INNOVATION CRITICAL

SCOTLAND'S NET ZERO MISSION AND CLIMATE TECH OPPORTUNITY

scdi Scottish Council for Development and Industry

BT BEYOND LIMITS

SCOTLANDIS

RSE The Royal Society of Edinburgh KNOWLEDGE MADE USEFUL

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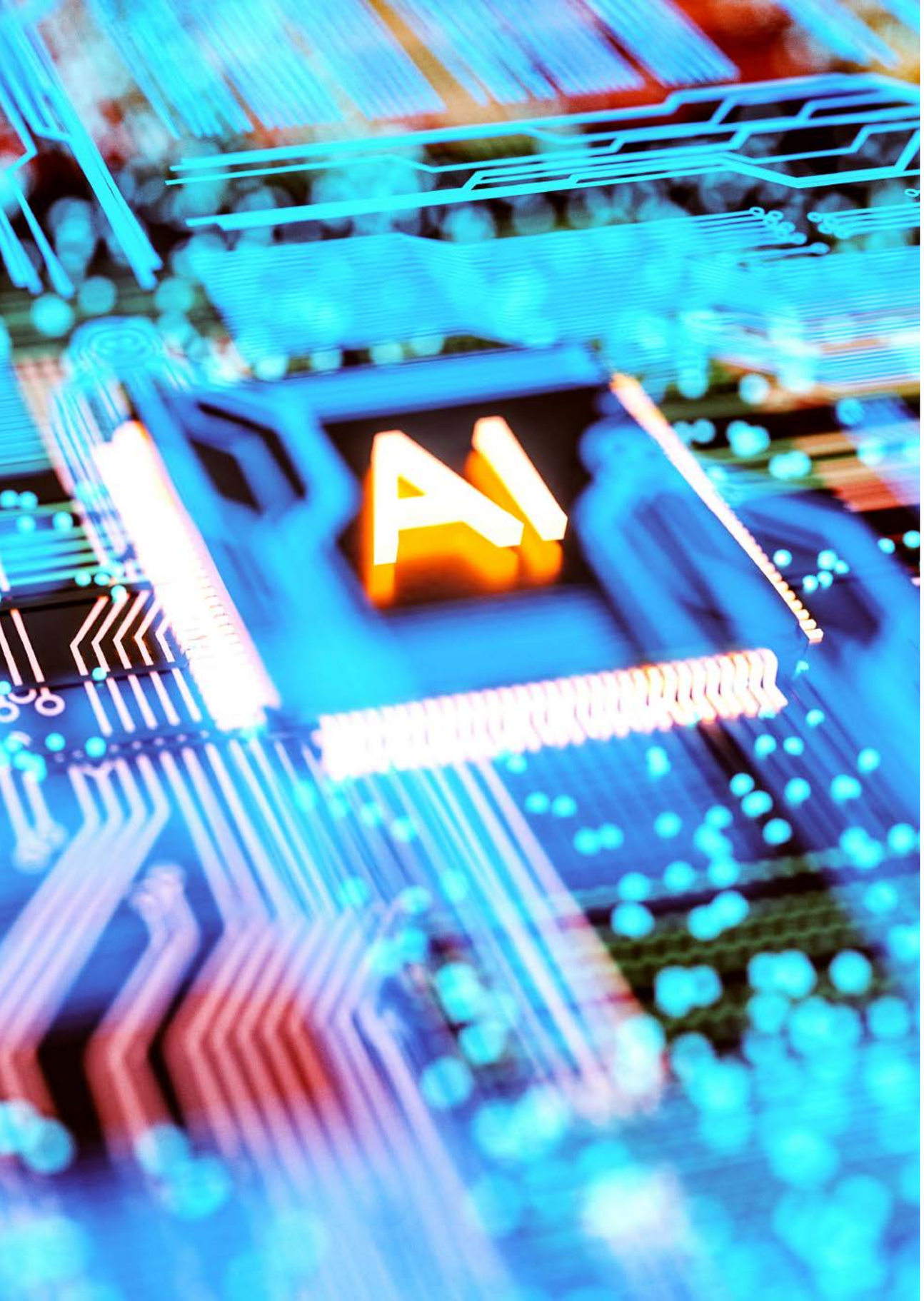

SUMMARY

Net Zero: our greatest innovation challenge

Achieving global net zero will be humankind's greatest innovation challenge. We will need to rapidly and radically transform and decarbonise our economy and our society. We will need to collaborate and innovate better and faster than ever before.

As we look ahead to COP26, the global climate summit in November in Glasgow, the momentum behind net zero is strong and growing. The number of commitments globally to net zero by countries, regions, places, businesses and sectors doubled last year.

Scotland's target for net zero by 2045 is ambitious and world leading. The Scottish Government was the first government in the world to declare a Climate Emergency. But now rhetoric needs to be turned into reality, pledges into action and challenges into solutions.

Governments will need to work together with academia, business and industry as well as citizens, consumers and communities to develop, test and adopt 'Climate Tech' – digital technologies like Artificial Intelligence (AI), data analytics or the Internet of Things which can be used to support climate action.

Innovation will be critical to achieving our net zero mission. We do not yet have all the Climate Tech we will need to achieve net zero. Up to 75% of the emissions reductions we need to achieve net zero are dependent on technologies which are immature, have not been deployed at scale or have not even been invented yet. But together we can do it.

Defining Climate Tech

Climate Tech refers to digital technologies and their applications which support or enable climate action by businesses, citizens, communities, governments, households or organisations to reduce greenhouse gas emissions or address the impacts of climate change

Climate Tech: Scotland's strategic opportunity

Climate Tech is a global market with huge growth potential. Globally, billions of pounds of investment is being directed into this nascent sector as demand snowballs for solutions to net zero challenges. However, in Scotland there are issues around access to finance as well as the pace of innovation and adoption, skills, diversity and regulation.

Climate Tech represents a major strategic opportunity for the Scottish economy. Scotland is home to a growing ecosystem of Climate Tech businesses, organisations and partnerships across the public, private and third sectors.

Our engagement with businesses and start-ups suggests that Scotland has major strengths in Climate Tech in the Built Environment and Waste & Circular

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Economy due to expertise in data analytics, as well as major opportunities in Agriculture and Land Use, Land Use Change & Forestry due to our natural capital assets.

From harnessing the power of AI and blockchain to eliminate food waste or improve energy efficiency, to using data analytics and the Internet of Things to enhance biodiversity or monitor pollution, Scottish entrepreneurs, innovators and researchers are delivering affordable, effective and scalable solutions to the challenges of achieving net zero.

Scotland has produced three tech 'unicorns' (start-ups now worth over $1bn), but none yet in the Climate Tech sector. Hosting COP26 gives Scotland one of the biggest shop windows in the world and an unparalleled opportunity to attract inward investment which can grow our Climate Tech sector.

This report identifies significant assets and capabilities which can be leveraged to realise its huge growth potential. Our tech sector is the second fastest growing sector of the Scottish economy and has more new start-ups in the UK than anywhere outside London and the South East of England. More than 1 in 3 jobs in Edinburgh are tech jobs.

Scotland's enterprise, innovation and skills agencies offer a wide range of business and innovation support, from accelerator programmes to innovation centres. Our world-class colleges and universities possess leading research expertise in key sectors and technologies for climate adaptation and mitigation and can play a key role in educating the next generation.

Scotland is also home to one of the most developed angel investment communities in Europe, as well as one of the continent's leading financial centres as a significant hub for fund management and a hotspot for innovation in FinTech.

Our ambition, therefore, must be to strengthen and expand our ecosystem to establish Scotland as a leading innovator and exporter of Climate Tech, where entrepreneurs, innovators and investors choose to develop, test, produce and roll out new digital technologies for climate action.

Climate Tech is vital for the future of our economy and our planet. Growing Scotland's Climate Tech sector will be essential to deliver a just transition to net zero by 2045 and will create green jobs, boost exports, innovation and productivity and support global economic and environmental prosperity.

Realising our growth potential

Investment in Scotland's Climate Tech sector grew by 35% in 2020. Current projections suggest it could hit £123m by 2025.

We are calling for a 'Climate Tech Moonshot' with two new and ambitious national targets:

- at least one Climate Tech unicorn worth over $1bn in Scotland by 2025
- increase investment in Climate Tech sector to £250m by 2025

Voices of Business

Our full report includes case studies of 14 innovative Climate Tech start-ups, businesses and partnerships in Scotland and their digital technologies:

- arbnco
- Bellrock Technology
- BT and University of Stirling
- Cascade Water Products
- Dunelm Energy
- HappyPorch
- Iceni Earth
- Integrated Environmental Solutions
- IntelliDigest
- Pawprint
- QIoTech
- Reath
- Space Intelligence
- Wyoming Interactive

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Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

What is to be done? Our recommendations

In this report, we identify 7 major challenges to achieving our ambitious vision for Climate Tech in Scotland – and offer 10 recommendations to deliver change:

Challenge #1
How can we deliver an ambitious vision and strategy for Scotland's Climate Tech sector?

- Launch Scotland's 'Climate Tech Moonshot' before COP26 to inspire and coalesce ambition, action and collaboration around a national innovation mission and achieve at least one Climate Tech unicorn in Scotland by 2025

Challenge #2
How can we close the Scottish start-up funding gap?

- Strengthen investment in early-stage innovation and the 'missing middle' of Climate Tech businesses with new public grant funding and targeted patient capital

Challenge #3
How can we accelerate the pace of Climate Tech innovation and adoption?

- Pioneer and roll out new innovation models which accelerate financing, co-design markets and boost scaling by bringing together partnerships of innovators, investors and industry to create or co-design new markets and commercial opportunities

Challenge #4
How can we nurture and grow Scotland's Climate Tech ecosystem?

- Launch ClimateTech Scotland to establish, manage and grow a new Climate Tech Accelerator and Cluster, a new organisation based on the FinTech Scotland model providing enhanced and integrated funding and support for Climate Tech start-ups

Challenge #5
How can we close Scotland's green and digital skills gaps?

- Recognise carbon and digital literacy as essential skills for the 21st century and embed them across education and learning including early years, primary, secondary and tertiary education, professional learning and work-based learning
- Empower everyone to reskill or upskill at any stage of their life or career with an equal share of a new Reskilling and Upskilling Fund open to every Scottish adult

Challenge #6
How can we increase diversity and open up opportunity in Climate Tech?

- Strategic priority for diversity across Climate Tech sector with commitment to accessibility, inclusivity and fairness from all businesses, organisations and leaders

Challenge #7
How can Scotland be a Living Lab for Climate Tech Innovation?

- Increase open data sharing and invest in key infrastructure like digital connectivity and green data centres
- Transform procurement and scale-up CivTech across Scotland's public sector
- Establish a Centre of Future Regulation to inform and advise government, parliament, industry and society on emerging regulatory issues from new innovations and sectors

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INTRODUCTION

The Net Zero Innovation Challenge

In 2018, the Intergovernmental Panel on Climate Change warned the world that it needed to limit global warming to 1.5°C above pre-industrial levels to avoid the most catastrophic effects of climate change.[1]

This momentous report in the wake of the Paris Agreement of 2015[2] has contributed to growing public consciousness, social movements and political activism and helped to accelerate the momentum behind climate action by citizens, consumers and communities as well as businesses, organisations and governments.

The World Meteorological Organisation's annual State of the Global Climate report found that 2020 was one of the three warmest years on record as global average temperatures rose to 1.2°C higher than pre-industrial levels, 'dangerously close' to the 1.5°C limit. The decade to 2020 was the warmest ever.[3]

Concentrations of major greenhouse gases in our atmosphere increased in 2020 despite COVID-19 lockdowns. There has been unprecedented and intensifying disruption to agriculture, food production and supply chains. An estimated 9.8 million people were displaced from their homes due to the impact of climate change – from rising sea levels and more dangerous storms to more frequent heatwaves and droughts – during first half of last year alone.[4]

Scotland has set an ambitious and world-leading target of net zero by 2045.[5] Business and industry will need to work together with government and the wider public sector as well as citizens, consumers and communities to rapidly and radically transform and decarbonise our economy and our society to meet our national targets.

Achieving global net zero will be humankind's greatest innovation challenge. We need to collaborate and innovate faster and better than ever before.

We cannot simply stop doing certain things, we must also find new ways to do things differently, more sustainably and more inclusively. As the Fourth Industrial Revolution in Artificial Intelligence (AI), data and digitisation gathers pace, technological progress is increasingly giving us the tools to help us do the job. We will need to change our behaviour and innovate at pace and at scale to develop, test and deploy affordable and effective technological solutions.[6]

As our 14 case studies of Scottish Climate Tech start-

1 www.ipcc.ch/sr15
2 www.un.org/en/climatechange/paris-agreement
3 https://library.wmo.int/index.php?lvl=notice_display&id=21880#.YH6OA2dKjD5
4 https://library.wmo.int/index.php?lvl=notice_display&id=21880#.YH6OA2dKjD5
5 www.legislation.gov.uk/asp/2019/15/contents/enacted
6 https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.177.7472&rep=rep1&type=pdf

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ups and businesses illustrate (see Voices of Business), digital technologies can help us solve a vast range of net zero challenges.

Iceni Earth and Space Intelligence are applying AI and data analytics to satellite data to help farmers and land managers monitor change, adopt more sustainable practices and reverse biodiversity loss.

Reath and IntelliDigest are harnessing data analytics to help businesses track and reuse materials or retrieve chemicals and nutrients from food waste.

Integrated Environmental Solutions and QIoTech are utilising digital software and the Internet of Things to monitor and improve energy efficiency and air quality in our buildings or pollution on our streets through Digital Twins and networked sensors.

> ***Digital technologies could have a transformational impact on our ability to meet the 2030 [Sustainable Development Goals] Agenda."***
>
> *Global Enabling Sustainability Initiative* [7]

It will be essential to educate, engage and empower not just businesses but citizens and communities too about the potential of digital technologies in helping them to live more sustainably.

There are growing calls to rally 'techno-optimism' behind a 'global green innovation mission'.[8] The COVID-19 crisis has undoubtedly shown that we can rapidly harness science and innovation to respond to an emergency – especially in the rapid development, production and rollout of effective vaccinations in record time.

Some of these solutions are proven technologies which already exist and have been successfully commercialised and deployed for climate action – like AI, data analytics or digital software – or are ready and growing but may have yet to be harnessed at scale for climate action – like 5G or the Internet of Things.

Others will soon become a reality as they are mainstreamed after development, testing and optimisation at pilot sites, through trials or in labs – like vertical farming, synthetic meat production or industrial biotechnology.

Many more have yet to be developed or even conceptualised and will need to be conceived, created and invented in the future to provide solutions to persistently complex decarbonisation problems – like the carbon-intensive production of cement and steel or the use of petroleum and natural gas in a myriad of everyday items and products which we rely on for modern life.[9]

> ***We can do it… We have some solutions we need to deploy in a big way now, and we also need a lot of innovations to be developed and spread around the world in the next few decades."***
>
> *Bill Gates (2021) How to Avoid a Climate Disaster: The Solutions We Have and the Breakthroughs We Need*

Innovation will be critical to achieving our net zero mission. We do not yet have all the Climate Tech we will need to achieve net zero.[10] The International Energy Agency estimates that 75% of the emissions reductions necessary for net zero are currently dependent on commercially or technically immature technologies and will require a 'major acceleration' of their development and financing.[11]

The Climate Change Committee, the UK's independent adviser on tackling climate change, agrees. It has concluded that 'technological innovation' will be required alongside 'behavioural change' to achieve net zero in Scotland and across the UK. There is an urgent need for accelerated and expanded public and private investment in developing, testing and deploying new, emerging and future technologies that enable low- or -zero carbon. The costs of many of these technologies is already falling.[12]

7 https://digitalwithpurpose.gesi.org
8 https://institute.global/policy/should-tech-make-us-optimistic-about-climate-change
9 https://primecoalition.org/wp-content/uploads/2017/12/Winter_2018_the_investment_gap_that_threatens_the_planet.pdf?x48191
10 www.pwc.com/gx/en/services/sustainability/assets/pwc-the-state-of-climate-tech-2020.pdf
11 www.iea.org/reports/energy-technology-perspectives-2020
12 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

> ***[There should be] a focus on identifying and accelerating investments in low-carbon and adaptation technologies that build long-term productive capacity in the economy of Scotland… deploying low-carbon technologies to drive down costs for the world as a whole.***
>
> ***People and businesses will need help to make low-carbon choices, both in terms of behaviours and in adopting low-carbon technologies…"***
>
> *Climate Change Committee's 2020 Progress Report to Scottish Parliament* [13]

Scotland's updated Climate Change Plan sets out how the Scottish Government intends to reduce carbon emissions by 75% by 2030, a critical and highly challenging interim milestone. It recognises the essential role which new, emerging and future technologies will play in helping us to achieve net zero.

Technology is integral to the Plan in all sectors of the Scottish economy, from agriculture and land use to waste and the circular economy. The adoption and improvement of technologies accounts for a very significant proportion of the anticipated progress in emissions reductions set out in the Plan. It also specifically supports and commits public investment into negative emissions technologies like Carbon Capture and Storage (CCS), backed by detailed modelling and evidence building to identify net zero pathways.[14]

> ***No-one currently has all the answers on how we deliver the transition over the next 25 years or how emerging technologies can be deployed efficiently at scale. Many of the solutions rely on further technological innovation, market development and wider take up and adoption as well as action by others."***
>
> *Scottish Government's Climate Change Plan update 2018 – 2032* [15]

Scotland's carbon footprint is a fraction of total global carbon emissions. However, we have an ethical responsibility to play our part by ending our contribution to climate change as well as a major economic opportunity to design, develop and export Scottish technological solutions which enable global climate action around the world.

'Green trade' has been identified as a major area of growth potential and as a policy priority by the UK Board of Trade. It has advised the UK Government to 'play a leadership role' by working to 'remove barriers to trade in environmental goods and services'.[16]

The UK Government should ensure that increasing green trade is a key priority in its trade negotiations with other countries, while the Scottish Government's forthcoming Tech Exporting Strategy should target Climate Tech as a major export opportunity.

The UK Government has recognised that 'climate tech and conservation tech can help us address one of the greatest challenges of our time'. One of its ten 'tech priorities' is to 'give British businesses the digital tools' to harness 'digital innovation to reach net zero' and 'drive forward a Green Industrial Revolution', especially in the run-up to COP26, the global climate summit.[17] It also published a Clean Growth Strategy in 2017.[18]

COP26 represents a major historic moment in the journey to net zero for governments to secure a 'Glasgow Agreement' which accelerates and catalyses global climate action. It is also an unparalleled trade and inward investment opportunity for Scotland with the eyes of the world on Glasgow.

By showcasing the assets, capabilities and opportunities for Climate Tech in Scotland, we can attract green finance, fuel technological innovation, create green jobs and engage citizens, communities and young learners to maximise clean growth in a just transition to net zero. [19]

13 www.theccc.org.uk/publication/reducing-emissions-in-scotland-2020-progress-report-to-parliament
14 www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032
15 www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032
16 www.gov.uk/government/publications/board-of-trade-report-global-britain-local-jobs
17 https://dcms.shorthandstories.com/Our-Ten-Tech-Priorities/index.html
18 www.gov.uk/government/publications/clean-growth-strategy
19 www.scdi.org.uk/policy/clean-growth-download-our-manifesto

COP26

The UK will host the 26th UN Climate Change Conference of the Parties (COP26) in Glasgow on 1 – 12 November 2021. The summit will bring parties together to accelerate action towards the goals of the Paris Agreement (COP21) (2015) and the UN Framework Convention on Climate Change.

Defining Climate Tech

Building on the definitions offered by PwC[20], ScotlandIS[21], TechNation[22] and others, we define Climate Tech as digital technologies and their applications which support or enable climate action by businesses, citizens, communities, governments, households or organisations to reduce greenhouse gas emissions or address the impacts of climate change.

Our definition encompasses technological approaches, innovations and solutions in both climate mitigation and climate adaptation or resilience. As research in the Stanford Social Innovation Review has revealed, Climate Tech is largely mission-based and always solutions-focused.[23]

Our definition is deliberately sectorally broad – inclusive of all businesses, organisations and citizens from high-tech innovators to non-specialist adopters – and technologically narrow – with a specific focus on digital technologies.

Definition of Climate Tech

Climate Tech refers to digital technologies and their applications which support or enable climate action by businesses, citizens, communities, governments, households or organisations to reduce greenhouse gas emissions or address the impacts of climate change

The Climate Tech literature and research to date has tended to focus on energy generation and distribution technologies, while the huge potential of digital technologies to support or enable climate action has tended to receive less attention.

Data and digital technologies will be critical enablers to decarbonisation across all sectors of our economy. Climate Tech like 5G, the Internet of Things or AI can be harnessed to help solve a huge range of net zero challenges – from improving the energy efficiency of buildings or finding more efficient ways to manage assets, to reducing our consumption and waste of materials or water.

It also represents a major strategic opportunity for the Scottish economy given our ambitions, assets and capabilities for net zero and in the data, digital and tech sectors. This report showcases fourteen compelling examples of innovative start-ups, businesses and partnerships in Scotland which are leading the way (see *Chapter 2 – Climate Tech in Scotland*) and seeks to highlight and encourage a greater focus from policymakers on Climate Tech (*see Chapter 4 – Recommendations*).

Categories of Climate Tech

Deloitte have identified seven major categories of digital technologies which underpin and support Climate Tech:

- *Digital Access* – connectivity for people to people and people to the internet
- Fast Internet – next generation connectivity personified by disruptive technologies like 5G, that provides speed and capacity at fundamentally different levels
- Cloud – provision of highly scalable, advanced IT capabilities as 3rd party services
- Internet of Things – connecting physical objects to the internet enabling communication from, and to, the object
- Cognitive – the application of advanced analytics, machine learning and AI approaches to big data to develop insight
- Digital Reality – virtual digital worlds of systems (virtual reality) or mixed virtual and physical worlds (augmented reality)
- Blockchain – digital ledger of transactions comprising a database of information, with an append-only structure, governed by a network of computers[24]

Our Research

This is the fifth report by SCDI and our partners at BT, one of the world's leading communications services companies; the Royal Society of Edinburgh (RSE), Scotland's National Academy; and ScotlandIS, the trade association championing Scotland's digital technologies industry.

BT has launched its Green Tech Innovation Platform to harness breakthrough technologies and work with scale-ups to cut carbon. Glasgow firm iOpt was one of the first two businesses selected for funding and support.[25] BT is also investing in key digital infrastructure to power Scotland's road to net zero like full fibre broadband and 5G networks, helping to pave the way for lower carbon ways of life and work.[26]

The RSE draws upon the wide-ranging expertise and practitioner experience of its 1,600 Fellows for public benefit in Scotland, including in the areas of Energy & Environment, Innovation & Economy and Science & Technology. The RSE's Enterprise Fellowships business development and training programme provides researchers and entrepreneurs with support, funding and mentorship to commercialise science and technology ideas.[27] Two businesses which have benefited from the programme – IntelliDigest and Space Intelligence – feature in this report *(see Voices of Business)*.

ScotlandIS recently published a report on activity in Scotland's Climate Tech sector and hosts a new Climate Tech Knowledge Hub to highlight funding opportunities as well as share relevant news stories, events and other resources.[28]

This report follows a series of reports by SCDI and our partners into Scotland's opportunities in AI and Data, including *Automatic… For the People?* (2018)[29] and *Building a World-Leading AI and Data Strategy for an Inclusive Scotland* (2019).[30] These reports led to the Scottish Government's commitment to develop an AI Strategy for Scotland, which was published in March 2021. The strategy sets out a vision of AI 'enabling us to make better use of resources and develop new, low carbon industries' and is based on a principle that 'AI should benefit people and the planet'.[31]

This report also builds on the work of our Clean Growth Leadership Group which published two reports – *Building Scotland's Green Recovery* (2020)[32] and *Manifesto for Clean Growth* (2020)[33] – setting out how Scotland can kick-start a green recovery from COVID-19 and maximise the economic benefits of a just transition to net zero.

This report reflects our conclusions from three months of intensive engagement with businesses and organisations across Scotland, listening to the views, experiences and expertise of entrepreneurs and innovators as well as studying data, evidence and thought leadership from around the world. Our research objectives have been to:

- Review the global market and emerging strategies for Climate Tech (*see Chapter 1 – The World of Climate Tech*)
- Assess the assets and capabilities of Scotland's Climate Tech sector (*see Chapter 2 – Climate Tech in Scotland* and *Chapter 3 – Voices of Business*)
- Explore opportunities for Climate Tech to enable

20 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
21 www.scotlandis.com/climatetech
22 https://technation.io/net-zero-report
23 https://primecoalition.org/wp-content/uploads/2017/12/Winter_2018_the_investment_gap_that_threatens_the_planet.pdf?x48191
24 https://digitalwithpurpose.gesi.org
25 www.bt.com/about/digital-impact-and-sustainability/tackling-climate-change/our-green-tech-innovation-platform
26 www.bt.com/about/annual-reports/2021summary
27 www.rse.org.uk/awards/enterprise-fellowships
28 www.scotlandis.com/climatetech
29 www.scdi.org.uk/policy/automatic-for-the-people
30 www.scdi.org.uk/policy/ai-and-data
31 www.scotlandaistrategy.com
32 www.scdi.org.uk/policy/download-our-green-recovery-plan
33 www.scdi.org.uk/policy/clean-growth-download-our-manifesto

and accelerate climate action in Scotland and globally (*see Chapter 2 – Climate Tech in Scotland* and *Chapter 3 – Voices of Business*)

- Consider how to establish Scotland as a leading innovator and exporter of Climate Tech (*see Chapter 4 – Recommendations*)
- Identify the challenges facing Climate Tech in Scotland and develop policy solutions (*see Chapter 4 – Recommendations*)

In Numbers: Our Evidence-Build

3
Partners

1
Literature review of global data, evidence and thought leadership

19
Responses to our Call for Views

32
Interviews with Climate Tech leaders, founders, innovators and experts

2
Workshops with 8 speakers and 68 participants

14
Case studies of Climate Tech start-ups and businesses

CHAPTER 1
The World of Climate Tech

A Growing Global Market

In April 2019, Nicola Sturgeon declared a Climate Emergency as First Minister of Scotland, making the Scottish Government the first government to do so.[34] Antonio Guterres, Secretary-General of the United Nations, has urged all governments to do the same.[35] More than twenty other countries worldwide have since followed suit, including Bangladesh, France, Japan, New Zealand and Wales.

Governments have also been translating these declarations into national targets for reducing carbon emissions and ending their contributions to climate change. Scotland's 2045 net zero target is among the earliest and most ambitious. The UK was the first major G20 economy to enshrine its 2050 target into law.

Meanwhile, the world's two largest industrial economies and biggest environmental polluters have set climate goals too. The 2050 goal set by the new US Presidential Administration is ten years ahead of China's 2060 target.

These declarations and targets set by governments at the national and political level have catalysed ambition and action. The momentum behind net zero is strong and growing rapidly. Businesses and organisations in all sectors, including some of the world's largest firms, as well as towns, cities and communities of all sizes, are increasingly setting their own science-based targets and developing their own plans or investment strategies.[36]

Race to Net Zero [37]

Bhutan	Carbon-negative
Uruguay	2030
Finland	2035
Iceland	2040
Scotland	2045
Sweden	2045
Germany	2045
UK	2050
Brazil	2050
United States	2050
South Africa	2050
China	2060

34 https://climateemergencydeclaration.org/scotland-worlds-first-government-to-declare-a-climate-emergency
35 www.un.org/sg/en/content/sg/statement/2020-12-12/secretary-generals-remarks-the-climate-ambition-summit-bilingual-delivered-scroll-down-for-all-english-version
36 https://sciencebasedtargets.org/resources/files/foundations-for-net-zero-full-paper.pdf
37 https://eciu.net/netzerotracker

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Global corporate climate goals [38]

Apple	Net Zero by 2030
AstraZeneca	Net Zero by 2025, carbon negative by 2030
Barclays	Net Zero by 2050
BT	Net Zero business by 2045
Cemex	Net Zero concrete by 2050
Coca-Cola	Net Zero by 2040
Facebook	Net Zero value chain by 2030
IKEA	carbon positive by 2030
Microsoft	Net Zero by 2030
Shell	Net Zero by 2050
Tesco	Net Zero by 2035
Unilever	Net Zero by 2039

The number of commitments to net zero by governments, regions, cities and businesses doubled globally between 2019 and 2020. Over 823 cities and 101 regions representing nearly 1 billion people across every continent, as well as over 1,541 companies worth over $11.4 trillion or half of US GDP to the global economy, have now pledged to end their contribution to climate change.[39]

Climate Tech is a 'nascent sector' with huge growth potential. This 'snowball-effect demand signal' has set the stage for an 'explosion' of investment in Climate Tech globally.[40] Although the sector in Scotland faces distinct challenges in access to finance, the growing global market also represents a significant export opportunity for Scottish Climate Tech.

As more and more countries and companies commit to net zero targets, and as more and more clients, consumers and communities prioritise sustainability, global demand for technological solutions to climate adaptation and mitigation will only accelerate and intensify.

> ***"Climate Tech funding seems to be coming from every corner of the market… The COVID-19 pandemic has not slowed investment activity… The bottom line is that demand for Climate Tech is only going to accelerate."***
> PwC (2020) The State of Climate Tech 2020[41]

This will create new opportunities and challenges for the sector to innovate at a pace and at a scale which delivers the transformations required. Every government, every business, every organisation, every community and every household will need to adopt, utilise or implement Climate Tech solutions to solve problems as part of their decarbonisation journey on the road to net zero.

Who is driving rising global demand for Climate Tech?

Governments
International commitments, Climate Emergency declarations and ambitious net zero targets are shifting political priorities and public investment towards green infrastructure and Climate Tech

Consumers
Climate-conscious consumers are increasingly demanding stronger, faster climate action and backing sustainable business models, pressing brands into Climate Tech to maintain competitiveness and secure market share

Businesses
Disruptive incomers and ambitious net zero targets are shifting corporate priorities and private investment towards Climate Tech

Regulators
New policies and regulations like carbon pricing or bans on single-use plastics are strengthening carrots and sticks which compel or promote adoption of or investment in Climate Tech

38 https://carbon.ci/insights/companies-with-net-zero-targets/
39 https://newclimate.org/wp-content/uploads/2020/09/NewClimate_Accelerating_Net_Zero_Sept2020.pdf
40 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
41 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

Investors
Successful Climate Tech unicorns, improving returns on sustainable portfolios and institutional investor pressure are attracting private, impact and philanthropic investors into Climate Tech or pushing them to decarbonise their portfolios

The digital and tech sectors are also experiencing a period of remarkable growth which is likely to continue. It has been fuelled by the automation, data and digitisation trends underpinning the Fourth Industrial Revolution, as well as evolving consumer expectations, and now accelerated by the disruption caused by the COVID-19 pandemic.

Investment is shifting from carbon-intensive activities and industries into Climate Tech innovation opportunities. It is estimated that around a third of the $17 trillion in managed assets globally are now 'aligned to sustainability objectives' compared to less than a tenth a decade ago. Such investment assets are now significantly outperforming the rest.[42] [43]

However, it remains the case that there is a Climate Tech 'investment gap which threatens the planet'. The level of investment in Climate Tech – especially at the early, high-risk stage for unexplored or nascent technological solutions – needs to continue to rise and reach significantly higher levels to deliver complex and rapid decarbonisation across all sectors of the global economy.[44]

42 www.technologyreview.com/2021/01/25/1016648/green-future-index
43 https://institute.global/policy/should-tech-make-us-optimistic-about-climate-change
44 https://primecoalition.org/wp-content/uploads/2017/12/Winter_2018_the_investment_gap_that_threatens_the_planet.pdf?x48191

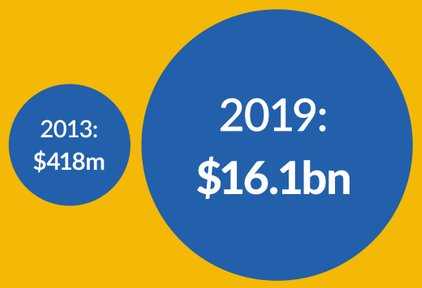
Climate Tech in Data

CLIMATE TECH INVESTORS AND START-UPS GLOBALLY [45]

2,700+
unique private, public and philanthropic investors

1,200+
Climate Tech start-ups since **2013**

GLOBAL VENTURE CAPITAL INVESTMENT IN CLIMATE TECH [46]



6%
of total VC funding globally

84%
annual growth

3,750%
increase in just 6 years

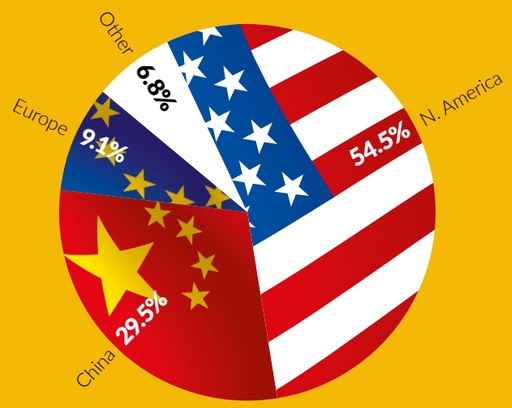
3x
faster growth than VC funding for AI

2,700+
funding rounds

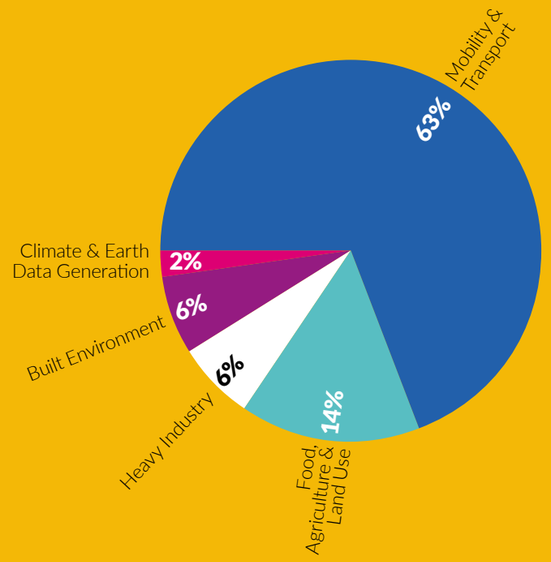
CLIMATE TECH UNICORNS [47]

43
Climate Tech unicorns **globally**

Start-ups **valued** at
$1 bn+

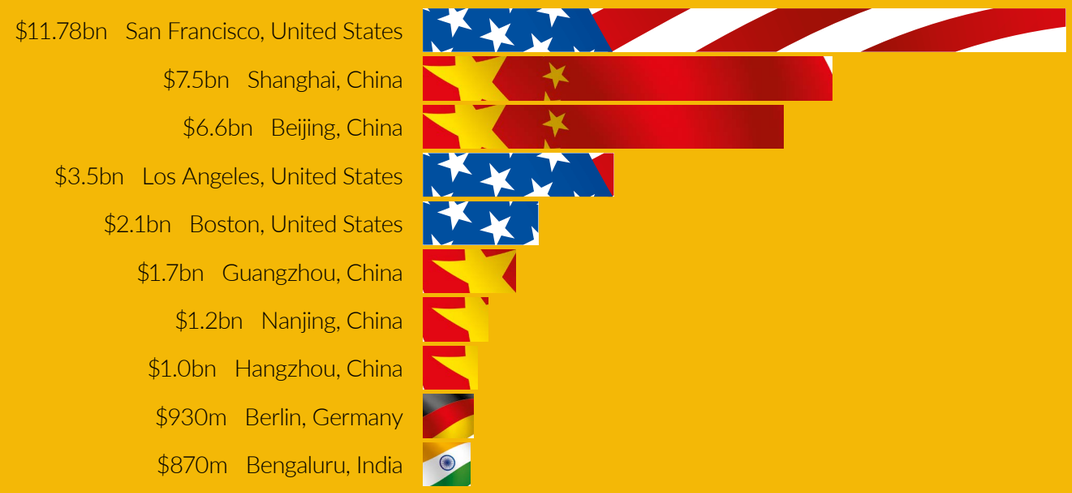


GLOBAL VENTURE CAPITAL INVESTMENT IN CLIMATE TECH BY SELECTED AREA [48]

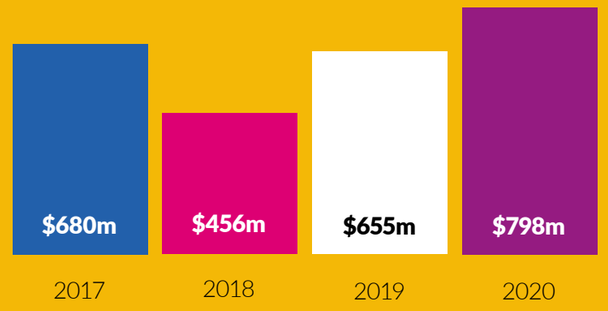


45 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
46 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
47 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
48 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html

TOP CLIMATE TECH INVESTMENT HUBS [49]



CLIMATE TECH INVESTMENT IN THE UK [50]



120+ record number of Climate Tech deals in UK in 2020

SCOTLAND'S TECH SECTOR [51]

12,050
digital tech firms

59,270
jobs

£8BN
turnover

3
unicorns

2
High-value start-ups – 'future unicorns'

49 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
50 https://technation.io/report2021
51 https://technation.io/report2021

SCOTLAND'S CLIMATE TECH SECTOR [52]

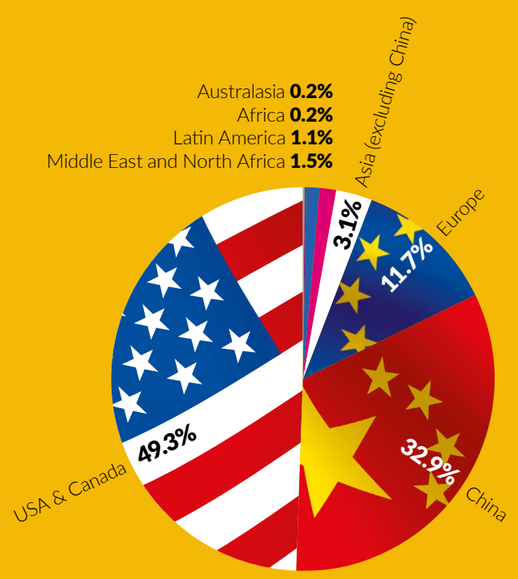
£27.4m
investment in 2020

35%
increase on previous year

9
deals

£1.1m
median investment value

INVESTMENT BY GLOBAL REGION [54]



SCOTLAND'S TECH HUBS [53]

EDINBURGH

£91m investment in 2020
5th in UK

GLASGOW

£35m investment
11th in UK

DUNDEE

£0.3m investment
26th in UK

DIGITAL SECTOR GLOBAL FORECASTS [55]

€6 trillion
size of sector by 2030

50%+
increase in size of sector by 2030

$3 trillion+
to be spent on R&D by 2030

52 https://technation.io/report2021
53 https://technation.io/report2021
54 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
55 https://digitalwithpurpose.gesi.org

China and the United States dominate the sector and global investment rankings by number and size of start-ups, unicorns, investors and venture capital deals. Activity is concentrated in the world's leading innovation hubs – Silicon Valley, Los Angeles and the Chinese industrial heartlands around Shanghai. Eight of the ten biggest Climate Tech hubs are in China or the United States, which are responsible for nearly 83% of all investments.

The overwhelming strength of these leading hubs and the persistence of strong agglomeration or clustering effects means that they are likely to retain their positions in the future despite the impacts of the COVID-19 pandemic on collaboration and connectivity. Investors and founders are likely to continue to be attracted to be in physical proximity to these locations to facilitate better access to capital, networks and talent.

The Chinese market is dominated by indigenous investors, particularly state-led or state-backed, with an overwhelming focus on Electric Vehicles (EVs) and battery technology. The US market, as the most mature venture capital market in the world, is flooded by investors from across the world, especially North America and Europe, with a more diverse spread of deals.[56]

Amazon, Microsoft and Unilever are among the multinationals which have followed venture capitalists in creating dedicated corporate investment funds for Climate Tech. Other global businesses and philanthropic trusts are expected to follow suit in the years ahead.

Government and public sector sources are also key funders of Climate Tech globally, especially in innovation at earlier, pre-commercialisation and higher-risk stages which remain underserved by traditional commercial investors.

Overall, the UK is home to a third of global venture capital investment and hit a record high of $15bn in 2020, with activity concentrated in London. In addition, the UK's thriving tech start-up and scale-up ecosystem has grown by more than 120% since 2017. However, London is not in the top ten Climate Tech investment hubs, despite significant growth in recent years. Its competitive advantage is instead largely centred on FinTech due to its status as a global financial services hub.[57]

Scotland, meanwhile, is ranked fourth in the nations and regions of the UK in venture capital investment in the tech sector overall, with volumes less than half that in the South East and East of England.[58]

Scotland has given birth to three tech unicorns to date. Although none has yet been in the Climate Tech sector, the impact of other smaller nations beyond the largest global tech hubs, as well as the success story of our burgeoning FinTech sector, is testament to the opportunity. Scotland has the potential to leverage its assets and capabilities to produce a Climate Tech unicorn as part of a virtuous cycle of growth and innovation at all levels of a healthy ecosystem (*see Chapter 2 – Climate Tech in Scotland*).

Key funders of Climate Tech

Private sector

Amazon – $2bn Climate Pledge Fund
Microsoft – $1bn Climate Innovation Fund
Unilever – $1bn Climate and Nature Fund
Climate Tech Capital Partners – Edinburgh-based firm launched new £60m Climate Tech Venture Fund to invest in scaling-up Scottish start-ups

Not-for-profit sector

Philanthropists – philanthropic funding for climate change mitigation has doubled since 2015 to worth $9bn in 2019, but remains just 2% of $730bn in total philanthropic giving[59]

56 www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech-2020.html
57 https://technation.io/report2021
58 https://technation.io/report2021
59 www.climateworks.org/press-release/funding-trends-climate-change-mitigation-philanthropy

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Government and public sector

Norges Bank – Norway's $1tn state-owned sovereign wealth fund is divesting from fossil fuels and shifting to invest in Climate Tech

Temasek – Singapore's state-owned sovereign wealth fund has invested $2bn+ in Climate Tech start-ups

Scottish National Investment Bank – new institution owned by Scottish Government will invest £2bn of patient capital over 10 years, including in innovation supporting net zero

Emerging Strategies

Global efforts to tackle climate change remain focused on the evident challenges of decarbonising national energy systems. As a result, climate strategies overwhelmingly focus on how to fund or regulate the energy sector's transition from fossil fuels like petrol and diesel and coal-fired power stations towards renewable energy sources like solar, hydro, wind and marine.

Digital technologies supporting climate action have tended to receive significantly less strategic attention and policy focus by comparison, even as governments worldwide increasingly adopt new industrial strategies on AI and Data that respond to the challenges and opportunities of the Fourth Industrial Revolution.

However, many strategies relevant to Climate Tech are emerging, which are summarised below. Scotland is home to much best practice, but it is also important that we learn lessons from elsewhere, particularly to ensure that our various strategies are aligned and joined-up in their delivery and implementation.

Our analysis of these emerging Climate Tech and green industrial strategies has identified the following key elements:

Go Big and Go Home
Governments around the world are investing increasingly large sums in climate-related innovation to create green jobs in domestic industries. These are often part of large-scale stimulus programmes to build a Green Recovery from COVID-19 and funded by higher levels of public borrowing and new taxes on carbon. There is often also a focus on targeting stimulus first in regions reliant on declining high-carbon sectors or in deprived communities.

Tech-Inclusive
Governments are taking a 'technology-inclusive' approach which is not prescriptive about the future – between electrification and hydrogen, for example – but instead supports the development and recognises a wide range of potential technological solutions. This approach focuses on goals, encourages technologies to compete to reduce costs and acknowledges the inherent uncertainty of technological change, disruption and progress.

Target Start-Ups – and Remember SMEs
Governments are targeting public investment and support in early-stage R&D, which private funders focused on reliable returns generally cannot support, and at start-ups and SMEs, which account for more than 90% of businesses globally and have been underserved by traditional investors.

Mission net zero
Many governments are adopting a 'mission-orientated' approach to innovation policy with net zero at its heart. Agreeing 'grand challenges' or 'national missions' which represent large, complex, systemic thematic issues can help identify clear shared goals, focus investment and join-up policies and regulations across many actors.

Collaboration
Governments around the world are developing efforts to connect expertise across sectors of the economy, as well as across countries, to break down barriers and encourage new ways of thinking about innovation. Collaboration can optimise results through sharing assets and resources or applying ideas or practices in new contexts

EU

NextGenerationEU
EU's largest ever stimulus package to build a 'greener, more digital and more resilient Europe' after COVID-19, with a total of €1.8tn to be invested and 30% earmarked to fight climate change

European Green Deal
EU's new growth strategy to decouple growth from consumption, achieve climate neutrality by 2050 and ensure no person and no place is left behind

New European Bauhaus
New 'creative initiative' which seeks to break down boundaries between science, technology, art and culture to help artists, designers, engineers, scientists, entrepreneurs, architects and students to collaborate on designing, deploying and disseminating new solutions which deliver the European Green Deal

Renovation Wave
New strategy to double building renovation rates across EU by 2030 through public funding and new regulations for 'smart readiness' and 'digitally friendly renovations' in construction

Horizon Europe
EU's latest and world's largest research and innovation programme, will invest €95.5bn between 2021 and 2027, with €33.4bn or a third earmarked for climate-related research and innovation

EU SME Strategy
EU's SME strategy for a 'digital and sustainable Europe' sets out plans to launch an investment initiative and SME Initial Public Offering (IPO) Fund designed to increase finance for SMEs and start-ups developing and adopting 'green tech' solutions

Carbon Border Adjustment Mechanism
The EU is considering a border tax on carbon to prevent 'carbon leakage' and encourage industrial innovation, especially in the hardest to abate sectors

Germany

KfW Bankengruppe
Germany's state-owned investment bank, the KfW, is the world's largest national development bank and its new 'Climate Campaign for the SME Sector' offers low-interest loans and 'climate grants' of up to €100m annually

Green Federal Securities
Germany issued its first 'green bonds' in 2020 with an initial €6.5bn offering – which was five times oversubscribed – to raise capital for the federal government to invest in projects which support energy transition, increased energy efficiency and climate-related research and innovation

United States of America

American Rescue Plan
$1.9tn stimulus package to recover from COVID-19 included $35bn in federal funding for tackling climate change but failed to pass new voluntary standards for energy efficiency

Mission Innovation 2.0
The US is relaunching its participation in this global climate innovation initiative of 25 member states and the EU by quadrupling clean energy innovation funding over four years and leading a new Agriculture Innovation Mission for Climate in partnership with other countries

China

14th Five-Year Plan (2021 – 2025)
China's latest social and economic development blueprint aims to transform the high polluting factory of the world into the global leader in 'low-carbon tech' and 'high-tech goods' for a 'carbon-constrained world'

National Emissions Trading System
Draft rules for China's long-promised carbon pricing system were published in 2020, but with no date confirmed for a new carbon market

Made in China 2025
China aims to become the world leader in science and innovation by 2050, building on its advantage in high-tech digital industries like AI and robotics

R&D Strategy
China now invests around 2.23% of its GDP or $468bn in research and development, over 20% of the global total, just missing its 2020 target of 2.5%

Australia

International Technology Partnerships
New $565.8m scheme to co-fund with industry and other governments 'new international technology partnerships' to research, trial and develop low-emissions technologies in Australia as part of 'technology not taxes' approach

UK

Trade Strategy
Targets growth in 'green trade' and gives estimates for potential growth in exporting of tech solutions from UK

National Data Strategy
UK Government's new strategy commits to invest in data foundations, skills, availability and responsibility and recognises that better use and sharing of data 'has the potential to help solve wider climate change problems and help the UK meet its net zero 2050 target'

UK Industrial Strategy
Clean growth was one of four 'Grand Challenges' set out in the UK's Industrial Strategy in 2018, featuring a target of 2.4% of GDP in R&D by 2027, but this has been scrapped to be replaced by a 'Plan for Growth'

Green Savings Bond
The UK Government has announced plans for new 'green bonds' to be launched later this year to help raise capital from investors and savers to fund net zero investments

Scotland

Climate Change Plan update 2018 – 2032
Scottish Government's updated plan recognises new, emerging and future technologies as integral to delivering net zero across agriculture, land use, industry and waste and commits new investment to some existing and emerging solutions it identifies as key

Scotland's AI Strategy
Scottish Government's first-ever AI strategy sets out a vision of AI 'enabling us to make better use of resources and develop new, low carbon industries' and is based on a principle that 'AI should benefit people and the planet'

Digital Strategy for Scotland
Scotland's new strategy for a 'greener digital nation' recognises the tech sector's potential to reduce our emissions and commits to 'use our data capability to address climate change targets' – such as 'by extending our Earth Observation programme to monitor peatland restoration and waste monitoring, and building on the work of our AI for Good Climate Change programme'

Logan Review
Last year's independent Scottish Technology Ecosystem Review by Mark Logan set out how the Scottish Government could stimulate and accelerate the maturity of Scotland's tech sector, including through a 'national backbone network' of 'tech-scalers' to turn start-ups into scale-ups and unicorns

Scotland's Inward Investment Plan
Scottish Government's new plan identifies 'net zero' and 'digital' as two of three major 'opportunity areas' to prioritise in attracting inward investment into Scotland thanks to our research expertise, natural capital, skilled workforce and innovative firms

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

CHAPTER 2
Climate Tech in Scotland

Scotland's Capabilities

> ***"We must aspire to be the inventor and the manufacturer of the digital, high-tech and low-carbon innovations that will shape the future, not just a consumer of them."***
> Nicola Sturgeon MSP, First Minister of Scotland [60]

Smaller nations must be innovative to compete and thrive on the global stage. By identifying and investing in priority sectors with high growth potential, smaller nations can build on their existing strengths to develop competitive advantage and compete globally.[61]

As Scotland looks to recover from the COVID-19 crisis with the Fourth Industrial Revolution and our journey to net zero well underway, Climate Tech is a major strategic opportunity for the Scottish economy which should be a focus of our industrial strategy.

Glasgow's hosting of COP26 is the latest sign of Scotland's reputation as an innovative and sustainable nation. We are already globally recognised as a leader in the renewable energy transition, but also increasingly noted for our significant capabilities and potential in the Climate Tech sector.

Scotland is home to a growing ecosystem of businesses, organisations and partnerships across the public, private and third sectors – significant capabilities which need to be leveraged to realise the growth potential of the sector.

Our ambition must be to strengthen and expand this ecosystem to establish Scotland as a leading innovator and exporter of Climate Tech, creating new green jobs, boosting productivity and helping businesses, organisations and communities to achieve net zero at home and abroad. Delivering the right policies and funding for a just transition to net zero could create up to 367,000 jobs in Scotland, according to research for the STUC.[62]

Our sample (see Voices of Business) suggests that Scotland has major strengths in Climate Tech in the Built Environment and Waste & Circular Economy due to expertise in data analytics, as well as major opportunities in Agriculture and Land Use, Land Use Change & Forestry due to our natural capital assets.

> ***"Scotland is on the cusp of a Climate Tech revolution and in the lead up to COP26, it is vital that we highlight Scotland's Climate Tech capability to the global audience… Scotland has an opportunity to demonstrate ambition and become a Climate Tech global leader."***
> ScotlandIS (2021) Climate Tech Opportunity in Scotland [63]

60 www.gov.scot/publications/shaping-scotlands-economy-scotlands-inward-investment-plan
61 www.nesta.org.uk/report/when-small-is-beautiful-lessons-from-highly-innovative-smaller-countries
62 www.stuc.org.uk/files/Policy/STUC_Green_Jobs.pdf
63 www.scotlandis.com/climatetech

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Tech sector

The thriving tech sector is the second fastest growing sector of the Scottish economy. An ambitious, diverse and highly innovative ecosystem of global talent across 12,050 tech firms – from start-ups, spinouts and SMEs to scale-ups, multinationals and bona fide 'unicorns' – delivers over £8bn in annual turnover and employs nearly 60,000 people.[64] Data and digital skills are in high demand, but limited supply is constraining business growth.[65]

Scotland is one of the UK's strongest tech hubs, with more new start-ups in 2020 than anywhere outside London and the South East of England. Leading the way is Edinburgh, where more than 1 in 3 jobs are tech jobs and £91m of investment was attracted last year. Overall, Scottish start-ups collectively raised £345m in venture capital funding in 2020, despite the pandemic.[66]

However, while £27.4m of this was invested in Climate Tech – significant annual growth of 35% – it represents only 8% of the total.[67] Scotland has given birth to three tech unicorns with global impact and success worth more than $1bn – but none in Climate Tech to date.

While the global tech sector generates technological solutions to climate change, it is also a growing and not insignificant contributor to global emissions primarily due to high energy consumption levels to store and manage ever increasing quantities of data in large data centres.[68]

The Scottish Government's Green Data Centres Vision and Action Plan sets out to emulate Ireland's success in 'attract[ing] new investors that require high-speed data transit to locate in Scotland'. Scotland could leverage its renewable energy assets to become a 'leading zero-carbon, cost competitive green data hosting location'.[69] However, this will require significant investment in the data and digital infrastructure across Scotland's public sector and in developing future-proof potential data centre locations.[70]

Business & innovation support

Scotland's enterprise, innovation and skills agencies provide a wide range of business and innovation support – as do other institutions and organisations in the private and third sectors, from corporates to not-for-profits to universities – in a complex but fertile landscape.

Climate Tech start-ups and businesses can access accelerator programmes, advice, funding and other services from ScotlandIS, Innovate UK, Scottish Enterprise, Highlands & Islands Enterprise, South of Scotland Enterprise, Zero Waste Scotland and NatureScot. It will be important for this valuable support to continue to evolve, expand and improve to meet the needs and ambitions of a growing and priority sector of the Scottish economy and tackle the great innovation challenge of net zero.

All businesses will need to become informed and intelligent customers for Climate Tech, especially home-grown Scottish solutions. Scotland's enterprise, innovation and skills agencies and the wider SME support ecosystem, like SCDI's Productivity Club Scotland programme, will play a key role in supporting SMEs to do so as a way of boosting productivity as well as sustainability.[71]

There are seven Innovation Centres in Scotland which work to support innovation and entrepreneurship in key sectors. They are funded by the Scottish Government in partnership with Scotland's enterprise agencies, backed by industry and utilise Scottish research expertise. Five of the seven will play a critical role in growing the Climate Tech sector as catalysts for partnerships to develop and adopt data and digital technologies which support or enable climate action.

64 www.skillsdevelopmentscotland.co.uk/media/46258/scotlands-digital-technologies-summary-report.pdf
65 www.scotlandis.com/scottishtechsurvey
66 https://technation.io/report2021
67 https://technation.io/report2021
68 https://itif.org/publications/2020/07/06/beyond-energy-techlash-real-climate-impacts-information-technology
69 www.gov.scot/publications/green-datacentres-and-digital-connectivity-vision-and-action-plan-for-scotland
70 www.scottishfuturestrust.org.uk/media/first-class-datacentre-sites-identified-in-new-reports
71 www.productivity.scot

Ambitious place-based programmes like the Data Driven Innovation programme in Edinburgh and the new Michelin Scotland Innovation Parc (MSIP) in Dundee will coalesce and co-locate academia, businesses and innovators to accelerate Climate Tech innovation. The Edinburgh City Region Deal aims to make Scotland's capital the 'data capital of Europe'.[72] MSIP focuses on sustainable mobility and a vision to 'facilitate the ongoing prosperity of the Climate Tech ecosystem' – including through creating 'opportunities to pitch to potential venture investors and potential customers or channels to bring the technologies to commercialisation and market'.[73]

BT's Green Tech Innovation Platform

BT's new Green Tech Innovation Platform is uncovering the latest breakthrough technologies from UK-based tech scale-ups that could support the company and its public sector customers to transition to net zero. Partnerships will range from BT using its expertise to find a cheaper, faster initial route to market through to new revenue share models or even taking a stake in the business. Glasgow-based IoT start-up iOpt were one of the first two firms to be selected.

Scotland's Innovation Centres

Centre for Sensor and Imaging Systems (CENSIS)
Centre of excellence for Sensor and Imaging Systems technologies, enabling leading industry innovators and world-class university researchers to collaborate, innovate and develop products and services for global markets

Industrial Biotechnology Innovation Centre (IBioIC)
Supporting companies in their innovation journey across the bioeconomy to use plant-based and waste resources to produce or process materials, chemicals and energy, offering green and sustainable alternatives to fossil fuels in everything from medicine to packaging

Sustainable Aquaculture Innovation Centre (SAIC)
Transforming Scottish aquaculture through innovation excellence, connecting businesses and academics

Construction Scotland Innovation Centre (CSiC)
Championing innovation and connecting Scotland's construction industry to deliver transformational change

The Data Lab
Accelerating the journey to a data- and AI-powered future by fuelling innovation through collaboration, building skills and growing talent, and strengthening Scotland's thriving data science community

Colleges & Universities

Scotland's world-class colleges, universities and other research institutions possess leading expertise in key sectors and technologies for climate adaptation and mitigation. They will also have a key role in developing core green skills of carbon literacy, digital literacy, problem-solving and resource efficiency across society by transforming learning and teaching for a 'Green Skills Revolution'.[74]

Climate Tech employers tell us that digital and green skills shortages in Scotland are hampering their growth (see Voices of Business). We must harness all the talents of Scotland to achieve net zero. We need to increase the diversity of our tech workforce by encouraging more people from under-represented groups into Science, Technology, Engineering and Mathematics (STEM) education and careers, as well as removing barriers or discrimination which prevent accessibility, inclusion or equal opportunity.

Colleges and universities are expanding their green skills offer and exploring ways to mainstream core green skills across curricula, while increasingly offering environmental or sustainability 'microcredentials' as well as carbon literacy training to students and staff. Meanwhile, the college sector is working in partnership to develop 'Net Zero Apprenticeships' to create new learning pathways and green talent pipelines.

72 https://ddi.ac.uk
73 www.msipdundee.com
74 www.scdi.org.uk/policy/clean-growth-download-our-manifesto

Scotland's Rural College is a leading centre of expertise offering a wide range of advice, education and training services to help farmers, crofters and land managers to reduce carbon emissions, reverse biodiversity loss and adopt AgriTech.

Academics, researchers and students at higher and further education institutions across Scotland are nurturing the next generation of sustainable entrepreneurs and innovators, generating new Climate Tech spinouts and start-ups and building new partnerships with industry, local authorities and communities to design and deploy sustainable solutions.

However, inspiring the next generation begins early. An interest in a STEM career can be sparked at early years or in school. STEM engagement and outreach programmes such as SCDI's Young Engineers and Science Clubs (YESC) which support educators and schools to do this will need to focus delivery on how digital technologies can solve our net zero challenges.

Glasgow Innovation District – 'Creating a Climate Neutral District'

The University of Strathclyde is developing plans with Glasgow City Council to create a Climate Neutral Innovation District in the heart of the city extending from Cathedral Street, down High Street to the River Clyde. An innovative 'whole systems approach' will integrate heat, power, transport, climate adaptation and wellbeing solutions that are socially inclusive.

The solutions brought forward after technical feasibility work – including heat pumps harnessing the River Clyde and 'smart streets' to prioritise pedestrians and encourage active travel – will be designed to be fundable, costed, deliverable, replicable and at scale.

Investors

Scotland is home to a significant and very active angel investment community, which is one of the most developed in Europe. It is focused on providing critical but relatively small pre-seed or seed capital for early-stage start-ups. Some have a strategic focus on Climate Tech, many more do not and are sector- or tech-agnostic.

However, Scotland's angel investors are often unable to provide the larger level of funds which businesses need to scale-up and angel investment does not seamlessly lead to venture capital investment. Scotland has 24 angel syndicates and a handful of venture capital investors like Kelvin Capital, Par Equity and Scottish Equity Partners.

Global venture capital funds prepared to make very significant investments at later stages in scale-ups are concentrated and focus their activities in key global tech hubs such as London and San Francisco, but can also be active in Scotland.

For example, based in Edinburgh as well as London, Climate Tech Capital Partners has launched a Climate Tech Venture Fund initially seeking to raise up to £60m with Series A investments of £2m to £5m per company 'in primarily Scottish Climate Tech companies.'[75]

Financing stages for Climate Tech start-ups

Pre-seed capital – Earliest innovation stage where start-ups develop concepts or prototypes into tech or products and seek small sums with high risk for investors

Seed capital – Start-ups seek investment to set on path to growth and fund minimum viable product before commercialisation – 'valley of death' where start-ups often fail to progress due to lack of access to funding

Series A – Development stage at which start-ups require larger financial commitments to further pilot and develop tech with early customers
Series B – Financing to take start-ups to the next level, validating tech commercially and at scale, building market share and paving way for project financing

Series C – Tech and business model proven and successful, lower risks opening up access to institutional investors, investment banks and public markets, raising capital to scale-up

75 www.climatetechcapitalpartners.com

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

Financial Services sector

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 by leading and globally significant firms such as Abrdn, Baillie Gifford and Scottish Widows.[76]

This represents a significant opportunity for Scotland to leverage this key sector to improve and increase financing in Climate Tech start-ups. For example, Scottish Widows has become the first major pensions and insurance provider to target halving the carbon footprint of all its £170bn investments by 2030 as part of its journey to net zero by 2050. This promises to unlock billions of pounds for investment in Climate Tech.[77]

There is a need to shift investments from those which have a negative impact on the environment in terms of carbon emissions and biodiversity loss, towards those which align with net zero, while fully integrating climate and environmental factors into mainstream financial decision making across all sectors and asset classes.

FinTech Scotland

FinTech Scotland has been supporting a key growth sector of the Scottish economy since 2017 by building a 'FinTech ecosystem' through integrated funding, support and infrastructure for firms and talent. It facilitates collaboration between over 160 firms, 15 universities and 16 incubators and accelerators, as well as connecting start-ups to public, private and third sector investment opportunities.[78]

76 www.sfe.org.uk/about/financial-services-in-scotland
77 www.scottishwidows.co.uk/about_us/responsibleinvestment/our-climate-change-approach
78 www.fintechscotland.com/about

CHAPTER 3
Voices of Business

We have put the voices and views of business at the heart of our research. We have listened to the expertise and experience of nearly 100 entrepreneurs, founders, innovators, investors, leaders and technologists from across Scotland's Climate Tech sector.

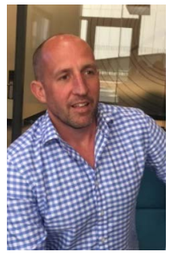
Here we showcase some of their voices through a diverse range of 14 case studies, whose ideas and insights have informed our thinking and shaped our recommendations.

arbnco™

Building performance software platform for utilities, national property managers and commercial real estate

Location: Glasgow
Sector: Buildings
Climate Tech: Data Analytics

Maureen Eisbrenner
Co-Founder, CEO and Chairperson



Simon West
Co-Founder, COO and Sales Director

Established in 2015, arbnco is an award-winning building performance software company now operating across Europe and the United States and working with some of the world's largest property owners and occupiers.

arbnco's data analytics platform allows businesses to optimise their property portfolios to operate as healthy, efficient and intelligent green buildings. It produces bespoke energy and wellbeing performance risk reporting and uses data analytics to generate actionable insights.

This helps businesses to measure, analyse and improve energy efficiency and indoor environmental quality, which makes for healthier buildings and workplaces, now more important than ever to businesses worldwide. Businesses can better measure their performance to accelerate their transition to net zero.

www.arbnco.com

What is Scotland's Climate Tech opportunity?

"Scotland's built environment has a substantial role to play meeting our net zero targets. Robust data should be at the heart of our decision making with technology used to accelerate the roadmap to net zero."

What is needed to accelerate tech that enables climate action in Scotland?

"A strong focus on Climate Tech R&D projects would accelerate innovation in Scotland's tech sector and allow smaller businesses to thrive. We have worked on a number of government-funded R&D projects to bring our Climate Tech solutions to market."

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Adam Brown
Chief Executive Officer

Smart technology to deliver data-driven solutions to business decision makers

Location: Glasgow
Sector: Data
Climate Tech: AI and Data Analytics

Bellrock Technology exists to help organisations do more with their data. It works with a wide range of firms, from blue chips to start-ups, to improve decision making and performance.

Many organisations want to use data to empower better real-time decisions. These could range from decisions that minimise the carbon footprint of an office to those that ensure the reliable operation of new low-carbon technologies.

Creating decision support solutions that combine data and extract meaningful insights is not straightforward. The process is time-consuming and labour intensive. As a result, the true value of organisations' data is often not realised.

Bellrock Technology has created new advanced decision support solutions for organisations of all sizes to more efficiently manage their assets and therefore reduce associated climate impacts by minimising energy use or maximising reuse of materials.

www.bellrock.tech

What is Scotland's Climate Tech opportunity?

"Digital technologies and data insights will play a critical role in our move to net zero. Data will underpin our energy transition, the introduction of new low-carbon technologies, the way we run our businesses and decisions we take as individuals.

"We have not yet even begun to tap the potential of data for our communities, economy and climate change ambitions."

What is needed to accelerate tech that enables climate action in Scotland?

"Positive steps have already been taken. The Digital Strategy for Scotland and Scotland's AI Strategy are taking steps to encourage the open sharing of suitable public sector data.

"But one of the biggest barriers remains that building data-driven solutions is a complex and manual exercise, traditionally requiring highly-skilled and sizeable teams. Historically, only the largest organisations have had the resources to put these teams in place.

"But technologies do now exist that can make the benefits of data more widely available. We need to embrace the positive disruption that these technologies bring, seek opportunities for automation and welcome new ways of working that will help us meet our goals sooner."

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

Simon Haston
Chief Technology and Innovation Officer, Regions and Devolved Nations

Digital twinning the Firth of Forth to build Scotland's first Green Recovery Platform

Location: Edinburgh
Sector: Land Use, Land Use Change & Forestry
Climate Tech: AI, Internet of Things and VR

We feel the effects of climate change through water, but water is also central to the green recovery. It enables sustainable energy solutions, is core to the circular economy and key to natural capital management for carbon sequestration, supporting biodiversity and mitigating extreme events. Effective management of our water relies on access to robust and sustainable data in near real time.

'Forth-ERA' is a digital twin of the Firth of Forth Catchment which is being developed by BT, one of the world's leading communications services companies, in partnership with the University of Stirling alongside industry, statutory agencies and communities. It will build Scotland's very first 'Green Recovery Platform'.

Forth-ERA harnesses sensor networks (through IoT, including 5G) and Earth observation, and couples these with process-based modelling and AI and novel data visualization (including VR), to deliver innovation across the water continuum and provide full system understanding that will enable opportunities for net zero, green recovery and the mitigation of extreme events.

What is Scotland's Climate Tech opportunity?

"To unlock the climate and biodiversity crisis, bring the environment to the heart of decision making and deliver sustainable, inclusive growth."

What is needed to accelerate tech that enables climate action in Scotland?

"Partnership between sectors is vital to stimulate investment and create wider ecosystems."

Cascade WATER PRODUCTS

Carolyn Hogg
Managing Director

Domestic greywater reuse system to reduce household water consumption by 45%

Location: Angus
Sector: Waste & Circular Economy
Climate Tech: Internet of Things

Cascade Water Products is developing and commercialising carbon-negative, low-cost domestic greywater reuse technology which collects, disinfects and filters used water to reduce its waste.

The firm is award-winning and aims to make the world a better place by saving water in the home by making it easy for people to reduce their carbon footprint. Sustainable water is one of the biggest challenges facing the world.

By incorporating a SMART meter for water, Cascade can help residents to change their behaviour and reduce water consumption by 45%. Water companies are under pressure from regulators to achieve net zero and reduce domestic water consumption by 30%.

www.cascade-enviro.com

What is Scotland's Climate Tech opportunity?

"This is a great time for Scotland's Climate Tech entrepreneurs. With the drive to achieve net zero and protect the planet, any innovation can grab attention and make a difference.

"In the past, it has been incredibly hard to connect with people who can help advance an idea. But communication has become easier and the whole world is connected by the touch of a keyboard.

"With COP26 being held in Glasgow, this is a prime time to showcase the innovations Scotland has to offer the world and be a catalyst for action and adoption."

What is needed to accelerate tech that enables climate action in Scotland?

"Changing people's behaviour is extremely hard. Inertia must be overcome. People's desire for change is growing, but not quickly enough.

"When I started out, I did not have a clue what I was doing. Start-ups are running on fresh air. It seems to me help is available once the product is developed rather than in development – this is back to front! Help is needed throughout the whole journey. We need more efficient, joined-up thinking."

Dunelm Energy

Ian Marchant
CEO & Consultant

Investing in and providing advice and assistance to sustainable start-ups

Location: Edinburgh
Sector: Electricity, Buildings and Industry
Climate Tech: Angel Investment

Dunelm Energy was established by Ian Marchant, former Chief Executive of SSE, one of the UK's leading utility companies and Scotland's largest industrial company. It invests in sustainable start-ups as well as to provide advice and assistance to businesses and organisations who are seeking to meet the challenges of net zero.

Since 2013, it has invested in over 100 early-stage companies, around 80 of which remain active, in a diversity of sectors – from renewable energy and smart asset management to digital healthcare and sustainable fashion.

Dunelm Energy has supported these innovative firms with investment, industry knowledge and access to networks.

www.dunelmenergy.co.uk

What is Scotland's Climate Tech opportunity?

"The Climate Tech opportunity facing Scotland is to bring together its world-class academic institutions, vibrant entrepreneurial and start-up community and globally important energy and industrial business to develop, deploy and scale up technologies that can make a real impact on tackling the UN Sustainable Development Goals.

"Scottish invention and engineering prowess have changed the world before – and it can do it again!"

What is needed to accelerate tech that enables climate action in Scotland?

"There are two major issues in the sphere of entrepreneurial finance to boost the growth of Climate Tech companies. Firstly, how to address a lack of mid-stage funding. Secondly, how to equip tech-ready start-ups with essential business knowledge and skills to put things together.

"We need to fill the gap of the 'missing middle' where there is a lack of investors providing finance in the £2m to £5m range for mid-stage growth businesses. We also need to encourage collaboration between SMEs and route-to-market partners to help them with project management, bidding for projects and securing funding."

happyporch

Barry O'Kane
Founder

Ideas, strategy and software development to power circular innovation

Location: **Fully remote-first team across Scotland and Europe**
Sector: **Waste & Circular Economy**
Climate Tech: **Digital Software**

HappyPorch are a progressive, distributed team of specialist web developers working remotely across Scotland and Europe to enable circular innovation by businesses and through supply chains.

HappyPorch work with entrepreneurs and intrapreneurs to accelerate the transition to a circular economy, turning technology into action. They develop concepts into solutions that impact people's lives, their business and the planet for the better.

To successfully tackle major issues such as climate change, waste crises and biodiversity loss, the linear economy of 'take-make-waste' must change – from how we manage resources and how we design, make and use products to what we do with the materials afterwards. The circular economy is a vital part of the solution and an exciting opportunity for transformation.

www.happyporch.com

What is Scotland's Climate Tech opportunity?

"Scotland's opportunity is to combine the strengths of forward-thinking policy, strong academic institutions and the powerful creative and engineering sectors. The role of tech is to create and amplify climate solutions that bring together these great strengths."

What is needed to accelerate tech that enables climate action in Scotland?

"Scotland needs to significantly grow and improve the talent pool. The opportunities are there for a strong, diverse and talented workforce.

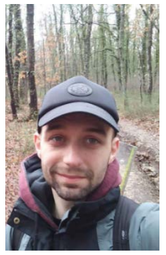
"We also need cooperation between public and private sectors, across disciplines and between businesses of all sizes. This is equally as important across borders as it is within Scotland. No single individual, business, sector, government or even country can solve the climate problem alone. 'A rising tide raises all boats' – if we can embrace this mindset Scotland can be truly mighty."

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

Iceni

Iceni Earth

Tom Woolnough
Co-Founder & CEO



Jamie Woolnough
Co-Founder & Chief Design Officer

Digital platform and mobile app to support farmers sustainably manage land and restore nature

Location: **Edinburgh**
Sector: **Agriculture and Land Use, Land Use Change & Forestry**
Climate Tech: **Digital Software and Data Analytics**

Iceni Earth is an 'Earth Tech' start-up that is empowering land-based industry to enhance and restore biodiversity and natural capital. Both are critical as up to 30% of global climate action requires nature-based climate solutions.

Iceni Earth has developed a mobile app and website platform to assess and enhance biodiversity. They integrate machine learning, community benchmarking and offline mapping technology, which is packaged through an intuitive interface to help users take climate action.

It is early stages for this young and ambitious company. As a successful alumnus of the Scottish Government's CivTech programme, they have been working alongside NatureScot since November 2020. Under this project, around 100 farmers across Scotland are using their Iceni Farm app to score and improve biodiversity across five habitat types.

Iceni Earth is exploring emerging opportunities with agriculture, forestry, infrastructure and construction, amongst others. They are developing adaptable but salient metrics, so all land-based industries can adopt and demonstrate biodiversity as a key metric.

www.iceni.earth

What is Scotland's Climate Tech opportunity?

"There is a massive interest in Climate Tech coming out of Scotland, but also in helping the country to achieve its national targets. Scotland has the potential to lead the world in Earth Tech, which is a rapidly emerging space."

What is needed to accelerate tech that enables climate action in Scotland?

"We have to aim for 'Earthshots' – the bold, ambitious but risky goals that have to happen for us to achieve net zero and reverse biodiversity loss. We have to build feasible and commercially viable solutions that ensure those who can, actually do.

"As a start-up, we would benefit from a well-embedded active network for climate start-ups operating in Scotland to cross-pollinate, find synergies and compete. That's how innovation will blossom here; by connecting start-ups, the public sector and industry to grow the tech ecosystem in its entirety."

Integrated Environmental Solutions

Don McLean
CEO

Digital Twins to help design and refurbish buildings to increase energy efficiency

Location: Glasgow
Sector: Buildings
Climate Tech: AI, Data Analytics and Digital Twins

Integrated Environmental Solutions (IES) has been developing solutions to improve building energy efficiency and lower carbon emissions for over 25 years. Its Digital Twin technology is being used to help design and refurbish buildings across the world with maximised energy efficiency from its Glasgow HQ and offices in Australia, India, Ireland and the United States.

The technology leverages a combination of physics-based building simulations, real-time operational data, machine learning and AI to transform data into information and produce a 3D digital replica of any building or community of buildings to identify, analyse and implement decarbonisation solutions. It helps owners and occupiers to identify and weigh up the risks and potential savings prior to implementation, as well as to intelligently monitor performance and manage progress towards net zero over time.

IES software has been used on an estimated 95% of medium to large buildings in Scotland, including the Riverside Museum and SSE Hydro. It has thousands of users worldwide resulting in an estimated 36 power stations prevented from being built to date.

www.iesve.com

What is Scotland's Climate Tech opportunity?

"Digital Twin technology can help decarbonise Scotland's Built Environment and support the creation of new high-quality, technical jobs.

"It is exactly this kind of technology that Scotland, and the rest of the world, desperately needs to decarbonise our buildings. It represents a massive global opportunity for Scottish innovation to export our technology and expertise."

What is needed to accelerate tech that enables climate action in Scotland?

"While Scotland has some of the most ambitious emissions targets in the world, these mean nothing if we do not implement appropriate plans and solutions to make our vision of net zero a reality by 2045.

"There are major problems we need to overcome. We need to change existing regulations which embed decarbonisation problems into many buildings that are costly to correct at a later stage. We need to resolve the financial constraints and procurement issues faced by the public sector, so that they can lead the way to net zero by investing in innovative technological solutions and decarbonising public buildings."

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

IntelliDigest
Empowering Global Food Sustainability

Dr Ifeyinwa Kanu
Founder & CEO

Innovating to eliminate food waste and empower global food sustainability

Location: Edinburgh
Sector: Waste & Circular Economy
Climate Tech: AI, Blockchain, Data Analytics and IoT

Over 800m people globally are malnourished, yet over 1.3 billion tonnes or $1tn of food is wasted every year causing up to 10% of global greenhouse gas emissions. IntelliDigest is on a mission to empower global food sustainability.

Its technology solutions are founded on robust cutting-edge technologies to empower stakeholders in the food system from farm to fork on the path of meeting the Sustainable Development Goals by 2030. IntelliDigest also offers capacity building and research services on top of its innovative solutions to national and international organisations.

IntelliDigest's 'nature inspired' robot-iDigest conveniently processes inedible food waste to recover sustainable chemicals or nutrients to produce alternative protein and grow fruits and vegetables. A blockchain-driven trading platform provides traceability and accountability on the source of the sustainable chemicals to end user.

https://intellidigest.com

What is Scotland's Climate Tech opportunity?

"Scotland has positioned itself as the tech hub for Europe and has a great opportunity to continuously grow its tech prowess.

"Scotland has great universities that have distinguished themselves in different fields such as AI, blockchain and molecular technology. It is high time for innovative climate companies based in Scotland to be supported by these great human resources to pull together multi-disciplinary expertise in tackling the climate issue that we are facing today."

What is needed to accelerate tech that enables climate action in Scotland?

"There is a need for greater awareness of the need to support innovative Climate Tech companies to flourish, especially within investor communities for funding and across wider society for adoption. We need to give innovative Climate Tech companies equal opportunities to thrive, otherwise many talents will be lost due to institutional biases.

"Organisations such as Enterprise Campus and the Scottish Institute for Enterprise were very efficient in engaging with students from a variety of backgrounds and encouraging them to explore entrepreneurial paths following graduation. But their funding and activities have been stopped.

"Public sector organisations will need to lead the way and hold themselves accountable."

Christian Arno
Founder

Empowering people to measure, understand and reduce their carbon footprint at home, work and beyond

Location: Edinburgh
Sector: Behaviour Change
Climate Tech: App and Digital Software

Pawprint is a behavioural change tool which educates people on the work and lifestyle changes they can make to reduce their carbon footprint.

With much of the UK population currently living high carbon lifestyles, and an urgent need to limit global warming to well below 2C, there is a need for tech which encourages people to start living in a more climate-friendly way. Pawprint is that tech.

The entry point is through businesses that are dedicated to becoming something people can believe in. Pawprint works with them to build a culture that influences not just business operations, but also the wider world around them.

Whether it is a reminder to switch off a light, or encouragement to organise a litter pick, or even the inspiration to write to an MSP, Pawprint is a companion to walk with people and businesses along their eco journey.

www.pawprint.eco

What is Scotland's Climate Tech opportunity?

"Scotland has the desire to do good in its DNA. We also have a lot to contribute, from natural resources to a strong philanthropic culture, to a community which naturally works collaboratively, to the attention we've got through events like COP26.

"It's the perfect launch pad for Scottish Climate tech, now all we've got to do is make a difference!"

What is needed to accelerate tech that enables climate action in Scotland?

"Climate Tech is a huge business opportunity and humanitarian necessity. First and foremost, we need widespread recognition that this is the right thing to do; this starts with our leaders and ends with you and me.

"Then, we need focused funding for all life stages, to encourage and educate people to get behind the movement. We really need our brightest minds behind this if we're going to beat it. Talent is what will accelerate tech that enables climate action in Scotland and beyond."

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.

Frank Quinn
Founder & CEO

Utilising the Internet of Things to monitor pollution and improve public health

Location: Paisley
Sector: Buildings and Industry
Climate Tech: Internet of Things

QIoTech is a one-stop provider of global Internet of Things (IoT) solutions founded in 2018 and based in Paisley. It is utilising the latest in AI and machine learning via connected devices to create powerful algorithms that generate a wide range of real-time data reports on the performance of end user products or devices – from inhalers to industrial machines – and deliver actionable insights.

Their solutions can be applied to climate mitigation and adaptation. It has developed laser particle pollution sensors which measure nine separate gases at hyper-local levels. It is working with local authorities in Scotland to install these sensors onto lampposts right across their towns and cities to record and monitor pollution levels 24/7 and in real time. The data can inform better policymaking and decision-making in creating more sustainable, less polluted places, and be used to produce maps of air quality which are free and accessible online to all.

QIoTech has also developed connected inhalers for asthma patients which are being used in the NHS. Connected inhalers enable patients to record their daily inhaler consumption and generates data about asthma attacks and the geographical location of such attacks. Overlayed with the pollution monitoring map, this can identify causes and areas of higher risk to public health and the environment.

http://qiotech.co.uk

What is Scotland's Climate Tech opportunity?

"COP26 has to be the biggest shop window in the world. But government and its agencies are failing to maximise the event to help showcase the technology we have in Scotland. We need investment, marketing and support to get as many genuinely innovative Scottish companies exhibiting at COP26 as possible."

What is needed to accelerate tech that enables climate action in Scotland?

"There is huge gap that exists between government funding and tech businesses. Funding applications are enormously complex and difficult. Smaller specialist tech businesses like mine can't afford to hire professional bid writers, yet our actual technology is years ahead.

"The tech sector was left behind when it came to financial support during COVID-19. The enterprise, innovation and skills agencies need to massively up their game to provide better support to smaller tech businesses to grow and export."

reath

Emily Rogers &
Claire Rampen
Co-Founders

Building the digital infrastructure for circular systems

Location: Edinburgh
Sector: Waste & Circular Economy
Climate Tech: Data Analytics

Reath is one of the UK's fastest growing tech scale-ups on a mission to reduce carbon emissions. Founded in 2019 and based in Edinburgh, it is dedicated to tackling the environmental and climatic impact of our throwaway culture and helping other companies adopt circular economy practices.

Reath is on a mission to build the digital infrastructure required for businesses to shift to the circular economy. They have published the world's very first global Open Data Standard for reusable packaging. Their platform enables businesses to transition away from single-use models by applying track and trace technology to solve the data problems inherent in reuse models.

It tags and tracks circular assets to build the 'digital passport' they need – a kind of Google Analytics for the circular economy – to break down the logistical and commercial barriers. It helps businesses to stay compliant, generate insights, create new revenue opportunities and identify savings.

https://reath.id

What is Scotland's Climate Tech opportunity?

"Shifting to a net zero, resource efficient society will require an immense amount of investment and change. However, there are opportunities for new value creation.

"In the circular economy, we have seen this first-hand. New ways of doing business that revolve around resource efficiency instead of 'take-make-waste', require an entirely different digital infrastructure to support it, creating new business opportunities in the process."

What is needed to accelerate tech that enables climate action in Scotland?

"At Reath, we have found the most critical levers to accelerate our growth has been our network, both within and outwith Scotland. We are proud to have brought investment, advisors and talent into Scotland from elsewhere, as well as finding these resources with Scotland via programmes such as the Unlocking Ambition Challenge by Scottish Enterprise.

"We believe that outward-facing perspective is going to be critical for Scotland to lead on the world stage and see benefit in formalising more connections with other countries and ecosystems who are leading in this space."

SPACE INTELLIGENCE

Dr Ed Mitchard
Co-Founder & Chief Scientific Officer

Dr Murray Collins
Co-Founder & CEO

Protecting Natural Capital by applying machine learning to Big Data from space

Location: Edinburgh
Sector: Agriculture and Land Use, Land Use Change & Forestry
Climate Tech: AI and Data Analytics

Space Intelligence is an innovative data analysis and intelligence generation company built by scientists for the Fourth Industrial Revolution. Founded in 2018 and ranked two years later in the top 10 most innovative Scottish tech companies, it acquires, processes and analyses satellite data to generate actionable business intelligence to help businesses make better environmental decisions.

In partnership with NatureScot, Space Intelligence is helping to measure and protect our Natural Capital by developing the first-ever nationwide high-resolution habitat maps of Scotland using machine learning applied to Big Data from space. An advanced cloud-based AI platform analysed tens of thousands of satellite images over Scotland from a range of different types of sensors.

Policymakers, landowners and land managers have to date lacked accurate, up-to-date landcover information to inform land use decision-making. This ground-breaking new mapping system – which is available online for anyone to use for free – can now be used to track changes over time and to identify the most efficient and impactful ways and places to restore habitats, improve biodiversity or sequester carbon through interventions like peatland or native woodland restoration.

The system was developed thanks to funding from the Scottish Government through the CAN DO Innovation Challenge Fund, managed by Scottish Enterprise.

www.space-intelligence.com

What is Scotland's Climate Tech opportunity?

"We are deploying operational systems that help us address the twin environmental challenges of our age: the climate crisis and the biodiversity crisis. We look forward to working with our partners to establish Scotland as a global leader in the monitoring of Natural Capital through the development of AI applied to Big Data from space."

What is needed to accelerate tech that enables climate action in Scotland?

"We think the number one thing Scotland could do to would be to have more competitions along the lines of the CAN DO Innovation Challenge Fund's 'AI for Good' Challenge.

"We received 100% funding for developing new technology to address the climate crisis. This enabled us to develop new IP around landcover mapping and a new web platform to deliver these maps, and to hire new developers, who we are now funding through private sector contracts. This model of competition-based funding for SMEs should be expanded. Based on our experience it was a very efficient use of government funds."

Wyoming Interactive

Rob Innes
Head of Consultancy

Using data science to reduce energy inputs and harmful outputs in manufacturing

Location: Edinburgh
Sector: Industry
Climate Tech: Data Analytics

Based in Edinburgh but working globally, Wyoming Interactive is a leading digital and data consultancy specialising in life and chemical sciences. Wyoming Interactive has provided expert solutions over thirteen years through data science to improve processes, lower energy usage, lower emissions and thus benefit the environment.

Energy input and ineffective processes within manufacturing can have negative long-term effects on the environment and produce unnecessary costs. Wyoming Interactive uses data to analyse current processes and produce insights of how to improve them. This may yield data models, process changes or real-time dashboards all aimed at creating long-term sustainable solutions. These solutions are directly focused on reducing waste, reducing energy input and improving yield or quality.

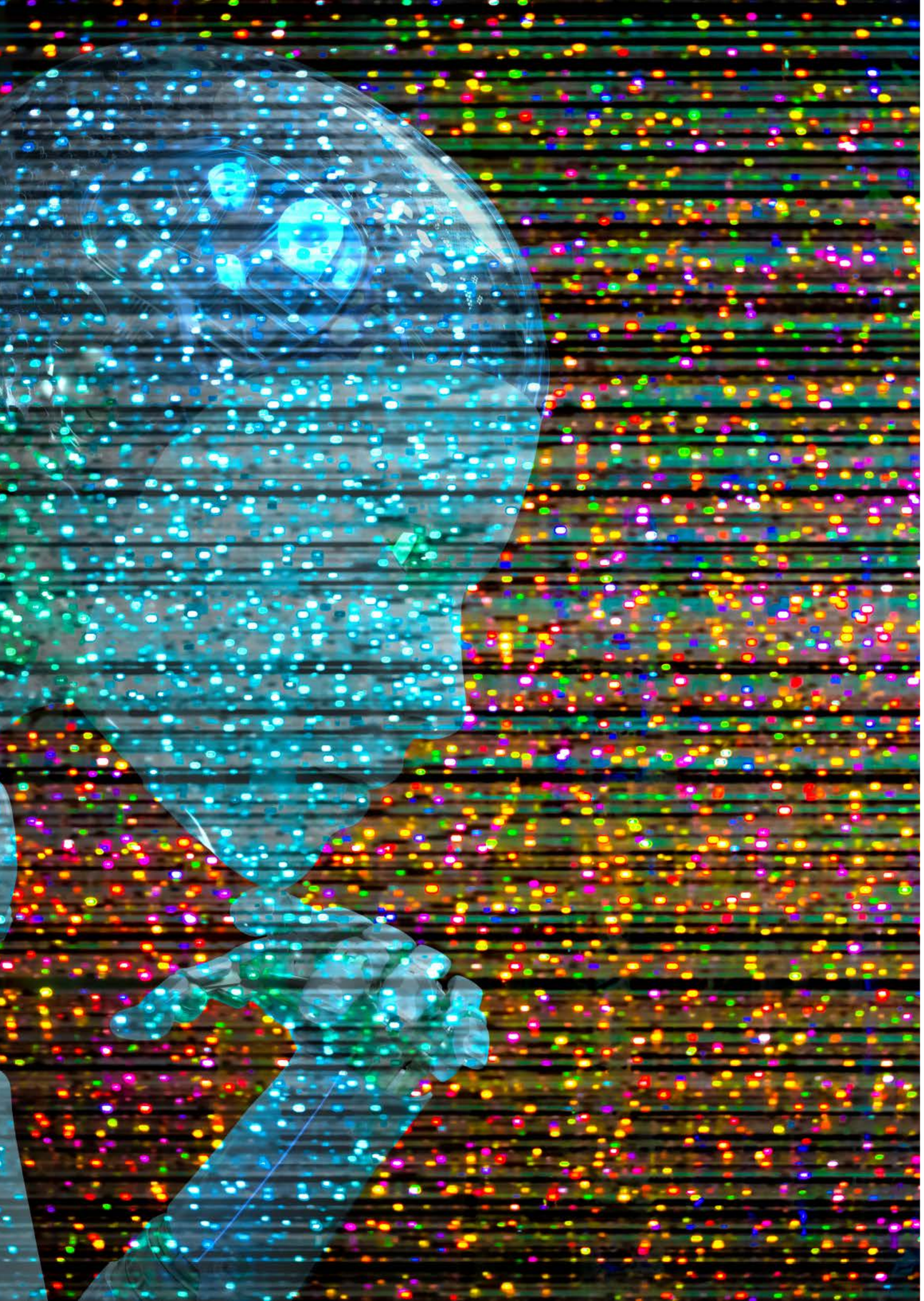
Wyoming Interactive has worked with manufacturers to reduce costs and energy usage. With improved visibility of complex biotechnology processes, interventions now start earlier and require smaller inputs. The application of predictive analytics can also give operators faster and more accurate insights into current and future performance, allowing micro-adjustments to be made early.

www.wyoming-interactive.com

What is Scotland's Climate Tech opportunity?

"With a relatively modest environment footprint, Scotland's opportunity lies more in scalable solutions than local change. Being well supplied with research, engineering, design, modelling & project management, Scotland is well placed to lead digital transformations that impact communities globally, not just locally."

Innovation Critical – Scotland's Net Zero Mission and Climate Tech Opportunity.



CHAPTER 4
Recommendations

Through our engagement with over 100 leaders, founders, innovators, experts and other stakeholders, we have identified 7 major challenges for Climate Tech in Scotland – and offer 10 recommendations to deliver change.

Ambition, Strategy & Vision

Challenge #1
How can we deliver an ambitious vision and strategy for Scotland's Climate Tech sector?

A growing global market, the capabilities across our private, public and third sectors and major assets like our human and natural capital mean that there is huge potential to grow the Climate Tech sector in Scotland.

Investment in the sector in Scotland is likely to more than double on current annual growth trends of 35% from £27m in 2020 to over £67m by 2023, potentially reaching £123m by 2025.[79] But time is short to mobilise sufficient capital to accelerate innovation, fast-track adoption and development, build Scotland's competitive advantage and to achieve net zero by 2045. And we believe that Climate Tech in Scotland has much greater growth potential.

We need to unleash a spirit of innovation to achieve net zero. We need to raise our collective ambitions and fast-track joint working across the private, public and third sectors to accelerate the innovation, adoption, commercialisation and export of Scottish solutions to humankind's greatest innovation challenge. We need to act now to realise the potential of Climate Tech in Scotland to deliver a just transition to net zero by 2045 and clean growth for people, the economy and the planet.

Recommendation
Launch Scotland's 'Climate Tech Moonshot' before COP26

Scotland's private, public and third sectors should unite behind a Moonshot for Climate Tech in the run up to COP26 which inspires and coalesces ambition, action and collaboration by leaders and decisionmakers, entrepreneurs and policymakers, citizens and communities around a new national innovation mission to design, develop and export data and digital technologies which support or enable climate action.

The Climate Tech Moonshot sponsored and led by the Scottish Government can help deliver the Climate Change Plan and should include the following key elements:

- National target of at least one Climate Tech unicorn in Scotland by 2025
- National target to increase investment in

79 https://technation.io/report2021

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Climate Tech in Scotland to £250m by 2025, double current projections

- Strategic priority to back Climate Tech innovation and exporting as part of core remit of all Scotland's enterprise, innovation and skills agencies
- Joint programme to accelerate Climate Tech innovation and adoption by Scotland's Innovation Centres
- New Climate Tech stream as part of expanded CivTech programme to facilitate public-private partnerships which accelerate, develop and adopt Climate Tech solutions
- National campaign to champion Climate Tech solutions and drive adoption across the private, public and third sectors, as well as educating and engaging with citizens and communities about the opportunities, to build buy-in across our economy and our society
- Showcase as many Scottish Climate Tech start-ups and inward investment opportunities as possible at COP26
- Align delivery and implementation of the Climate Change Plan with Scotland's Digital, AI and Export Strategies, the Logan Review, the Inward Investment Plan and the forthcoming Tech Exporting Strategy

Finance, Funding & Investment

Challenge #2
How can we close the Scottish start-up funding gap?

Early-stage entrepreneurs and innovators make big personal sacrifices and take serious financial risks. Securing investment from the right investor at the right stage is critical to help any start-up to survive and thrive. The right type and level of investment is essential to fund the often complex or protracted transformation of start-ups into scale-ups, turning innovative ideas into effective prototypes and protypes into manufactured commercial products.

Scotland's ecosystem of private and public investors has strengths. The Angel Investment community, Scottish Enterprise and others provide significant levels of seed capital funding up to circa £2m to earlier-stage businesses. The new Scottish National Investment Bank will provide patient capital on a commercial basis to firms which could advance its mission of supporting Scotland's transition to net zero by 2045, although the limited initial capitalisation of £2 bn over ten years could significantly constrain its ability to do so.

However, there is a significant investment gap for Climate Tech start-ups with two major fissures which need to be closed. Firstly, many Scottish founders still struggle to access the very early-stage, high-risk funding they need to work with ideas, concepts and prototypes, creating the time and space to invent, innovate and learn. Secondly, there remains a mid-stage 'valley of death' or 'missing middle' where Scottish start-ups frequently fail to fund commercialisation or scaling due to a lack of access to venture capital at a larger scale between circa £2m–£5m.

Recommendation
Strengthen investment in early-stage innovation and the 'missing middle'

The Scottish Government and its enterprise, innovation and skills agencies should diversify the public finance offer for start-ups in Scotland to improve access to funding for early-stage, high-risk innovation as well as the 'missing middle' of Climate Tech businesses.

Key elements should include:

- New grant funding for very early-stage, high-risk Climate Tech innovation to support Scottish entrepreneurs
- Target patient capital at £2m–£5m investment level to drive higher levels of Climate Tech commercialisation and scale-up
- Accelerated capitalisation of Scottish National Investment Bank from £2bn over 10 years to £2bn over 5 years to enhance its investment capacity and impact

Challenge #3
How can we accelerate the pace of Climate Tech innovation and adoption?

The pace and scale of technological innovation which will be required to achieve net zero is immense. We will need to invent and develop new solutions and then test, manufacture and roll out with businesses, organisations, communities and households across our economy and our society with unparalleled urgency.

The current 'push' model of innovation – in which ideas are 'pushed' out from start-ups and spinouts, entrepreneurs and academics, to the market to find public or private investment – may not be fit for purpose to achieve our goals.

This linear model often leads to a slow, inefficient or sub-optimal process which fails to match demand with supply, investment with start-ups and problems with solutions. Many businesses and organisations – especially smaller businesses struggling to take climate action – lack time and capacity to engage.

Recommendation
Pioneer and roll out new innovation models which accelerate financing, co-design markets and boost scaling

If we want to achieve net zero by 2045 and establish Scotland as a leading innovator, adopter and exporter of Climate Tech at COP26 and beyond, we will need to experiment with and replicate new, innovative and non-linear models of innovation which accelerate routes to success or failure and accelerate financing or commercialisation.

Scotland could pioneer and roll out alternative 'pull' models of innovation like Project-X[80] or Deep Demonstrations by Climate-KIC[81] which support early-stage and lasting collaboration and partnership between the supply (innovators, providers, start-ups etc.) and demand (investors, industry, local authorities, customers etc.) sides. This kind of non-linear process can identify decarbonisation problems and connect them directly with Climate Tech solutions.

It can lead to the creation or co-design of new markets and the generation of new commercial opportunities with committed or captive customers to significantly accelerate learning, adoption and scaling across the economy. It could facilitate significantly quicker development and adoption of Climate Tech. It could form an integral part of Scotland's unique pitch at COP26 to attract global industry, investors and innovators.

The Scottish Government should leverage its national and international convening power and climate leadership to build a Climate Tech innovation platform which pioneers and rolls out this new model in sectors, cities and regions across the country. It should coalesce the capabilities across our private, public and third sectors to offer Scotland at COP26 and beyond as a forward-thinking and solutions-focused 'living lab' for Climate Tech innovation.

The Scottish Government should lead the way by testing and adopting Scottish Climate Tech solutions to decarbonise its own operations and to deliver more innovation and sustainable net zero public services, while also exploring incentives which could stimulate uptake across the economy, especially by SMEs. SMEs need to be supported to become informed and intelligent customers for Climate Tech, especially home-grown Scottish solutions, by Scotland's enterprise, innovation and skills agencies and the wider SME support ecosystem.

Business & Innovation Support

Challenge #4
How can we nurture and grow Scotland's Climate Tech ecosystem?

Scotland has a thriving, fast-growing tech sector. However, our ecosystem remains relatively immature

80 https://projectxglobal.com/how-it-works
81 www.climate-kic.org/programmes/deep-demonstrations

compared with other global tech hubs with which we compete, from London to Stockholm to San Francisco. The agglomeration or clustering effects or benefits of being located near to these dense networks of potential investors, partners and talent is invaluable to help start-ups grow and attracts many founders, innovators or entrepreneurs to relocate away from Scotland.

Founders of Climate Tech start-ups have told us how important nurturing a Climate Tech ecosystem in Scotland is for them to 'accelerate our growth' and to 'cross-pollinate, find synergies and compete'. There is a need for business and innovation support which is tailored to the sector's challenges and opportunities.

They have also told us how accelerator or innovation programmes by Scottish Enterprise or Zero Waste Scotland – or support from an innovation centre or working in partnership with a university – has helped them turn their idea from a concept into a prototype or product or to take their business to the next level. There is lots of support out there from a wide variety of providers – but this has led to a complex and at times confusing or cluttered landscape which can be challenging and time-consuming to navigate.

Recommendation
Launch ClimateTech Scotland to establish, manage and grow a new Climate Tech Accelerator and Cluster

The Scottish Government should launch a new ClimateTech Scotland organisation based on the FinTech Scotland model with a mission to nurture and grow Scotland's ecosystem in support of the Climate Tech Moonshot.

Its role should be to establish and manage a new Climate Tech Accelerator as part of a dedicated Climate Tech Cluster which provides enhanced and integrated funding and support for Climate Tech start-ups – from tailored advice and protecting intellectual property to networking opportunities and leadership programmes. It should be ambitious and outward-looking, connecting Scottish founders, innovators and entrepreneurs to each other as well as industry, investors and ecosystems in other countries. It should build on the positive impact of the Data and Cyber Clusters managed by ScotlandIS.

The major strategic objective of the Logan Review was to 'stimulate and accelerate the maturity of Scotland's tech ecosystem'. It recommended a range of interventions to increase the number of start-ups and scale-ups – including a national backbone network of 'Tech-Scalers' to combine best practice in incubation, intensive founder education, ecosystem social infrastructure and integrated funding. One of the five tech scalers which the Scottish Government has committed to establish – with an initial £4m over five years to initially support up to 500 firms before 2022 – should be focused on the opportunities of Climate Tech.[82]

Leadership, Skills & Talent

Challenge #5
How can we close Scotland's green and digital skills gaps?

Employers tell us that skills gaps are a barrier to innovation, growth and transformation in businesses, organisations and sectors across the Scottish economy, as well as a just transition. Shortages of core green or digital skills (like carbon or digital literacy) and specialist green or digital skills (like carbon accounting, resource efficiency or data analysis) are particularly acute and damaging in the Climate Tech sector. Access to the leadership, skills and talent they need is critical for start-ups to survive and thrive.

Scotland needs a Green Skills Revolution. In the future, every job will need to be digital and sustainable.[83] Everyone will have a part to play in helping Scotland get to net zero. The workforce of the future will need to be supported to utilise and maintain new Climate Tech. The Logan Review highlighted the urgent need to improve Computing Science teaching as part of a wider expansion of quality STEM education and engagement with children and young people in our schools.[84]

Carbon and digital literacy should be as fundamental to the education of our young people in the 21st century as literacy and numeracy. We need to prepare them for the jobs, challenges and opportunities of the future and equip them to be Climate Tech founders, innovators and entrepreneurs, as well as informed and sustainable citizens and consumers.

Recommendation
Recognise carbon and digital literacy as essential skills for the 21st century and embed them across education and learning including early years, primary, secondary and tertiary education, professional learning and work-based learning

Educators, employers, learners and workers should recognise carbon and digital literacy as essential skills for the 21st century, which are an integral part of lifelong learning. All schools, colleges, universities, training providers and employers should embed carbon and digital literacy across education and learning including early years, primary, secondary and tertiary education, professional learning and work-based learning.

This will require a national approach to and increased investment in career-long professional learning (CLPL) in STEM for teachers and career advisors. Teachers will need to be better supported to develop engaging and innovative ways for children and young people to learn about climate change, develop an interest in sustainable entrepreneurship and build their green and digital skills from an early age – including through extra-curricular programmes which excite and inspire the next generation of data scientists, inventors and programmers.[85] Careers advisors will need to be better supported to upskill and provide more up-to-date information about careers, opportunities and trends in industry and technology.

Recommendation
Empower everyone to reskill or upskill at any stage of their life or career

The Scottish Government should establish a Reskilling and Upskilling Fund which empowers everyone to reskill or upskill through a new right to lifelong learning. Every Scottish adult should receive an equal share of grant funding which they could access to wholly or partly fund learning opportunities from colleges, universities and other training providers at any stage of their life or career.

From bitesize and online courses to full- or part-time study and technical training, it could enable and inspire hundreds of thousands of Scots to gain or develop the green and digital skills they need to take their career to the next level, transition into a new green or digital sector, learn about how to adopt Climate Tech in their job or business or launch their very own Climate Tech start-up.

Challenge #6
How can we increase diversity and open up opportunity in Climate Tech?

There is currently a lack of diversity across the tech sector in Scotland and beyond, with women and ethnic minorities among the significantly under-represented groups. There are often cultural or institutional barriers to ensuring equal opportunities which can unfairly determine who has their ideas listened to, who gets put forward for opportunities or who secures investment.

We must harness all the talents of Scotland to deliver a just transition to net zero. We need to open up the Climate Tech sector to everyone. We cannot afford to leave anyone behind or keep anyone out to achieve Scotland's Climate Tech Moonshot.

82 www.gov.scot/publications/scottish-technology-ecosystem-review
83 www.weforum.org/agenda/2020/01/future-of-work
84 www.gov.scot/publications/scottish-technology-ecosystem-review
85 www.scdi.org.uk/yesc

Recommendation
Strategic priority for diversity across Climate Tech sector

Diversity must be a strategic priority for all businesses, organisations and leaders across the Climate Tech sector. It should also be a major focus of the new ClimateTech Scotland organisation to increase the diversity of the sector's founders, leaders and workforce. It should create accessible and inclusive programmes as part of its Climate Tech Accelerator and Climate Tech Cluster, as well as deliver dedicated programmes targeted at under-represented groups from leadership level to apprenticeships and STEM education in schools.

Infrastructure, Procurement & Regulation

Challenge #7
How can Scotland be a Living Lab for Climate Tech Innovation?

Our ambition is for Scotland to be a place which entrepreneurs, innovators and investors choose to test new ideas and trial new technologies for climate action – a welcoming, world-leading 'Living Lab for Climate Tech Innovation'. However, significant changes to the policy, procurement and regulatory environment are required to help make this happen.

Firstly, there is a need for better use of data and greater data sharing, transparency and openness in and across the public, private and third sectors. Ethical, secure and high-quality data – backed by critical infrastructure like digital connectivity and green data centres – is a key enabler of Climate Tech innovation. Energy, industrial, mobility or geospatial data can unlock new worlds of insight and analysis that help policymakers, researchers, innovators and citizen scientists to understand climate change and design or plan more effective interventions or technologies to adapt to and mitigate its impacts. It will be essential to engage citizens and communities about the opportunities to build effective and trusted safeguards around data privacy and security and to build buy-in across our society.

Secondly, public procurement is in urgent need of reform and resource. The public sector needs to change the way it does business with the private sector, working more flexibly and more quickly with Scotland's agile start-ups and SMEs. We have heard from several public bodies and businesses that have benefited from the Scottish Government's CivTech programme, which helps the public sector to solve problems in collaboration with innovative businesses. It provides a model to deliver viable, scalable solutions relatively quickly.

Thirdly, there is a need to address regulatory uncertainty which can delay or disincentivise investment in the development or adoption of innovation by encouraging a cautious, 'wait and see' approach from businesses and investors, especially in key sectors for emissions and the Scottish economy like agriculture and land use, as well as by SMEs.

Recommendation
Increase open data sharing and invest in key digital infrastructure

Government, business and industry need to take steps to improve the accessibility, transparency and openness of the data it collects or utilises with privacy, security and trust at its heart. This should be backed by public and private investment in key future-proof infrastructure like 5G and green data centres which support innovators and attract investors.

The Competition and Markets Authority's Open Banking system and standards – which securely enables people and businesses to share their transaction data to enable competition and innovation – has revolutionised digital financial services since 2018 and fuelled the growth of the FinTech sector in Scotland.[86] Now it is time to do the same for Climate Tech.

Ordnance Survey is working to increase access, use and reuse across the public sector of its vast geospatial database, while also making its location data available to the private sector on a commercial basis. BT is developing 'Forth-ERA', a digital twin of the Firth of Forth Catchment, in partnership with the University of Stirling to build the first 'Green Recovery Platform' in the world, providing real-time environmental data to businesses and organisations, enabled by BT's 5G network.[87]

Local authorities, transport providers and Big Tech collect a wealth of information about our people, towns and cities which could be shared widely as open data to enable Climate Tech innovation by start-ups or to engage and empower citizens and communities. Edinburgh's Data Driven Innovation programme provides a significant opportunity for the capital to lead on this agenda.

Recommendation
Transform procurement and scale-up CivTech across Scotland's public sector

The Scottish Government, its agencies and local authorities should transform procurement across the public sector by developing new culture, rules, practices and programmes which – supported by workforce training and third-party certification of climate impacts – change approaches to risk, evaluate whole life economic and environmental costs and benefits and accelerate the adoption of Climate Tech innovation.

Scotland needs more ambitious, agile and solutions-orientated public-private partnerships which rapidly respond to emerging Climate Tech opportunities – 'seek, solve and scale'. This should include a significantly scaled-up CivTech programme with a major focus on responding to net zero challenges and greater accessibility for start-ups through enhanced funding, lower barriers to entry and a clearer route to scaling Climate Tech solutions across Scotland's public sector.

The Scottish Government should lead the way by testing and adopting Scottish Climate Tech solutions to decarbonise its own operations and to deliver more innovation and sustainable net zero public services, while also exploring incentives which could stimulate uptake across the economy, especially by SMEs.

Recommendation
Establish a Centre of FutureRegulation

The Scottish Government, its agencies and regulators should seek to provide strategic direction and as much clarity as possible on the incentives, rewards or 'carrots' as well as or disincentives, penalties or 'sticks' which households, businesses and organisations should expect in the just transition to net zero to enable them to plan, prepare and invest now.

The Scottish Government should establish an independent Centre of Future Regulation with expertise to inform and advise government, parliament, industry and society on emerging regulatory issues from new innovations and sectors, with the aim of accelerating innovation across the Scottish economy, especially in developing, testing and adopting Climate Tech.

It should support existing regulators to adapt and change to better support Climate Tech innovation. It should assist in the creation of new regulatory sandboxes – testing environments which can be used by innovators and regulators to trial new products, services or business models in real-world, ring-fenced settings with safeguards – across the sector.

86 www.openbanking.org.uk

87 www.stir.ac.uk/about/forth-environmental-resilience-array

Glossary

5G
Next generation of mobile technology which works in the same way as existing mobile networks but with much faster and more reliable connections even in the busiest places

Accelerator
Fixed-term programmes which support young, early-stage start-ups to accelerate their growth through an intensive process of education, mentorship and financing

Artificial Intelligence (AI)
Ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings like learning from experience or solving problems

Blockchain
Digital ledger of transactions that is duplicated and distributed across a computer network

CivTech
Scottish Government programme which helps the public sector to solve problems in collaboration with innovative businesses through open challenges and tech accelerators

Climate Tech
Digital technologies and their applications which support or enable climate action by businesses, citizens, communities, governments, households or organisations to reduce greenhouse gas emissions or address the impacts of climate change

Cluster
Structure to facilitate collaboration and innovation between inter-connected businesses and institutions from a particular field or sector of the economy concentrated in a place or region

COP26
26th UN Climate Change Conference of the Parties (COP26) to be hosted by Glasgow between 1 and 12 November 2021

Data Analytics
Processes, tools or techniques used to analyse data to generate insights

FinTech
Fast-growing sector applying digital technologies to improve or create new financial products or services

Fourth Industrial Revolution
Accelerating technologies like automation, Artificial Intelligence, blockchain, data analytics, digitalisation and robotics disrupting our economy and our society

Internet of Things
Network of physical objects embedded with sensors and software to connect and exchange data with other devices and systems via the Internet

Moonshot
Highly ambitious or ground-breaking project or mission undertaken to spark big thinking, accelerate action and encourage an 'anything is possible' mentality

Net zero
The balance between the amount of greenhouse gases released into and removed from the atmosphere, achieved when the amount we add is no more than the amount taken away

Start-up
A new or young company founded to develop a unique product or service

Unicorn
A privately owned start-up company that has grown to be valued at over $1 billion

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