the pendulum will have swung away from the dominance of private car use, particularly single occupancy, to a society which has embraced **more walking, wheeling, cycling, public transport and shared transport options**, particularly in urban settings. We will reduce reliance on cars in Scotland to reduce emissions but **where people do use private cars, these will predominantly be electric** and be in rural settings where public transport is less accessible.

3.3.18 By 2045, in line with our vision in NTS2, we will have a sustainable, inclusive, safe and accessible transport system, helping deliver a healthier, fairer and more prosperous Scotland for communities, business and visitors. The **Sustainable Travel and Investment Hierarchies** (below) will have informed infrastructure development and ensure that transport options focus on reducing inequalities and the need to travel unsustainably. We will not have catered for unconstrained increases in traffic volumes and will first make best use of existing assets. Consequently, our future vision encompasses improved transport and planning approaches, better utilisation of space and place-setting, and enhanced digital connectivity.

The Sustainable Travel Hierarchy

Walking and wheeling



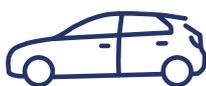
Cycling



Public transport



Taxis & shared transport



Private Car



The Sustainable Investment Hierarchy

Reducing the need to travel unsustainably

Maintaining and safely operating existing assets

Making better use of existing capacity

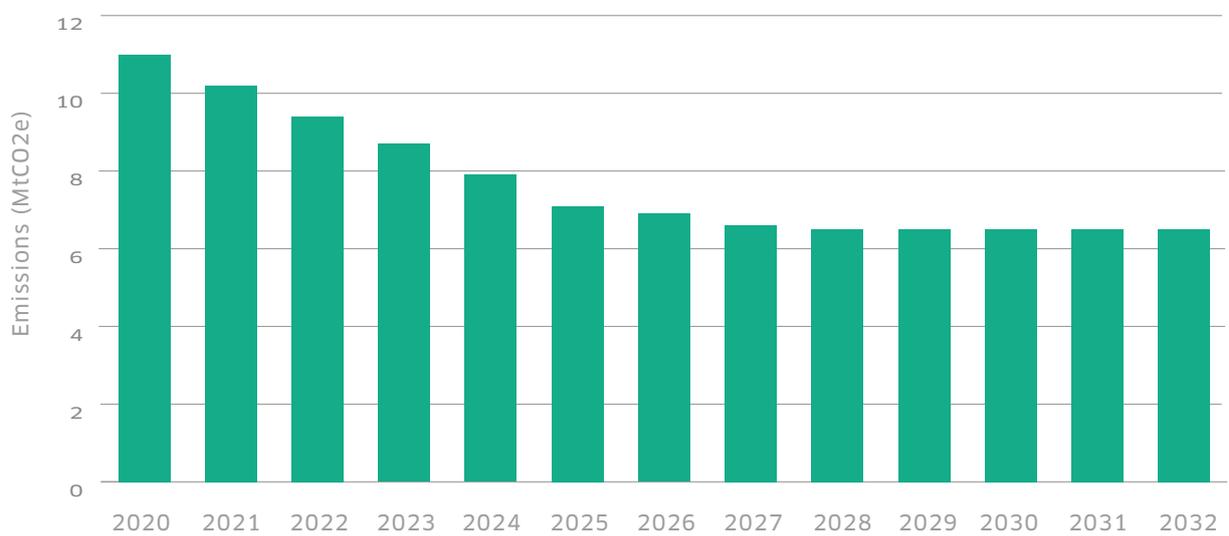
Targeted infrastructure improvements



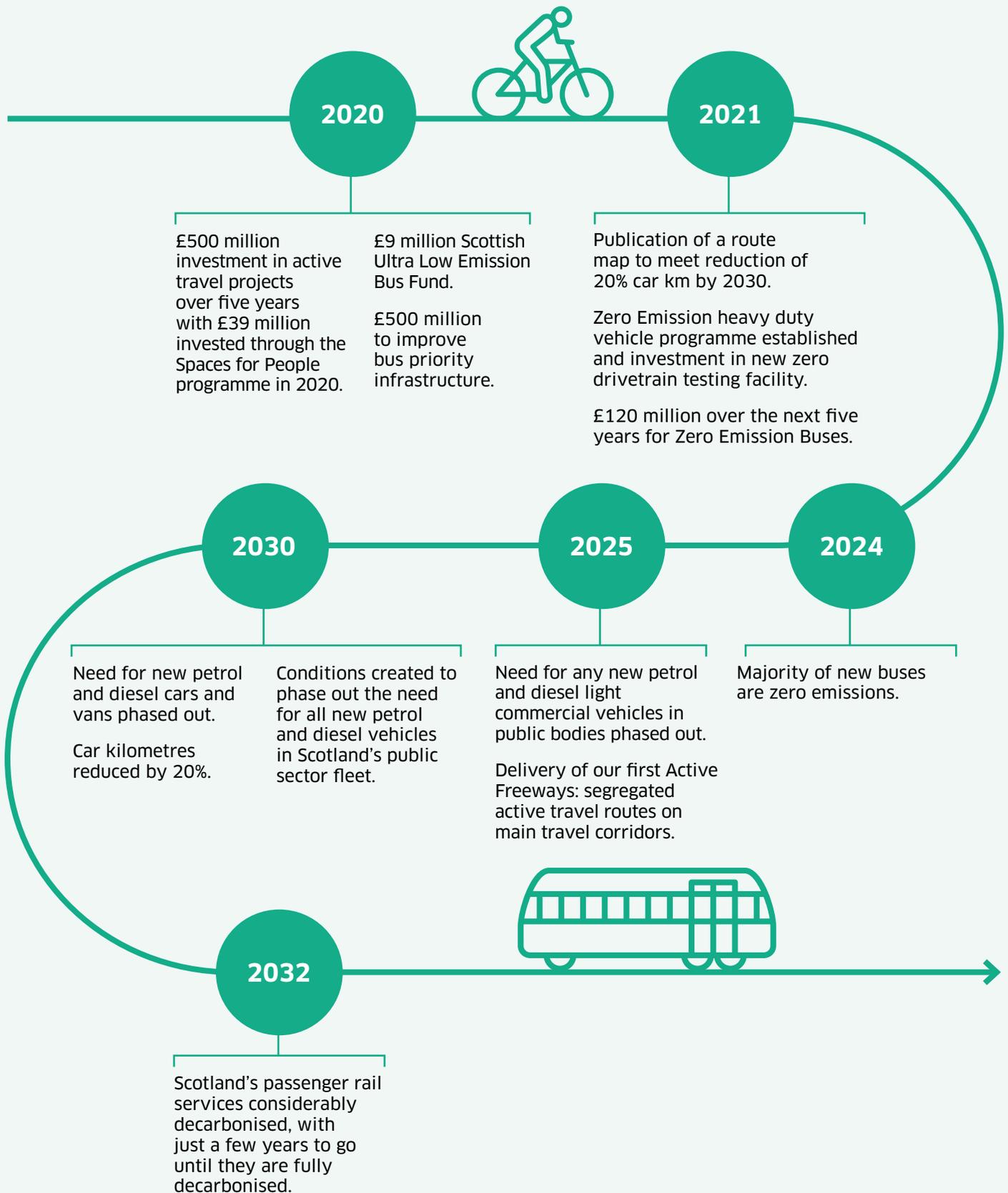
Scottish Cycle Repair Scheme

Emissions Reduction Pathway to 2032

Transport



Route Map to 2032



The actions we are taking

Reduce car kilometres by 20% by 2030

3.3.19 Achieving our vision for 2032 and beyond will take cross-sectoral effort which goes beyond transport, reducing people's need to travel with more **local access to goods and services**. Likewise, digital connectivity and flexible working approaches will play a key role. The Scottish Government is therefore announcing this **new commitment to reduce car kilometres** on Scotland's roads through improved transport and planning approaches, better utilisation of space and place-setting, enhanced digital connectivity and an increased location-focus. At this time, COVID-19 is creating significant uncertainty on future transport trends and people's behaviours, including work and lifestyle choices. Therefore, assuming the health pandemic has moved to a phase to allow more certainty regarding future forecasting, a **route map to meet this reduction will be published in 2021**. This complements our commitment to develop our **20-minute neighbourhoods and our Work Local Programme**⁷⁴.

3.3.20 These actions will support innovation in workplaces to better enable flexible and remote working. In keeping with our commitment not to plan infrastructure for unconstrained traffic demand⁷⁵, phase 1 of the

second Strategic Transport Project Review (STPR2) will be published in early 2021. It will begin the process of reviewing the best use of existing assets and consider what new infrastructure may or may not need to be built. STPR2 will cover the strategic road and rail networks, and national infrastructure investment to support active travel and island connectivity, as well as providing an evidence base for investment decisions. It will also align with our fourth National Planning Framework (NPF4), with its spatial plan and planning policies delivering carbon conscious places.

3.3.21 Initiatives to promote active travel and public transport will aid a shift to more sustainable choices and help to reduce reliance on cars. To encourage modal shift we will invest over **£500 million in bus priority infrastructure**⁷⁶ to tackle the negative impacts of congestion on bus services and raise bus usage. As part of this, last month we launched the **Bus Partnership Fund**⁷⁷ to support local authorities to achieve their ambitions around bus priority in partnership with bus operators. We are also progressing work to provide bus priority on the trunk road network, initially via managed motorways focussing around Glasgow. We remain **committed to delivering a National Concessionary Travel Scheme for free bus travel for young people aged under 19**⁷⁸, and have begun the necessary preparations, including planning, undertaking a consultation, legal

74 Our 2020-2021 Programme for Government included a commitment to work with local government to take forward ambitions for 20 minute neighbourhoods where people can live, work and learn in communities close to home, as well as the launch of our Work Local Challenge to drive innovation in work place choices and remote working to support flexible working and our net zero objectives.

75 Commitment announced in our National Transport Strategy (NTS2), published on 5 February 2020

76 Announced in our 2020-2021 Programme for Government

77 Complementing powers in the Transport (Scotland) Act 2019

78 Announced in the 2020-2021 Scottish Budget and reaffirmed in our 2020-2021 Programme for Government

review and due diligence. A **review of discounts available on public transport to those under the age of 26**⁷⁹ has also begun, due for completion by the end of this year. Both of these projects will have social benefits and will help to embed positive travel behaviours in younger people before they adapt to using a private car.

3.3.22 To support transformational active travel projects we have **boosted our** commitments on **active travel**, with a five year investment of over **£500 million**⁸⁰, including infrastructure, access to bikes and behaviour change schemes. On infrastructure, we will promote a consolidated approach, aligning with the corresponding bus measures, to promote a coherent transport network. We want local authorities to develop ambitious joined-up plans across bus and active travel so they make sense as a whole. This will enable the delivery of high quality and safe walking, wheeling and cycling infrastructure. To build on this we are committing an additional £50 million to ‘Active Freeways’ which will involve identification and design development of the strategic active travel network, to provide segregated active travel routes on main travel corridors to city and town centres and major trip attractors linking communities throughout Scotland. Education and advocacy to encourage more people to choose active and sustainable travel will also be vital, and we will continue to support the **Smarter**

Choices, Smarter Places programme to encourage this behaviour change⁸¹. On cycling, we are offering **new** support to increase access to bikes for all including the **provision of public bike and e-bike share schemes**, particularly in areas of multiple deprivation and support the use of e-bikes and adapted bikes through interest free loans, grants and trials⁸². We will support the **provision of child and adult cycle training** and safety programmes including driver awareness training⁸³. To help increase confidence in active travel choices, we will publish **Scotland’s Road Safety Framework to 2030**, following consultation on an ambitious and compelling long-term vision for road safety where there are zero fatalities or serious injuries on Scotland’s roads by 2050⁸⁴.

3.3.23 We will **continue to develop and promote awareness of the role and benefits of shared transport** such as **car clubs and promote bike sharing, ride sharing and multi-modal journeys**. This will be supported by **Mobility as a Service (MaaS)** and promotion of peer-to-peer car sharing⁸⁵. We are harnessing innovation within our transport system, investing up to £2 million over three years to develop MaaS in Scotland, and we are **grant-funding CoMoUK**, to increase awareness of the role and benefits of shared transport and look at the barriers to uptake of car clubs. We also have a **new** commitment to support the monitoring requirement for the

79 Announced in 2020-2021 Programme for Government

80 Boosted since 2018 CCP in 2020-2021 Programme for Government

81 Smarter Choices, Smarter Places (SCSP) was rolled out across Scotland in 2015/16. More information can be found here: <https://www.transport.gov.scot/active-travel/smarter-choices-smarter-places/#>

82 Free loans, grants and trials announced in 2020-2021 Programme for Government

83 We are continuing to support the provision of child and adult cycle training, and safety programmes including driver cycling awareness training through Bikeability Scotland: <https://www.cycling.scot/bikeability-scotland>

84 Announced in 2020-2021 Programme for Government

85 Announced in 2018-2019 Programme for Government

National Transport Strategy set out in the Transport (Scotland) Act 2019, and to further our understanding of how and why people travel we will invest in data and develop a **data strategy**.

3.3.24 We will take forward policy consultation in advance of drafting regulations and guidance to enable local authorities to implement **workplace parking levy** schemes that suit their local requirements⁸⁶. Transport Scotland will also have a **new** commitment to work with **local authorities to continue to ensure that their parking and local transport strategies** have proper appreciation of the needs of climate change, as well as the impact of road users, including public transport operators, disabled motorists, cyclists and pedestrians.

Phase out the need for petrol and diesel cars and vans in Scotland by 2030

3.3.25 We have **boosted** this target from 2032 to 2030 in line with the CCC's recommendation in its 2020 Progress Report for Scotland⁸⁷. We are already delivering a range of measures to address the key barriers to Ultra-Low Emission Vehicle (ULEV) uptake, including **investing £30 million to establish the fourth largest electric vehicle (EV) charging network in the UK** (measured by market share) and delivering our **Low Carbon Transport Loan** which continues to transform demand for electric vehicles across Scotland and has already provided over £80 million of funding to support the switch to low carbon vehicles⁸⁸. Our **new focus on used vehicles will help households, who may otherwise**



Project PACE, Falkirk

86 Included in Transport (Scotland) Act 2019

87 <https://www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament/>

88 Policies announced in 2018 Climate Change Plan, and boosted with further investment announced in 2019

be put off by the higher purchase price of ULEVs, benefit from the cheaper running costs associated. We will consider and **develop new financing and delivery models for electric vehicle charging infrastructure** in Scotland and are working with the Scottish Futures Trust to do so⁸⁹. Furthermore, we will continue to promote the uptake of ULEVs in the taxi and private hire sector, promote the benefits of EVs to individuals and fleet operators and invest in innovation to support the development of ULEV technologies. Additionally, we will take forward the initiatives in respect of connected and autonomous vehicles set out in the Connected and Autonomous Vehicles (CAV) Roadmap for Scotland⁹⁰.

3.3.26 **We have a boosted commitment to work with public bodies to phase out the need for any new petrol and diesel light commercial vehicles by 2025⁹¹ and to create the conditions to phase out the need for all new petrol and diesel vehicles in Scotland’s public sector fleet by 2030⁹².** Our existing Switched on Fleets programme has supported the decarbonisation of almost 2500 vehicles in Scotland’s fleets to date. We will continue to support the public sector to lead the way in transitioning to EVs including using public procurement to support decarbonisation.



89 Boosted in 2019-2020 Programme for Government
 90 <https://www.transport.gov.scot/transport-network/roads/connected-and-autonomous-vehicles-cav/a-cav-roadmap-for-scotland/>
 91 Boosted in 2019-2020 Programme for Government
 92 Boosted in 2019-2020 Programme for Government

CASE STUDY: GIVING BUS THE PRIORITY IT DESERVES

Bus services are vital to a just transition to net zero. Bus is used proportionately more by people in lower socio-economic groups, a large number of people rely upon bus services for all manner of journeys, and, crucially, a full double decker can remove 75 single occupancy cars from the road. Cars account for 40% of Scotland's transport emissions⁹³.

We are supporting mode shift from car to bus through over £500 million of long term bus priority infrastructure funding to tackle the negative effects of congestion on bus, so that bus journeys are quicker, more punctual and reliable. The Bus Partnership Fund is also intended to bring forward further action and investment from local authorities and bus operators to provide their communities with an even better alternative to car use.

In parallel, the Bus Decarbonisation Taskforce, made up of leaders from the bus, finance and energy sectors, are co-designing the pathway to a zero-emission bus fleet. This year Scottish Enterprise provided Alexander Dennis Ltd with £10 million in R&D grant support for manufacture of ultra-low emission buses, and the Scottish Ultra-Low Emission Scheme is supporting the purchase of 41 new electric buses, of which 35 will be manufactured in Scotland.

To reduce emissions in the freight sector, we will work with the industry to understand the most efficient methods and remove the need for new petrol and diesel heavy vehicles by 2035.

3.3.27 Freight accounts for 25% of transport emissions in Scotland⁹⁴. Additionally, we have seen a rapid increase in online shopping and e-commerce across Scotland during COVID-19⁹⁵. Therefore, helping

to decarbonise the movement of goods and our overall logistics network are central pillars to Scotland's efforts to reach its emissions reduction targets. Work has begun on this, and we have committed to phase out the need for new petrol and diesel vans by 2030 (as outlined above). To complement this, we have a **new** policy to **engage widely across industries to create opportunities for changing technologies and**

93 Carbon Account for Scotland (P4) <https://www.transport.gov.scot/media/48199/sct07209535161.pdf>

94 Scottish Greenhouse Gas Emissions 1990-2018, <https://www.gov.scot/news/scottish-greenhouse-gas-emissions-2018/#:~:text=Source%20emissions%20were%2041.6%20million,cent%20between%202017%20and%202018.>

95 Office of National Statistics - <https://blog.ons.gov.uk/2020/09/18/how-the-covid-19-pandemic-has-accelerated-the-shift-to-online-spending/>

innovations in logistics, such as consolidation centres, to reduce carbon emissions. We also have a **new** commitment to explore the **development of green finance models** to help draw private sector investment in zero-carbon solutions for the movement of goods. We will continue to work with public bodies, the automotive sector and Scotland's innovation community to explore effective solutions to reduce emissions from the freight sector and make a significant positive contribution to the net zero target. We have a **new** commitment to establish a **Zero Emission Heavy Duty Vehicle Programme** with Scottish Enterprise to support innovation in the Scottish supply chain and will invest in a **new zero emission drive train testing facility in 2021**⁹⁶. We will also **continue to deliver on the actions from our Rail Freight Strategy**, consolidating and furthering our progress to date demonstrating how a shift from road freight to rail can be an important part of the solution. **We are supporting rail freight with innovative regulatory targets to encourage growth and significant investment, including a £25 million ring-fenced fund for the period 2019 to 2024**⁹⁷, helping to unlock opportunities for rail freight across the country. Since 2019, freight capacity has been improved across Scotland and the Freight Facilities Grant and Mode Shift Revenue Support schemes remain available to companies; they have already enabled rail freight services to remove millions of lorry miles from our roads.

3.3.28 We have also supported various trials and demonstrations of ultra-low emission heavy duty vehicles not connected with freight (such as refuse collections vehicles and gritters). We have established the Zero-Emission Mobility Industry Advisory Group, and this year we launched the new **Hydrogen Accelerator Programme**⁹⁸ to help scale up and quicken the deployment of hydrogen technologies across multiple vehicles types.

We will work with the newly formed Bus Decarbonisation Taskforce, comprised of leaders from the bus, energy and finance sectors, to ensure that the majority of new buses purchased from 2024 are zero-emission, and to bring this date forward if possible.

3.3.29 The Climate Change Plan 2018 policy outcome on **ultra-low or zero emission buses** has been **boosted** and **we will work with the bus, finance and energy sectors to ensure that the majority of new buses purchased from 2024 are zero-emission, and to bring this date forward if possible.** Since the Climate Change Plan 2018 was published, we have held a workshop on opportunities from a just transition of the sector to zero emissions and commissioned analysis which shows that the whole-life costs of battery-electric buses are approaching parity with diesel vehicles. We have also revised the green incentive of the Bus Service Operators Grant, run an initial round of the Scottish Ultra-Low Emission Bus Scheme and established a Bus

96 Announced in 2020-2021 Programme for Government

97 Announced 2019: <https://www.gov.scot/news/rail-freight-fund-announced/>

98 Announced in 2019-2020 Programme for Government

Decarbonisation Taskforce. The **Bus Decarbonisation Taskforce** is made up of leaders from the bus, finance and energy sectors and has one year to **co-design a pathway to a fully decarbonised bus fleet**, identifying solutions to any remaining hurdles. We recognise the impact that COVID-19 has had on the sector and supply-chain and over the period of the Climate Change Plan and we will work to align government financial support of £120 million over the next 5 years with private sector investment to decarbonise the bus sector in a way that is good for passengers, businesses, and the workforce, as well as the climate.

We will work to decarbonise scheduled flights within Scotland by 2040.

- 3.3.30 This **new** commitment aims to create the world's first zero emission aviation region, in partnership with Highlands and Islands Airports Limited (HIAL)⁹⁹, including action to decarbonise HIAL's airport operations. We will also support trialling and the introduction of low or zero emission aircrafts¹⁰⁰ to support cost-reductions for decarbonisation, with a view to securing economic opportunities for Scotland. We have a **new** commitment to explore the potential for the purchase of zero/low emission aircraft by the Scottish Government, for lease back to operators, with more detailed assessment in the

forthcoming Aviation Strategy. Moreover, as part of that strategy, we also make a **new** commitment to explore options for incentivising the use of more sustainable aviation fuel, recognising that significant levers in this area are reserved.

- 3.3.31 The Scottish Government will continue to engage with the Aviation sector to encourage sustainable growth in the recovery from COVID-19. We note the CCC's recommendation on demand management in relation to aviation emissions¹⁰¹, and as we work with the aviation industry to help restore connectivity, we will do so in a way that reduces the environmental effects of aviation growth, both in the air and on the ground.

30% of Scottish Government owned ferries will be low emission by 2032

- 3.3.32 We commit to continue to examine the scope for utilising hybrid and low carbon energy sources in the public sector marine fleet as part of our vessel replacement programme. We also have a **new** commitment to **work with the UK Government to support proposals at the International Maritime Organisation (IMO)** to significantly lower shipping carbon emissions in the global sector, including the option of introducing a global levy on marine fuel to fund research in cleaner technologies and fuels¹⁰².

99 Announced in 2019-2020 Programme for Government

100 Announced in 2019-2020 Programme for Government

101 <https://www.theccc.org.uk/wp-content/uploads/2020/10/Reducing-emissions-in-Scotland-Progress-Report-to-Parliament-FINAL.pdf>

102 Announced in 2020-2021 Programme for Government



By 2032 low emissions solutions will be widely adopted at Scottish ports

3.3.33 We will achieve this with our **new** policy to work with individual ports and the British Ports Association to **consider a process for encouraging shared best practice initiatives for reducing emissions across the sector**. Additionally, we will work with the ports sector and with its statutory consultees through the **Harbour Order process** to ensure future port developments are environmentally underpinned.

Scotland's passenger rail services will be decarbonised by 2035.

3.3.34 We have **boosted** our commitment to **decarbonise Scotland's passenger rail services by 2035¹⁰³**, which will be delivered through investment in electrification (also benefitting rail freight) and complementary alternative traction systems. In July this year, Transport Scotland published the **Rail Services Decarbonisation Action Plan**, which builds on the significant rail electrification programme that has already removed a large number of diesel trains across the central belt, and

103 Announced in Rail Services Decarbonisation Action Plan: <https://www.transport.gov.scot/media/47906/rail-services-decarbonisation-action-plan.pdf>

encourages the conversion of freight from carbon-fuelled road-based vehicles to electric rail-based traction. Work is ongoing by industry partners to develop the initial schemes. We will establish an **international rail cluster in Scotland to unlock supply chain opportunities** using the interest at Longannet as a catalyst. This will be built around existing strengths in rail in Scotland and will seek to enhance the innovation and supply chain in the decarbonisation of our rolling stock and wider network.

Our call to others

The UK Government

3.3.35 Decarbonising the transport sector will require substantial action by the UK Government in areas where key powers remain reserved. In addition to the 2030 ban on the sale of new petrol and diesel cars and vans the UK Government must take action in other areas. The UK Government must continue promoting parity with the EU's car and van CO₂ targets following full departure from the EU later this year, and set stretching CO₂ targets for new cars and vans beyond 2020, requiring a high electric vehicle market share. Additionally we call on the UK Government to implement policies, including fiscal instruments, to strengthen incentives to purchase cleaner vehicles, including loan schemes. This will enable progression towards a complete discontinuation of new petrol and diesel cars and vans. We are also seeking further investment in public and active travel, including in high speed rail connections to Scotland, connecting communities and decreasing the need for single-occupancy car journeys.

3.3.36 Fuel duty has a direct influence on the attractiveness of buying and running a petrol or diesel car. It is a wholly reserved matter and the Infrastructure Commission for Scotland's 2020 report¹⁰⁴ recommended that *'To enable a managed transition to an inclusive net zero carbon economy road infrastructure, the Scottish and UK Governments should immediately commit to work together to establish a charging/payment regime alternative to the existing fuel and road taxation based structure'*. The Scottish Government has welcomed this proposal and the Cabinet Secretary for Transport, Infrastructure and Connectivity has made representations to the UK Government in order to seek to progress on it. To enable reduced private car use, we will continue to press the UK Government to review options on Fuel Duty and Vehicle Excise Duty, in the context of the need to end unsustainable travel and potential revenue generation therefrom.

3.3.37 If the UK Government joined Scotland in setting stretching targets for emissions reductions from new HGVs, it would address the rise in emissions and enable businesses to exploit opportunities to improve logistics and increase the uptake of eco-driving. Moreover, we are calling on the UK Government to continue to invest in pilot and early stage roll-out of hydrogen projects and to develop a strategic approach to refuelling infrastructure, as well as continuing to support developments in biofuel technology. This will enable the full decarbonisation of technologically challenging modes, such as HGVs.

3.3.38 We call on the UK Government to commit to a UK ETS (as discussed in more detail in the Industry chapter) that, together with the international arrangements being developed by the International Civil Aviation Organization (ICAO), continues to incentivise decarbonisation of international aviation.

Scottish public sector organisations

3.3.39 The Scottish Government recognises the vital relationship between national, regional and local public sector organisations in achieving transport emissions reductions. We have already been working with local authorities and Regional Transport Partnerships on this, including on the collaborative development of the National Transport Strategy (NTS). The NTS provides the strategic context of decision-making that allows local and regional authorities to continue their work to decarbonise transport and reduce transport emissions.

3.3.40 Public Sector bodies recognise the level of ambition required to see the scale of change needed on transport, as Scotland’s largest emitting sector. Community engagement and participation, for example through local authorities and Regional Transport Partnerships, will be increasingly important to garner support for this shift, delivering local measures that encourage use of active and sustainable transport and reduce car use. Transport Scotland will also work with these key local and regional partners to continue to ensure that local and regional transport strategies that are

developed or updated, e.g. parking strategies, support transport’s contribution to Scotland’s climate change targets. For example, we have recently seen the Spaces for People fund used by local authorities to support temporary road space re-allocation for active travel, and we will work with local authorities on permanent schemes where appropriate. We will also work closely with local authorities on the further measures that will be necessary to dissuade car use; for example, bus prioritisation in town centres and parking restrictions.

3.3.41 Local authorities can implement Low Emissions Zones where Air Quality Management Areas exist, reducing access to the most polluting vehicles. Councils also have decriminalised parking enforcement options and can implement pay-and-display and other parking regulations as part of their local strategies or approaches to transport management. The Workplace Parking Levy (WPL) provisions contained in Part 7 of the Transport (Scotland) Act 2019 provide local authorities with discretionary powers to implement a WPL scheme once commencement and supporting regulations are in place.

3.3.42 Furthermore, we will continue to support local authorities to green their bus, HGV and other vehicle fleets and encourage them to embrace this change, while also considering further additional ways to reach net zero in their localities. This may include looking at implementing new infrastructure, such as consolidation centres, expanding electric vehicle

infrastructure or continuing to help change behaviours through parking regulations or education campaigns. Scotland's seven Regional Transport Partnerships (RTPs) also have a strategic role to play in the public sector on reducing transport emissions. The RTPs are listed as relevant public authorities required to publish an annual report on their climate change duties as required by the Climate Change (Scotland) Act 2009.

3.3.43 There are legacy transport and related environmental issues with how our existing cities, towns and wider settlements, including business and industry, have evolved. We need to do all we can to support liveable places and employment locations which are accessible by walking, wheeling and public transport, discouraging car use, while continuing to ensure appropriate access for those with reduced mobility. We will therefore support local authorities to consider the implications for transport when making spatial planning and land use decisions, strengthening application of the sustainable transport hierarchy to development proposals. We will also promote patterns of development which help us to transition towards local, low carbon living and working patterns, including by applying the 20 minute neighbourhood concept. This includes prioritising development in locations that are well located in relation to existing infrastructure and services, as well as considering where we locate new schools, workplaces, shops and services using a place-based approach to reduce the need

to travel. It is also particularly important that local authorities have regard for roads around schools and consider how to disincentivise car use in these areas.

3.3.44 We will continue to work collaboratively to ensure that when planning decisions are made they are supported by stronger policies that prioritise accessibility and sustainable modes of travel, avoiding building-in car dependency. This will further embed the vision and priorities of the National Transport Strategy within the development planning process, and will have a positive impact on choices about the types of journeys we make, when we make them and how we make them, delivering long-term benefits to air quality, emissions reduction and improving physical and mental health.

Scottish businesses and industry

3.3.45 Achieving Scotland's emissions reductions targets, both in the transport sector and more widely, is a national endeavour with all sections of society having a role to play. Scottish businesses and industry are vital to our successful economy, and transport connects businesses and communities together. We want to work with businesses and industry to enable them to invest in and implement policies that will help Scotland to reach our targets as part of a green recovery from the pandemic, while also improving the health and wellbeing of their employees.

3.3.46 The CCC has recommended that a green recovery requires businesses to explore and disclose climate risks and to make plans¹⁰⁵. We are asking businesses to consider flexible or remote working practices where these are viable and do not adversely affect business model and to examine closely the potential for business travel plans to be developed and implemented. We are also asking businesses to support employees to reduce the number of flights taken for business purposes and to enable digital connectivity solutions in place of these meetings. The Scottish Government encourages businesses to consider how their employees commute, and to support and incentivise employees to choose walking, cycling and/or public transport for commuting, as well as for business journeys. Where possible, we also encourage businesses to support and/or incentivise employees to access zero emission transport to work, and to help address affordability of transport as a barrier to employability. The Scottish Business Pledge¹⁰⁶ already exists, and we are asking businesses to take forward the environmental aspects of it.

3.3.47 Businesses in Scotland import, manufacture, produce and then transport and export goods around the country and beyond, including key Scottish exports that are essential to our economy. We ask that businesses consider

ways to reduce their transport emissions: where possible, businesses should use rail rather than road to transport goods to market, and support consolidation centres in relation to freight and e-commerce. There are also opportunities around last mile deliveries to electrify van fleets, or to use e-cargo bikes to deliver more locally. Furthermore, we encourage businesses to welcome 20-minute neighbourhoods and set up businesses locally to encourage people to shop, live and work nearby.

Individuals/households

3.3.48 Individuals have a significant contribution to make to help reduce emissions from transport. We therefore ask that individuals to consider their transport choices holistically and to consider their need to travel on a daily basis. For instance, when COVID-19 restrictions are lifted, those who can may consider working remotely some of the week and use online conferencing facilities, rather than travel for employment and business purposes. This will reduce commuter travel and consequential emissions. When travelling to work, we encourage individuals to leave the car at home where possible, and use public transport, walk or cycle for those journeys. Similarly, when travelling to school or for leisure purposes, and especially for short journeys, where you can we ask that you take the bus, cycle

105 CCC, Letter: Building a resilient recovery from the COVID-19 crisis to Roseanna Cunningham MSP, 6 May 2020, accessed: <https://www.theccc.org.uk/publication/letter-building-a-resilient-recovery-from-the-covid-19-crisis-to-roseanna-cunningham-msp/>

106 <https://scottishbusinesspledge.scot/#:~:text=What%20is%20the%20Scottish%20Business,voluntary%20and%20free%20to%20make.>

or walk. The Scottish Government also asks that you consider your discretionary travel and work, shop and socialise locally, wherever possible. This will help reduce emissions from driving to other more distant locations, and has the potential to help revitalise local communities. Our recently published National Planning Framework 4 position statement sets out that a significant shift is required to achieve net zero emissions by 2040 and the key opportunities to achieve this including removing the need for planning permission for active travel and electric vehicle charging points so that we can roll-out new infrastructure widely and quickly¹⁰⁷.

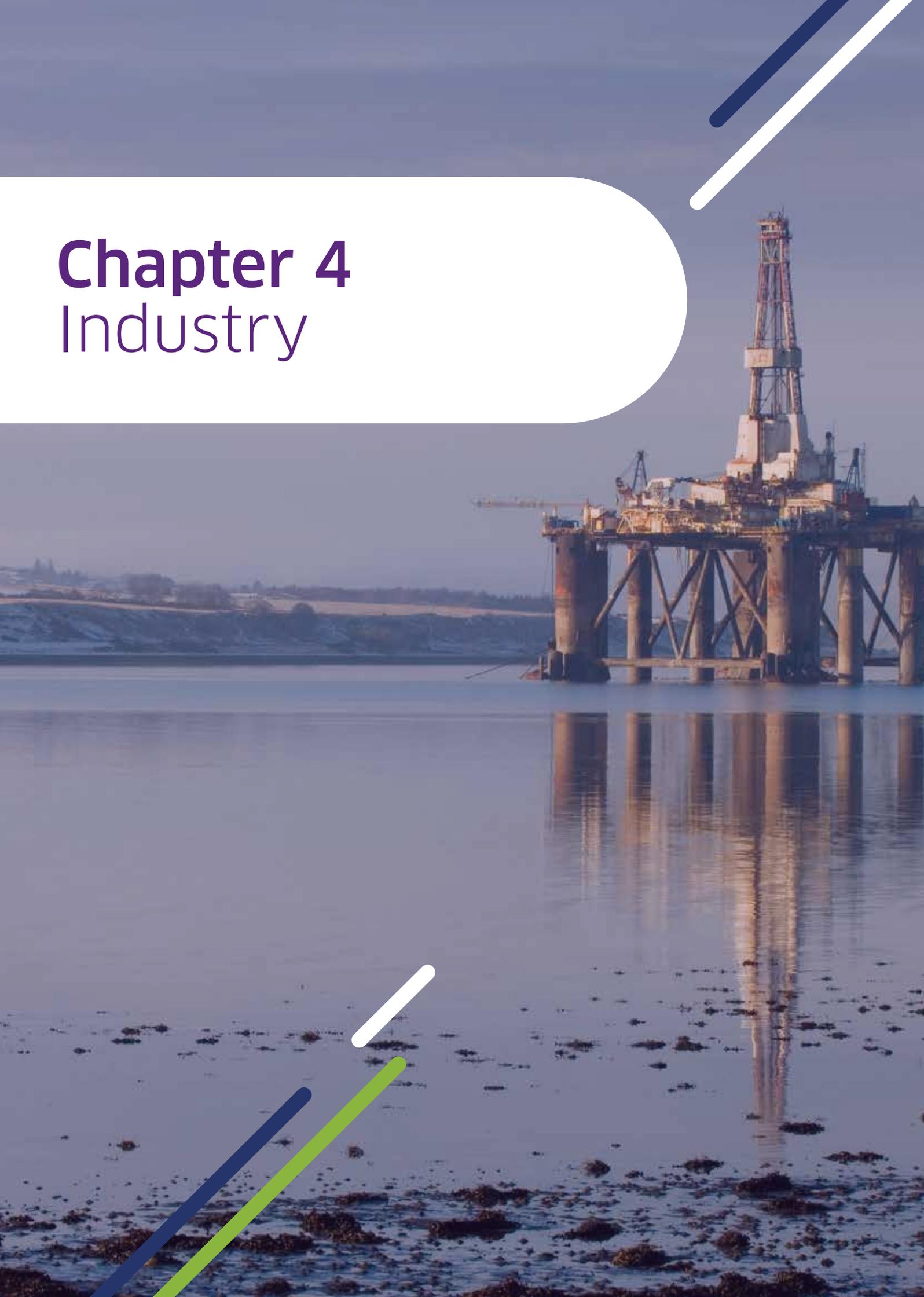
International engagement

3.3.49 We recognise that the Scottish transport sector cannot be decarbonised without international engagement. Reducing emissions from aviation and shipping in particular will require an international policy approach. We will continue to engage through the UK Government with the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) to reduce the environmental impacts of aviation and shipping. For other sectors we will seek to engage with countries and cities around the world in order to share good practice. We will continue to work with international organisations such as the Transport Decarbonisation Alliance to accelerate collective and timely action to reduce transport emissions worldwide.



Chapter 4

Industry



3.4. Industry

Introduction

- 3.4.1 There is no doubt that Scottish industry has much to gain from being at the forefront of the transition to a net zero economy. Decarbonising our industrial sector in a just and fair way, that leaves no one behind, will help the sector to grow and compete in the economy of the future, capturing new export and investment opportunities and sustaining and creating jobs and wealth across Scotland.
- 3.4.2 There has been a considerable decline in Scotland's industrial emissions since 1990, falling by over 45% (9.5 MtCO₂e) between 1990 and 2018. This was driven by the closure of heavy emitting sites, particularly in the steel and paper sectors, but also by the deployment of innovative and more energy efficient technologies and processes. By 2032, emissions need to decrease by 43% on 2018 levels while Scottish industry remains globally sustainable and competitive.
- 3.4.3 Emissions from industry continue to constitute a large proportion, around 30%, of total Scottish emissions. These emissions are generated from a variety of activities across a diverse range of sectors, predominantly manufacturing, as well as mining and construction. Combined, these sectors are fundamental to the Scottish economy, contributing £26 billion annually and employing over 300,000 people. Recent Scottish Government commissioned research¹⁰⁸ from Element Energy estimates that emissions from Scotland's large industrial sites could feasibly reduce by 80% or more by 2045, while maintaining output. This, combined with additional efforts to tackle residual emissions, potentially through Negative Emissions Technologies (NETs, discussed later and in Chapter 8), as well as action taken in other sectors, could be consistent with a net zero pathway.
- 3.4.4 Within the Industry sector, because of the balance of reserved and devolved responsibilities, progress is often dependent on UK Government and/or international policy and markets. There remains a significant risk that decarbonising faster than the rest of the UK and Europe could lead to carbon leakage¹⁰⁹. Both support for investment and a level regulatory playing field is therefore needed. Nevertheless, the Scottish Government is ensuring that the industrial sector understands its role in decarbonisation, the opportunities this can bring, and the support being offered to manage their transition.
- 3.4.5 There are opportunities for the industrial sector; for example, the development of a carbon capture and storage (CCS) network is described by the Committee on Climate Change (CCC) as a "necessity, not an option" to achieve net zero emissions as it underpins action for industrial decarbonisation and negative

108 Deep Decarbonisation Pathways for Scottish Industries to be published alongside the Hydrogen Policy Statement in December 2020

109 Carbon leakage refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with laxer emission constraints. This could lead to an increase in their total emissions. The risk of carbon leakage may be higher in certain energy-intensive industries (https://ec.europa.eu/clima/policies/ets/allowances/leakage_en).

emissions technologies, where Scotland is well positioned to capture economic benefits from any such major infrastructure investment. Globally there are more than 20 CCS facilities already in operation, including in Norway, USA and Japan, with nearly 40 more in construction and development. CCS is a proven technology that offers great opportunity if commercialised at scale in Scotland.

- 3.4.6 Another significant opportunity is the use of hydrogen to displace fossil fuels in industry, requiring development of regional hydrogen production facilities, and also servicing hydrogen demand for other sectors such as heat, transport and electricity. The Deep Decarbonisation Pathways for Scottish Industries report, cited above, reiterates the critical role of CCS and Hydrogen, as well as electrification and energy efficiency, in decarbonising industry in Scotland.

New context

- 3.4.7 The COVID-19 crisis has had, and continues to have, an unprecedented effect on Scotland's industrial labour market. Workers have been furloughed or lost their jobs as businesses have temporarily or permanently closed, and the pandemic has highlighted how abrupt and unplanned shifts can exacerbate inequalities. Interrupted supply chains have highlighted domestic vulnerabilities and the need for local and national resilience. Now, more than ever, we need a just transition that supports sustainable economic growth and jobs, whilst ensuring no one is left behind.

- 3.4.8 The principal industrial decarbonisation challenges and impacts have been amplified as a result of the COVID-19 pandemic. A primary challenge is the ability and willingness of companies to finance industrial decarbonisation investments at this time of great global, national, financial and social uncertainty. In the current economic climate, financial resources are severely limited with many companies prioritising business-critical spending to maintain operations and jobs, rather than new discretionary capital expenditure for the long-term transition to net zero operations.

Green recovery and just transition

- 3.4.9 In supporting industry to recover and retain jobs, we will need to identify and capture green market opportunities, including support for domestic supply chains through smart procurement, and reskilling and retraining skilled workers to access green jobs in the near and long term.
- 3.4.10 A just transition will be an essential part of the green recovery of the industry sector. This means supporting industry to transition in a way that is fair and where no one is left behind, and positioning industry to capture the opportunities from net zero. A just transition must be delivered in partnership between government and industry as well as with places, regions and local communities. Such a partnership approach is being demonstrated, with initiatives such as the Grangemouth Future Industry Board, Scottish Industrial Decarbonisation Partnership, and

North East CCUS (NECCUS), which will be described later in the chapter.

- 3.4.11 The CCC recognises the challenge of pacing and sequencing policy interventions and decarbonisation initiatives to align with the timing of industry's strategic decisions and the capital intensive repurposing and upgrading of infrastructure. The Just Transition Commission's report on green recovery (July 2020) states that leveraging private investment is an 'absolute necessity', and is a challenge in the current economic climate. That is why the Scottish Government recently announced the Scottish Industrial Energy Transformation Fund (SIETF) to match fund and leverage in private investment tailored to the particular characteristics of our industrial manufacturing sites, or clusters, and their supply chains.
- 3.4.12 A key element of securing a just transition is to create and protect employment as we decarbonise our industries. Looking ahead, emerging energy technologies such as Carbon Capture Utilisation and Storage (CCUS) and Hydrogen have the potential to safeguard employment and create value in hard to decarbonise industries, as well as gearing up the supply chain in terms of manufactured goods and services. In the 2020-2021 Programme for Government, we committed to expand our evidence base on CCUS and have commissioned an economic assessment of CCUS in Scotland which will consider the associated jobs within a broad range of scenarios for the development of CCUS.
- 3.4.13 It is estimated that by 2030 anywhere between 7,000 and 45,000 UK jobs could ultimately be associated with Scotland securing 40% of the carbon storage element of a European CO2 management market. By 2050 this could rise to between 22,000 and 105,000 jobs, and more as the industry extends to low carbon fuel supply¹¹⁰. Our economic impact assessment currently underway will provide us with greater clarity and Scotland-specific job estimates over a broad range of development scenarios.
- 3.4.14 We have carried out economic impact analysis as part of the Hydrogen Assessment Project. The potential scale of the economic opportunity from the production of hydrogen has been calculated and the assessment scenarios attribute this in the main to future export demand from the UK and Europe. The gross impacts by 2045 across three scenarios modelled range from 70,000 to over 300,000 jobs protected or created and GVA impacts of between £5 billion and £25 billion. These figures are based on a range of current views and assumptions and we are treating these figures as illustrative, but nonetheless they depict a significant potential economic impact.
- 3.4.15 Scotland's strategic energy intensive industrial (EII) sites and the skills therein, such as those present in the Grangemouth cluster, must be harnessed as assets in the energy transition. It is key that a trajectory is set to support business, give confidence for investment, and provide a policy environment which

110 Centre for Energy Policy, University of Strathclyde (2019) The economic opportunity for a large scale CO2 management industry in Scotland: <http://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=showPromoted&id=689>

protects employment and allows for growth. Doing otherwise will undermine or restrict the ability of Scottish industry to compete in global markets, with the risk that businesses will relocate operations to other countries with less ambitious climate measures. Businesses considered by the EU to be at risk of relocating, predominantly in manufacturing, employ over 95,000 workers in Scotland, have an annual turnover of around £19 billion, and account for over 45% of all Scottish international exports.

3.4.16 Scotland's Future Skills Action Plan will also ensure the continued advancement and development of skills across the industrial sector, necessary to support a low carbon transition and to safeguard jobs. The National Manufacturing Institute Scotland is included in this broader Action Plan, and will establish a Manufacturing Skills Academy to develop a catalogue of advanced manufacturing modules.

3.4.17 The Scottish Government is also a member of the Energy Skills Alliance, a newly created and cross energy collaborative group established to develop an integrated skills strategy for a vibrant, net zero energy industry. The work streams include: mapping future energy skills demand; taking a phased approach that looks towards the near-term of 2030, and ahead to 2050; development of the My Energy Career Programme; delivery of an integrated energy apprenticeship scheme by 2022; and longer-term development of a roadmap for aligning all energy training and standards.

Negative emissions technologies in industry

3.4.18 Negative Emissions Technologies (NETs) are technologies which remove greenhouse gases from the atmosphere on a permanent basis through the use of carbon capture and storage (CCS) systems and networks.

3.4.19 The Industry sector provides a key opportunity for deploying NETs. For example, biomass or waste gasification with CCS is a technology pathway which uses heat, steam and oxygen to convert biomass or waste to hydrogen for industrial use, and where carbon can then be sequestered. Utilising CCS, direct air capture (DAC) removes atmospheric CO₂ and can be used to manage emissions from distributed sources. DAC is a complementary technology, and not an alternative, to traditional point source CCS.

3.4.20 Delivering NETs in Scotland as part of our pathway to net zero has the potential to deliver substantial benefits. Existing industries, which are currently some of Scotland's largest carbon emitters, may be able to move to a sustainable business model, actively reducing Scotland's emissions, and potentially coupling economic activity with this emissions reduction.

3.4.21 NETs in industry is, however, one of a number of potential applications. We describe these, our plans to better understand their potential, and our ambition for the delivery of negative emissions across our energy system in Chapter 8.

CASE STUDY: FOCUS ON ST FERGUS

St. Fergus is currently the location where 35% of the UK's natural gas is brought to shore. In the next decade, projects planned at St Fergus could see it transform to a centre for Scotland's industrial decarbonisation, demonstrating and scaling emerging new technologies, and generating opportunities for new markets. These activities could unlock and enable decarbonisation in other industrial centres across Scotland; creating an integrated network to support Scotland's industrial sector in its transition to net zero.

Utilising existing offshore transport infrastructure, **Acorn CCS** will create Scotland's first carbon capture plant, capturing and storing CO₂ at the St Fergus gas plant. The project aims to be in operation from 2024 and could remove 340,000 tonnes of CO₂ per year. Although initially a relatively small project, Acorn CCS will act as a major clean growth catalyst. By commercialising CCS, it will establish the technology and open up opportunities to access and capitalise on Scotland's vast offshore storage capacity.

The **Acorn Hydrogen** project, developing in parallel to Acorn CCS, will reform North Sea natural gas into clean-burning hydrogen. It is expected to be operational in 2025, creating a low carbon fuel which presents various market opportunities. A high proportion of the CO₂ emissions created from generating the hydrogen

will be safely removed and stored using Acorn CCS infrastructure. The hydrogen produced can be used to blend with existing natural gas, initiating decarbonisation of heat and industry across Scotland, or to provide fuel for transport.

Aberdeen Vision is a project led by Scottish Gas Network (SGN) that would take the hydrogen produced at St Fergus, transported via a new 100% hydrogen pipeline, to the gas network in Aberdeen City, introducing an initial 20% hydrogen blend to support the city's decarbonisation. Utilising complementary green hydrogen projects on Scotland's North East Coast could see this contribution increase to 100%. The project could, thereby, provide a route for decarbonisation in the region, while supporting the oil and gas industry to transition to the production of blue and green hydrogen.

Hydrogen is also an exportable product, with potential markets across Europe. Infrastructure development at Peterhead Port with good transport routes to St Fergus could open up international shipping routes for the export of hydrogen and the complementary import of CO₂ from Europe, which would be stored by Acorn CCS in the North Sea. The international trade in the gases would generate income in Scotland's North East and anchor St Fergus as an internationally renowned centre for decarbonisation.

Establishing CCS infrastructure will provide opportunities for further negative emissions technologies to be developed, initially at St. Fergus, where there is potential for the UK's first Direct Air Capture (DAC) plant, and then across Scotland, as CCS transport infrastructure projects develop.

The integrated approach to decarbonisation being taken at St. Fergus though the co-location of emerging technologies and infrastructure, will demonstrate what can be achieved in other industrial centres across Scotland to increase the options for industrial decarbonisation and maximise the economic opportunities these locations present for our net zero future.



The St Fergus gas terminal.
Credit: North Sea Midstream Partners (NSMP) Limited

Vision for 2032 and 2045

3.4.22 By the early 2030s, Scottish industrial sites will be global exemplars on a sustainable growth trajectory, having benefitted from early adoption of low carbon, energy efficient technologies, and a supportive public/private investment framework. The appropriate infrastructure will be in place that enables deep decarbonisation, including through deployment of CCS technologies, electrification or operational production and utilisation of green and low carbon blue hydrogen.

3.4.23 Our industries will be competitive in global markets for low carbon products produced in Scotland, following investment that supports low carbon industrial innovation and maximises export opportunities. Households and businesses will have access to low carbon products from, for example, the food and drink, cement, chemical and glass sectors. Manufacturing innovation will support the delivery of low carbon energy, transport and buildings to society, as well as the transition to a circular economy.

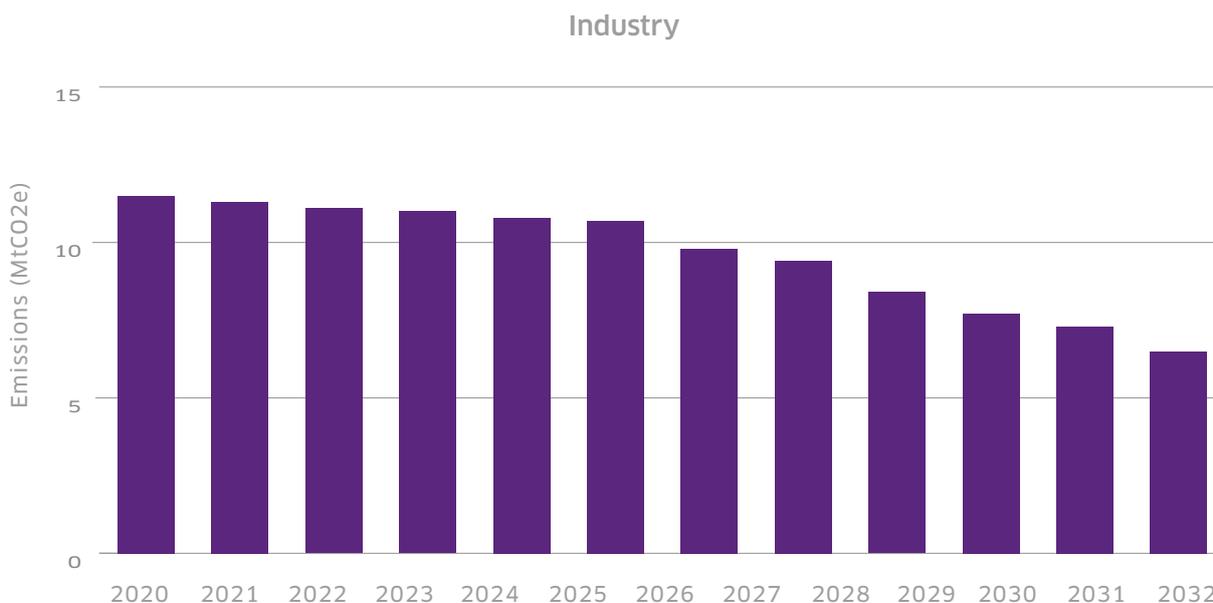
3.4.24 This transition will be managed to ensure that Scottish industry and businesses will maintain and grow their global competitiveness and will continue to be based in Scotland, retaining highly skilled jobs and ensuring that we maximise the employment opportunities that come with sustainable industrial innovation. We will have attracted new industries and investment to Scotland, on the basis of our competitive advantages in CCS storage capacity, renewable energy generation, highly skilled workforce and research and development expertise.

combine to offer an unique opportunity to develop a Scottish economy where renewables, hydrogen and CCUS coexist and complement each other. The Acorn CCS Project is scalable and aims to develop into a much larger CO2 transportation and storage network, bringing with it significant economic potential, not least from the shipped import of CO2 via Peterhead Port by as early as 2025 from Scotland’s industrial central belt, other UK regions and European nations where CO2 transportation and storage is limited.

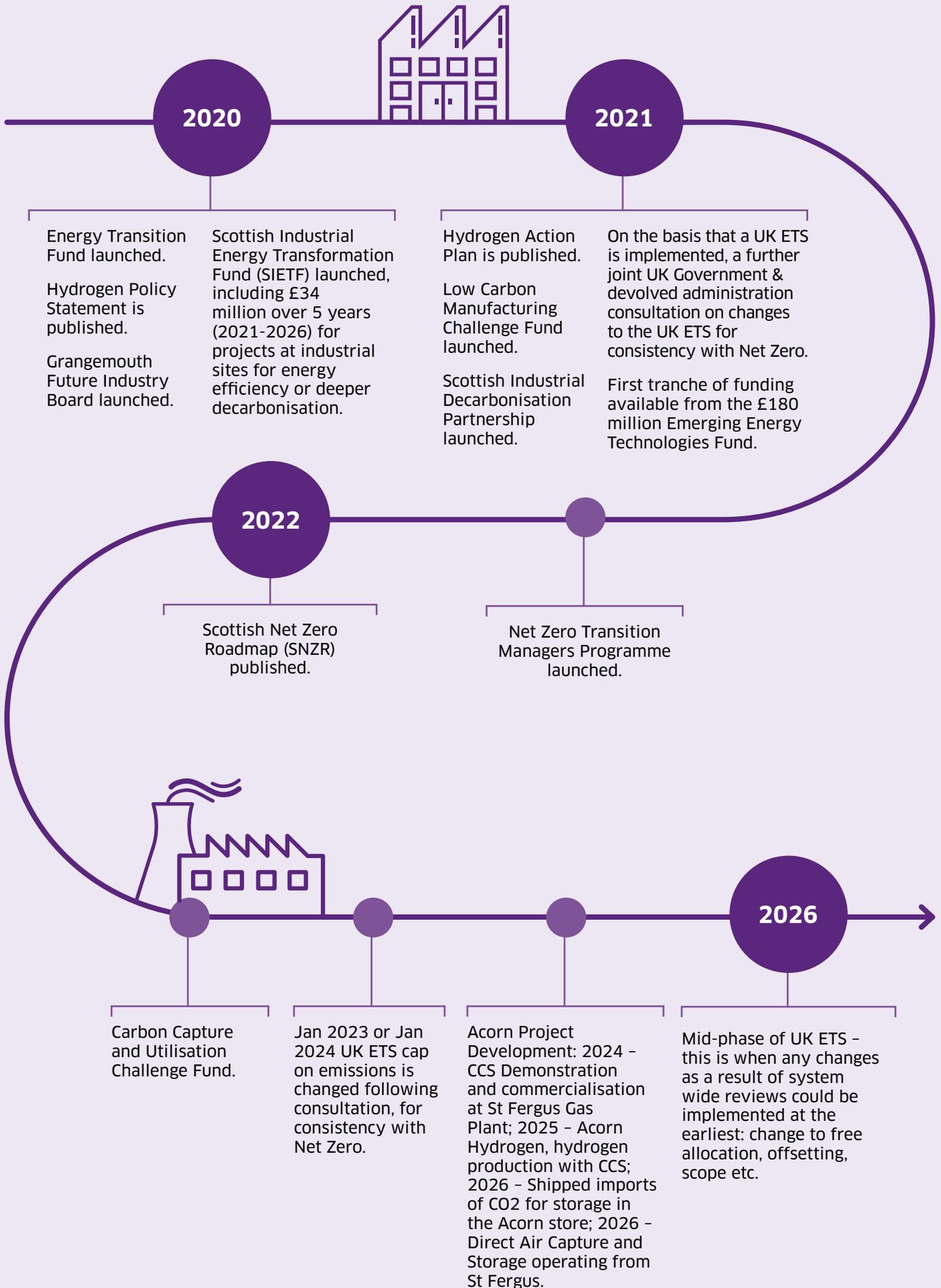
3.4.25 The extensive potential for renewable energy generation, the presence of major subsurface CO2 storage sites, and the availability of existing offshore pipeline infrastructure in the North Sea,

3.4.26 In 2045, the industrial sector in Scotland will be highly decarbonised and a recognised world leader at the forefront of innovation, skills, and fair, quality work in the net zero economy.

Emissions Reduction Pathway to 2032



Route Map to 2032



The actions we are taking

3.4.27 Policies to deliver industrial decarbonisation must reach beyond the need to improve process efficiencies, given the vital social and economic co-dependencies between industry and the communities where they are located. A properly sequenced and strategic approach to decarbonising Scotland's industrial sector offers the chance to position Scottish industries and supply chains to expand exports into global markets.

Emissions Trading Scheme (ETS)¹¹¹

3.4.28 The key mechanism to decarbonise the Industrial Sector has been the EU Emissions Trading System (ETS), accounting for 28% of greenhouse gas emissions in Scotland. After leaving the EU, the Scottish Government's preference is to **establish a UK ETS jointly with the three other UK administrations, which is linked the EU ETS** and maintains a carbon price that incentivises industrial decarbonisation after leaving the EU.

3.4.29 As announced by the four governments in June 2020, the design of the UK ETS mirrors the EU ETS to enable a smooth transition for industry¹¹². The UK ETS will have an interim emissions cap 5% lower than the current EU ETS cap, and this will be reviewed for consistency with net zero following the CCC's advice on the Sixth Carbon Budget, and amended by January 2024 at the latest.

3.4.30 **The Scottish Government's preference is to link the UK ETS to the EU ETS, to continue to provide a level playing field for Scottish industry and protection against carbon leakage**, as emissions caps reduce (both in the UK ETS and the anticipated tightening of the EU ETS cap following an EU commitment to net zero).

3.4.31 We will also continue to work with the UK Government on future evolution of the UK ETS, which could include expanding the scope in future phases, and urge the UK Government to remain aligned to future EU developments in carbon pricing.

Support for commercialisation of Carbon Capture Utilisation and Storage (CCUS)

3.4.32 **CCUS is essential to reach net zero emissions, as identified by the CCC, and is a key to industrial decarbonisation.** It is expected to be the most cost effective decarbonisation technology for key sectors of Scottish industry.

3.4.33 The commercialisation of CCS is also necessary for NETs, which are needed to reduce emissions at the rate necessary to meet our climate change targets. We will take action to better understand the potential of each of these technologies in industrial decarbonisation by commissioning detailed research. However, action from the UK Government will be key to the development of CCS to enable NETs. We therefore call on UK Government to urgently ensure that the market and regulatory systems are in place to support business plans for NETs.

111 Boosted in June 2020 announced in joint [Government response to consultation on future of UK carbon pricing \(publishing.service.gov.uk\)](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/889037/Government_Response_to_Consultation_on_Future_of_UK_Carbon_Pricing.pdf)

112 Joint Governments' Response on UK ETS June 2020: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/889037/Government_Response_to_Consultation_on_Future_of_UK_Carbon_Pricing.pdf

3.4.34 Scotland’s vast potential for offshore CO2 storage, and legacy oil and gas infrastructure and skills, provide internationally significant advantages in CCUS that will enable us to remain internationally economically competitive. **We continue to support the Acorn CCS Project located in the North East of Scotland at the St. Fergus Gas terminal.** This project is uniquely placed to be the least-cost opportunity to deploy a full chain CCS project in the UK and also provide carbon management solutions for Europe.

3.4.35 Acorn CCS is anticipated to be operational by 2024 and is well placed to attract support from the UK Government’s £1 billion CCUS Infrastructure Fund. Once the CCS infrastructure has been established, the Acorn Project will enable an economic opportunity for the deep water Peterhead Port and become a catalyst for clean growth, with major low carbon blue hydrogen production aligned with CCS at St Fergus.

3.4.36 Further support and investment in CCUS was a key recommendation of a number of stakeholders and advisory bodies, including the CCC, Climate Emergency Response Group and the Advisory Group on Economic Recovery, amongst others.

Emerging Energy Technologies Fund

3.4.37 We are announcing a new **Emerging Energy Technologies Fund of £180 million** that will support the development of

hydrogen and CCS, and which will add new impetus to the development of NETs in Scotland. We will make £100 million available to support hydrogen projects in line with our Hydrogen Policy Statement, and a further £80 million of this funding will be directed to projects supporting the development of a CCS transport and storage network that will further enable NETs projects to develop in Scotland. This funding will help to deliver emissions reductions, and sits alongside our ambitious innovation and energy transition programme including within the marine environment.

Industrial Cluster Representation and Roadmap

3.4.38 The Scottish Government has offered **grant funding of up to £300,000 to NECCUS**, an industry-led alliance drawn from industry, academia, membership organisations and private sector bodies established to promote CCUS and support industrial decarbonisation in Scotland. NECCUS represent the Scottish industrial cluster with an aim to attract funding for CCUS and low carbon blue hydrogen development, and to secure the first UK CCUS project in Scotland.

3.4.39 NECCUS has used its position as a Scottish industries representative to lead the development of Scotland’s Net Zero Roadmap (SNZR), attracting over £800,000 of funding from the UK Industrial Decarbonisation Challenge Fund to complete this work.

Carbon Capture and Utilisation Fund

3.4.40 We will work with our agencies **to develop a £5 million Carbon Capture and Utilisation Challenge Fund**¹¹³ to boost early stage work and explore technologies and innovations that can capture and create value in CO₂, reduce emissions and develop new income streams for Scottish businesses in this emerging market. Priming a utilisation market supports the acceleration of carbon capture in the industrial sector by supporting innovation and cost reduction as well as providing markets to sell into. The Carbon Capture and Utilisation Challenge Fund will require industry match funding which will leverage private investment into cost reduction.

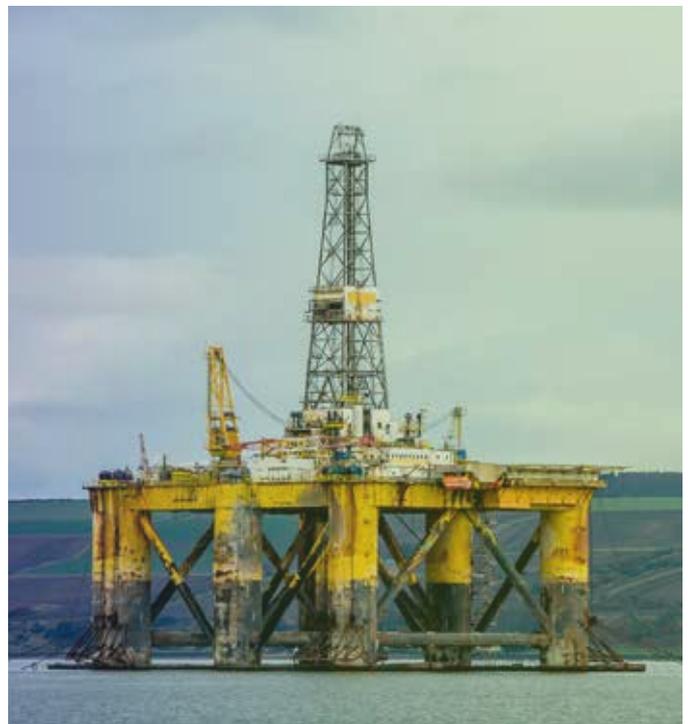
Opportunities for Hydrogen in Industry

3.4.41 Scotland has the opportunity and capability to produce large volumes of blue and green hydrogen. **We are committed to supporting the development of the emerging hydrogen sector in Scotland**¹¹⁴ and to maximise the 'new industry' benefits that the production of hydrogen itself may bring to Scotland.

3.4.42 We will work with the major point emitters in Scotland to assess applicable decarbonisation solutions, including opportunities for fuel switching to hydrogen and the opportunities that large scale hydrogen production can offer industry, particularly in the cross-sector nature of hydrogen systems.

3.4.43 The Hydrogen Assessment Project is now complete; results will be published alongside our Hydrogen Policy Statement, helping to confirm that Scotland has an abundance of the natural resources needed to produce both blue and green hydrogen at scale and enough hydrogen production potential to serve our own needs and service an export market as well.

3.4.44 Recognising Scotland's natural resources and competitive advantages, including our existing oil and gas skills, capabilities and competence and Scotland's large onshore or offshore wind resource, we will consider the consenting process and produce guidance for the construction of large-scale offshore wind to hydrogen (commonly referred to as power-to-gas) development.



113 Announced 2020-2021 Programme for Government

114 Boosted in 2020-2021 Programme For Government and Hydrogen Assessment and Policy Statement (2020)

CASE STUDY: H100 FIFE 100% HYDROGEN PROJECT

Scottish Government have provided £6.9 million funded support towards the cost of this ground breaking £27.7 million project. Other funders partnering in this project include Ofgem (Office of Gas and Electricity Markets), SGN, Cadent, Northern Gas Networks (NGN), Wales and West Utilities (WU). The H100 Fife Project is recognised as a key building block in the strategic 'Gas Quality Decarbonisation Pathway' set out by UK gas distribution network operators and adopted by the Energy Networks Association (ENA).

Scottish Gas Networks (SGN) will partner with other UK gas operators in this project to ensure the delivery of a world-first demonstration of an end-to-end 100% hydrogen energy system, to evidence the role that hydrogen can play in decarbonising heat, using the gas network. The project will construct and operate a hydrogen heat network system in Fife able to service around 300 houses and will be of UK-wide significance, offering an important validation of the evidence base carried out by the UK Government in their Hy4Heat Programme.

The project will connect with the existing ORE Catapult 7MW offshore wind turbine, situated off the coast of Leven in Fife, to directly supply power to the electrolyser for hydrogen production, evaluating the opportunity for grid integration systems between renewables and hydrogen production, and demonstrating the business case opportunities that offshore wind can offer for production of hydrogen at scale.

The H100 Fife project is part of a larger phased programme proposed by SGN:

Phase 1 - H100 Fife (the project described above) will enable the decarbonisation of 300 homes saving 662 tonnes of CO₂/annum. Only phase 1 is funded at present.

Phase 2 will offer opportunities to expand H100 Fife to 1000 properties providing annual emissions savings totalling 2,208 tonnes of CO₂/annum.

Phases 3, 4 and 5 progressively grow the hydrogen production capability to convert wider domestic, industrial and commercial gas demand of up to 5GWh in the region to eventually reduce emissions by 860,000 tonnes of CO₂/annum.

Green Jobs Fund

3.4.45 We are investing **£100 million to help businesses create new, green jobs via the Green Jobs Fund**¹¹⁵.

Our enterprise agencies will provide £50 million to businesses which provide sustainable or low carbon products and services to help them develop, grow and create jobs. A further £50 million will help to ensure that businesses and supply chains across Scotland can capitalise on our investment in low carbon infrastructure such as the decarbonisation of heating and green transport.

Investing with the industrial manufacturing sector

3.4.46 We will continue to support innovation throughout the industry sector, developing solutions that can be scaled up and contribute to a pipeline of projects and leading to wider benefits for jobs, place and the environment.

3.4.47 **The Scottish Industrial Energy Transformation Fund (SIETF) commits £34 million for projects at industrial sites for energy efficiency or deeper decarbonisation.** For the next five years, via match-funding, SIETF will leverage asset-based private capital into this vital productive part of our economy and support the readiness of business cases for investment.

3.4.48 **The £26 million Low Carbon Manufacturing Challenge Fund** will build on the success of the Advancing Manufacturing Challenge Fund to support innovation in low carbon technology, processes and infrastructure. This fund will help drive up project standards, the need for collaboration to

create efficient and sustainable manufacturing practices, and better enable firms to enter low carbon markets and/or their existing supply chains¹¹⁶.

A partnership with Scottish industrial stakeholders

3.4.49 A Scottish Industrial Decarbonisation Partnership (SIDP) will strengthen existing engagement with energy-intensive industrial (EII) manufacturers. Linked to the First Minister chaired Scottish Energy Advisory Board, this partnership will foster mutual expectations to decarbonise in line with our economic recovery implementation plan, bringing together strategic initiatives.

3.4.50 SIDP will facilitate dissemination of industrial decarbonisation best practice and advise on the practical sequencing of policies or projects, informed by evidence, including sub-sectors' own ambitions of how to reach net zero. It will feed into programme reviews and into capital infrastructure budget planning that supports industry to set strategic and ambitious net zero transition plans.

Net Zero Transition Managers Programme

3.4.51 We will facilitate a number of non-revenue generating roles to incentivise Energy Intensive Industry (EII) to compete in low-margin markets. The Managers will be embedded in their organisations and tasked with identifying, quantifying and recommending decarbonisation opportunities for the business. They will collaborate as a cohort to ensure consistent knowledge capture and dissemination.

115 Announced in the 2020-2021 Programme for Government

116 SIETF and MLCF announced in the 2020-2021 Programme for Government

Creating market benefit for Scottish industries that invest to decarbonise

3.4.52 A key part of successful industrial decarbonisation is improving the market benefits for low carbon industrial production and incentivising forward-look investment. The CCC's Net Zero Report (2019) called for a policy approach to decarbonising industry that includes a suite of measures covering procurement, consumer behaviour and product standards to drive change. A study has been started that will contribute to policy development on options to influence market conditions for Scottish manufacturers who produce relatively lower carbon products than their competitors and contribute to the circular economy.

Seizing the Economic Opportunity

3.4.53 A key aspect of decarbonising the economy is to help industry identify and engage with the measures both it and its customers require in order to decarbonise. We will work across government, enterprise agencies and the innovation system to identify strengths that can be built on as part of the decarbonisation journey, for example:

- **The Clyde Mission** provides an opportunity to bring together a range of low carbon investments and circular economy thinking, for example around transport, heating and housing, in a coherent and systematic way to deliver sustainable and inclusive growth at scale, £250-£500 million, in a single place.

- The Scottish Government will continue to support **Michelin Scotland Innovation Parc (MSIP)**. The Parc is focused on meeting public sector procurement challenges in low carbon energy and sustainable mobility. The incubator will bring manufacturing prototyping capabilities to integrate procurement with manufacturing capabilities and supply chains.

Making Scotland's Future

3.4.54 We have already ensured that the transition to the future low carbon economy is at the heart of our existing commitments around **advanced manufacturing**, which includes substantial investments in the **National Manufacturing Institute Scotland** and the **Advancing Manufacturing Challenge Fund**. In the short-term we will champion a green recovery as a part of a broader manufacturing recovery plan. This will utilise the framework of our longer-term 'Making Scotland's Future' Programme for manufacturing, which will support the delivery of net zero emissions by 2045 by:

- establishing a supply chain strategy aligned to low carbon markets;
- encouraging the development of low carbon technologies for minimal environmental impact;
- creating service offerings to enable companies to maximise low carbon market opportunities;
- identifying and leveraging low carbon expertise and networks in Scotland and beyond; and
- embedding circular economy skills and thinking in the future workforce.

3.4.55 'Making Scotland's Future' will drive the development of low carbon manufacturing techniques and work with partners to ensure the successful delivery of the £60 million Scottish Government investment in a Scottish Industrial Energy Transformation Fund (£34 million) and a Low Carbon Manufacturing Challenge Fund (£26 million).

Grangemouth Future Industry Board

3.4.56 The Grangemouth Future Industry Board¹¹⁷ will provide a forum that brings together key decision makers across the Scottish Government, Scottish Enterprise and Falkirk Council, with a focus on Scotland's key manufacturing cluster. It will strengthen alignment and co-ordinate activity to ensure the significant opportunities for low carbon economic growth are maximised at Grangemouth.

3.4.57 The board will focus on specific and agreed workstreams that will shape efforts to unlock potential investment and identify policy levers that can support sustainable growth, and advance the circular economy, at Grangemouth. Decarbonisation, longevity, competitiveness and just transition will be at the heart of the board's efforts.

Scotland's Climate Emergency Skills Action Plan and Manufacturing Skills Academy

3.4.58 The Climate Emergency Skills Action Plan (CESAP) remains central to our ambition to create a future workforce that can support our transition to a net

zero economy. The National Manufacturing Institute Scotland is included in this broader skills action plan, through the **Upskilling and Retraining** theme, as it will establish a **Manufacturing Skills Academy** to develop a catalogue of advanced manufacturing modules. This will **support skills development**, and help drive **efficiency and productivity** across the manufacturing and industrial sectors.

Energy Transition Fund

3.4.59 **The £62 million pound Energy Transition Fund (ETF)** is a package of investment for the North East that will support our energy sector and help us make significant progress on energy transition as we move toward net zero by 2045¹¹⁸. The projects that will be considered under the ETF are:

- ▶ a Global Underwater Hub;
- ▶ an Energy Transition Zone based in Aberdeen;
- ▶ hydrogen projects including Aberdeen Hydrogen Hub and ACORN Hydrogen; and
- ▶ OGTC transition technology projects.

3.4.60 We want to protect existing jobs and create new jobs in the North East, and across Scotland, by opening up opportunities through energy transition and harnessing private sector funding as companies move from oil and gas to low carbon and renewable investments.

117 New policy announced in 2020-2021 Programme for Government

118 Announced June 2020: <https://www.gov.scot/news/gbp-62-million-fund-for-energy-sector/>

Our call to others

The UK Government

3.4.61 The CCC analysis of the balance of reserved and devolved responsibilities lists industry as one of the areas where progress is most dependent on UK Government and/or international policy¹¹⁹. Vital powers in regulation of the energy market and fuels (namely oil, gas, coal, electricity), are reserved to the UK Government. Crucially for the decarbonisation of industry, hydrogen and aspects of CCUS are also reserved, limiting the Scottish Government's power to enact change where we want and need to.

3.4.62 As noted above, there remains a significant risk carbon leakage if Scotland decarbonises faster than the rest of the UK and Europe, and therefore support for both investment and a level regulatory playing field is required.

3.4.63 The Scottish Government calls on the UK Government to:

- **Implement a UK ETS rather than a reserved carbon emission tax** to replace the EU ETS from January 2021, and to ensure that a link to the EU ETS is agreed in UK-EU negotiations. Furthermore, in ongoing development of the UK ETS policy between the four administrations, in particular on changes to the cap for net zero, we urge the UK Government to take into account the different statutory climate targets in Scotland, and our particular industrial landscape.
- **Support and enable CCUS and low carbon blue hydrogen.** Scottish Ministers have

impressed upon the UK Government that the full scale deployment of CCUS in Scotland is dependent on progress in development of the commercial, policy and regulatory frameworks required to support CCUS at scale in the UK. Whilst BEIS have published their response to their consultation on CCUS business models, further clarity on this is needed to bring forward the investment decisions for critical decarbonisation infrastructure. This must include the **creation of a stable policy framework, including business model and financial frameworks for blue hydrogen and for CCUS**, in order to build confidence and enable the development of the first CCUS facilities in the UK to be commissioned from the mid-2020s.

- **Include Scotland's net zero ambitions within the UK's Industrial Decarbonisation Strategy.** Scotland will input into the development of a coherent long-term vision to create a credible trajectory for getting industry to net zero emissions. This strategy should reflect devolved priorities, policies and programmes and allow our participation in disseminating the conclusions of this strategy which will inform investment decisions across the UK.
- **Support and Enable large scale Green Hydrogen Production and integration into wider energy systems**, including the creation of stable policy frameworks including the business models and financial instruments necessary to drive investment.

Scottish public sector organisations

- 3.4.64 Our Enterprise Agencies are supporting key investments by business in the low carbon transition. Scottish Enterprise have begun to map key industry supply chains to better understand where Scotland has a comparative advantage and where targeted investment may be required.
- 3.4.65 The Infrastructure Commission have highlighted the interdependence between infrastructure and the move to low carbon. Close engagement with this work will be important as we seek to maximise the economic benefits of the transition.
- 3.4.66 Working with agency partners, including SEPA, we will develop methods of benchmarking the efficiencies of some key energy intensive industrial processes then explore how to drive improvements. We encourage industry to discuss with SEPA entry into Sustainable Growth Agreements (SGAs), voluntary agreements that focus on practical action to deliver environmentally positive outcomes such as driving reductions in water, energy and materials use and all forms of waste. SEPA's sector plans, specifically those relevant to manufacturing, will also support decarbonisation through their regulatory role and by taking opportunities to work with companies to go beyond compliance.

Scottish businesses and industry

- 3.4.67 The Scottish Government encourages businesses and industrial sites to:
- ▶ review their energy intensive processes, pursuing all energy efficiency options available to them, working with the Scottish Government;
 - ▶ further explore innovative and cutting edge solutions to remove carbon from their operations (including CCUS);
 - ▶ investigate embedding carbon costs into their procurement processes, to acknowledge the potential higher cost associated with low carbon production; and
 - ▶ work in partnership to support low carbon suppliers and producers to define new business relationships and models that will decrease the commercial risk in production of low carbon goods.

Individuals/households

- 3.4.68 The majority of the UK's greenhouse gas emissions arise from our production and consumption of energy, whether that's driving cars, manufacturing goods or simply boiling a kettle. Decarbonising and diversifying Scottish Industry will benefit individuals by offering low carbon energy and goods from Scottish manufacturing. Consumers can support this transition through driving demand for low carbon goods and services, for example by switching to low carbon fuels. A just transition within the industry section will help to ensure that any costs are not passed unfairly to the consumer.

3.4.69 Our research into improving market benefits for Scottish manufacturers who produce relatively low carbon goods will investigate consumer behaviour and preferences. It will identify opportunities for green labelling to inform purchasing decisions for a range of energy intensive products produced in Scotland, including food and drink.

3.4.70 Following the passage of the Consumer Scotland Act 2020, we are in the process of establishing ‘Consumer Scotland’, a non-Ministerial body that will advocate the views of Scottish consumers and that will be able to address consumer issues and opportunities in this area. It will build on the work of the Energy Consumer Commission and will also work closely with other stakeholders within the consumer landscape to ensure that consumers are able to make informed choices and issues of detriment are identified for relevant challenge.

International engagement

3.4.71 The Scottish Government, as European Co-Chair of the Under2 Coalition, is participating in the Industry Transition Platform (ITP) alongside several regions of Europe and North America. This peer-learning forum explores policy solutions that are relevant for decarbonising energy intensive industry across the regions taking part, and focuses on developing regional hydrogen-based strategies for industry. It already benchmarks our existing decarbonisation activities, as well as influencing our potential to work in close partnership with industry to implement a policy framework. ITP provides a channel for ongoing international engagement,

maintaining Scotland’s valued international relationships post-EU Exit. It will conclude in Brussels in June 2021, where members will share project results.

International Engagement Plans for Hydrogen and CCUS

3.4.72 Hydrogen and CCUS are key areas for international engagement as we prioritise activity and collaborations that: increase our attractiveness to international partners and lead to longer term investment and export opportunities; build upon Scotland’s reputation; and promote learning and policy exchange.

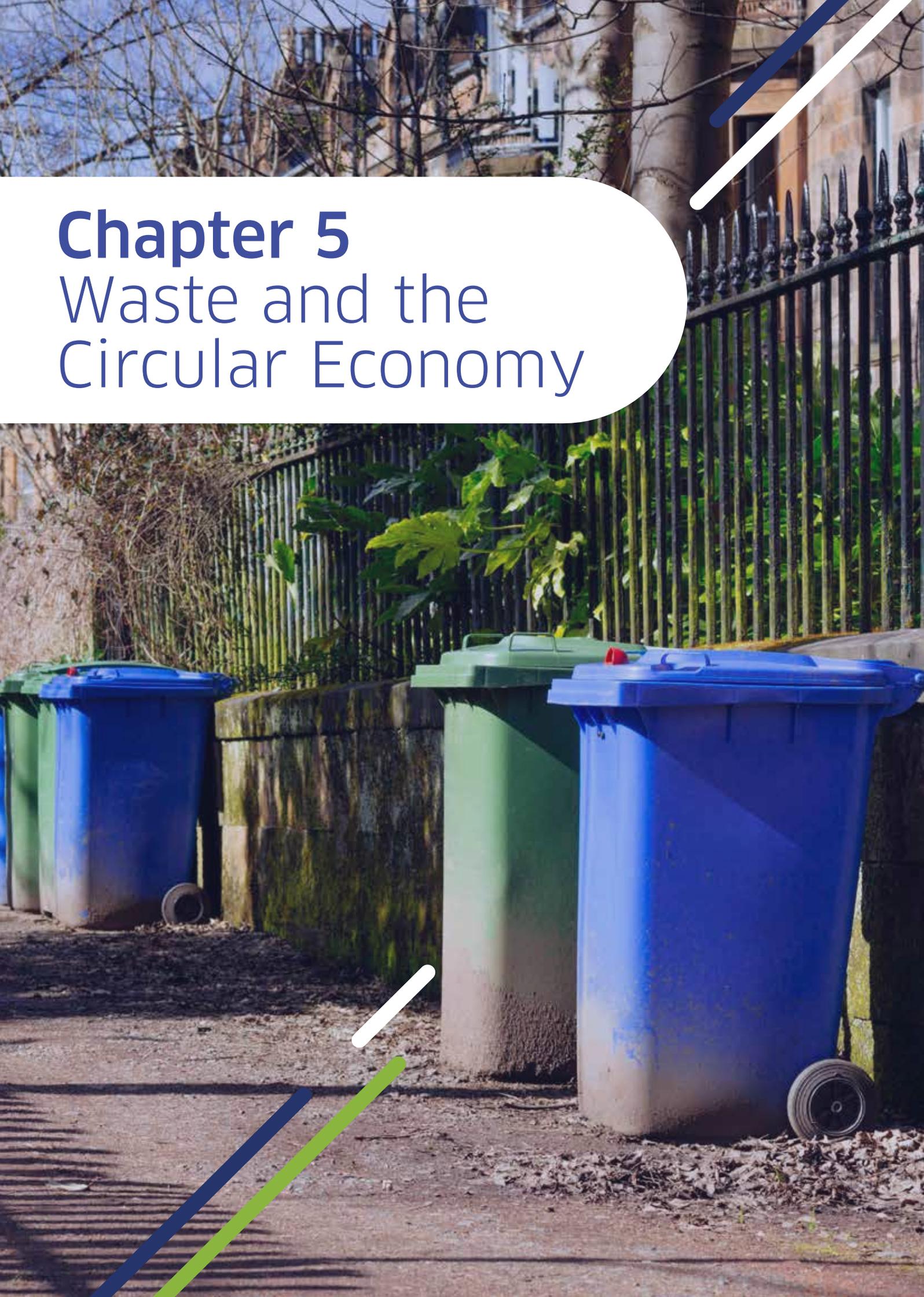
3.4.73 International activity on hydrogen is growing at pace in Europe and further afield. We have acted promptly to ensure Scotland is engaged in the developing hydrogen economy. A coordinated plan of international engagement activity has been developed to help advance our ambitions for international collaboration in this area.

3.4.74 Our international engagement on hydrogen is already underway, including Ministerial and official-level engagement, and working with partners at various levels. The engagement plan will highlight Scotland’s strengths in offshore wind and hydrogen, the potential for green hydrogen export, and possible areas for collaborative development and future cooperation.

3.4.75 This includes extensive engagement at strategic, sectoral and company level, participation in webinars and seminars to promote Scotland’s potential, and ensuring Scottish companies are aware of international opportunities in the hydrogen supply chain where these arise.



- 3.4.76 Further details of the Hydrogen International Engagement Plan can be found in the Hydrogen Policy Statement.
- 3.4.77 In a similar fashion there are international opportunities for CCUS supporting decarbonisation efforts in Europe and in the export of knowledge derived from our ambition to be an early mover in CCUS. We are currently engaging with key industry partners and will be developing a strategy to steer our engagement in this area in early 2021.
- 3.4.78 Scotland's vast storage potential provides an opportunity for the import of CO₂ via ship from European carbon capture projects, opening up the potential for a CO₂ transportation economy. An international revenue stream via shipping of CO₂ to projects such as Acorn CCS will support our own industrial decarbonisation efforts by anchoring storage projects and delivering confidence to emitters in Grangemouth of a long term solution for their industrial emissions.
- 3.4.79 CCUS presents a significant economic opportunity for Scotland; for this to be realised and maximised, it needs to be supported by a strong international promotion.
- 3.4.80 Scotland is the best placed country in Europe to realise CCUS on a commercial scale, and we want to ensure our potential and experience is increasingly recognised internationally. Our international engagement on CCUS will focus around Scotland's significant storage potential, our practical expertise, and our ambitious plans to develop the sector. A priority for this activity, in the European context, will also be to raise the profile of Scottish activity and ensure visibility post-Brexit.



Chapter 5

Waste and the Circular Economy

3.5. Waste and the Circular Economy

Introduction

- 3.5.1 Scotland's progress in reducing emissions in the waste and resources sector over the past 20 years has been striking. Recycling is now a more established part of our everyday life, and we recycle over 60% of Scotland's waste. The amount of waste going to landfill in Scotland is at its lowest since records began. In 2018, waste and resources sector emissions were over 70% lower than in 1998.
- 3.5.2 However, we still have a significant challenge ahead in order to meet our ambitious emissions reduction targets. Emissions in the sector are currently around 1.9 megatonnes per year; our aim is to reduce these emissions to 1.2 megatonnes by 2025, and 0.8 megatonnes by 2030. Achieving these milestones will require meeting our ambitious waste reduction and recycling targets, including: ending landfilling of biodegradable municipal waste and significantly reducing food waste; accelerating efforts to address legacy emissions from closed landfill sites; and ensuring a more rapid transition to a fully circular economy in Scotland. This process will require radical and transformational changes, and we will work with partners to ensure that these changes are delivered in a managed and just way.
- 3.5.3 The COVID-19 crisis has had, and continues to have, a significant impact on the waste and resources sector. These impacts have been felt differently across the sector, with changes in business leading to reduced demand for commercial collections, as well as reduced quantities of materials for sorting and reprocessing; and changes in household behaviours affecting the volume and type of waste managed by local authority waste services.
- 3.5.4 It is too soon to understand the full impact of the COVID-19 crisis on our recycling targets in Scotland, and we are undertaking further work to explore this. There are some signs that consumer and business behaviour has reverted to a preference for single use/disposable items, which in some cases has been a necessary step to prevent transmission of the virus. On the other hand, the Waste and Resources Action Programme (WRAP) reported that, from a survey conducted in April 2020, households in the UK managed their food better under "lockdown", with reduced food waste¹²⁰.
- 3.5.5 As a result of the pandemic's impact on our legislative agenda, we took the difficult decision to delay introduction of our Circular Economy Bill. However, we remain committed to achieving circular economy outcomes and will continue to work with stakeholders to pursue these.

Green Recovery and just transition

3.5.6 As we move towards our recovery from the pandemic, we need to support consumers and businesses to make sustainable choices, to adapt business models and to maintain positive behaviour changes. Our priorities include preventing waste by encouraging more sustainable product design, reducing consumption of single-use items, promoting reuse of products, and enhancing our recycling infrastructure. We also have an opportunity for renewed impetus in building a fully circular economy in Scotland which will drive materials up the waste hierarchy and keep them in high value use for as long as possible. This will also stimulate job creation: research has shown that 10,000 tonnes of waste can create 1 job in incineration, 6 jobs in landfill, 36 jobs in recycling or up to 296 jobs in repair and reuse¹²¹.



Deposit Return Scheme

Circular Economy

In our existing economy, we “take, make and dispose”. We take resources from the ground, air and water; we make them into products and structures; then we dispose of them. We need to move to a circular economy where we **reduce** the demand for raw material in products; encourage **reuse** and **repairs** through responsible production; and **recycle** waste and energy to maximise the value of any waste that is generated.

The circular economy represents an enormous economic and industrial opportunity for Scotland and contributes directly to a green recovery. It tackles emissions through influencing product design, manufacturing and waste and resource management, and is a vital part of sectors delivering their net zero aspirations. It can improve productivity and open up new markets, while also benefiting workers and communities by providing local employment and lower priced goods. A circular economy also contributes to a range of UN Sustainable Development Goals, including ensuring sustainable consumption and production patterns.



121 <http://www.rreuse.org/wp-content/uploads/Final-briefing-on-reuse-jobs-website-2.pdf>

3.5.7 As has been recommended by a number of stakeholders, including the Advisory Group on Economic Recovery, the Decoupling Advisory Group and Scottish Environment Link, we will embed circular economy principles into our wider green recovery, prioritising areas with the biggest opportunities: construction; agriculture/food and drink; energy and renewables; procurement; skills and education; and plastics.

3.5.8 Our approach to delivering a circular economy must be inclusive. We will consider the potential impacts on different consumer groups, in order to identify any barriers to fair access and ability to adopt new circular economy practices.

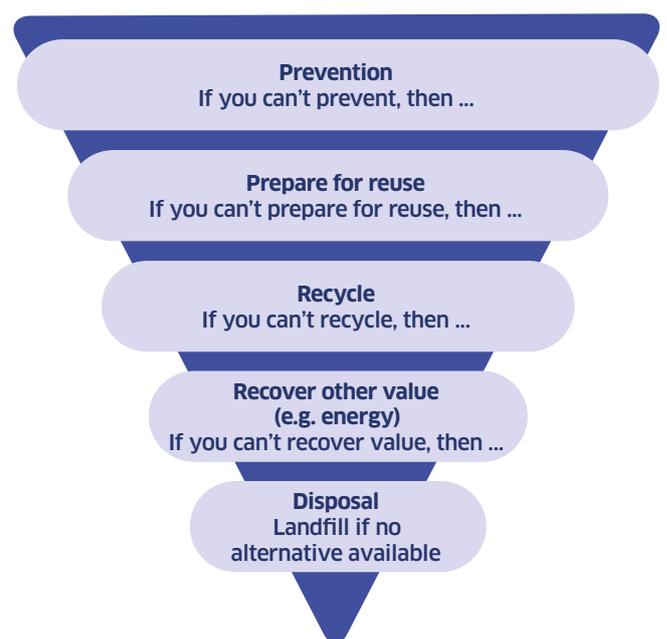
Positive vision for 2032 and 2045

3.5.9 By 2032 (and before) we will have the tools in place to equip individuals, businesses and organisations to make a fundamental shift in how we use and re-use materials. We will be well on track to embedding a fully circular economy approach, which is designed to reduce, reuse, repair and recycle. Recycling will be a much simpler option for households, with clear product labelling, effective communication, enhanced collection infrastructure, and more consistent approaches to recycling across Scotland.

3.5.10 By 2045, as well as improving our position in the global market, we will produce many more goods that are bought, used and regenerated

or recycled right here in Scotland. This is just one of the many reasons why we will have moved completely from a 'take, make and dispose' linear economy to a fully circular economy. Our vision is that by 2045 Scotland's cultural, social and business norms will be driven by a focus on:

- Responsible Consumption, where people and businesses demand products and services in ways which respect the limits of our natural resources. Unnecessary waste, in particular food waste, will be unacceptable in Scotland.
- Responsible Production, where a circular economy is embraced by the businesses and organisations that supply products, ensuring the maximum life and value from the natural resources used to make them.
- Maximising Value from Waste and Energy, where the environmental and economic value of wasted resources and energy is harnessed efficiently.



Waste Hierarchy

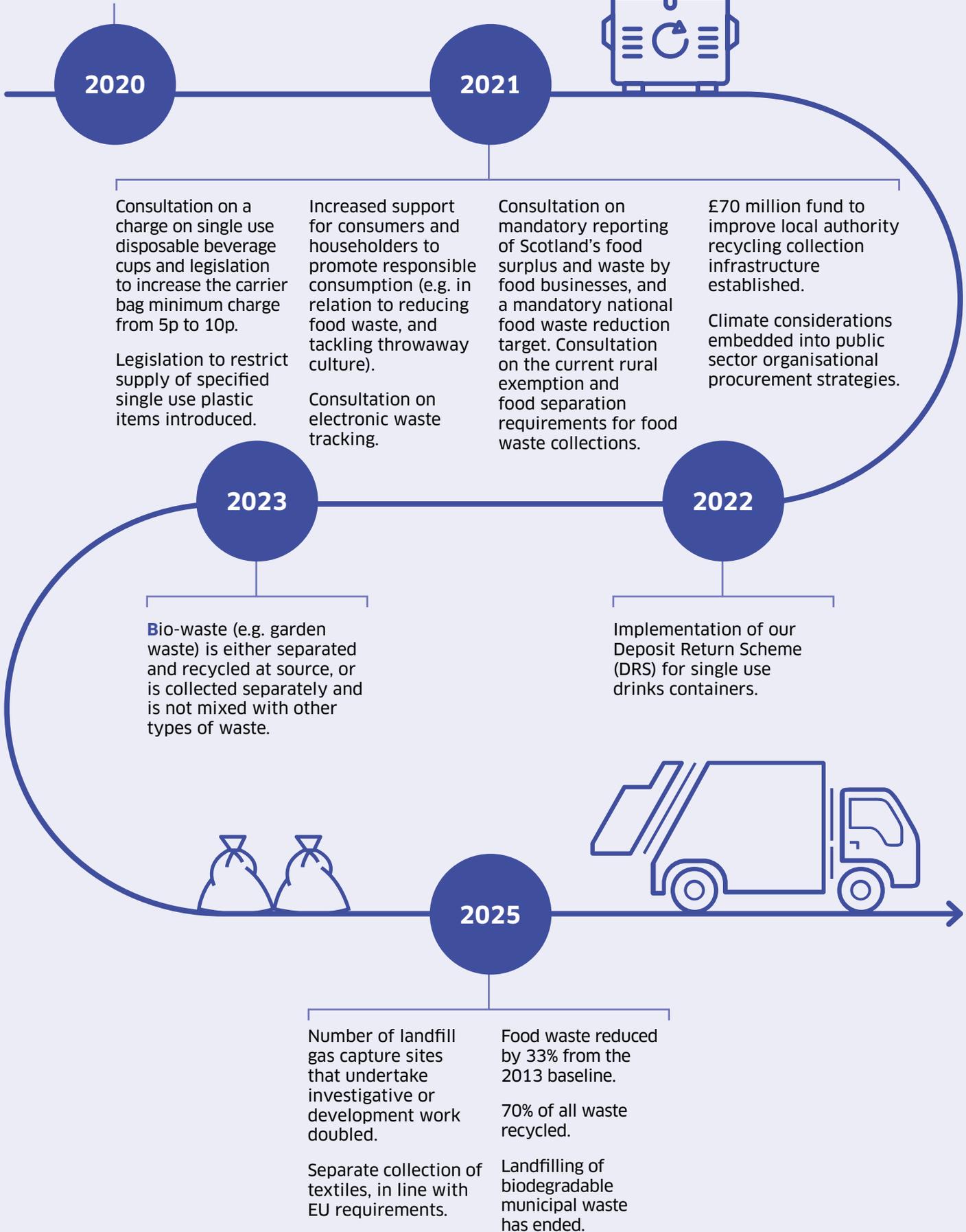


Emissions Reduction Pathway to 2032



Route Map to 2032

Consultation on banning priority single use items.



The actions we are taking

Building the Circular Economy

- 3.5.11 We are **boosting** our commitment to building a **circular economy**, where goods and materials are kept in use for longer by **embedding circular economy principles in the wider green recovery**. Through Zero Waste Scotland and Scottish Environment Protection Agency (SEPA), we will **intensify our work with industry and businesses** to address emissions associated with production, consumption and waste of products/resources, and to promote resource efficiency. Zero Waste Scotland will also continue to develop tools and resources for education at all levels.
- 3.5.12 Through our work on **the fourth National Planning Framework (NPF4)** we will update our planning policies to reflect the **new opportunities** arising from a **shift towards a circular economy**. Planning can support development which reflects the waste hierarchy, prioritising the **reduction and reuse of materials**, and helping to facilitate the delivery of **new infrastructure** required to achieve this.
- Driving down food waste**
- 3.5.13 We have **boosted** our efforts to tackle food waste by leading collaborative efforts to deliver Scotland's landmark **Food Waste Reduction Action Plan**, supported by Zero Waste Scotland, in order to help deliver our ambitious target to **reduce food waste by one third against a 2013 baseline by 2025**¹²².
- 3.5.14 This will involve improving our monitoring and infrastructure by **considering a mandatory national food waste reduction target and mandatory reporting of Scotland's food surplus and waste by food businesses**. We will also break down barriers to food recycling by **consulting on the current rural exemption** and food separation requirements for food waste collections.
- 3.5.15 We will work closely with the public and private sectors, promoting **leadership, innovation, and effectiveness** in waste reduction and recycling. For example, we will support the development and implementation of an **NHS Scotland national action plan on food waste**. In partnership with Zero Waste Scotland, we will also carry out a **sustained approach to public engagement and communications** to enable the public to **make sustainable choices** around food and food waste.
- Reducing waste sent to landfill**
- 3.5.16 We will **end landfilling of biodegradable municipal waste by 2025, reduce the percentage of all waste sent to landfill to 5% by 2025 and recycle 70% of all waste by 2025**. We will develop a **route map** to outline how we will deliver our waste and recycling targets in a way that maximises carbon saving potential¹²³.
- 3.5.17 We have committed significant investments to deliver on these targets, including **£70 million to improve local recycling collection infrastructure**. We have also committed to work with the Convention of Scottish Local Authorities (COSLA) in the coming

122 2018 Climate Change Plan commitment to reduce food waste by 33% boosted through the Food Waste Reduction Action Plan, published 2019

123 Announced in the 2020-2021 Programme for Government

year to **evaluate the Household Recycling Charter** and review its Code of Practice as key steps in developing a future model of recycling collections that promotes **high quality recycling and helps make the right choices easier for householders**¹²⁴.

3.5.18 In line with **EU Commission's Circular Economy Package**, we will also consult on requirements to **separately collect garden waste** (by 2023), **textiles and hazardous elements of household waste** (by 2025). These measures have the potential to further promote reuse and recycling¹²⁵.

3.5.19 In response to the Committee on Climate Change's (CCC's) latest recommendations, it is our intention to **extend the forthcoming ban on sending biodegradable municipal waste to landfill to include biodegradable non-municipal wastes**, subject to appropriate consultation and work to provide assurance around some specific waste streams.

Improving waste data

3.5.20 We will take steps to **improve waste data** by working with the UK Government, other devolved governments, and agencies such as SEPA, to develop and implement the **electronic waste tracking system**; and we will provide **additional funding** to support implementation in Scotland. This step change in the quality and timeliness of waste data will support decision-making and underpin the key building blocks required to reduce emissions and drive delivery on existing waste and recycling targets¹²⁶.

Reducing emissions from closed landfill sites

3.5.21 We will **accelerate** our **landfill gas capture** and **landfill legacy management**. Working closely with SEPA and waste operators, we will scale up the existing landfill gas capture programme to mitigate the negative effects of landfill and the environmental impact of closed landfill sites¹²⁷.

3.5.22 We will **double** the number of **landfill gas capture sites** in Scotland that undertake investigative or development work (from 12 to 24 sites) by 2025 and will provide **additional funding** to support this. This will harness the energy generated from landfill gas capture and maximise circular economy opportunities.

Promoting efficiency of energy from waste plants

3.5.23 In line with the waste hierarchy, our primary focus is on **preventing waste and promoting the reuse of materials**. However, we still need capacity to dispose of residual waste while we make the transition to a circular economy. In the context of the latest CCC recommendations and building on progress already made by the sector, we will consider **measures to ensure new energy from waste plants are more efficient** and **how waste infrastructure can be 'future-proofed' for carbon capture and storage (CCS)** technology.

Encouraging reprocessing investment

3.5.24 We have a new action to work with local authorities and the future **Deposit Return Scheme** administrator(s) to explore options

124 All announced in the 2020-2021 Programme for Government

125 First announced in the 2019-2020 Programme for Government

126 Boosted through Low Carbon Fund

127 Boosted through Low Carbon Fund

that will **unlock reprocessing investments**, including **pricing and incentive schemes**, to create jobs and a ready supply of recycled material for new packaging¹²⁸.

Preventing waste

3.5.25 Banning problematic single use items:

We are currently consulting on banning a number of problematic single-use plastic items, such as straws and cutlery, identified in the EU's Single Use Plastics Directive, with a view to introducing legislation in 2021, and considering how we will give effect to the wider requirements of the Directive¹²⁹.

3.5.26 **Packaging reform:** We will continue to work with the UK Government and other devolved administrations on **reforms to the packaging extended producer responsibility regime**, which we expect will deliver improved funding for local authorities in the future¹³⁰.

3.5.27 **Environmental charging:** We will introduce measures to encourage people to shift toward reusable products and to encourage more sustainable consumption, for example, we will take further steps to **consult on a charge on single use disposable beverage cups** and will **introduce legislation to increase the carrier bag minimum charge from 5p to 10p** in this parliamentary session¹³¹. In recent public research, we found that these kinds of measures are **supported by 82% of the public**.

3.5.28 Several of the measures outlined in this plan are intended to increase **fiscal incentives** for producers and consumers to

reduce waste and move up the waste hierarchy. Examples include the **Deposit Return Scheme**, reform of **Extended Producer Responsibility schemes** and our **proposal to introduce a charge on single use beverage cups**. However, if we are to meet our ambitious targets for 2025 and beyond, then further, and likely more far-reaching fiscal incentives will be needed, alongside the other policy interventions set out in this chapter. As part of our work to develop a route map to 2025, we will therefore undertake a specific and focused piece of work to **examine the range of fiscal measures used by other countries** to incentivise positive behaviours and to develop proposals to go further in this area.

3.5.29 We recognise that significant and more radical transformational changes will be required in this area if we are to meet our targets in 2025 and beyond. Therefore, we will work with partners to **develop a post-2025 route map to identify how the waste and resources sector will contribute towards Scotland's journey towards net zero in the period to 2030 and beyond**.

Our call to others

The UK Government

3.5.30 The Scottish Government is taking action on policy measures that lie within devolved competence, but some of the policy measures required to drive the transition to a fully circular economy are dependent upon UK Government action. The CCC's December 2019 progress report made clear that UK Government policy ambition

128 Announced in 2020-2021 Programme for Government

129 <https://consult.gov.scot/zero-waste-delivery/introducing-market-restrictions-on-single-use-plas/>

130 Announced in 2020-2021 Programme for Government

131 Boosted in 2020-2021 Programme for Government

did not match that of the Scottish Government, and challenged the UK Government to “step up” in areas where key powers are reserved. The CCC’s latest Scottish Progress report notes that the UK Government has only delivered one of the CCC’s 16 key reserved policies that unlock action in Scotland.

3.5.31 We are already working with the UK Government and other Devolved Administrations on reform of the packaging producer responsibility system to reduce waste and boost recycling. This is key to both encouraging sustainable packaging design and to providing funding for more effective collection services.

3.5.32 We welcome the UK Government’s plans to introduce a ‘plastics tax’ to incentivise the use of recycled content in plastic packaging. However, there are a number of key areas that require further UK Government action. For example, we call on the UK Government to: introduce new fiscal measures to influence behaviour; reduce consumption of unsustainable material; boost the competitiveness of recycled materials; and bring forward measures to influence global markets and reduce imported emissions.

Scottish public sector organisations

3.5.33 Public sector leadership is vital to achieving our emissions reduction targets in the waste and resources sector. We are therefore working with the public sector to embed circular economy principles into their procurement strategies, and to accelerate reduction and recycling of waste. Examples

include the forthcoming 2025 ban on landfilling biodegradable municipal waste.

3.5.34 **Food waste** is a significant contributor to emissions that come from the public sector, and our **Food Waste Reduction Action Plan**¹³², published in 2019, highlights the need for our public sector to reduce food waste throughout its buildings and services. Key agencies, including SEPA and Food Standards Scotland, will provide the regulatory oversight, support, and infrastructure to drive change and help deliver Scotland’s food waste targets.

3.5.35 **SEPA** have a vital role to play in supporting the future decarbonisation of the waste and resources sector in Scotland. SEPA work with all sectors to ensure compliance with waste regulation, whether that be on pollution prevention, producer responsibility, waste exports or landfill tax. We will continue to support SEPA with the appropriate funding and support it needs to fulfil its aims.

3.5.36 We are also working closely with **Scottish Water**, who have huge potential for renewable energy generation and energy efficiency, including in the waste water treatment network. For example, over the last 5 years Scottish Water has delivered 19 GWh p.a. of energy efficiency and aims to deliver a further 20% improvement. Scottish Water’s ambitious Net Zero Route Map includes a wide range of action to minimise emissions across all aspects of its activities to meet, and go beyond, their target of net zero emissions by 2040¹³³.

132 <https://www.gov.scot/publications/food-waste-reduction-action-plan/>

133 <http://www.scottishwaternetzero.co.uk/>

3.5.37 We also expect Scottish Water to continue to invest heavily in modernising the waste water treatment capability across Scotland and to deliver additional heat from sewers projects, building on those already in place.

Scottish businesses and industry

3.5.38 The second largest sector source of food waste is Food & Drink Manufacturing (25%)¹³⁴. Reducing this will involve transformative change in business practice throughout the food supply chain. The Scottish Government's Food Waste Reduction Action Plan highlights the need for the Scottish food and drink industry to show leadership and drive innovation to reduce waste throughout the supply chain, as well as to drive changes in labelling and in food businesses' corporate behaviour.

3.5.39 The Scottish Government and Zero Waste Scotland provide a range of advice and business support to promote the adoption of circular economy practices and to support innovation. Many businesses are doing so already through a range of voluntary initiatives, including the UK Plastics Pact and the Courtauld 2025 Commitment on food waste, both of which the Scottish Government is a signatory of. The Circular Economy Investment Fund is the most high profile of the Scottish Government's financial support measures, and we will continue to ensure the right strategic interventions are in place to provide maximum economic and emissions reductions benefits in the future.

3.5.40 Key priorities for businesses and industry include:

- continuing to actively increase waste prevention as well as reuse and recovery rates by rethinking operations, diversifying businesses and supporting innovation;
- putting in place alternative treatment solutions for residual waste in order to deliver the forthcoming ban on biodegradable municipal waste to landfill by no later than 2025;
- scaling up existing landfill gas capture measures to mitigate the negative effects of landfill and the environmental impact of closed landfill sites;
- taking further steps to maximise efficiency of energy from waste plants and considering how infrastructure can be 'future proofed' for CCS technology; and
- ensuring that the waste supply chain supports a circular economy by reusing where possible and only landfilling waste that has reached the end of its life.

Individuals/households

3.5.41 The largest sector source of **food waste** in Scotland is Household & Consumer (61%)¹³⁵. In 2014, Scottish households threw away around 600,000 tonnes of food and drink waste. Household food waste alone accounts for 1.6 million tonnes of carbon dioxide equivalent emissions; this is 2.1% of Scotland's carbon footprint¹³⁶.

134 <https://www.gov.scot/publications/food-waste-reduction-action-plan/p.21>

135 <https://www.gov.scot/publications/food-waste-reduction-action-plan/p.21>

136 <https://www.gov.scot/publications/food-waste-reduction-action-plan/>

- 3.5.42 To support and enable required behaviour change, we will deliver a sustained programme of communications designed to raise people's awareness and understanding of food waste, including a second phase of our marketing campaign planned for 2021.
- 3.5.43 We encourage people in Scotland to purchase products and services in ways which respect the limits of our natural resources; to see unnecessary waste, in particular avoidable food waste, as unacceptable; and to embed reuse and recycling into everyday behaviours. We regularly engage with the public to understand attitudes towards waste, as we seek to help make the right choices easier for householders¹³⁷.
- 3.5.44 As we recover from COVID-19, we will support consumers to make positive decisions to tackle climate change and make sustainable choices, where possible. For example, we will: encourage the use of washable, reusable face coverings and a move from 'fast fashion' clothing choices more generally; implement the deposit return scheme; improve local authority recycling collection infrastructure; and consult on a charge on single use disposable beverage cups.
- International engagement**
- 3.5.45 An estimated four fifths of global climate emissions are currently linked to the production, consumption and waste of products and resources. The importance of promoting a circular economy is therefore a global challenge. Many of the products that Scotland consumes are produced overseas and imported, emphasising the importance of waste reduction if we are to reduce Scotland's global resource/emissions footprint as well as domestic emissions. There is a risk of 'offshoring' a significant proportion of Scotland's waste emissions given that they are not accounted for under our own greenhouse gas inventory.
- 3.5.46 A number of EU frameworks and Directives are directly relevant to Scotland, including EU's Circular Economy Package (CEP) which introduces a revised legislative framework on waste, establishing an ambitious and credible long-term path for waste management and recycling. In March the European Commission adopted a new Circular Economy Action Plan, which contains a number of initiatives for the lifecycle of products, including waste reduction, consumption, repair, reuse, recycling, and bringing resources back into the economy¹³⁸. As outlined in the UK Withdrawal from the European Union (Continuity) (Scotland) Bill, the Scottish Government is committed to maintaining or exceeding EU environmental standards after we leave the EU¹³⁹.

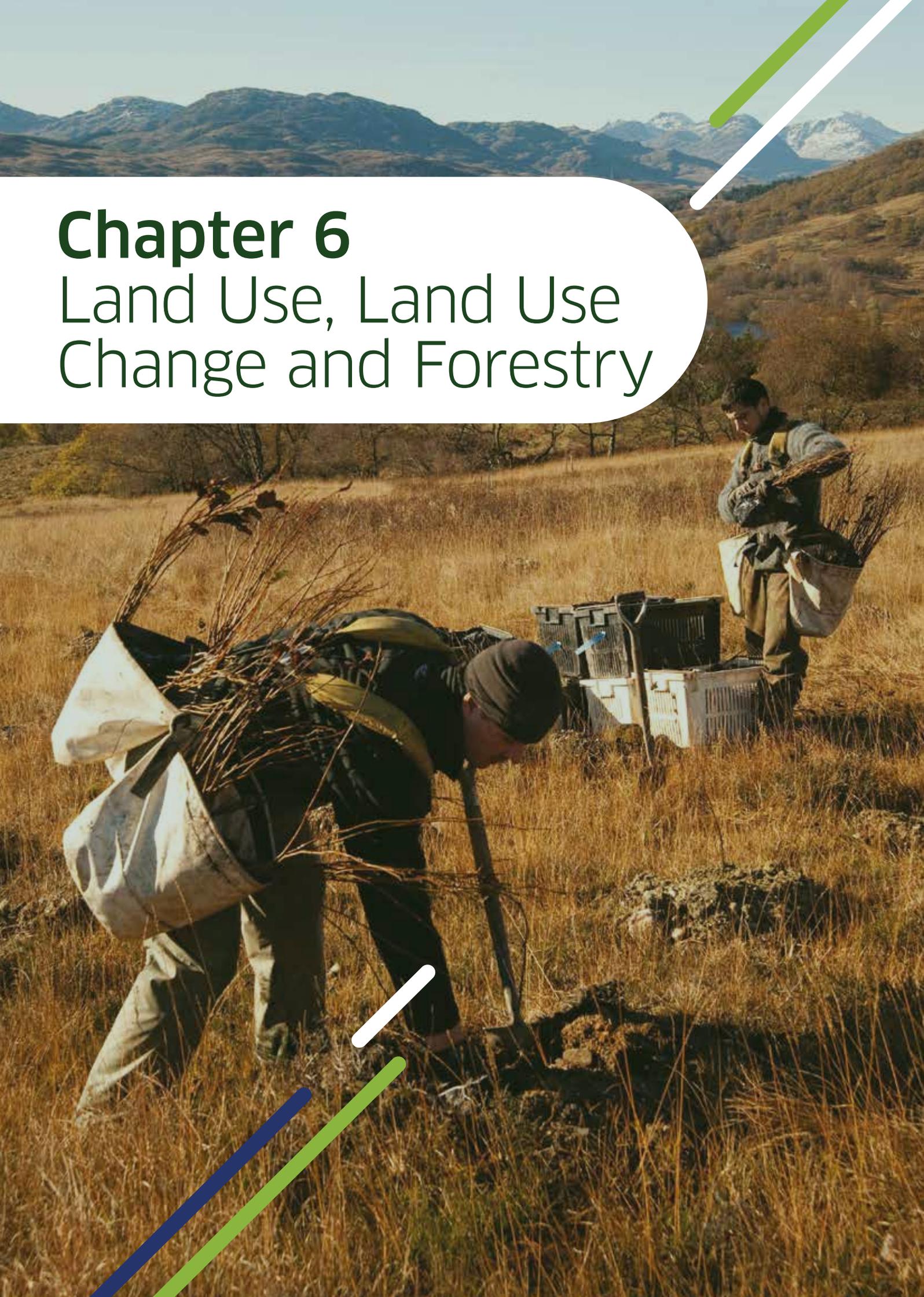
137 Recent examples include the public consultation on single-use plastic items (<https://consult.gov.scot/zero-waste-delivery/introducing-market-restrictions-on-single-use-plas/>) and engaging with island communities to identify potential impacts from the introduction of the deposit return scheme for single-use drinks containers (<https://www.gov.scot/publications/deposit-return-scheme-scotland-islands-communities-impact-assessment/>)

138 https://ec.europa.eu/environment/circular-economy/index_en.htm

139 <https://beta.parliament.scot/bills/uk-withdrawal-from-the-european-union-continuity-scotland-bill-2020>

Chapter 6

Land Use, Land Use Change and Forestry



3.6. Land Use, Land Use Change and Forestry

Introduction

- 3.6.1 Land is key to Scotland's history, culture, and identity. Our landscape and natural environment is one of our greatest national assets, contributing hugely to our economy and society. How we use our land matters to our collective health and wellbeing.
- 3.6.2 We are rightly proud of our world-renowned, diverse and rich nature and landscapes. They have a vital role to play in our future, not least in supporting us to meet our ambitious climate change targets and ambitions. The importance of our land in delivering Scotland's emissions reduction targets has been highlighted by the UK Climate Change Committee. The capacity that our land has to deliver nature-based solutions to climate change, including through increased tree cover and restoration of degraded peatland, is unique within the UK. Scotland has a positive story to tell in these areas but we have not always fully understood that what we do on the land, and to the land, can have far reaching consequences and negative impacts, some of them intangible and long lasting.
- 3.6.3 For example, it is estimated that around 80% of Scotland's peatlands are degraded and, despite the significant progress over recent years, Scotland remains heavily deforested compared to many European countries, and imports significant quantities of timber and timber products. Our soil quality is poor and some native species are finding it hard to survive in our current environment.
- 3.6.4 Changing these outcomes is both a challenge and an opportunity: through significant increases in tree cover and widespread peatland restoration, we can reduce greenhouse gases and other pollutants, increase the levels of carbon dioxide being absorbed and locked up in timber products, enhance and protect our biodiversity, derive other co-benefits such as flood mitigation and climate adaptation, and also support clean, new jobs as part of the green recovery.
- 3.6.5 We must now act urgently and make real and substantive progress in cutting emissions. We must make large scale and rapid changes in the way we use and manage our land to help reach our statutory net-zero targets. This will require us to move appropriate land out of farming as we currently understand it into forestry and peatland, and require those who manage our land for whatever purpose to embrace more sustainable practices (such as those set out in the agriculture chapter of this update).
- 3.6.6 Increasing woodland creation and peatland restoration on this scale, and over this number of years, will result in significant changes in the iconic landscape and environment which has evolved over centuries and for which Scotland is globally renowned. We need to ensure that the people of Scotland understand and support these changes, particularly those individuals and communities likely to be most

impacted. To do that will require early engagement, consistent communication, and genuine dialogue between different groups and communities. We must take people with us in understanding why the look of Scotland and key parts of our landscape are changing. We must also ensure that we don't assume nor accept that radical reform of land use necessarily means fewer people living in rural Scotland: the aim should be to use land use change to help repopulate remote and island areas too.

3.6.7 Achieving land use transformation on this scale will require a major increase in the size and capability of the workforce. This significant expansion of an already important sector of the rural economy is an opportunity for more people to work and live in rural Scotland. We will accordingly need more rural housing and more planning flexibility in the provision of that rural housing.

3.6.8 This chapter sets out the policies and actions that the Scottish Government is taking to enable, support and drive these land use changes. We are also determined to ensure that we transition in a just way, and in a way that also supports our wider ambitions and priorities such as:

- protecting and restoring Scotland's biodiversity and natural environment;
- investing in the natural capital that underpins our economy and wellbeing;
- providing a platform for the sustainable production of high quality food;

- providing a source of other long-term sustainable products like Scottish timber;
- providing a base for more renewable energy generation like on-shore wind and bio-energy, with appropriate safeguards for biodiversity;
- prioritising nature-based solutions to societal challenges, including air quality, water supply and quality, flood risk management, climate mitigation and adaptation and much more; and
- providing more modern, affordable and energy-efficient rural housing.

3.6.9 Scotland's forthcoming third Land Use Strategy (due for publication in spring 2021) will demonstrate how these priorities and the actions of the Scottish Government come together as we deliver on our sustainable land use vision and objectives.

The two key pillars of LULUCF in Scotland: forestry and peatland

3.6.10 Expanding the area of Scotland's forests and woodlands will contribute to reduced greenhouse gas emissions, and will also generate an important commercial natural resource, improve biodiversity and provide spaces for people to enjoy. We have created over 22,000 hectares of new woodland in the last two years, and we will continue to invest to increase overall forest cover in Scotland. As part of the Scottish Government's Low Carbon Fund, Scottish Forestry will receive an additional £100 million to increase new planting and Forestry

and Land Scotland will receive an additional £30 million to expand Scotland's national forests and land. We will also provide £20 million to further increase tree nursery capacity, investing in new and redeveloped facilities to support higher production. This investment will enable us to increase woodland creation from the current level of 12,000 hectares in 2020/21 up to 18,000 hectares in 2024/25, ensuring that forestry and woodlands play an important role in cutting emissions and sequestering carbon.

3.6.11 Peatlands are a key part of the Scottish landscape, our cultural and natural heritage, forming more than 20% of Scotland's land cover. In good condition, they actively remove and store carbon from the atmosphere, support habitats and species and help to improve water quality and manage flood risk. When degraded, peatlands no longer provide these benefits and emit more carbon than they remove, becoming a net source of greenhouse gases.

3.6.12 The 2018 Climate Change Plan established an annual peatland restoration target of 20,000 hectares (noting that using an area target is a proxy measure for achieving greenhouse gas emissions reductions and the extent of restoration will vary considerably according to the mix of land type). Since 2012, over 25,000 hectares of degraded peatlands have been put on the road to recovery through projects supported by Peatland Action – the NatureScot programme that is funded by the Scottish Government. This includes around 6,000 hectares annually over the

past two years. Although feasibility studies have been carried out since 2012 on over 200,000 hectares (including nearly 75,000 hectares annually in the past two years), the extent of restoration achieved thus far over 8 years illustrates the scale of our challenge. It also highlights that achieving peatland restoration at scale requires a considerable step change in the pace and geographical extent of restoration and that new approaches need to be explored.

3.6.13 Earlier this year we announced a £250 million ten-year funding package to support the restoration of 250,000 hectares of degraded peat by 2030. We are currently working with our peatland restoration delivery partners and others involved across the public, private and third sectors to improve and streamline how we organise, fund and deliver increased restoration in the coming years, and to identify and develop solutions to any current barriers. These include the need for multi-year funding, enhanced contractor capacity, as part of developing a peatland restoration sector, and improved awareness among land owners and managers of the opportunities and benefits of peatland restoration. We will also be exploring with major landowners and stakeholders a strategic approach to achieve large-scale restoration projects over multiple years.

3.6.14 Modelling shows that in order to deliver on the 2032 emissions envelope of this update, annual peatland restoration would need to be far higher than the current 20,000 hectare annual target. As highlighted at the start of this

chapter, meeting these challenges will require fundamental change in the way land is used and managed, and how support is provided. How to achieve this change will require careful thought; there are many technical considerations and uncertainties to overcome. We will work closely with public sector and other delivery partners, land owners, land managers, farmers and crofters to continue to encourage protection, maintenance and restoration of all peatland types and will explore opportunities to restore more of the land that offers the highest emission savings per hectare.

- 3.6.15 Determining the optimal mix of land use involves a complex set of interlinked considerations and goals that are at times in tension. We have commissioned research to map the location of land that offers the greatest emissions savings potential and to understand its current use and tenure in order to inform targeted action. We have also commissioned research to better understand landowner and land manager motivations for, and attitudes towards, undertaking peatland restoration.



The Woodland Carbon Code

The Woodland Carbon Code is a standard for generating verified carbon credits through planting new woodlands, enabling businesses to compensate for their residual emissions. The Code underpins trust in the woodland carbon market in order to attract additional investment into woodland creation by verifying that woodland carbon projects are responsibly and sustainably managed to national standards. An updated and expanded carbon registry, the UK Land Carbon Registry, was launched in November 2020 and now also includes peatland restoration credits generated under Peatland Code. Over 250 woodland projects have been validated under the Woodland Carbon Code to date. These are predicted to sequester over 5 million tCO₂ in the future, and provide a range of other benefits for the environment and local communities.

A new mixed productive and broadleaved woodland covering over 225 hectares of former low quality hill grazing land in the Yarrow Valley, Scottish Borders, will generate over 70,000 verified carbon credits. Situated adjacent to the Minch Moor drove road and the Southern Upland Way, the woodland also offers recreation benefits for the surrounding area and supports flood mitigation and biodiversity in both the woodland and open ground areas. The code is a UK wide scheme and more information can be found here: <https://www.woodlandcarboncode.org.uk/>

New context

3.6.16 During the COVID-19 crisis, and the restrictions necessary in our response to it, we have seen people right across Scotland, in cities and rural areas alike, connect with nature and the environment to a much greater degree. Nature has provided a source of comfort, strength and solace at a time of national and personal crisis, and has itself benefited from reductions in air and noise pollution.

3.6.17 Many of the actions set out in this Climate Change Plan update enhance and increase these opportunities. The expansion of new woodland and enhanced protection and restoration of peatlands will improve important natural habitats for a range of species, as well as expanding opportunities to support public health and wellbeing outcomes through recreation and increased interaction with nature.

Green recovery and just transition

3.6.18 Scotland's land and the natural capital it supports will play a fundamental role not only in our response to the climate crisis, but also in our green recovery from COVID-19. Land use change at the required scale will provide green economic and employment opportunities, offer public health benefits, help to address rural depopulation and provide social benefits to communities across Scotland. This will in turn help secure a just transition to our economic and environmentally sustainable future. The LULUCF

sector will therefore form a key plank of our green recovery from COVID-19.

3.6.19 Government cannot fund this on its own, we need everyone to get involved. Both public and private investment in Scotland's natural capital will be essential to deliver on our emissions reduction targets, not least to support people and businesses to make the changes we need on how they use and manage land. It will also be necessary to ensure long-term sustainable management of restored peatland so that the carbon it stores remains locked up in the long term. As well as our commitment of £250 million of funding over ten years, we are working to attract increased private investment.

3.6.20 For example the Woodland Carbon Code and Peatland Code are recognised standards for businesses to purchase and report on carbon units for woodland creation and peatland restoration. Scottish Forestry oversees the management and development of the Woodland Carbon Code and through our grant funding via our delivery partners we contribute to the development and management of the Peatland Code and are working with the IUCN to promote it more widely to land managers and businesses.

3.6.21 In the future we will work to integrate public and private funding for woodland creation and peatland restoration and management through better coordination between the Woodland Carbon Code, Peatland Code and government grants to our delivery partners. A shared carbon registry has been set up

in 2020 for the Woodland Carbon and Peatland Codes to reduce complexity in the carbon market and facilitate increased private sector investment in nature-based solutions to tackle greenhouse gas emissions and improve wellbeing.

- 3.6.22 We will also explore the development of a Peatland Restoration Standard to ensure best practice and continuous development in the success and effectiveness of peatland restoration.
- 3.6.23 Scotland's forestry sector currently supports over 25,000 jobs across Scotland, including among demographic groups where job creation is particularly needed, such as in rural and remote areas and among younger age categories. Scottish Forestry is doubling its recruitment of assistant woodland officers and Forestry and Land Scotland is doubling the number of opportunities for young people (including modern apprenticeships, student placements, etc.) creating high value, high skilled jobs often in remote locations in the natural economy. Employment in the private forestry sector will grow in response to our more ambitious targets for woodland creation and increasing domestic timber production, which is forecast to increase by over a third during the next 10 years.
- 3.6.24 Similarly, peatland restoration offers further potential to create skilled green jobs across rural Scotland. It is estimated that over 3-5 years starting in 2021-22, peatland restoration associated

with our existing commitment to invest around £25 million annually will build to supporting around 200 FTE contractor and delivery jobs across Scotland¹⁴⁰.

- 3.6.25 In addition to direct employment, these actions will support employment in wider supply chains associated with forestry and woodland creation, and peatland restoration. There will also be spill over benefits in the wider rural economy for rural and island communities.
- 3.6.26 As well as increasing the pace and extent of restoration of degraded peatlands, we also need to protect existing peatlands which may be damaged by certain human activities including commercial extraction and development. We will therefore accelerate work towards our 2019-2020 Programme for Government commitment to seek to phase out the use of horticultural peat by increasing uptake of alternative growing materials, including undertaking research to understanding the issues around transitioning to alternatives. Our Position Statement on National Planning Framework 4 confirmed our current thinking that through the planning system we will not support applications for planning permission for new commercial peat extraction for horticultural purposes¹⁴¹. We are looking at strengthening controls on development on peatland and we will help facilitate restoration through permitted development rights.

140 On the basis that every £1 million of investment in peatland restoration is estimated to create around 10 contractor/delivery jobs. This would actually comprise a higher number of contractor posts on a part-time basis due to the seasonal nature of the work on the ground (i.e. the need to work outside severe winter conditions and the bird breeding season).

141 Fourth National Planning Framework: Position Statement - <https://www.gov.scot/publications/scotlands-fourth-national-planning-framework-position-statement/>

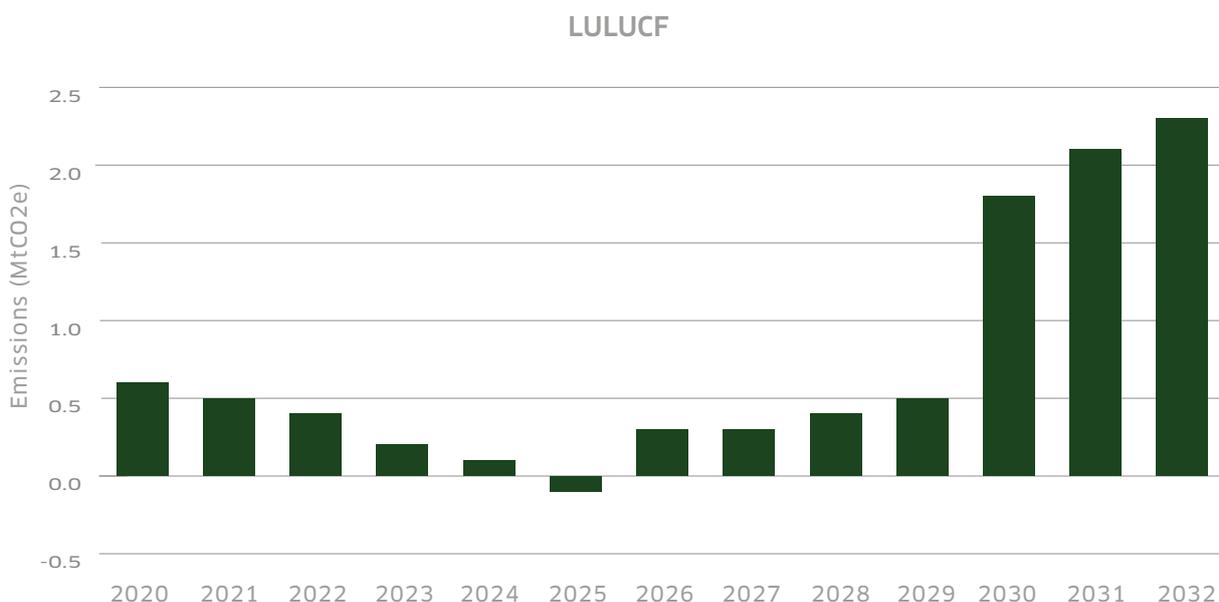
Positive vision for 2032 and 2045

3.6.27 By 2032, land use will have already changed significantly. Since trees need to become established before they begin to sequester carbon significantly, we need to plant in this decade to deliver to 2045 targets. Increased forestry cover along with the restoration of degraded peatland and changes in the management practices of other land based industries will have begun to ensure that our land is used and managed more sustainably. We will have raised awareness of the importance of our land and be firmly on the road to fully recognising and better understanding and valuing the resources it offers. People and communities will accept why landscapes are beginning to look different, businesses will welcome the opportunities land use

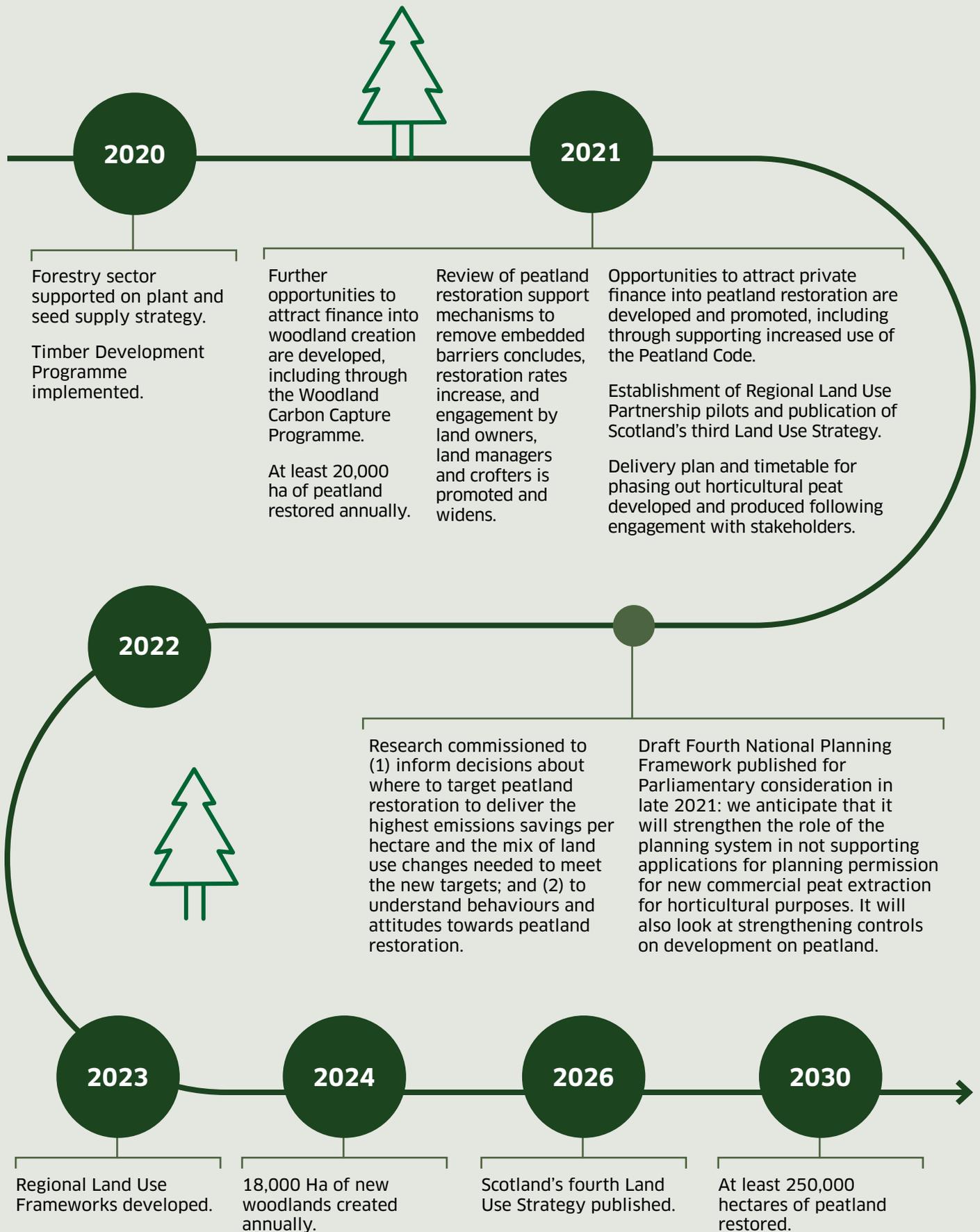
change has created, and our rural communities will be recognised as providing good employment opportunities and high-quality housing.

3.6.28 By 2045, Scotland will be internationally recognised for its woodland and peatland restoration achievements and potential, attracting investors from international and domestic business organisations who want to play their part in delivering a more sustainable future. Our landscapes will be a mosaic of integrated land uses featuring a range of nature based solutions to produce high quality food sustainably, to deliver a vibrant and enriched natural environment and to help Scotland be a prosperous, healthy, fair and inclusive nation with a thriving natural economy.

Emissions Reduction Pathway to 2032



Route Map to 2032



The actions we are taking

Woodland creation

3.6.29 We have **boosted** our policy outcome on **woodland creation**¹⁴²:

Year	Proposed annual woodland creation target (hectares)
2020-21	12,000
2021-22	13,500
2022-23	15,000
2023-24	16,500
2024-25	18,000

3.6.30 The 2020-2021 Programme for Government announced an increased woodland creation target of **18,000 hectares per year** by 2024/25, together with **£150 million of funding** support through **forest grants** (£100 million), increased **state nursery production** (£20 million) and **expansion of Scotland's national forests** (£30 million).

Woodland Carbon Capture Investment Programme

3.6.31 Scottish Forestry and Forest and Land Scotland will implement a new work programme with investors, carbon buyers, landowners and market intermediaries to increase private investment in new woodlands in order to **increase the woodland carbon market by at least 50% by 2025**. Building on almost 4 million validated credits (each equivalent to one tonne CO₂) in the Woodland Carbon Code registry in March 2020, this will require the validation of approximately 400,000 credits a year between 2020 and 2025.

3.6.32 Scottish Forestry will:

- ▶ provide strategic and technical support to some major private sector investment proposals, helping them to develop new business models and to design their woodland proposals;
- ▶ work with market intermediaries to increase the accessibility and liquidity in the buying and selling of carbon credits in order to achieve greater scale and maturity in the market; and,
- ▶ further develop the Woodland Carbon Code to attract more private investment in woodland creation, building on the launch in November 2020 of a new UK Land Carbon Registry in conjunction with the Peatland Code.

3.6.33 Forestry and Land Scotland will attract carbon investment with a view to acquiring more land to support a diverse forest estate including **continuous cover and native woodlands** on Scotland's national forests and land for the benefit of future generations and to optimise carbon sequestration.

Plant and seed supply strategy

3.6.34 We have a **new** policy to support the forestry sector to develop a plant and seed supply strategy to help meet the increased planting targets. A programme of technical innovation to develop and adapt modern horticultural practices will help improve seed preparation and handling, techniques to reduce environmental impacts, and increase nursery production. Funding to support increased production of young trees is available through the Harvesting and Processing grant which is now open to forest nurseries across GB with support from Defra.

142 Boosted in the 2020/2021 Programme for Government.

Agro-forestry

3.6.35 Working with the farming sector, we will **boost** our work on forestry and farming and develop models to **increase woodland creation** on both tenanted and owner-occupied farms, **increasing the scale and scope of agro-forestry**.

Capacity building and awareness raising: forestry

3.6.36 We have maintained our policy on capacity building in the forestry sector, working closely with the sector through the **Scottish Forestry and Timber Technologies Industry Leadership group**. We have supported the development of a **skills action plan** to encourage new entrants into forestry and to **increase the skill sets** of those already working in the sector.

3.6.37 We are carrying out a series of **training and awareness events**, including through the **Institute of Chartered Foresters**, to build knowledge and capacity in the sector and develop opportunities in the woodland carbon market.

3.6.38 We are building our staff resources, creating employment opportunities in rural and remote areas. **Scottish Forestry is doubling its recruitment of assistant woodland officers and Forestry and Land Scotland is doubling the number of opportunities for young people** (including modern apprenticeships, student placements, etc.), both of which provide an important entry route for future careers in the forestry sector.

3.6.39 Through the Scottish Forestry Improvement Programme, we will continue to invest in **streamlining and digitising our grant application and regulatory processes**, ensuring that they are as efficient and

simple as possible. By delivering an efficient and customer-focused service, we will make it easy for those who wish to engage in land use change to do so.

3.6.40 We will identify opportunities to **expand the Forestry and Land Scotland land acquisition programme**, investing in new state-owned forestry and peatland assets, underpinning greater growth in both areas.

Capacity building and awareness raising – peatland

3.6.41 We have **boosted** our commitment to significantly increasing the pace and extent of peatland restoration. In 2019-20 we increased funding by £11 million to a total of £14 million and in February 2020 we announced a commitment to invest more than **£250 million over 10 years to support the restoration of at least 20,000 ha of Scottish peatland annually**, towards a total of **250,000 hectares by 2030**. This will support at least **200 new skilled green jobs** across rural Scotland.

3.6.42 Going beyond this level of peatland restoration to meet the new targets will increase opportunities and challenges. We will undertake **new** research to inform our understanding of these and will **boost** work to develop opportunities to **attract private finance into peatland restoration**, including through supporting increased use of the Peatland Code.

3.6.43 To support our ambitions, we have launched with our key delivery partners a **new review of peatland restoration support mechanisms** to improve and streamline how we organise, fund and deliver increased restoration in the coming years, and to identify and develop

solutions to barriers. A **virtual peatland summit** with stakeholders across the public, private and third sectors held in December will inform this review and help raise awareness of opportunities, characterise barriers to peatland restoration and identify solutions, particularly around multi-year funding and contractor capacity.

- 3.6.44 In our 2019-20 Programme for Government we made a **new commitment to seek to phase out the use of peat in horticulture** by increasing uptake of alternative materials and undertaking stakeholder engagement to understand transitional challenges, **improving the uptake of alternatives and developing a time-scaled plan**¹⁴³. We will consider approaches to raising public awareness of these issues, and work with the UK Government as necessary where levers exist at that level.
- 3.6.45 We are strengthening the role of the planning system: our **Position Statement on National Planning Framework 4** confirmed our current thinking that through the planning system **we will not support applications for planning permission for new commercial peat extraction for horticultural purposes**, that we are looking at strengthening controls on development on peatland, and also that we will help facilitate restoration through permitted development rights (which will provide clarity that planning permission is not required to undertake peatland restoration and thus help streamline the approval and implementation of new peatland restoration projects)¹⁴⁴.
- 3.6.46 We will explore how to **involve Scotland's crofters and crofting communities** more in our mission to deliver more restored peatland. There is over 550,000 ha of Common Grazing land in Scotland, some of which is degraded peat and part of which is owned by the Scottish Ministers. We will also explore how best to **restore all degraded peat in the public estate** and also within formally designated nature conservation sites, including through statutory mandate.
- 3.6.47 We intend to undertake research into the scale of the **wider environmental, social and economic benefits** across society derived from peatland restoration, and how such considerations can be **embedded in wider public investment decisions**.
- 3.6.48 We will also explore the potential to **enhance Forestry and Land Scotland's existing peatland restoration programme**, ensuring that any forest removals on peatlands are replaced with new forest planting on suitable land. This would be an additional programme of land acquisition to directly replace hectare for hectare land restored to peatland from forestry.
- 3.6.49 How best to incentivise and reward **high value nature farming**, including peatland restoration and agro-forestry will be considered and included in our policy and approach to future rural support, which will also include **sustainable food production, emissions reduction**, production of **biofuel crops** and **appropriate land use change**.

143 Commitment made in 2019-2020 Programme for Government, and restated in this Climate Change Plan update.

144 Fourth National Planning Framework: Position Statement - <https://www.gov.scot/publications/scotlands-fourth-national-planning-framework-position-statement/>



3.6.50 The above areas where our policy and approach will be developed will help enable us to achieve our current emissions reduction targets and they have the potential, in time, to help deliver the expanded LULUCF envelope.

Spatial Planning

3.6.51 In developing the fourth National Planning Framework (NPF4) we recognise that nature-based solutions to climate change, including tree planting and peatland restoration, and tackling emissions related to **soil disturbance and agricultural land use**, will be essential to reduce emissions from our land and increase carbon sequestration. We expect that our spatial strategy will **explore how we can promote nature-based solutions to climate change**, which also **protect and restore biodiversity** and deliver wider benefits.

Regional land use partnerships

3.6.52 We have reaffirmed our commitment to make use of **Regional Land Use Partnerships from 2021**. We continue to develop our approach to Partnerships which enable **national and local government, land owners, stakeholders and local communities to work together to meet regional priorities**, whilst also supporting our national endeavour to end Scotland's contribution to climate change from land use. By the end of 2021, we will have established pilot Regional Land Use Partnerships to test our approach, and **by 2023 each Partnership will have developed a Regional Land Use Framework** that strategically identifies where resource can have the most positive climate impact.

Our Call to Others

The UK Government

- 3.6.53 We require urgent clarity from the UK Government on what funding it will provide after EU Exit to replace the EU funding element in the Forestry Grant Scheme. We also need to understand how and where the UK Government proposes to deliver the ambitious woodland creation and peatland restoration targets it has adopted at a UK level; and we will continue to look to UK Government funding to help support our expanded forestry and peatland restoration activity as a contribution to delivery of UK climate change targets.
- 3.6.54 To ensure a coordinated approach to the phasing out of horticultural peat where levers and risks exist at the UK level, we will continue to engage where relevant with the UK Government and the other devolved administrations.



Scottish public sector organisations

- 3.6.55 We will take forward the statutory duty, established by the Forestry and Land Management Act (Scotland) 2018, for all public authorities to promote sustainable forest management in exercising their functions. In particular, we need and will support public sector organisations to develop opportunities for woodland creation, and to improve sustainable management of existing woodlands on publicly owned land. We will look to relevant public sector bodies to adopt a 'team Scotland' approach to supporting our enhanced tree planting commitments, including ensuring an optimum approach is adopted to applying any advisory or regulatory roles.
- 3.6.56 Key public sector delivery partners will work collaboratively with the Scottish Government to identify innovative solutions to the barriers currently limiting the pace and extent of peatland restoration.

Scottish businesses and industry

- 3.6.57 In the forestry sector, supply chain businesses, including nurseries, contractors and land managers, need to scale up to ensure that enough capacity exists to deliver woodland creation at increased scale and pace. In the construction sector, we will encourage businesses to recognise the advantages of using sustainably sourced wood fibre and make more use of wood products.

3.6.58 We will also work to encourage private investment in woodland creation, peatland restoration and long-term management through mechanisms such as the Woodland Carbon Code and the Peatland Code which provides the quality and reliability assurances that investors considering this emerging and innovative opportunity will need.

Individuals/households

3.6.59 Scottish Forestry and Forestry and Land Scotland are developing and enhancing opportunities for individuals, families and communities to:

- make use of woodlands on public and private land, leading to benefits in health, recreation and wellbeing; and
- engage with proposals for woodland creation and management of existing forests.

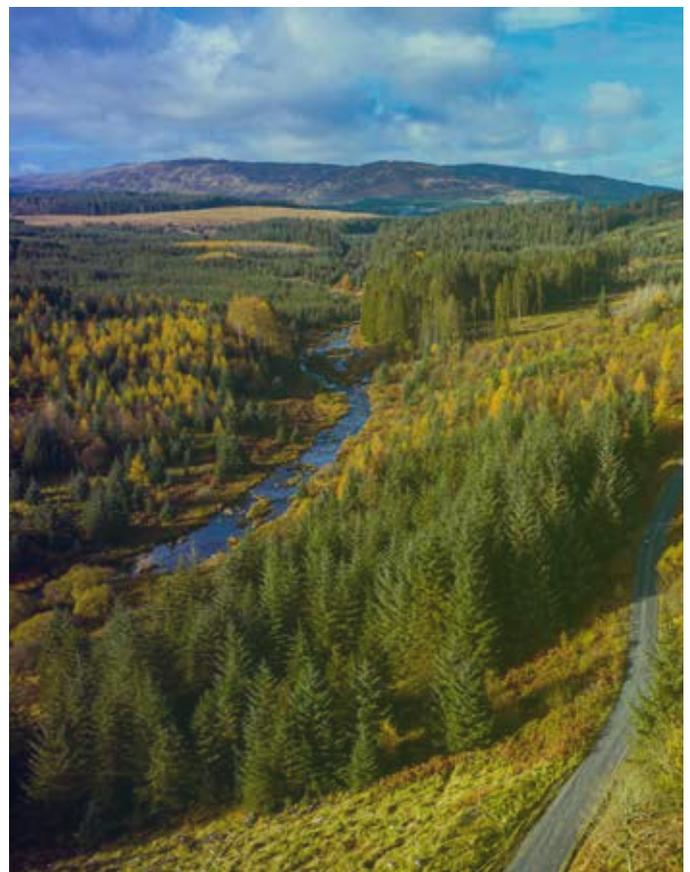
3.6.60 The policies within this Climate Change Plan update will lead to a wider choice of sustainably sourced wood products via construction and other sectors. Consumer recognition of the benefits of this in their purchasing decisions will allow a greater and faster development of sustainable woodland businesses.

3.6.61 We will also develop a greater understanding of the benefits that peatland restoration can make to mitigate climate change and support significant biodiversity across areas of international importance, as well as delivering further benefits to members of the public through assisting with flood risk management and improved drinking water quality.

International engagement

3.6.62 Many countries, including but not only in the EU, have established significant afforestation programmes. The Scottish Government seeks opportunities to share experience with these countries including through exchange visits. Scotland has also made international commitments for example through the Bonn Challenge to contribute, through its own programme of woodland creation, to wider global goals to restore degraded land.

3.6.63 We will engage internationally on peatland restoration with nations with similar interests and ambitions before, during and after COP26 in order to showcase our achievements and expertise, exchanging understanding and learning.



Dumfries and Galloway

Blue Economy Action Plan

A clear opportunity for recovery and renewal in Scotland lies in our massive marine zone - six times the size of Scotland's land mass. Our rich marine natural capital has the potential to help drive Scotland's green recovery from COVID-19. The Organisation for Economic Cooperation and Development forecast the global blue economy to double from 2010 to 2030¹⁴⁵.

The ocean absorbs over a quarter of the CO₂ produced by humans, and produces over half of our oxygen. Scotland's marine carbon stores are vast – research indicates that our marine sediments may contain eleven times the amount of carbon stored in Scotland's peatlands given the vast marine area we're responsible for¹⁴⁶.

In recognition of the importance of the marine environment for naturally storing carbon, we have committed over £570,000 to our Blue Carbon Research Programme. We are also developing Scotland's Blue Economy Action Plan, which will provide leadership through collaboration and innovation, maximising the impact of public investment and developing better regulation to help manage the shared use of the seas by Scotland's marine sectors, communities and ecosystems. We will optimise opportunities in order to unlock the significant inclusive growth potential of Scotland's marine space whilst supporting a transition to net zero.

This will take sustained joint working across government bodies, industry and NGOs, stimulated, stimulated by government leadership, throughout which we will draw on international learning and experience, maintain pace and momentum, and secure engagement with a well-supported robust whole-systems approach.

Near term initiatives which we expect to deliver very soon include the key building blocks for the development of our Blue Economy Action Plan, such as our strategy on future fisheries management, our sectoral offshore wind plan and the Scottish Marine Assessment 2020.

Over the next 6-9 months we will engage widely across government and the wider public sector to develop a strategic approach to marine-related policies and actions. We will also undertake engagement with key marine industry and environmental sectors to ensure that they can meaningfully input into the development of an Action Plan that adds value and gains traction.

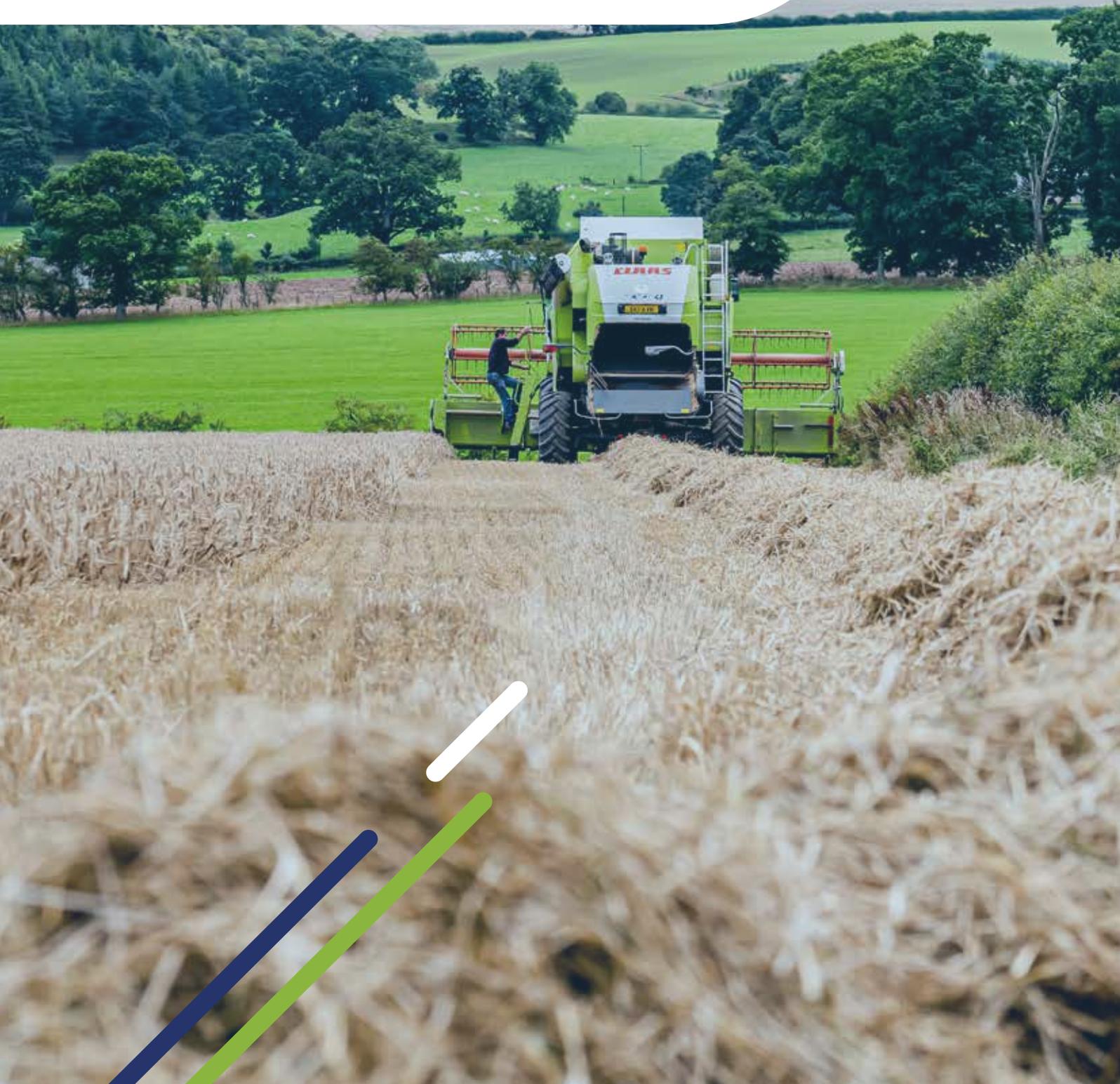
Longer-term, we will work to further develop and improve the Action Plan, and embed the approaches and mechanisms needed to benefit emissions reductions, as well as broader interests in years to come. We expect the outcome of the national marine plan review next spring to help inform that longer-term vision.

145 <http://www.oecd.org/environment/the-ocean-economy-in-2030-9789264251724-en.htm>

146 <https://data.marine.gov.scot/dataset/compendium-marine-related-carbon-stores-sequestrations-and-emissions>

Chapter 7

Agriculture



3.7. Agriculture

Introduction

- 3.7.1 In 2019 Scotland's agriculture industry contributed around £1.3 billion worth of GVA towards to the Scottish economy, employed 67,000 people (making it a key employer in rural Scotland) and generated a gross output of around £3.3 billion. The Scottish Government supports Scotland's food and drink Ambition 2030 targets of doubling the value of the food and drink sector by 2030 to £30 billion. This ambitious target has encouraged growth in the sector amongst small, medium and large businesses. That positive messaging on Scotland as a land of food and drink must be maintained but increasingly combined with an added narrative that we also have ambitious climate change targets.
- 3.7.2 Agriculture and food production rely on natural processes, and will therefore always cause some degree of greenhouse gas emissions; in particular, livestock will always emit some greenhouse gases. Therefore, a fine balance must be found to ensure greenhouse gas reductions can take place while Scotland continues to produce high quality and sustainable food. Brexit also presents key challenges around trade, potential tariffs and the loss of the security of EU support.
- 3.7.3 However, we do believe that with its temperate climate, reliable rainfall, and permanent grassland, Scotland has a climate ideally suited to livestock farming. We also believe that, with changes in farming practices, we have a sustainable future as one of the places in the world most suited to producing high quality meat, but with our farming approach altered so that this is done in accordance with best practice in emissions reduction. Moreover, were Scotland to cease to produce high quality food, and in particular meat, then that production would simply take place elsewhere, effectively resulting in no change to global emissions and with the potential that our carbon foot print would be higher.
- 3.7.4 The majority of the emissions in the agriculture sector come from livestock, however, it is important that all farmers and crofters, not just those with livestock, continue to adopt the low carbon technologies that currently exist, as well as those that become available in the future through technological advances. These can also support our wider environmental goals: for example, the use of precision farming techniques can reduce the need for fertilisers and pesticides which has a positive impact on biodiversity.
- 3.7.5 Farmers, crofters and land managers, through their stewardship, have created the magnificent scenery which we tend to take for granted and which underpins our tourism success. In fact the scenery is the factor most commonly mentioned when people describe why they decided to visit Scotland. That scenery rests on their active management of the land and for that they deserve our thanks and credit.
- 3.7.6 We know that these landscapes will evolve as we respond to climate change with more woodland and through the restoration of our peatlands as well as an increase in land for growing biomass. We see

this as an approach founded not only on nature based solutions but one with people at its heart. Our farmers crofters and land managers must have access to the benefits, both economic and social, that these changes will bring. We also recognise the need to maintain support for existing activities such as mixed livestock production, which promotes managed permanent grassland which can benefit biodiversity. Without that land use, land tends to revert to scrub, bracken, thistles, rushes and wasteland with negative visual appeal.

3.7.7 It is also important that our soils and grassland are managed appropriately, and Scotland's farmers and crofters play a key role in this. For example, poorly managed soils can become degraded and release carbon, while under good management the use of clover can help reduce the need for fertilisers and soils can actively sequester carbon. It is important that farmers and crofters are supported in positive management of soil as an asset, for food production, as a carbon store and to support biodiversity restoration, particularly in high nature value areas.

3.7.8 There are multiple pressures on agricultural land use. Food production, forestry, peatland restoration, bio-energy, feedstock production and habitat restoration are all competing, meaning it is important to consider optimal land use, as discussed in the LULUCF chapter (Part 3, Chapter 6). There is no doubt, however, that we will want to continue to support rural population growth, including by keeping people on suitable land to produce food as the basis for

a thriving Scottish food and drink sector, and indeed we wish to repopulate parts of rural Scotland where the local population has dwindled and fallen and revitalise our communities by encouraging and enabling more people to live there. Encouraging more localised and regionalised supply chains can build resilience to disruption and provide market support to high quality sustainable food production.

3.7.9 We have taken forward a range of actions in the agriculture sector since the Climate Change Plan was published in 2018. We have increased the provision of advice, with a corresponding increase in uptake and support through the Farm Advisory Service and Farming for a Better Climate; we have undertaken a range of research and knowledge transfer projects to inform low carbon farming and to help develop our understanding of low carbon technologies and the opportunities they present for Scotland; we have supported farmers to improve efficiencies and therefore reduce emissions; we have encouraged the integration of trees on farms and crofts; and we have secured improvements on how agriculture emissions are recorded in the Greenhouse Gas Inventory. We have also seen the good work that is already being undertaken by farmers and crofters to reduce emissions, and have encouraged peer to peer support through our Climate Change Champions and Monitor Farms. With support from the Forestry Grant Scheme and local forestry advisory initiatives, over 200 farmers and crofters each year are already creating new farm woodlands and diversifying their farming businesses to include forestry.



Farming for a Better Climate helps farmers and land managers identify low or no-cost greenhouse gas mitigation measures for everyday activities on the farm. Delivered by SAC Consulting and funded by Scottish Government, the Farming for a Better Climate initiative has worked with 12 volunteer climate change focus farmers and their discussion groups, showcasing practical measures and sharing ideas as they work towards improving farm efficiency and reducing the farm carbon footprint. Farming for a Better Climate is currently exploring soil regenerative agriculture techniques with the help of five arable farmers in the North East of Scotland, charting their experiences and activities to protect and enhance farm soils, and the accompanying benefits for the business. The Farming for a Better Climate webpage and social media accounts help to promote and share ideas, highlight what other farmers are doing and provide a hub of information for farmers and land managers looking to reduce their farm carbon footprint and respond to the climate challenge. More info at www.farmingforabetterclimate.org

- 3.7.10 We have directly supported farmers, crofters and land managers to play their part in cutting emissions, addressing climate change as well as delivering wider bio-diversity and environmental benefits, with a third of Common Agricultural Policy (CAP) schemes providing funding in this area.
- 3.7.11 This work has laid the foundations, but the introduction of the emissions reduction targets set out in the Climate Change (Emissions Reduction) (Scotland) Act 2019 means that the urgency has increased. There is now an opportunity, as we support farmers and crofters alongside wider land managers through the impacts and recovery from COVID-19 and Brexit, towards agricultural transformation. This ambition and support for transformation is reflected in the new policy outcome and policies outlined below. We are already working in partnership to develop new rural support measures that will result in a rapid and widespread uptake, to transition to a sustainable sector that more directly and explicitly supports our climate and environmental ambitions. We will build on this.
- 3.7.12 The multi-dimensional nature of farming, crofting and land use means that this is complex and challenging. We will work with and support farmers, crofters and land managers through this transition, recognising that the existing work underway to consider wider future rural policy must be allowed to conclude.

New context

- 3.7.13 The COVID-19 crisis has created significant challenges for the agriculture and food and drink sectors. Yet it has also demonstrated the power of localism and connecting people with nature, reminding us why we must tackle the climate emergency and biodiversity loss, while reconnecting people with their food producers. Consumers increasingly value sustainability and resilience in food production, including high animal welfare standards, environmental credentials and transparency in the food supply chain. The crisis has also reminded us about the need for food security and producing our own food given the fragility of international food chain supply arrangements, and tariff imposition.
- 3.7.14 The agricultural sector, as part of the critical national infrastructure for food, has played its part in ensuring food supply chains continued to operate throughout the COVID-19 crisis, particularly in rural and remote areas. It is too early to formally assess the overall impacts of COVID-19 on agricultural businesses but the recognition of food production as being critical, alongside continued EU funding, has maintained the sector. The pandemic highlighted the vital importance for agricultural businesses to have live contingency plans in place, so that in emergency situations animal welfare needs can be met and food production can continue. The Scottish Government is committed to delivering a green recovery from the pandemic, with farming and food production and the wider agricultural supply chain playing a key part.

Green recovery and just transition

- 3.7.15 We must build a sustainable food production sector for future generations whilst reducing greenhouse gas emissions and increasing carbon sequestration, as well as helping to improve biodiversity, air and water quality and allowing households access to fresh and affordable local Scottish produce.
- 3.7.16 There is an opportunity to work alongside agriculture and land based industries to develop new policies aimed at delivering on climate change and wider environmental outcomes, such as: restoring biodiversity; improving water, soils and air quality; and encouraging natural flood management as well as climate adaptation to facilitate a sustainable future for farming. The COVID-19 pandemic has allowed people to rediscover nature and, where appropriate, the countryside, and to value the important role that farmers, crofters and land managers play as custodians of our rural landscapes. We must build upon this.
- 3.7.17 Partnership is key to achieving a fair transition. The proposals set out in this Climate Change Plan update are founded on a co-development approach. We have committed to farmer-led groups, working with farmers and crofters and other stakeholders in the food and drink sector. The aim is to support farmers, crofters and agricultural businesses to cut their emissions to the lowest level possible and to commit to low carbon, sustainable farming. We will achieve this by progressing

appropriate policies, developing new support mechanisms, and providing appropriate advice and support to secure further positive behavioural change within the industry.

3.7.18 This will also allow us to build further on the levels of innovation we have already seen across the sector, with farmers, crofters and land managers presently using a range of approaches to reduce greenhouse gas emissions from their businesses, as well as the potential to maintain and enhance carbon storage from our land.

3.7.19 At the same time, we must optimise land use: we want farmers and crofters to produce food for people and livestock more sustainably, but we also want them to use appropriate land to support carbon sequestration and storage through planting trees and restoring peatland. We will also encourage them to farm products which can contribute to renewable energy ambitions, and to take a whole-farm approach to their emissions. We will work with the industry to consider the complex issues around multi-faceted land use and decisions that impact on them, while we identify the best way to ensure delivery of these outcomes. As reflected in the LULUCF chapter, we need to take people with us as our land use changes and we will initiate a conversation with communities, particularly those likely to be most impacted, to ensure people understand what we are doing and why.

3.7.20 We must also recognise the role that farmers, crofters and land managers play in supporting our thriving natural capital, landscapes and green tourism, along with

food production. These can all offer opportunities for upskilling and diversification, which will need investment and support mechanisms in place to ensure such opportunities are maximised. The Scottish Government is committed to developing the natural economy and creating clean, green jobs and skills.

3.7.21 The scale of the change necessary will also present opportunities for some farmers, crofters and land managers to access new income streams either through established industries such as tree planting or from more novel approaches such as growing bioenergy crops. We will work with the sector to ensure farmers crofters and land managers as well as the wider rural and island communities share the benefits that come from these opportunities.

Positive vision for 2032 and 2045

3.7.22 By 2032, the agriculture sector in Scotland will have adopted and be competently using all available low emission technologies throughout the whole sector, such as maximising efficiencies, minimising inputs and maximising outputs, precision farming, optimal slurry and manure usage and storage. There will also be increased innovation in areas such as feedstuffs and use of fertilisers, making a significant contribution to meeting our climate change targets as well as wider environmental and biodiversity impacts for the whole of Scotland.

3.7.23 Through partnership working between government and industry, agricultural businesses will have the skills and access to training that they need to shift to low emissions and sustainable farming. Through Scottish Government support to the industry, farmers and crofters across Scotland will benefit from increased climate-conscious consumption and

sustainable investment from retailers. In addition, there will have been significant changes in use of appropriate land to accommodate a large increase in afforestation and peatland restoration/management, along with further integration of woodland and hedges on farms and crofts across Scotland.

CASE STUDY: JAMES HOPKINSON, CLOUD FARMING



James Hopkinson is one of five farmers working together as part of the Soil Regenerative Agriculture Group under Farming for a Better Climate. James is a partner and founder of Cloud Farming and Arable Ventures, combining the family farm Lindertis and Walker-Munro Farms, growing winter wheat, spring barley, winter barley, oats, peas, linseed and beans.

To protect and improve farm soils, James and his team have moved away from conventional ploughing across to direct drilling, non-inversion & shallow scratch tillage, causing less disturbance

to soils and keeping soils covered under permanent cropping, stubbles or suitable cover crops where possible. James knows that he must first have healthy soil to support the farm to move away from the use of chemicals and synthetic fertilisers. James said *“I believe that it is becoming rapidly unviable to consider only treating the symptoms of poor soil health, such as pests & diseases, and that we need to be addressing the root causes which are poor soil structure, restore chemical balance and improve biological activity. I hope that this project will help us gain a clearer understanding on how to change and improve soils on our farms and work towards reducing our farm carbon footprint”.*

This is just one example of an innovative use of technology in agriculture. More info about this and other best practice examples can be found at www.farmingforabetterclimate.org

3.7.24 In 2045, our agriculture industry will have been transformed into a low emissions, holistic and integrated food production system that has a low environmental impact as well as benefitting nature, restoring biodiversity and contributing to our economy.

3.7.25 This will have been achieved through widespread adoption of all applicable low emission farming practices, with these existing as usual practice, rather than good practice. New innovative technologies will have emerged, to reduce the greenhouse emissions associated with food production, and these will be readily taken up by farmers and crofters. A whole-farm, low carbon approach will be the standard, and farmers will grow more biomass crops for both their own and industry use.

3.7.26 Farmers and crofters will have sustainable businesses, recognised for not just high quality, sustainable food, but also the delivery of natural capital outcomes, including on climate, soils, air, water and biodiversity. Continued professional development will be the norm so that farming practices continue to evolve to embrace new technologies as they emerge. Consumers will recognise the value of high quality, sustainably produced local produce, and producers will be much more responsive to market demand. Supply chains will be stronger and more localised, and value will be more fairly distributed.

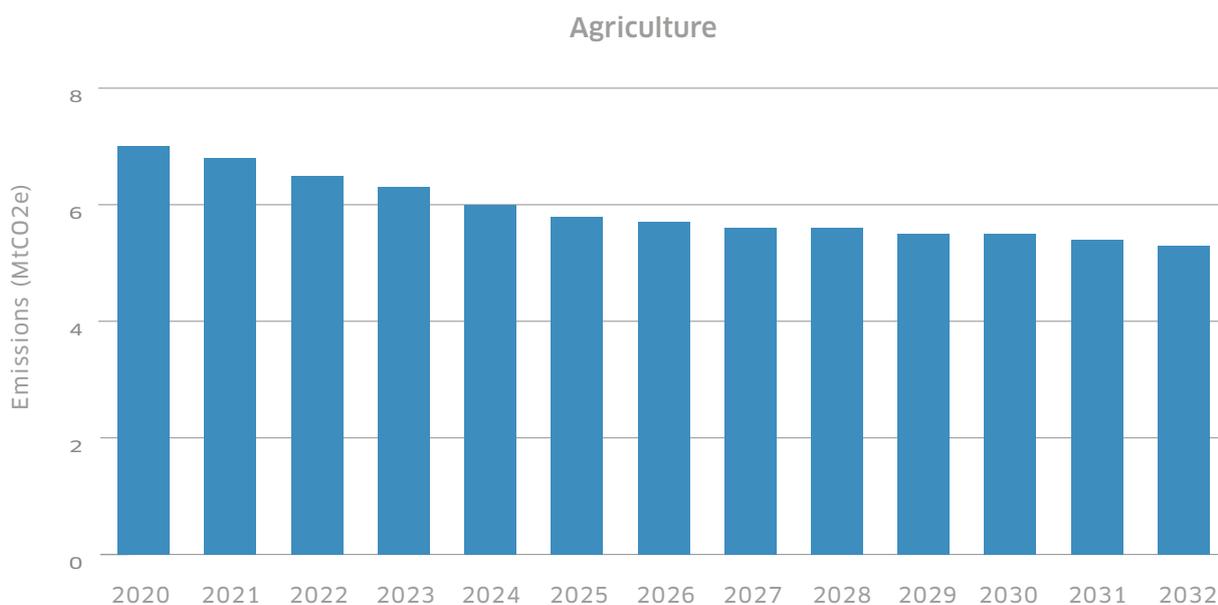
3.7.27 The trees planted in the years since 2011 will have matured and be sequestering carbon at scale. Productive timber harvesting will be followed by restocking to begin repeating the process, where appropriate. Farmers and crofters will have facilitated peatland restoration and management along with the growth of crops for biomass at scale.



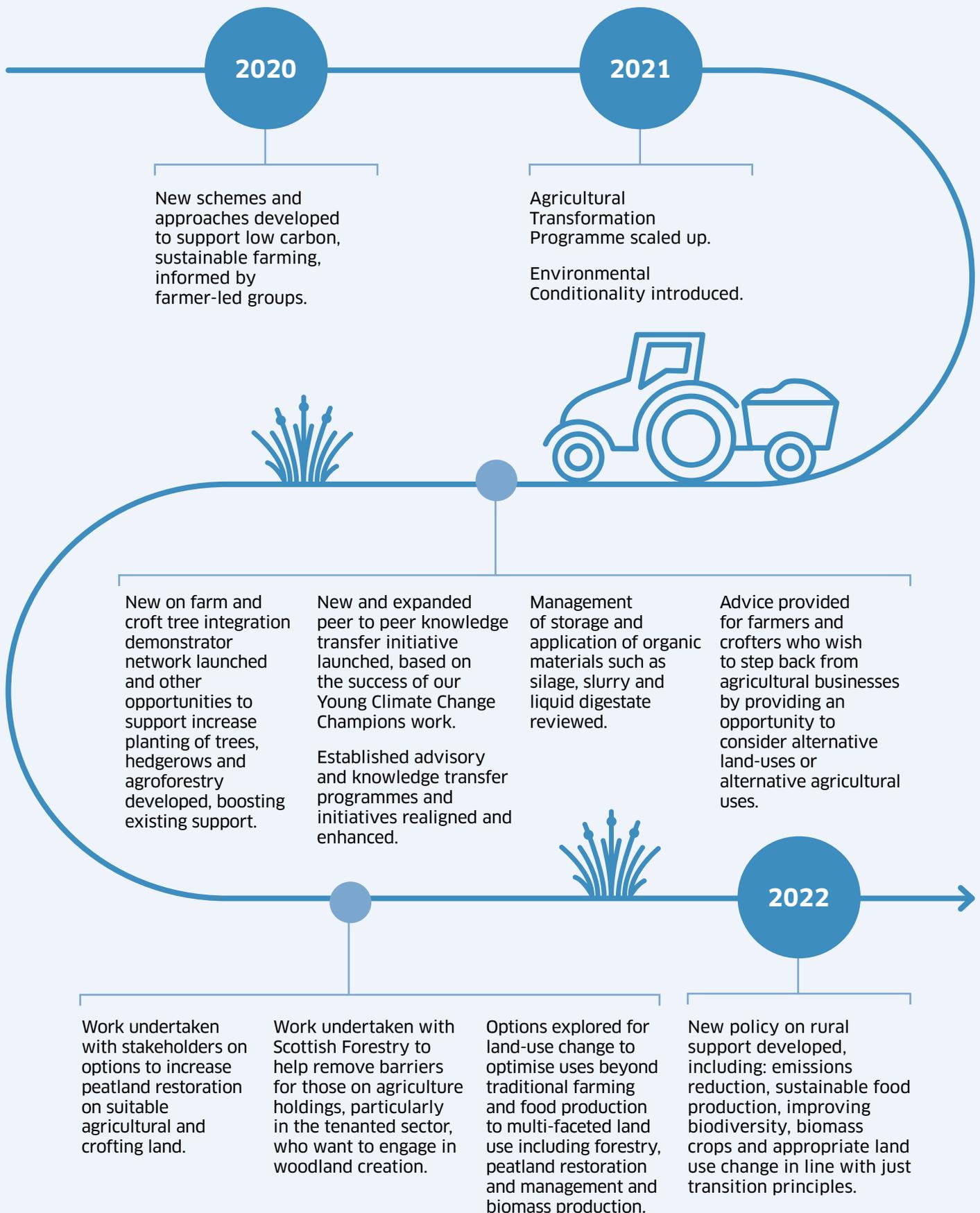
3.7.28 As outlined in the LULUCF chapter, land use will provide green economic and employment opportunities, offer public health benefits, help to address rural depopulation and provide social benefits to communities across Scotland. We will have ensured that farmers and crofters are benefitting from these opportunities with new, additional sources of income and investment in these land use changes.



Emissions Reduction Pathway to 2032



Route Map to 2032



The actions we are taking

- 3.7.29 The agriculture policies outlined in this Plan update provide a route map for agricultural transformation, starting in 2020 as we begin piloting and introducing new mechanisms of **support for farmers, crofters and land managers** to meet Scotland's climate ambitions, as well as delivering **wider biodiversity and environmental benefits** and continuing food production. We will take a co-development approach, working with stakeholders and farmer-led groups to secure increased uptake of **low emission farming measures through new schemes and approaches**, the development of **environmental conditionality** and **enhanced advisory support**. Assistance will also be provided for farmers and crofters who wish to retire or leave the industry with dignity by providing an opportunity to consider alternative land uses or alternative agricultural uses. We recently consulted on a package of new agricultural permitted development rights, including for the conversion of agricultural buildings to new homes. This measure will help to encourage the re-use of surplus buildings and the provision of much-needed housing in rural areas, including in support of farm succession.
- 3.7.30 We believe that the best way to deliver our climate change ambitions in agriculture is to persuade farmers, crofters and land managers to change the way they produce food and farm the countryside. The work of the farmer led group is aimed as the objective of devising a new deal for them and a new deal based on a clear vision of a Scottish farming sector which produces high quality food for itself and for export; but which does so in a way which seeks to make emission reductions and thus tackling climate change a key objective. These shall be the two twin imperatives that drive our policy and will guide us in devising new programmes of financial support.
- 3.7.31 For that vision to be able to become a practical reality, it is essential that we continue to provide regular reliable income support for our farmers and crofters; but in exchange for that income we will expect them to farm in different ways in order to reduce emissions. We see this as a social contract with our farmers and crofters and through provision of fair and reasonable income levels we will recognise their hard work and effort in food production and environmental stewardship.
- 3.7.32 In delivery of this vision, the input of advice, expertise and experience of farmers and crofters (alongside scientists and others) will help us secure the support of the broader farming and crofting communities. In order to transform this vision into a series of pragmatic programmes, we are asking farmers and crofters to accept conditionality, requiring them to deliver on environmental standards, principally in emissions reduction but also in biodiversity. We will work with farmers and crofters and their representative bodies to implement these programmes in a way that provides the time, advice, and capacity to be effective, and over a reasonable transitional period move towards making such conditionality mandatory.

3.7.33 Alongside initiating transformation of the agriculture sector, we will continue to develop an altered approach to rural policy, having left the EU Common Agricultural Policy (CAP). Our approach will build on the programmes brought by the work of farmer led groups, to include and combine this with forestry, peatland restoration and other methods of reducing emissions. We will also open a discussion on **optimum land uses** beyond just farming and food production to multi-faceted land use including **forestry, peatland restoration and management and biomass production**.

3.7.34 In recognition of the need for agricultural transformation, we have introduced a **new** outcome (detailed in Annex A) for a **more productive, sustainable agriculture sector** that significantly contributes towards delivering Scotland's climate change, and wider environmental outcomes, through an increased uptake of **climate mitigation measures** by farmers, crofters, land managers and other primary food producers.

3.7.35 Under this outcome there will be a number of new policies that will help transition and begin the transformation of farming and food production. These are listed below, along with new and boosted policies under the existing five outcomes in the Climate Change Plan (shown in context in Annex A).

Future Rural Support

3.7.36 In the future farmers and land managers shall be able to access advice in order to encourage

positive land stewardship that contributes to tackling climate change. We have introduced a **new** policy proposal to develop rural support to enable, encourage and, where appropriate, require the shift to low carbon, sustainable farming through emissions reduction, sustainable food production, improving biodiversity, planting biomass crops and appropriate land use change, developed in line with just transition principles. This will consider how a policy specifically designed to deliver outcomes for Scotland can be introduced to replace the existing EU CAP regime.

New agricultural support measures

3.7.37 A **new** commitment to develop new schemes and approaches to support low carbon, sustainable farming, including through the **Programme Board for the Beef Suckler Climate Group**¹⁴⁷ and other farmer-led groups on arable, dairy and high value, nature farming and crofting which will report in 2021¹⁴⁸.

Agricultural Transformation Programme

3.7.38 A **new** commitment to scale up the Agricultural Transformation Programme¹⁴⁹ across all the policies, including monitoring to assess the effectiveness of the pilot Sustainable Agricultural Capital Grant Scheme that will enable farmers and crofters to purchase equipment that should assist in reducing their greenhouse gas emissions, and support practice change¹⁵⁰.

147 Announced at Agriscot, November 2020

148 Announced in 2020-2021 Programme for Government

149 Announced in 2019-2020 Programme for Government

150 £10 million pilot Sustainable Agricultural Capital Grant Scheme announced in 2020-2021 Programme for Government

Environmental Conditionality

3.7.39 A **new** policy proposal to introduce **environmental conditionality** in the agriculture sector from 2021 via implementation of the Beef Suckler Climate Report and more widely from 2022 through the review of existing CAP Greening, which will extend the requirements to all farmers and crofters to undertake environmental actions.

Further provision of advice for farmers and crofters who wish to retire

3.7.40 A **new** commitment to work with stakeholders to provide **advice**, including further extending the **Land Matching Service** and **guidance for farmers and crofters** who wish to step back from agricultural businesses by providing an opportunity to **consider alternative land-uses or alternative agricultural uses**. We also consider that transition of use and succession of outgoing farmers will be a process that can be facilitated by a more relaxed approach to **planning** and the **provision of housing on farm**.

Agriculture, Biodiversity and Climate Change Network

3.7.41 A **new** and expanded **peer to peer knowledge transfer** initiative based on the success of our **Young Climate Change Champions** work, whilst also incorporating wider environmental interests. This will allow peers to raise awareness of the issues, opportunities and best practice for low carbon farming along with wider environmental and land use considerations.

Advice and knowledge transfer

3.7.42 Since the 2018 Climate Change Plan, we have supported the **dissemination of information and advice** on climate change mitigation measures in agriculture through a range of communication methods, utilising technology and all media to best effect. This advice and knowledge transfer is essential and we will develop this through a **new** policy to realign and enhance our established programmes and initiatives such as the **Farm Advisory Service**, the **Knowledge Transfer and Innovation Fund** and **Monitor Farm Programme** to create a more cohesive approach to ensure advice and support is focussed on helping the industry to professionalise and support sustainable farming. This will also boost a range of existing policies in this Plan update.

Nitrogen Use

3.7.43 Policies on nitrogen use have been **boosted** through the development of a whole economy **Nitrogen Balance Sheet**.

Reduced emissions from the use and storage of manure and slurry

3.7.44 A **new** policy proposal to review management of **storage and application of organic materials** such as silage, slurry and liquid digestate, including what support may be required to ensure best practice. It is also **boosted** through **funding slurry equipment** and **slurry store covers** under the **pilot capital grant scheme** that was available in 2020¹⁵¹.

Livestock emissions

3.7.45 **We have boosted** our policies on **livestock emissions intensity** through finalising research into the practicalities and feasibility of using **feed additive methane inhibitors** at scale in Scotland; and supporting research and development into **livestock greenhouse gas emissions reduction** including in areas such as methane capture and breeding for low emitting livestock. This research will allow consideration, including by the farmer-led groups, of how we can support further development and uptake of **emerging technologies** in Scotland.

Land use change

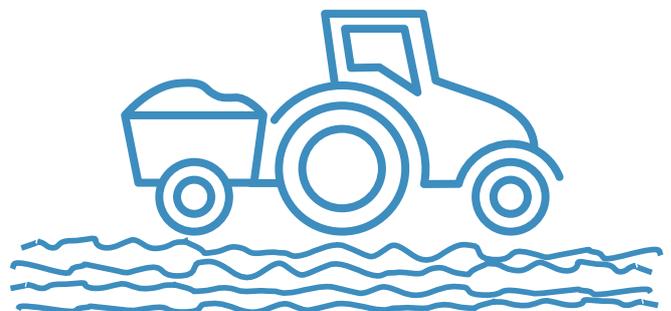
3.7.46 A **new** policy proposal to explore options for land-use change to **optimise uses beyond traditional farming and food production** to multi-faceted land use including **forestry, peatland restoration and management and biomass production**.

**Woodland creation**

3.7.47 **Boosted** existing support and agro forestry scheme through the launch of a **new** on farm and croft tree integration based demonstrator network and an additional £1.5 million to further support the **integration of small woodlands** on farmers and crofts across Scotland¹⁵². A new policy proposal, building on the successful work integrating woodland with farming businesses, to help remove barriers for those on agricultural holdings, particularly in the tenanted sector who want to engage in woodland creation, including exploring the potential to reform legislation where appropriate.

Peatland

3.7.48 A **new** policy proposal to work with stakeholders on options to **increase peatland restoration** on suitable agricultural and crofting land, to support delivery of policies in the LULUCF chapter. We will map peatland against this land which will allow modelling options for land-use change and inform opportunities for **targeted support** of peatland restoration and management.



Our call to others

The UK Government

3.7.49 The Scottish Government has called upon the UK Government for funding to support this work as a contribution to delivery of UK climate change targets. The level of that support must reflect the large contribution Scotland's land mass has to offer in sequestering and storing carbon, not only to meet our climate change targets, but to help the whole of the UK meet theirs. The Scottish Government also expects the UK Government to uphold commitments to provide replacement EU funding to ensure that farmers, crofters, land managers and rural businesses can continue to receive support.

3.7.50 We have also asked that the UK Government ensures that future trade deals do not undercut the high agricultural and environmental standards delivered by Scottish farmers. The Scottish Government published clear proposals for the next 5 years in its stability and simplicity paper aimed at providing farmers with financial certainty in the face of Brexit. We are working to ensure that sustainability and inclusion lie at the core of future trade policy and we want the emission intensity of agricultural goods, and livestock in particular, to be a consideration when assessing future trade deals.

Scottish public sector organisations

3.7.51 The support and expertise of public sector partner organisations will be vital as we take forward the policies and proposals included in this Plan update and a new rural support policy. It is important that we work in collaboration and public sector partners must

also engage farmers, crofters and land managers and owners in the formulation and delivery of new policies and programmes.

3.7.52 We will therefore continue to share knowledge and best practice, for example through our collaborative work with public sector organisations such as NatureScot and Forestry and Land Scotland, particularly on land use change and delivery of outcomes at a landscape scale. One example is our work with NatureScot on Piloting an Outcome Based Approach in Scotland. Another is the work that FLS are doing on the restoration of the damaged industrial landscapes of the Central Belt. Restoring the damaged landscape, a legacy of heavy and the extractive industries, with the aim of returning to a more natural but nonetheless productive countryside that people can enjoy. This is an exciting and transformational, landscape scale set of interventions truly aimed at community payback and environmental improvement.

3.7.53 Regional Land Use Partnerships will involve government, land owners, stakeholders and local communities working together to meet regional priorities, whilst also supporting our national endeavour to end Scotland's contribution to climate change.

Scottish businesses and industry

3.7.54 Scottish businesses and industry have a key role to play as we decarbonise the agriculture sector. The Scottish Government will continue to work in partnership with stakeholders and farmers to highlight solutions, as well as taking forward actions in this Plan update and through

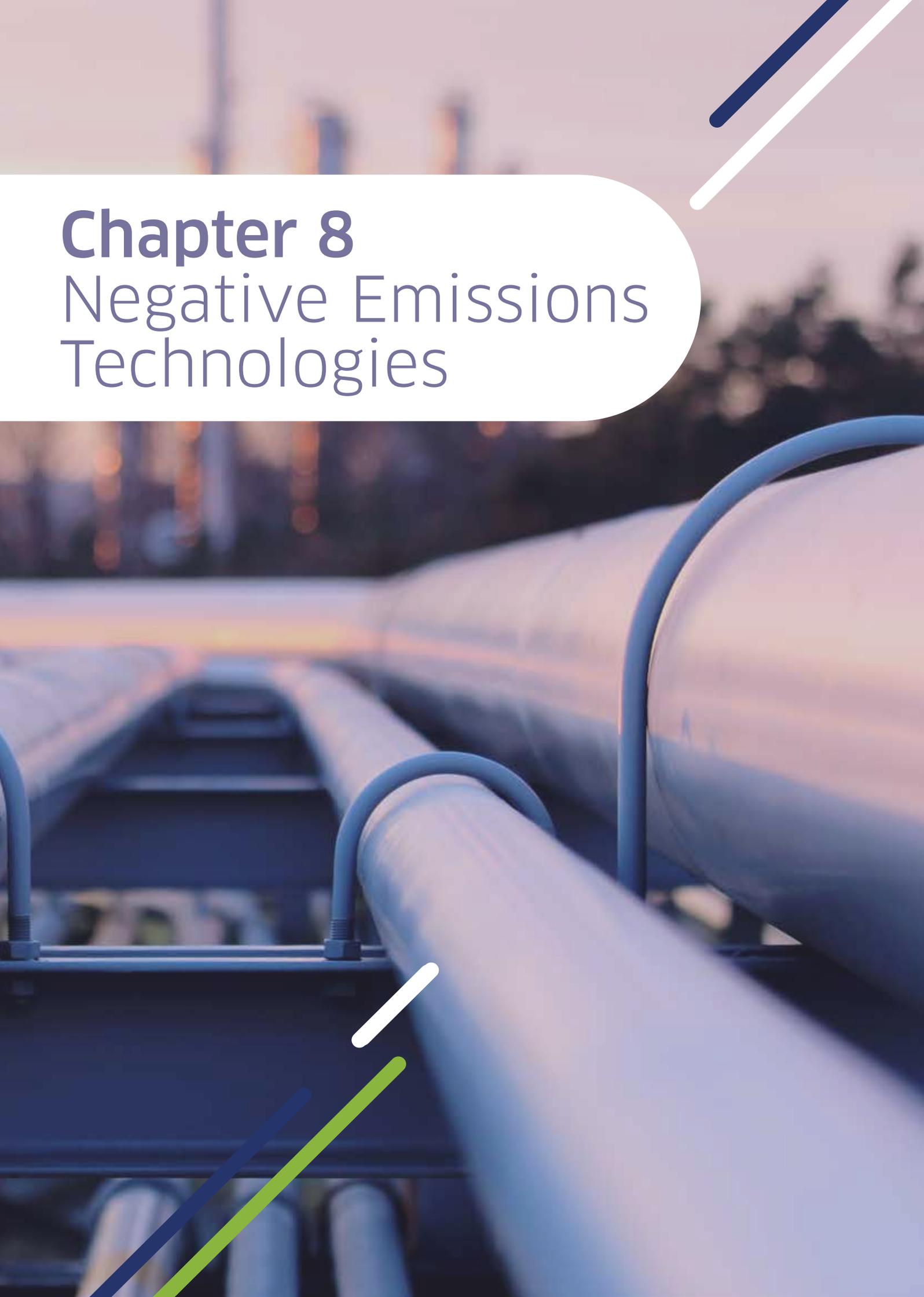
the development of future rural support required to create a sustainable Scottish agriculture sector. For example, we encourage businesses to support farmers, crofters and land managers by investing in high quality Scottish produce, promoting sustainability within the agriculture sector. The wider agricultural supply chain also has a role to reduce their emissions and enable the quick adoption of new methods, equipment, tools and products.

- 3.7.55 The private sector also has a role in supporting investment in nature based solutions, bringing forward novel approaches for natural accounting investment vehicles that farmers and land managers can access.

Individuals/households

- 3.7.56 The Scottish Government has long supported the need for a healthy diet, and Food Standards Scotland have a well-established set of [guidelines](#) on how to achieve this. This guidance includes the need for a healthy level of consumption of red meat and dairy products and a marked increase
- 3.7.57 The Scottish Government encourages this healthy diet, and would further encourage the people of Scotland to consider the positive impacts of eating locally sourced food and, crucially, minimising food waste. Through buying high quality local Scottish produce, including red meat and dairy products, we can work with our food production sector to ensure it is produced in a truly sustainable manner and avoid simply off-shoring emissions to other countries. Creating greater security and resilience in our food supply chains will also create opportunities for innovation, skills and jobs in the wider food and drink sector.
- 3.7.58 As has been highlighted within the waste chapter (Part 3, Chapter 5) of this update, reduction of food waste also has an important role to play in driving emissions reductions within Scotland, and can result in significant cost saving for households.



The background of the page is a photograph of industrial pipes, likely from a power plant or refinery, during sunset. The pipes are arranged in a perspective that leads the eye towards the horizon. The sky is a mix of orange, pink, and blue. There are decorative elements: a dark blue line and a white line in the top right corner, and a white line, a dark blue line, and a light green line in the bottom left corner. A white rounded rectangle contains the chapter title.

Chapter 8

Negative Emissions Technologies

3.8. Negative Emissions Technologies

Introduction

- 3.8.1 Our pathway to net zero is focused on reducing emissions from across Scotland's economy. However, we also need to bring forward key technologies which will compensate for residual emissions. In other words, we need technologies which will not just store emissions resulting from energy or industrial processes, but deliver a net reduction in emissions. The Climate Change Committee (CCC) has highlighted the importance of Negative Emissions Technologies (NETs) in meeting net zero across the UK, and the relatively greater potential we have in Scotland to remove and store emissions.
- 3.8.2 The use of NETs can remove carbon from the atmosphere on a permanent basis. This is achieved in two stages: firstly, its sequestration (for example the natural capture of carbon emissions by plants and trees); and secondly, its capture and long term storage. The two primary options for sequestering carbon discussed in the chapter are through the growth of biomass and through the direct (technological) capture of carbon from the atmosphere. There are also other ways of removing carbon from the atmosphere, such as through the expansion of forestry, which are covered in the LULUCF Chapter of this Plan update (Part 3, Chapter 6). This chapter focuses on the removal of carbon via technologies, rather than through land use.
- 3.8.3 NETs pathways with the potential to contribute to net zero in Scotland include:
- ▶ **Bioenergy with Carbon Capture and Storage (BECCS) for electricity:** this involves the use of biomass to generate electricity coupled with Carbon Capture and Storage (CCS) to prevent the emitted carbon from entering the atmosphere. As well as generating electricity, the process results in negative emissions, as the carbon sequestered by bioenergy crops when they grow is captured and stored.
 - ▶ **Biomass/Waste Gasification and Carbon Capture and Storage for hydrogen:** Biomass or waste gasification is a technology pathway which uses heat, steam and oxygen to convert biomass or waste to hydrogen, without combustion. The biomass or waste is heated to high temperatures to produce a syngas rich in hydrogen, which also contains carbon monoxide (CO) and CO₂. This syngas can then be upgraded and separated to sequester the carbon via CCS, and produce negative carbon hydrogen, which can then be used for energy applications across a number of sectors.
 - ▶ **BECCS in industry:** in addition to the use of negative carbon hydrogen or electricity, there are opportunities to develop BECCS applications linked to the production of industrial heat or other industrial processes.
 - ▶ **Biofuel production with Carbon Capture and Storage:** the conversion of biomass resources into biofuels represents a further pathway for the use of bioenergy, which in combination with CCS can deliver negative emissions.

- **Direct Air Carbon Capture and Storage (DACCS):** this is not an energy producing technology; it is a process that is run for the purpose of capturing CO₂ from the atmosphere in order to safely and permanently store it.

Carbon Capture and Storage

- 3.8.4 As this list shows, CCS is an essential part of any NETs project. Our strategy for delivering NETs will be built around our support for a flexible and adaptable CCS system in Scotland, capable of transporting carbon from industrial or electricity generation sites in Scotland to storage in the North Sea.
- 3.8.5 We have already made substantial progress in supporting the development of CCS in Scotland. The Acorn project in North East Scotland, supported by the Scottish Government, has developed a detailed delivery plan for major CCS infrastructure based at St. Fergus. It aims to commission and begin capturing and storing emissions in 2024 and has the potential to capture and store 10 MtCO₂e per year by 2030. This will involve the development of a carbon storage site in the North Sea capable of storing over 20 Gt of carbon in total and the repurposing of a North Sea gas pipeline to deliver carbon to the site. Further storage sites mean the total storage opportunities in Scottish waters is estimated at 46 Gt.
- 3.8.6 This technology is supported by the work of North East CCUS (NECCUS), the industry body bringing together action on decarbonisation. NECCUS will lead the development of the Scottish Net Zero Roadmap (SNZR). The SNZR will identify pathways and

opportunities for decarbonisation, including Hydrogen production and fuel switching, and how the Acorn project will enable emissions to be captured in the wider Scottish industrial cluster.

Bioenergy

- 3.8.7 With the exception of DACCS, NETs pathways depend on the use of bioenergy. A key part of developing NETs will be to understand the implications, scale and pace with which bioenergy resources should be focused on each of the possible pathways, and how this interacts with other uses for bioenergy.
- 3.8.8 For example, where we use biomass grown or produced in Scotland we need to fully understand and consider the impacts on our agriculture and land use sectors. Where we import biomass, it will be important to do so in a way that supports efforts to tackle the global climate emergency, which means adopting a sustainable way of using bioenergy resources produced elsewhere, and considering the growing importance of bioenergy as a pathway to decarbonisation in other countries.

Markets, regulation and revenues

- 3.8.9 Developing market structures and support mechanisms which can support innovative and novel technologies will be vitally important to growing NETs capacity. This will require substantial changes in reserved policy areas by the UK Government, working in cooperation with the Scottish Government, including future carbon pricing arrangements and the development of appropriate support mechanisms.

3.8.10 These developments can build on existing success stories such as Contracts for Difference, which have driven the continued growth and development of renewable electricity generation while dramatically reducing the cost of energy. It is also important that market structures recognise and reward the real value, in captured carbon, and build this into mechanisms that value and price carbon.

3.8.11 As discussed in the Industry chapter, we support the implementation of a UK ETS once the UK leaves the EU, to maintain the carbon price signal provided by the EU ETS. Through this we will work with the UK Government to explore ways to value and reward negative emissions as well as pricing positive emissions. Support for NETs needs to recognise the variety of technologies that will need to come together, and the composite and innovative nature of NETs.

The opportunities for NETs

3.8.12 The potential for developing NETs in Scotland, and the role that they will need to play in meeting our targets, represents a substantial change from our 2018 Climate Change Plan. This Plan update sets out that we expect to begin removing emissions from the atmosphere through NETs by 2030, as an important part of meeting our climate change targets.

3.8.13 There are significant opportunities in both electricity generation and industrial processes that can be brought forward during the 2020s, together with wider opportunities to support the decarbonisation of heat and transport in the 2030s and 2040s. Our first step will therefore be to identify the most efficient and effective NETs pathways for Scotland and map these opportunities.



St Fergus Gas Plant, site of future Direct Air Capture project. Credit: North Sea Midstream Partners (NSMP) Limited.

3.8.14 This will mean identifying which locations and sectors are best suited to NETs, and how these can be brought together with a coordinated CCS system. We will take forward work urgently to gather this information, starting with commissioning a detailed feasibility study next year. This will give us the strongest platform and body of knowledge possible for accelerating the delivery of NETs projects during the rest of this decade.

3.8.15 A strong and urgent focus on NETs provides an opportunity for Scotland to be at the forefront of developing new technologies to tackle climate change, one that can build on existing strengths: our natural resources, expertise, as well as the developing pipeline of CCS projects.

3.8.16 The use of BECCS for electricity generation has the potential to deliver substantial negative emissions across the UK. The CCC highlights this as the biggest contributing application in 2050 in its net zero report. A major retrofit of CCS to an existing bioenergy power station at Drax in Yorkshire has the potential to deliver substantial negative emissions by 2030. The development of BECCS in Scotland, building on the work described in this chapter, which will enable us to better understand the best uses and wider implications, has real potential to turn electricity generation in Scotland from an emitting sector to one that delivers negative emissions overall.

3.8.17 BECCS also has deployment potential in industrial settings, where there are fewer alternatives for decarbonisation. Bringing forward projects which can produce negative carbon industrial heat and hydrogen alongside electricity has the potential to make substantial inroads into what is currently our highest emitting sector.

Making decisions

3.8.18 Making early decisions on where to use NETs means increasing our understanding of both the *technology* options and the *place* based options. Our initial focus will be on looking across Scotland at which sites provide opportunities for either electricity generation or industrial applications of NETs and, working with industrial partners, carrying out high level feasibility studies which link closely to the development of CCS.

3.8.19 This work to identify feasible sites will be carried out in parallel with our review of bioenergy so that by 2023 we will have the evidence to focus our resources on bringing forward and developing specific NETs projects.

Research and development, trial and demonstration

3.8.20 Many of the technologies needed to deliver NETs already exist. A key challenge will be how to integrate each component into an efficient and commercially viable process. Alongside our focus on developing the knowledge and measures needed to bring forward large scale NETs projects, we will also focus innovation and industrial

support onto projects which raise the technological readiness of each of the NETs pathways. This will leverage our existing support for CCS, along with the substantial investment in this technology expected from the UK Government over the coming decade.

- 3.8.21 We have provided £300,000 of start-up and support funding to the industrial decarbonisation membership body NECCUS. NECCUS has secured industry funding to develop Scotland's Net-Zero Roadmap (SNZR); this will identify and highlight opportunities for carbon reduction, including NETs, and will form a key part of our initial feasibility work. We have directly supported CCS planning to date at St. Fergus through the Acorn project with £425,000.
- 3.8.22 We have announced a major fund to decarbonise industry and manufacturing opening up opportunities to develop NETs technologies across industry. The Scottish Industrial Energy Transformation Fund (SIETF) commits £34 million for projects at industrial sites for energy efficiency or deeper decarbonisation, including working with the industrial sector on feasibility and conceptual studies into the role of NETs.
- 3.8.23 We are also announcing a £100 million funding commitment for hydrogen, as part of a wider new Emerging Energy Technologies Fund of £180 million to support the development of hydrogen and CCS, and which will add new impetus to the development of NETs.

3.8.24 Whilst DACCS is an emerging technology, there are fifteen trial and demonstration direct air capture plants operating in Europe, the USA and Canada. For example, the CarbFix project in Iceland is currently capturing CO₂ from the atmosphere and dissolving it in water for injection and underground storage. There are already opportunities to scale up this technology. The Canadian company Carbon Engineering is developing a large-scale direct air capture plant in the USA that could capture up to 1 MtCO₂e each year.

3.8.25 We believe that the potential exists to bring forward a DACCS demonstration plant in Scotland during the 2020s, subject to the appropriate consultation and planning processes. The recent memorandum of understanding between Carbon Engineering and Acorn CCS is consistent with this goal. The UK Government launched a competition during 2020 to support Direct Air Capture and other Greenhouse Gas removal technologies, and has also confirmed plans to open a call for evidence on these issues. Successful projects will need to have access to substantial offshore transport and storage infrastructure of the kind being developed in North East Scotland.

Green recovery and just transition

3.8.26 NETs have the potential to secure existing jobs as well as delivering new ones. If successful, existing industries, which are currently some of Scotland's largest carbon emitter will be able to move to a sustainable business model

actively supporting and reducing Scotland's emissions with every unit they produce, taking us closer to net zero as their output increases. As outlined in the Industry chapter, jobs in the CO₂ management industry, a core facet of the Carbon Capture Utilisation and Storage (CCUS) sector, are estimated to reach between 7,600-45,000 by 2030, and 22,000-105,000 by 2050, if Scotland is successful at securing 40% of the European CO₂ market.

3.8.27 The criticality of CCS to NETs means that there will be growing opportunities to repurpose and help transition the skills and expertise currently deployed across the Oil and Gas sector. This will help secure work, jobs and income for a major sector of the Scottish economy, which currently supports approximately 100,000 jobs.

3.8.28 The need to develop NETs research and development projects, demonstration and trials, and to move quickly to larger scale roll out, will represent a major investment in our green economy, supporting our recovery and continued economic growth throughout the 2020s.

Positive vision for 2032 and 2045

3.8.29 By 2032, there will be major NETs projects operating in Scotland: world leading developments capable of generating clean energy while removing greenhouse gas emissions from our atmosphere. The demonstration and early roll-out of CCS achieved during the 2020s will build the foundation for unlocking negative emission

potential across industrial and electricity sectors. By 2032, CCS infrastructure in north east Scotland will be able to capture and store over 10 MtCO₂e per year, facilitating low carbon technologies as well as NETs. Roll-out will have been enabled by demonstration and trial projects developed during the first half of the 2020s, and operational for several years.

3.8.30 By 2045, we expect Scotland to benefit from a substantial and mature NETs sector with deployment across multiple applications and pathways. Deployment will have been informed and guided by a detailed evidence base, taking place in a way that is compatible with sustainable land use within Scotland. It will also support sustainable international trade, ensuring that the necessary bioenergy resources are available to countries around the world.

3.8.31 There will also be potential for technologies which are currently less well developed or understood to make an impact. For example, the use of gasification and/or the production of biofuels may, if the evidence shows that this is an efficient use of bioenergy, form part of the NETs systems in Scotland. This could create the opportunity for negative-carbon hydrogen to support decarbonisation of domestic buildings, services and transport, as well as industry and electricity.

3.8.32 DACCS is likely to have been deployed in Scotland in a focused and specific way, to ensure that it can counterbalance any further residual emissions.

CASE STUDY: DIRECT AIR CAPTURE

Pale Blue Dot Energy, the developers behind Acorn CCS and Acorn Hydrogen Project located at St Fergus Gas terminal in North East Scotland have entered into a partnership with Carbon Engineering, a leading provider of Direct Air Capture (DAC) technology that captures carbon dioxide out of the atmosphere.

The companies have announced their intentions to work together to deploy commercial DAC projects in the UK and have signed a Memorandum of Understanding to collaborate on the development of facilities that will contribute towards the removal of millions of tonnes of CO₂ from the atmosphere each year. This agreement marks the first partnership between a DAC technology company and a UK development partner and signifies the next step towards establishing a UK DAC industry that will create significant environmental and economic benefits.

One of the locations being considered by the partnership for their first UK DAC plant is close to the Acorn CCS project at St Fergus. The proposed DAC facility would deliver permanent carbon dioxide removal by capturing

significant volumes of CO₂ from the air and then safely and permanently storing it deep below the seabed in an offshore geological storage site. Pale Blue Dot Energy are currently developing the offshore Acorn CO₂ storage site, which was awarded the first UK CO₂ appraisal and storage licence by the Oil and Gas Authority.

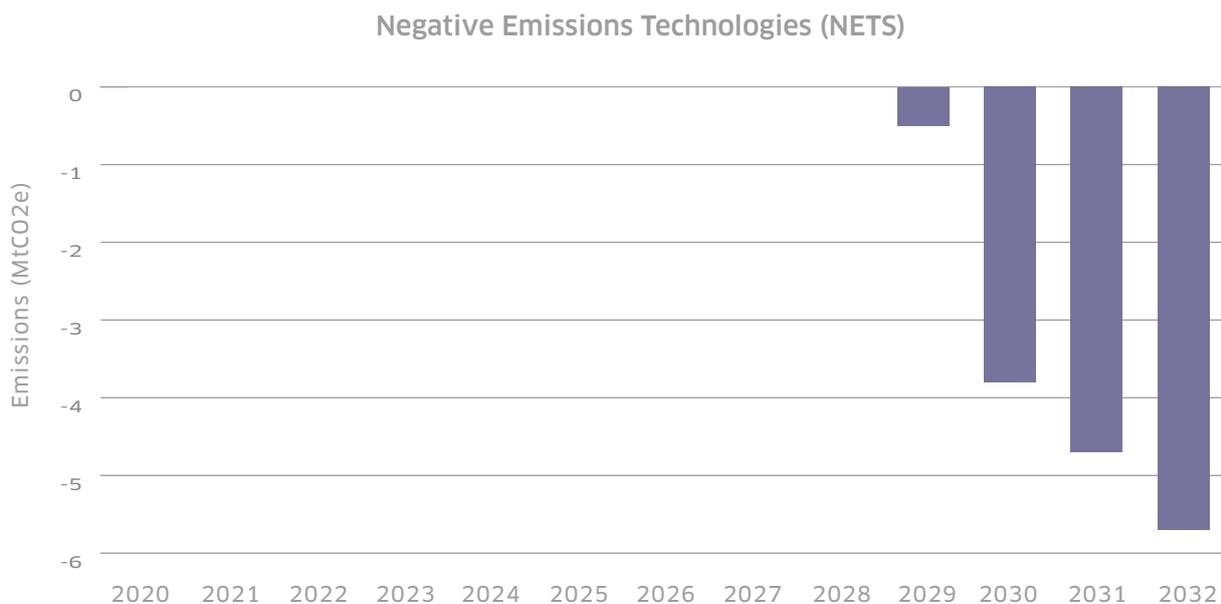
From a pilot plant in British Columbia Canada, Carbon Engineering has been removing CO₂ from the atmosphere since 2015 and converting it into fuels since 2017 and is now engineering its first large-scale commercial plant in the United States that will capture one million tonnes of atmospheric CO₂ annually – equivalent to the work of 40 million trees.

Acorn is aiming to be operational from late 2024 and the first DAC project could be operational approximately two years later. These types of greenhouse gas removal projects can help accelerate Scottish and UK efforts to reach net zero emissions by compensating for sectors of the economy that are challenging to decarbonise directly, such as aviation, shipping and agriculture.

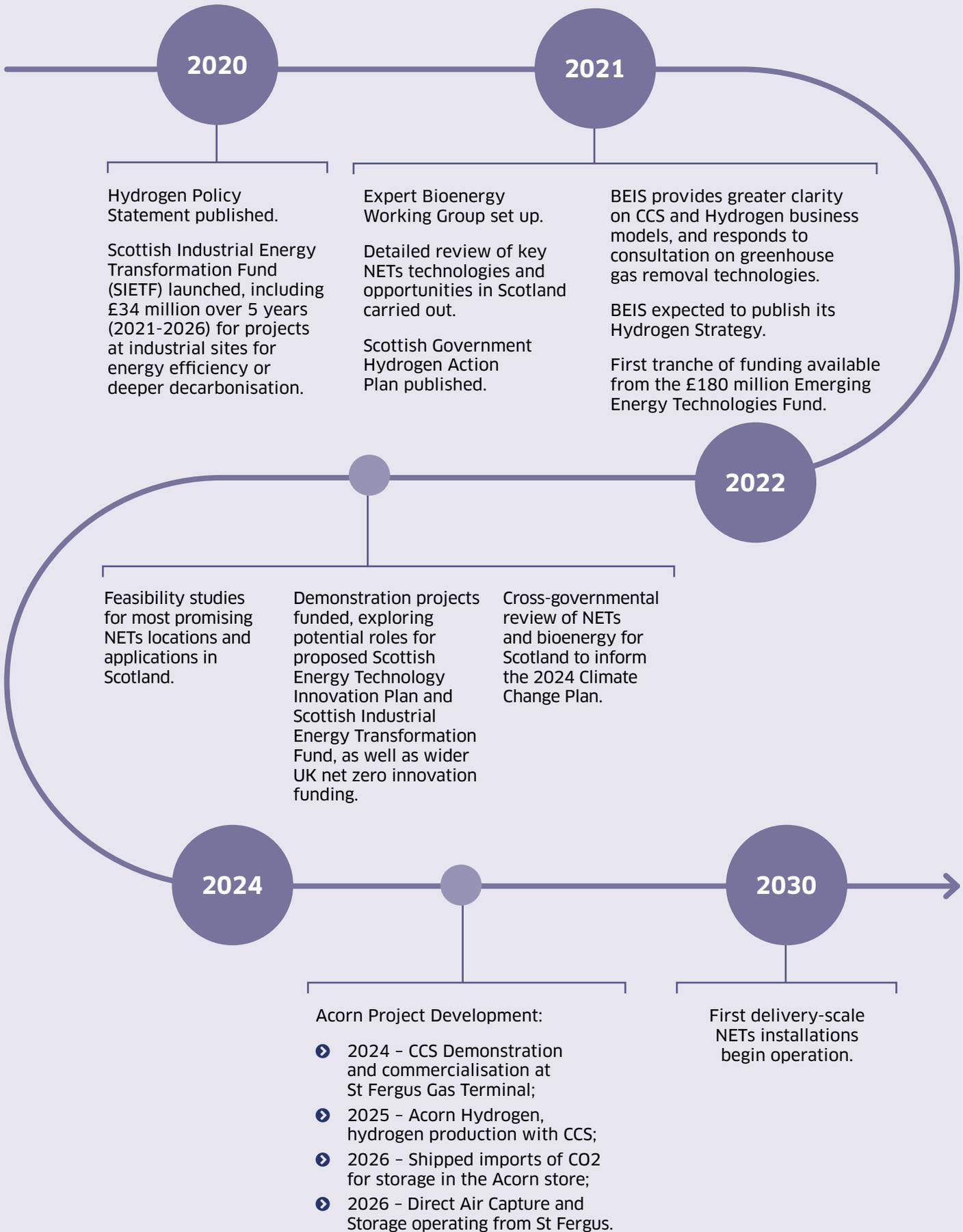


St Fergus Gas Plant, site of CCS Project. Credit: Shell

Emissions Reduction Pathway to 2032



Route Map to 2032



The actions we are taking

3.8.33 We are announcing a new **Emerging Energy Technologies Fund of £180 million** that will support the development of hydrogen and CCS, and which will add new impetus to the development of NETs. We will make £100 million available to support hydrogen projects in line with our Hydrogen Policy Statement, and a further £80 million of this funding will be directed to projects supporting the development of CCS and NETs in Scotland. This funding will help to deliver negative emissions, and complements our ambitious energy transition programme, including innovative marine energy solutions.

Bioenergy

3.8.34 We will publish a **Bioenergy Update** in early 2021, laying out our current position and understanding of the role of bioenergy in the energy system and setting out in more detail how we will move forward.

3.8.35 In 2021 building on the Bioenergy Update we will establish a **Bioenergy Expert Working Group** to consider and identify the most appropriate and sustainable use for bioenergy resources across Scotland. It will also assess the volume of bioenergy resources that we can grow or produce within Scotland, and confirm the level of import that we believe is compatible with a sustainable global trade in bioenergy.

3.8.36 By 2023, in time to inform the next Climate Change Plan, we will publish a **Bioenergy Action Plan**, incorporating the learning developed by the expert working group and our understanding of the options to use Bioenergy in both NETs and other applications.

CCS

3.8.37 The Industry chapter of this Plan update (Part 3, Chapter 4) provides more detail and outlines our support for achieving the commercialisation of CCUS within the timeframe of this plan. Building on this, our funding and support for the development of CCS, which is the keystone technology for delivering NETs, will **ensure that the development of carbon transport and storage infrastructure is designed and developed to support the delivery of NETs.**

3.8.38 We will ensure that **Scotland's net zero roadmap developed by NECCUS** and our support for the Acorn CCS based at St. Fergus focus on developing a flexible CCS system in Scotland capable of accepting carbon from NETs projects across north east and central belt of Scotland. This will be complemented by our **£5 million Carbon Capture and Utilisation challenge** fund that will operate between 2022 and 2024.

NETs Studies

- 3.8.39 In 2021/22, we will carry out a **detailed feasibility study of opportunities for developing NETs in Scotland**, ready for the early 2030s. This will identify specific sites and applications of NETs, including developing work to support policy on Direct Air Capture and its role within NETs in our future energy system.
- 3.8.40 From 2022, based on the outcomes of this feasibility work, **we will provide support for commercial partners to develop NETs proposals, including initial design and business cases.**

Keeping NETs under review

- 3.8.41 We will put in place a **continual process to review NETs development and progress** against its envelope. Where progress is strong and there is clear indication of which technologies and applications are being taken forward, we will be able to re-allocate the negative emissions to specific individual sectors in the next Climate Change Plan.
- 3.8.42 If new evidence indicates that NETs are not developing at an appropriate rate to meet the envelope from 2030, we will reassess the scale and role of NETs in the next Climate Change Plan, including any need to re-allocate emissions reductions across other sectors.

Our call to others

The UK Government

- 3.8.43 The UK Government needs to create the stable policy environment and incentives, including business model and financial frameworks, required to build confidence and enable the development and commissioning of the first CCS facilities in the UK from the mid-2020s.
- 3.8.44 This will require urgent clarity on the steps that the UK Government will take to support and deploy negative emissions technologies and capacity within the electricity generating and industrial sectors. As part of that, the UK Government must consider a number of characteristics of NETs technologies:
- ▶ **Innovative, ground breaking world firsts:** The pioneering nature of these projects will provide substantial risks to commercial investors. It will be important that mechanisms are developed which fairly share the risks and rewards between government, industry and consumers. Mechanisms such as Contract for Differences (CfDs) which provide support based on the output (e.g. electricity) of a NETs installations provide one way of doing this, and Regulatory Asset Base (RAB) models where allowed rates of return on investment are agreed up front is another.

- ▶ **Use of bioenergy:** a UK-wide framework will need to take account of the environmental and land use impacts of bioenergy production across the country as well as the implications for sustainable international trade. It will be important that support mechanisms put in place to develop NETs don't lead to unintended and negative consequences for land use or global sustainability.
- ▶ **Complex, multi-component projects:** NETs projects will need to link many large scale processes in a coordinated way. For example BECCS in industry or electricity generation means adapting existing and already complex processes, for example converting from fossil fuel to bioenergy and combining these with new systems to capture, transport and store the carbon emissions.
- ▶ **Negative emissions:** unlike existing industries with positive emissions, the role of mechanisms which price carbon will be to reward NETs for the carbon it removes from the atmosphere. It is important that the UK Government explores options for valuing and pricing negative as well as positive emissions.

3.8.45 In December 2020 the UK Government published a consultation and call for evidence on greenhouse gas removal¹⁵³. The Scottish Government will take this opportunity to engage with stakeholders on the issues raised, and to submit a measured response.

3.8.46 The UK government must also set out its view, advice and plans for the role of bioenergy in the energy system.

Scottish businesses and industry

- 3.8.47 The development of NETs in Scotland will provide an opportunity for industry in Scotland to pioneer ways which can deliver their long term sustainability. To deliver this, we need Scottish business to commit to helping us understand and deliver NETs. By doing so they will be developing world-leading technologies and processes, giving them a global edge.
- 3.8.48 We need business to work with us to help understand where and when NETs can be used in their processes, and what support is needed to bring NETs investment forward. Through our Emerging Energy Technologies Fund and Scottish Industrial Energy Transformation Fund we will provide substantial financial support to developing projects. In return we need business to engage constructively, helping us identify potential projects, and showing how these can fit within the wider development of CCS infrastructure, and our overall *whole system approach* to developing the energy system.

Annexes



Annex A – Policies and Proposals in the Climate Change Plan

Electricity

Outcome 1: The electricity system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies.

Policy:

Support the development of a wide range of renewable technologies by addressing current and future challenges, including market and policy barriers.	Maintained
Support improvements to electricity generation and network asset management, including network charging and access arrangements that encourage the deployment and viability of renewables projects in Scotland.	Maintained
Publish a revised and updated Energy Strategy, reflecting our commitment to net zero and key decisions on the pathways to take us there.	Boosted [March 2020]
Develop and publish a Hydrogen Policy Statement by the end of 2020, followed by a Hydrogen Action Plan during 2021.	Boosted [2020-2021 PfG]
A new renewable, all energy consumption target of 50% by 2030, covering electricity, heat and transport.	Maintained

Proposals:

Introduce a new framework of support for energy technology innovation, delivering a step change in emerging technologies funding to support the innovation and commercialisation of renewable energy generation, storage and supply.	New [CCPu 2020]
Renewed focus on developing local energy projects and models, including through CARES, supporting the achievement of 1GW and 2GW of renewable energy being in Local Community ownership by 2020 and 2030.	Maintained
We will carry out detailed research, development and analysis during 2021 to improve our understanding of the potential to deliver negative emissions from the electricity sector.	New [CCPu 2020]

We will continue to review our energy consenting processes, making further improvements and efficiencies where possible, and seeking to reduce determination timescales for complex electricity generation and network infrastructure applications.	New [CCPu 2020]
We will deliver the actions from our Offshore Wind Policy Statement, published in October. These actions, ranging from support for supply chain, planning, innovation and skills, will support the development of between 8 and 11 GW off offshore wind capacity by 2030.	New [CCPu 2020]
Accelerate our work with aviation, energy and other stakeholders to ensure that all radars are wind turbine tolerant/neutral during the coming decade.	Boosted [CCPu 2020]
Review and publish an updated Electricity Generation Policy Statement ahead of the next Climate Change Plan.	New [CCPu 2020]

Outcome 2: Scotland's electricity supply is secure and flexible, with a system robust against fluctuations and interruptions to supply.

Policy:

Support the development of technologies which can deliver sustainable security of supply to the electricity sector in Scotland and ensure that Scottish generators and flexibility providers can access revenue streams to support investments.	New [CCPu 2020]
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Proposals:

Press the UK Government for market mechanisms and incentives which recognise locational value, both for energy and for security of supply, and which do not create undue barriers for investment in Scotland.	Maintained
Collaborate on actions to support investment in new pumped storage hydro capacity.	Maintained
Work with all parties to secure maximum benefits from the move towards smarter and more flexible electricity systems and networks, as set out in the UK Smart Systems and Flexibility Plan (2017).	Maintained
Encourage and support increased interconnection which can enhance Scottish system security while considering effects on domestic capacity and investment.	Maintained

<p>Launch a call in 2021 for evidence and views on technologies that can transform our electricity system, including energy storage, smart grid technologies, and technologies to deliver sustainable security of supply. This will help ensure that our funding and interventions support world leading activity in Scottish based companies.</p>	<p>New [CCPu 2020]</p>
<p>Develop a series of whole system energy scenarios to guide infrastructure investment decisions for Scotland.</p>	<p>New [CCPu 2020]</p>
<p>Ensure that sustainable security of electricity supply is included as a priority within future Scottish Government energy innovation funding programmes.</p>	<p>New [CCPu 2020]</p>

Outcome 3: Scotland secures maximum economic benefit from the continued investment and growth in electricity generation capacity and support for the new and innovative technologies which will deliver our decarbonisation goals.

Proposals:

<p>Press the UK Government to further reform and maintain the CfD mechanism in a manner which better captures the economic benefits and total value added for the Scottish and UK supply chains.</p>	<p>New [CCPu 2020]</p>
<p>Introduce new requirements for developers to include supply chain commitments when applying to the ScotWind leasing process run by Crown Estate Scotland.</p>	<p>New [CCPu 2020]</p>
<p>Identify and support major infrastructure improvements to ensure that Scotland’s supply chain companies and facilities can benefit from the continued growth of renewable energy.</p>	<p>New [CCPu 2020]</p>

Buildings

Outcome 1: The heat supply to our homes and non-domestic buildings is very substantially decarbonised, with high penetration rates of renewable and zero emissions heating

Outcome 2: Our homes and buildings are highly energy efficient, with all buildings upgraded where it is appropriate to do so, and new buildings achieving ultra-high levels of fabric efficiency

Policy:

Energy Company Obligation (ECO) requires obligated energy supply companies to deliver energy efficiency measures in homes – mainly insulation-based measures and boiler replacements.

Maintained

Energy Efficient Scotland Delivery Schemes:

- Area Based Schemes and Warmer Homes Scotland.
- Home Energy Scotland Advice Service and Loans.
- Home Energy Scotland cashback scheme for zero emissions heating technologies and energy efficiency measures - boosted.
- SME Advice Service and Loans.
- SME cashback scheme for zero emissions heating technologies and energy efficiency measures - boosted.

**Boosted
[2020-2021 PfG]**

Review support programmes

We will review existing Scottish Government funding schemes to ensure that they support the deployment of low and zero emissions heat. We will expand the provision of loans to the SME sector, and enhance the wider energy efficiency and heat advice service and provision of tailored start-to-end support.

**Boosted
[2020-2021 PfG]**

Procure a new national delivery scheme, to replace the existing Warmer Homes Scotland contract, to open in 2022.

**Boosted
[CCPu 2020]**

Energy Efficiency Standard for Social Housing: will be met by social landlords by 2020.

Maintained

2024 New Build Zero Emissions from Heat Standard: requiring new buildings to have zero emissions heating systems.

**Boosted
[2020-2021
PfG + CCPu]**

<p>Review of energy standards within building regulations. The review investigates the potential for further, significant improvement on 2015 standards and how building standards can support other carbon and energy policy outcomes, including our decarbonisation of heat agenda.</p>	<p>Maintained</p>
<p>Heat in Buildings regulation: Put in place regulation to increase uptake of zero emissions heating systems and improve energy efficiency standards across all tenures, prioritising the raising of standards for households living in fuel poverty.</p> <p>Re-introduce revised regulations to the Scottish Parliament requiring mandatory minimum energy efficiency standards for the Private Rented Sector, to come into force from 2022.</p>	<p>Boosted [2020-2021 PfG]</p>
<p>Low Carbon Infrastructure Transition Programme (LCITP) - supports investment in decarbonisation of business and the public sector.</p>	<p>Boosted [2020-2021 PfG]</p>
<p>Expanded £1.6bn Heat in Buildings capital funding over the next parliament Building on the Low Carbon Infrastructure Transition Programme (LCITP) and existing energy efficiency and zero emissions heat support programmes.</p>	<p>Boosted [2020-2021 PfG]</p>
<p>Non Domestic Public Sector Energy Efficiency (NDEE) Framework:</p> <p>A four year framework launched in March 2016, designed to support public and third sector organisations to procure Energy Efficiency retrofit work. The Framework will continue for a further four years commencing in 2020.</p> <p>NDEE Support Unit accelerates the number of projects and delivery timescales of public sector energy efficiency projects using the NDEE Framework and supports our wider ambitions around energy demand reduction.</p>	<p>Maintained</p>
<p>The Renewable Heat Incentive (RHI) - a GB-wide scheme created by the UK Government (with the agreement of the Scottish Government). UK Government is extending both the domestic and non-domestic RHI out to 2022.</p>	<p>Boosted [August 2020]</p>
<p>UK Green Gas Support Scheme - a GB-wide Green Gas Scheme is planned to come into force in 2022, stimulating biomethane injection into the gas grid.</p>	<p>New [UK Government announcement]</p>
<p>UK Clean Heat Grant - a GB-wide Clean Heat Grant is planned to come into force in 2022, supporting uptake of heat pumps (and limited biomass boilers) via up-front grants.</p>	<p>New [UK Government announcement]</p>
<p>Support for Heat Networks: the District Heating Loan Fund helps address the financial and technical barriers to district heating projects by offering low interest loans.</p>	<p>Maintained</p>

Implement the provisions of the Heat Networks (Scotland) Bill to create a strong regulatory framework to support delivery by 2023.	Boosted [2020-2021 PfG]
Continue to support the Heat Network Partnership - a collaboration of agencies focused on the promotion and support of district heating schemes in Scotland.	Maintained
Net Zero Carbon Public Sector Buildings Standard will be introduced in 2021 and progressively rolled out across the public sector, as announced in the Programme for Government 2019.	Boosted [2020-2021 PfG + CCPu]
Local Heat and Energy Efficiency Strategies (LHEES) will be in place by the end of 2023, setting out preferred heat solutions zones, guiding building owner decision making about replacement heating systems, and forming the basis for local delivery plans targeting heat and energy efficiency investment.	Boosted [2020-2021 PfG + CCPu]
Assessment of Energy Performance and Emissions Regulations (Non-Domestic Buildings) - The Assessment of Energy Performance of Non-domestic Buildings (Scotland) Regulations 2016 require assessment of the energy performance and emissions of larger non-domestic buildings (those over 1,000 m ²). A review programmed for 2021 will investigate and consult upon amended scope of standards and more challenging improvement targets to create a viable pathway for all existing non-domestic buildings to deliver the level of energy demand and emissions reductions needed.	Maintained
Support for community low and zero emissions heat projects through CARES.	Boosted [2020]
Salix financing facility to support investment in non-domestic buildings retrofit.	Maintained
Work with social landlords to bring forward the review of the existing Energy Efficiency Standard for Social Housing (EESH2) with a view to strengthening and realigning the standard with net-zero requirements.	Boosted [CCPu 2020]
Work with our partners, including the UK Government, local authorities and utility providers to determine the best approach to heat decarbonisation for buildings currently heated by natural gas.	Boosted [CCPu 2020]
Review the system of building assessments and reports on energy performance and heat to ensure a system that is fit for purpose in meeting net zero emissions objectives for heat in buildings.	Boosted [CCPu 2020]

<p>Work with stakeholders to further understand and support the application and use of low and zero emissions heating within designated historic environment assets and hard to treat buildings.</p>	<p>New [CCPu 2020]</p>
<p>Develop and introduce future regulation for non-domestic buildings and launch a consultation on these proposals.</p>	<p>Boosted [CCPu 2020]</p>
<p>Undertake work to identify the capacity and output of renewable electricity generation required in Scotland to support the projected roll-out of heat pumps.</p>	<p>New [CCPu 2020]</p>
<p>Consider whether to extend Permitted Development Rights for zero-emission heat networks and micro-renewable technologies.</p>	<p>New [CCPu 2020]</p>
<p>Undertake work to better understand the impact on electricity networks of projected heat pump deployment.</p> <p>Work with the Distribution Network Operators through the Heat Electrification Partnership to build an evidence base to inform business planning.</p> <p>Work with industry and networks to understand need for heat pumps systems to be smart enabled, and identify options to integrate smart systems into our delivery programmes; and to explore how innovation can help to improve the consumer experience.</p>	<p>New [CCPu 2020]</p>
<p>Support heat networks through:</p> <p>Introducing a Non-Domestic Rates Relief for renewable and low carbon heat networks until 2023/24.</p> <p>Working to identify how new buildings in Heat Network Zones could be made ready to connect to heat networks.</p> <p>Including district heating within the Permitted Development Rights review.</p> <p>Through National Planning Framework 4, ensuring that local development plans take account of where a Heat Network Zone has been identified.</p>	<p>New [CCPu 2020]</p>
<p>Explore how local tax powers could be used to incentivise or encourage the retrofit of buildings, and commission further analysis to identify potential options.</p>	<p>New [CCPu 2020]</p>
<p>Design future delivery programmes to ensure significantly accelerated retrofit of buildings, with new programmes to be in place from 2025.</p>	<p>New [CCPu 2020]</p>

Outcome 3: Our gas network supplies an increasing proportion of green gas (hydrogen and biomethane) and is made ready for a fully decarbonised gas future

Policy:

Hydrogen for heat demonstrator – providing £6.9m support for SGN’s H100 hydrogen for domestic heat demonstrator.	Boosted [2020-2021 PfG]
Work with UK Government on product standards, with a view to making new gas boilers hydrogen-ready.	New [CCPu 2020]

Outcome 4: The heat transition is fair, leaving no-one behind and stimulates employment opportunities as part of the green recovery

Policy:

Develop a long-term public engagement strategy in 2021 and begin implementation of early actions.	New [CCPu 2020]
Smart Meter installation: All homes and businesses will be offered a smart meter by 2020 under a UK Government initiative, providing the opportunity for a greater understanding of final energy consumption.	Maintained
Work with the Scottish Cities’ Alliance and the seven cities on the opportunities to accelerate activity on heat and energy efficiency.	New [CCPu 2020]
Provide capital investment for Scottish colleges for equipment to deliver training for energy efficiency and heat.	New [CCPu 2020]
Respond to the recommendations of the Expert Advisory Group on a heat pump sector deal for Scotland, by Q1 2022.	New [CCPu 2020]
Bring forward and support demonstrator projects, such as: hybrids and high temperature heat pumps; the use of hydrogen for space and water heating; projects to understand the impact of heat transition on existing energy networks.	New [CCPu 2020]
Publish a ‘Heat Network Investment prospectus’ in 2021/22 - a first-cut of HN Zones across Scotland, combined with information on decarbonisation needs of existing networks.	New [CCPu 2020]
Establish a short life working group on finance for the heat transition.	New [CCPu 2020]

<p>Establish principles to underpin our commitment to ‘no-one being left behind’ in the heat transition, ensuring our approach neither increases the fuel poverty rate nor increases the depth of existing fuel poverty. This will include the effective design and targeting of our fuel poverty and heat in buildings programmes.</p>	<p>New [CCPu 2020]</p>
<p>Ensure Local Heat and Energy Efficiency Strategies are developed through extensive engagement with local communities.</p>	<p>New [CCPu 2020]</p>
<p>Continue delivery of energy efficiency investment to support fuel poor households and conduct further modelling and analysis to better understand the potential impact of the heat transition on fuel poor households and the scale of, and options for, mitigation that may be required.</p>	<p>New [CCPu 2020]</p>
<p>Urge the UK Government to rebalance levy costs on energy bills to make gas and electric systems relatively more cost comparable.</p>	<p>New [CCPu 2020]</p>

Transport

Outcome 1: To address our overreliance on cars, we will reduce car kilometres by 20% by 2030

Policy:

<p>If the health pandemic has moved to a phase to allow more certainty on future transport trends and people's behaviours – and work and lifestyle choices future forecasting – we will publish a route-map to meet the 20% reduction by 2030 in 2021.</p>	<p>New [CCPu 2020]</p>
<p>Commit to exploring options around remote working, in connection with our work on 20-minute neighbourhoods and work local programme.</p>	<p>New [2020-2021 PfG]</p>
<p>COVID-19 has impacted on how we work. We launched a Work Local Challenge to drive innovation in work place choices and remote working to support flexible working and our net zero objectives.</p>	<p>New [2020-2021 PfG]</p>
<p>We will work with the UK Government on options to review fuel duty proposals, in the context of the need to reduce demand for unsustainable travel and the potential for revenue generation.</p>	<p>New [CCPu 2020]</p>
<p>We will work with local authorities to continue to ensure that their parking and local transport strategies have proper appreciation of climate change, as well as the impact on all road users, including public transport operators, disabled motorists, cyclists and pedestrians.</p>	<p>New [For CCPu 2020 – although continuation of work already underway]</p>
<p>To support the monitoring requirement for the National Transport Strategy set out in the Transport (Scotland) Act 2019, and to further our understanding of how and why people travel, we will develop a data strategy and invest in data.</p>	<p>New [CCPu 2020]</p>
<p>Continue to support the Smarter Choices, Smarter Places (SCSP) programme to encourage behaviour change. Continue to support the provision of child and adult cycle training, and safety programmes including driver cycling awareness training through Bikeability.</p>	<p>Maintained</p>

<p>Support transformational active travel projects with a £500 million investment, over five years, for active travel infrastructure, access to bikes and behaviour change schemes. Enabling the delivery of high quality, safe walking, wheeling and cycling infrastructure alongside behaviour change, education and advocacy to encourage more people to choose active and sustainable travel. Support the use of E-bikes and adapted bikes through interest free loans, grants and trials.</p>	<p>Boosted [2020-2021 PfG]</p>
<p>We have re-purposed almost £39 million of active travel funding for the Spaces for People; this is enabling local authorities to put in place the temporary measures such as pop-up cycle lanes and widening walkways that are needed to allow people to physically distance during transition out of the COVID-19 lockdown.</p>	<p>New [2020-2021 PfG]</p>
<p>Support increased access to bikes for all including the provision of public bike and e-bike share.</p>	<p>New Throughout 2019-2020</p>
<p>Mobility as a Service and increased use of peer to peer car sharing which will help reduce the number journeys made by car. To do this we are harnessing innovation within our transport system through investing up to £2 million over three years to develop 'Mobility as a Service' (MaaS) in Scotland. We will grant funding CoMoUK to increase awareness of the role and benefits of shared transport and looking at the barriers to uptake of car clubs. We will provide support for travel planning through Travelknowhow Scotland, which is an online resource which offers employers access to sustainable travel planning tools to develop and implement workplace Travel Plans and encourage ride-sharing in order to start changing travel behaviour within organisations.</p>	<p>New [PfG 2018]</p>
<p>We will work to improve road safety, ensuring people feel safe with appropriate measures in place to enable that. We will publish Scotland's Road Safety Framework to 2030, following consultation on an ambitious and compelling long-term vision for road safety where there are zero fatalities or serious injuries on Scotland's roads by 2050.</p>	<p>New [2020-2021 PfG]</p>
<p>We are committed to taking forward policy consultation in advance of drafting supporting regulations and guidance to enable local authorities to implement workplace parking levy schemes that suit their local circumstances.</p>	<p>New Throughout 2019-2020</p>
<p>We will bring forward a step change in investment with over £500 million to improve bus priority infrastructure to tackle the impacts of congestion on bus services and raise bus usage. We will launch the Bus Partnership Fund in the coming months to support local authorities' ambitions around tackling congestion.</p>	<p>New [2020-2021 PfG]</p>

We remain committed to delivering a national concessionary travel scheme for free bus travel for under 19s, and have begun the necessary preparations including planning, research, legal review and due diligence.	New [2020-2021 PfG & Budget 2020]
We are also carrying out a review of discounts available on public transport to those under the age of 26 - due for completion end of December 2020 (with consultation planned on young people's views on the impacts of COVID 19 and post lockdown measures on public transport usage and behaviour).	New [2020-2021 PfG]
Delivery of our first Active Freeways - segregated active travel routes on main travel corridors connecting communities and major trip attractors.	New [CCPu 2020]

Outcome 2: We will phase out the need for new petrol and diesel cars and vans by 2030

Policy:

We will consider and develop new financing and delivery models for electric vehicle charging infrastructure in Scotland and working with the Scottish Future Trust to do so.	Boosted [2019-2020 PfG]
We have invested over £30m to grow and develop the ChargePlace Scotland network which is now the 4th largest in the UK. We will continue to develop the capacity of the electric vehicle charging network.	Maintained
Our Low Carbon Transport Loan has provided over £80m of funding to date to support the switch to low carbon vehicles. We will continue to support the demand for ultra-low emission vehicles (ULEVs) through our Low Carbon Transport Loan scheme, which is now being expanded to include used electric vehicles.	Maintained
We will continue to promote the uptake of ULEVs in the taxi and private hire sector.	Maintained
Continue to promote the benefits of EVs to individuals and fleet operators (exact nature of promotion to be decided annually).	Maintained
We will work with public bodies to phase out the need for any new petrol and diesel light commercial vehicles by 2025.	Boosted [2019-2020 PfG]
We will support the public sector to lead the way in transitioning to EVs, putting in place procurement practices that encourage EVs. In the Programme for Government we committed to work with public bodies to phase out the need for any new petrol and diesel light commercial vehicles by 2025.	Boosted [2019-2020 PfG]

Create the conditions to phase out the need for all new petrol and diesel vehicles in Scotland's public sector fleet by 2030.	New [2019-2020 PfG]
We will continue to invest in innovation to support the development of ULEV technologies and their adoption.	Maintained
Take forward the initiatives in respect of connected and autonomous vehicles set out in A CAV Roadmap for Scotland.	Maintained
With local authorities and others, evaluate the scope for incentivising more rapid uptake of electric and ultra-low emission cars and vans.	Maintained

Outcome 3: To reduce emissions in the freight sector, we will work with the industry to understand the most efficient methods and remove the need for new petrol and diesel heavy vehicles by 2035.

Policy:

To support businesses we will establish a Zero Emission heavy duty vehicle programme and will invest in a new zero drivetrain testing facility in 2021.	New [2020-2021 PfG]
Explore the development of green finance models to help business and industry to invest in new road transport technologies.	New [CCPu 2020]
We will engage with industry to understand how changing technologies and innovations in logistics (including consolidation centres) can help to reduce carbon emissions, particularly in response to the increase in e-commerce.	New [CCPu 2020]
Continue to investigate the role that other alternative fuels, such as hydrogen, and biofuel can play in the transition to a decarbonised road transport sector. Consider the scope for testing approaches to alternative fuels infrastructure and supply.	Maintained
Launched the new Hydrogen Accelerator Programme to attract technical experts to help scale up and quicken the deployment of hydrogen technologies across Scotland.	New [July 2020]

Outcome 4: We will work with the newly formed Bus Decarbonisation Taskforce, comprised of leaders from the bus, energy and finance sectors, to ensure that the majority of new buses purchased from 2024 are zero-emission, and to bring this date forward if possible.

Policy:

We have introduced a revised green incentive of the Bus Service Operators Grant.	New [April 2019]
We launched a £9 million Scottish Ultra Low Emission Bus Scheme (SULEBS).	New [August 2020]
In the context of the National Transport Strategy Delivery Plan and Transport Act, we will examine the scope for climate change policies, in relation to buses, across the public sector in high-level transport legislation strategies and policies.	Maintained
We will work to align government financial support of £120 million over the next 5 years with private sector investment to decarbonise the bus sector.	New [CCPu 2020]

Outcome 5: We will work to decarbonise scheduled flights within Scotland by 2040.

Policy:

We will aim to create the world's first zero emission aviation region in partnership with Highlands and Islands Airports Limited (HIAL). This will include taking action to decarbonise airport operations in the HIAL region.	New [New Green Deal 2019]
We will begin trialling low or zero emission planes in 2021.	New [2020-2021 PFG]
The Scottish Government will continue to engage with Aviation sector to encourage sustainable growth post COVID-19.	New [CCPu 2020]
Explore the potential for the purchase of zero/low emission aircraft by the Scottish Government, for lease back to operators, with more detailed assessment in the forthcoming Aviation Strategy.	New [CCPu 2020]
Explore options for incentivising the use of more sustainable aviation fuel as we develop our Aviation Strategy, recognising that significant levers in this area are reserved.	New [CCPu 2020]

Outcome 6: Proportion of ferries in Scottish Government ownership which are low emission has increased to 30% by 2032.

Policy:

Continue to examine the scope for utilising hybrid and low carbon energy sources in the public sector marine fleet as part of our vessel replacement programme.	Maintained
Working with the UK Government to support proposals at the International Maritime Organisation (IMO) to significantly lower shipping carbon emissions in the global sector, including the option of introducing a global levy on marine fuel to fund research in cleaner technologies and fuels.	New [2020-2021 PfG]

Outcome 7: By 2032 low emission solutions have been widely adopted at Scottish ports

Policy:

Working with individual ports and the British Ports Association to consider a process for encouraging shared best practice initiatives for reducing emissions across the sector.	New [CCPU 2020]
Working with the ports sector and with its statutory consultees through the Harbour Order process to ensure future port developments are environmentally underpinned.	New [CCPU 2020]

Outcome 8: Scotland's passenger rail services will be decarbonised by 2035.

Policy:

Our commitment to decarbonise (the traction element of) Scotland's railways by 2035 will be delivered through investment in electrification and complementary alternative traction systems. Transport Scotland has published the Rail Services Decarbonisation Action Plan (July 2020) which will be updated as appropriate. Work is ongoing by industry partners to develop the initial schemes.	New [2020-2021 PfG]
We will establish an international rail cluster in Scotland to unlock supply chain opportunities using the interest at Longannet as a catalyst. This will be built around existing strengths in rail in Scotland and will seek to enhance the innovation and supply chain in the decarbonisation of our rolling stock and wider network.	New [Part of Rail Services Decarbonisation Action Plan, July 2020]
Continue to deliver our Rail Freight Strategy.	Maintained

Industry

Outcome 1: Scotland's Industrial sector will be on a managed pathway to decarbonisation, whilst remaining highly competitive and on a sustainable growth trajectory.

Policy:

Emissions Trading Scheme (ETS): following EU Exit we will work with UK Government and other devolved administrations on maintaining carbon pricing that is at least as ambitious as the EU ETS. The Scottish Government's preference is to establish a UK ETS will have an interim cap 5% tighter than the EU ETS, and will be reviewed for consistency with Net Zero in 2021.

Boosted
[June 2020]

Deliver an Energy Transition Fund (ETF) to provide support for a sustainable, secure and inclusive energy transition in the North-East.

New
[June 2020]

Establish and deliver a Scottish Industrial Energy Transformation Fund (SIETF) - to support the decarbonisation of industrial manufacturing through a green economic recovery.

New
[2020-2021 PfG]

Making Scotland's Future: multi-faceted programme will boost manufacturing productivity, innovation, and competitiveness, supporting manufacturing businesses to make the transition to net zero and realise the opportunities of a low carbon economy.

New
[December 2020]

Low Carbon Manufacturing Challenge Fund: to support innovation in low carbon technology, processes and infrastructure. Will be based on successful delivery of ERDF funded Advancing Manufacturing Challenge Fund.

New
[2020-2021 PfG]

The Renewable Heat Incentive (RHI) is a GB-wide scheme created by the UK Government (with the agreement of the Scottish Government). UK Government is extending both the domestic and non-domestic RHI out to 2022.

Boosted
[August 2020]

Proposals:

Scottish Industrial Decarbonisation Partnership (SIDP): Scottish Government -convened cross-sector energy-intensive-industrial (EII) stakeholder forum with representatives from manufacturing sites. Initial objectives: bring together other initiatives; build a shared narrative between government/industry on decarbonisation; and disseminate best-practice.

New
[CCPu 2020]

Deliver a Net Zero Transition Managers Programme to embed Managers in organisations tasked with identifying, quantifying and recommending decarbonisation opportunities for the business.	New [CCPu 2020]
Establish a Grangemouth Future Industry Board (GFIB) – forum to coordinate public sector initiatives on growing economic activity at the Grangemouth industrial cluster, whilst supporting its transition to our low-carbon future.	New [2020-2021 PfG]
Develop policy on providing market-benefit for Scottish industries that invest to decarbonise production.	New [CCPu 2020]
Green Jobs Fund, to help businesses create new, green jobs, working with enterprise agencies to fund businesses that provide sustainable or low carbon products and services to help them develop, grow and create jobs. Further funding will help to ensure that businesses and supply chains across Scotland can capitalise on our investment in low carbon infrastructure such as the decarbonisation of heating and green transport.	New [2020-2021 PfG]
Seizing the economic opportunity, we will work across government, enterprise agencies and the innovation system to identify strengths that can be built on as part of the decarbonisation journey, for example on The Clyde Mission and continued support for the Michelin Scotland Innovation Parc (MSIP).	New [CCPu 2020]

Outcome 2: Technologies critical to further industrial emissions reduction (such as carbon capture and storage and production and injection of hydrogen into the gas grid) are operating at commercial scale by 2030

Policy:

ACORN CCS Project: support the delivery of the CCS and Hydrogen capability at St. Fergus Gas Processing complex by 2025.	Maintained
Establish and deliver a Carbon Capture and Utilisation (CCU) Challenge Fund.	New [2020-2021 PfG]

Proposals:

Emerging Energy Technologies Fund – to support the development of Hydrogen, CCUS and Negative emissions technologies.	New [CCPu 2020]
Carbon Capture Utilisation and Storage (CCUS): work closely with the UK Government to get commercial, policy and regulatory frameworks required to support CCUS at scale in the UK.”	Boosted [2020-2021 PfG]

Forums for CCUS and Blue (low-carbon) Hydrogen: to bring together industry, academics and membership organisations to promote and attract investment in CCUS and Blue Hydrogen.	Boosted [NECCUS 2019]
Evidence for CCUS and Blue Hydrogen: building the evidence base on impact of technology, regulatory and market barriers.	Boosted [PfG 2020/21]
Strategic development of Scotland's hydrogen economy - This is a cross-portfolio proposal that will impact on the delivery of multiple outcomes.	Boosted [Hydrogen Assessment and Policy Statement 2020]
Hydrogen Demonstration: to replicate and scale-up demonstration projects and the evidence base for hydrogen-based technologies.	Boosted [Hydrogen Assessment and Policy Statement 2020]

Waste and the Circular Economy

Outcome 1: Reduction in waste sent to landfill

Policy:

End landfilling of biodegradable municipal waste by 2025, reduce the percentage of all waste sent to landfill to 5% by 2025 and recycle 70% of all waste by 2025 by:

- Developing a new route map to reduce waste and meet our waste and recycling targets for 2025 in a way that maximises their carbon savings potential.
- Developing a post-2025 route map for the waste and resources sector, identifying how the sector will contribute towards Scotland's journey towards net zero in the period to 2030 and beyond.
- Establishing a £70m fund to improve local authority recycling collection infrastructure.
- In line with EU requirements, further promoting reuse and recycling ensure separate collection of textiles by 2025; and ensuring that bio-waste (e.g. garden waste), is either separated and recycled at source, or is collected separately and is not mixed with other types of waste by 2023.
- In response to the Committee on Climate Change's (CCC's) latest recommendations, it is our intention to extend the forthcoming ban on biodegradable municipal waste to landfill to include biodegradable non-municipal wastes, subject to appropriate consultation and work to provide assurance around some specific waste streams.

Boosted
[2020-2021 PfG]

Work with COSLA in the coming year to evaluate the Household Recycling Charter and review its Code of Practice as a key step in developing a future model of recycling collection.

Boosted
[2020-2021 PfG]

Underpinning this we will take steps to improve waste data, continuing to work with UK Government, other devolved governments and agencies to develop electronic waste tracking, which will help deliver a step change in the quality and usefulness of waste data for decision making. This will include taking the necessary steps alongside SEPA to drive implementation of the system in Scotland.

Boosted
[Low Carbon Fund 2020]

Electronic waste tracking fund Improved waste data system will help drive further progress to deliver on existing waste and recycling targets.

New
[Low Carbon Fund 2020]

Outcome 2: Reduction in emissions from closed landfill sites.**Policy:**

Accelerate Landfill Gas Capture and Landfill Legacy Management: we will work with SEPA and key industry partners to scale up the existing landfill gas capture programme to mitigate effects of landfill and environmental impact of closed landfill sites.

**Boosted
[Low Carbon
Fund 2020]**

Proposals:

Landfill gas capture on closed sites: in association with SEPA and the waste industry, double the number of landfill gas capture sites that undertake investigative or development work (from 12 to 24 sites) by 2025, in order to harness energy generated from landfill gas capture and maximise other circular economy opportunities. SEPA has already identified 12 sites for potential investigative work.

**Boosted
[Low Carbon
Fund 2020]**

Outcome 3: A reduction in food waste**Policy:**

We will lead collaborative efforts to deliver Scotland's landmark Food Waste Reduction Action Plan. To reduce food waste by 33% from the 2013 baseline by 2025. Actions include:

- Improving monitoring and infrastructure by considering a mandatory national food waste reduction target and mandatory reporting of Scotland's food surplus and waste by food businesses.
- Consulting on the current rural exemption and food separation requirements for food waste collections, to help break down barriers to food waste reuse and recycling.
- Supporting leadership, innovation, effectiveness and efficiency in Scotland's public, private and hospitality sectors by expanding pilot programmes across the education sector and public sector buildings;
- Support the development and implementation of an NHS Scotland national action plan on food waste;
- Develop best practice guidance for public sector procurement teams to drive new ways of working and more transparent supply chains.
- A sustained approach to public engagement and communications to enable the public to make changes in their choices and behaviours around food and food waste, in partnership with Zero Waste Scotland.

**Boosted
[FWRAP
published 2019;
2020-2021 PfG]**

Outcome 4: Reduce waste and establish a more circular economy, where goods and materials are kept in use for longer.

Proposals:

<p>We will work with local authorities and the future DRS scheme administrator(s) to explore options that will unlock reprocessing investments, including pricing and incentive schemes, to create jobs and a ready supply of recycled material for new packaging.</p>	<p>New [2020-2021 PfG]</p>
<p>Measures to encourage more sustainable consumer purchasing, including plans to take further steps to consult on a charge on single use disposable beverage cups and to increase the carrier bag minimum charge from 5p to 10p in this parliamentary session.</p>	<p>Boosted [2020-2021 PfG]</p>
<p>Banning priority single use items: We will consult on banning a number of problematic plastic items identified in the EU's Single Use Plastics Directive (with a view to introducing legislation in 2021) and outline how we will give effect to the wider requirements of the Directive before the end of 2020.</p>	<p>New [2020-2021 PfG]</p>
<p>Implementation of our Deposit Return Scheme (DRS) for single use drinks containers.</p>	<p>Maintained</p>
<p>We will also work collaboratively across the public sector developing tools and guidance and a practical approach to influence and empower buyer, supplier and key stakeholder communities to use public procurement to support a green recovery and our wider climate and circular economy ambitions through procurement, embedding climate considerations in organisational procurement strategies by 2021 and reporting progress in annual procurement reports.</p>	<p>New [2020-2021 PfG]</p>
<p>Reforming extended producer responsibility schemes: We will continue to work with the UK Government and other devolved administrations on reforms to the packaging extended producer responsibility regime, which we expect will deliver improved funding for local authorities in the future.</p>	<p>New [2020-2021 PfG]</p>
<p>We are boosting our commitment to building a circular economy, where goods and materials are kept in use for longer. We will deliver this by embedding circular recovery principles in the wider green recovery. Through Zero Waste Scotland and Scottish Environment Protection Agency (SEPA), we will intensify our work with industry and businesses to address emissions associated with production, consumption and waste of products/resources; and to promote resource efficiency.</p>	<p>Boosted [CCPu 2020]</p>
<p>In the context of the latest CCC recommendations and building on progress already made by the sector, we will consider measures to ensure new energy from waste plants are more efficient, and 'future-proofed' for Carbon Capture and Storage technology.</p>	<p>New [CCPu 2020]</p>
<p>As part of our work on developing a route map to 2025, we will undertake a specific and focused piece of work to examine the range of fiscal measures used by other countries to incentivise positive behaviours and to develop proposals to go further in this area.</p>	<p>New [CCPu 2020]</p>

Land Use, Land Use Change and Forestry

Outcome 1: We will introduce a stepped increase in the annual woodland creation rates from 2020-2021 to enhance the contribution that trees make to reducing emissions through sequestering carbon.

Policy:

Forestry grants: we will provide funding via a grant scheme, to support eligible land owners establish appropriate woodlands.	Boosted [2020-2021 PFG]
Woodland creation on Scotland's national forests and land. Forestry and Land Scotland will deliver an annual contribution towards the overall woodland creation target by creating new sustainable woodland on Scotland's national forests and land, including through partnerships with external organisations to scale carbon capture opportunities.	Maintained
Awareness-raising. We will continue to deliver a programme of farm-based events to demonstrate and support improved productivity through integration of farming and forestry enterprises.	Maintained
Woodland standards. The Scottish Government will lead on the work with the UK and other UK Governments to maintain and develop a UK Forestry Standard that articulates the consistent UK wide approach to sustainable forestry. The Standard defines how woodland should be created and managed to meet sustainable forest management principles and provides a basis for monitoring.	Maintained
Woodland carbon capture. The Scottish Government will further develop and promote the Woodland Carbon Code in partnership with the forestry sector, and will work with investors, carbon buyers, landowners and market intermediaries to attract additional investment into woodland creation projects and increase the woodland carbon market by 50% by 2025.	New [CCPu 2020]

Forestry and woodland strategies. Forestry and woodland strategies continue to be prepared by planning authorities, with support from Scottish Forestry. They provide a framework for forestry expansion through identifying preferred areas where forestry can have a positive impact on the environment, landscape, economy and local people.

Maintained

Proposals:

Support forestry sector on plant and seed supply strategy to help meet the increased planting targets. A programme of technical innovation to develop and adapt modern horticultural practices will help improve seed preparation and handling, techniques to reduce environmental impacts, and increase nursery production. Funding to support increased production of young trees is available through the Harvesting and Processing grant which is now open to forest nurseries across GB with support from Defra.

**New
[Scottish
Forestry
Implementation
Plan]**

Forestry and Land Scotland will begin development of a new approach to woodland investment with a view to acquiring more land to establish further woodland on Scotland's national forests and land for the benefit of future generations and to optimise carbon sequestration. This includes partnering with private sector and other organisations to enhance scale and funding of carbon capture projects.

**New
[CCPu 2020]**

Outcome 2: Increase the use of sustainably sourced wood fibre to reduce emissions by encouraging the construction industry to increase its use of wood products where appropriate.

Policy:

In collaboration with the private forest sector and other public sector bodies the Scottish Government will implement the Timber Development Programme through an annual programme of projects that support the promotion and development of wood products for use in construction.

Maintained

Outcome 3: To enhance the contribution of peatland to carbon storage, we will support an increase in the annual rate of peatland restoration.

Policy:

Restoration grants: We will provide grant funding to support eligible land managers to deliver peatland restoration. Levels of funding will enable at least 20,000 hectares of peatland restoration per year. We will undertake research to inform where restoration can deliver the greatest emission savings per hectare.

**Boosted
[Budget
2020/21,
reinforced in
2020-2021 PfG]**

<p>Awareness raising: Working through partnership, we will put in place tools and information to promote peatland restoration and develop the capacity, skills and knowledge of land owners, land managers, contractors and others to deliver peatland restoration.</p>	<p>New [CCPu 2020]</p>
<p>With partners, refresh our vision for Scotland's peatlands and review peatland restoration support mechanisms to overcome embedded barriers and improve how we fund and deliver this activity.</p>	<p>New [CCPu 2020]</p>
<p>Phase out the use of peat in horticulture by increasing uptake of alternative materials, undertaking stakeholder engagement to understand transitional challenges, to improve the uptake of alternatives and develop a time-scaled plan.</p>	<p>New [2019-2020 Pfg]</p>
<p>Our Position Statement on National Planning Framework 4 confirmed our current thinking that through the planning system we will not support applications for planning permission for new commercial peat extraction for horticultural purposes, we are looking at strengthening controls on development on peatland and we will help facilitate restoration through permitted development rights.</p>	<p>New [CCPu 2020]</p>
<p>Proposals:</p>	
<p>Develop opportunities for private sector investment in peat restoration, engaging with sectors to establish investment pathways, enabling both public and private sector to invest in a range of measures to help mitigate effects of climate change.</p>	<p>New [CCPu 2020]</p>
<p>Explore how best to restore all degraded peat in the public estate and also within formally designated nature conservation sites, including through statutory mandate.</p>	<p>New [CCPu 2020]</p>
<p>Explore the development of a Peatland Restoration Standard to ensure best practice and continuous development in the success and effectiveness of peatland restoration.</p>	<p>New [CCPu 2020]</p>
<p>Outcome 4: We will establish pilot Regional Land Use partnerships (RLUPs) over the course of 2021.</p>	
<p>Establishment of pilot Regional Land Use Partnerships to help ensure that we maximise the potential of Scotland's land to help achieve net zero. Publication of Scotland's third Land Use Strategy.</p>	<p>New [CCPu 2020]</p>

Agriculture

Outcome 1: A more productive, sustainable agriculture sector that significantly contributes towards delivering Scotland's climate change, and wider environmental, outcomes through an increased uptake of climate mitigation measures by farmers, crofters, land managers and other primary food producers

Policy:

Scale up the Agricultural Transformation Programme across all the policies, including monitoring to assess the effectiveness of the pilot Sustainable Agricultural Capital Grant Scheme that will enable farmers and crofters to purchase equipment that should assist in reducing their greenhouse gas emissions, and support practice change.

New
[2019-2020 PfG]

Proposals:

Develop rural support policy to enable, encourage and where appropriate, require the shift to low carbon, sustainable farming through emissions reduction, sustainable food production, improving biodiversity, planting biomass crops and appropriate land use change developed in line with just transition principles.

New
[CCPu 2020]

Develop new schemes and approaches to support low carbon, sustainable farming, including through the Programme Board for the Beef Suckler Climate Group, other farmer-led groups on arable, dairy and high value, nature farming and crofting which will report in 2021.

New
[2020-2021 PfG & Agriscot 2020]

Introduce Environmental Conditionality, from 2021 via implementation of the Beef Suckler Climate Report and more widely from 2022 through the review of existing CAP Greening which will extend the requirements to all farmers and crofters to undertake environmental actions.

New
[CCPu 2020]

Further provision of advice for farmers and crofters who wish to retire: A new commitment to work with stakeholders to provide advice, including further extending the Land Matching Service and guidance for farmers and crofters who wish to step back from agricultural businesses by providing an opportunity to consider alternative land-uses or alternative agricultural uses.

New
[CCPu 2020]

Outcome 2: More farmers, crofters, land managers and other primary food producers are aware of the benefits and practicalities of cost effective climate mitigation measures

Policy:

The dissemination of information and advice on climate change mitigation measures in agriculture through a range of communication methods utilising technology and all media to best effect.

Boosted
[Through new policy to realign and enhance advice]

An agri-tech group will be established to share, disseminate and encourage adoption of advances in agricultural science and technology as widely as possible.

Maintained

Launch a new and expanded peer to peer knowledge transfer initiative based on the success of our Young Climate Change Champions work.

New
[CCPu 2020]

Realign and enhance our established programmes and initiatives such as the Farm Advisory Service, the Knowledge Transfer and Innovation Fund and Monitor Farm Programme to create a more cohesive approach to ensure advice and support is focussed on helping industry to professionalise to support sustainable farming.

New
[CCPu 2020]

Proposals:

Carbon Audits: in 2018, we will consult on how best to ensure maximum take up of carbon audits and how to enable tenant farmers and crofters in particular to benefit.

Maintained

We will explore with stakeholders, including the Scottish Tenant Farmers Association and the Tenant Farming Commissioner, how best to engage tenant farmers to increase understanding of the environmental and economic benefits of low carbon farming.

Maintained

Marketing scheme: Determine the feasibility of a Low Carbon Farming marketing scheme.

Maintained

Outcome 3: Nitrogen emissions, including from nitrogen fertiliser, will have fallen through a combination of improved understanding, efficiencies and improved soil condition

Policy:

<p>Communicate and demonstrate the benefits of precision farming and nitrogen use efficiency in order to achieve a reduction in GHG emissions.</p>	<p>Boosted [Through new policy to realign and enhance advice]</p>
<p>Work with the agriculture and science sectors regarding the feasibility and development of a SMART (specific, measurable, achievable, relevant and time bound) target for reducing Scotland's emissions from nitrogen fertiliser.</p>	<p>Boosted [Through Scotland's National Nitrogen Balance Sheet]</p>
<p>From 2018 we expect farmers to test the soil on all improved land every five or six years, and we will work with them to establish how best to achieve this.</p>	<p>Boosted [Through new policy to introduce conditionality]</p>

Proposals:

<p>Investigate the benefits and barriers of leguminous crops in rotation.</p>	<p>Maintained</p>
<p>Crop varieties with improved nitrogen-use efficiency.</p>	<p>Maintained</p>

Outcome 4: Reduced emissions from red meat and dairy through improved emissions intensity

Policy:

Commission and publish a report into the establishment of emissions intensity figures for beef, lamb and milk.	Maintained
Work with Quality Meat Scotland, ScotEID and livestock producers to encourage improved emissions intensity through genotyping, improving fertility, reducing animal mortality and improving on farm management practices.	Boosted [CCPu 2020]

Proposals:

Determine the practicality of establishing a SMART target for reduction in the intensity of emissions for beef, sheep and dairy sectors.	Maintained
Consult in 2018 to determine the nature of livestock health measures that the sector will adopt from 2019.	Maintained
Determine the practicalities and feasibility of using livestock feed additives as a means of reducing emissions.	Maintained

Outcome 5: Reduced emissions from the use and storage of manure and slurry

Proposals:

Engaging with farmers to explore their support requirements, establish how they can improve the use and storage of manure and slurry, including the potential for cooperatively owned and managed anaerobic digesters.	Boosted [Dec 2020, before CCPu 2020]
Investigate the practicalities of livestock grazing in rotation on current arable land.	Maintained
Conduct a feasibility study for the establishment of manure/slurry exchange.	Maintained
Determine how to consistently minimise emissions from slurry storage.	Maintained
Review management of storage and application of organic materials such as silage, slurry and liquid digestate, including what support may be required to ensure best practice.	New [CCPu 2020]

Outcome 6: Carbon sequestration and existing carbon stores on agricultural land have helped to increase and maintain our carbon sink

Policy:

Explore with the farming and forestry sectors how best to increase planting of trees and hedgerows which optimise carbon sequestration, including the role of agroforestry.

Boosted
[Two actions,
1st announced
summer 2020,
2nd CCPu 2020]

Proposals:

Investigate the feasibility of payment for carbon sequestration taking into account any existing schemes such as the woodland carbon code as a means of encouraging the uptake of carbon sequestration on farms.

Maintained

Increase woodland cover on suitable agricultural land.

Maintained

Building on the successful work integrating woodland with farming businesses, help remove barriers for those on agriculture holdings, particularly in the tenanted sector who want to engage in woodland creation, including exploring the potential to reform legislation where appropriate.

New
[CCPu 2020]

Work with stakeholders on options to increase peatland restoration on suitable agricultural and crofting land, to support delivery of policies in the LULUCF chapter. We will map peatland against this land which will allow modelling options for land-use change and inform opportunities for targeted support of peatland restoration and management.

New
[CCPu 2020]

Explore options for land-use change to optimise uses beyond traditional farming and food production to multi-faceted land use including forestry, peatland restoration and management and biomass production.

New
[CCPu 2020]

Negative Emissions Technologies

Outcome 1: Detailed feasibility studies on NETS will assess the opportunities for negative emissions in Scotland, and identify applications with the greatest potential, including specific sites where possible.

Proposals:

In 2021/22 carry out a detailed feasibility study of opportunities for developing NETs in Scotland ready for the early 2030s. This will identify specific sites and applications of NETs, including developing work to support policy on Direct Air Capture and its role within NETS in our future energy system.

New
[CCPu2020]

From 2022, based on the outcomes of the feasibility work, we will provide support for commercial partners to develop NETs proposals including initial design and business cases.

New
[CCPu 2020]

Put in place a continual process to review the development of NETs and progress against its envelope.

New
[CCPu2020]

We will work with UK Government to ensure that they bring forward suitable mechanisms to support the development of NETs business cases in relevant sectors.

New
[CCPu2020]

Outcome 2: CCUS: the continued development of CCUS technologies and systems is prioritised to ensure these can be rolled out commercially and at scale by the late 2020s.

Policies:

Support the development of NETS technologies within Scotland.

New
[CCPu 2020]

Proposals:

Support the inclusion of NETS in the development of strategic, industry lead pathways for CCUS infrastructure in Scotland.

New
[CCPu 2020]

Funding through the Scottish Industrial Energy Transformation Fund to consider the development of NETs demonstrators.

New
[CCPu 2020]

Provide a focus on integrating NETS projects with CCS infrastructure through the Emerging Energy Technologies Fund.

New
[CCPu 2020]

Outcome 3: Bioenergy: a cross-sectoral approach for the appropriate and sustainable use of biomass in energy applications is agreed and implemented (taking into account competing land and feedstock uses).

Policy:

<p>We will publish a Bioenergy Update in early 2021, laying out our current position and understanding of the role of bioenergy in the energy system and setting out in more detail how we will move forward.</p>	<p>New [CCPu 2020]</p>
<p>In 2021, building on the Bioenergy Update, we will establishing a cross sectoral Bioenergy Expert Working Group to consider and identify the most appropriate and sustainable use for bioenergy resources across Scotland. It will also assess the volume of bioenergy resources that we can grow or produce within Scotland, and confirm the level of import that we believe is compatible with a sustainable global trade in bioenergy.</p>	<p>New [CCPu 2020]</p>
<p>By 2023, in time to inform the next Climate Change Plan, we will publish a Bioenergy Action Plan, incorporating the learning developed by the expert working group and our understanding of the options to use Bioenergy in both NETs and other applications.</p>	<p>Boosted [CCPu 2020]</p>

Annex B: Monitoring Framework

This element of the Plan update represents an important step in the ongoing improvement of the Monitoring Framework set out in the 2018 Plan for tracking progress to delivery of the policies. It includes:

- an adjustment to the definitions of different types of indicators from those used in the 2018 Plan, to more clearly distinguish their purpose; and
- a revised set of policy outcome indicators that reflect the content of the updated Plan.

Introduction

Monitoring implementation is vital to ensure that the policies in the Climate Change Plan are making progress towards meeting Scotland's emissions reduction targets in a way that is delivering a just transition to net zero.

The *Climate Change Plan 2018-32* included a monitoring framework for the first time and embedded indicators for policies for each sector. This framework has been the basis of two published Climate Change Plan Monitoring Reports, in October 2018¹⁵⁴ and December 2019¹⁵⁵.

Section 35B of the Climate Change (Scotland) Act 2009 (as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019) places annual progress reporting on a statutory footing, with reports for each sector to be produced and laid in Parliament from May 2021 onwards. The updated monitoring framework, as set out below, will underpin the assessments of progress made in these reports.

The Committee on Climate Change will also continue to produce independent, annual reports on Scotland's progress towards meeting emissions reduction targets (the most recent such report was published in October 2020¹⁵⁶).

The structure of the Monitoring Framework:

The updated Monitoring Framework for the Climate Change Plan for sectors is structured on three levels: **greenhouse gas emissions** statistics provide the highest-level measure of progress at an economy-wide and sectoral level; a suite of **policy outcome indicators** measure the success of policies in achieving the changes that are needed; and a **policy tracker** monitoring implementation of specific policies and proposals.

The updated Framework also includes cross-sectoral monitoring of **social and economic** indicators to focus on impacts on workforce, employers and communities. This will enable us to monitor progress towards our just transition objectives.

Greenhouse Gas Emissions Statistics

Official Statistics on Scottish greenhouse gas emissions determine progress towards national emissions reduction targets and also provide information on total annual emissions at a sectoral level. Statistics are published annually, typically in June, and two years in arrears. For example, the most recent figures, published in June 2020, cover emissions during 2018¹⁵⁷.

154 <https://www.gov.scot/publications/climate-change-plan-monitoring-report-2018/>

155 <https://www.gov.scot/publications/climate-change-plan-monitoring-report-2019/>

156 <https://www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament/>

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Policy Outcome Indicators

The Plan includes key policy outcomes for each sector, defined as a measurable change on the ground resulting from a policy or combination of related policies. The Framework will measure progress towards achieving these with a set of policy outcome indicators¹⁵⁸.

A policy **outcome indicator** is a specific, objective measure closely aligned to achieving the outcome. It will underpin monitoring of long-term progress towards the outcome, but should also be responsive to change in the near-term, so that it can be used to evaluate whether the Plan is on track. Specific **milestones** (or targets) are set, where appropriate, for the level of the indicator to be achieved at a given time.

In this update, the set of outcome indicators from the 2018 Plan were reviewed to ensure that they reflect the updated policy commitments and to improve the quality and clarity of indicators. This has led to new outcome indicators being identified, others being revised, and a few being removed where they were no longer appropriate or there were significant issues with robustness. The overall set of outcome indicators is now 39, up from 29 previously used for the 2018 Plan.

A revised set of outcome indicators for the updated Plan is out below.

Policy outcome indicators help to answer the question: are we seeing the results – the change on the ground – that we expected?

Policy Tracker

The Plan includes a set of specific policies and proposals for each sector to achieve the policy outcomes. The Framework will monitor progress towards implementing policies and developing proposals with a **policy tracker**, which will be set out for annual progress reporting, from May 2021. This will consistently record progress and next steps for policies, and where possible it will include **implementation indicators** for specific policies.

Policy **implementation indicators** will help us to measure whether a policy's course of actions is delivering the intended outputs. This can be used to identify whether policies are being implemented as expected, and to focus attention on potential issues. Implementation indicators will be updated as part of annual progress reporting.

Policy implementation indicators help to answer the question: are we doing what we said we would do?

Cross-Sectoral Social and Economic Indicators

The actions needed to become net zero by 2045 will transform all sectors of our economy and society. We recognise the need to further develop appropriate monitoring at both cross-cutting and sector level to better track progress in these areas. However, for the near-term we will use the existing Office of National Statistics: Low Carbon Renewable Energy Economy (LCREE) data set, including business turnover and jobs, to begin annual monitoring of the impacts on the wider economy and livelihoods as we transition to net zero.

158 This is an update of terminology from the 2018 version of the Monitoring Framework, which referred to these as policy output indicators.

Principles of the Monitoring Framework

The monitoring framework is guided by a set of principles that inform both its design and its ongoing use in assessment of progress. These are:

1. It will assess both the efficiency of policy implementation (are we doing what we said we'd do?) and whether this is effective in achieving policy outcomes (are we getting the results we expected?).
2. It will underpin annual progress reports assessment of whether we are 'on track' in the short-term, as well as providing an on-going basis for consistent monitoring of progress to long-term outcomes.
3. Our policy objectives will be SMART159 (Specific, Measurable, Achievable, Realistic and Time-limited) so that they are suitable for monitoring and evaluation.
4. It will gather the data needed to give reliable and consistent measurement, while being proportionate to policies and varying data availability.
5. We will learn from the monitoring framework, using it to support improvement in policy design and delivery.

Alignment with the National Performance Framework

The National Performance Framework (NPF) sets the overall purpose and vision for Scotland and tracks progress using a set of National Indicators. The Climate Change Plan sets out Scotland's plan to reduce greenhouse gas emissions in line with Scotland's statutory targets, progress to which also directly underpins a National Indicator. The Monitoring Framework for the Plan allows more detailed tracking of progress to policy outcomes and implementation of specific policies across sectors. As the Plan aims to reduce emissions while achieving the broader purpose set by the NPF, there are also synergies across a wider range of other economic, social and environmental National Indicators.

Next steps

Annual progress reports on delivery of the updated Plan, on a sector by sector basis, will be published and laid in Parliament from May 2021 onwards. The content of those reports will be underpinned by the Monitoring Framework structure set out above, including the most up-to-date available information on sectoral emissions, the current set of policy outcome indicators, and relevant policy tracker information.

The Monitoring Framework itself will continue to develop as we learn from experience and as new sources of monitoring information become available. Cross-portfolio governance arrangements for the Framework, which will include oversight of the process for making any future adjustments to the set of indicators, remain under review and a further update on this will be provided to the Parliament in due course.

Sector Policy Outcome Indicators

Electricity

Outcome	Indicator	On-Track Assessment (Milestones/ Targets)
1	Electricity grid intensity (CO ₂ e per kilowatt hour) ^a	Maintain below 50 g CO ₂ e per kilowatt hour
1	Installed capacity of renewable generation (GW) ^a	Year-to-year change
1	Renewable capacity at planning stages (GW: 3 categories) ^a	Year-to-year change
2	Loss of Load Expectation (hours per year) ^b	Maintain GB standard below 3 hours per year

Data Source:

(a) Scottish Government Scottish Energy Statistics Hub; (b) National Grid Winter Outlook.

Buildings

Outcome	Indicator	On-Track Assessment (Milestones/ Targets)
1	% heat in buildings from low greenhouse gas emission sources ^a	Progress to target [TBC in 2021] ⁱ
1	% of buildings using low greenhouse gas emission heating systems ^a	Year-to-year change
2	Energy intensity of residential buildings (MWh per household) ^b	Progress to target [at least 30% by 2032]
2	Energy intensity of non-domestic buildings (GVA in the services sector per GWh) ^b	Year-to-year change
2	% of homes with an EPC (EER, or equivalent) of at least C ^c	Progress to 2035 target [all homes to have EPC C or higher where technically feasible and cost effective]
2	% new homes built with a calculated space heating demand of not more than 20 kWh/m ² /yrT ^d	Year-to-year change

Outcome	Indicator	On-Track Assessment (Milestones/Targets)
3	% of Scottish gas demand accounted for by biomethane and hydrogen blended into the gas network ^a	Year-to-year change
4	Percentage of households in fuel poverty ^e	Progress to 2040 target [no more than 5%] interim 2030 [no more than 15%] 2035 [no more than 10%] targets ⁱⁱ

Notes: Where targets have not been set, we will aim to do so as we develop the indicators. (i) Target to be set in the Heat in Buildings Strategy expected summer 2021; (ii) set out in the Fuel Poverty Act with consideration of associated indicators on extreme fuel poverty and the fuel poverty gap.

Data Source:

(a) Indicator in development; (b) Scottish Government Scottish Energy Statistics Hub; (c) Scottish Government Scottish House Condition Survey National Statistics; (d) EPC data provided on completion of each new home; (e) Scottish Government Scottish House Condition Survey National Statistics.

Transport

Outcome	Indicator	On-Track Assessment (Milestones/Targets)
1	% reduction in car kilometres ^a	Progress to target [20% reduction by 2030] ⁱ
2	% of new car registrations that are ULEV ^b	Year-to-year change
2	% of new van registrations that are ULEV ^b	Year-to-year change
3	% of new HGV registrations that are ULEV ^b	Year-to-year change
4	% of new bus registrations that are ULEV ^b	Progress to target [>50% by 2024]
5	% reduction in emissions from scheduled flights within Scotland ^c	Year-to-year change
6	% of ferries that are low emissions ^d	Progress to target [30% by 2032]
8	% of single track kilometres electrified ^e	Progress to target [70% by 2034]
8	% of trains powered by alternative traction ^e	Year-to-year change

Notes: Where we have been unable to set targets, Transport Scotland will aim to do so when the necessary data becomes available. Also: (i) from 2019 baseline.

Data Source:

(a) Scottish Transport Statistics (Chapter 5); (b) Scottish Transport Statistics (Chapter 13); (c) Airline(s) operating scheduled flights within Scotland; (d) ad hoc Transport Scotland; (e) ad hoc Network Rail (Scotland)

Industry

Outcome	Indicator	On-Track Assessment (Milestones/ Targets)
1	Industrial energy productivity (£GVAm per GWh) ^a	Progress to target [Increase 30% by 2032] ⁱ
1	Industrial emissions intensity (tCO ₂ e per £GVAm) ^a	Progress to target [Reduce 30% by 2032] ⁱ
2	% of Scottish gas demand accounted for by biomethane and hydrogen blended into the gas network ^b	Based on trend

Notes: (i) from 2015 baseline.

Data Source:

(a) Scottish Government Scottish Energy Statistics Hub; (b) Indicator in development

Waste and the Circular Economy

Outcome	Indicator	On-Track Assessment (Milestones/ Targets)
1	Total amount of landfilled waste (tonnes) ^a	Progress to target [no more than 5% of all waste to landfill by 2025]
1	Total amount of biodegradable landfilled waste (tonnes) ^b	Year-to-year change + Progress to interim target [0 tonnes of biodegradable municipal waste landfilled by 2026]
2	Number of closed landfill sites with exploratory landfill gas capture/ flaring ^c	Progress to target [12 by 2025]
3	Household and non-household food waste reduced (tonnes) ^a	Progress to target [reduce all food waste by 33% by 2025] ⁱ
4	Total waste generated (tonnes) ^a	Progress to target [reduce total waste by 15% by 2025] ⁱⁱ

Notes: (i) Reduce all food waste arising in Scotland on a per capita basis by 33% by 2025, based on 2013 baseline; (ii) By 2025 reduce total waste arising in Scotland by 15% against 2011 levels;

Data Source:

(a) Waste from all sources – summary data 2018: SEPA; (b) Waste landfilled in Scotland 2019: SEPA; (c) *ad hoc* SEPA;

LULUCF

Outcome	Indicator	On-Track Assessment (Milestones/ Targets)
1	Hectares of woodland created per year ^a	2020/21 = 12,000 ha/yr 2021/22 = 13,500 ha/yr 2022/23 = 15,000 ha/yr 2023/24 = 16,500 ha/yr 2024/25 = 18,000 ha/yr
1	Woodland Ecological Condition ^a	Year-to-year change
1	Woodland Carbon Code: Projected carbon sequestration (validated credits) ^a	Progress to target (increase 50% by 2025) ⁱ
2	Annual volume (in millions of cubic metres) of Scottish produced sawn wood and panel boards used in construction ^a	Progress to Targets [2020/21 = 2.6 million m ³ 2026/27 = 2.8 million m ³ 2031/32 = 3.0 million m ³]
3	Hectares of peatland restored per year ^b	20,000 ha/yr ⁱⁱ
3	Peatland Carbon Code: Projected emissions reduction (validated units) ^c	Year-to-year change

Notes: (i) carbon sequestration baseline March 2020; (ii) area of peatland restored is a proxy measure which doesn't directly represent the reduction in emissions, an emissions reduction indicator may be adopted in the future. Also, the current per annum area restoration target figure is under review and may be increased, updates will be reflected in future annual reporting.

Data Source:

(a) Forestry Statistics; (b) NatureScot will compile from Peatland Action, FLS, National Parks, Scottish Water and other sources; (c) IUCN Peatland Carbon Code Registry for the UK.

Agriculture

Outcome	Indicator	On-Track Assessment (Milestones/Targets)
2	Increased engagement with Farm Advisory Services on environmental issues and climate change ^a	Based on trend
3	Use of Nitrogen fertilisers ^{i, b}	Based on trend
3	Spreading precision of Nitrogen fertilisers ^b	Based on trend
4	Time taken from birth to slaughter and increased efficiency through improved health and reduced losses ^c	Based on trend
5	Improvement in covered slurry storage ^d	Based on trend
5	Precision application of manure and slurry ^b	Based on trend
6	Hectares of peatland restored per year ^{ii, e}	Year-to-year change
6	Area of woodland on agricultural land ^f	Based on trend

Notes: We will be improving baseline data for this new set of indicators alongside ongoing policy development. Also: (i) Potential to use Scottish Nitrogen Balance Sheet: sectoral nitrogen use efficiency when developed; (ii) This replicates the LULUCF indicator for outcome 3, efforts will be made to monitor the % of restored peatland on agricultural land.

Data Source: (a) Farm Advisory Service: calls to advisory service about CC, use of Agrecalc tool, awareness of environmental issues; (b) British Survey of Fertiliser Practice; (c) Cattle Tracing Scheme (CTS); (d) The Survey of Agricultural Production Methods (SAPM); (e) NatureScot will compile from Peatland Action, FLS, National Parks, Scottish Water and other sources; (f) Agricultural Census/SAF.

Additional Notes:

1. It is intended that an 'on track' assessment (i.e. "on track", "off track" or "too early to say") will be made periodically for each outcome indicator – and will inform annual progress reporting. This assessment can be made by: (i) where appropriate, using annual milestones/targets that have been set for the indicator; (ii) using expert judgement to assess progress to a set target (e.g. 2025 or 2030); or (iii) where a target is either not possible or appropriate at present, using expert judgement to assess trends or level of change.

2. A set of criteria was used as a guide when reviewing outcome indicators to be included in this update. These were as follows:

- **Relevance:** Is there is a clear relationship between the indicator(s) and the Climate Change Plan outcome?
- **Validity:** Does the indicator measure what it purports to measure?
- **Credibility:** Is the indicator based upon impartial, reliable sources?
- **Practicality:** Can the data for the indicator be obtained with reasonable, feasible and affordable effort (for Scottish Government and for those providing the data)?
- **Clarity:** Is the indicator easily understood? Is it clear what constitutes an improvement and a deterioration?
- **Sensitivity:** Is the indicator precise enough to detect important changes over short to medium (1 to 5 year) time periods that are amenable to policy intervention?
- **Distinctiveness:** Does the indicator measure something that is not already captured under other indicators?
- **Coverage:** Does the indicator (or set of indicators) provide sufficient information to usefully assess progress on the outcome in question? Is anything missing?

ANNEX C: Derivation of Sector Emissions Envelopes

A key element of this Climate Change Plan update is the presentation of emissions envelopes for each sector over the period 2020 to 2032. These envelopes have been developed through an iterative process which combines evidence, analytical modelling and the application of judgement in the face of considerable uncertainty.

TIMES modelling

As with the previous Climate Change Plan, the TIMES model was used to provide the initial basis for the development of the sector emissions envelopes¹⁶⁰.

The model was updated in 2019 to a 2015 base year and the key assumptions were reviewed and aligned with the latest evidence. In particular, the current modelling makes use of the most recently published Scottish greenhouse gas inventory data and best current expectations for known upcoming technical changes to the UK inventory in relation to the implementation of new/updated IPCC guidelines on the inclusion of emissions from peatlands, and revisions to the global warming potentials of some greenhouse gases. Decisions on the exact nature of these technical revisions remain to be made by the UK Government and these aspects of the evidence base will need to be kept under review for the next full Climate Change Plan.

An initial TIMES model run, using this updated evidence base and taking into account constraints around technical feasibility, was undertaken to demonstrate the potential distribution of emissions-reduction effort across sectors. After reviewing initial model results, Scottish Government sector analysts advised on further technical refinements to the model, based on sector modelling, latest externally-commissioned research and expert judgement. This, alongside a quality assurance process by TIMES analysts, as well as an Assurance Group chaired by the Chief Economist, resulted in a revised model run and set of sector envelopes.

Uncertainty

The TIMES modelling provides an integrated and consistent approach, but significant uncertainty is present across all sectors and all key domains (cost; technology availability; emissions factors; energy demand) and this uncertainty increases over time (but is not accounted for in the modelling). As with all modelling, the Assurance Group advised that the limitations of the model should be set out and that the results from the model should be deployed alongside other evidence.

¹⁶⁰ TIMES is a high-level strategic model, covering the Scottish energy system, as well as non-energy sectors, including Agriculture, Waste, Land Use, Land Use Change and Forestry (LULUCF). It identifies the least-cost pathway for deployment of technologies, fuels and other carbon abatement measures to meet our final demands and emissions targets. [See Climate Change Plan: third report on proposals and policies 2018-2032 – technical annex for further information on the TIMES model](#)

Final Envelopes

Building on the initial rounds of TIMES modelling, a further scenario was introduced to provide evidence on the potential implications of allowing the industrial sector higher emissions than in the previous run described above, to help protect against carbon leakage¹⁶¹. The emissions envelope for the industrial sector was constrained in the TIMES model to the current European Union Emissions Trading System (EU ETS) cap to 2020 and then to the assumed rate of a projected EU/UK cap to 2025 (effectively the current EU ETS Cap less 5%). Post-2025, the industrial sector envelope followed a linear path to a 90% reduction in 2050, based on the CCC's advice for that specific sector in a UK-wide net zero scenario¹⁶².

The envelopes produced by the TIMES model for this scenario resulted in total emissions which exceeded the statutory targets during the period of the Plan (ie the TIMES model was unable to identify a set of sector pathways consistent with the statutory targets).

In order to ensure the envelopes met the cross-economy statutory targets, a further decision was taken to allocate the necessary additional emissions-reduction effort, outwith the TIMES framework, across the sectors on a pro-rata basis. Two exceptions were made to this:

- no additional emissions were allocated to the Industry sector, consistent with the approach to avoid carbon leakage; and
- the emissions envelope of the Agriculture sector was constrained to the level of the 'core technical' TIMES run and the additional annual quantity of emissions reductions which would have been allocated pro rata to the Agriculture sector were instead assigned to Land Use, Land Use Change and Forestry (LULUCF).

A final series of 'off-model' adjustments were made in order to ensure that the resultant annual emissions envelopes were consistent with expectations around deliverability and did not result in any increase in a particular sectors' emissions following a period of decarbonisation. These adjustments acted to:

1. delay the roll-out of carbon capture and storage process as far as possible; and
2. ensure that no sector shows a temporary increase in emissions.

161 whereby tight emissions reduction targets in one country could cause business to relocate to other countries with more lax climate regulation, potentially resulting in higher global greenhouse gas emissions overall.

162 Net Zero Exhibits - Industry, available to download here: <https://www.theccc.org.uk/publication/net-zero-technical-report/>

The resulting set of envelopes are below.

Table of emissions by sector													<i>MtCO_{2e}</i>	
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Agriculture	7.0	6.8	6.5	6.3	6.0	5.8	5.7	5.6	5.6	5.5	5.5	5.4	5.3	
Electricity	1.7	1.6	1.6	1.5	1.4	1.3	1.0	0.8	0.5	- 0.5	- 3.7	- 4.2	- 4.7	
Industry	11.5	11.3	11.1	11.0	10.8	10.7	9.8	9.4	8.4	7.7	7.2	6.3	5.5	
Waste	1.6	1.5	1.3	1.2	1.0	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Transport	11.0	10.2	9.4	8.7	7.9	7.1	6.9	6.6	6.5	6.5	6.5	6.5	6.5	
Buildings	8.0	7.6	7.1	6.7	6.2	5.6	5.0	3.9	3.1	2.6	2.6	2.6	2.6	
LULUCF	0.6	0.5	0.4	0.2	0.1	- 0.1	0.3	0.3	0.4	0.5	1.8	2.1	2.3	
Targets/total	41.6	39.5	37.5	35.4	33.4	31.3	29.4	27.3	25.1	23.0	20.6	19.4	18.3	

As mentioned in Part 3, Negative Emissions Technologies (NETs) are being presented separately for this Plan update only. The final set of envelopes below removes NETs from Industry and Electricity envelopes and creates a NETs envelope.

Table of emissions by sector (with separate NETs category)													<i>MtCO_{2e}</i>	
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Agriculture	7.0	6.8	6.5	6.3	6.0	5.8	5.7	5.6	5.6	5.5	5.5	5.4	5.3	
Electricity	1.7	1.6	1.6	1.5	1.4	1.3	1.0	0.8	0.5	-	-	-	-	
Industry	11.5	11.3	11.1	11.0	10.8	10.7	9.8	9.4	8.4	7.7	7.3	6.9	6.5	
Waste	1.6	1.5	1.3	1.2	1.0	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Transport	11.0	10.2	9.4	8.7	7.9	7.1	6.9	6.6	6.5	6.5	6.5	6.5	6.5	
Buildings	8.0	7.6	7.1	6.7	6.2	5.6	5.0	3.9	3.1	2.6	2.6	2.6	2.6	
LULUCF	0.6	0.5	0.4	0.2	0.1	- 0.1	0.3	0.3	0.4	0.5	1.8	2.1	2.3	
NETs	-	-	-	-	-	-	-	-	-	- 0.5	- 3.8	- 4.7	- 5.7	
Targets/total	41.6	39.5	37.5	35.4	33.4	31.3	29.4	27.3	25.1	23.0	20.6	19.4	18.3	



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