scdi Scottish Council for Development and Industry

MANIFESTO FOR CLEAN GROWTH

CLEAN GROWTH LEADERSHIP GROUP

Manifesto for Clean Growth – Clean Growth Leadership Group

CONTENTS

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Oil and Gas Technology Centre | Oil and Gas UK | Perth & Kinross Council | Scottish Enterprise | ScottishPower
Scottish Water | Shell UK | University of Edinburgh | Zero Waste Scotland

FIND OUT MORE

Visit **www.scdi.org.uk/cleangrowth** | Email **views@scdi.org.uk** | Follow us **@SCDInews**
Join the conversation with **#CleanGrowth** or **#NetZeroScotland**

Partners supported the reporting via a Clean Leadership Group and provided extensive input to shape them. However, individual recommendations cannot be attributed to any single partner. SCDI takes full responsibility for the content and recommendations of all associated reports and publications.

SUMMARY

Clean Growth Leadership Group

SCDI's Clean Growth Leadership Group brings together partners from across the public, private and third sectors to lead the way to Net Zero.

We published an interim report in June, Building Scotland's Green Recovery. Our plan for Scotland's Green Recovery from the COVID-19 crisis featured 12 big ideas to respond to the climate emergency with the same urgency as the public health emergency.

This new report builds on that work and looks beyond the immediate crisis towards the horizon of 2045 and asks:

What are the Clean Growth opportunities for Scotland of the transition to Net Zero – and how can we maximise them?

We have engaged with businesses, organisations, experts and stakeholders across all sectors and all geographies of the Scottish economy. Interviews, roundtables and surveys throughout 2020 have helped to inform this report and its recommendations. Our ideas are backed by business and have been shaped by SCDI's diverse membership.

We all have our part to play in Scotland's Clean Growth future and this report sets out how we can work together to accelerate the pace of change.

In Numbers: Our Evidence-Build

16 Partners on Clean Growth Leadership Group

77 Online survey responses from SCDI members

9 Submissions to our Call for Views

13 Interviews with experts and stakeholders

8 Meetings of Clean Growth Leadership Group

3 Regional SCDI Committee meetings in Highlands & Islands, North East and South

14 Clean Growth-related discussions at SCDI events

Our Vision

We believe Scotland's social, economic and natural resources – from our skilled workforce and unrivalled landscape, to our innovative businesses and world-class colleges and universities – give us unique advantages which we can leverage to capture the economic value of the global transition to Net Zero.

Our vision is for Scotland to be a world leader in Clean Growth which delivers for people, for our economy and for our planet:

PLANET – reduces carbon emissions/protects and restores nature/achieves Net Zero by 2045.

ECONOMY – boosts competitiveness/innovation/productivity/resilience/sustainability.

PEOPLE – creates green jobs/improves health & wellbeing/delivers a Just Transition for all.

Scotland's Clean Growth opportunities

This report identifies 7 Clean Growth opportunities and 21 priority actions for Scotland. It makes recommendations to government, business and industry, academia and education, regulators, investors, communities and citizens about how we can each contribute, and how we can collaborate with each other, to maximise them.

Together, they represent our Manifesto for Clean Growth:

1 INDUSTRY

Transform Industry

We can establish world-leading circular and bio economies in Scotland to transform and decarbonise industry to boost innovation, protect jobs and create green jobs in the new green sectors of the Net Zero economy

A Scottish Government and Zero Waste Scotland should bring forward plans for repair, durability and sustainability ratings for all electronic and household appliances supported by a national repair network

B Industry should build sectoral and cross-sectoral partnerships which develop circular expertise, innovations, strategies and new supply chains for reuse materials and repairs with support from Zero Waste Scotland, SEPA and Innovation Centres

C UK Government and Scottish Government should back biotechnological innovation which supports industry to decarbonise, transform Grangemouth into a biorefinery and protect jobs through public investment, innovation, incentives and innovation support

2 ENERGY

Clean Energy Innovation World Leader

We can build on our existing world-class energy expertise to maximise renewable energy generation and flexible storage, pioneer CCUS and build a hydrogen economy to create green jobs, strengthen domestic supply chains and lead in the Clean Growth technologies of the future

A Industry should work with Scottish Government to build an internationally competitive domestic supply chain for renewable energy manufacturing and related services and increase local content in equipment and people

B UK Government should bring forward the necessary funding to accelerate the Acorn CCS Project and establish a CCS Hub at St Fergus as one of the UK's four clusters

C Scottish Government and UK Government should invest in innovation, infrastructure and incentives to scale-up green and blue hydrogen production and use

3 CONNECTIVITY

Net Zero Domestic Connectivity

We can accelerate modal shift to active travel and public transport, invest in transport technology, innovation and infrastructure, transform supply chains and deepen digital connectivity to deliver world-leading Net Zero domestic connectivity by 2030

A UK Government and Scottish Government should work together to revisit the potential for a national model of road user pricing or similar measures to address congestion and fund future low- and zero-carbon infrastructure

B Industry should work with Scottish Government and local authorities to accelerate the building of a national network of EV and Ultra-Fast charging and hydrogen refuelling points as an urgent priority

C UK Government, Scottish Government, industry and communities should work together to reduce demand for travel and level the digital playing field by connecting all of Scotland with future-proof 5G infrastructure, prioritising rollout in hardest-to-reach communities

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4 PLACE

Sustainable Communities

We can lock-in local value, increase planning ambition and resources, accelerate retrofit, decarbonise heat and raise building standards to build and nurture sustainable, resilient and thriving communities

A Public sector should mobilise total public spending of £81 billion in Scotland for Clean Growth through Community Wealth Building to create local, green jobs, build local, resilient supply chains and back inclusive, sustainable business models

B National Planning Framework 4 should recognise a presumption in favour for Net Zero developments within the context of plan-led development

C Scottish Government should provide strategic ambition, regulatory certainty, support businesses to adapt and innovate and implement an ambitious Net Zero Standard for all new buildings by 2023

5 PEOPLE

Green Skills Revolution

We can drive a Green Skills Revolution which builds green skills across society and invests in the reskilling, upskilling and lifelong learning of our people to prepare them for the green industries of the future to create new green jobs, boost productivity, raise wages and attract inward investment

A All schools, colleges, universities, training providers and employers should embed core green skills and carbon literacy across curricula, professional learning and work-based learning

B Scottish Government should coordinate a voluntary, inclusive and accessible National Service for Net Zero programme of employment and volunteering opportunities across the public, private and third sectors backed by a Green Skills Passport

C Scottish Government should create a Reskilling and Upskilling Fund which empowers every Scottish adult to fund reskilling or upskilling opportunities at any stage of their life or career

6 FINANCE

Close the Investment Gap

We can deliver a green stimulus, unlock green finance and recognise climate risks to fund the transition to Net Zero, deliver co-benefits for society, economy and environment and establish Scotland as a world leader in ethical, responsible and sustainable investment

A UK Government and Scottish Government should scale-up public investment funded through additional affordable borrowing and taxation of carbon emissions to deliver a large-scale green stimulus

B Scottish Government should develop the *Inward Investment Plan* into a Net Zero inward investment proposition which positions Scotland as the home of sustainable business

C UK Government should work with industry and devolved administrations to agree a new carbon pricing mechanism which aligns with Net Zero, fully accounts for carbon emissions and helps to funds Clean Growth innovation and infrastructure, including supporting a viable business model for CCUS

7 NATURE

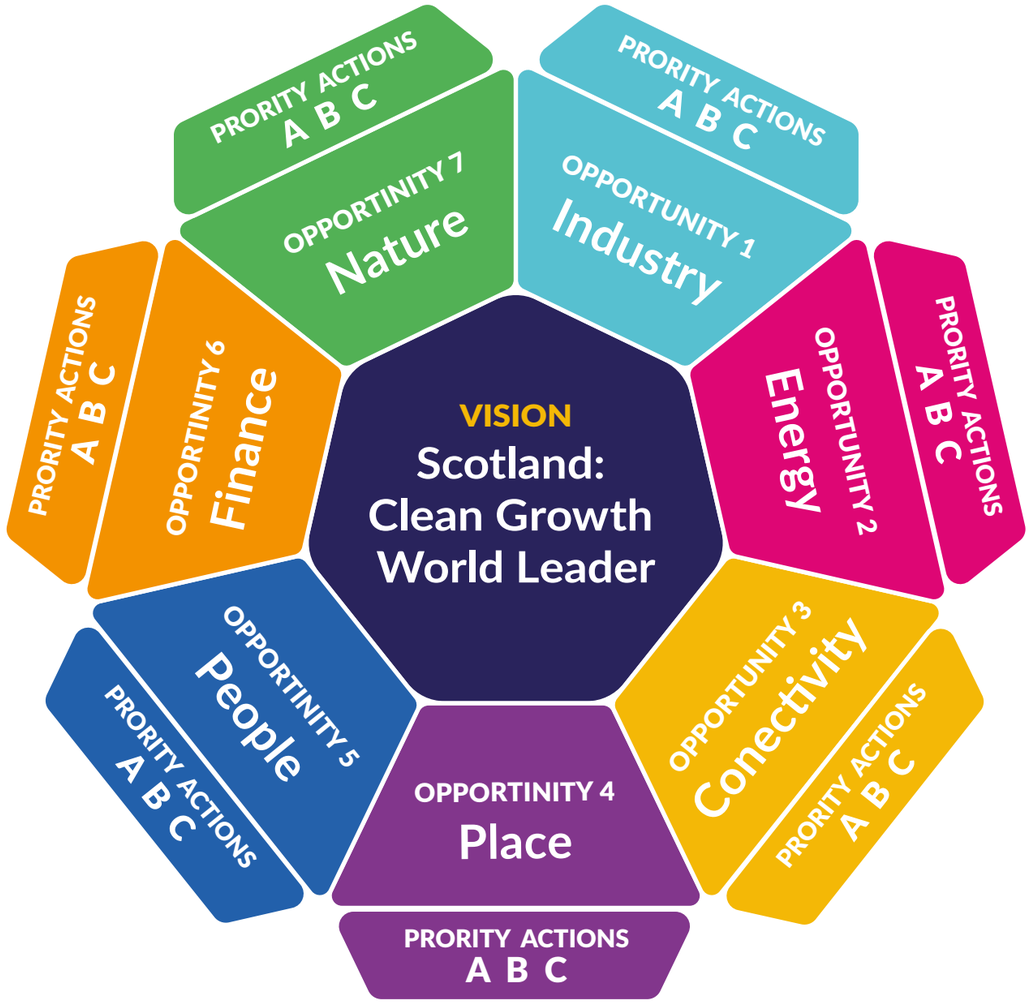
Nature-Rich Future

We can reverse biodiversity loss, transform agriculture, support sustainable forestry, restore our peatlands and grow the Blue Economy to ensure a nature-rich future for all of Scotland

A Scottish Government should recognise the nature emergency and set ambitious nature targets to reverse biodiversity loss which are aligned with Scotland's climate targets

B Scottish Government should propose a new system of farm support payments which protects and restores biodiversity, support innovative and sustainable food production and is aligned with expanded and strengthened advisory services for farmers and crofters

C Scottish Government, its agencies, industry and academia should work together to shape and deliver the *Blue Economy Action Plan*, doubling the size of the sector by 2030 and positioning Scotland as a global leader in marine innovation and sustainability



The Way Forward

We know that this report is just the beginning. We know that the costs and challenges of delivery and the transition to Net Zero will be high – but the costs of failing to act for people, our economy and our planet will be even higher.

We must act and invest now to maximise Scotland's Clean Growth opportunities and to achieve Net Zero by 2045, giving real confidence and fresh hope to our young people and to future generations. The returns will also be high and we can all reap the rewards in the years and decades ahead.

We therefore propose 7 fundamental principles for the way forward to inform the implementation of our ideas:

1. ***Ambition***
   We all need to act with ambition to make Scotland a world leader in Clean Growth, because of the scale of the opportunity to strengthen social, economic and environmental prosperity.

2. ***Collaboration***
   We all need to work together to achieve Net Zero by 2045, because of the complexity and scale of the challenge. This should be the starting point of any action.

3. ***Integration***
   We need to think holistically and develop cross-sectoral partnerships and plans, because silos will create unintended consequences. We should provide certainty and foresight to allow businesses and individuals to prepare and adapt.

4. ***Fairness***
   We need to deliver a Just Transition which leaves no one and no community behind, because we cannot accept or afford inequality.

5. ***Governance***
   We need robust national governance and oversight to coordinate delivery, because there are many different actors across Scotland's economy and society which need to play their part to achieve Net Zero by 2045.

6. ***Pace***
   We all need to act with urgency to respond to the climate and nature emergencies and to maximise Clean Growth in Scotland, because time is short to save the planet and build our competitive advantage. We should be happy to test and learn what works, be comfortable with incomplete knowledge and accept that failure is a risk worth taking.

7. ***Strategy***
   We need to think strategically and develop long-term partnerships and plans, because systemic change can be difficult and will take time. We should take this opportunity to start and continue a national dialogue about how we meet any funding gaps, realising that our investments will also bring economic opportunities.

INTRODUCTION
LEADING THE WAY TO NET ZERO

SCDI's Clean Growth Leadership Group launched in January 2020 to bring together partners from across the public, private and third sectors to lead the way to Net Zero. Our vision is for Scotland to be a world leader in Clean Growth. Our mission is to help make it happen.

We have engaged with businesses, organisations, experts and stakeholders across all sectors and all geographies of the Scottish economy. Our rigorous evidence-build process of interviews, round tables and surveys over several months has helped us to develop ideas backed by business and shaped by SCDI's diverse membership.

We all have a part to play. We hope to inspire ambition and spur action across our economy and our society by government, business and industry, academia and education, regulators, investors, communities and citizens.

We published an interim report in June, *Building Scotland's Green Recovery*. Our plan for Scotland's Green Recovery from the COVID-19 crisis featured 12 big ideas to respond to the climate emergency with the same urgency as the public health emergency. This new report builds on that work and looks beyond the immediate crisis towards the horizon of 2045 and asks:

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What is Clean Growth?

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ECONOMY – boosts competitiveness/innovation/productivity/resilience/sustainability.

PEOPLE – creates green jobs/improves health & wellbeing/delivers a Just Transition for all.

What are the Clean Growth opportunities for Scotland of the transition to Net Zero – and how can we maximise them?

Clean Growth

Clean Growth is growth which works for people, strengthens our economy and saves our planet. It means increasing prosperity while reducing emissions and reversing biodiversity loss. It means responding to the climate and nature emergencies at the same time as delivering a Just Transition for all.

It is a concept which recognises that we need growth for a strong economy and a strong society, but we need to accelerate the decoupling of economic growth and emissions growth if we are to achieve Net Zero. It recognises that our social, economic and environmental prosperity – the future for people, economy and planet – are inextricably linked because of the existential threat of climate change. We must address them together.

7 Clean Growth Opportunities

Our social, economic and natural resources mean that Scotland can become a world leader in Clean Growth if we all work together to maximise the 7 Clean Growth opportunities identified in this report.

Each chapter sets out what must be done with recommendations for government, business and industry, academia and education, regulators, investors, communities and citizens.

Together, they represent our manifesto for Clean Growth:

1. Industry – Transform Industry
Establish world-leading circular and bio economies in Scotland to transform and decarbonise industry to boost innovation, protect jobs and create green jobs in the Net Zero economy

2. Energy – Clean Energy Innovation World Leader
Build on our existing world-class energy expertise to maximise renewable energy generation and flexible storage, pioneer CCUS and build a hydrogen economy to create green jobs, strengthen domestic supply chains and lead in the Clean Growth technologies of the future

3. Connectivity – Net Zero Domestic Connectivity
Accelerate modal shift to active travel and public transport, invest in transport technology, innovation and infrastructure, transform supply chains and deepen digital connectivity to deliver world-leading Net Zero domestic connectivity by 2030

4. Place – Sustainable Communities
Lock-in local value, increase planning ambition and resources, accelerate retrofit, decarbonise heat and raise building standards to build and nurture sustainable, resilient and thriving communities

5. People – Green Skills Revolution
Drive a Green Skills Revolution which builds green skills across society and invests in the reskilling, upskilling and lifelong learning of our people to prepare them for the green industries of the future to create new green jobs, boost productivity, raise wages and attract inward investment

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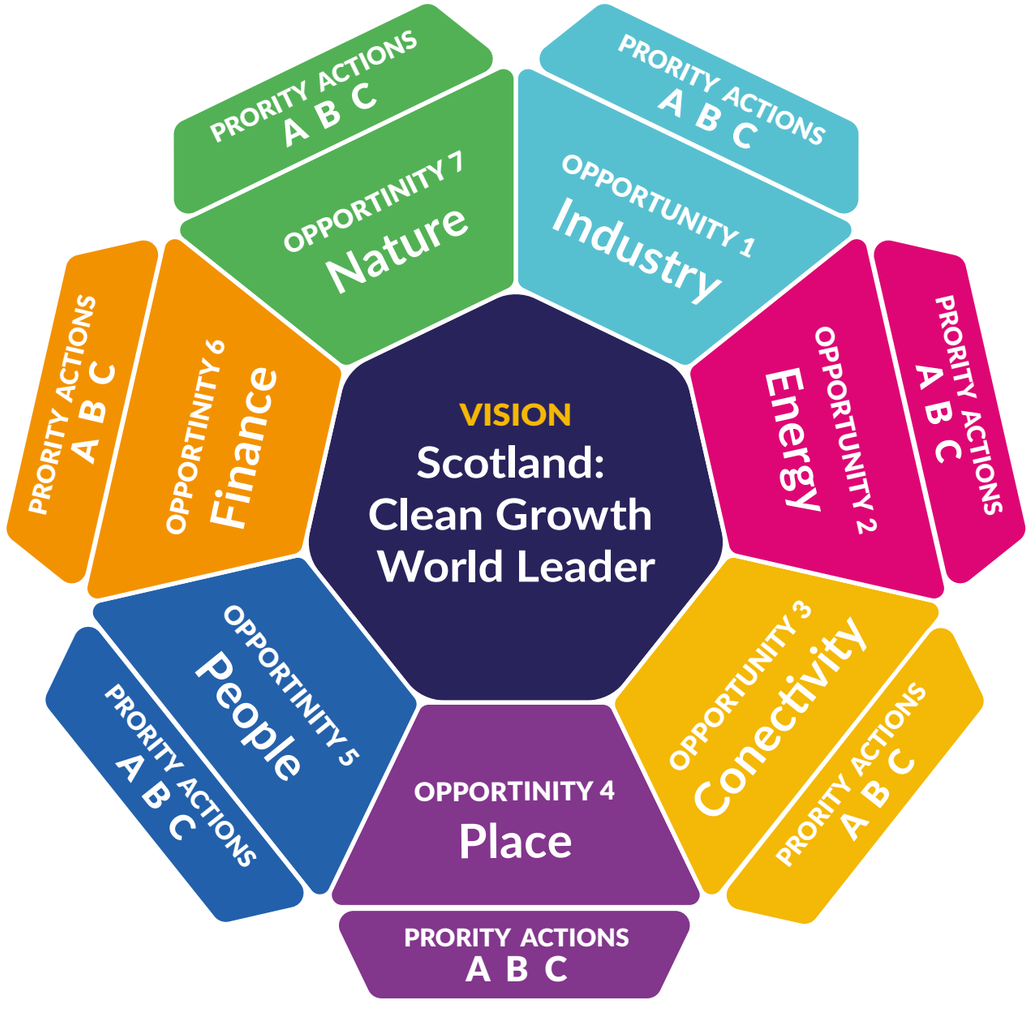
6. Finance – Close the Investment Gap
Deliver a green stimulus, unlock green finance and recognise climate risks to fund the transition to Net Zero, deliver co-benefits for society, economy and environment and establish Scotland as a world leader in ethical, responsible and sustainable investment

7. Nature – Nature-Rich Future
Reverse biodiversity loss, transform agriculture, support sustainable forestry, restore our peatlands and grow the Blue Economy to ensure a nature-rich future for all of Scotland



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We therefore propose 7 fundamental principles for the way forward to inform the implementation of our ideas:

1. *Ambition*
We all need to act with ambition to make Scotland a world leader in Clean Growth, because of the scale of the opportunity to strengthen social, economic and environmental prosperity.

2. *Collaboration*
We all need to work together to achieve Net Zero by 2045, because of the complexity and scale of the challenge. This should be the starting point of any action. We should collaborate with international partners to achieve global Net Zero, deliver Climate Justice and make COP26 in Glasgow a success.

3. *Integration*
We need to think holistically and develop cross-sectoral partnerships and plans, because silos will create unintended consequences. We should provide certainty and foresight to allow businesses and individuals to prepare and adapt. We should work with international partners to help each other achieve Net Zero.

4. *Fairness*
We need to deliver a Just Transition which leaves no one and no community behind, because we cannot accept or afford inequality. We should work with international partners to deliver Climate Justice.

5. *Governance*
We need robust national governance and oversight to coordinate delivery, because there are many different actors across Scotland's economy and society which need to play their part to achieve Net Zero by 2045.

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We all need to act with urgency to respond to the climate and nature emergencies and to maximise Clean Growth in Scotland, because time is short to save the planet and build our competitive advantage. We should be happy to test and learn what works, be comfortable with incomplete knowledge and accept that failure is a risk worth taking.

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We need to think strategically and develop long-term partnerships and plans, because systemic change can be difficult and will take time. We should take this opportunity to start and continue a national dialogue about how we meet any funding gaps, realising that our investments will also bring economic opportunities.

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INDUSTRY
TRANSFORMING INDUSTRY

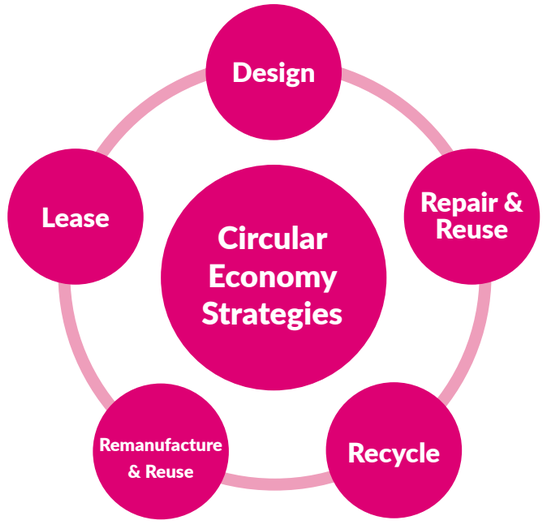
Industry is responsible for a fifth of Scotland's territorial carbon emissions and will have to be largely decarbonised if we are to achieve Net Zero by 2045.

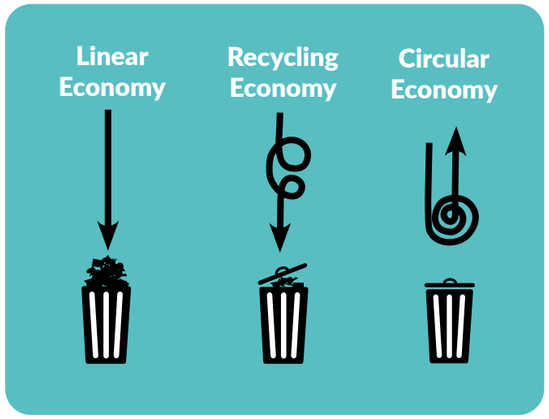
We need to invest in collaboration, innovation and technology to develop more sustainable business models. We need to focus on the most challenging sectors to decarbonise – such as construction, manufacturing and heavy industry – which have so far received less focus or support. We need to develop ambitious collaborations, incentives and regulations which will unleash circular innovation by science and industry.

By establishing world-leading circular and bio economies in Scotland, while also pioneering Carbon Capture, Utilisation and Storage (CCUS), we can transform and decarbonise industry to boost innovation, protect jobs and create new green jobs in the Net Zero economy.

Establish world-leading circular economy

A circular economy maximises value and minimises or eliminates waste. It replaces the linear business model of make-use-waste with a circular approach of make-use-remake. It respects the finite resources of our planet and reduces carbon emissions by transforming the design, production and distribution of products and services. However, it also creates Clean Growth opportunities for business and industry to boost productivity, reduce costs, identify new markets and build competitive advantage.





80% of Scotland's total carbon footprint comes from the heat and energy required to grow, make, process and move goods and materials. Adopting circular business models could reduce emissions for carbon-intensive products like aluminium, plastics and steel by 40% or more.[1]

Circular Jobs

Circular engineers design products to enable parts and resource to be reused

Building information managers maintain data to track and optimise components and assets and minimise energy use

Repair technicians repair appliances, machines or vehicles

Demand planners oversee supply and demand to create greater value

Process operators sort waste for sellable products

Agronomic advisers support healthy soils with organic fertiliser

Procurement professionals stimulate demand for secondary materials

Source: Zero Waste Scotland

Circular economy strategies are generally 'labour and skill intensive' with the potential to create many new high-quality, high-skill green jobs. Nearly 1 in 10 jobs in Scotland already relate to the circular economy, particular in repair, recycling and renewables.[2] The Aldersgate Group estimates that the UK could create over 200,000 new circular jobs, especially in the creative, construction, manufacturing and waste management sectors.[3]

Circular strategies offer the opportunity to re-shore and decentralise production through a diverse localised network of reuse exchanges; sharing economies; maintenance, repair and remanufacture workshops; recycling facilities; and urban farms. Such a network could reindustrialise the regions; build more resilient towns and cities; create more local, more sustainable supply chains; and create secure, local jobs.

Industry will need to develop and implement new design, construction and manufacturing techniques to minimise waste and maximise life cycles. Technologies such as materials traceability, automated sorting and enhanced recycling systems could trace, separate and enable the reuse of materials. New ways of working will need to be developed and mainstreamed across large and complex sectors of the economy and their supply chains – such as in circular construction, which could be revolutionised by new techniques like modular building and more sustainable materials like timber. This will require significant investment in innovation, learning and research to understand the potential for deconstruction of individual materials, reuse and embedding new supply chains. Regulation will be essential to provide clarity and a level playing field for business.

Core green skills in carbon literacy, resource efficiency and digital literacy will be in high demand in the circular economy, as discussed further in the 'People' chapter. Workers will need to reskill and upskill, learning and developing new circular ideas and techniques, as well as how to operate, maintain or repair new circular technologies and equipment. Workers will need to be adaptable, collaborative and innovative.

Educators and employers will need to upskill their workforces and nurture the next generation of circular designers, engineers, entrepreneurs and leaders. Strengthening and expanding access to apprenticeships, vocational training and work-based learning will be vital to prevent major future skills gaps or labour shortages and unlock the Clean Growth opportunities of circular innovation.

Consumers will need to be supported with the information and knowledge they need to make more sustainable choices and back circular businesses. 79% of UK consumers are changing preferences based on social responsibility, inclusiveness or environmental impact, while 88% want brands to help them live sustainably.[4] Improving the labelling of products and services to reflect carbon footprint would raise consumer awareness and further shift consumer behaviours.

1 www.energy-transitions.org/publications/mission-possible
2 www.zerowastescotland.org.uk/content/future-work
3 www.aldersgategroup.org.uk/asset/1697

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The British Retail Consortium has developed a road map for a 'Net Zero retail industry' by 2040. Large retailers from Aldi to Timpson have signed up to ambitious targets to power their businesses with renewable energy, move to low-carbon logistics, source sustainably and produce Net Zero products which help their customers and employees to live low-carbon lifestyles.

IKEA has introduced a new ***Buy Back Initiative*** in the UK. Customers can now return items of furniture in exchange for vouchers up to 50% of original value. Items will then be reused, resold or recycled.

France will introduce repair, durability and sustainability ratings for all electronic and household appliances such as smartphones, televisions and washing machines by 2024. Consumers will be empowered to make more informed choices based on environmental impact, while producers will be incentivised to reduce waste, extend life cycles and bring 'planned obsolescence' to an end. It will be supported by a national network of repair workshops in local communities.

The net costs for consumers of new circular products and services are likely to be minimal. Circular strategies can reduce costs and identify new markets. However, public investment and a mix of regulations and incentives will be required to unleash circular innovation by industry.[5]

Skills and innovation support for circular technologies to be developed, tested, deployed and scaled-up on a commercial basis can support an accelerated, just and smooth transition to Net Zero. It should build on the support announced to date, such as the Green Jobs Fund. Scotland's enterprise and skills agencies and seven Innovation Centres, in addition to the Scottish Institute for Remanufacturing and National Manufacturing Institute Scotland, are important assets to leverage to grow our circular economy.

Skills Development Scotland and Zero Waste Scotland have an essential role to play to work together with partners across academia, agencies and industry to develop and deliver circular reskilling, upskilling and work-based learning programmes with a particular focus on SMEs to transform industry and its supply chains.

The 15% of Scotland's waste which is exported every year is a wasted Clean Growth opportunity. Much of this waste is exported to jurisdictions with significantly lower environmental and employment standards. Taking greater responsibility for our own emissions and environmental impact could reduce emissions, retain value in Scotland and create new green jobs in circular innovation and waste management. The Scottish Government should therefore set a national target to reduce the proportion of waste exported from Scotland and invest in strengthening domestic recycling capacity.

Industry should build sectoral and cross-sectoral partnerships to develop new supply chains for reuse materials or repairs, share best practice and pool and share resources or risks. There are opportunities to integrate industrial processes and supply chains to support mutually reinforcing, mutually supportive circular business models.

Waste or by-products from one sector, such as food & drink or manufacturing, can be valuable resources for reuse in another sector, such as agriculture or aquaculture. Zero Waste Scotland, SEPA and the Innovation Centres can play an intermediary role to identify potential opportunities for industry collaboration.

Scotland's Circular Economy Strategy (2016) aims to end our 'throwaway culture' and set targets to recycle 70% of all waste and send no more than 5% of all waste to landfill by 2025. A statutory prohibition on biodegradable municipal waste going to landfill, a levy to plastic bags and a ban on cotton buds and microbeads have been recently introduced. A Deposit

4 https://brc.org.uk/media/676312/climateactionroadmap_final_rgb_updated.pdf
5 www.energy-transitions.org/publications/mission-possible

Return Scheme will be implemented in 2022.

Deposit Return Scheme

Scotland's Deposit Return Scheme will go live on 1 July 2022 to reduce litter, waste and pollution:

- 20p deposit on plastic, metal and glass drinks containers
- More than 17,000 return points nationwide
- Reverse vending machines in retail, hospitality, public buildings and communities
- 90% of containers will be recycled

The Scottish Government is currently consulting on banning the use of major single-use plastics such as containers, cutlery and straws. This welcome step would make Scotland one of a handful of countries globally to so. Canada will implement a nationwide ban by the end of 2021.

Scotland could also align with the target of the *EU Circular Economy Package 2018* that all plastic packaging in use should be recyclable by 2030. The UK Government could learn from Italy to reduce consumption, where plastic production will be limited to high-quality, highly sustainable materials and a 45 cents per kilo plastic tax introduced from January 2021. The UK Government will also introduce a Plastic Packaging Tax in 2022 to plastic packaging manufactured in or imported into the UK which contains less than 30% recycled plastic, incentivising businesses to transform production processes and supply chains.

Nevertheless, the UK and Scotland can and should go further to maximise the Clean Growth opportunities of the circular economy. Local authority reuse, recycling and food waste services need to be enhanced and expanded across the country, especially in rural areas where progress or provision has often lagged.

Extended Producer Responsibility (EPR) systems which currently cover packaging, batteries, electronics and vehicles should be strengthened to ensure that they are robust and fit for purpose to deliver a Just Transition. New EPR systems for all manufactured products should be developed across the UK. Data and technology could be harnessed to track and monitor waste.

Making Polluters Pay

The aim of EPR schemes is to ensure that producers are financially responsible for the negative environmental impacts of their own products – and are incentivised to reduce or eliminate these impacts.

This can include covering the costs of awareness raising, cleaning up litter, waste collection or data analysis to support take-back, reuse or recycling.

The four nations of the UK are working jointly to review existing EPR schemes and potentially develop new ones.

Build a bioeconomy

A significant challenge to decarbonising industry will be to develop alternatives to the many industrial processes which inevitably create carbon emissions and to transition away from petrochemicals as the key means or ingredients to manufacture chemicals, pharmaceuticals, fuels and everyday consumer goods in a global economy dependent on fossil fuels. New biofuels can be developed from agricultural crops, while waste from local value chains can be used as feedstock.

Key sectors like chemicals, refining and food & drink are among our biggest employers, largest exporters and highest emitters. Over 180,000 people – around 7% of Scotland's workforce – are employed in manufacturing.

The Grangemouth cluster, centred on a major petrochemicals plant and Scotland's only crude oil refinery, is Scotland's largest and the UK's third largest industrial cluster. It is of strategic importance to our economy. It supports key sectors from aviation to haulage, in addition to thousands of direct and indirect jobs. It also contributes 30% of Scotland's total

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industrial emissions.[6]

The emerging scientific approaches of industrial biotechnology offer solutions to transform these petrochemical-based industries and represents a Clean Growth opportunity for Scotland. Alongside circular innovation and CCUS at scale, industrial biotechnology can support these sectors to decarbonise, protect jobs and grow sustainably.[7]

What is Industrial Biotechnology?

Industrial biotechnology is a new, exciting and fast-growing sector in the circular economy which uses natural processes, sustainable raw materials and renewable feedstocks in advanced, high-value manufacturing to develop new low- and zero-carbon industrial products or find new uses for industrial by-products.

Scotland's burgeoning industrial biotechnology sector was identified as a key opportunity in the Scottish Government's *Inward Investment Plan*, taking advantage of the expertise, experience and infrastructure of our energy, life sciences and manufacturing sectors. The global market for industrial biotechnology is projected to reach $577bn by 2026.[8]

The Industrial Biotechnology Innovation Centre (IBioIC) was established in 2014 to connect industry with research expertise to accelerate the development of new biotechnology processes and products for the global market. The National Plan for Industrial Biotechnology has set a £900m turnover target to be achieved in Scotland by 2025. In 2012, industrial biotechnology turnover in Scotland was less than £200 million. By 2019 it had grown by over 270% to £747 million.

Public investment, incentives and innovation support could leverage and support the Falkirk Growth Deal, the IBioIC and industry to transform the Grangemouth petrochemicals site into a biorefinery as the key enabler, accelerator and cornerstone of a future bioeconomy thriving across Scotland. A pilot plant and demonstrator facilities in Grangemouth will test CO2 re-use and biomass as feedstocks and develop new, clean biorefinery processes.

Bio-based manufacturing shares key skills sets with conventional petrochemical-based manufacturing which could help deliver a Just Transition. Existing firms and workers could transition new markets and new roles in this new sector with relative ease and with support from the higher and further education sector across the Central Belt.

Establish Scotland as a CCUS pioneer

It may not be possible, however, to decarbonise all of industry using circular strategies or biotechnologies. It is likely that the only route to zero-carbon cement production, for example, as well as the most effective route to zero-carbon steel or chemicals production, will be by utilising Carbon Capture, Utilisation and Storage (CCUS).[9]The Climate Change Committee (CCC) is clear that we will need CCUS to get to Net Zero.[10]

Reducing heat and energy use through energy efficiency and demand management should also play a major role. It should reduce the cost and scale of other interventions which would otherwise be required to decarbonise and minimise the need for carbon offsetting only when necessary or unavoidable.

As discussed further in the 'Energy' chapter, CCUS should be part of Scotland's Net Zero energy mix. The infrastructure required to decarbonise industry, including CCUS, should be a key priority for the Infrastructure Investment Plan 2021-2026. The UK Government and Scottish Government should work together to provide the necessary public investment to pioneer CCS in Scotland at St Fergus in the North East as part of an integrated Energy Strategy.

Scotland can pioneer CCUS to support the decarbonisation of Scottish, UK and European industry. The Acorn CCS project would repurpose

6 www.theccc.org.uk/wp-content/uploads/2019/12/Reducing-emissions-in-Scotland-2019-Progress-Report-to-Parliament-CCC.pdf
7 www.scottishscience.org.uk/article/ssac-report-environmental-impacts-scottish-manufacturing-industry
8 www.gov.scot/publications/shaping-scotlands-economy-scotlands-inward-investment-plan
9 www.energy-transitions.org/publications/mission-possible
10 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament

existing gas pipelines to put 80% of Scotland's industrial emissions within reach, including Grangemouth. Scotland could capture and store 4 million tonnes of CO2 every year – a third of our annual industrial emissions today – from the mid-2020s.[11] Industries could relocate production to Scotland to eliminate or store their emissions and achieve Net Zero – or to utilise captured CO2 in new industrial processes. Scotland's pioneering carbon storage services could be sold to other countries which lack similar domestic capacity.

However, there is a need to develop a commercial model for CCUS, as well as strengthen incentives and regulations which accelerate industry's efforts to decarbonise, as discussed further in the 'Energy' and 'Finance' chapters of this report.

RECOMMENDATIONS

Establish world-leading circular economy

- Educators should embed circular skills in curricula across primary, secondary and tertiary education

- Skills Development Scotland, Zero Waste Scotland, educators and employers should strengthen and expand access to circular reskilling, upskilling and work-based learning opportunities across the workforce with a focus on SMEs

- Scottish Government and Zero Waste Scotland should bring forward plans for repair, durability and sustainability ratings for all electronic and household appliances supported by a national repair network

- Industry should build sectoral and cross-sectoral partnerships which develop circular expertise, innovations, strategies and new supply chains for reuse materials and repairs with support from Zero Waste Scotland, SEPA and Innovation Centres

- UK Government and devolved administrations should strengthen existing EPR systems and develop new EPR systems for all manufactured products

- Scottish Government should set a national target to reduce the proportion of waste exported from Scotland and invest in strengthening domestic recycling capacity and expertise

Build a bioeconomy

- UK Government and Scottish Government should back biotechnological innovation which supports industry to decarbonise, transform Grangemouth into a biorefinery and protect job through public investment, regulation, incentives and innovation support

Establish Scotland as a CCUS pioneer

- Scottish Government should deliver an integrated Energy Strategy with the ambition of establishing Scotland as a global CCUS pioneer

- UK Government should bring forward the necessary funding to accelerate the Acorn CCS Project and establish a CCS Hub at St Fergus as one of the UK's four clusters

11 www.neccus.co.uk/the-roadmap

Manifesto for Clean Growth – Clean Growth Leadership Group

ENERGY

CLEAN ENERGY INNOVATION WORLD LEADER

Scotland has the potential to be a world leader in clean energy innovation, harnessing our geology, our economy and our people to build on the great progress made in the deployment and generation of renewable energy.

Scotland's energy sector, its strong supply chains and its skilled workforce are part of the solution to climate change and our Clean Growth future. Their strengths and assets give us the opportunity to reduce emissions from the oil and gas basin to Net Zero, and to pioneer new technologies like floating offshore wind, CCUS and hydrogen.

By maximising renewable energy generation and flexible storage solutions to fully decarbonise our electricity system, pioneering CCUS and building a hydrogen economy, we can create a living lab for clean energy innovation in Scotland to create new green jobs, strengthen domestic supply chains and develop, test, deploy and export the Clean Growth technologies, jobs and expertise of the future.

Maximise renewable energy capacity

The rise of renewables has been the biggest success story of Scotland's Net Zero journey so far. The power sector has delivered a remarkable transformation from a high-carbon, high-polluting industry to the lowest emitting sector of the Scottish economy.

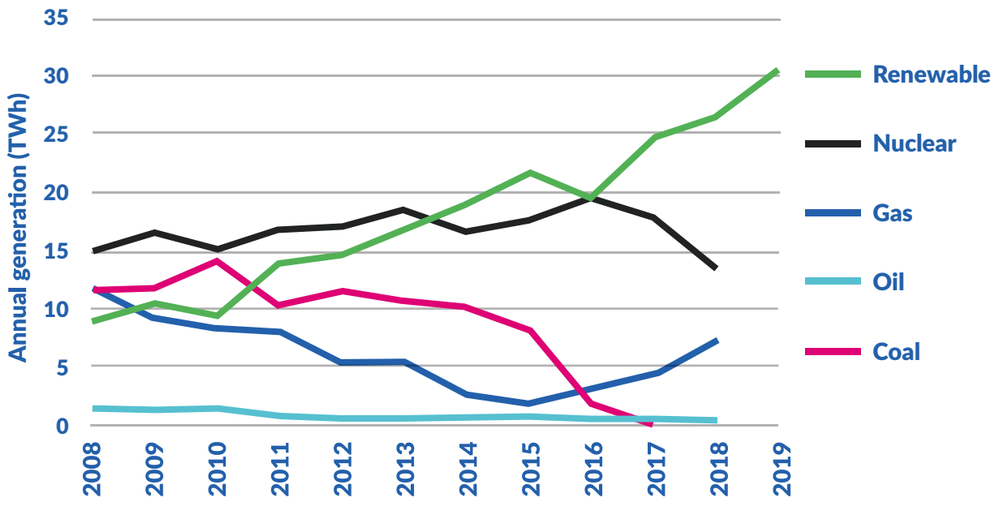
Scotland's last coal-fired power station and biggest single polluter at Longannet closed in 2016. Renewables support mechanisms have facilitated large onshore and offshore wind developments which continue to come onstream, such as the Beatrice, Clyde and Whitelee Wind Farms. Solar, wave, tidal and hydropower are a key part of Scotland's increasingly sustainable and diverse energy mix. The oil and gas sector will also continue to play an important role and is committed to investing and innovating to reduce emissions and deliver a Net Zero oil and gas basin by 2050.[1]

In the decade to 2018 power sector emissions fell dramatically by 85%, establishing Scotland as a world leader in electricity system decarbonisation. 2019 was a record year for renewable electricity generation as Scotland produced 90.1% of its total electricity consumption from renewables. The national target of 100% by 2020 set a strong signal of ambition and is now well within reach. Scotland also set a record for electricity exports worth £745m.[2]

The costs of renewable energy have also fallen dramatically as deployment and innovation have delivered productivity gains and economies of scale. Renewable energy now generates the 'cheapest

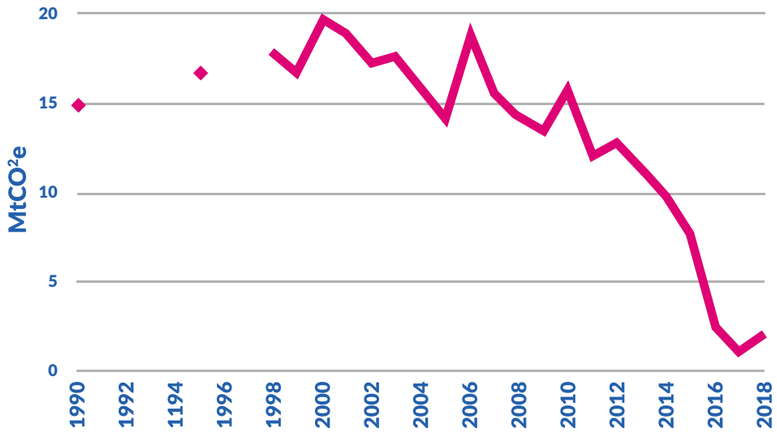
1 https://roadmap2035.co.uk/roadmap-2035/
2 Energy Statistics Scotland, Q1 2020

Figure 3.15.
Energy generation by fuel in Scotland (2008-2018)



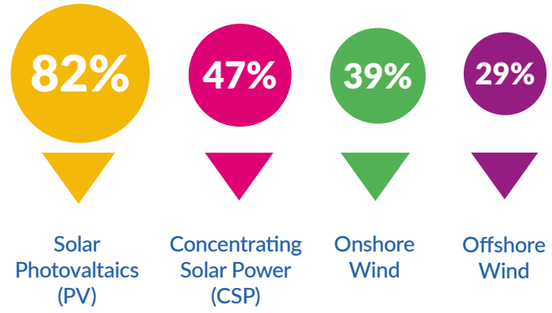
Source: Scottish Goverment (2020). *Scottish Energy Statistics Hub: Proportion of electricity generation by fuel, Electricity generated from renewable sources 2000-2019.*

Figure 3.14.
Power sector emissions in Scotland (1990-2018)



Source: NAEI (2020) *Greenhouse Gas Inventories* for England, Scotland, Wales and Northern Ireland: 1990-2019.
Notes: No emissions data are available for Scotland for 1991-1994 or 1996-1997. Does not reflect forthcoming revisions to global warming potentials (see Box 2.1).

Falling Power Generation Costs
Renewable energy costs declined rapidly over the last 10 years (2010-2020)



electricity in history'. Returns for investors are increasingly competitive, strong and reliable.[3]

Scotland's energy sector is continuing to invest in innovation to reduce emissions and maximise productivity. It is leveraging mature domestic supply chains, including many SMEs, which have long supported the oil and gas industry and are now pivoting towards the clean energy technologies of the future.[4]

By continuing to expand our renewables capacity beyond the 100% target, Scotland can seize the Clean Growth opportunities of electrification of our economy and exporting clean energy to countries and markets around the world.

We need to maximise this potential by ramping up testing and deploying next generation technologies like wave, tidal, onshore wind and floating offshore wind, cementing Scotland's reputation as a living lab for Clean Growth innovation in renewables.

Renewable electricity generation, 2019

Total – 90.1% of total consumption

Onshore Wind – 56.5%
Hydro – 15.8%
Offshore Wind – 9.4%
Other – 8.4%

Source: Energy Statistics Scotland

Scotland has 25% of Europe's offshore wind potential, 25% of its tidal resource and 10% of its wave resource. The Scottish Government's latest Offshore Wind Policy Statement sets an ambition of increasing the offshore wind capacity in Scottish waters to 11GW by 2030. Scotland has 5.6GW of consented offshore capacity, of which 1GW is operational. Crown Estate Scotland's first round of ScotWind Leasing will facilitate this next generation of developments over the next decade.

Hywind: First Ever Floating Wind Farm

Located 15 miles off the coast from Peterhead, Hywind is the world's first commercial floating wind farm. It generates enough electricity for more than 20,000 homes. The infrastructure floats on the surface of the ocean rather than being dug into the seabed.

Nearly 12,000 people now work in our renewables sector. However, the anticipated green industrial revolution with high value jobs in the manufacture of renewables equipment and infrastructure, has not yet materialised.

We cannot afford to continue to outsource or offshore high-value green jobs in advanced and low-carbon manufacturing. We should maximise the proportion of wind turbines, tidal barrages, wave energy converters and storage technologies like batteries which are

3 www.webstore.iea.org/world-energy-outlook-2020
4 https://theogtc.com/media/3875/closing-the-gap-summary-report.pdf

manufactured in Scotland.

Scotland needs to take steps to build internationally competitive domestic supply chains for the renewable energy sector. Supporting it to secure a greater share of the £5 billion of investment which is on the horizon would maximise the Clean Growth opportunity for Scotland. Due to the location of many of these opportunities and developments, this could also deliver a Just Transition by creating high-value green jobs in regions with higher deprivation or unemployment.

Future seabed leasing rounds and contractual agreements for projects should include minimum requirements for local content in equipment and people. The Offshore Wind Sector Deal, for example, includes an ambitious local content aspiration of 60%, which government and industry will have to work together to deliver.[5] The UK's departure from the EU also potentially creates the legal and policy space to review the approach of the UK Government and the Scottish Government towards State Aid, adopting more pro-active industrial strategies for Clean Growth.

Higher levels of renewable energy generation and accelerated electrification of much of our economy will create new challenges for the power system. The CCC has recognised the need for further investment in the capacity, flexibly and resilience of the grid and energy networks to support higher levels of generation, storage and transport and to ensure secure and stable energy supply. The grid will face new challenges with increasingly frequent and extreme fluctuations in weather due to climate change, as well as large increases in demand due to, for example, the take-up of Electric Vehicles (EVs) and electric heat pumps. Electricity storage technologies like batteries and pumped storage will be essential when the wind does not blow or the sun does not shine.[6]

SSE, ScottishPower and **National Grid** will make a multi-billion investment in an 'underwater super-highway' to significantly increase the UK's renewable energy capacity.

The ***Eastern Link*** is will enable enough electricity for around four million homes to travel up to 440km from Peterhead and Torness to North East England, as well as support hundreds of green jobs from 2024 throughout construction and operation

Scotland now has 764 MW of storage available, including 24 MW of battery storage, but the vast majority from two pumped storage hydro plants, Drax's Cruachan and SSE's Foyers. Pumped storage technology is the dominant storage technology worldwide. It can offer long duration and grid level storage but it is also highly flexible so it can help enable the deployment of renewables.

There are several potential pumped storage developments which can create economic opportunities in communities across rural Scotland. Almost 3.7 GW of storage projects are in planning or awaiting construction, including four separate pumped hydro projects with a combined capacity of 2.8 GW.[7] Projects such as Drax's Cruachan 2, which involves the expansion of the existing pumped storage power station in Argyll, are recognised as 'national developments' in Scotland's NPF3.

Current policy frameworks which do not fully recognise the value of storage solutions can create challenges for large-scale, long-term capital investment in these assets. UK Government support for establishing a suitable market mechanism to enable further investment in new pumped hydro storage projects is vital.

The UK Government and Ofgem, as well as Scotland's planning authorities, will need to work together to accelerate, prioritise and support the delivery of renewable energy projects. Planning needs to be reformed and properly resourced to do so, as discussed further in the 'Place' chapter.

5 www.gov.uk/government/publications/offshore-wind-sector-deal
6 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament
7 Scottish Government (2020) Annual Compendium of Scottish Energy Statistics – August Update

Manifesto for Clean Growth – Clean Growth Leadership Group

Establish Scotland as a CCUS pioneer

Oil and gas will remain a part of Scotland's diverse future energy mix beyond 2045 with some products and services still dependent on fossil fuels. Pioneering CCUS will therefore be essential. CCUS at scale can enable sequestration of high volumes of CO2 and utilisation of CO2 for new products and services to create high value green jobs and fuel Clean Growth for business and industry. We cannot get to Net Zero without it.[8]

How does CCUS work?

1. **Capture** – CO2 separated from other gases produced at large industrial facilities (e.g. gas-fired power station, cement plant, refinery)
2. **Transport** – CO2 compressed and transported (e.g. by pipeline, ship, truck) to geological site
3. **Storage** – CO2 injected into deep underground rock formations, usually at depths of one kilometre or more
4. **Utilisation** – Alternatively, CO2 can be used as a resource to create valuable products or services (e.g. animal feed, chemicals, biofuels)

Scotland is a potential world leader in CCUS because of our geology, our existing infrastructure and the experience and expertise of our workforce. Scotland holds 35% of European geological storage resources suitable for CO2. Only a handful of countries have this Clean Growth opportunity because of their geology.

Scotland's CCUS Advantage

1. **Geology** – Globally significant scale of geological storage resource in Scottish North Sea to satisfy much of Europe's CO2 storage needs to get to Net Zero
2. **Infrastructure** – Scotland's major industrial clusters and oil & gas sector with strong supply chains and legacy infrastructure to harness and repurpose for CCUS
3. **People** – Skills and talent of Scotland's oil and gas workforce with 50 years' expertise and experience working in North Sea and on UK Continental Shelf

We can utilise the skills, expertise and experience of our oil and gas sector and its strong supply chains, as well as its legacy infrastructure such as wells, rigs and pipelines, to deploy CCUS at pace and at scale, accelerating our transition to Net Zero and fuelling Clean Growth across key sectors of the Scottish economy.

Even capturing a relatively small market share would create significant numbers of new, high-value green jobs in fulfilling domestic and global demand. CO2 from Europe's energy-intensive industrial heartlands could be transported for capture and storage in offshore sites in the Scottish North Sea – or for utilisation by industry in the production of animal feed, chemicals and biofuels. There are only 19 CCS facilities in operation worldwide today, but over 4,000 CCS facilities will be required globally to meet the emissions targets in the Paris Agreement of 2015.[9]

Progress in the deployment of CCUS infrastructure in the UK has, nevertheless, been slowed by two major barriers: the capital intensity of CCUS projects and the lack of a commercial model.

Government therefore has an essential and urgent role to play in the future of CCUS through both regulation and investment. Regulation can create new markets and simulate innovation. Public investment can provide policy certainty and market confidence, support economies of scale and reduce risks to unlock private investment in CCUS, as well as send signals to enable the domestic supply chain to pivot towards new opportunities.

Developing a viable business model will be important for the long-term sustainability and effectiveness of CCUS infrastructure. The UK Government committed in August 2020 to develop a business model within

8 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament
9 www.webstore.iea.org/world-energy-outlook-2020

the next two years. Further innovation will also be required by the energy sector to reduce costs and maximise efficiency.[10]

A viable business model for CCUS will require a carbon pricing mechanism which creates strong financial incentives for businesses, especially in the hardest to decarbonise sectors, to invest in reducing or at least storing industrial emissions. Whether this mechanism is a strengthened emissions trading system or a new carbon tax, or includes a carbon tax on imports, it will need to be applied consistently, fairly and predictably across the economy and aligned with Net Zero by 2045.

The Scottish Government should deliver an integrated Energy Strategy with the ambition of pioneering CCUS in Scotland, which signals strategic direction and promotes market confidence. The infrastructure required to decarbonise industry, including CCUS, should be a key priority for the *Infrastructure Investment Plan 2021-2026*.

The UK Government's CCS Infrastructure Fund and *10 Point Plan for a Green Industrial Revolution* make strong commitments to CCS. A total of £1 billion of funding will create two CCS clusters by the mid-2020s and another two by 2030. The UK Government should bring forward the necessary funding to accelerate the Acorn CCS Project and establish a CCS Hub at St Fergus as a priority to harness Scotland's CCUS advantage to in geology, infrastructure and people to decarbonise Scottish industry and fuel Clean Growth.

Acorn: Scotland's CCS Opportunity

Acorn CCS is a CCS project based at the St Fergus gas terminal in the North East, where more than a third of the UK's natural gas comes onshore.

The first phase offers a low capital cost start by repurposing existing gas pipelines to transport CO2 to St Fergus from the Central Belt. The Feeder 10 pipeline puts 80% of Scotland's industrial emissions within reach, including Grangemouth. CO2 could also be imported via Peterhead Port.

The project is led by Pale Blue Dot Energy with funding and support from industry partners at Chrysaor, Shell and Total. Positive public investment decisions in 2021 could unlock the project, with preparations at the storage site kicking off in 2022 followed by fully operational CCS in 2024 and CO2 imports in 2025.

Build a hydrogen economy

Hydrogen will be an integral part of the energy transition. Scotland has the opportunity to build on our early success as one of Europe's leading early adopters of hydrogen technologies and solutions to build a world-leading hydrogen economy which attracts inward investment and creates new high-value green jobs across energy, engineering, manufacturing and transport. The hydrogen economy could be worth up to £22.5 billion to Scotland's GDP and create up to 28,900 jobs.[11]

'Green' Hydrogen and 'Blue' Hydrogen

Green hydrogen is when the electrolyser is powered by renewable sources like wind and solar power. The process is completed without any emissions to ensure a zero-carbon product. ScottishPower is developing a green hydrogen production facility near Glasgow at Whitelee Wind Farm to supply the commercial market within two years.

Blue hydrogen is primarily produced through steam methane recovery from natural gas. The process creates carbon emissions, but CO2 can be captured and used or stored through CCUS to create low-carbon products. Acorn Hydrogen is part of the Acorn CCS project at St Fergus which could produce hydrogen to transmit nationally and for export.

10 www.theogtc.com/media/3875/closing-the-gap-summary-report.pdf
11 www.theacornproject.uk/wp-content/uploads/2020/09/Hydrogen-in-Scotland-The-role-of-Acorn-Hydrogen-in-Enabling-UK-Net-Zero.pdf

Hydrogen has several major uses which can be deployed to decarbonise key sectors and fuel Clean Growth. It can be utilised as an alternative to batteries for zero-carbon connectivity, particularly for larger vehicles in public transport or haulage such as buses, trucks, lorries and even ships. It can be utilised in heavy industry in the production of chemicals, iron or steel as a replacement for fossil fuels.

Hydrogen could also be utilised to potentially decarbonise all or parts of the gas network, with new zero-carbon hydrogen boilers replacing high-carbon gas boilers to heat our homes, businesses, hospitals and schools. Some models are already on sale and some scoping projects are underway.

However, there are significant technical and regulatory barriers to its use for domestic and non-domestic heat which need to be overcome. Existing regulations restrict the use of hydrogen through the existing gas grid. The National Transmission System may also need to be updated, perhaps with the creation of dedicated hydrogen pipelines, to ensure safety, security and resilience of energy supply.[12]

Levels of domestic zero- and low-carbon hydrogen production are very low at present. By stimulating demand for low-carbon hydrogen, blue hydrogen could be leveraged as an enabler of green hydrogen to accelerate progress.[13] Scotland will need to vastly expand zero- and low-carbon hydrogen production to meet future demand from a mature domestic hydrogen economy and to capture future export potential.[14]

Scotland is home to some world-leading hydrogen pilots, especially along Scotland's 'Hydrogen Coast' from Fife to the Northern Isles. SGN's H100 Fife proect will create a world-first 100% hydrogen-to-homes zero-carbon network in Levenmouth.[15] Orkney has developed its own local hydrogen strategy. The Scottish Cities Alliance has a strong track record of facilitating collaboration and innovation on hydrogen in our seven cities. Aberdeen is one of Europe's pioneering hydrogen cities and the local authority has switched much of its bus fleet to hydrogen. Glasgow City Council is decarbonising its vehicle fleet through a mix of battery and hydrogen fuel cell vehicles in partnership with Scottish Power who are providing 100% renewable electricity to support this transformation.

'The Hydrogen Islands'

Orkney Islands Council's **Hydrogen Economic Strategy** sets out its support for green hydrogen production, a new hydrogen heating system for a local school, reskilling the local workforce and a growing fleet of hydrogen fuel cell vehicles for the local authority.

Scotland needs a national hydrogen strategy to build a national hydrogen economy supplied by strong domestic supply chains producing electrolysers, fuel cells, storage and other critical infrastructure. The Programme for Government 2020/21 announced that the Scottish Government will set out a new *Energy Strategy, a Hydrogen Policy Statement* and a *Hydrogen Action Plan* in 2021. The UK Government's *Hydrogen Strategy* will be published in Spring 2021.

Together, these policy statements should set out how the Scottish Government nd the enterprise agencies will work with the UK Government, local authorities and the private sector to radically scale-up production of green and blue hydrogen; develop a national network of hydrogen refuelling stations where necessary; create incentives to back innovation; and build a learning ecosystem and domestic supply chain which can meet new levels of demand, create new green jobs and support workforce transition.

These new documents should be aligned with a refreshed *UK Industrial Strategy*, which should make building a hydrogen economy a key priority, backing innovation, removing regulatory barriers and developing risk-sharing mechanisms to create new markets for hydrogen.

12 www.theacornproject.uk/wp-content/uploads/2020/09/Hydrogen-in-Scotland-The-role-of-Acorn-Hydrogen-in-Enabling-UK-Net-Zero.pdf
13 www.oxfordenergy.org/wpcms/wp-content/uploads/2020/06/Blue-hydrogen-as-an-enabler-of-green-hydrogen-the-case-of-Germany-NG-159.pdf
14 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament
15 www.sgn.co.uk/H100Fife

Both governments should work together to ensure that their new strategies and action plans are aligned. Both governments should recognise the importance of green and blue hydrogen as an essential part of an integrated Energy Strategy to help decarbonise transport, heat and industry, as well as create Clean Growth opportunities for Scotland.

The UK Government's target to raise funding for research, science and innovation to 2.4% of UK GDP is therefore very positive. A large proportion of this funding should be targeted at Clean Growth R&D, such as innovation in CCUS, hydrogen or geothermal minewater, to maximise the Clean Growth opportunities of the transition to Net Zero. For example, the Scottish Government's Energy Transition Fund should be extended and expanded to accelerate Clean Growth innovation across the energy sector.

It is also critical that the UK negotiates continued participation in the EU's Horizon Europe research programme from 2021 or at least matches current levels of investment in research, science and innovation. The UK Government's own estimates suggest it could have to fill a £1.5 billion funding hole. Between 2015 and 2017, the UK secured over €4.5 billion from the EU for research and innovation in the UK, which played a vital role in accelerating Clean Growth R&D across all sectors of the economy.[16]

Geothermal Minewater Innovation

The University of Strathclyde has won UK Research and Innovation funding to develop a bid to utilise the geothermal energy trapped in Scotland's disused, flooded coal mines for low-carbon domestic heat. If successful, 'HotScot' will develop at least three minewater geothermal heating, cooling and energy storage sites.

Heat trapped in the disused mines of the Central Belt alone could meet up to 8% of Scotland's domestic heat demand, deliver £303 million for GDP and create 9,800 new green jobs. The technology could build sites globally, exporting Scotland's Clean Growth innovation and expertise around the world.

RECOMMENDATIONS

Maximise renewable energy capacity

- Industry should work with Scottish Government to build an internationally competitive domestic supply chain for renewable energy manufacturing and increase local content in equipment and the use of local people
- UK Government should commit to introducing a policy mechanism to support the deployment energy storage provided by technologies such as pumped storage
- UK Government, Scottish Government, Ofgem and local authorities should work together to accelerate, prioritise and support the delivery of renewable energy projects

Establish Scotland as a CCUS pioneer

- Scottish Government should deliver an integrated Energy Strategy with the ambition of establishing Scotland as a global CCUS pioneer
- UK Government should work with industry and devolved administrations to agree a new UK carbon pricing mechanism which supports a viable business model for CCUS, aligns with Net Zero and funds Clean Growth innovation and infrastructure
- UK Government should bring forward the necessary funding to accelerate the Acorn CCS Project and establish a CCS Hub at St Fergus as one of the UK's four clusters
- Scottish Government should extend and expand the Energy Transition Fund to invest in Clean Growth innovation across the energy sector

Build a hydrogen economy

- UK Government and Scottish Government should invest in innovation, infrastructure and incentives to scale-up green and blue hydrogen production and use
- UK Government should incentivise industrial-scale energy users to adopt hydrogen-fuelled technologies
- UK Government, Scottish Government, local authorities and industry should build a national network of hydrogen refuelling stations

16 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/844488/Changes_and_Choices.pdf

Manifesto for Clean Growth – Clean Growth Leadership Group

CONNECTIVITY
NET ZERO DOMESTIC CONNECTIVITY

Connectivity supports the movement and exchange of people, ideas, goods and services across physical and virtual networks. Digital and transport infrastructure keep us connected, help us collaborate and plug our economy into global flows of talent, technology, trade and investment.

The Just Transition to Net Zero presents two big connectivity challenges for Scotland because of our rural, remote and island communities and our position on the geographical periphery of Europe. We must remain open for business and connected to the world, whilst delivering a Just Transition which leaves no one and no community behind.

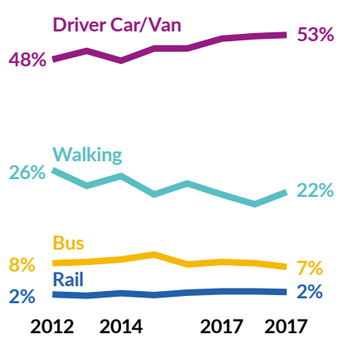
By accelerating modal shift to active travel and public transport, investing in transport technology, innovation and infrastructure, transforming supply chains and deepening digital connectivity, we can deliver world-leading Net Zero domestic connectivity by 2030.

Accelerate modal shift to active travel and public transport

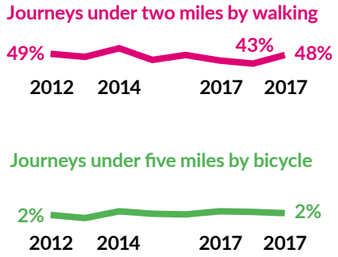
Transport is Scotland's highest emitting sector,

How Scotland Travels

Journeys by mode of transport



Active travel journeys



Source: Scottish Household Survey 2019

representing 36% of emissions in 2018. In the context of a growing population, but despite substantial progress in other sectors, transport emissions remain largely unchanged on 1990 levels. This is largely due to stubbornly high levels of private car use. Road vehicles powered by fossil fuels represent up to 30% of Scotland's total emissions.[1]

The key to delivering low- and zero-carbon transport connectivity is enforcing the sustainable transport hierarchy through both investment and regulation, incentives and deterrents. There has been a lack of action to date to systematically deprioritise and disincentivise petrol and diesel cars. There have been concerns that doing so would impact negatively on the economy. However, accelerating modal shift is not only necessary to get to Net Zero, but also supports Clean Growth.

Businesses, communities and individuals need to be encouraged and supported to change behaviours and make better travel choices for the planet and for their own health and wellbeing. We need to work with people and communities to break down barriers to or negative perceptions of active travel or using public transport.

Sustainable Transport Hierarchy

1. Walking and Wheeling
2. Cycling
3. Public Transport
4. Taxis and Shared Transport
5. Private Car

National Transport Strategy (2020)

Future investment, including Transport Scotland's budgets and the *Infrastructure Investment Plan for Scotland*, will need to better reflect the sustainable transport hierarchy and the urgency of the climate and nature emergencies.

There will need to be a shift in investment away from roads towards strengthening, expanding and upgrading low- or zero-carbon rail and bus infrastructure, as well as zero-carbon active travel infrastructure, especially for short journeys in our towns and cities. City Region Deal and Inclusive Growth Deal projects and programmes will also need to be reviewed and reformed in the context of Net Zero.

Active Travel Cities

Brussels – Creating 40km of new bicycle lanes across the Belgian capital

Copenhagen – 28% of journeys in the city are made by bicycle

Paris – 'Plan Vélo' will make every street cycle-friendly by 2024 and remove 72% of on-street car parking spaces

However, it is important to recognise that investment in roads will still be required to better maintain or utilise existing assets, improve road safety and help decarbonise transport – for example, to develop a future-proof network fit for purpose for public transport, EVs and Connected and Autonomous Vehicles and Mobility as a Service (MaaS). The UK Government should explore a road user pricing or similar measures to fund the investment in future low- and zero-carbon infrastructure which will be required.

The Scottish Government has committed to invest £17 million over the next three years to support the introduction of Low Emission Zones (LEZs) in Aberdeen, Edinburgh, Dundee and Glasgow. Transport providers are being supported to make the transition through the Scottish Ultra Low Emission Bus Scheme. However, the original timeline has been significantly delayed due to the COVID-19 crisis. LEZs are now not likely to be operational in Scotland's four largest cities until 2022, nearly two years late.[2]

The crisis should create new opportunities to develop plans for more ambitious LEZs to be implemented in all of Scotland's seven cities, including Inverness, Perth and Stirling as public health restrictions are lifted and as part of efforts to support the sustainable recovery of our towns and cities. There will be a range of benefits in reduced pollution and congestion, improved air quality and better quality of life for town and city residents.

Climate Emergency Action Plan for Perth & Kinross

Perth & Kinross Council is developing a Climate Emergency Action Plan in partnership with its citizens, engaging and empowering communities across the region. An interim report has set out action to reduce emissions, including investment in active travel and EVs, and to adapt to climate change, including mitigating flood risks along the River Tay.

Our towns and cities need to build on the temporary active travel interventions which have facilitated social distancing during COVID-19. Permanent changes should be made to the way our places work and how we move around them to permanently reclaim spaces for people.

Scotland's major towns and cities should develop Green Town Plans or Green City Plans with support from the Scottish Government and local partners which set out the concrete actions they will take together to reduce emissions and improve transport to create highly connected, highly sustainable places. Many of Scotland's local authorities have set Net Zero targets or declared a Climate Emergency but still need to make difficult decisions to translate rhetoric into reality.

These holistic plans should deliver and coordinate short- and long-term actions, from creating new parks and revitalising vacant land to expanding low-speed/-emission zones and active travel networks. They should accelerate modal shift, apply lessons from the 20 minute neighbourhood concept and address inequalities in access to green space and public transport for a Just Transition.

Invest in tech, innovation & infrastructure

Electrification and the hydrogen economy present big Clean Growth opportunities for Scotland in the transition to Net Zero. Investments and regulations in new technologies to decarbonise and enhance Scotland's transport connectivity can fuel innovation and create new green jobs in the Net Zero economy of the future.

UK Government, Scottish Government , enterprise agencies and local authorities will play an essential role in growing sustainable demand and unlocking private investment by providing greater policy certainty and ambition, as well as raising the level of public investment and R&D in anticipatory, future-proof infrastructure. We need to act now to create and shift markets and to develop the infrastructure needed to support more electric cars, trains and trams or hydrogen lorries, vans and buses across our transport networks.

Scotland can be a living lab for Clean Growth innovation, harnessing the talent of our academics, entrepreneurs and scientists to develop new technology and expertise to get us to Net Zero and for export around the world. There is an opportunity for the Scottish Government to harness its strategic assets and public companies to test, develop and deploy zero-carbon transport innovation for land, sea and air.

Scotland's Biggest: Falkirk's EV Hub

Scotland's largest public EV charging hub is located at the Falkirk Stadium just off the A9. The facility has capacity for 26 vehicles, generates nearly a third of its own electricity needs with solar panels and provides easy access to Helix Park and the Kelpies. It will form part of the 'Electric A9' from Polmont to Scrabster.

From the Ashes: Talgo at Longannet

Spanish train manufacturers Talgo plan to transform Longannet, the site of Scotland's last ever coal power station, into a factory producing

1 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament
2 www.lowemissionzones.scot

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fast, lightweight, electric trains for global markets.

The site will employ 1,000 people and indirectly support a further 5,000 jobs.

Showcasing Scotland at COP26

Glasgow City Council will have 19 hydrogen-powered refuse trucks in time for COP26 thanks to £6.3 million of UK Government funding.

World First: Aberdeen's Hydrogen Buses

The UK's first hydrogen production and bus refuelling station was opened in Aberdeen in 2015 as part of a £19 million demonstration project. The Aberdeen City Council-led project tested the economic and environmental benefits of hydrogen transport and aims to drive the development of hydrogen technologies. The Granite City is now home to the world's first fleet of hydrogen-powered double decker buses.

Net Zero Manufacturing in East Ayrshire

Cumnock-based manufacturer Emergency One has developed the world's first fully electric fire engine. The firm is targeting export-led growth in key overseas markets, supporting over 200 high-quality local jobs.

Innovative Dundee

Michelin-Scotland Innovation Parc is an ambitious joint venture between Dundee City Council, Scottish Enterprise and Michelin to attract and support firms which will transform Dundee into a key location for innovation in sustainable mobility and low-carbon energy.

Scotland already leads in testing and deploying electrification and hydrogen to power vehicles. The Scottish Government, its enterprise agencies and the Scottish National Investment Bank and the UK Infrastructure Bank must build on the great examples of opportunity and success to create local jobs and build domestic supply chains through a strong commitment to greater funding for innovation and scale-up, as well as national rollout across the public sector and our towns and cities.

The creation of a new national circular or scrappage scheme to reuse or replace thousands of petrol and diesel buses and taxis with low-carbon or zero-carbon hydrogen and EVs would support our domestic manufacturing base and local green jobs. So too would investment to decarbonise the ferries and planes serving Scotland's rural, remote and island communities, or to electrify the public sector fleet. We must not outsource or offshore high-value green jobs.

Scotland will need to move faster on building a truly national network of EV charging points to meet likely future demand. It is vital that the network is in line with UK and international standards, supports cross-nation interoperability and recognises the distinct needs of different places. For example, it may be especially important for residents in densely populated city centres or urban areas who require a car have access to public Ultra-Fast charging points.

Accelerated rollout of EV and Ultra-Fast charging points across all our urban and rural communities could ensure a Just Transition which leaves no one behind and creates a highly connected economy from urban to rural, North to South, East to West. The UK Government should maintain current grants and financial incentives to purchase EVs until the market reaches a tipping point after which EVs become more affordable than combustion-engine equivalents – which could be as soon as 2022.[3] This will be critical to shift consumer behaviour and demand.

As road and rail electrification gathers pace, the type and level of demand for electricity will change and grow. The comprehensive take-up of EVs could increase electricity demand in Scotland by 25%. There will be a need for investment in strengthening the resilience of the grid and in expanding the capacity and flexibility of our renewable energy networks, including through electricity storage technologies like batteries and pumped storage. Scotland's regulatory and

3 www.bloomberg.com/opinion/articles/2019-04-12/electric-vehicle-battery-shrinks-and-so-does-the-total-cost

planning authorities and systems need to accelerate, prioritise and support the delivery of such projects. Scotland has welcome national targets which give positive signals to consumers, businesses and supply chains to prepare for changes on the way. The Scottish Government has committed to phase out new petrol and diesel cars and vans in Scotland by 2032 and to decarbonise Scotland's railway by 2035. However, Scotland could be even more ambitious in unlocking Clean Growth opportunities.

The Scottish Government should set a world-leading national target of Net Zero domestic connectivity by 2030 to create new green jobs, crowd-in private investment and accelerate progress in decarbonising transport. This would include bringing forward the ban on fossil fuel vehicles to 2030 to match the ambition of the UK Government. It should also speed up plans to decarbonise public transport across rail and road by the end of the decade through mass deployment of electric or hydrogen trains and buses, significant expansion of active travel and rail networks and much greater anticipatory investment in the innovation and infrastructure required which will support this transformation.

The UK aviation sector is the first in the world to commit to Net Zero by 2050 in its roadmap for 'flying without carbon'. Airlines and airport operators will reduce emissions by using more efficient aircraft and developing new low- or zero-emissions energy sources such as biofuels, alongside offsetting activities to bridge the gap.[4]

Batteries are likely to form the principal energy source solution for decarbonising short-haul flights. Electric planes could be flying over Scotland as early as 2021, with government, industry, airlines and airport operators already working together on new battery and propulsion innovations.

Electric planes over the Highlands & Islands

Loganair is working with aviation researchers to design, build and fit an electric or hybrid propulsion system into the nine-seater planes used on island-hopping routes connecting

the Highlands & Islands. It hopes to bring the revolutionary new aircraft into service on some short Scottish routes in 2021 or 2022. The Scottish Government has committed that all flights in the region will be low carbon by 2040.

Aircraft manufacturers are working to resolve the challenges associated with decarbonising air travel over longer distances, including through the Jet Zero Council in partnership with the UK Government.

Sustainable aviation fuels also offer a low-carbon solution for longer-haul air transport which could significantly reduce emissions. Biofuels made from wastes like municipal refuse and forest offcuts could deliver carbon savings of more than 70% on kerosene. Developing a domestic sustainable aviation fuel industry could also create thousands of green jobs in waste management, refining and production across Scotland, including at key industrial sites at St Fergus and Grangemouth, to serve a global, growth sector of the future.[5]

The UK Government should support supply of and demand for sustainable aviation fuels through new incentives, and regulations for industry and investors, as committed in its 10 Point Plan for a **Green Industrial Revolution**. It could accelerate production and use by backing innovation projects, reducing costs towards the level of kerosene, mandating higher sustainability standards and showcasing the UK's progress at COP26.

Transform supply chains

As globalisation accelerated in previous decades, global trade and supply chains have been a major force in creating a highly connected, increasingly prosperous global economy. It is critical for Scotland, especially as a country on the geographical periphery of Europe, to remain open for business and connected to the world.

4 www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation_CarbonReport_20200203.pdf
5 www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation_CarbonReport_20200203.pdf

We must not retreat from competing on the global stage, working with global partners or exporting to growing global markets. Estimates suggest that Scottish exports directly support more than 529,000 jobs.[6] Digital and transport connectivity globally for Scottish talent and businesses will remain critical.

However, the territorial emissions of developed countries' like Scotland underestimates the full impact of our activity and consumption on our planet. For example, new research suggests that 20% of global carbon emissions are generated by the large, complex and sprawling global supply chains of multinational companies.[7]

Large firms have significant leverage to change business practices and priorities across the global economy with big social, economic and environmental co-benefits. They should take greater responsibility for and work more closely with their supply chains. They can play a positive role in reducing emissions by investing in energy efficiency, reducing waste and partnering only with Net Zero suppliers throughout their supply chains, aligned with rigorous review and enforcement.

The 1.5C Supply Chain Leaders initiative, a coalition of leading global firms including BT, Ericsson, Ikea and Unilever, has committed to make 'climate-related targets and performance' a key supplier purchasing criteria to transform and decarbonise their global supply chains. The UK retail sector has developed a road map for Net Zero by 2040 which includes ambitious targets to decarbonise the global supply chains and logistics of the UK's retail giants. [8]

Scottish businesses should model this best practice domestically as well as globally, recognising our responsibilities and our Clean Growth opportunity to sell Scotland to the world as the home of sustainable business.

Business and industry will increasingly locate and invest where their emissions can be minimised or eliminated in response to climate change and pressure from consumers, regulators and investors. Scotland should therefore continue to enhance its strong commitment to the highest standards of sustainability. Higher regulatory standards and stronger compliance will be required in many areas and can support Clean Growth by helping Scotland to develop competitive advantage and attract inward investment.

In the context of the COVID-19 crisis, some businesses are now exploring whether to permanently relocate production or how to build shorter, more localised supply chains to increase resilience to future disruption or shocks. This could represent a major departure from previous corporate and investor approaches. It is also a potentially significant opportunity for Scotland to attract industries to invest, develop supply chains or expand production here, creating new green jobs and revitalising some of our lost industrial and manufacturing capacity.

As discussed further in the 'Finance' chapter, Scotland can develop a unique and compelling offering based on 'pace, place and space'. The Scottish Government should work with its agencies and partners to develop the *Inward Investment Plan* into a Net Zero inward investment proposition which positions Scotland as the home of sustainable business.

Deepen digital connectivity

Digital connectivity can play an essential role in getting to Net Zero and represents a significant opportunity to deliver a Just Transition and maximise Clean Growth. It can be harnessed to boost the productivity of workers and businesses by providing better, quicker access to new customers, digitised or automated processes and global talent, markets or job opportunities.

It enables citizens, educators, learners, employees and employers to access knowledge or education about climate change or green reskilling and upskilling courses from anywhere in the world. It strengthens the resilience of communities to climate disruption by enabling much social and commercial life to continue virtually or from home, as has been demonstrated during COVID-19.

6 www.sbs.strath.ac.uk/economics/fraser/20170420/Exports-and-Employment-Scotland.pdf
7 www.ucl.ac.uk/bartlett/construction/news/2020/sep/multinationals-supply-chains-account-fifth-global-emissions
8 https://brc.org.uk/media/676312/climateactionroadmap_final_rgb_updated.pdf

All of Scotland's communities and regions have a role to play in getting us to Net Zero and Clean Growth must be for everyone, everywhere. Different parts of Scotland face specific challenges, but also have their own strengths and assets. This is particularly true of rural Scotland, which is home to 20% of Scotland's population yet accounts for 27% of the Scottish economy.

The OECD's latest rural development framework recognised the rural context as a 'geography of opportunities'. Digital connectivity is enhancing social, economic and environmental wellbeing in rural communities worldwide. It has the potential to end the 'penalty of distance' historically paid by places far from urban centres – and to reduce transport emissions by lowering both the demand and the need for travel.[9]

The Scottish Government has delivered progress by investing over £600 million in the R100 programme and the Scottish Broadband Voucher Scheme for households and businesses to ensure 'people in every part of Scotland have access to superfast broadband by end 2021'. R100 has a welcome focus on the final 5-6% of premises without superfast broadband or any future upgrade plans.[10]

But progress has been frustratingly slow for many households and businesses, especially those suffering from weak connections or located in mobile 'notspots'. People in the most deprived communities remain significantly less likely to have internet access, limiting their access to public services, the labour market, employment and education and public health advice, which has been especially damaging during COVID-19.[11]

COVID-19 will have a long-term impact on how and where we live, work and play. Flexible and remote working patterns will be increasingly common. Digitally connecting every part of Scotland with 5G would allow businesses and people to live, work, do business and access the services they need anywhere. Local or regional working hubs with 5G connectivity could play a positive role in reducing the need for commuting or other work-related travel as well as strengthening communities and tackling isolation experienced in remote working.

Creating a more level digital playing field no matter where you live in Scotland, alongside new, ambitious and innovative place-based approaches to transforming our communities, will be critical for a Just Transition to Net Zero. It could encourage more people to live and work in rural communities which have struggled with depopulation for decades. Rural communities could become increasingly attractive places to live, work and invest if we can deepen digital connectivity across the country.

RECOMMENDATIONS

Accelerate modal shift to active travel and public transport

- Transport Scotland budgets and the Infrastructure Investment Plan should reflect the sustainable transport hierarchy
- Transport Scotland should lead a national dialogue with businesses, local authorities and communities to understand the barriers to modal shift and to change behaviour
- Transport Scotland should identify places as pilots for implementation and proof of concept for 20 minute neighbourhoods
- UK Government and Scottish Government should work together to revisit the potential for a national model of road user pricing or similar measures to address congestion and fund future low- and zero-carbon infrastructure
- Local authorities should implement Low Emission Zones in Scotland's cities as public health restrictions are lifted
- Local authorities should develop Green Town/City Plans for Scotland's major towns and cities with support from Scottish Government

9 OECD (2020) Rural Wellbeing: Geography of Opportunities
10 www.gov.scot/publications/reaching-100-superfast-broadband
11 Scottish Household Survey 2019

Invest in tech, innovation & infrastructure

- Scottish Government should harness its strategic assets and public companies to test, develop and deploy zero-carbon transport innovation for land, sea and air

- Industry should work with Scottish Government and local authorities to accelerate the building of a national network of EV and Ultra-Fast charging and hydrogen refuelling points as an urgent priority

- UK Government should maintain EV grants/ incentives until market tipping point

- Scottish Government should create a new national scrappage scheme for petrol and diesel buses and taxis

- UK Government should support green air travel and accelerated production of sustainable aviation fuels

Transform supply chains

- Scottish Government should develop the Inward Investment Plan into a Net Zero inward investment proposition which positions Scotland as the home of sustainable business

Deepen digital connectivity

- UK Government, Scottish Government, industry and communities should work together to reduce demand for travel and level the digital playing field by connecting all of Scotland with future-proof 5G infrastructure, prioritising rollout in hardest-to-reach communities

- Scottish Government, local authorities and rural communities should work together to create local or regional working hubs

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PLACE

SUSTAINABLE COMMUNITIES

Investment in the physical and social fabric of places must deliver for people, economy and planet. More sustainable communities are more equal, more resilient and more prosperous.

Placemaking enhances the social and physical fabric of our urban and rural communities, bringing together policies and interventions across buildings, connectivity and planning. We need places where people want to live, work, play, visit and invest – and where they can do so sustainably.

By locking in local value, reforming and resourcing planning, expanding retrofit, decarbonising heat and raising building standards, we can build and nurture sustainable, resilient and thriving communities as part of a Just Transition for everyone and every community.

Collaborate rather than compete to achieve Net Zero

Government, businesses, organisations, public agencies and local authorities across Scotland have set out different visions for Net Zero with different timescales for delivery. Meanwhile, the powers to achieve these targets are distributed across different institutions, regulators and levels of government.

Key levers are devolved to the Scottish Government or held by local authorities, while many other key levers are reserved to the UK Government. This creates complex interdependencies which can only be overcome with common purpose and coordinated action. Devolved and reserved policies should be aligned and coordinated as far as possible.

Government and local authorities will need to collaborate rather than compete to deliver their ambitions and targets, sharing or learning from expertise and best practice, coordinating or aligning investments and working together to maximise assets and resources.

Scottish Local Authority Net Zero Targets

Aberdeen – 2045
Dumfries & Galloway – 2025
Dundee – 2045
Edinburgh – 2030
Fife – 2045
Glasgow – 2030
Highland – 2025
Midlothian – 2030
North Ayrshire – 2030
Perth & Kinross – 2045

Local authorities need to work closely to develop more holistic plans which take account of negative spill-over effects or unintended consequences beyond their regions. This is especially critical with neighbouring authorities and City Region partners. Scottish Enterprise, Highlands and Islands Enterprise and the new South of Scotland Enterprise will play a key role in tailoring national priorities and programmes to local and regional needs.

Leaders in all sectors and all places will need to take bold and concrete action to break down barriers to progress and geographical, organisational or sectoral silos. It will require innovation, whole systems thinking

and a 'one Scotland' approach. The shared focus must be on delivering a nature-rich futur and Scotland's national target of Net Zero by 2045.

Lock-in local value

The UK is among the most imbalanced major economies in the world with the gap widening between struggling and thriving places. People in Scotland's most deprived communities face lower life expectancy and quality of life, higher levels of pollution and weaker access to jobs, green spaces, nature and public services in their local area.[1]

Scotland must deliver a Just Transition to Net Zero. By rebalancing the UK economy to reduce regional inequalities, we can unleash the potential of people, businesses and communities and boost Clean Growth in places which have been left behind.

Public and private investment should be targeted in those places and opportunities which need it most and where it will deliver the biggest social, economic and environmental gains. Clean Growth can help us tackle climate change and inequality together. The proposed inclusion of natural infrastructure in the Infrastructure Investment Plan provides an opportunity to place natural assets, and the multiple benefits they bring, alongside traditional place infrastructure.

The full public spending budget in Scotland is around £81 billion, representing almost half of the Scottish economy and offering a huge opportunity to reshape and strengthen local economies.[2] Scotland's public sector, especially our local authorities and enterprise agencies, must harness this immense spending power for Clean Growth, developing new place-based, sustainable economic models.

Community Wealth Building is one such innovative approach which focuses on harnessing local economic assets and maximising local economic opportunities to strengthen local economic power. It can revolutionise how public money is spent to transform our communities, deliver a Just Transition and support Clean Growth through better land use, shortened supply chains and greener procurement.

North Ayrshire Council has developed the first *Community Wealth Building Strategy* in Scotland, learning from the highly successful 'Preston model'. The strategy aims to bring together the regions local 'anchor institutions' or major employers to change how, where and why they invest, spend or procure to lock-in local value, better utilise community assets, support Fair Work and back local ownership and more sustainable business models such as SMEs, employee ownership and cooperatives.[3]

North Ayrshire's Community Wealth Building Strategy

1. **Procurement** – We will use our spend to actively encourage and support a growing, diverse and resilient local business base, and to support our net zero carbon ambitions.
2. **Fair Work** – We will encourage the creation of fair and meaningful jobs with progression opportunities to unlock the potential of our residents.
3. **Land & Assets** – We will support the wider regeneration of our communities by maximising all of our land and assets including through alternative uses for community and business benefit.
4. **Financial Power** – We will invest locally and encourage regional and national institutions to invest in our communities.
5. **Plural Ownership** – We will support the creation and sustainability of a range of business models including SMEs, social enterprise, employee ownership, cooperatives, municipal activity and community enterprises.

Our interim report called for other local authorities to learn from and embrace this new approach to help build a strong Green Recovery across the country. The Scottish Government committed in the *Programme for Government 2020/21* to work with five further areas – Clackmannanshire, South of Scotland, Glasgow City Region, Western Isles and Tay Cities – to roll out Community Wealth Building approaches in each area.

Scotland's enterprise agencies and public sector can continue to lead the way and encourage the private and third sectors to follow, developing Community Wealth Building approaches tailored to local needs and priorities. Government, public agencies, local authorities and others across the wider public sector should ensure that public money supports local and small businesses to secure public contracts, protects and creates local jobs, extends Fair Work across local labour markets and incentivises sustainable business practices.

Public procurement should be updated and reformed with new rules, practices and culture which, supported by improved workforce training and third-party certified information on climate impacts, looks beyond outdated lowest cost models of assessment to evaluate whole life economic and environmental costs and benefits.

Significant changes will need to be made to the guidelines of the *Treasury Green Book*, which is currently under review, as well as the interpretation and enforcement of State Aid rules. Public procurement should be empowered to favour low-carbon, net-zero and circular business models and to build more local, more sustainable supply chains which lock-in local value.

Increase planning ambition and resources

Scotland's long-term spatial plan and planning policy framework is under review with the development of a new National Planning Framework, the NPF4, which will incorporate for the first time Scottish Planning Policy. NPF4 represents a decisive opportunity to build on the Place Principle and ensure that Scottish Planning Policy is fit for purpose to deliver a Just Transition to Net Zero and maximise Clean Growth.

Scottish Planning Policy needs to be more ambitious to achieve Net Zero and deliver a nature-rich future for every community. It should be visionary and plan-led to provide greater certainty and consistency to maximise its potential as a positive tool for Clean Growth. NPF4 should raise development standards, deliver positive effects for biodiversity and align with Scotland's legal emissions targets and the Climate Change Plan update.

NPF4 should result in developments which are more accessible with higher environmental, sustainability and biodiversity standards, including in relation to construction materials, energy efficiency and access to nature. The Scottish Government has a positive vision for 20 minute neighbourhoods – 'liveable, accessible places... where people can meet their daily needs within a 20 minute walk', such as public services, workplaces, education, green spaces, shops and other key amenities.

The **Edinburgh Home Demonstrator Project** is a collaborative partnership across public sector, industry and academia to develop a new business model for new affordable housing. The model is based on collaborative procurement, whole life cost evaluation, greater standardisation of components and a range of other transformative approaches. The model will then be applied to the delivery of 1,000 new affordable homes across the Edinburgh City Region built to net zero carbon standards.

Planning authorities will need to be supported to develop the skills and capacity required for 'place-based systems thinking', building on the Place Principle to develop, implement and ensure compliance with more ambitious and more comprehensive strategies to achieve Net Zero and deliver a nature-rich future for every community.

They will need the resources to meet demand as higher volumes of applications come through the system. Decision-making must be timely and efficient, with digital technologies utilised to improve the accessibility and quality of planning applications. Local authorities must also have stronger powers and guidelines to reject developments which are incompatible with Clean Growth objectives.

There will need to be a national dialogue about the future of our towns and cities in the aftermath of the pandemic. 20 minute neighbourhoods will require

1 Scottish Household Survey 2019
2 www.gov.scot/publications/government-expenditure-revenue-scotland-gers-2019-20
3 www.north-ayrshire.gov.uk/Documents/nac-cwb-strategy-brochure.pdf

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higher levels of urban density in walkable, mixed use neighbourhoods across our towns and cities, reconnecting citizens to revitalised local assets like the High Street and under-used, vacant or derelict buildings and land, bringing jobs and employers back to our cities or re-shaping their use to attract new jobs and employers.

The Scottish Land Commission's Vacant and Derelict Land Taskforce has set out the clear 'missed opportunity' which the nearly 11,000 hectares of vacant and derelict land in Scotland represents as places to build new homes, provide new business premises, grow local food, generate local energy, provide spaces for play, exercise and leisure or new sites of inward investment.[4]

New residential and commercial developments should not contribute to suburban sprawl which encroaches on greenbelt land or damages biodiversity. Planning must incentivise and prioritise developments which balance the natural and built environments, building in harmony with animal and plant life. Developments should not sustain car dependence and must be accessible by active travel and well served by public transport to ensure their long-term sustainability.

'Building with Nature'

Building with Nature is a voluntary approach that enables developers to go beyond statutory requirements to create places that deliver for people and wildlife. It brings together guidance, training and good practice to support high quality green infrastructure at all stages of the development process including policy, planning, design, delivery and long-term management and maintenance.

Case Study – Forth Valley Hospital in Larbert

Scotland's then largest ever NHS infrastructure project was completed in 2010. It achieved a 'national exemplar' fusing a new state-of-the-art hospital with the nature on its doorstep. Patients, visitors and staff can access courtyards, gardens, fields, woods and loch on a sustainably managed estate with benefits for physical and mental health and wellbeing.

The presumption in favour of sustainable development should be strengthened and expanded. NPF4 should recognise a presumption in favour for Net Zero developments within the context of plan-led development. Such developments should be conditional on and include key green infrastructure which are essential to achieve Net Zero – such as active travel routes, woodlands and ponds, onshore wind farms, pumped storage hydro or zero-carbon housing. By accelerating and integrating the approval and delivery of plans and projects which meet the highest environmental standards and deliver big economic benefits, Scotland can accelerate Clean Growth.

Accelerate retrofit and decarbonise heat

Scotland has a housing crisis. Workers have experienced a decade of weak or stagnant real wage growth, yet renters have faced soaring costs. Between 2010 and 2019, private sector rents in Scotland increased by an average of 25%.[5]

Many key workers in our hospitals, factories, schools and care homes are struggling to afford accommodation in our major cities or find suitable housing in rural areas. A generation of young people faces the prospect of never being able to afford a deposit to buy their own home as house prices rise relentlessly. Scotland needs more affordable, sustainable, quality homes of all tenures to deliver a Just Transition.

Residential (15%) and commercial (6%) buildings emissions also represented 21% of total Scottish emissions in 2018, according to the CCC. This represents an increase of 7% on 2017 levels, largely due to the extreme winter weather of that year. Non-residential buildings account for 29% of Scotland's buildings emissions, while residential buildings account for 71%. Some progress towards decarbonisation has been made in the last decade as buildings emissions are now 16% lower than they were in 2008.[6]

But Scotland will have to accelerate its progress to reach Net Zero. Most of our buildings and places have not been designed with sustainability in mind. Many are unprepared for the increasing disruptive changes which are taking place to Scotland's climate, including rising temperatures and more frequent extreme weather events such as major floods and storms. We will need to modernise and decarbonise millions of homes, offices, shops, factories, schools, hospitals and other private and public buildings.

The CCC notes three major challenges in decarbonising buildings, but each also represents a major economic opportunity for Clean Growth: low-carbon heat in existing homes, energy efficiency in existing homes and new sustainable homes.[7]

Scotland can tackle the housing crisis, respond to the climate emergency and support Clean Growth by investing in increasing the supply of new sustainable housing and improving existing housing stock through retrofit of insulation, heat pumps, district heating networks and renewable energy generation. The Scottish Government will publish its *Heat in Buildings Strategy* shortly and has committed £1.6 billion of investment over the lifetime of the next parliament.

Regulation and public investment have a big role to play in growing demand, building confidence and stimulating innovation to reduce costs. Much greater public investment will be required to transform the public sector estate. Steps will need to be taken to incentivise consumers, homeowners, landlords and businesses to act by providing policy certainty, improving competitiveness and strengthening the link between sustainability and property value.

Public investment in a Just Transition should also be targeted at the worst housing stock in our poorest neighbourhoods to achieve the biggest social, economic and environmental impact, reducing emissions, fuel poverty and inequality at the same time. 1 in 4 households live in fuel poverty due low incomes, high fuel prices and poor energy efficiency in low quality housing stock. 41% of homes in Scotland fail to meet the Scottish Housing Quality Standard, mostly due to a lack of effective insulation or central heating. Most of these homes are in the social housing and private rented sectors.[8]

80% of the buildings which will be in use in Scotland in 2045 have already been built. Energy efficiency accounts for 40% of the global carbon emissions reductions required to meet the goals of the Paris Agreement. Buildings retrofit reduces emissions through reduced energy consumption, better use of buildings and changes in behaviour by residents, consumers or employers.

There is a need to expand and accelerate investment in existing schemes such as Warmer Homes Scotland and Energy Efficient Scotland local authority area-based schemes, as well as to explore new fiscal and regulatory opportunities to better incentivise and catalyse progress, especially by landlords in the private rented sector. Some previous interventions have failed to be effective with lower than anticipated take-up due to high level of complexity for consumers and landlords. Certainty over spending over multiple years is required for industry to invest.

Energy efficiency interventions are among the most cost-effective ways to reduce carbon emissions – and the most economically beneficial. Investment in energy efficiency has large multiplier effects in terms of jobs, productivity and growth. It creates jobs which are resilient to offshoring, which workers can transition relatively quickly with reskilling and upskilling. It supports large supply chains which are largely composed of local SMEs.

There is capacity for both the domestic energy efficiency and heat pump sectors to expand supply chains to meet significantly higher levels of demand and create new jobs across the Scottish economy, if government demonstrates long-term intent with a package of multi-year funding.

4 www.landcommission.gov.scot/downloads/5f73555fbfe93_VDL%20Task%20Force%20Recommendations.pdf
5 www.gov.scot/publications/private-sector-rent-statistics-2010-2019
6 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament
7 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament
8 www.gov.scot/publications/scottish-house-condition-survey-2018-key-findings

Build Back Better with SMEs

95% of construction firms employ 10 or fewer people

80% of construction sector supply chain is SMEs

Tradespeople generate two-thirds of revenue locally

Source: European Commission

Raise building standards

Scotland's new build standards are set to be legislated in 2021 by the Scottish Parliament. The new standards for residential buildings will come into force in 2024 before the CCC's 2025 deadline to ensure that 'all new homes built' are 'designed for a changing climate, are ultra-energy efficient and use low-carbon heat.'

Similarly, ambitious standards for non-residential buildings will also be required to provide policy certainty to businesses, landlords and the construction sector to inform decision-making, unlock capital, accelerate renovation plans and stimulate innovation. They need to know how much they will have to spend – and that what they spend today will not be obsolete tomorrow.

NHS Scotland is leading the way with a commitment to ensure all new buildings and major refurbishments to be designed to be Net Zero from this year. This best practice should be replicated across Scotland's public sector.

A new and ambitious Net Zero Standard for all buildings by 2023 which meets the highest sustainability standards is required to future-proof new developments. For example, cycling storage, EV charging points, the use of circular or sustainable materials like timber and access to green space should be standard in new residential and commercial buildings on a consistent basis nationwide.

The Scottish Government has committed to increase the use of Scottish wood as a more sustainable material. Enhanced regulations to increase requirements for the use of timber in construction will be required and would significantly expand domestic demand to support Clean Growth in the forestry sector and stimulate timber-based circular economy product innovations for the construction sector.

RECOMMENDATIONS

Collaborate rather than compete

- Government, businesses and organisations, public agencies and local authorities should explore how to better leverage public-private partnerships, business-to-business collaboration and inter-government cooperation to achieve Net Zero by 2045

Lock-in local value

- Public sector should mobilise total public spending of £81 billion in Scotland for Clean Growth through Community Wealth Building to create local, green jobs, build local, resilient supply chains and back inclusive, sustainable business models

- UK Government should radically reform *Treasury Green Book* to better reflect whole life economic and environmental costs and benefits

Increase planning ambition and resources

- Scottish Government and local authorities should invest in skills and capacity of the planning system to achieve Net Zero and deliver a nature-rich future for every community

- National Planning Framework 4 should recognise a presumption in favour for Net Zero developments within the context of plan-led development

- National Planning Framework 4 should require developments to have positive effects for biodiversity to stimulate private investment in protecting and restoring nature

Accelerate retrofit and decarbonise heat

- UK Government and Scottish Government should increase public investment in retrofit, energy efficiency and low-carbon heat programmes as an urgent priority

- UK Government and Scottish Government should create new incentives and regulations to increase private investment in retrofit, energy efficiency and low-carbon heat as an urgent priority

Raise building standards

- Scottish Government should provide strategic ambition, regulatory certainty, support businesses to adapt and innovate and implement an ambitious Net Zero Standard for all new buildings by 2023

PEOPLE
GREEN SKILLS REVOLUTION

Technological change and climate change are changing the skills which citizens, consumers and workers will need for the future. Every job will be disrupted, some jobs will be displaced and others will be created by the Fourth Industrial Revolution and the transition to Net Zero.

Government, educators and employers will need to support workers to adapt. Shortages of green skills are a major barrier to Clean Growth in Scotland. To deliver a Just Transition, all workers will need core green skills to work with new technologies, shift to more sustainable practices and adopt different behaviours.

By driving a Green Skills Revolution which builds green skills across society and invests in the reskilling, upskilling and lifelong learning of our people to prepare them for the green industries of the future, we can create new green jobs, boost productivity, raise wages and attract inward investment.

Build core green skills across society

Net Zero by 2045 will require a rapid transformation across all sectors of our economy and a fundamental shift in behaviour by individuals, households, communities and businesses. Sustainability will be everyone's job in the Clean Growth economy. We will all have to think and act differently, making more sustainable choices to protect our environment, minimise our waste and reduce our emissions.

Building core green skills which everyone will need in a Just Transition to Net Zero across our society should be a national priority for government, educators and employers to deliver a Just Transition and empower all of our people with the knowledge and skills they will need to make more sustainable choices as informed citizens, consumers and workers in their homes, communities and workplaces.

Core Green Skills which every citizen or worker will need in the transition to Net Zero:

- Carbon Literacy
- Digital
- Problem Solving & Innovation
- Resource Efficiency & Circular Economy

Key Green Skills which many workers will need in the transition to Net Zero:

- Carbon Accounting & Management
- Data Analysis
- Net Zero Design
- Project Management
- STEM

All schools, colleges, universities and employers have important roles to play, especially in developing Scotland's next generation of Clean Growth leaders, innovators and entrepreneurs. The *Climate Emergency Skills Action Plan* being developed by Skills Development Scotland and due to be published before the end of the year will begin to set out Scotland's approach and the role we can all play.

Core green skills should be embedded in curricula across primary, secondary and tertiary education, as well as professional and work-based learning. Carbon

literacy and digital literacy should be as fundamental to the education of our young people in the 21st century as literacy and numeracy to prepare them for the green jobs and climate challenges of the future. Schools, teachers and career advisers should be better supported to develop engaging and innovative ways for children and young people to learn about climate change, develop an interest in the environment and build their green skills from an early age.

Young Engineers and Science Clubs (YESC)

YESC is SCDI's nationwide nursery, primary and secondary school education programme supported by the Scottish Government and industry partners like BP and Shell. It sparks enthusiasm in Science, Technology, Engineering and Mathematics with projects to inspire the next generation of engineers and scientists in Scotland and to prepare them for the jobs of the future.

Climate Smarter *with Vattenfall and Wood* – hands-on classroom experiments for primary and secondary pupils to learn about how energy is produced and used

Knotts to Watts *with Crown Estate Scotland and Institute of Physics Scotland* – competition for primary and secondary pupils to research offshore wind technologies and to design, build and test a floating wind turbine which generates electricity

Code vs Climate – pupils combine digital skills using a Micro:bit with creativity to design satellites with an environmental mission

Our world-class universities and seven Innovation Centres are well placed to leverage their research capabilities to transform teaching and learning and to support innovation which will achieve institutional and national emissions targets.

Our world-class colleges are well placed to reach SMEs and develop green skills in the small business workforce because of their extensive local and regional networks. The colleges sector is working in partnership to develop 'Net Zero Apprenticeships' to create new learning pathways and green talent pipelines.

A Net Zero University

The University of Edinburgh's Climate Strategy aims to create a 'net zero university' by 2040 with a 'whole institution' approach to climate change mitigation and adaptation. Its campuses will be 'living laboratories for learning' and test innovative solutions.

Rural Skills Hubs

The Skills and Learning Network is a partnership between Borders College and Dumfries and Galloway College to address skills gaps in key sectors through flexible online learning across the region. The four skills hubs include a renewable energy and engineering hub in Dumfries and a construction hub in Hawick.

Employers are well placed to develop peer-to-peer and work-based learning opportunities in partnership with colleges and universities which bridge the gap between education and work, create a green skills pipeline and deliver experiential learning which is up-to-date, relevant and authentic. Demand for opportunities from apprenticeships to mentoring is growing.

The Graduate Apprenticeships model has achieved early success and will need to be scaled up significantly in more subjects and across more sectors with a greater focus on core and key green skills which support Clean Growth. However, a more flexible model of delivery and a more long-term model of funding are required to improve access and widen participation for learners and support better planning by employers and institutions as part of a Just Transition.

Harness all of Scotland's talents to get to Net Zero

We must harness all the talents of all of Scotland to achieve Net Zero. Everyone should be empowered to play their part. The green jobs of the future must be accessible, inclusive and welcoming for all, recognising the importance of equality for a Just Transition and of diversity for maximising innovation and productivity.

Government, educators, regulators and employers should focus on ensuring equal access and opportunities for those historically marginalised from or discriminated against in the labour market, the classroom or the workplace, including ethnic minorities, people from deprived communities and people with learning disabilities.[1]

Scotland must find bold ways of inspiring people to act for the common good and harnessing the ambition, passion and talent which exists across society. Increasing numbers of people want lives or careers of social or environmental purpose. 78% of UK adults want to play a part in reaching the UK's net zero goal. 57% want to work for an organisation that helps get us there. Young people are especially committed to tackling climate change and want to make a personal and professional contribution.[2]

Scotland should coordinate a 'National Service for Net Zero' programme to empower everyone to play their part. The programme should be voluntary, accessible and inclusive. It should be targeted at opportunities for young people but extended to the whole population. It could provide employment opportunities in green sectors of the economy or volunteering opportunities in local communities.

The programme could match the right people to the right opportunities depending on skill profile, time commitment and location. A mix of paid and unpaid, short-term and longer-term, formal and informal opportunities could be provided, but with alignment to the highest standards of Fair Work.

What could National Service for Net Zero look like?

Key principles:

- Voluntary
- Open to All
- Fair Work

Potential opportunities:

- Volunteering – Pick litter or help environmental charity
- Community organising – Join local food cooperative
- Work-based learning – Part-time work at local repair café, part-time vocational training
- Short-term work – 3 months on wildlife or nature conservation project
- Longer-term work – 12 months in tree planting, peatland restoration or buildings retrofit with pipeline and prospects for secure employment
- Green Skills Passport to validate skills learned for employability

The programme could leverage existing opportunities as well as help create new opportunities across the public, private and third sectors businesses under the same banner to create a sense of momentum and shared national mission which could help to tackle labour shortages, plug skills gaps and develop green skills by attracting new talent into key sectors. It should be tailored to local needs and circumstances and aligned with local resources such as employability services or community groups.

Young people in particular could, for example, choose to complete a year of National Service for Net Zero after leaving education, or as a 'gap year' between secondary and further or higher education, to put into practice or further develop their green skills, explore a potential career in a green job and help to tackle climate change. It could also support others to re-enter or transition in the labour market, such as after

1 https://fraserofallander.org/learning-disabilities/scotlands-invisible-people/
2 National Grid (2020) Building the net zero energy workforce

redundancy, long-term unemployment or a period away from work.

Individuals committed to National Service for Net Zero could receive a 'Green Skills Passport' to demonstrate their learning and development, as well as become Ambassadors for Net Zero in their households, workplaces and communities to pass on their knowledge and skills to others.

Reskill and upskill workforce for green jobs of the future

We are in an era of disruption for economies and labour markets. The public health emergency of COVID-19 is only the latest example of the complex, multifaceted and interlinked crises and challenges to which all societies will have to adapt.

The climate and nature emergencies and the Fourth Industrial Revolution will be the most significant of these inter-linked global mega-trends in the decades to come with profound long-term consequences for employers, educators and workers.

Climate change and technological change will most likely become the dominant disrupters and drivers of skills demand and supply in every sector of the global economy, starting a new global war for 'green talent', intensifying the need to reskill or upskill the workforce and changing our learning ecosystem.

Automation, artificial intelligence, big data and digitisation are changing the way we live and work. Some jobs will be displaced by technology and regulation, which is not new. Work will not disappear, as some have feared, but some jobs will, as work continues to change. Automation will focus on tasks, rather than jobs, empowering workers to become more innovative, productive and purposeful, and to harness technology for Clean Growth.[3]

AI and robotics can be deployed to remove dirty, dangerous or dull tasks from jobs. Automation can help maximise resource efficiency and minimise waste. Big data analytics can assess emissions to inform the redesign of processes, products and services which will decarbonise businesses, sectors and communities. Digital connectivity and Augmented or Virtual Reality can help reduce unnecessary travel, as well as make employment or education opportunities more accessible, engaging and interactive for learners or workers in every part of Scotland.

In this industrial revolution, as in every previous one, inventions and innovations will disrupt the status quo and change the way we live and work, leading to the transformation of most jobs, the elimination of some jobs especially in declining sectors and the creation of many new kinds of green or 'green collar' jobs [4] in new sectors of the economy – all accelerated by the transition to Net Zero as climates, markets, regulations and policies change, as discussed in the chapter on Industry.

All of these trends will have a significant impact on the future green skills needs of businesses and organisations across the Scottish economy and create significant challenges for the Just Transition agenda.

Impact of Transition to Net Zero on Green Skills Needs

1. ***Green Restructuring*** – employment density shifts from declining, high-emission sectors to growing, emissions-reducing sectors like retrofit or renewable energy
2. ***New Green Occupations*** – entirely new occupations like sustainability specialist or vertical farmer emerge due to new regulations, innovations or markets
3. ***'Greening' Existing Jobs*** – skills profiles of existing occupations change to require more green skills due to new equipment, priorities or ways of working such as circular business models

Source: International Labour Organisation

Businesses, organisations and communities can decarbonise and grow sustainably with the right people with the right green skills. Scottish firms can compete and thrive on the global stage with access to the best 'green talent' through an open, flexible and welcoming immigration system. Global investors can be attracted to invest in or relocate production in Scotland if our workforce has the green skills of the future.

Net Zero by 2045 will require fundamental transformation in all aspects of our lives and across all sectors of the economy at a pace and on a scale not seen in generations. The skills we all need will inevitably change too. The skills profile of every job in every sector will be disrupted. By 2030, one third of all required skills will be 'wholly new'.[5]

Workers will need to be supported to continually refresh, update and develop their skills to adapt to climate and technological change. 9 out of 10 employees will need to reskill or upskill by 2030.[6]

A recent study from the London School of Economics suggested that 10.1% of jobs in Scotland have skills for which demand could grow in the transition to Net Zero, while 10.4% of Scottish jobs could require reskilling. A total of more than 2.4 million people could be affected.[7]

What are Green Jobs?

Green jobs are jobs in any sector which tackle climate change, build resilience to environmental disruption or protect and restore nature by:

- Reducing carbon emissions
- Developing zero- and low-carbon innovations
- Improving energy and material efficiency
- Minimising waste, pollution and consumption
- Restoring biodiversity and ecosystems
- Adapting to effects of climate change

Source: International Labour Organisation

Workers whose jobs could be displaced from declining or high-emissions sectors will need reskilling opportunities to transition into new jobs in growing, low-emissions sectors. Workers whose jobs will be disrupted or transformed by new regulation or innovation will need upskilling opportunities to work with new technologies or fulfil new roles.

All workers will need new green skills to shift to new, more sustainable business practices, techniques and organisational cultures. All workers will need new green skills and knowledge to understand climate change, analyse and monitor how their work impacts on the environment and take steps to reduce emissions and waste – at home, at work and in the community.

Many workers will need new green skills to deploy, utilise and maintain new low-/zero-carbon or emissions-reducing technologies. Sectors like Agriculture, Food & Drink, Manufacturing and Transport will be increasingly automated and reliant on skilled people to design, implement, operate and maintain complex equipment or infrastructure which minimise waste and maximise energy or resource efficiency.

Shortages of green skills are a major barrier to Clean Growth in Scotland and in economies around the world, especially in renewable energy, construction, manufacturing, energy efficiency and renovation and resource efficiency.[8]

We need to invest in our people and their skills to prepare them for the green jobs of the future. We must all act now to drive a Green Skills Revolution which will deliver a Just Transition to Net Zero and maximise Clean Growth.

By building a workforce with green skills and knowledge, we can fuel Clean Growth – supplying businesses with the skills they need to decarbonise and grow sustainably; increasing productivity and efficiency by reducing waste and misuse of resources; creating new green jobs, especially in places which

3 SCDI (2020) Upskilling Scotland: The Future of Skills and the Fourth Industrial Revolution
4 www.cognizant.com/futureofwork/article/5-green-collar-jobs-of-the-future
5 www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
6 www.cbi.org.uk/media/5723/learning-for-life-report.pdf
7 www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2019/02/Investing-in-a-just-transition-in-the-UK_policy-brief_8pp-1.pdf
8 www.ilo.org/skills/projects/WCMS_115959/lang--en/index.htm

need it most; attracting inward investment to fund the transition to net zero; and positioning Scotland as the global home of sustainable business.

The International Labour Organisation estimates that the transition to Net Zero could generate up to 60 million jobs worldwide in the next two decades. The UK Government has set a target of creating 2 million green jobs across the UK by 2050. The National Grid estimates that 400,000 jobs could be created across the UK in the energy sector alone in the years to 2050 as we accelerate and deepen the energy transition to renewables. Our national mission is to maximise the number of these jobs which are created here in Scotland.

To meet the moment, and respond to the scale of the challenge, there is an urgent need for a paradigm shift in how we all think about and invest in learning, with a much greater commitment to lifelong learning and work-based learning for everyone at all stages in their life and career to accelerate green reskilling and upskilling across the workforce.

Reskilling vs. Upskilling

What is 'reskilling'?
Learning new skills to retrain, change job or career or transition into a new sector

Examples
Combustion engine mechanic learns how to maintain EVs or hydrogen fuel cells
Redundant retail worker retrains as STEM teacher or insulation installer
Farmer learns how to use new equipment to implement more sustainable practices

What is upskilling?
Developing or enhancing existing skills to progress up the workforce value chain and increase productivity

Examples
Experienced offshore engineer builds on skills developed on oil rigs to work on CCUS

Construction worker develops circular economy expertise to build with more sustainable materials

Teacher builds knowledge of sustainability to embed climate change in teaching

We must build a learning ecosystem which can deliver a Just Transition and leaves no one behind. We will have to move beyond our current focus on pre-employment and early-career stage education to a more holistic commitment to lifelong learning for everyone at all stages of their life. Our learning ecosystem must now and in the future have a much greater focus on those in work and those in mid- or late- career.

Many workers in sectors like Scotland's oil and gas industry will need support to reskill and retrain to transition into new green jobs to prevent a surge in unemployment. The oil and gas sector workforce has decades of expertise and experience that will be essential for the energy sector and the whole of Scotland to harness to achieve Net Zero. It is essential that we do not lose or waste the STEM skills and knowledge of this workforce concentrated in the North East of Scotland. OGTC is developing a plan to upskill and diversify the sector's workforce to meet its ambiti on of a Net Zero oil and gas basin by 2050.[9]

The forthcoming *Climate Emergency Skills Action Plan* must identify how and where oil and gas workers can be re-deployed in CCUS, hydrogen or renewables. The Just Transition Commission and the Scottish Government should identify which other sectors, workforces and regions are most likely to be affected by the transition to Net Zero, including indirectly via supply chains for sectors like construction.

There is a need for higher levels of support for the workforce. Government and employers have a key role to play. Scotland underinvests in its people compared to the leading economies of Western Europe and Scandinavia, where government and employers prioritise human capital and pursue a high-investment, high-skill, high-pay and high-productivity labour market model.

9 https://roadmap2035.co.uk/roadmap-2035/

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Before the pandemic, 2 in 3 employers in Scotland did not have a training budget. With finances deteriorating and capital dwindling during the COVID-19 crisis, the capacity for employers to look to the future and invest in their people is now likely to be even lower. SMEs, often with limited time, capacity and resources to fund reskilling and upskilling opportunities for staff, are the backbone of the Scottish economy. Workers are often unable to fund their own learning independently or access it due to family responsibilities or a lack of flexibility in provision.[10]

Many employers are also not certain about their current or future green skills needs. Many are unsure about what Net Zero might mean for them or their sector. We will need to develop active labour market interventions and a flexible, innovative and responsive learning ecosystem which can anticipate and address emerging and future green skills needs, especially to plug urgent or major skills gaps or labour shortages. The *Climate Emergency Skills Action Plan* will develop policies to tackle identified skills demands in key sectors like Energy, Construction, Transport, Manufacturing and Agriculture.

Scotland needs a Green Skills Revolution. Everyone should be empowered to compete for and thrive in the green jobs of the future. Everyone should have access to the funding they need to develop new or improve existing green skills. Everyone should have access to the support they need for reskilling, upskilling and lifelong learning.

There is increasing demand from both learners and employers for learning opportunities which are flexible in mode of delivery, especially remote, digital or blended learning, as well as delivered in shorter or smaller segments, such as 'unbundled' college or university qualifications, to improve access and widen participation. These learning opportunities could be better tailored to the green skills needs of an employer, sector or individual, as well as more responsive to new and emerging climate trends or low- and zero-carbon technologies. 82% of prospective students who are unemployed, at risk of unemployment or want to learn new skills are keen to study individual modules of university degrees.[11]

Scotland's colleges and universities should expand and further develop their offer of flexible, modular and tailored learning opportunities underpinned by support and incentives from the Scottish Government and the Scottish Funding Council. More 'bitesize' reskilling and upskilling courses would make learning opportunities significantly more attractive and accessible to a wider section of the workforce – especially to those in mid-career with family, caring or other responsibilities.

Everyone in Scotland should have a lifelong entitlement to learning. Individuals need to be empowered to direct their own learning, to shape their own place in the labour market and to control their own future with support from funding which they can access throughout their lifelong learning journey. There is also a need to close Scotland's skills funding gap and to respond to the growing personalisation of curated learning.

The Scottish Government should establish a Reskilling and Upskilling Fund in addition to existing support. The Fund should be ambitions, flexible and universal. It should empower every Scottish adult to fund reskilling or upskilling opportunities at any stage of their life or career, learning from the successful SkillsFuture model in Singapore. It should help learners and workers to gain or develop green skills they need for the green jobs and green industries of the future, keeping pace with technological change and climate change as part of a Just Transition to Net Zero.

How would a Reskilling and Upskilling Fund work?

A Reskilling and Upskilling Fund would empower everyone in Scotland to become a lifelong learner. Everyone would have an equal number of credits which could be used to partly or wholly fund opportunities to reskill or upskill throughout their working lives.

For example:

- *Early career* – Bitesize upskilling courses in carbon literacy and digital from local college

10 SCDI (2020) Upskilling Scotland: The Future of Skills and the Fourth Industrial Revolution
11 www.universitiesuk.ac.uk/news/Pages/Majority-of-adult-learners-would-upskill-at-university-if-given-the-chance.aspx

- *Mid-career* – Higher education qualification to develop project management or leadership skills through part-time study from Scottish university
- *Late career* – Remote learning in STEM from global providers to reskill to keep pace with latest innovations or to transition into another sector

Align Green Recovery investment with jobs and skills programmes

Our interim report called on the UK Government and the Scottish Government to deliver a fiscal stimulus packages to support a Green Recovery from the COVID-19 crisis. We called for investment in green infrastructure like retrofit and energy efficiency, low- and zero-carbon transport, nature-based solutions and digital connectivity to be prioritised.

Both governments are now accelerating or expanding labour-intensive programmes in active travel, domestic retrofit and peatland restoration, for example, among others, which will create new green jobs for those with the right green skills.

This public investment in a Green Recovery must be aligned with specific job creation and skills support programmes and harness the role of the enterprise and skills agencies. Meanwhile, while all job creation and skills support programmes should be aligned with Clean Growth objectives to ensure a Just Transition and develop a workforce with the green skills required for delivery and implementation.

Government and its agencies should prepare now, working in partnership with colleges, universities, training providers and employers, to ensure that we do not face future skills gaps or labour shortages in key sectors where it is clear public investment will quickly and significantly expand demand – from green engineers to insulation installers to tree planters.

Both governments are delivering new skills support programmes, including those targeted at young people such as the Kickstart Scheme and the Young Person's Guarantee, which could be aligned with the opportunities created by Green Recovery programmes to develop green skills in young people and create a new green talent pipeline.

The Kickstart Scheme is currently designed to provide funding for employers to create part-time job placements for 16- to 24-year olds on Universal Credit who are at risk of long-term unemployment over six months. However, the scheme could be more effective by combining part-time work with part-time study. Young people could be supported to develop green skills both through work-based learning on site or in the remote or physical workplace as part of a Green Recovery programme and in the digital or physical classroom of a local college, university or other accredited industry training provider.

RECOMMENDATIONS

Build core green skills across society

- Educators, employers, learners and workers should recognise carbon literacy and digital literacy as essential skills for the 21st century

- All schools, colleges, universities, training providers and employers should embed core green skills and carbon literacy across curricula, professional learning and work-based learning

Harness all of Scotland's talents to get to Net Zero

- Scottish Government should coordinate a voluntary, inclusive and accessible National Service for Net Zero programme of employment and volunteering opportunities across the public, private and third sectors backed by a Green Skills Passport

Prepare workforce for green jobs of the future

- Scotland should establish a culture of and an entitlement to lifelong learning

- Scottish Government should create a Reskilling and Upskilling Fund which empowers every Scottish adult to fund reskilling or upskilling opportunities at any stage of their life or career

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Align Green Recovery investment with jobs and skills programmes

- UK Government and Scottish Government should align public green infrastructure investment and procurement with green jobs and skills programmes

- UK Government and Scottish Government should align jobs and skills programmes for all workers at all stages with Clean Growth objectives

FINANCE
CLOSE THE INVESTMENT GAP

Climate change represents a serious financial risk to the global economy and the fiscal costs of the transition to Net Zero will be immense. But so too are the opportunities for Clean Growth. However, the investment gap between what we are currently able or preparing to spend and what we will have to spend to decarbonise is significant.

We need to close the investment gap to fund the transition to Net Zero. Government, business and individuals will need to unlock higher levels of public and private investment. Traditional public and philanthropic sources of funding will be insufficient to the scale of the climate and nature emergencies. Our financial services sector will need increase its commitment to sustainability to increase its competitiveness.

By delivering a green stimulus, unlocking green finance and recognising climate risks, we can fund the transition to Net Zero, deliver co-benefits for society, economy and environment and establish Scotland as a world leader in ethical, responsible and sustainable investment.

The UK's Green Finance Strategy

Scotland is one of Europe's leading financial centres, with a strong and diverse sector responsible for over 160,000 jobs from banking, insurance and FinTech to asset management, pensions and professional services. Over £800 billion of funds are managed in Scotland.[1] Scotland also boasts many significant opportunities for investment in green technology, infrastructure and innovation – from renewables and hydrogen to the circular economy and natural capital – as highlighted throughout this report.

Together, these strengths mean that green finance represents a significant Clean Growth opportunity for Scotland. By harnessing the assets, expertise and experience of our financial services sector, as well as reforming the financial system which regulates and governs it, Scotland can establish itself as a world leader in ethical, responsible and sustainable investments which accelerate the global transition to Net Zero.

The UK's first *Green Finance Strategy* was published in 2019. It identified two necessary elements in the shift towards green finance which, alongside maximising the economic opportunities for a more competitive and more sustainable financial services sector, represent the strategic pillars of the UK's approach.

1 www.sfe.org.uk/about/financial-services-in-scotland

Firstly, the capital shift for 'Financing Green' in which funds move away from investments which have a negative impact on the environment in terms of carbon emissions and biodiversity loss, towards those which align with Net Zero.

Secondly, the culture shift for 'Greening Finance' in which climate and environmental factors are fully integrated into mainstream financial decision making across all sectors and asset classes.[2]

Financing Green

The fiscal costs of the transition to Net Zero will be immense. Achieving Net Zero will require unprecedented levels of public and private investment in low- and zero-carbon technologies and innovation. Billions of pounds worth of investments will need to be reallocated from high-polluting industries into new and emerging green sectors. Our public services, infrastructure and communities will need to be transformed to ensure their resilience to climate change.

Estimates suggests that the total cost for the UK to get to Net Zero could be between £50 billion and £70 billion per year until 2050.[3] This burden will need to shared fairly and sustainably across our economy and our society to ensure a Just Transition for all.

We will need to mobilise the enormous financial resources of global capital markets and pension funds accelerate the flow of green finance into Clean Growth opportunities in Scotland. There are indications of growing demand and substantial latent capital for green investments.

However, the investment gap between what government, business and industry and citizens and consumers are currently prepared to spend and what they will have to spend to achieve Net Zero and restore nature is dramatic. There is a risk that this will be exacerbated by the COVID-19 crisis, delaying progress if there is a significant long-term impact on the ability of much of business and industry to make necessary and productive green investments.

Business investment and indebtedness have been negatively affected by the COVID-19 crisis. Business investment fell sharply by more than a quarter in 2020, the largest fall on record.[4] Meanwhile, Scottish businesses could face over £6 billion of unsustainable debt by early 2021, half of which is expected to burden SMEs.[5]

UK Government, Scottish Government and enterprise agencies will therefore have to lead the way by raising public investment, taking steps to accelerate and unlock private investment and developing more diverse and innovative approaches, such as blended finance where public and private investment is combined to share risks.

France, Germany and several other European countries are delivering stimulus programmes of around 4% of GDP, often with a strong focus on Clean Growth or aligned with Net Zero objectives. 4% of Scottish GDP would represent a stimulus of around £6 billion. The UK Government and the Scottish Government would have an essential role to play in delivering such a stimulus for Scotland funded through additional affordable borrowing, especially with borrowing costs at record lows, as well as further taxation on carbon emissions.

The *Programme for Government 2020/21* in September, the *Comprehensive Spending Review* and the *Financial Services Statement* contained welcome new green investments, policies and regulations to begin to close the investment gap. The Chancellor announced in November that the UK Government will issue its first Sovereign Green Bonds in 2021 to finance green infrastructure projects.

However, the limited borrowing powers of devolution's Fiscal Framework significantly constrain the Scottish Government's ability to raise levels of green investment at pace to meet the scale of the challenge of Net Zero. The Scottish Government can only borrow an annual total of £450 million or just 0.3% of GDP. There is more still to do.

The UK Government and the Scottish Government should work together to review and reform the Fiscal Framework to ensure the Scottish Government's fiscal powers are fit for purpose to achieve Net Zero by 2045.

Government and the wider public sector can also take steps to leverage private investment. Scotland's Net Zero targets provide clear sense of strategic direction and ambition for global investors. The Scottish National Investment Bank and the UK Infrastructure Bank will play an essential role in crowding-in private investment to tackle the climate and nature emergencies through creating new markets, facilitating match funding or reducing the capital costs and risks of innovation.

This report identifies several potential new spending commitments for public money which are urgent and necessary to achieve Net Zero, deliver a Just Transition and maximise Clean Growth in Scotland. The UK Government should therefore work with industry and the devolved administrations to agree a new carbon pricing mechanism for the UK to ensure a smooth transition from the EU Emissions Trading System.

Whether this mechanism is a strengthened emissions trading system or a new carbon tax, or includes a carbon border tax, it will need to be applied consistently, fairly and predictably across the economy and aligned with Net Zero by 2045. It should hold polluters responsible for negative environmental impact and create strong financial incentives for business and industry to accelerate and intensify investment and innovation in reducing emissions.

It could generate substantial new revenue from activities, products and services contributing to climate change which could be leveraged to fund the immense fiscal costs to taxpayers of a Just Transition to Net Zero. Revenue should, for example, be reinvested in Clean Growth innovation and infrastructure, nature-based solutions or climate adaptation measures, helping us to grow the low- and zero-carbon sectors of the Net Zero economy.

The UK Government will also have to explore alternative models for raising public investment, such as road user pricing or similar measures to fund the significant investment in future low- and zero-carbon infrastructure which will be required to decarbonise transport connectivity.

Clean Growth policies must be coherent and strategic, providing as much clarity and long-term certainty as possible around strategic direction, transition periods and implementation dates for policies, incentives and regulations as soon as possible to create market confidence and stimulate investment. Devolved and reserved policies should be aligned and coordinated as far as possible.

Closing the Biodiversity Financing Gap

The *£1 Billion Challenge* was launched by the Scottish Environment Protection Agency and the Scottish Wildlife Trust to propose new funding models to close the biodiversity financing gap. The Route Map sets out nine innovative opportunities to stimulate new private investment in Scotland's natural assets, including:

Landscape Enterprise Networks – Partners work together to assess their dependence on local natural assets (e.g. soil in agriculture, water in manufacturing, woodland in forestry). Joint business cases for investing in the local landscape can stimulate businesses to re-invest in the natural assets on which they depend. Nestlé is pioneering this approach in South West Scotland

Net Positive for Nature – A new national framework could be created to ensure developers directly fund compensatory investment to balance any new pressures on the environment and biodiversity which developments create

Nature-Climate Bond – Citizens and investors could buy bonds to fund nature-based solutions with returns derived from long-term savings or new income generation

2 www.gov.uk/government/publications/green-finance-strategy
3 www.instituteforgovernment.org.uk/explainers/net-zero-target
4 www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/businessinvestment/apriltojune2020revisedresults
5 www.thecityuk.com/research/supporting-uk-economic-recovery-recapitalising-businesses-post-covid-19

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Business models and commercial funding mechanisms for some technologies and sectors, particularly for CCUS, hydrogen and nature restoration or conservation, are still to be developed to unlock private investment, as noted elsewhere in this report. Government and its enterprise agencies have a key role to play in developing and replicating best practice initiatives.

New schemes could be considered to attract capital from the growing number of businesses and organisations which are investing in the offsetting of their carbon emissions. New approaches to home-grown carbon offsetting, which encourage and enable domestic or international firms to invest in certified carbon offsetting activities in Scotland, could increase and direct private investment in biodiversity and carbon storage through native tree planting or other projects.

Smaller Clean Growth projects will struggle to attract major investors unless aggregated into larger portfolios. For example, the level of investment needed to improve energy efficiency in domestic buildings can be substantial for individuals, yet too small to incentivise investors despite delivering otherwise attractive and reliable returns. In the retrofit sector, this can be achieved through Energy Service Companies.[6]

The Scottish Government, local authorities and housing associations should work together to develop a model to build aggregated portfolios of social housing retrofit projects, potentially on a regional or city region basis, and other investment opportunities, which would deliver the scale necessary to unlock green finance.

Green Investment Portfolio

Scotland's first Green Investment Portfolio promotes ten market-ready projects worth with over £1 billion of investment potential which are seeking private capital.

Projects include hydrogen innovation in Aberdeen, plastic recycling in Perthshire and a deep-water port in North Ayrshire.

The portfolio will ultimately expand with further projects to reach a total value of £3 billion.

Government can work with industry to support the development of investor-ready projects, such as through the Green Investment Portfolio. Decision-making by global business and industry about where to locate and invest will also increasingly consider environmental factors as they look to locate and invest where emissions can be minimised or eliminated. Scotland can develop a unique and compelling offer for global industry and investors.

Scottish Government should develop the *Inward Investment Plan* into a Net Zero proposition which can attract industries to invest, develop supply chains or expand production here. It should position Scotland as the home of innovative, resilient and sustainable business based on our competitive advantage of 'pace, place and space'.

Scotland: The Home of Sustainable Business

Pace – Our world-leading Net Zero targets, our progress in decarbonising power and our backing for circular or hydrogen innovation sets out our ambition for Clean Growth

Place – Our great urban and rural communities with innovative firms, green infrastructure and green skills attract industries and investors here

Space – Our unique natural assets which support biodiversity, improve health and wellbeing and facilitate social distancing attracts people to live, work and visit here

6 www.aldersgategroup.org.uk/asset/1697

Greening Finance

Achieving Net Zero by 2045 will require significant changes to how our financial system operates and how investment decisions are often made. Every business and investor will need to ensure that the current and future financial risks and opportunities of climate change and biodiversity loss are integrated into their financial decision-making. Industry will need to deliver investments and developments which deliver for climate and nature.

Technological and climate change will mean that high-polluting industries will be ultimately displaced by new green sectors of the economy. Extreme weather events such as floods, droughts or storms will become increasingly frequent and increasingly likely to disrupt or damage production, operations, infrastructure and supply chains.

There has already been significant progress. Environmental, Social and Corporate Governance (ESG) approaches, which measure, report and demonstrate commitment to contributing positively to social and environmental challenges, are increasingly widespread.

What is ESG?

ESG criteria measure the wider impact of an organisation or investment beyond financial factors:

Environmental – How does it affect the planet? Does it tackle climate change?

Social – How does it affect people, consumers and communities? Does it support diversity, inclusion and fairness?

Governance – How is it governed and structured? Does it align with Fair Work?

7 www.gov.uk/government/publications/green-finance-strategy
8 www.ussif.org/files/GSIR_Review2018F.pdf
9 https://investmentnews.co.nz/wp-content/uploads/ESGsov.pdf
10 www.ussif.org/files/GSIR_Review2018F.pdf

The Task Force on Climate-related Financial Disclosures (TCFD) has developed a framework which is the new global gold standard to 'help public companies and other organizations more effectively disclose climate-related risks and opportunities through their existing reporting processes'. The TCFD framework has been endorsed by institutions representing $118 trillion of assets globally and 70% of UK banks now classify climate change as a financial risk.[7]

The UK Government created the Green Finance Institute to facilitate collaboration on green finance between the public and private sectors. The UK is developing a 'green taxonomy' framework to determine which economic activities and investment products are environmentally sustainable. Project owners in Scotland's public, private or third sectors will need to improve their understanding of what green investors are looking for to ensure proposals meet their needs.

High Street lenders like **Barclays** and **Nationwide** now offer a range of ***'Green Home Mortgages'*** which enables purchasers of new build properties with the highest energy efficiency ratings to secure a lower mortgage rate.

The global demand and supply of ethical, responsible and sustainable financial products is growing strongly across the world. Countries which are highly sustainable will be increasingly attractive to investors. ESG investment – which excludes or prioritises certain products, firms or sectors based on ESG criteria or targets investment to solve social or environmental problems – rose to $30.7 trillion across major markets in 2018.[8]

New Zealand is ranked as the world's leading country for ESG.[9] 63% of the value of assets managed by its financial services sector are ESG investments.[10] It will become the first country in the world to ask its banks, insurers, investors and other financial institutions to

report on climate risks and strategies using the TCFD framework by 2023. However, the UK Government has committed to go further than this 'comply or explain' approach, making climate-related disclosures mandatory for large companies across the economy by 2025.

This represents a significant Clean Growth opportunity for Scotland to establish itself as a world leader in ethical, responsible and sustainable investment. Scottish business and the financial services sector could match New Zealand's ambition by accelerating its embrace of TCFD best practice by 2023, well ahead of the UK's legal milestone of 2025.

- Green finance skills will need to be developed across the sector's workforce, embedded within the professional qualifications of accountants, actuaries, bankers, financial analysts, insurers, investment managers and risk managers and the focus of upskilling opportunities to support this shift in culture, behaviours and practices.

RECOMMENDATIONS

Financing Green

- UK Government and Scottish Government should scale-up public investment funded through additional affordable borrowing and taxation of carbon emissions to deliver a large-scale green stimulus

- UK Government and Scottish Government should review and reform the Fiscal Framework and boost the Scottish Government's borrowing powers

- Scottish Government and its agencies should develop new and innovative models to stimulate private investment

- Scottish Government, local authorities and partners should develop a model to build aggregated regional or city region portfolios of investment opportunities from housing retrofit to nature-based solutions which unlock green finance

- Scottish Government should develop the *Inward Investment Plan* into a Net Zero inward investment proposition which positions Scotland as the home of sustainable business

- UK Government and Scottish Government should work together to revisit the potential for a national model of road user pricing or similar measures to address congestion and fund future low- and zero-carbon infrastructure

- UK Government should work with industry and devolved administrations to agree a new carbon pricing mechanism which aligns with Net Zero, fully accounts for carbon emissions and helps to funds Clean Growth innovation and infrastructure, including supporting a viable business model for CCUS

Greening Finance

- Industry should embrace best practice on climate-related disclosures and ESG by 2023
- Industry should commit to nature-rich investments and developments which deliver for people, economy and planet

Manifesto for Clean Growth – Clean Growth Leadership Group

NATURE
NATURE-RICH FUTURE

The world faces a nature emergency. Climate change is contributing to biodiversity loss and environmental degradation at an unprecedented rate in human history, which poses growing risks of severe disruption and damage to the global economy.

Scotland's environment and economy are under threat too. Nature is fundamental to life on earth and a major economic asset which we must protect and restore. We have unique natural resources which we can sustainably harness for Clean Growth and to achieve Net Zero as part of a thriving rural economy.

By reversing biodiversity loss, transforming agriculture, supporting sustainable forestry, restoring our peatlands and growing the Blue Economy, we can ensure a nature-rich future for all of Scotland.

Reverse biodiversity loss

Over 1 million animal and plant species are at risk of extinction worldwide. Biodiversity loss is accelerating at a pace unseen in human history due to climate change as well as changing land and sea use, habitat destruction, hunting and resource extraction. Pollution, deforestation and overexploitation of nature are increasingly damaging its chances to survive and thrive.

Natural capital is a major asset for our societies and economies and in our fight against climate change. Its animals, plants and systems give us the essentials for life, provides materials for food, medicine and shelter, supports the resilience of the planet and absorbs CO2. [1] Over half of global GDP depends on the goods and services provided by the natural world, such as air quality and food or water security, known as Biodiversity and Ecosystem Services.

1 in 5 countries are at risk of ecosystems collapse as biodiversity declines rapidly. Developing nations in the Global South across Africa, Asia and the Middle East are likely to be most severely affected. The UN has proposed a global target to increase nature conservation and protection to 30% of the world's surface by 2030.[2]

What is Biodiversity?

'Biodiversity is the variety of life, in all its forms. It has many dimensions, including the diversity and abundance of living organisms, the genes they contain, and the ecosystems in which they live.'

The Dasgupta Review (2020)

However, Scotland has its own fragile ecosystems which threaten future prosperity. Nearly half of species are in decline. 1 in 9 species are threatened with national extinction. [3] We are failing to manage our natural assets effectively and sustainably,

1 https://ipbes.net/global-assessment
2 www.mckinsey.com/business-functions/sustainability/our-insights/valuing-nature-conservation
3 www.swissre.com/media/news-releases/nr-20200923-biodiversity-and-ecosystems-services.html

recognise their full value to our society and our economy or respect limits on their overuse.[4]

Natural heritage is worth an estimated £23 billion annually to Scotland's GDP. It directly and indirectly supports hundreds of thousands of jobs in key sectors of the Scottish economy like agriculture, construction, blue economy, energy, food & drink, forestry and tourism & hospitality.

The strength of Scotland's brand is built on the beauty and opportunity of our mountains, glens, forests, rivers, lochs, coasts and wildlife. It is a key factor in our competitive advantage as a leading destination for tourism and inward investment, our ability to attract global talent to live, work or study here and our strengths in the rural economy.

Protecting and restoring animal and plant biodiversity is critical to enable Scotland to be a Clean Growth world leader. It can support climate mitigation and adaptation through reducing the risks, severity or impact of floods, storms, heatwaves and other extreme weather events, as well as improve public health and wellbeing through better air and water quality and more equal access to nature. It can also create jobs in wildlife management and nature conservation.[5]

However, as discussed in the Finance chapter of this report, underinvestment in nature remains a significant issue. The complexity of natural capital can make its economic benefits difficult to quantify. Nature is often overlooked as a Clean Growth opportunity as a result.

We need to develop new ways to understand, measure and value Scotland's natural capital to support public and private investment and to close the investment gap in nature conservation and restoration, building on the annual Scottish Natural Capital Accounts and State of Nature reports.

Business and industry should deepen its efforts to assess and mitigate the risks of declining natural capital and biodiversity loss on its assets, operations and supply chains, identifying where it can and should invest. New approaches will need to be underpinned by better data and modelling to inform leaders, decisionmakers and policymakers and strengthen the business case for biodiversity.[6]

Government also has a key role to play in setting the strategic ambition and direction which catalyses greater action to protect and restore nature across the public, private and third sectors. Scotland should recognise the nature emergency and the climate emergency as twin crises, focusing attention, priorities and resources to tackle both together.

Scotland should therefore have nature targets alongside its ambitious climate targets for Net Zero by 2045, as advocated by Scottish Environment LINK and others.[7] Public bodies should have a statutory duty to play their part in reversing biodiversity loss and to monitor and regularly report on progress. A refreshed *Biodiversity Strategy* and expertise from an independent advisory committee could support businesses, organisations and sectors to develop plans to implement of the new ambitious, legally binding targets.

'Beyond Compliance'

The Scottish Environment Protection Agency's regulatory strategy, One Planet Prosperity, goes 'beyond compliance'. Every Scottish business will comply with the law, but SEPA is working to ensure as many as possible go further.

SEPA provide support to businesses who recognise the environmental, economic and social benefits of embracing voluntary 'beyond compliance' opportunities – such as developing sustainable business practices or innovating across supply chains.

A new oversight body is being established to take on the enforcement and scrutiny functions of the European Commission as the UK leaves the EU. The Scottish Government should ensure that Environmental Standards Scotland, alongside regulators like the Scottish Environment Protection Agency and agencies like NatureScot, have the powers, resources and independence they need to ensure a nature-rich future for all.

It is vital that existing and future environmental regulations are fairly and fully enforced. Regulatory strategies should be focussed on deterrence or prevention, rather than compensation or redress, of damage to nature, supporting businesses to be innovative and sustainable.

Transform agriculture

70% of land use in Scotland is agricultural. Agriculture is the second largest emitting sector and can play an essential role in the transition to Net Zero. It is a key sector of our economy, especially in rural communities, as the third largest employer in rural Scotland with 8% of the workforce. Scotland's farmers and crofters take pride in producing high-value products which have a hard-earned global reputation for sustainability and quality.

However, there is much more still to do. Agricultural emissions will have to fall by at least 35% by 2045 for Scotland to achieve Net Zero, according to the CCC.[8] Climate change is causing significant financial damage to the sector. The extreme weather of 2017-2018 cost Scottish farmers £161 million in livestock losses and lower crop yields.[9] Accelerating the decarbonisation of Scottish agriculture can create Clean Growth opportunities for the sector to increase sustainability and productivity, becoming more green and more competitive.

Research by WWF Scotland suggests that supporting farmers and crofters to learn and adopt more innovative, more sustainable practices – including reduced nitrogen fertiliser use, rotational grazing techniques, improved animal health and breeding, better management of manure, nutrients and soil, organic farming and reduced waste – could reduce carbon emissions from agriculture by 38% or more by 2045.[10]

Agroforestry, where trees and crops are grown on the same land, can reduce carbon emissions, enhance crop yields and create new revenue streams related to timber. Through biotechnology, we can harness Scotland's research and rural capabilities to decarbonise agricultural production with lower levels of chemical use and higher levels of crop yield through gene-editing, creating new opportunities boost Scotland's exports and help sustainably feed the world's fast-growing population.

There is appetite within the sector to be innovative, testing and developing new low-carbon production and carbon sequestration solutions. Half of Scottish farms businesses have already diversified their activities, especially in renewable energy.[11]

However, the transformation of farms and crofts will require a fundamental change in approach and a significant expansion of support to shape and fund the transition. There will be a need for upfront investment in innovation, infrastructure and equipment, as well as long-term support for the reskilling, upskilling and lifelong learning of landowners and land managers and across the rural workforce.

Agricultural subsidies globally have tended to focus largely or solely on food production, leading to damaging practices or unintended consequences which have damaged nature and biodiversity.[12] The UK's withdrawal from the EU presents the opportunity for a radical rethink of the funding which Scotland provides to its agriculture sector as part of a thriving rural economy.

A new funding scheme for Scottish agriculture will be implemented from 2024 to replace the Common Agricultural Policy. There will be a 'stability and simplicity' transition period in the interim. However, the Scottish Government has yet to publish its vision for innovative and sustainable agriculture through a

4 www.nature.scot/state-nature-scotland-report-2019
5 Dasgupta Review (2020)
6 https://scottishwildlifetrust.org.uk/wp-content/uploads/2020/08/A-Nature-Recovery-Plan.pdf
7 www.mckinsey.com/business-functions/sustainability/our-insights/valuing-nature-conservation
8 www.scotlink.org/wp-content/uploads/2020/10/On-a-Path-to-Recovery-nature-targets-report-Oct-2020.pdf
9 www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk
10 www.wwf.org.uk/sites/default/files/2019-12/WWF%20Net%20Zero%20and%20Farming.pdf
11 www.wwf.org.uk/sites/default/files/2019-12/WWF%20Net%20Zero%20and%20Farming.pdf
12 www.gov.scot/publications/scottish-farm-business-income-estimates-2017-18
13 www.paulsoninstitute.org/key-initiatives/financing-nature-report

new system of farm support payments. It should do so as soon as possible to provide clarity and long-term certainty for the sector, enabling it to prepare and invest for the future.

NFU Scotland has called for financial stability, productivity measures and environmental measures to be the three components of future support for the agricultural sector. [13]

Scotland's future farm support payment system will need to be designed to deliver a wider range of positive outcomes for biodiversity and nature in addition to sustainable food production. It should incentivise and support the sector to pioneer biotech innovation; improve water quality; protect local wildlife and habitats; create farm woodlands and wetlands with native species; increase soil carbon storage; and strengthen climate mitigation and resilience.

It should be aligned with tailored information and support from an expanded and strengthened network of rural and agricultural advisory services to help farmers and crofters to access funding, develop plans and implement changes to equipment and practices.

There should also be further support for innovation and investment, building on the Agriculture Transformation Fund. The Scottish Government should develop a national scrappage scheme to help farmers and crofters fund purchases of new low-carbon equipment, technologies and vehicles.

The CCC has concluded it will be necessary to reduce consumption of the most carbon-intensive foods, such as beef, lamb and dairy. Consumption of beef, lamb and dairy should fall by at least 20% per person within healthy eating guidelines. [14] However, it is important to recognise that more sustainable domestic producers support local jobs, local prosperity and our food security by reducing our reliance on high-carbon imports.

Informed consumers should be supported to adopt more climate-friendly diets and to support Scotland's local and sustainable food producers. The public sector can play a key role by leveraging procurement, as discussed in the Place chapter of this report. New targets should be introduced to accelerate progress.

Invest in nature-based solutions

Nature-Based Solutions

- Protect, sustainably manage or restore nature
- Solve social, economic or environmental problems (e.g. climate change, unequal access to nature)
- Deliver co-benefits for people and planet (e.g. health & wellbeing, pollution, biodiversity) and support Clean Growth (e.g. green jobs)
- **Examples**: native tree planting, peatland restoration, coastal habitat restoration

Forestry remains a key sector in rural Scotland from Argyll to Galloway. It contributes almost 25,000 jobs and £1 billion annually to the Scottish economy. It is a vital carbon sink for negative emissions, absorbing 3 million tonnes of CO2 every year, which needs to be sustainably managed to ensure they are in good ecological condition and to encourage the natural regeneration of native woodlands. [15]

Scotland's *Forestry Strategy 2019-2020* aims to increase woodland cover from 18.5% to 21% and to increase native species to 35% of woodland cover, building on the progress of recent years. *The Programme for Government 2020/21* committed significant additional funding to create 18,000 hectares of woodland every year by 2024/25 to meet the ambitions of the CCC. It is vital that a significant proportion of new planting is of native woodlands.

It will be critical to accelerate and improve existing grant schemes for tree planting as 90% of activity is delivered by the private sector. Conservation and expansion of Scottish woodlands should focus on quality, diversity in scale and native species and identifying appropriate locations. Access to labour and skills to deliver these ambitions will likely remain a challenge for the sector in rural areas which are struggling with depopulation or a shrinking working-age population, as discussed in the 'People' chapter of this report.

Regional Land Use Partnerships, which will begin to be established in 2021, will create opportunities for better collaboration across in Scotland to maximise the potential of our land to help us achieve Net Zero and to tailor sustainable solutions to local communities.

The Scottish Government has also committed to increase the use of Scottish wood in construction as a sustainable material. Enhanced regulations to increase requirements for the use of timber in construction as an alternative to concrete or cement could significantly expand domestic demand to support Clean Growth in the forestry sector although further R&D investment may be required to ensure new home-grown timber products or timber-based products meet existing standards.

Peatland restoration sequesters large quantities of carbon and creates new green jobs. Peatlands are present in almost every country on earth and cover only 3% of the world's surface. They contain 30% of the carbon stored globally on or by land.

World's Biggest Carbon Sink

The peatlands of Flow Country in Caithness and Sutherland is the largest peat deposit and carbon repository in the world, an uninterrupted 4,000 sq km blanket bog. The UK Government is considering whether to request its designation as a UNESCO World Heritage Site, making the region a global showcase for peatland restoration.

60% of peatlands in central Scotland are degraded, with similar proportions in the rest of the UK and other countries. By leading the way on peatland restoration at home, Scotland can develop expertise, experience and innovation to export around the world and help other nations achieve Net Zero. The Scottish Government should expand its investment in peatland restoration and enhance regulatory protections, banning damaging practices such as burning or extraction.

Peatland ACTION

NatureScot's Peatland ACTION Fund has helped landowners and land managers to restore 25,000 hectares of damaged peatlands since 2012. In 2020, the Scottish Government announced further funding of £250 million over the next decade.

Grow the Blue Economy

Scotland's marine area is six times its land area. Our 18,000km of coastline, 8% of Europe's coast, is critical to our international connectivity and the strong and diverse sectors of our Blue Economy.

The Blue Economy is worth nearly £14 billion and over 84,000 jobs to the Scottish economy. It represents a significant Clean Growth opportunity for Scotland, especially in coastal and rural communities, with the size of the global Blue Economy expected to double by 2030 to meet rising global demand for sustainable fish, marine renewable energy and other major products and services from our seas.

14 www.nfus.org.uk/userfiles/images/Policy/Brexit/STEPS%20FOR%20CHANGE%20March%202018%20-%20for%20email.pdf
15 www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk
16 https://digitalpublications.parliament.scot/ResearchBriefings/Report/2020/9/9/The-Multiple-Roles-of-Scottish-Woodlands-1

Scotland's Blue Economy

Aquaculture – 3rd largest farmed salmon producer globally, Scotland's top food export; opportunities to scale-up sustainable seaweed production
Fisheries & fish processing – over half of UK landings by value; nearly half of UK jobs
Marine biotechnology – world-leading research and test sites; strong SME cluster
Marine tourism – some of world's finest sailing areas; strong cruise passenger growth
Ports, shipbuilding & shipping – connectivity to global trade routes; world-class naval ship build, design and support
Marine renewables – world-leading offshore wind, wave and tidal research, innovation and deployment
Oil & gas – largest oil producer; 2nd largest gas producer in EU

The Scottish Government has committed to develop a *Blue Economy Action Plan*. Industry and academia should play a critical role alongside Marine Scotland, Crown Estate Scotland and Scotland's enterprise and skills agencies in shaping and delivering the Action Plan. A Blue Economy innovation network of communities, industry, and researchers is already being fostered via the MAXiMAR Science and Innovation Audit and the Islands Deal.

The Action Plan should look to create new jobs, boost productivity and double the size of the sector by 2030. It should be national in vision, but with regional differentiation and delivery. It should leverage Scotland's assets and strengths in a more ambitious and coordinated way and position Scotland as a global leader in marine innovation and sustainability.

The Action Plan should be a platform to develop cross-sectoral, interdisciplinary partnerships for collaboration, investment and research and learning. Ultimately, it should support achieving Net Zero and delivering a nature-rich future by developing a joint action plan for decarbonisation with agreed ambitions and milestones for the sector. It should support interdisciplinary research projects to be developed into disruptive innovation where Scotland can take a leadership role.

Major sectors of the Blue Economy have made significant progress in reducing Scotland's emissions, decarbonising their own operations or developing healthier relationships with nature. However, recent parliamentary inquiries have concluded that there is an urgent need for more effective action by business and regulators to improve fish health and reduce negative environmental impacts from aquaculture. [16] SEPA should strengthen its regulatory and monitoring regime, improve enforcement and raise industry standards, while salmon producers must redouble their efforts to ensure compliance.

The Scottish Salmon Producers' Organisation's new roadmap for the sector commits to raise animal welfare standards, protect the marine environment and achieve Net Zero by 2045. [17] The Scottish Aquaculture Innovation Centre will play a key role in unlocking more sustainable ways to sustainably produce high-quality, low carbon, environmentally friendly Scottish salmon.

RECOMMENDATIONS

Reverse biodiversity loss

- Industry should develop new approaches to assess the value of natural capital, strengthen the business case for biodiversity and invest in conservation, mitigation and restoration

- Industry should commit to nature-rich investments and developments which deliver for people, economy and planet

- Scottish Government should recognise the nature emergency and set ambitious nature targets to reverse biodiversity loss which are aligned with Scotland's climate targets, supported by the expertise of an independent advisory committee and inform a refreshed *Biodiversity Strategy*

17 https://digitalpublications.parliament.scot/Committees/Report/REC/2018/11/27/Salmon-farming-in-Scotland
18 www.scottishsalmon.co.uk/betterfuture

Transform agriculture

- Scottish Government should propose a new system of farm support payments which protects and restores biodiversity, support innovative and sustainable food production and is aligned with expanded and strengthened advisory services for farmers and crofters

- Scottish Government should develop a national scrappage scheme to help farmers and crofters fund purchases of new low-carbon equipment, technologies and vehicles

- Educators, regulators and industry bodies should help consumers adopt more climate-friendly diets and support local and sustainable food producers

- Local authorities and public bodies should set ambitious new targets to accelerate local and sustainable food procurement

Invest in nature-based solutions

- Scottish Government should accelerate and improve existing grant schemes to support landowners, local authorities and communities to meet targets for woodland creation

- Scottish Government should enhance regulations to increase requirements for the use of timber in construction and invest in the R&D to ensure home-grown timber products can be developed to meet the required standards

- Scottish Government and NatureScot should expand investment in peatland restoration and explore opportunities to export our expertise

- Scottish Government should enhance regulatory protections for peatlands including a ban on damaging practices such as burning and extraction

Grow the Blue Economy

- Scottish Government, its agencies, industry and academia should work together to shape and deliver the *Blue Economy Action Plan*, doubling the size of the sector by 2030 and positioning Scotland as a global leader in marine innovation and sustainability

- Academia and industry should develop cross-sectoral, interdisciplinary partnerships for collaboration, investment and research and learning across the Blue Economy

- SEPA should strengthen its regulatory and monitoring regime, improve enforcement and raise industry standards.

OUR PARTNERS

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