

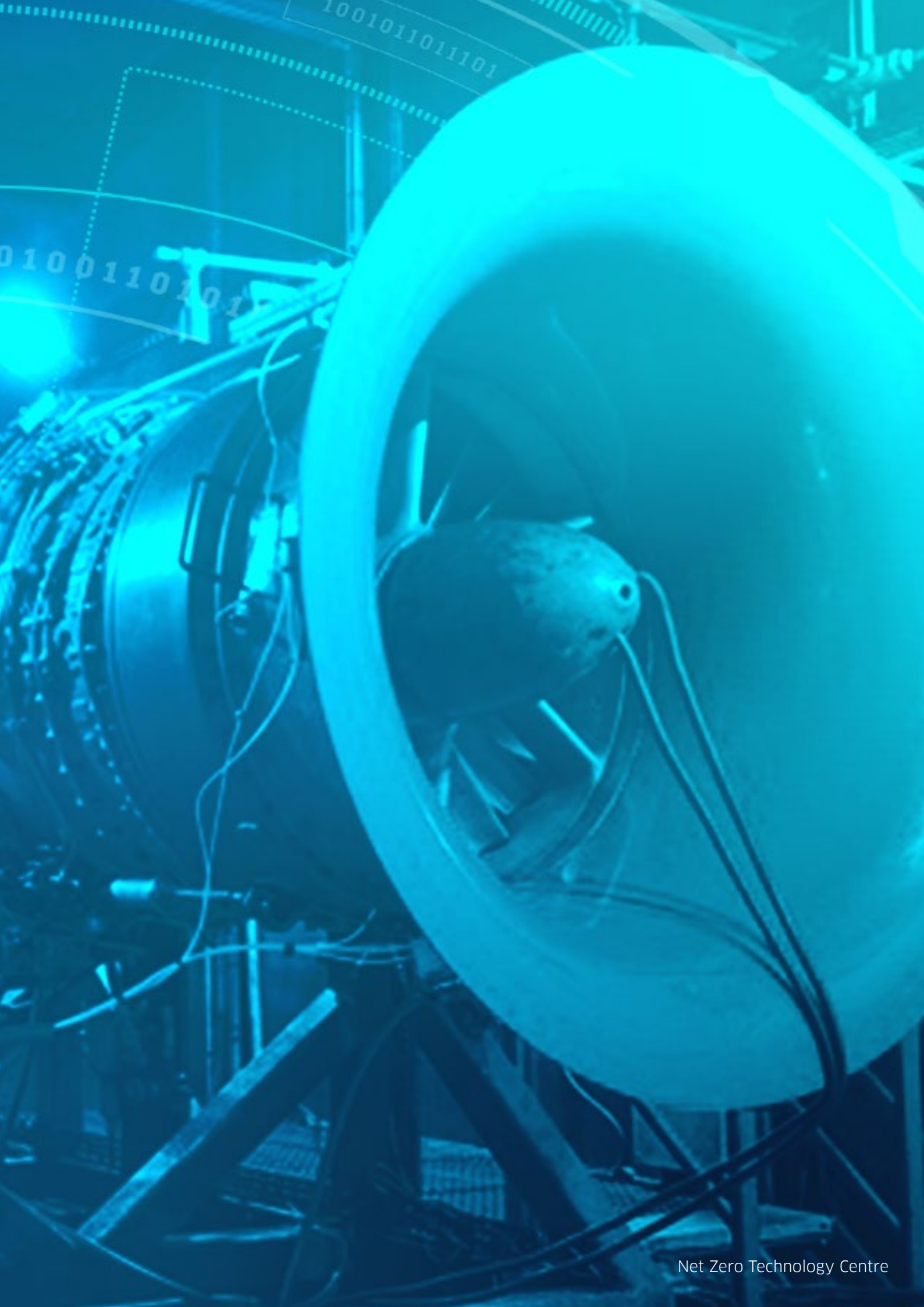
Scotland's National Innovation Strategy



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1. Ministerial Foreword

Innovation powers the wealthier, fairer and greener Wellbeing Economy described in our National Strategy for Economic Transformation (NSET). It generates opportunities for entrepreneurs, closes the productivity gap, attracts international capital and enables us to grow clusters of successful businesses in the markets of the future.

Scotland has a proud and enviable history and tradition of invention and innovation. Our people for centuries have been known as innovators with some of the best scientists and engineers, as well as writers and philosophers, coming from Scotland and helping to change the world.

We face challenges in maintaining our record of innovation in a rapidly changing, inter-connected world. While Scotland's productivity and business investment in Research and Development (R&D) have seen significant improvements in recent years - with the gaps to the rest of the UK largely closed - we have work to do to catch up with our international competitors. Too few Scottish businesses are innovating, and some of our most innovative companies struggle to scale.

Scottish innovators and inventors have been at the cutting edge of technological change throughout history. The next decade will bring profound changes with new technological breakthroughs and pressing challenges on climate change, health and the cost of living. These challenges also bring opportunities and I know that Scottish innovators, entrepreneurs and our innovative companies stand ready to meet those challenges and return Scotland to a central role on the global innovation stage.

This strategy describes how Scotland will overcome these challenges, build on its past and reaffirm its status as an innovative country in the future economy. It demonstrates how we will deliver product, service and process innovations which make the most of our natural advantages and translate our research excellence into commercial opportunity. In doing so, it sets out an approach that embraces every sector of our economy and every region of our country.

The strategy has been co-produced with partners across our country and overseen by a Steering Group co-chaired between Scottish Ministers and Sir Jim McDonald. It has been informed by a public consultation and is supported by an accompanying Evidence Paper which has been undertaken by Scottish Government economists and analysts in close collaboration with independent experts. The result is a diverse and inclusive approach to innovation that is consistent with our overall National Strategy for Economic Transformation¹ and key supporting documents such as our Inward Investment Plan,² our Global Capital Investment Plan,³ A Trading Nation,⁴ our exports plan, and our Energy Strategy and Just Transition Plan⁵.

Scotland has incredible strengths in innovation and a history of spectacular successes. This strategy is about the ways in which we build on the platform we have inherited and chart a course to continuing economic success.

My ambition is that Scotland will once again be known as one of the most innovative countries in the world, leading the world in a number of key areas and providing solutions to global problems. I believe that this Strategy will help us as a nation to achieve that ambition.

Richard Lochhead MSP
Minister For Small Business,
Innovation & Trade



1 [Scotland's National Strategy for Economic Transformation - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/national-strategy-for-economic-transformation/pages/introduction.aspx)
2 [Shaping Scotland's economy: inward investment plan - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/shaping-scotland-s-economy-inward-investment-plan/pages/introduction.aspx)
3 [Investing with Purpose: global capital investment plan - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/investing-with-purpose-global-capital-investment-plan/pages/introduction.aspx)
4 [Helping Scottish businesses to export - A Trading Nation \(mygov.scot\)](https://mygov.scot/Helping-Scottish-businesses-to-export-A-Trading-Nation)
5 [Draft Energy Strategy and Just Transition Plan - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/draft-energy-strategy-and-just-transition-plan/pages/introduction.aspx)

2. Foreword From Sir Jim McDonald

We want Scotland to become one of the most innovative small nations in the world by 2033. That is an entirely achievable ambition as Scotland is already home to some of the very best research institutions and most exciting and innovative companies in the world. There is more to be done to unleash the potential of innovation across the country and this Strategy is focused on the actions required to move the dial.

It sets out a vision and road map to transform Scotland's economy over the next decade by placing innovation at the heart of our economic growth, societal prosperity and wellbeing. By capturing the transformative power of innovation, we will place Scotland ahead of the pack in key sectors and technologies on the global stage. This will drive up productivity in more companies, attract more investment and increase the quality and effectiveness of our public services. By collaborating and concentrating on strategic priorities we will ensure that the benefits and opportunities of a thriving innovation ecosystem are delivered across the nation to all our citizens, businesses and communities.

Innovation is global and the international dimension of these endeavours will be an important enabler in realising the success of this Strategy. We will support our innovative sectors to internationalise and export, continue to build international partnerships and learn lessons from our international comparator nations, drawing on good practice wherever it is found. And woven through our Strategy will be a focus on inclusiveness and diversity in all its forms, so that it is enriched by more

diverse perspectives, and in turn more people and communities will be engaged in and benefit from the work that follows the Strategy.

The transformative potential of innovation is undeniable. The power of new ideas and new technologies is driving global change at an unprecedented rate and scale. Countries that can show agility and harness this power will thrive in the 21st century, becoming magnets for talent and investment, becoming exporters of the next generation of products and services, and significantly raising their citizens' quality of life.

It has been a privilege to have co-chaired the Steering Group that has played a key role in shaping this Strategy, supported by a number of expert working groups and an extensive evidence gathering and engagement process. I am grateful for the time, knowledge and expertise of these of these entrepreneurs, industry experts, academics and business leaders. We came together through the ambition that we can make Scotland one of the most innovative small countries in the world over the next decade.

I believe this Strategy will enable this country to achieve that ambition.

**Professor Sir
Jim McDonald**
Principal
University of Strathclyde





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3. Executive Summary

Our vision is for Scotland to rank alongside Denmark, Norway and Finland in being recognised as one of the most innovative small countries in the world. Innovation and the ecosystem of businesses, organisations universities and talent that promote and deliver it, will drive future national and regional economic success.

Following an in-depth data-led exercise and an extensive and inclusive engagement programme, the Strategy identifies four programmes of action which, taken together, are designed to shift the dial on our innovation performance elevating our performance to a world-class level. We will also initiate a new approach to measuring and evaluating our innovation performance which we will benchmark against other comparator nations.

1. Building successful Innovation Clusters

Scotland has a competitive advantage and a strong research and business base in a number of key markets. These give rise to four broad innovation themes on which future activity will focus:

Energy Transition: where we will look to harness Scotland's natural capital, regional expertise, internationally leading energy research and innovation capabilities and business activity within energy transition, with a particular focus on Hydrogen Generation, Storage and Transport, Floating Offshore Wind, Built Environment Transition and the Decarbonisation of Transport.

Health & Life Sciences: where we will capitalise on one of the biggest current life sciences clusters in Europe and a track record of research excellence and cross sector collaboration, prioritising opportunities in Digital Health, Future Medicines Manufacturing and Precision Medicine. Scotland's abundant natural assets also present innovation opportunities within the Industrial Biotechnology, Animal Health, AgriTech and Aquaculture sectors.

Data & Digital Technologies: where we will build on the impetus of the STER Review⁶ and national Techscaler network to support horizontal innovation of digital, data and Artificial Intelligence in areas such as Fem Tech and Gov Tech and with a particular future focus on Quantum Technologies, Photonics and FinTech / Financial Services.

Advanced Manufacturing: where we will work through our enviable infrastructure of support including the National Manufacturing Institute Scotland, the Medicines Manufacturing Innovation Centre and the National Robotarium to promote innovation across our manufacturing base and focus on vertical sectors such as Small Satellite Space, Robotics and Autonomous Systems.

These opportunities will be pursued through a systematic, European-style national cluster building approach that will see the development of a Scottish Cluster evaluation and facilitation process that will provide tailored packages of support to stimulate growth and innovation. The process will be aligned to the current EU cluster management accreditation scheme - EUCLES. This will be supported by a Scottish Cluster Network that will provide national representation for priority areas and enable international collaboration.

2. Innovation Investment Programme

To support the growth and scaling of our priority areas we will recalibrate our innovation investment and support landscape to ensure it aligns with our innovation priorities and maximises all appropriate sources of funding. We are determined to embed an investor mindset that maximises leverage, closes capital supply gaps and balances risk/return to ensure the maximum impact of the funding available through the public sector.

The public sector remains the most frequent investor in business innovation through our enterprise and skills agencies, the Scottish Funding Council, Skills Development Scotland and the Scottish National Investment Bank (the Bank). Private Equity and Venture Capital is the next most active investor type whilst Scotland also enjoys the benefits of well-established Business Angel Networks.

Our Innovation Investment Programme will ring-fence a significant proportion of public sector innovation funding to be spent and invested in the priority areas and enable a coordinated approach to increasing Scotland's share of UK and EU innovation funds including the opportunities provided by Innovate UK and Horizon Europe.

We also recognise that the current landscape of the public sector is complex and we will review this approach, consolidate funding streams where possible, improve information and simplify access. We will also introduce new models of investment to better support R&D investment.

3. Innovation-led Entrepreneurship and Commercialisation Programme

The Commercialisation Programme is focused on three key elements – supporting our universities in their ambitions for a new Investment Fund, developing a Research Commercialisation Action Plan, and delivering existing commitments on entrepreneurship in universities.

Scottish universities will consider the creation of a co-invested new Scottish Innovation Fund to attract additional private sector funding to support the development of an investment ecosystem for late-stage R&D, with a particular focus on patient capital for spin-outs in deep science and deep tech. We will work with our universities to help secure cornerstone investment for the Fund.

A Research Commercialisation Action Plan will be published as an addendum to this Strategy. This will consider and set out new national guiding principles on how we make a step change in the commercialisation of research. It will

be developed to deliver improvements against our key metrics and will focus on three key areas – how we can facilitate greater collaboration between industry and academia, support the creation of more scalable spin-outs, and ensure we have the necessary infrastructure, funding and talent to retain our most successful spin-outs in Scotland. We will also publish a comprehensive treatment of the actions necessary to stimulate more staff and student-led start-ups.

The Commercialisation Programme will complement and align with existing commitments (from STER and NSET) to develop and build an entrepreneurial mindset and culture across our higher education and research system through Entrepreneurial Campuses.

4. National Productivity Programme

We will introduce an innovation themed National Productivity Programme which diffuses the benefits of innovating for productivity gains. It will make full use of our Innovation Architecture to support more of our SMEs to innovate to increase their productivity. This will be designed and developed to deliver an increase in the number of our businesses who are 'innovation-active', and over the ten-year timeframe of the Strategy we will look to close the gap with comparator nations.

We will link the Innovation Productivity Programme into the development of our Cluster Network, so that the wider supply chain of current and potential SME customers and suppliers can be brought into our success in our identified priority areas.

We will introduce an innovation adoption referral charter to ensure that any business being referred from one part of government or agency to another experiences a warm and effective handover.

We will establish Scotland as a global leader in adoption and diffusion evidence and practice, testing new thinking and gather new evidence.

5. Innovation Scorecard

To demonstrate progress and guide future action we will develop and publish an innovation scorecard which will rigorously measure and assess the strength and performance of each level of Scotland's innovation ecosystem. This will monitor activity at the triple helix of innovation – industry, academia, and the public sector. Whilst some of the data required to participate in internationally recognised benchmarks is not available, our scorecard will provide visible metrics within each of the key stages of innovation:

- **Concept** –the generation of new ideas both within universities and the private sector which will be tracked through Patents Granted and Income from Collaborations. We will also track innovation between higher education and the wider economy through monitoring data on academic income from business and community interactions
- **Convert** –the conversion of early-stage research into commercial products and services. This will be assessed on the basis of early-stage risk capital and university spin-outs accessing equity finance
- **Commercialise** – the realisation of the economic benefits of innovation. This will be assessed through the number of BERD jobs, the number of high growth businesses in the economy and Value of late-stage investment (over £10 million) in the economy.

The scorecard will also assess the Adoption and diffusion of innovation by measuring the **percentage of innovation-active businesses in the economy** and expenditure on research and development from the private sector, higher education, and the public sector. We will also develop suitable metrics to capture and assess participation and impact in the innovation ecosystem including data on **equalities, diversity and inclusion**. This will include access to finance, funding, jobs and opportunities.

Taken together, these actions will enable us to develop and scale Scotland's innovation ecosystem and create the conditions for a world-leading innovation nation.

Case Study – Advanced Manufacturing Innovation District Scotland (AMIDS)

Manufacturing innovation is in Renfrewshire's DNA. From textile production of the famous Paisley Pattern to spitfire engines and steam boilers, so much capability and technology came from Renfrewshire and was exported worldwide.

Today Renfrewshire remains right at the forefront of cutting-edge manufacturing with Rolls Royce, Howden, Thermo Fisher and Terumo Aortic, just some of the companies based there. The future looks bright too, through development of the Advanced Manufacturing Innovation District Scotland (AMIDS).

AMIDS is a collaborative project led by Renfrewshire Council with strategic support from Scottish Government, Scottish Enterprise, Skills Development Scotland and academic partners University of Strathclyde and West College Scotland. Together, they're creating Scotland's home of manufacturing innovation. Located next to Glasgow Airport, the innovation district aims to attract manufacturers to locate here and support the sustainable growth of manufacturing in Scotland.

Advanced manufacturing combines game-changing technology like automation, data and cyber-systems with world-leading research to make new products and develop new processes that support a net zero world.

The district's central 52-hectare Netherton site has been carefully designed as an exemplar for innovation, a green, welcoming environment which fosters collaboration. Boasting excellent connectivity and a scenic riverside setting, companies who choose AMIDS benefit from access to Scotland's first fifth-generation heat network providing heating and hot water in a method which is 90% greener than a gas boiler.

Manufacturers can also access the expertise of its two anchor tenants. There's the University of Strathclyde-operated National Manufacturing Institute Scotland (NMIS) whose headquarters at Netherton comes complete with a skills academy, digital factory and publicly accessible collaboration hub. And the Medicines Manufacturing Innovation Centre, led by CPI, which launched in 2022 and is forecast to generate £200 million in technology innovation in its first five years as it accelerates state-of-the-art solutions in medicine development and manufacturing.

More than £185 million of investment has been attracted into AMIDS so far, including Boeing choosing the district for its first-ever research and development (R&D) project in Scotland, part of plans to double their supply chain and create 200 new, quality jobs.

New products for a new world are being made in Renfrewshire, the success of AMIDS could provide a major boost to Scotland's manufacturing sector, to the country's economic prosperity and to a net zero future.



4. Introduction

Our vision is for Scotland to be one of the most innovative small nations in the world. This is our ten-year strategy to deliver that ambition.

That ambition will bring Scotland in line with European countries of a similar size such as Denmark, Norway and Finland. Realising that ambition will mean that we have developed and scaled Scotland's innovation ecosystem to become a core driver of the national economy.

It will mean that we have a national network of innovative clusters where Scottish businesses are working at the cutting edge of technology and engaging in international partnerships and opportunities in areas where we have a clear competitive advantage. It will mean that we have an investment landscape, balanced and co-ordinated in line with our priorities, that delivers value and impact and re-invests in the ecosystem.

It will mean that our universities are nurtured and supported and that we are becoming a leader in the commercialisation of research, generating valuable spin-outs and student start-ups. Our businesses across the country will be supported to become active in innovation and we will have national programmes of incentives, infrastructure, training and engagement to help businesses and citizens become innovative and innovators. And we will have a public sector that takes an 'innovate first' approach and supports the development of a world-leading innovation ecosystem.

We define innovation as **'the introduction and implementation of a new or significantly improved product, service, process, or method with the purpose of helping to solve societal challenges or delivering economic growth.'**⁷ Innovation is about new ideas, technologies and research being utilised, adopted and commercialised to benefit society and the economy. Innovation is closely linked to entrepreneurship and they are mutually dependent and supportive. Entrepreneurship is defined as the creation or extraction of economic or social value often using resources beyond those controlled. It is the process of creating and developing a new business to generate profit while taking on financial risk. It is about a building a national culture and mindset that will create the conditions for starting and scaling businesses.

The twin engines of an innovation and entrepreneurial ecosystem are its innovation capacity and its entrepreneurship capacity. It requires engagement from five key stakeholder communities - the public sector (including governments both national and local, agencies, and public bodies such as the NHS and Police Scotland), industry (of all sizes and sectors), academia (universities, colleges and research institutions), the entrepreneurial community (who will create the enterprises of tomorrow) and the investors and providers of risk capital (who will assess and fund new ventures).

Innovation can therefore be seen as the vehicle to deliver entrepreneurship and a thriving innovation ecosystem is fuelled by an entrepreneurial mindset. The development of the innovation ecosystem is closely aligned to our ambitions for becoming a more entrepreneurial 'start-up' nation. The outcomes of a strong innovation ecosystem will be a pipeline of scaleable spin-outs and start-ups delivering new jobs, opportunities and investments around the country. This critical mass of activity will enable Scotland to become a world-leading innovation nation.

This Strategy builds on a range of successful activities, strategies and programmes being delivered across the nation. It connects and aligns with the National Strategy for Economic Transformation and in particular its programmes for Entrepreneurship and New Markets.

NSET's Entrepreneurship programme aims to establish Scotland as a world-class entrepreneurial nation with a much stronger pipeline of scaling businesses, and founded on a culture that encourages, promotes and celebrates entrepreneurial activity in every sector of our economy. NSET's New Markets programme aims to strengthen Scotland's position in new markets and industries, generating new well-paid jobs from a just transition to net zero. This Strategy links across these programmes and will help deliver those ambitions.

We want Scotland to be more innovative because innovation is a tool not just for achieving economic growth but also for reducing inequalities, improving societal outcomes, and achieving our net zero ambitions.

By improving our innovation performance we will support the creation of new companies, new technologies, and new products; we will bring in investment and drive collaborative relationships with international partners; we will support existing businesses to utilise and adopt innovation to grow and scale; and we will create a national network of clusters in areas where Scotland can lead the world. These initiatives will unlock investment and create jobs and opportunities across the country.

All of Scotland, our businesses, our entrepreneurs, our communities, will have a part to play in our journey to becoming a world leading innovation nation and the benefits of that journey will be felt in every village, town and city through high value jobs and economic growth powering better services and increasing the nation's wellbeing and health.

This places innovation at the heart of Scotland's wellbeing economy.

As we deliver this Strategy and its transformational programmes we will do in line with broader ambitions to transform our country's economic model so that we build an economy that celebrates success in terms of economic growth, environmental sustainability, quality of life and equality of opportunity and reward.

This Strategy focuses on the areas which will make the biggest impact, taking action in five interlinked key areas.

1. We will identify and promote the innovative technologies and sectors in which Scotland has clear potential to lead the world. We will take a cluster building approach to supporting these areas to become world-leading and internationally facing - driving mutual benefits from international partnerships.

2. We will adopt an investor mindset to supporting our most innovative businesses – investing where we have a competitive advantage, providing a comprehensive and co-ordinated package of support and leveraging in venture capital.

3. We will transform our commercialisation landscape, strengthening the role that our research base plays in driving economic and societal prosperity.

4. We will rapidly increase the rate and scale at which innovations are adopted in Scotland – by businesses, by communities, and by the public sector.

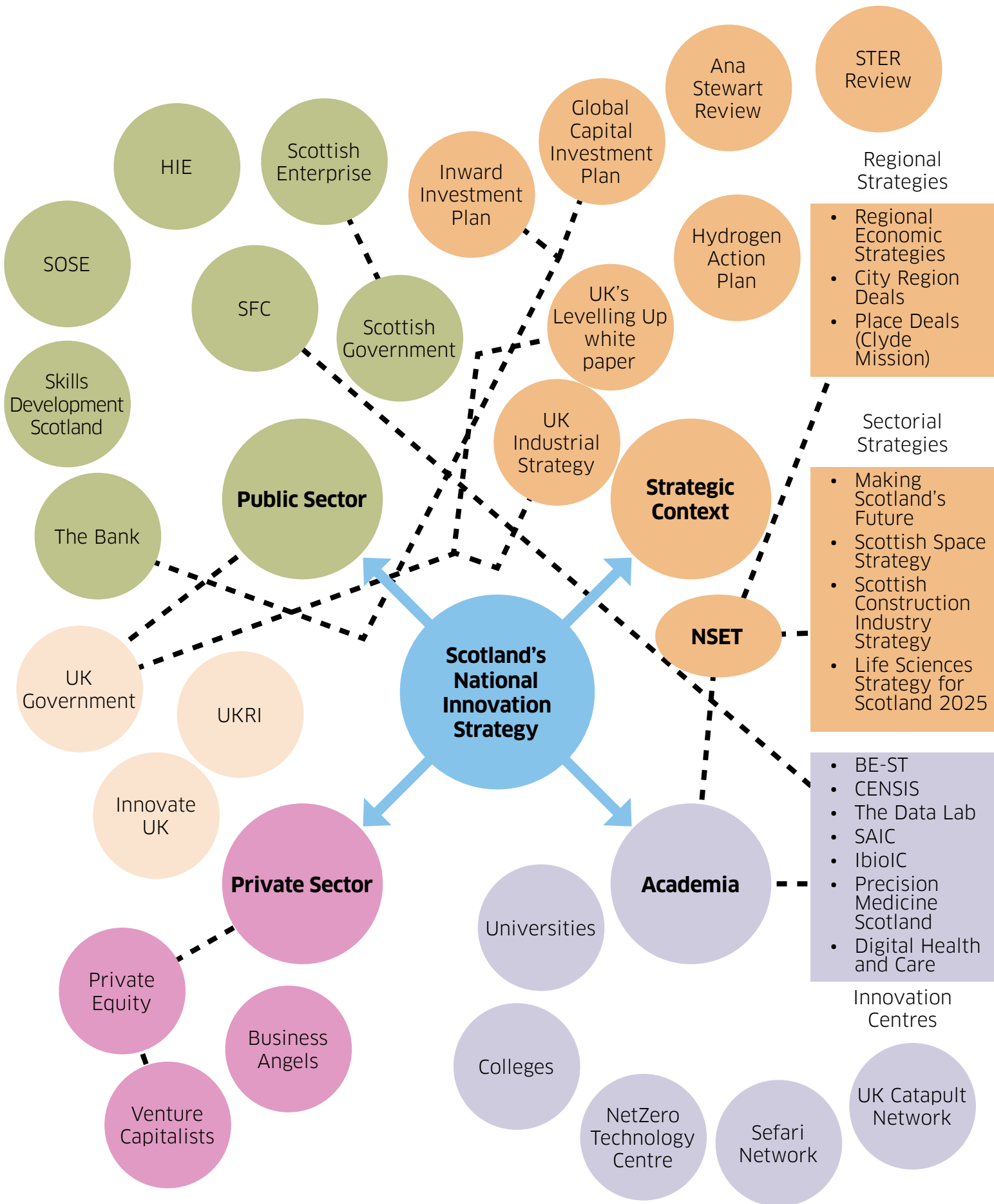
5. We will measure and monitor the performance of our innovation ecosystem and benchmark this against other nations in an annual Innovation Scorecard.

The Strategy has been informed by an extensive, inclusive and collaborative approach which has utilised the diversity of Scotland's innovation ecosystem. We have engaged across the country with a series of roundtables and workshops for business, universities, colleges, investors, and the wider public sector. We have engaged with a range of independent industry experts and commissioned research from SCDI to develop the set of actions which form the Strategy. The Strategy is evidence-led, making best use of all available data to clearly identify where we should focus our efforts to build a technologically enabled, net zero wellbeing economy, with the principles of fair work and sustainability, inclusive growth and Community Wealth Building at its heart.

It has been informed by a public consultation and is supported by an accompanying Evidence Paper which has been undertaken by Scottish Government economists and analysts in close collaboration with independent experts.

The Strategy sets out, across each of its five themes, a vision of what we want to achieve, the opportunity for transformation, the current landscape including the barriers we are seeking to overcome, and the actions we will take to address those barriers, engage with those opportunities and achieve the vision we're aiming for.

Figure 1: Scotland's innovation ecosystem



Case Study – Edinburgh BioQuarter

In the Little France area of Edinburgh is Edinburgh BioQuarter, an innovative place where improved healthcare treatments and patient care are developed and taken to the world.

Edinburgh BioQuarter is where industry meets first-rate academics, clinical practitioners and medical innovators: an innovative place that is attracting businesses, investors and tenants. Partners include Scottish Enterprise, the University of Edinburgh, NHS Lothian and the City of Edinburgh Council.

The 'BioQuarter Vision' is to unlock BioQuarter's full innovation potential, accelerate its growth and for it to become a global destination for pioneering health innovation and enterprise. Over the next decade BioQuarter will transition into Edinburgh's Health Innovation District - a new mixed-use urban neighbourhood of Edinburgh, centred around a world-leading community of health innovators and companies.

Building on the £600 million capital invested to date and the City Region investment, through a new strategic joint venture partnership, new commercial health innovation accommodation will be developed alongside residential, retail and leisure amenities and high-quality public realm. By creating a thriving place, we can attract, nurture and retain high-growth companies, establish a community of health innovators and make a positive impact to our local communities.

A Health Innovation District is forming with the Royal Infirmary, a new Children's Hospital, the University of Edinburgh Medical School, an Institute for Regeneration and Repair and the Usher Institute for Data-Driven Health Innovation sitting alongside the Cell and Gene Therapy Catapult and commercial research space at BioCubes and at Building Nine.

BioQuarter is an innovative place:

- where more than 7,500 healthcare and life sciences experts are working towards improved patient care, new treatments and therapies.
- that connects academics, scientists, clinicians, healthcare professionals and entrepreneurs.
- for tenant companies, spin-outs and start-ups, giving them the potential to grow, to forge international partnerships and to take advantage of co-locating alongside world-leading expertise across the BioQuarter campus.
- that is strengthening its connection to the local community.

The ambition for the future is for a further £1 billion of private sector investment to establish the BioQuarter as a world-leading Health Innovation District. A new vibrant mixed-use district supporting a community of more than 20,000 people. BioQuarter will be a place for people to innovate, live, study and thrive.



5. Innovation Priorities

Vision

Scotland has high innovation potential and a tradition of great ambition and success. It is blessed with strong natural assets and excellence across its academic and business communities. Yet for a country of Scotland's size to be at its most successful it must prioritise a number of areas in which it can be truly exceptional.

In this Strategy we contend that Scotland continues to possess all of the ingenuity and assets necessary to once again take our place as a world-class innovative nation with consequent economic benefits through the creation of high value jobs, wage growth and increased tax revenues.

But to realise this vision, we must confront the reality that the world has changed and that we operate in a global environment that is deeply competitive. For a country of Scotland's size to excel it must concentrate its effort and resource on a set of focused priorities where it has the educational, industrial and natural assets necessary to be truly world class.

That is why in developing this Strategy we have undertaken a rigorous data-driven exercise to identify what those priorities should be. We also recognise that rapid change is inherent in the concept of innovation and that our approach needs to be agile enough to identify and catalyse nascent clusters as they emerge.

Opportunity

There is a great deal that Scotland can learn from comparably sized nations with globally competitive innovation systems. Countries such as Denmark and Finland have achieved great success by pivoting their economies towards a small set of innovation priorities that play to their unique strengths. Both countries have adopted a missions-oriented, place-based approach to innovation aligned with the EU's Smart Specialisation approach, which provided a blueprint for the deep engagement with business, civic Scotland and the higher education sector that we have undertaken in developing this Strategy.

Smart Specialisation is 'a place-based approach characterised by the identification of strategic areas for intervention based both on the analysis of the strengths and potential of the economy and on an Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement.' The EDP is an inclusive process of stakeholders' involvement, whereby 'market forces and the private sector discover and produce information about new activities, and the government assesses the outcomes and empowers those actors most capable of realising this potential.'

Source: [What is Smart Specialisation - Smart Specialisation Platform \(europa.eu\)](https://ec.europa.eu/euro-observatory/en/what-is-smart-specialisation)

This approach mirrors the analysis in NSET, which describes an approach to innovation based on the principle of identifying and focusing on sectors and technologies where we can objectively demonstrate that we have a competitive advantage. This is an approach that has served us well in the execution of our Export, Inward Investment and Global Capital Investment Plans, where clarity of focus on specific areas of opportunity is delivering strong results.

This exercise has been data-driven and expert-led, supported by a solid evidence base, expert advice from industry, academic input and alignment with existing Government commitments and targets.

The Current Landscape

Scotland performs well in a range of prominent, well-established sectors, that serve a number of key international markets and contribute significantly to Scotland's national and regional economies.

Scotland's food and drink sector is one such sector of key importance to our economy. A £15 billion industry comprising over 17,000 businesses that in total employ around 129,000 people, it reaches into all parts of Scotland's communities, playing a hugely important role in supporting our most remote and rural communities. The sector accounts for 4.9% of total employment in Scotland and 15.1% of employment in Food and Drink across Great Britain and employment in Scotland in the sector increased by 8.4% in 2021. The appetite from across the globe for our fine produce is borne out by the latest export statistics which show that overseas food and drink exports were worth a record £8.1bn in 2022.

We are continuing to support the food and drink sector and committed support of £15m over 2020-2023 towards the Industry's Recovery Plan to assist all sectors of Scotland's food and drink industry in recovering from Covid and the disruptions of Brexit. In addition, the Scotland Food & Drink Export Plan for which we have provided £2.7m in funding over 2019-2024 is helping to grow the sector on the global stage. With the Recovery Plan phase coming to an end we are continuing to work with the Scotland Food & Drink Partnership on a refreshed food and drink industry strategy to be published in the near future which will outline the sector's aims and ambitions over the next ten years, setting out a range of activities to be delivered over the short, medium and long term.

Other well-established sectors in Scotland's economy include vibrant creative industries and a thriving blue economy, as well as additional fast-growing sectors that are pivoting in line with Scotland's just transition toward a fair and greener future. These include thriving sub-sectors of Scotland's life sciences sector, such as the industrial biotechnology sector and the animal bioscience, AgriTech and aquaculture sub-sectors.

Natural capital (defined as the utilisation of the natural environment for the benefit of communities and the economy) is a similarly emerging opportunity area for Scotland, and our enterprise agencies in the Highlands and Islands and the South of Scotland are committed to building and scaling research and innovation in this emerging area.

The Process for Identifying Priorities

The accompanying evidence paper to this Strategy looks at our areas of economic strength through an innovation lens. It outlines a broad sectoral analysis of Scotland's economic landscape, identifying those sectors in which Scotland performs comparatively strongly on innovation, where it has the potential for further growth and its overall areas of economic strength, cross-referencing with existing Scottish Government strategies.⁸

This evidence draws on existing data, employing multiple layers of analysis to identify the sectors in which Scotland currently excels and has the potential for further growth across three tiers:

1. Higher education sector capabilities (furthest from market):

to identify the research areas in which Scottish higher education institutions (HEIs) currently excel in. For this, Scottish HEIs' performance relative to UK HEIs on a range of research outputs was analysed, including:

- a. technical products
- b. spin-outs
- c. patents (from HE)
- d. publications
- e. data on the proportion of EU research funding secured by Scottish HEIs

2. Application of innovation into business:

to identify the sectors where the application of innovation into business is highest. Here, we draw upon analysis using sectoral data in terms of:

- a. patenting
- b. business-higher education collaboration

3. Business capabilities (closest to market):

to identify sectors where businesses in Scotland currently perform most strongly in innovation. Specifically, we analysed:

- a. Business Enterprise Research and Development (BERD) spend data
- b. sectoral data on innovation-active businesses⁹ from the UK Innovation Survey¹⁰
- c. sectoral allocation of risk capital
- d. sectoral distribution of inward investment

The analysis focused on Scotland's innovation strengths in terms of broad sectors, given that data is typically not available at a more granular sectoral level. A summary of the findings of this multi-layered analysis is shown below, and the full detail is contained in the accompanying evidence paper.

⁸ [Scotland's Innovation Strategy Economic Evidence Paper](#)

⁹ The UK Innovation Survey defines businesses as being 'innovation-active' if they have undertaken one of the following activities outlined in the Organisation for Economic Co-operation and Development (OECD) definition of innovation in the Oslo Manual 2018: The introduction of a new or significantly improved product (good or service) or process; Engagement in innovation projects not yet complete, scaled back, or abandoned; New and significantly improved forms of organisation, business structures or practices, and marketing concepts or strategies.

¹⁰ [UK Innovation Survey 2021 Report \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

Figure 2: Scotland's broad sectoral innovation strengths

Sector	Business capabilities	The application of innovation to business	Higher education sector capabilities
Scientific R&D (part of life sciences)	Yes	Yes	Yes
Computing/ICT	Yes	Yes	Yes
Financial and insurance activities	Yes	No	No
Business services	Yes	Yes	No
Professional services	Yes	Yes	No
Architectural, engineering and technical activities	Yes	Yes	No
Creative services	No	Yes	No
Health	Yes	Yes	Yes
Energy	Yes	No	Yes
Emerging technologies	Yes	No	Yes
Physics and space	Yes	No	Yes

Data analysis is, however, only one stage of any such prioritisation exercise, particularly when the data is available only for broad sectors and by definition focusses on past performance. To identify our innovation priorities for the next ten years, our current strengths and potential must be balanced with industry insight into future opportunities and emerging markets where Scotland can claim a comparative advantage.

The data-driven analysis is therefore supplemented with expert advice and insights from industry, academia and the public sector, capturing new disruptive and radical innovations and highly specific sub-sectors and technologies that, if scaled according to their economic potential over the next ten years, could see Scotland becoming a global competitor.

These expert insights were gathered through an extensive engagement process involving:

- a public **call for evidence** exercise
- many **business roundtable events** - crowding in insights from industry representatives from a vast range of sectors and business sizes
- **additional roundtable events** - including those delivered by the Royal Society of Edinburgh, the OECD, and the Foundation for Science and Technology
- regular **Innovation Strategy Steering Group** meetings chaired by Sir Jim McDonald and featuring key figures from across industry, investment and academia
- a workshop focused on how we achieve **world-leading excellence**, with expert representation from universities and colleges, public sector agencies and industry experts, chaired by Innovation Strategy Steering Group member Stephen Ingledew OBE (Chair of FinTech Scotland)
- further discussions with sector-specific industry, academic, public sector agencies and Scottish Government policy experts
- engagement with the relevant Industry Leadership Groups

Innovation Priorities

In consideration of both our current strengths and most significant emerging opportunities, this process has found that the innovation priorities can be grouped into four broad themes of:

- **Energy Transition**
- **Health and Life Sciences**
- **Data and Digital Technologies**
- **Advanced Manufacturing**

Using a coordinated and phased approach through the ten-year lifecycle of the Strategy, we will seek to support these innovation priorities and the opportunity areas within them to grow and scale into world-class economic clusters. These priorities serve as a starting point for our journey to become one of the most innovative small nations, and we will remain agile to identifying further emerging opportunity areas that arise out of our current broad areas of strength in the future, and to support them through our Cluster Evaluation and Facilitation Process.

For the remainder of this chapter we offer a more detailed analysis of each of these priority themes.

Theme 1

Energy Transition

The priority of energy transition is in line with the Scottish Government's net zero ambitions and just transition agenda, as outlined in the draft Energy Strategy and Just Transition Plan.¹¹ The priority transition of skilled workers from the oil and gas industries into renewable sectors augments this opportunity for society and our economy.

Taking the opportunity to harness Scotland's natural capital, regional expertise, internationally leading energy research and innovation capabilities and business activity within energy transition, offers significant potential to build economic advantage and growth.

It also provides substantial impacts for Scotland's societal and environmental wellbeing. Those at the forefront of energy transition will transform the energy efficiency of our built environment and lead the generation and adoption of green energy sources for heat, power and transport. Within energy transition, our highly innovative vertical sector-specific opportunities have been identified as:

- **Hydrogen Generation, Storage and Transport**
- **Floating Offshore Wind**
- **Built Environment Transition**
- **Decarbonisation of Transport**



11 [Draft Energy Strategy and Just Transition Plan \(www.gov.scot\)](http://www.gov.scot)

Theme 2

Health and Life Sciences

Scotland's health and life sciences sector is highly innovative, with a number of world-leading research and academic institutions supporting Scotland's NHS and the wider public sector to innovate to address national, regional and global societal health challenges. The breadth of expertise within Scotland's health and life sciences sector is united through pioneering health and life sciences innovation research in many of Scotland's universities, a strong base of health innovation companies covering a wide variety of specialisms, and test facilities in the National Health and National Care Services.

One of the biggest life sciences clusters in Europe, the scale of collaborative innovation in the health and life sciences sector has a significant national impact, serving to benefit our economy, the health and care needs of Scotland's citizens and improving outcomes through facilitating widespread adoption.

The scale of opportunity is also able to attract significant levels of private sector investment, as outlined in the Campbell Report: 'A Roadmap to Investment for Health Innovation Life Sciences and Health Tech in Scotland.'¹²

In addition to substantial expertise and growth potential in health innovation, Scotland's abundant natural assets present innovation opportunities within the Industrial Biotechnology, Animal Health, Agri-Tech and Aquaculture sectors. These sectors are already contributing to a nationwide approach to achieving Scotland's net zero ambitions and addressing the global climate crisis.

Within the breadth of specialisms represented in Scotland's health and life sciences sector, a number of highly innovative vertical sector-specific opportunities within health innovation have been identified as having significant growth potential:

- **Digital Health**
- **Future Medicines Manufacturing**
- **Precision Medicine**



Digital Health & Care Innovation Centre (DHI)

12 [The Campbell Report: a roadmap to investment for health innovation life sciences and healthtech - gov.scot \(www.gov.scot\)](https://www.gov.scot/resources/publications/2019/04/campbell-report-a-roadmap-to-investment-for-health-innovation-life-sciences-and-healthtech/)

Theme 3

Data and Digital Technologies

The scale of Scotland's data and digital capabilities continues to grow, and has an increasingly vital role in underpinning Scotland's digital economy. The Scottish Government's commitment to augmenting Scotland's culture of entrepreneurship is evident through the STER Review,¹³ NSET and the recent implementation of a national Techscaler network. These commitments build on an existing healthy environment of tech companies that provide enabling technologies that can support all of Scotland's economic sectors.



McAteer Photograph / Scottish Enterprise

These commitments particularly apply to Artificial Intelligence. Scotland's AI Strategy¹⁴ aims to make Scotland a leader in the development and adoption of trustworthy, ethical and inclusive AI. The Strategy is delivered as a collaborative cross-sector partnership – the Scottish AI Alliance. The Strategy's actions are currently being updated to reflect significant developments in AI technology and policy since its publication in 2021, including emerging UK and EU regulation and the widespread availability of generative AI. The increased pace of change presents new opportunities for Scotland but also requires government to accelerate actions to ensure citizens, workers and businesses are ready to seize those opportunities. The AI Strategy update will be published later in 2023, and its delivery will be joined-up with that of the Innovation Strategy, the STER and the Digital Strategy.¹⁵

As well as taking a horizontal enabling role in supporting all innovation priorities, we have identified a number of highly innovative vertical sector-specific opportunities within data and digital technologies:

- **Quantum Technologies and Photonics**
- **FinTech and Financial Services**

13 [Scottish technology ecosystem: review - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/scottish-technology-ecosystem-review-2021/pages/1-1-introduction.aspx)

14 <https://www.scottishai.com/>

15 [https://www.gov.scot/publications/a-changing-nation-how-scotland-will-thrive-in-a-digital-world](https://www.gov.scot/publications/a-changing-nation-how-scotland-will-thrive-in-a-digital-world/pages/1-1-introduction.aspx)

Theme 4

Advanced Manufacturing

Scotland has a strong tradition of manufacturing capability, with a proportionately high level of business investment compared to its share of Scotland's overall GVA, which only continues to grow its innovative capabilities as new societal challenges emerge.¹⁶ Strong manufacturing links to the energy transition agenda through initiatives such as the Hydrogen Innovation Fund and Zero Emissions Mobility Innovation Fund, exemplify how Scotland's strong manufacturing capability can underpin a number of Scotland's emerging renewable

sectors. Recent investments include the establishment of the National Manufacturing Institute Scotland (NMIS), the Medicines Manufacturing Innovation Centre (CPI led) and the National Robotarium, which offer internationally leading innovation facilities and expertise across multiple sectors supporting Scotland's high-value manufacturing capabilities.

In addition to acting as a horizontal enabler supporting all innovation priorities, we have identified a number of highly innovative opportunities within advanced manufacturing:

- **Small Satellite Space**
- **Robotics and Autonomous Systems**



Built Environment - Smarter Transformation Innovation Centre (BE-ST)

¹⁶ [Supporting documents - Investing with Purpose: global capital investment plan - gov.scot \(www.gov.scot\)](#), p.16.



6. Innovation Clusters

The Strategy's first programme of activity is focused on Innovation Clusters and is designed to support our priority areas to grow, scale and deliver world-class economic performance.

In this chapter we will define what we mean by clusters, set out the opportunities that exist to catalyse their rapid growth and propose a new vision for a more systematic approach to achieving that goal.

'Industry-led clusters have demonstrated they are a powerful enabling vehicle for delivering economic growth, high-value jobs and entrepreneurial start-up and scaling enterprises through impactful innovation and collaboration. I have valued the opportunity to share our cluster experience and expertise with a range of stakeholders and to now see the role of clusters form an integral part of the Innovation Strategy.'

Stephen Ingledeu,
Executive Chair
FinTech Scotland

Strategic context

Economic Clusters consist of dense concentrations of interconnected businesses, supply chains, skilled labour pools, economic and education institutions, public sector organisations and related infrastructure all operating in a particular field. Together, these actors create an ecosystem of collaboration, healthy competition, knowledge exchange and often close working partnerships.

There are numerous benefits to the formation and growth of economic clusters. They have been shown to drive the pace and quality of innovation; increase productivity and boost wage growth. Clusters are also strongly correlated with the formation of new high growth businesses, expanding and reinforcing the strength, competitive edge and innovation of the cluster. A good example is Scotland's emerging fintech sector, which has risen from a thriving financial services sector, to compete with existing businesses, driving innovation and ultimately reinforcing the scale and performance of the original cluster.

The reason that clusters are capable of having such a powerful economic impact is that they are uniquely capable of delivering the benefits of both competition and cooperation. Many

similar firms operating in similar markets and supply chains drives competitive innovation as they refine products to compete for customers. The fruits of that competitive innovation are then absorbed into the broader cluster, increasing its overall strength and productivity. Yet cooperation also takes place – not all actors in a cluster are competitors and companies are able to collaborate with supply chain partners, informed customers, universities and other public institutions to drive performance. Moreover, geographically concentrated clusters often foster a rapid learning ‘grapevine’ effect through which common relationships with major clients, supply chain partners and R&D facilities leads to clustered companies having much stronger intelligence on market needs, technological advances and new processes, machinery and production techniques.

Clusters also have social and environmental benefits that are wide-ranging and extend beyond immediate macroeconomic measures. The wellbeing and prosperity of particular regions and localities is very often driven by cluster activity, supporting local people whilst also attracting other professional services and inward migration that supports regions to thrive. An excellent example is the oil and gas sector in the North East of Scotland.

The importance of involving communities and citizens in this cluster activity, in setting and co-creating innovative solutions to deliver social and socially responsible innovation, as well as the importance of social and community innovation is an important part of the wider innovation ecosystem. Social Innovation is critical, especially in rural contexts, to addressing societal challenges (health, wellbeing, social care, climate response) through the effective delivery of public services and its value is heightened in a turbulent and fiscally

challenging environment where new models to address such challenges are a necessity. Social innovation promotes the application of more sustainable and resilient models, so is an important driver of rural resilience.

Over time, the scaled development of clusters can have a profound effect on a country’s economic performance and its ability to be internationally competitive. In the highest-performing clusters, such performance can be sustained over long periods of time as competition, deep expertise, innovation and collaboration lead to an anti-fragile effect in which the cluster continually adapts and regenerates.

Opportunity

As we have seen from the evidence in the preceding chapter, Scotland has a range of established, growing and emerging clusters which can act as a foundation for a vibrant innovation-led economy. The question is therefore how the relevant actors can best collaborate to drive their rapid growth.

In this regard it is worth reflecting on the nature of Scotland’s approach to economic development prior to the publication of NSET. While many outstanding and successful initiatives exist, as the New Markets chapter of NSET makes clear, we have not historically concentrated our efforts and resources in a systematic and sustained way on a clearly defined set of priorities. For the remainder of the chapter we examine the potential for just such an approach drawing, as usual, on examples of international best practice.

A new approach to cluster building

At a minimum, a new approach to cluster building approach must:

- provide **focus** on the scale of opportunity and global potential within our national innovation priorities.
- be capable of identifying weaknesses or growth opportunities in key clusters and provide a **systematic plan** for addressing them.
- provide **context on** Scotland's **international standing and competitiveness** in global markets.
- provide **alignment of policy and investment support** across the public, private and academic sectors.
- clearly and **visibly promote our world-leading capability** to international audiences.

Scotland can learn from international examples of best practice from countries of a similar size and outlook, where rigorous cluster-building approaches are the norm; underpinning national economic growth and signalling world-leading capability. Countries that have successful and highly productive and collaborative innovation ecosystems such as Norway and Denmark maintain tiered cluster development programmes that visibly define their national strengths and innovation capabilities, incorporating different regional strengths and then focus investment, business support and knowledge exchange accordingly.

With a similarly unified national network of high-performing clusters in each of our innovation priority areas, we will visibly demonstrate how Scotland can effectively harness different regional strengths and excellence into a collective national effort to become globally competitive. As with Denmark's Cluster Excellence network, a visible cluster network will unify different regional strengths to indicate a collective national expertise in a few specialisms, and can provide valuable signposting to attract further international investment, collaboration and talent.

Aligning public and private sector support for innovation priority clusters according to their specific needs will help businesses within our innovation priority areas to scale and grow, maximising their productivity and economic impact in accelerating Scotland's economic growth. As with the Norwegian Innovation Clusters, tailored packages of public support that catalyse growth and stimulate further private sector investment will support innovation priority clusters to achieve their world-leading capabilities.

Actions

1. We will work closely with our Enterprise Agencies and other relevant partners across industry, academia and the broader public sector to develop a Scottish Cluster Scheme.

This scheme will define a rigorous and systematic approach to the identification, evaluation and growth of priority Scottish clusters.

This will involve a detailed analysis of the cluster's size, potential, level of maturity and development needs.

We will look at 'best practice' approaches taken by comparator nations across Europe as we develop the scheme and the new system will align with the current EU cluster management accreditation scheme EUCLES, enabling clusters to benchmark themselves against others and to promote international collaboration.

While we begin this work with a focus on priority areas, it is crucial that other key and emerging clusters have the opportunity to use this system to accelerate growth. We recognise that rapid change is inherent in the concept of innovation and that our approach needs to be agile enough to identify to catalyse nascent clusters as they emerge. As we develop the scheme and associated tiered support packages we will work with the enterprise agencies and cluster leaders to ensure that the model is capable of broader application and that all clusters have an opportunity to undertake the process and form a deeper understanding of the actions necessary for growth.

2. We will begin our work on Cluster evaluation and facilitation process with a focus on each of the innovation priority areas identified in this Strategy.

The Scottish Government will work with cluster lead partners to undertake an evaluation and facilitation process to identify barriers and opportunities for each innovation priority area. This evaluation will be used to develop tailored packages of support according to each priority area's specific requirements to assist scale and growth toward world-leading status. As noted, these packages will be aligned with the Scottish Government's Innovation Funding Review, and a phased approach will be taken to delivery over the lifetime of the Strategy.

This will not always require the investment of funds. For example, clusters often grow exponentially as a result of non-financial factors such as the creation of key infrastructure, new opportunities for export, the arrival of an anchor inward investor, international connectivity, improved arrangements for peer learning or the expansion of skills and knowledge exchange activities. Compounding effects are often observed when such interventions are executed in combination.

For Scotland to achieve world leading capability in our innovation priority areas, we must harness the exceptional talent from all areas of our society through a cluster approach that encourages and facilitates growth of increasingly diverse innovation ecosystem.

We will ensure that clusters grow in a way that harnesses the diversity of innovation talent throughout Scotland, and a core part of the evaluation process will be evaluating the diversity of the current workforce, innovation actors and future talent pipelines each innovation priority area.

In line with the analysis in Ana Stewart's Pathways report ¹⁷ we will take a tailored approach to addressing particular barriers to widening access to innovation activity for female entrepreneurs, stimulating innovative business opportunities for individuals from ethnic minority backgrounds, and encouraging an entrepreneurial mindset and engagement from Scotland's young people through promoting career opportunities in highly innovative sectors.

Not all innovation priorities will have manufacturing and supply chain opportunities (e.g. fintech). Our cluster approach will support the identification of manufacturing and supply chain opportunities, highlighting them as priorities for Making Scotland's Future, our programme for advanced manufacturing, which draws together the support of our wider enterprise and skills network. We will also ensure companies with the potential to access new market opportunities in our priority areas are supported by our growing industrial innovation support infrastructure.

We will also track the data on the delivery of manufacturing and supply chain jobs within each of our priorities, adding this to our innovation scorecard and using it to inform decisions on future priorities.

3. We will support the development of a Scottish Cluster Network aligned to our innovation priority areas.

In recognition of the crucial importance of collaboration, peer learning and productive competition in driving cluster innovation, we will support the development of a new Scottish Cluster Network. The purpose of this network will be to facilitate relationships, knowledge exchange, international connectivity and collaboration across key cluster participants.

International Examples of National Cluster Support

Norway - A Tiered Model of Cluster Support

Norway's national cluster programme has been in operation since the early 2000s with the purpose of strengthening Norway's innovation ecosystem. The cluster support model provides public sector funding to three tiered cohorts that demarcate the level of maturity, the needs of each cluster and the length of funding commitment:

- **Arena** consists of clusters that are newly established, small and with limited collaboration initiatives on a regional basis.
- **Norwegian Centres of Expertise (NCE)** consists of clusters that are well-established with a national footprint and the potential for further national and international growth.
- **Global Centres of Expertise (GCE)** consists of world-leading clusters that are well-established and already entrenched in global value chains.

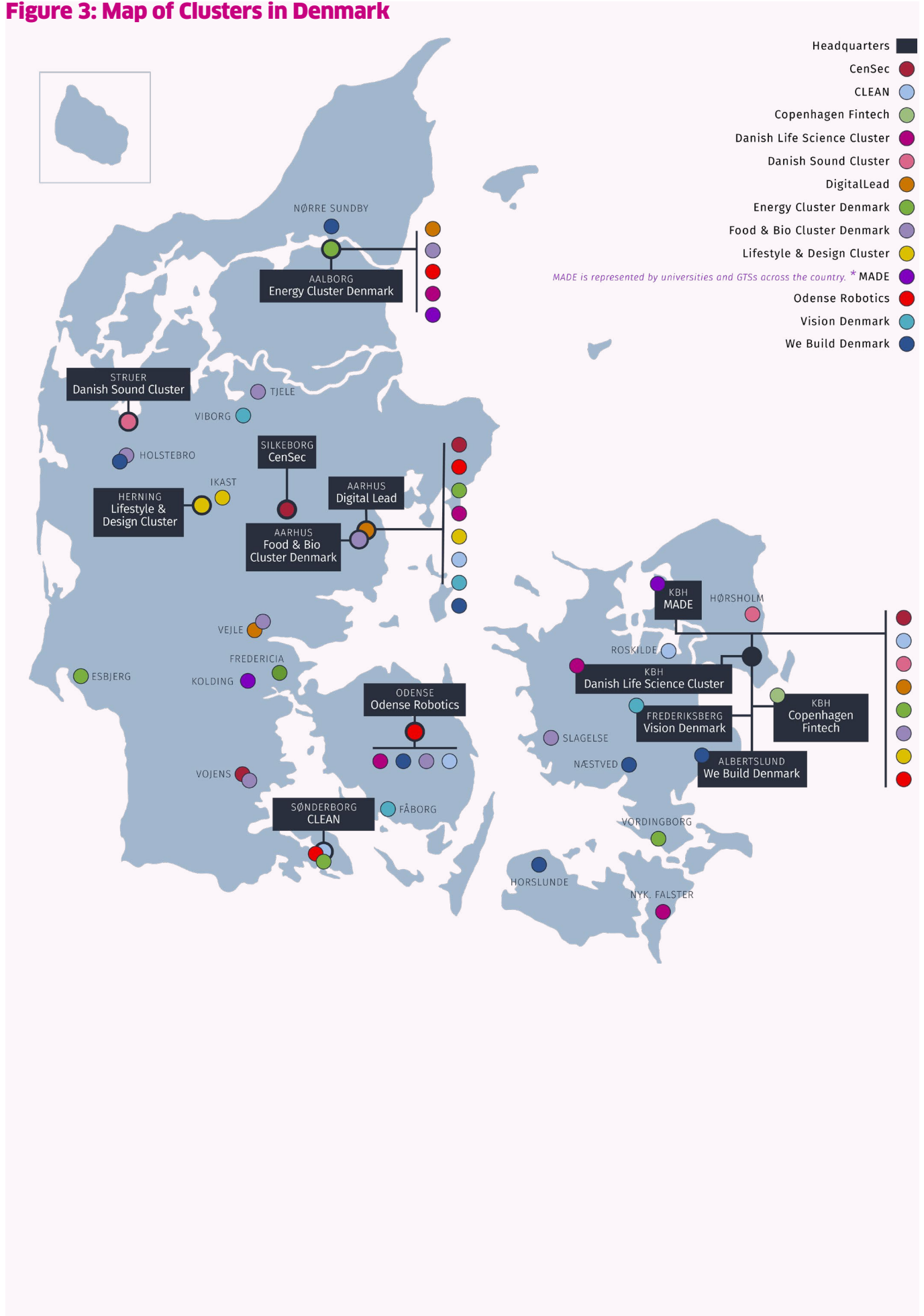
The cluster support programme is jointly owned by Innovation Norway, government enterprise agency SIVA and the Research Council of Norway, who manage on behalf of the Ministry of Trade, Industry and Fisheries and the Ministry of Local Government and Modernisation.

Denmark - A Hub-and-Spoke Model for National Clusters of Excellence

Denmark's national cluster network is built upon economically leading and emerging industry fields in which Denmark has particular world-leading expertise; environment, energy, maritime sector and life sciences.

A cross-country national coordinated effort, the Cluster Excellence Denmark initiative aims to simplify the landscape for businesses and acknowledge regional expertise whilst bringing together research and business communities in a shared national ambition. The Network is made up of 14 'superclusters', each with central hubs and additional regional spokes spanning across Denmark.

Figure 3: Map of Clusters in Denmark



Case Study – High-Tech Dairy Processing in South-West Scotland

Home to over three quarters of Scotland's dairy herds, the South-West of Scotland has long since been at the forefront of dairy production research and innovation. Spearheaded by the Scotland's Rural College (SRUC)-led Dairy Research and Innovation Centre – at Crichton Royal Farm, Dumfries – the region also boasts many innovative dairy farmers and producers who are boosting the value of their industry and the region's economy while also pioneering significant improvements in both environmental sustainability and animal welfare.

Cementing the South as Scotland's 'go to' region for future investment in high-tech, sustainable and regenerative food production systems, are a number of nationally significant projects including the Digital Dairy Chain, which received £21 million from UK Research & Innovation's Strength in Places Fund, and the £8 million Dairy Nexus project, drawing on Scottish and UK Government funding secured as part of the unique Borderlands Inclusive Growth Deal.

Led by SRUC from its Barony campus near Dumfries, the five-year multi-party Digital Dairy Chain project will see SRUC and academic and industry partners focus on developing a fully integrated and traceable dairy supply chain, including the development of new high-value dairy products. Aligning with the ambitions of Scotland's National Strategy for Economic Transformation, the project is expected to create more than 600 jobs and generate £60 million a year of additional value to the economy of the region by attracting large dairy processors and supporting investment in additional industry-focused research and development.

The Dairy Nexus project is creating a state-of-the-art facility at Barony as a catalyst to drive innovation to decarbonise the dairy sector, accelerate productivity growth, enhance animal welfare, and to develop new products from dairy resources. The new space will provide a modern knowledge exchange with co-working facilities, state-of-the-art research and development infrastructure for innovation in biorefinery and milk technology, and a UK-first digital twin of a grass-based dairy farm – boosting investment and employment in the region.

Complementing these investments are wider collaborations including that with Scotland's 5G Centre – which has seen the deployment of a 5G rural 'field lab' across Crichton Royal Farm, supporting new and greater use of sensor technologies and data to optimise processes and add value at every stage.

As pressures grow to produce food products more efficiently, sustainably, in a way which enhance human health and biodiversity, the South of Scotland is better placed than ever to continue leading the way.



7. Innovation Investment

The Strategy's second programme of activity is focused on the investment and funding necessary to catalyse economic innovation.

The intention is to collaborate across the public and private sectors to design a system of innovation investment and support that is truly built around the needs Scotland's businesses, ensuring that the right type and level of support is available to help develop their capacity and capability to innovate, no matter what stage of the innovation journey they are on or what part of the country they are in.

'It was hugely important to pull together the thoughts and opinions of a wide range of both public and private sector contributors to the Innovation Strategy.'

'It was clear from this that a diversity of investment sources and close involvement of the private sector and close collaboration with the public sector was going to be crucial in delivering the resources required for a vibrant start up scene in Scotland.'

'It was also clear that successful organisations should develop an "investor mindset", in making the most of the financial and support resources being provided, in order to navigate and build the growth organisations of the future.'

Paul Atkinson,
Founder Par Equity

Strategic context

Public sector support for business innovation is provided by our enterprise and skills agencies – Scottish Enterprise (SE), Highlands and Islands Enterprise (HIE), South of Scotland Enterprise (SoSE), Skills Development Scotland (SDS) and via our colleges and universities by the Scottish Funding Council (SFC). Commercial and equity investment is provided through the Scottish Enterprise Growth Investments and the Scottish National Investment Bank (the Bank).

Support to help Scottish businesses navigate the landscape to access information, advice and funding is provided by the Business Support Partnership (BSP).

The innovation support landscape in Scotland is complex, including a network of seven sector-focused innovation centres, grants and wider non-financial support for innovation, accumulating to around 90 innovation initiatives across the Scottish Government and the enterprise and skills agencies. This rises to around 500 initiatives when including innovation funds run by other organisations, such as the UK Government, EU, local Government and the third sector.¹⁸

There is evidence to suggest that for female founders this investment landscape is even more difficult to navigate. The Scottish Government's Pathways: A New Approach to Women in Entrepreneurship report highlights that there has been a widening gap between female and male-led companies securing institutional investment over the past five years, with female owned teams raising lower sums of money at each funding stage, as well as there being a lack of diversity in the UK-wide investment community itself.

Recommendations from the Pathways Report and the Scottish Technology Ecosystem Review seek to redress this imbalance and facilitate an increase in investment support for female entrepreneurs through addressing particular barriers to women fully utilising their entrepreneurial capabilities.

Through this Innovation Strategy we will complement this work by seeking out ways to identify and ensure there is a growing number of female entrepreneurs operating our innovation priority areas, and that these entrepreneurs are highly visible to the ecosystem and are able to access the right investment support, at the right level and the right time."

Innovation Funding in Scotland 2019/20

Scottish Public Sector Innovation Funding

In 2019/20 Scottish Public Sector Funding for Innovation through our Enterprise Agencies totalled over **£430m**. It should be noted that this figure includes funding for higher education institutions which, while contributing towards innovation, has broader objectives.

In 2019/20 innovation funding through Scottish Enterprise totalled around **£114.8m**. Of this the largest proportions of spend were on commercial investments (**£76.2m**) and R&D grants (**£23.5m**).

HIE funding during this period totalled **£8.28m**, of this the majority (**£5.03m**) was on investment in infrastructure investment, including investments in buildings for R&D intensive businesses.

Of the **£310m** of SFC fund, the majority comprised their Research Excellence Grant (**£236m**) and Postgraduate Research Grant (**£35.3m**). This total also includes funding of **£15.85m** towards Scotland's Innovation Centres and **£13.5m** on the University Innovation Fund.

UK Innovation Funding

In 2019, Scotland received **£328m** in funding from UKRI, This figure includes **£49m** to organisations based in Scotland through Innovate UK and **£279m** through the seven disciplinary research councils

International Innovation Funding

During financial year 2019/20 Scottish organisations were awarded around **€100m** in funding through Horizon 2020, the EU's then research and innovation funding programme and the precursor to the ongoing Horizon Europe programme.

In relation to support of a financial nature, the following breakdown provides an overview of both Scottish and UK public sector funding towards innovation in Scotland for the financial year 2019/20.¹⁹ This pre-dates the establishment of both SoSE and the Bank.

We recognise that public sector funding of innovation-led businesses is only one of a number of diverse types of investment. While recent data shows the public sector remains the most frequent investor in Scotland, private equity and venture capital was the next most active investor type, participating in 85 Scottish deals in 2021, up 29% on 2020.²⁰

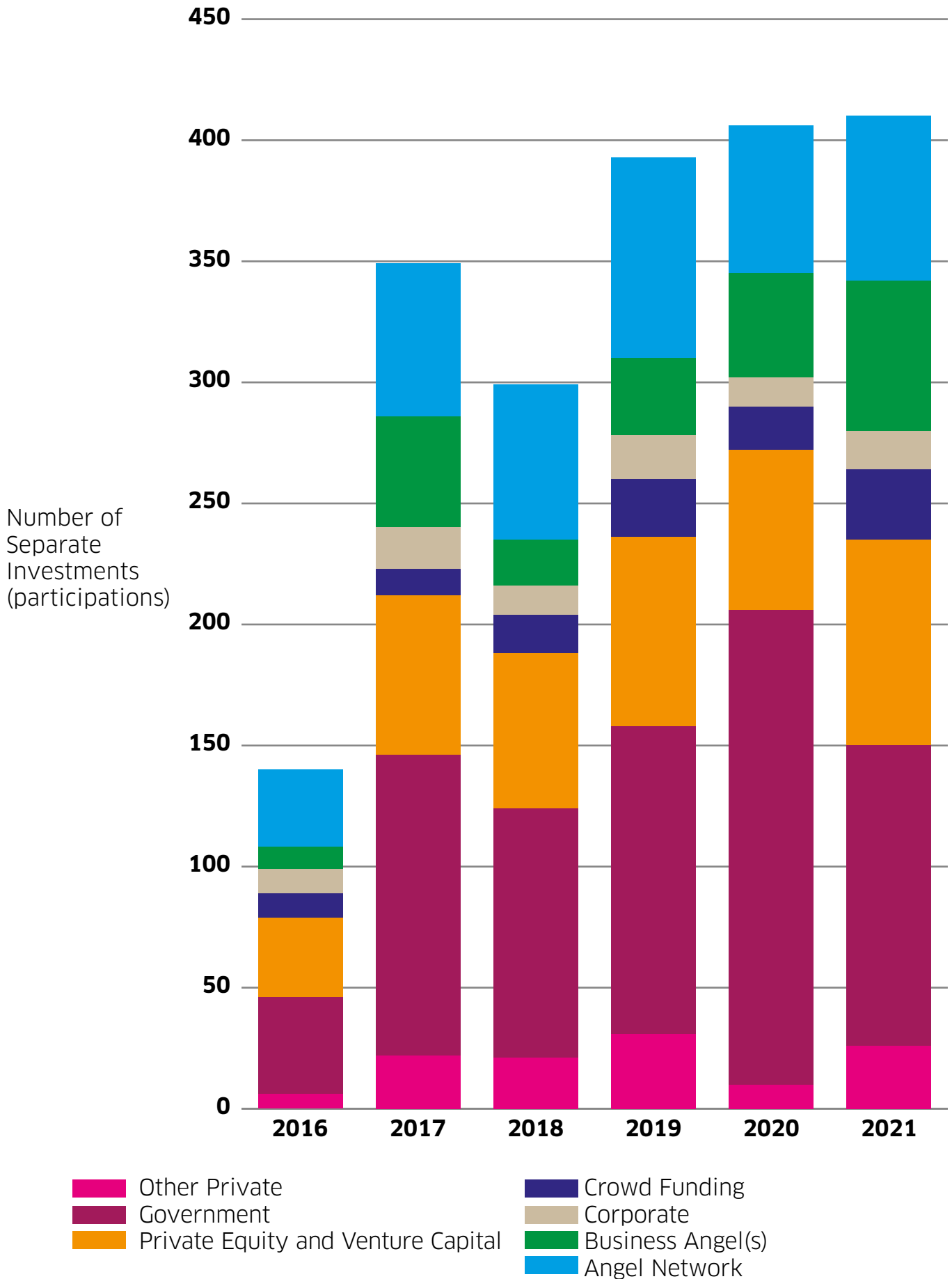
Scotland also stands out as having well-established business angel networks (also described as Business Angel Groups or Syndicates). Angel networks participated in 68 deals in 2021, an increase of 11% on the previous year.

19 2019/20 represents the most recent FY with minimal impact to funding steams from the COVID-19 pandemic. These figures pre-date the establishment of both SoSE and the Bank.

20 [Investing in Ambition. Scotland's Risk Capital Market in Context-2021 \(scottish-enterprise.com\)](https://www.scottish-enterprise.com/investing-in-ambition-scotland-s-risk-capital-market-in-context-2021)

Figure 4: Scotland's investor profile

Scotland Types of Investor, by Number of Separate Investments (participations). 2016 - 2021



Vision and Opportunity

It is our ambition that through renewing our approach to innovation investment and support, that over the next ten years we become a world leader in our priority areas, that we create jobs and opportunities throughout the country, leverage substantial levels of additional investment, contributing to our objective of making Scotland one of the most innovative small nations in the world.

We will recognise the importance of international collaboration and explore new ways to connect our innovation activities internationally, recognising the vital role international funding has played in developing Scotland's innovation system and aligning with the ambitions of Scotland's Global Capital Investment Plan.

This Strategy will improve and enhance the role of Scotland's public sector in driving and enabling innovation. By making our public sector an anchor customer for innovation we can enable and require the public sector to work together to support growth in our priority areas, support innovation more widely across the economy and to become more innovative in our own approaches.

We will place our priority areas at the heart of approach, ensuring that over time they are given the appropriate levels of support and investment to enable them to become world-leading. This will require a greater level of focus and ambition.

Actions

4. We will undertake an Innovation Funding Review to be completed by the end of 2023.

It is clear that a substantial number of small innovation funds have been established over time, many of which are trying to achieve common objectives. Through extensive engagement with the business community, as well as stakeholders from across the innovation ecosystem, it is apparent that the current system could be joined up more effectively to maximise the impact of the available funding.

In partnership with our Enterprise Agencies, local government and other public sector bodies we will therefore review public sector funding and the impact it is having, building on the mapping work previously undertaken by the Enterprise and Skills Strategic Board.

The review will focus on increasing alignment of funds, reducing unnecessary duplication and, over time, closing any gaps in the funding landscape. We will take a place-based approach to reviewing the landscape, considering the impact of across the whole of Scotland including its rural communities.

5. We will announce a renewed and consolidated Innovation Investment Programme in early 2024.

This renewed package of support will be aligned to our innovation priorities, ensuring that they are given the appropriate levels of support and investment to enable them to become world-leading. It will establish common service standards, metrics and monitoring activity for businesses engaging with Scotland's Innovation Support services. This will ensure all parts of our innovation system

provide a quality service, and fostering collaborative working and knowledge exchange across all areas of Scotland's innovation ecosystem.

We will include clear aims around leveraging additional investment, including working with international partners, supporting our ambitions of a world-leading innovation nation, and foster the creation of jobs and opportunities across the whole country.

Current levels of funding against our priorities are not known due to a lack of standardisation in metrics and monitoring across the funding landscape. The common service standards will ensure that we are able to accurately measure and monitor our levels of investment in these areas going forward.

Our Innovation Investment Programme will include consideration of ring-fencing a proportion of our innovation funding to be invested in the priority clusters identified in this strategy. We will work collaboratively with industry, academia and other parties including the UK Government and its agencies to maximise match-funding opportunities and through our agencies we will facilitate partnerships between industry and academia to collaborate on the big challenges within these priority areas.

As part of this Programme we will seek to take a more a coordinated approach to increasing Scotland's share of UK and EU innovation funds. This includes Innovate UK's funding of £2.4 billion over the next three years with a focus on place-based innovation, and Horizon Europe, the EU's fund of €95.5 billion or more fund for research and innovation which runs until 2027.

We will monitor and report on the impact of the Innovation Investment Programme on an annual basis as part of the Innovation Scorecard.

The Scottish public sector has an opportunity and an obligation to be one of the main customers for Scotland's most innovative businesses. There are a number of areas including the built environment and health where the Scottish state is the biggest customer and that provides an opportunity to drive new markets and encourage innovation.

We will work across the public sector to look at how we can move to an outcomes and value based approach to procurement, ensuring wider issues such as carbon footprint and impact on net zero are given due consideration. We will look at how we can scale successful assets such as CivTech and adopt these methodologies and frameworks more widely. We will look at how we can improve education and training tools for buyers and improve collaboration and knowledge exchange.

We will look at the public sector's levels of spend in our priority areas including how much of that funding is supporting Scotland's businesses and our supply chains. We will track this spend and set appropriate targets over the ten years of the Strategy.

We will work with our partners to develop a more progressive public sector procurement system which will help us create and maintain a world leading innovation ecosystem.

6. We will work with the Bank, SE Growth Investments and other key partners across the public and private sectors to explore the potential to create new and innovative models of investment to support Scottish businesses and clusters to innovate. This includes more traditional SMEs and the broader concept of productive finance (defined as investment that expands and advances growth and productivity e.g. infrastructure, R&D or new equipment).

It is clear from our engagement with businesses that there is a need for greater flexibility in the forms of investment and support available to Scottish firms to invest in innovation. This is especially true of traditional SMEs carrying pandemic-related debt, which limits their ability to secure new loans and where there is little culture or experience of sacrificing equity to raise capital for investment in innovation and growth. There is a need to think more creatively about how we support and capitalise these businesses, potentially through the creation of new and innovative financial instruments, and by the blending of existing tools such as grants and convertible loan notes. This is particularly important in the context of net zero transition where there is significant economic opportunity in supporting SMEs to invest in the innovation necessary to pivot towards supply chain opportunities in areas such as offshore wind.

We will seek to engage closely with private sector partners on this work. In particular, Scotland possesses genuinely world-class capability in the field of long-term asset management; often managing precisely the pools of capital that are best suited to patient investment vehicles of the kind noted. The Scottish industry is therefore ideally placed both to shape and benefit from such initiatives.

The details of this work will be announced as part of the renewed and consolidated Innovation Investment Programme in early 2024.

Case Study – Blue Innovation in the Highlands and Islands

Innovation is central to the future success of Scotland's economy – and just as important to rural areas as it is to our towns and cities. Highlands and Islands Enterprise (HIE) supports business and community growth across a diverse and beautiful region that covers half of the country, yet is home to less than a tenth of the country's population.

HIE's investment and strategic input over six decades have helped grow nationally-significant sectors such as tourism, food and drink and creative industries. At the same time, it has placed the region at the forefront of advances in areas where technological innovation is fundamental, including renewable energy, life sciences and, most recently, the space industry. In each case, the natural capital of land and marine assets has provided opportunities for business investment and growth, creating high-value employment and training opportunities and attracting more people to live, work, study, invest and visit.

A priority area is the blue economy, with Scotland's seas seven times larger than the land area and marine sectors with significant up-scaling and rapid growth potential. The breadth of expertise, weather and oceanographic conditions of the Highlands and Islands combine to offer a unique innovation environment for the development and sustainable growth of sectors as wide-ranging as aquaculture, biotechnology, offshore wind and wave energy.

Marine industries such as these have made a significant contribution to rural and island communities and to Scotland's economy for many years and will continue to do so in future. In Shetland, for example, they accounted for an impressive 19% of the total GVA and 17% of employment. And their significance goes beyond business growth, with marine natural capital providing adaptation opportunities in the face of climate change and creating prosperity and resilience in rural communities.

The Scottish Government also recognises the importance of this area through its [Blue Economy Vision](#) and approach, emphasising that innovation, investment in Scottish supply chains, sustainability and international trade will help harness opportunities for the marine sectors.

New technologies and scientific knowledge are critical to inform innovation in the blue economy. Two partners within the University of the Highlands and Islands – the Scottish Association for Marine Science (SAMS) and UHI Shetland – have deployed an innovative device called an imaging flow cytobot (IFCB) in Shetland waters. The first of their type in the UK, the cytobots detect and analyse phytoplankton – microscopic organisms that play an essential role in marine ecosystems.

The instruments were funded through £185,000 from HIE, the Scottish Government's Islands Green Recovery Programme, and £234,000 from the Natural Environment Research Council.

Hailed as a game changer by academics, the IFCB uses novel imaging technology and artificial intelligence to gather and live-stream data on plankton communities that reveals water quality and the overall health of the marine environment. Crucially, this provides an early warning system for the aquaculture industry, allowing proactive husbandry measures to protect stock from naturally occurring harmful algal blooms. It is expected that the datasets will help inform models on the impact of climate change and could inform mitigation adaptive actions.

Aquaculture is a prime example of a blue economy sector where there is increasing innovation activity that encompasses a range of expertise, such as in digital and data, engineering and biotechnology. Investment in innovations such as the IFCB demonstrates HIE's continuing support for new ways to inform future and sustainable growth across all sectors of our economy.

Case Study – Roslin Cell Therapies

The University of Edinburgh has an ambition to help Scotland evolve into a thriving deep-tech ecosystem, supporting innovative companies working on solutions to society's biggest problems. Last year, the University directly invested in 25+ early-stage ventures and total investment into companies connected to the University doubled to over £100 million.

Roslin Cell Therapies Limited ('Roslin CT'), is one example of such a venture. Founded in 2006 as a spin-out from the Roslin Institute, it specialises in advancing regenerative medicine through high-quality cell therapy development and manufacturing. Such therapies are already providing life-changing opportunities to treat cancer, genetic disorders, and other diseases. The company was supported in its early development by Scottish Enterprise, the Roslin Foundation and the University of Edinburgh, with its initial manufacturing based in the University's Centre for Regenerative Medicine. Led for many years by CEO Janet Downie, the company grew into a globally recognised player in cell therapy manufacturing, partnering with an international customer base of blue-chip Pharma and Biotech companies and employing over 100 staff in Edinburgh.

In December 2021, following a period of sustained growth, Roslin CT received investment from private equity fund, Global Healthcare Opportunities Capital ('GHO'). The deal (in excess of \$100 million) provided the company with the resources to expand its activity from an enlarged base in Edinburgh, providing further high-tech job opportunities for graduates and experienced hires. The transaction also provided the University (and the other partners) with substantial proceeds from their shareholdings which will be reinvested in other university-linked opportunities.



ENTREPRENEUR

/En-tre-pre-neur/ n.

Change maker, collaborator,
creator, dreamer, free thinker,
innovator, opportunity maker.

8. Innovation-Led Entrepreneurship And Commercialisation

'It is vital that we ensure the outputs of Scotland's world-leading innovation have a clear pathway to market. Through successful commercialisation of the end-products our innovation, return on innovation investment can be maximised and the potential benefits to society of that innovation achieved, both nationally and at a global level.'

Deborah O'Neil,
Founder and CEO
NovaBiotics

'Pre-seed funding is just one of many challenges that need to be tackled to help our ecosystem achieve its full potential. In order to scale, we will also need wider access to scale-up capital; mechanisms to train, attract and retain specialist talent; more incubation space (particularly laboratories); and better representation of women and other under-represented groups in our founding teams and boards. We, alongside partners across the ecosystem, are working on these challenges, but we need continued support and re-investment. Thankfully, our experience of the creativity, expertise, and energy of our founders, leaves us in little doubt about the potential rewards of doing so.'

Professor Sir Peter Mathieson,
Principal and Vice-Chancellor,
University of Edinburgh

Introduction

When viewed through the lens of economic value, innovation and entrepreneurship are in many respects two sides of the same coin. The economic and social benefits of innovation can be realised only where there exists a practical means of achieving scaled, real-world application. In this chapter we explore how we can optimise perhaps the most powerful means we have at our disposal to achieve that goal: establishing Scotland's higher education sector as a hotbed for the creation and scaling of innovation-led businesses.

Despite encouraging progress in recent years, this is an ambition that has so far proved elusive to Scotland. But, as we shall see, many similarly profiled European countries appear to have cracked this problem, with higher education institutions and their alumni consistently converting cutting edge technologies into scaling companies; applying innovation to seed the creation of new markets and supporting existing industry to exploit new technologies as a means of refining product development and increasing productivity. It is essential that we learn from the strategies implemented by these economies, with the goal of replicating and then exceeding their success.

Current performance

Scotland's research and development capability is world class, with considerable expertise across a wide range of disciplines and sectors. At UK level, this has helped Scotland to perform reasonably well at translating research into spin-out companies. The Universities of Edinburgh, Glasgow and Strathclyde all appear in the UK top ten for the total number of spin-outs

created since 2011. The University of Dundee appears in the UK top five for its entrepreneurial impact. Of the 211 equity deals involving spin-outs across the UK during 2021, 44 (21% of the total) came from Scottish institutions the highest proportion of any region or devolved nation and underscoring the importance of Scottish Enterprise as an early stage investor. Over the last ten years, our institutions have also produced some of the UK's most significant spin-out exits and investment rounds, such as Exscientia (University of Dundee) and ENOUGH (University of Strathclyde).

This success is indicative of an encouraging movement that is building in Scotland's higher education sector. Increasingly we are seeing institutions prioritising both the commercialisation of research and the provision of enhanced support for broader entrepreneurial activity in the form of staff and student-led start-ups. Similarly, following publication of the Cumberland/Little Report, many of Scotland's colleges are beginning to interpret their role in innovation more expansively, with several developing more ambitious and sophisticated programmes to catalyse entrepreneurialism amongst staff and students.

As well as carrying the potential to be a rich source of financial revenue and reputational capital for Scottish higher education, this movement can also be seen as responsive to a shifting culture in which post-pandemic learners no longer view institutions purely as a means of acquiring a degree, but as prominent entrepreneurial ecosystems in their own right: places where they can meet co-founders, experiment with cutting edge technologies, learn best-in-class start-up technique and ultimately create the innovation-led businesses necessary to drive Scotland's economic future.

While this progress is welcome, it is crucial that we continue to accelerate momentum. To achieve that it is important to guard against complacency and examine Scotland's performance in a global context. As Figure 10 below demonstrates, Scotland produces 50% less spin-outs than the rest of the UK relative to the percentage of HEI research funding, with consequent impacts on the quantum of investment capital raised by Scottish businesses. While it is difficult to source reliable data comparing Scotland's performance on spin-outs with other European nations, it is plainly observable that the exceptional individual cases noted above could reasonably be described as outlier successes rather than as products of an entrepreneurial campus system that can be relied upon to consistently generate high growth innovation-led businesses.

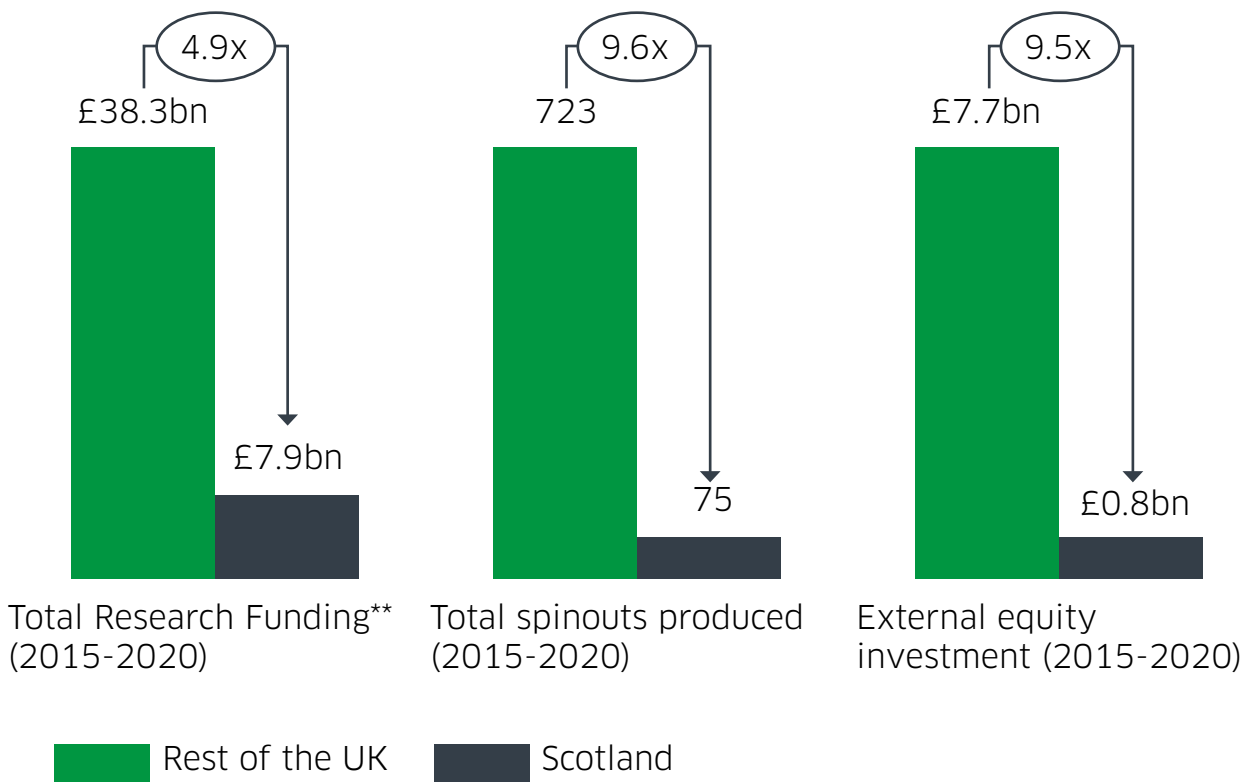
Whilst Scotland can evidence world class research and development capability, the Royal Academy of Engineering's 2022 Spotlight on Spinouts report highlights that only 12% of university spinouts that successfully secure funding include female founders, with only 4% boasting all-female founders (compared to 75% for all male founders). This is an issue of fairness but also an opportunity cost for the country - we are missing out on the economic and wellbeing benefits of a larger and more diverse innovation base.

That is why our future work on optimising the commercialisation of research and the production of spinouts will have a strong focus on increasing the visibility of our institutions' female founders, facilitating diversity of opportunity and of thought.

Figure 5: Scotland's Spin-out Production

Ineffective translation of academic and public-funded R&D into the business population is also reflected in HESA spin-out data.

Scotland's efficiency in producing spin-outs* from research is **roughly 50% lower** than the rest of the UK, and this translates to the quantity of capital the spin-outs raise.



It is also important to acknowledge that the contribution of higher education institutions to a vibrant start-up nation does not end at the production of spin-outs. Staff, student and alumni led start-ups are an equally crucial component of success and in this domain international comparisons are clear. The University of Stockholm, for example, has produced ten companies valued at more than \$1 billion, with a further 13 scale-ups identified as having 'unicorn' potential over the next 5-10 years.

Elsewhere, each year PitchBook publishes global rankings that compare universities by examining the number of graduate and undergraduate alumni who have founded venture capital-backed companies, based on an analysis of more than 144,000 founders. The latest rankings show that undergraduate alumni from the University of Lund have created 182 companies raising a total of \$3.4 billion, with University College Dublin alumni producing 170 companies that raised a combined \$2.4 billion. The postgraduate rankings reveal a similarly strong performance from European institutions with e.g. Esade Barcelona alumni founding 185 companies that have raised a total of \$6.9 billion. It is notable that only one Scottish institution, the University of Edinburgh, appears in either list, ranking at 62 in the postgraduate rankings.

We have an opportunity to improve significantly on this position. Many of the commercialisation support programmes of the Scottish Government and its agencies, the UK Government and Innovate UK operate independently, risking gaps, duplication and missed opportunities for collaboration. We also face challenges in catalysing activity at the scale required, and at an appropriate level of concentration, to deliver the optimal benefits for our economy. There is good collaboration in the university sector, but the underpinning capacity

required for truly transformative initiatives is often limited. Our success in a limited number of cases may be masking underlying weaknesses in our approach while other nations are extending a lead.

Addressing these issues will involve taking a systems view of Scotland's capacity and potential to translate our excellent research into commercial value – whether through the creation of a successful spin-out company, the licensing of a new technology, or the development of university-business partnerships that advance knowledge and enhance prosperity. All of these routes carry significant economic potential and it is incumbent on all relevant partners to ensure that each is functioning as effectively as possible.

This performance is reflective of the analysis of Scotland's broader entrepreneurial landscape outlined in both the Scottish Technology Ecosystem Review (STER) and NSET. In STER, the Chief Entrepreneur argues that entrepreneurial ecosystems exist in one of two states. The preferred state is where the ecosystem has passed through a 'tipping-point' in its development, defined as the point at which it hosts a critical mass of viable start-ups and scale-ups. At this point, it is argued, virtuous network effects begin to operate spontaneously, making the ecosystem anti-fragile, continually strengthening without requirement for state intervention. Examples of these effects include:

- **Recycling of executive and technical talent from successful later-stage companies into a critical mass of viable early stage companies; significantly improving the experience level in those businesses and increasing the likelihood of them being successful. These businesses in turn recycle others into the**

ecosystem. In short, success begets experience and experience begets success.

- External talent is attracted into the ecosystem. This leads to the creation of more start-ups and more successful ones at that. This in turn attracts more talent and a virtuous cycle again establishes itself.
- Investment firms start to pay greater attention to the ecosystem and spend more time within it. This brings more capital and expertise into the ecosystem, which leads to more and stronger businesses, again attracting more investors, entrepreneurs and talent.

STER argues that while Scotland's entrepreneurial ecosystem has never been stronger, it remains in a pre-tipping point state. That is to say, it does not consistently produce a stream of start-ups that reach sustained profitability, including a significant proportion that do so at scale; with consequent economic benefits through the creation of high value jobs, increased tax revenues and extending our country's tradition and legacy of economic innovation.

It seems reasonable to conclude that the same is true of the entrepreneurial performance of our higher education system, indeed this is logical since each is part of the broader whole.

Actions

This analysis is not intended to be gloomy. On the contrary, our higher education sector is the envy of the world and the gap between current and potential performance is undoubtedly one of our greatest economic opportunities. If we succeed in concentrating this capability on innovation-led entrepreneurship, then the potential scale of the consequent economic benefits are profound.

In this final section we explore the interventions necessary to translate potential into performance. In doing so, we will proceed in full recognition that it will not be sufficient to simply mimic international best practice in a Scottish context. Each of the international successes cited in this chapter are the product of those institutions' unique heritage and evolutionary path. Scotland's institutions are rightly proud of their own cultures and traditions, which have seen become globally renowned for research and teaching excellence. We will therefore identify common attributes of world-class entrepreneurial systems and will seek to work with the sector to apply them flexibly in a Scottish context.

7. We will design a new Research Commercialisation Framework for Scotland.

This Framework will set out the principles and interventions that will drive progress on research commercialisation learning, where appropriate, from international best practice. Through developing the Framework, we will establish a specific and coherent package of support for commercialisation, addressing gaps in evidence, coordination and, over the lifetime of the strategy, funding. Linked to our innovation funding review, and other initiatives such as UKRI's work on

commercialisation, this framework will help Scotland to:

- develop and embed the entrepreneurial skills, capabilities, culture and mindset necessary to commercialise research.
- promote good practice in the exploitation of university IP – from licensing arrangements through to spin-out support and ownership terms.
- build effective and impactful collaborations between researchers and businesses.
- secure the full range of economic and societal benefits that can flow from commercialised research – including research in the arts, humanities and social sciences, and work undertaken by research institutes.
- widen the opportunities for people from diverse and underrepresented backgrounds and communities to participate in commercialisation.

The Scottish Government will work closely with the higher education sector and the Scottish Funding Council to develop this Framework, also working across enterprise agencies, colleges and with universities and businesses over the course of the next 12 months.

Alongside government action, it is crucial that all players in the system are connecting and exchanging good practice, guidance and evidence. Universities Scotland's Research Commercialisation Directors' Group (RCDG) will continue to play an important role in driving progress in this area here, and we will work closely with the RCDG to develop our detailed proposals for research commercialisation. This will include exploring options for developing consistent approaches to, and guidance for, handling the intellectual property that arises from both publicly funded

research and inward investment, as set out in our Inward Investment Plan.

8. We will publish a comprehensive plan to establish the Scottish higher education system as a world-class hotbed of start-up creation and scaling.

In line with the analysis in this chapter, both STER and NSET highlight the economic importance of world-class 'entrepreneurial campuses'. To that end, the office of the Chief Entrepreneur has commissioned Professor Joe Little and serial start-up founder Ross Tuffee to produce a detailed, systematic plan aimed at raising Scotland's performance to a world-class level. This work, informed by a deep understanding of international best practice and collaboration with Scottish institutions is almost complete and will be published in the coming weeks. While it is important not to overly pre-empt its findings while they are being finalised, the report is rich in solutions proposing a series of interventions focused on key attributes found in the world's best systems. These include:

- the importance of senior leadership which inspires and drives an entrepreneurial agenda, underpinned by appropriate KPIs.
- a credit-bearing curriculum which delivers a high-quality entrepreneurial education across all faculties, including degree programmes focused on business creation and scaling.
- the availability of high-quality, scaled incubation spaces on campuses, providing access to world-leading extra-curricular support and, where appropriate, access to early-stage seed funding.

- deep integration of the entrepreneurial campus system with Scotland's broader innovation infrastructure such as the Techscaler network, innovation centres, the Net Zero Technology Centre and the National Manufacturing Institute for Scotland.
- a detailed examination of the more complex needs of spin-outs, including reforms of institutional approaches to technology transfer; equity retention, governance, revenue royalties and business acumen.

9. In line with our ambition to realise increased economic value from research and development, we will work with the higher education system and the Scottish Funding Council to evaluate the sufficiency of Scotland's current investment in applied research, knowledge exchange and broader research projects, aligned to the innovation priorities identified in this document, where they possess significant potential for commercial application.

10. We will work closely with universities to design and develop a £100 million Scottish Innovation Fund to invest in early stage start-ups focused on deep science and other emerging technology areas - an ambition that underpins and reinforces the success of the broader interventions proposed throughout this document.

Case Study – Glasgow Riverside Innovation District (GRID)

'Glasgow Riverside Innovation District (GRID) Discovery' is Scotland's first whole-system innovation demonstrator. The objective is simple – to deliver high-impact innovation that can be tested in the real-world, evaluated and scaled up to the benefit of Scotland.

Real-world testbeds offer six key benefits. They:

- **strengthen collaboration between public bodies, academia, industry and community.**
- **attract inward investment in similar and complementary technologies.**
- **improve delivery and efficiency of public services, and shapes policy and regulation.**
- **maximise the value of research activity, particularly at local level.**
- **reduce risk for participants, and provides space to iterate and fail.**
- **place the community at the centre, and promotes solutions that are specific to need.**

The discovery initiative will be led by the University of Glasgow through a £12 million investment over the next four years, as part of its commitment to stimulate innovation activity and entrepreneurship. In collaboration with Glasgow City Region and Scottish Enterprise, a testbed approach embedded within the Glasgow Riverside Innovation District will draw on the breadth of the University of Glasgow's research excellence, global reach, strong civic mission and partnership approach to catalyse impactful innovative activity, at pace.

By identifying collaborative research and innovation projects from across the University, and bringing together key stakeholders including our communities, partners will work together to remove barriers and ensure that the benefits of innovation impact positively on our place, society and deliver sustainable growth for Scotland's economy. The activity and investment enabled from the testbed will be additive, leveraging further investment and supporting new start-ups, spin-offs and market opportunities. Learning and evaluation on successes and failures will be fundamental to the design of GRID Discovery, enabling the development of an evidence base around the enablers and barriers to help shape policy and regulation.

The Glasgow Riverside Innovation District Discovery projects will look to complement and support existing initiatives that already exist within Scotland, such as the Scottish Government Accelerated National Innovation Adoption (ANIA) programme, Innovation Centres and through close alignment with the broader Glasgow City Regional Innovation Action Plan. It will build on the Levelling Up Innovation Accelerator pilots which will bring a further additional £37.1 million into the innovation district over the next two years.

Case Study – Energy Transition Zone, Aberdeen

Evolving from a fifty-year legacy of a world-class oil and gas industry, the North East of Scotland is home to a wealth of talent, experience and infrastructure that presents an unrivalled opportunity for renewable energy activity. Containing the most significant concentration of energy supply chain companies in the UK, Scotland's North East is fast becoming one of the most attractive locations in Europe for development, commercialisation and investment in low carbon and net zero technologies.

At the heart of this dynamic and collaborative energy cluster is the Energy Transition Zone (ETZ). A private sector-led, not-for-profit company, the ETZ is tasked with spearheading the North East of Scotland's energy transition ambition to position the region as a globally recognised energy cluster focused on the delivery of net zero. The ETZ builds upon the region's legacy as the oil and gas capital of Europe and aims to cement the North East of Scotland's position as the net zero capital of Europe.

The ETZ comprises a 120-hectare site adjacent to the brand new £400 million Aberdeen South harbour, the largest marine port development in the UK. This includes revitalised brownfield accommodation alongside a new release of greenfield development sites which will be developed using a whole-life carbon approach to property and business.

A comprehensive investment programme is underway to deliver market-ready properties and development sites for high-value manufacturing and the wider energy transition supply chain including a Marine Gateway and the creation of specialist campuses for Offshore Wind, Hydrogen, Innovation, and Skills. The Energy Transition Zone will establish a supportive innovation ecosystem that is second to none, helping businesses grow and flourish.

Each campus will have an anchor project which will catalyse further investment.

- **Energy Incubator and Scale-Up Hub (EISH)** in the Innovation Campus, has secured funding from BP (£1.25m) and Scottish Enterprise (£2m), and will provide around 3,000m² of flexible industrial and collaboration space to foster supply chain community building, high-value manufacturing and research and development alongside targeted business support to drive entrepreneurship and growth.
- The world's first National Offshore Wind Innovation Centre, developed in collaboration with ORE Catapult and located in the Wind Campus, will have with test and demonstration infrastructure to deliver the accelerated commercialisation of floating offshore wind, a sector in which the North East of Scotland can become global leaders. Core funding for activities is funded from industry partners, which is being used to leverage additional funding from other sources to maximise its impact.

Having once played a leading role in the global energy transition to oil and gas, Scotland's North East is now harnessing its legacy and experience to once again take the lead in the transition toward net zero.



9. The Adoption And Diffusion Of Innovation

The Strategy's fourth and final programme of activity is focused on the adoption of innovation across the economy and how this can help improve productivity across the country. This chapter will set out the context for where we are now, the vision for where we want to be and the actions which will help us achieve that vision over the next ten years.

'Typically, we think of "Research and Development" (R&D) as a rhyming couplet. In the UK's case, the R and the D do not seem to rhyme. The UK does R well, as a world-leading innovation hub. But it does D poorly, where the D refers not just to development but the diffusion and dissemination of innovation to the long, lengthening, languishing lower tail. When it comes to innovation, the UK is a hub without spokes.'

Andy Haldane,

Chief Executive of the Royal Academy of Arts and former chief economist of the Bank of England

For Scotland to benefit from being a world-leading innovation nation, then every business or organisation – wherever it is – should have the opportunity to adopt innovation. Innovation should be accessible to everyone, not just those businesses working at the cutting edge.

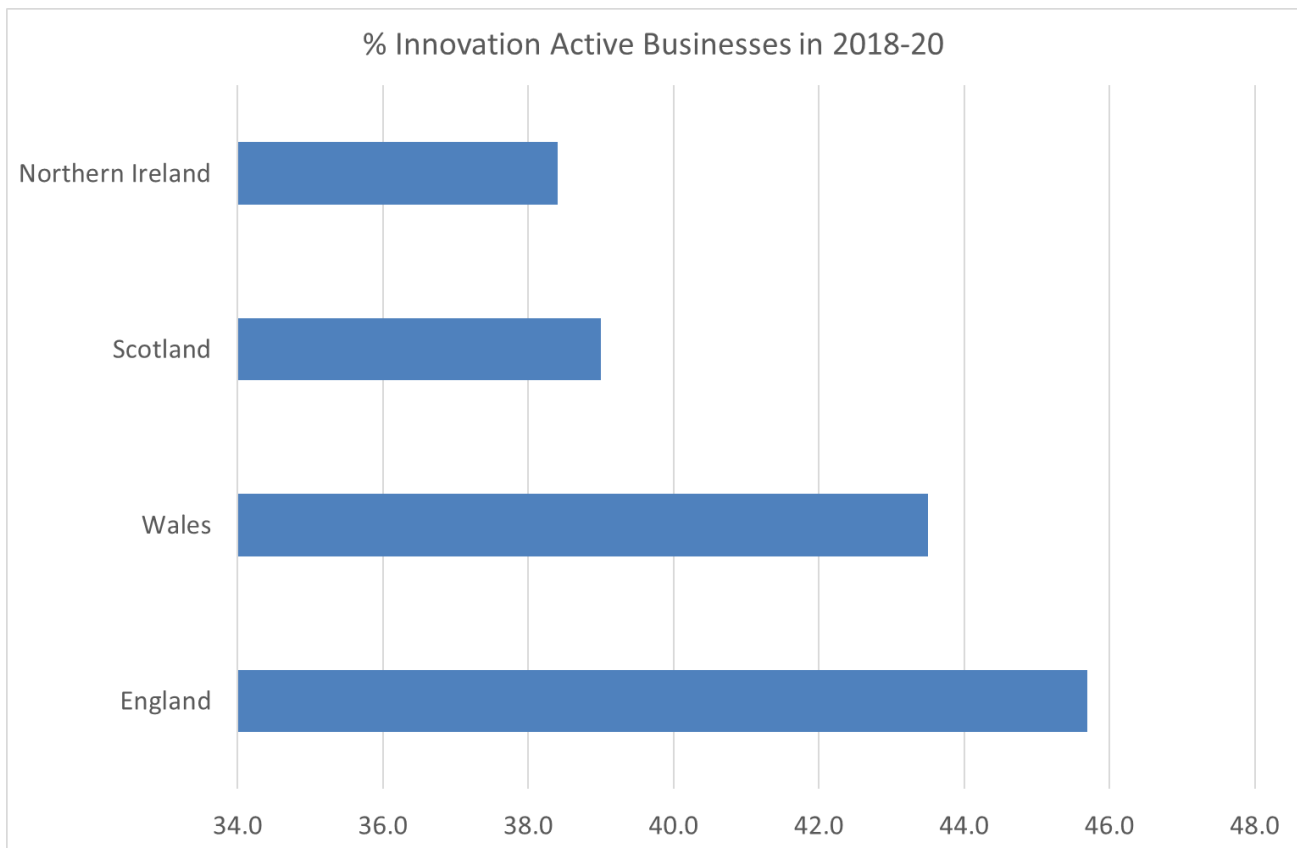
'Effective diffusion of innovation is an essential part of any highly innovative economy. Not only does it ensure that business, large and small, are taking advantage of the latest technology to improve their products, systems and customer proposition, it also provides the means to support upstream innovation continuing a virtuous cycle of pushing on frontiers and making that new knowledge and insight more widely available.'

John Fingleton,
Entrepreneur

Strategic Context

Scotland has fewer 'innovation-active' businesses (see footnote 9) than most other parts of the UK (Figure 6), although this percentage has risen over the past decade.²¹

Figure 6: % Innovation-Active Businesses



Source: UK Innovation Survey, 2021

On all measures of innovation activity Scotland remains below the UK average. Businesses in the 'research and experimental development in social sciences and humanities' sector were the most likely to be innovation-active in Scotland (70.2%) and the UK (66.5%), whilst businesses in the 'accommodation and food services,' 'renting of machinery equipment and personal and household goods' and 'construction' sectors were the least likely to be innovation-active.²²

²¹ [UK Innovation Survey 2021: Statistical Annex](#), table 1, row 17

²² UK Innovation Strategy, 2020, quoted in Scotland's Innovation Strategy: Call for Evidence: Economic Evidence Paper, Scottish Government, 2022.

Table 1: Types of innovation activity in Scotland²³
Percentage of businesses investing in each type of activity, 2018 to 2020

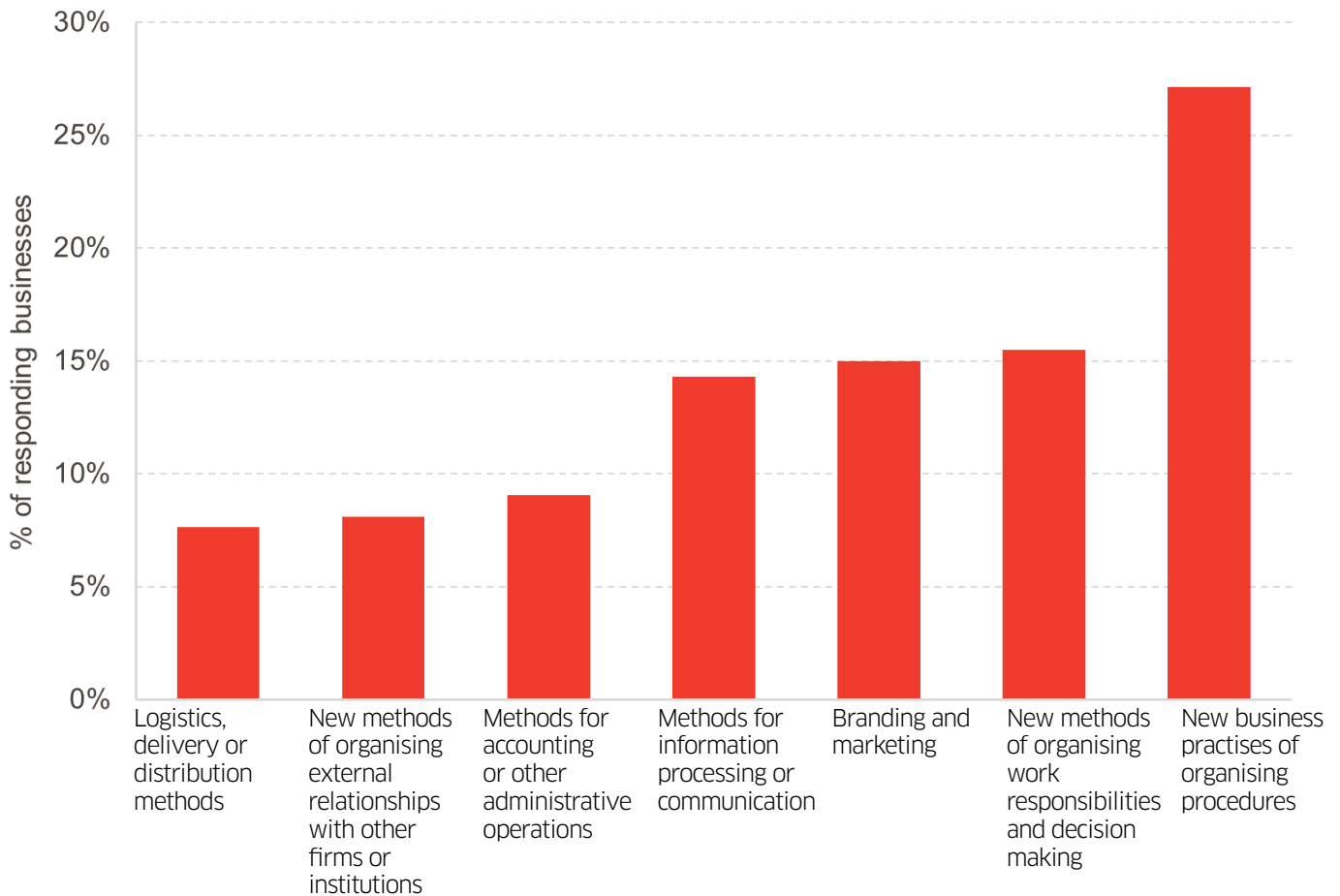
	Scotland	UK
Internal R&D	11.9	16
Acquisition of external R&D	4.3	5.3
Total machinery and equipment, computer hardware or software	31.4	34.4
Machinery and equipment	14.3	15.7
Computer hardware	20.2	23.2
Computer software	21.4	23.9
Acquisition of existing knowledge	2.9	4.3
Training for innovative activities	11.9	13.7
Any form of design activity	12.2	13.8
Total market introduction of innovation including i) Changes to product or service design, ii) Market research, iii) Changes to marketing methods	8.3	10.7
Changes to product or service design	4.5	5.7
Market research	2.3	3.3
Changes to marketing methods	4.7	6.1
Launch advertising	4.4	6.1

The 39% of Scottish businesses innovating cooperate with a range of partners, mostly with suppliers and private sector clients. Businesses in Scotland were also more likely to cooperate with higher education institutions and public research institutions than other parts of the UK.²⁴

²³ [UK Innovation Survey 2021: Statistical Annex](#), table 2, row 17.

²⁴ [UK Innovation Survey 2021: Statistical Annex](#) table 8c, rows 7 and 17.

Figure 7: In what areas does your business plan to make major changes for the purpose of innovation



Source: Scottish Business Monitor Q2 2022, Fraser of Allander Institute

This data aligns to more recent survey evidence from the Fraser of Allander Institute which confirms that one in every three businesses in Scotland are currently planning to make major changes for the purpose of innovation in the coming 12 months, whilst 60% were not (up slightly from Q1).²⁵

There is a clear link between the majority of our businesses not adopting innovative technologies and the resulting impact on productivity on Scotland's economy.

'If Scotland's productivity matched that of the OECD top quartile, average annual wages would be almost 10% higher.'²⁶

In its report 'Digital Dividend',²⁷ the OECD notes that the polarisation between businesses that adopt new technologies and those that don't has far-reaching implications for economic growth and inclusion. Sluggish productivity means limited economic growth, poor wage growth, depressed tax revenues and increasing income inequalities.

Without intervention this polarisation of the economy is projected to get worse. If SMEs are not able to adopt simple and relatively cheap technologies (such as cloud computing), there is little prospect of them having the capital, strategic capacity or skills necessary to invest in far more powerful and sophisticated

²⁵ [Fraser of Allander Scottish Business Monitor Q1, 2022.](#)

²⁶ [High Growth Firms | Nesta.](#)

²⁷ [Digital Dividend: Policies to Harness the Productivity Potential of Digital Technologies | OECD Economic Policy Papers | OECD iLibrary \(oecd-ilibrary.org\).](#)

technologies such as AI, data analytics and 5G. In contrast, frontier firms concentrated in major cities will continue to invest, train staff and grow faster and more productive. The risk is this will substantially deepen regional and skill-based wage inequality, dampen job creation (especially high value jobs) and weaken the competitiveness of Scottish SMEs compared with European competitors who will benefit from the EU Commission's prioritisation of SME digitalisation, adoption and diffusion.

There is strong evidence (from comparator nations such as Norway and Denmark) that establishing mechanisms for peer-to-peer support and collaboration between businesses is especially effective at improving strategic management capacity, digital adoption and boosting productivity. Numerous OECD reports echo this evidence, highlighting the 'spillover effects' of firms learning and mirroring the practices of highly digitalised supply chain partners, customers and competitors.

Vision and Opportunity

Scotland has achieved improvements in innovation and productivity performance over recent years. But we need to do more if we are to become a world-leading innovative nation. We need more businesses to innovate and make money from that investment, as the evidence highlights that those businesses are more resilient and successful. We need more of our businesses to invest in the adoption of technologies and capital equipment to drive improvements in productivity. We need to challenge and inspire business leaders to embed innovation as a culture across everything they do, responding to and embracing international opportunities.

If we do, we have enormous potential to increase the impact of innovation across the business community. Our aim is to unlock as much of this untapped innovation potential as possible. To do so we need more businesses innovating to - improve processes, develop new products or services, adopt new digital technologies, diversify into new markets, embrace automation, invest in skills, and adopt, fair work practices, and invest in plant and machinery to increase productivity.

Regional productivity gaps exist between urban and rural areas. Regions identifying and focusing on particular sectoral and place-based strengths and having effective support from government to do so will result in a narrowing of productivity gaps.

Evidence from the OECD illustrates that the highest productivity gains in Scotland over the last few years came from rural businesses innovating to make better use of resources. OECD's study on 'Unlocking Rural Innovation' highlights that in the midst of a global slowdown in productivity, unlocking the innovative potential of rural places is more important than ever.

With relatively high levels of social capital, and a diverse fabric of social innovation actors, Scotland has one of the most advanced ecosystems to support social innovation and social entrepreneurship in the world. This social capital is a supporting factor for social innovation, and has a positive impact on firms' labour productivity, especially across smaller, less productive and lower tech firms.²⁸ These are mutually reinforcing.

A business environment that is 'innovation-active' is one where supply chains and ecosystems will grow. It is an environment where businesses invest and investment flows in, and where jobs

28 [Firm-level productivity growth returns of social capital: Evidence from Western Europe - Ganau - Journal of Regional Science - Wiley Online Library](#)

and prosperity are sustained by highly productive businesses.

Approach

The approach we will take to supporting more of our businesses to become innovation-active will be twofold – diffusion and adoption.

This starts by diffusing the message that companies of all sizes can innovate, and that innovation is not solely about the invention of new technologies. Innovation also means the adaptation of existing technologies and the adoption of new ways of working to do things better and increase productivity.

We want more of the Scottish business base to be ready to innovate – whether that is to adopt new digital technology, to trial a new business process, to embark on a complex decarbonisation programme, or to engage with our world-leading academic research base. Achieving this will require collaboration and partnership across a wide range of stakeholders across Scotland. Taking a place-based approach, we will build significant momentum and buy-in over the ten-year period of this Strategy.

Actions

11. We will introduce an innovation themed National Productivity Programme.

The Productivity Programme will deliver, over the ten-year lifetime of the Strategy, an ambitious increase in the level of innovation taking place by businesses across the whole of Scotland. This will result in raised productivity, improved economic outcomes, and a more inclusive economy.

We will work with partners including our Enterprise Agencies, Business Gateway and Local Authorities to develop a

programme that diffuses the benefits of innovating for productivity gains. It will make full use of our Innovation Architecture to support more of our SMEs to innovate to increase their productivity.

Adoption activity within the productivity programme will comprise:

- supporting the capacity and capability of business leaders to adopt a culture of innovation and investment.
- supporting businesses' access funding (public and private) to increase the levels of innovation and capital investment leading to more widespread adoption of digital technologies, automation and energy efficient business processes, including investment in plant and machinery (where appropriate).
- identifying demand-led Open Innovation opportunities that connect businesses to customer challenges in the public and private sectors.
- exploring options to develop an 'Innovation Marketplace' as a platform that facilitates and connects companies looking for solutions to innovation challenges, to those that can potentially provide the solutions, including the provision of funding to encourage large corporates to source solutions from innovative Scottish SMEs who have the capacity and capability to develop and deliver solutions to challenges.
- assessing options for some form of 'Customer Platform' that allows companies to try new products or services developed by early-stage Scottish businesses on a 'try before you buy' basis as a means of gaining both customer traction and adoption and also feedback and validation, supporting ambitions to ensure that innovation and commercialisation are working in tandem.

- Skills Development Scotland working with our Enterprise Agencies and other partners to ensure we are investing in skills demanded by our prioritised sectors.

Diffusion activity within the productivity programme will comprise:

- telling our story of innovation more creatively by utilising multiple channels, demonstrating the diversity of innovations and innovators and using case studies that resonate with businesses of all sizes.
- utilising our innovation architecture to showcase how we are supporting businesses to innovate and become more productive.
- supporting businesses to de-risk and understand how to embed new processes, automations, technologies, and digital solutions to boost productivity.
- the delivery of innovation masterclasses to support clusters of companies to understand more fully the benefits of innovating and opportunities connected to the priorities set out in this Strategy.
- bringing supply chain companies together to share good practices and explore together the scope for productivity improvements.
- utilising SCDI Productivity Clubs to support peer-to-peer networking on key themes which help increase productivity.
- raising awareness of the benefits of fair work practices and the positive impacts on productivity.
- celebrating success through events/awards ensuring the full diversity of innovation is recognised and valued across Scotland.

We will link the Innovation Productivity Programme into the development of our Cluster Network, so that the wider

supply chain of current and potential SME customers and suppliers can be brought into our success in our identified priority areas. This will drive a more inclusive economy where innovation at the cutting edge benefits a greater number of people and communities across Scotland.

12 We will encourage more of Scotland's businesses to grow and diversify through innovation.

The priority themes and cluster approach set out in this Strategy encourage businesses to grow and diversify through innovation. We will ensure that support is tailored to company and sector needs, is easier to navigate and innovation journeys are joined up and complementary. This will build on the work of the Business Support Partnership 'one front door' approach. An innovation adoption referral charter will be introduced to ensure that any business being referred from one part of government or one agency to another, experiences a warm and effective handover to a named contact.

13. We will establish Scotland as a global leader in adoption and diffusion evidence and practice.

A key aim will be to test new thinking and gather new evidence. We will harness Scotland's extensive international network to identify, engage, and share good practice with international partners. We will work with expert organisations such as the Royal Society of Edinburgh, SCDI, the Fraser of Allander Institute, the Productivity Institute, The Scottish Centre of Employment Research and the Bayes Centre on a new strand of evidence-gathering. Our Innovation Scorecard will be updated to incorporate metrics and indicators of our innovation diffusion performance. This will enable us to benchmark against comparable metrics internationally.

Case Study – Innovation as an enabler of recovery, reform and sustainability in health and social care

The pressures and challenges currently facing health and social care can only be addressed if cost-saving, outcome-improving, experience-enhancing innovations can be rapidly identified and adopted. However, while Scotland has a rich history of invention and a vibrant life science sector, we have a poor record of quickly scaling and spreading innovation.

In response the Scottish Government has created the Accelerated National Innovation Adoption pathway and established an Innovation Design Authority. Together they will provide a 'once for Scotland' approach to the identification, assessment and accelerated adoption of innovative technologies that can have a transformative impact on recovery, reform and sustainability within health and social care in Scotland.

Launched in June 2022, the Accelerated National Innovation Adoption (ANIA) Pathway is led by the national Centre for Sustainable Delivery (CfSD), hosted by NHS Golden Jubilee. It is a collaborative venture involving, in addition to CfSD, NHS National Services Scotland, Healthcare Improvement Scotland, Public Health Scotland, Scottish Health and Industry Partnership and NHS Education for Scotland. ANIA brings together expertise from across the collaborative to support a rapid assessment of potential innovations in order to develop value case propositions and implementation plans.

The Innovation Design Authority (IDA) is co-chaired by Scotland's Chief Scientist (Health), Professor Dame Anna Dominiczak, and the Chair of the Scottish Ambulance Service, Tom Steele. It brings together senior Scottish Government and NHS leadership and will report to the Care and Wellbeing Portfolio Board. It will provide system leadership and co-ordination, approve ANIA stage gates and the progression of innovations through them. These will be assessed against impact on patient outcomes, patient experiences, staff experiences, cost effectiveness and carbon reduction.



sawyer

10. Innovation Scorecard

Vision

The Strategy's four transformational programmes will be designed and delivered to support our vision of Scotland becoming one of the most innovative small nations in the world. To ensure we are making the necessary progress towards that ambition we will track our innovation performance on a number of a key metrics over the next ten years.

We will do this through Scotland's **Innovation Scorecard** which will track Scotland's innovation performance over time on a set of key indicators against other nations.

Context

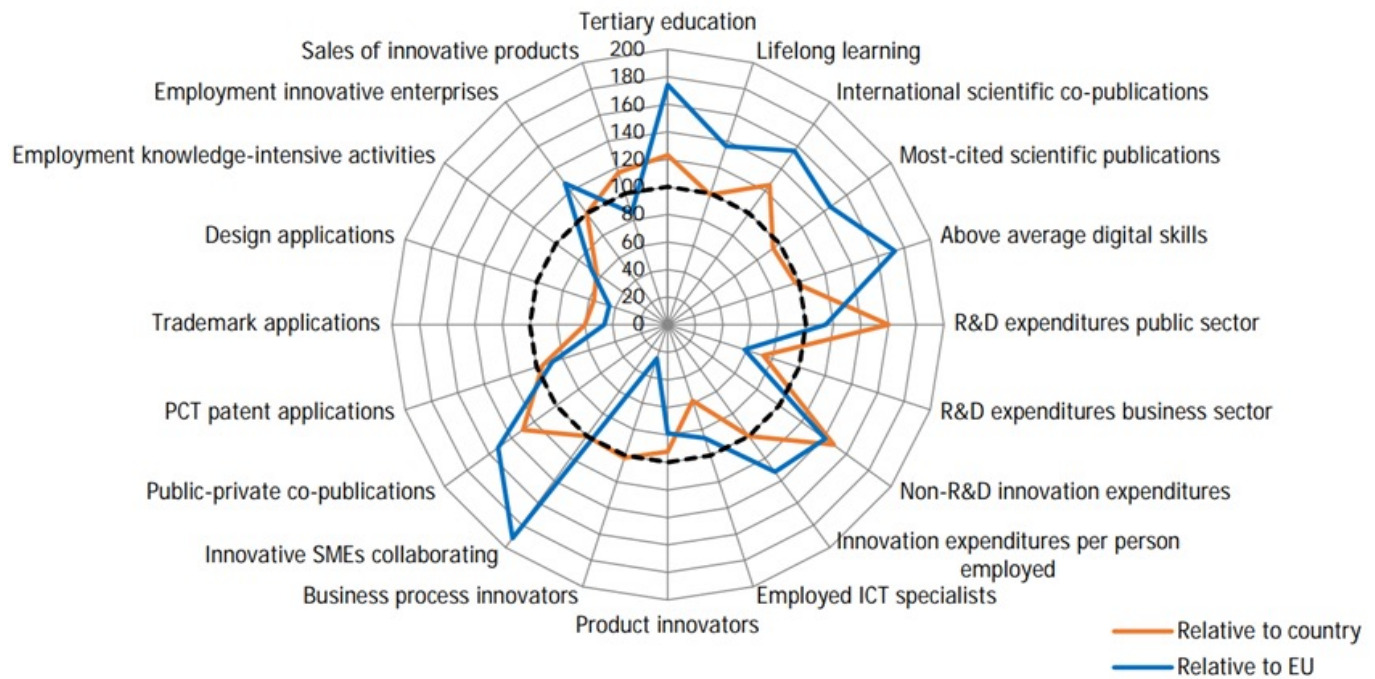
The European Innovation Scoreboard provides a starting point for EU-wide comparisons between Scotland and other European regions and nations.²⁹ EU countries and regions are assessed in four performance groups: Innovation leaders, Strong innovators, Moderate innovators and Emerging innovators. As part of its analysis of Scotland we can see:

i. Scotland's innovation credentials are ranked as 'strong' alongside other nations and regions including Ireland, Norway, Iceland, Austria and the West Midlands, but below those deemed to be innovation 'leaders' such as Denmark, Finland, Belgium, Sweden, and South East England.

- ii. Scotland's innovation performance is among the strongest in Europe in a number of areas including skills and education levels in the workforce. Scotland is ranked the top performing country in the OECD in terms of Higher Education investment in R&D as a percentage of GDP.
- iii. Scotland has an average level of performance relative to comparable 'strong' nations and regions on aspects including employment in innovative enterprises, and innovation expenditure per employee.
- iv. Scotland falls short relative to comparable 'strong' regions and countries in other areas – business R&D, SME product and processes innovations, and levels of employment in knowledge-intensive activities.

29 [European Innovation Scoreboard](#)

Figure 8: European Commission's Regional Innovation Scoreboard for Scotland, 2021



Source: [European Commission's Regional Innovation Scoreboard 2021](#)

Approach

The Scottish Innovation Ecosystem is based on an infrastructure of public, private and third sector organisations and a set of existing innovation assets based on Scotland's natural advantages, research specialisms and existing clusters of innovative businesses. These generate opportunities for public and private investment throughout the innovation process which we see in terms of both an innovation pipeline and a wider process of diffusion and adoption across Scotland's business and wider organisational base.

Our Innovation Scorecard will monitor the performance of our innovation ecosystem across each of its elements and stages using the best and most up to date data and evidence available. We will continue to engage across Europe and internationally and seek to learn from others in how we measure and assess our innovation performance and its impacts on the national economy.

While we need to be aware that there are often lengthy time lags until economic impacts emerge from new innovations, and we also need to factor in time to implement and deliver a new strategy, the Scorecard will provide a useful snapshot of the health of the Scottish innovation ecosystem over time.

Innovation Pipeline

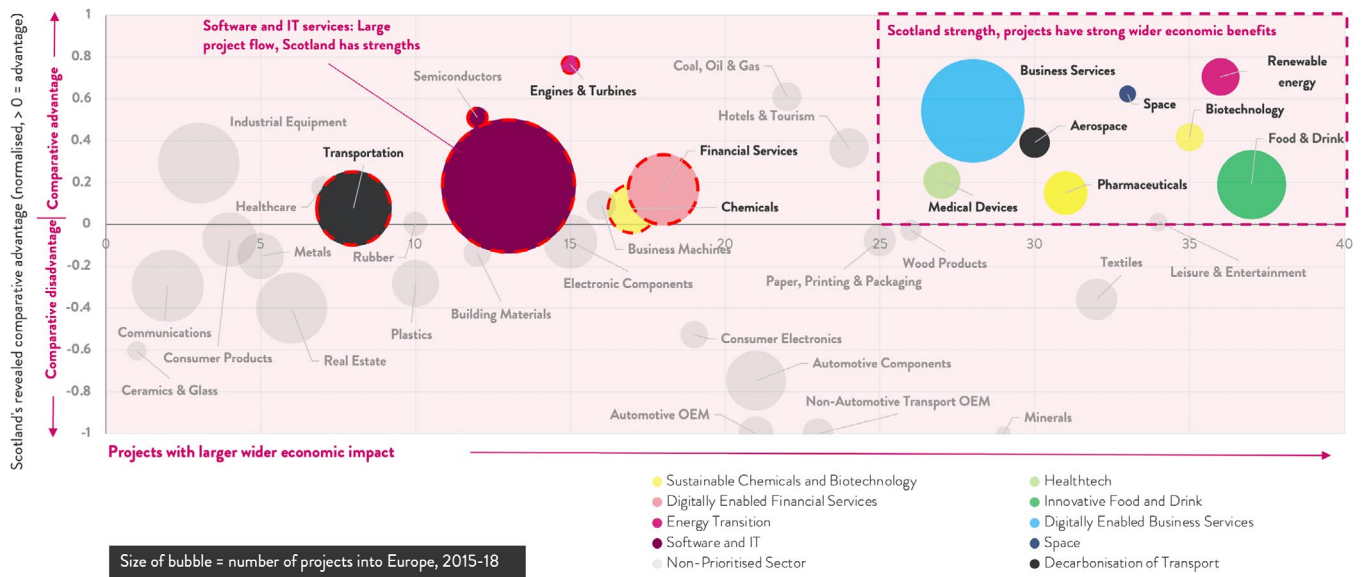
Key metrics have been identified for each stage of the innovation pipeline:

- **Concept** - which aims to track the generation of new ideas both within universities and the private sector
- **Convert** - which aims to measure the movement of early-stage research towards being closer to market
- **Commercialise** - which aims to track the realisation of the early economic benefits of innovation

For **Concept** we have selected patents and collaborations as our key metrics. Patents are traditionally used to track innovation and allow for comparison across different geographies. We have chosen to measure Patents Granted which is a more concrete indicator than applications. We will also track innovation between higher education and the wider economy through monitoring data on academic income from business and community interactions - this is a useful indicator of collaboration.

For **Convert** we have selected early stage risk capital and spin-outs accessing equity finance as our key metrics. The attraction of investment capital is an effective indicator of innovation that is closer to the market. Although not all deals are innovation driven, this is a strong proxy for innovation as the data shows the top sectors for deals are generally those associated with innovation. We will track risk capital overall and deals below £10 million, early-stage deals, and we will measure both the number and the value of deals. We will also measure the number of university spin-outs which are attracting equity finance and as such are likely to be high-growth start-ups.

Figure 9: Early stage equity investment deals in Scotland by sector, 2016-2020



Source: Scottish Enterprise, June 2021, Investing in Ambition: Scotland's Risk Capital Market in Context

For **Commercialise**, we have selected BERD jobs and high growth businesses. Whilst the number of BERD jobs may be small (as it is in other countries), there is a common understanding that there are large multipliers around these jobs for other professional occupations in innovating companies. We will also monitor the numbers of high growth businesses. These companies generate disproportionate jobs and innovation and are key to economic transformation. Finally, we will measure later stage investment (venture capital) which is an indicator that the projects behind the deals in question are seen by investors to offer strong opportunities for returns.

Manufacturing and Supply Chain - in addition, we will track the number of manufacturing jobs within each of our cluster priorities, drawing out rich data to include high value jobs, skills spending and apprenticeship numbers.

Diffusion and Adoption

The Innovation Scorecard will track 'diffusion and adoption' across the business base by measuring the percentage of innovation-active businesses and overall levels of research and development 'investment'.

The measure of innovation active businesses follows the OECD definition of innovation and assesses the following activities, within the survey period:

1. the introduction of a new or significantly improved product (good or service) or process;
2. engagement in innovation projects not yet complete, scaled back, or abandoned;
3. new and significantly improved forms of organisation, business structures or practices, and marketing concepts or strategies;
4. investment activities in areas such as internal research and development, training, acquisition of external knowledge or machinery and equipment linked to innovation activities.

A business that had engaged in any of the activities described in points 1 to 3 is defined as being 'innovation-active'. A business that had engaged in any of the activities described in points 1 to 4 is defined as a 'broader innovator'. Finally, any businesses that had engaged in the activity described in point 3 were classed as a 'wider innovator'.³⁰

We are also interested in measuring the adoption of innovation in the public sector. There is not currently a suitable available metric for measuring innovation in the public sector, but we will work with key stakeholders and learn from international best practise to pursue this ambition over the course of the Strategy's ten-year lifecycle.

For Investment we will monitor Expenditure on Research and Development from the innovation triple helix - industry, academia, and the public sector. We will track this for business and higher education and at an overall level (also including government investment) as a percentage of GDP to allow international comparisons. (N.B. these indicators are currently being reviewed by the Office for National Statistics following a significant initial revision to the method used to collect the data.)




Diversity and Inclusion






As part of the Scorecard, we will also develop suitable metrics to capture and assess participation and impact in the innovation ecosystem including data on equalities, diversity and inclusion. This will include access to finance, funding, jobs and opportunities. We will ensure that the Strategy's programmes are developed with diversity and inclusion at their heart and that suitable metrics and indicators are utilised to monitor this.



Action






14. We will publish an annual Innovation Scorecard.

The initial framework for this scorecard is shown in the table on page 68.

ECOSYSTEM	TRACKING	METRICS USED IN SCORECARD	CURRENT PERFORMANCE	COMPARISON	PROGRESS SINCE LAST YEAR
<p>Concept</p> 	<p>The generation of new ideas within universities and the private sector.</p>	<ol style="list-style-type: none"> 1. Patents granted 2. Academic Income from Business and Community Interactions 	<ul style="list-style-type: none"> • Scotland underperforms compared to the UK on patents when considering population size (approx. 31%). • Scotland underperforms in patents granted compared to the EU when considering GDP size. • income from business community interactions in 2020/21 was £690,907, which has grown by 45% over the past 4 years. • In 2020/21 the value of contracts held by Scottish HEIs was £292.4 million, which has been trending upwards for 4 years from £196.8 million in 2017/18. 	<ul style="list-style-type: none"> • Scotland had 251 patents granted in 2020. This represents an underperformance per capita compared to the UK of around 31%. • The EU granted 58,656 patents in 2020, which is 4.4 patents per billion GDP. In contrast, Scotland achieves only 1.2 patents per billion GDP. • Scotland is in the top 3 regions for value of HEI community to business interactions, and this figure is fast growing over the past 4 years. In the previous period, Scotland ranked 4th. 	<ul style="list-style-type: none"> • Scotland has seen growth in academic and community interactions since the previous year. • Scotland has improved from 4th to 3rd in comparisons with UK regions. • Scotland saw its patents granted per GDP increase over 2019/20 by 0.28pp while patents granted in both the UK and EU fell. However, Scotland still underperforms despite this growth. <div style="text-align: center;">   </div>

ECOSYSTEM	TRACKING	METRICS USED IN SCORECARD	CURRENT PERFORMANCE	COMPARISON	PROGRESS SINCE LAST YEAR
<p>Convert</p> 	<p>The movement of early-stage research to being closer to market.</p>	<p>3. Risk capital (deals under £10 million) 4. BERD jobs (as a percentage of 16-64 labour force)</p>	<ul style="list-style-type: none"> For deals under £10 million, £305 million was invested across 440 deals in 2020. This is down 5% over 2019. BERD jobs made up 0.61% of the total Scottish 16-64 labour force in 2020, up from 0.56% in 2019. 	<ul style="list-style-type: none"> Deals under £10 million has recently fallen, though not as severely as the UK average. Scotland ranks 4th lowest in the UK for BERD jobs as a percentage of the workforce. For context, 1st place is almost 3 times higher at 1.51%. 	<ul style="list-style-type: none"> Performance in risk capital has seen an increase in the number of deals, however total investment has stalled.  <ul style="list-style-type: none"> BERD jobs has seen a slight increase over 2019/2020. However Scotland remains ranked 4th lowest of the UK regions. 
<p>Commercialise</p> 	<p>The realisation of the early economic benefits of innovation.</p>	<p>5. High growth businesses 6. Later-stage equity (deals £10 million and over)</p>	<ul style="list-style-type: none"> 9.7% of businesses in Scotland were 'high growth' in 2020. This fell to 7.2% in 2021, likely due to the impact of the COVID-19 pandemic. 	<ul style="list-style-type: none"> The UK rate of 'high growth' businesses in 2020 was 10.1%. This fell to 8.2% in 2021, likely due to the impact of the COVID-19 pandemic. 	<ul style="list-style-type: none"> Both the UK and Scotland have seen a roughly 2% fall in high-growth businesses over 2020/21. However, Scotland has fallen from being the middle performer (6th of 12) to rank second-lowest of the UK regions in 2021. 

ECOSYSTEM	TRACKING	METRICS USED IN SCORECARD	CURRENT PERFORMANCE	COMPARISON	PROGRESS SINCE LAST YEAR
Adoption 	Organisations that are adopting innovation and have become innovation-active.	7. Percentage of innovation-active businesses	<ul style="list-style-type: none"> In Scotland in 2021, 39% of businesses were measured as being 'innovation-active' in the UK Innovation Survey. This is a 6.8% increase on the figure from 2018, however still lower than the previous high of 2014, which saw an innovation-active businesses rate of 50.4%. 	<ul style="list-style-type: none"> Scotland underperforms in terms of innovation-active businesses, both in the UK and EU. Scotland is second lowest after NI in innovation-active firms, and 9th lowest among the 27 EU member states. However, the percentage of innovation-active businesses has grown over the past 3 years (6.8%). 	<ul style="list-style-type: none"> Scotland has seen an increase in innovation-active businesses over the last two editions of the UK Innovation Survey (2018-21). However Scotland continues to underperform relative to the UK and EU. 

ECOSYSTEM	TRACKING	METRICS USED IN SCORECARD	CURRENT PERFORMANCE	COMPARISON	PROGRESS SINCE LAST YEAR
<p>Investment</p> 	<p>Expenditure on research and development.</p>	<p>8. GERD as a percentage of GDP 9. BERD as a percentage of GDP 10. HERD as a percentage of GDP 11. GovERD as a percentage of GDP</p>	<ul style="list-style-type: none"> Scotland saw an expenditure on GERD as a percentage of GDP in 2020 of 3.13%, this is a 0.29pp increase on the previous year. Scotland saw an expenditure on BERD as a percentage of GDP in 2020 of 1.91%, this is a 0.17pp increase on the previous year. Scotland saw an expenditure on HERD as a percentage of GDP in 2020 of 1.06%, this is a 10pp increase on the previous year. 	<ul style="list-style-type: none"> In terms of BERD spend by GDP in 2020, Scotland ranked in the middle of the UK regions (3rd highest).³¹ Scotland outperforms the EU 27 group of countries in terms of HERD in 2020, as the EU average was 0.51% of GDP. Scotland outperforms the EU 27 group average for BERD, which was 1.51% of GDP in 2020. In terms of total gross R&D expenditure, Scotland outperforms the EU 27 average for 2020, which was 2.26% of GDP. 	<ul style="list-style-type: none"> In terms of BERD spend by GDP in 2020, Scotland ranked in the middle of the UK regions (3rd highest).³² This is the same placement relative to other regions as in 2019.  <ul style="list-style-type: none"> Scotland outperformed the UK in terms of total GERD expenditure in 2020, at 17pp higher GERD spend as a percentage of GDP. 
<p>Investment</p> 				<ul style="list-style-type: none"> Total GERD spend as a percentage of GDP in the UK on was 2.96% in 2020. 	<ul style="list-style-type: none"> Over the past 3 years, Scotland has consistently outperformed the EU average levels for BERD/HERD/GERD as a percentage of GDP. 

31 Regions in this case have been combined into; Wales, Northern Ireland, North (North East, North West, Yorkshire and the Humber), Midlands and South West (East Midlands, West Midlands, South West), East of England, London and South East.

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World-leading Life Sciences innovation in Dundee

In 2014 Dundee was named as the UK's first City of Design by the United Nations. The City has been recognised by UNESCO for its diverse contributions to fields including medical research, comics and video games. Dundee was added to the UNESCO grouping of "creative cities" alongside European cities Turin, Helsinki, Bilbao and Curitiba in Brazil. The title recognised the design innovations which Dundee has contributed to the world, including aspirin, biomedical research which has led to hundreds of new cancer drugs, orange marmalade and video games including Lemmings and Grand Theft Auto.

Dundee is a vibrant location for education, research, and enterprise that is harnessing scientific discoveries to address local and global health challenges. It has world-renowned capabilities in life sciences research that is boosting UK life sciences competitiveness and growing the regional economy.

Dundee has an exceptional track record in life sciences and health technology commercialisation and in securing international venture capital investment to support it. Commercial successes include:

- **Exscientia**, a world leader in Artificial Intelligence-driven drug discovery and design that underwent a £0.5 billion IPO in 2021.
- **Amphista Therapeutics**, a global leader in the development of next-generation targeted protein degrader therapeutics; and
- **Current Health**, developed by CEO Chris McCann while studying at the University School of Medicine, delivers world leading remote patient monitoring to propel home-based care models.

Based on these strengths and successes, Dundee University is spearheading a step-change in life sciences R&D by creating a Life Sciences Innovation District. This will grow the biomedical cluster and, crucially, provide the physical infrastructure and support to anchor and scale high growth life sciences companies in the city for benefit of the regional economy. The first stages, the building of an Innovation Hub for spinout companies and a facility for MedTech innovation, are already underway.

Together with exciting developments at the James Hutton Institute, at the outskirts of Dundee, in agricultural and environmental science and in advancing food and ecological security, the Life Sciences Innovation District Dundee makes Dundee a go-to place for Life Sciences innovation and R&D. The inward investment will create hundreds of quality jobs for school leavers and graduates in the region and will be an exemplar of how exceptional science can drive the Scottish economy.

11. Scotland's Innovation Architecture

The Scottish Innovation Ecosystem comprises a number of institutions and assets that play an important and mutually supportive role in developing and delivering innovation in Scotland.

The delivery of this Strategy starts from a position of strength with world class innovation assets across the country, a strong and vibrant higher education system, a business base that includes highly innovative companies across different sectors and of different scales, a number of areas where Scotland has a distinct competitive advantage and the potential to lead the world, and a proud history of innovation and entrepreneurialism.

We have stories of incredible success and effective collaboration across the country, with a selection of these included in this Strategy as case studies. We also have a number of initiatives that will support and align with this Strategy. We are building a Tech Scaler network that will transform our entrepreneurial ecosystem and form a national network of institutions dedicated to the intensive schooling of tech entrepreneurs in the best available leadership, commercial and scaling techniques and will, for the first time, provide our best tech start-ups with a truly world-class developmental environment.

We also are supporting collaboration and partnership working between industry and the public sector in areas such as Health with new initiatives on NHS test beds. Our Innovation Ecosystem is driven by our innovative businesses and our academic and research institutions. It is supported by a range of infrastructure, architecture and programmes.

This table sets out some of the key actors and assets and the contribution they make to the ecosystem. This is not intended to be a comprehensive list of all the assets across the country, merely a snapshot to provide some context on the various important stakeholders in the ecosystem and the roles they play.

	Contribution
Scottish Government	<p>Scottish Government is responsible for setting the policy direction for Innovation in Scotland. With the delivery of the Scottish Innovation Strategy, the Scottish Government aims to transform Scotland's innovation ecosystem in order to ensure that our businesses, people and institutions are ready to meet the global economic challenges and opportunities we face over the next ten years.</p>
Scottish Enterprise	<p>Scottish Enterprise (SE) is Scotland's national economic development agency. Its purpose is to help businesses innovate and scale to transform the economy. Central to this are greater levels of innovation, building international competitiveness and encouraging more investment in companies and infrastructure. We work with partners in the public and private sectors to find and exploit the best opportunities.</p> <p>SE along with Highland and Islands Enterprise and South of Scotland Enterprise support sustainable and inclusive growth across Scotland.</p>
Highland and Islands Enterprise	<p>Highland and Islands Enterprise (HIE) offers an innovation Service which gives support to businesses within the Highlands and Islands regional area and helps them identify the changes needed for businesses to thrive. HIE do this in a number of ways, such as giving support on; improving productivity, protecting intellectual assets for businesses, developing new products and services, providing support on research and development, identifying new opportunities for businesses to look in to and developing a strategy for future innovation.</p>
South of Scotland Enterprise	<p>South of Scotland Enterprise (SOSE)'s bold and inclusive remit covers the growth and development of the economy, environment and communities in the South of Scotland. It provides specialist and tailored innovation and entrepreneurial support, to organisations, irrespective of size, through all stages of the innovation journey. It follows a roadmap approach focused on the key stages of idea generation, activation, commercialisation, acceleration and scaling. It also works in partnership with many national partners, including the Innovation Centres, academic partners, Civtech and Codebase as part of the Scottish Government's innovative Tech Scaler initiative to create and scale start-ups.</p>

	Contribution
Regional Economic Partnerships	<p data-bbox="466 241 1476 555">Regional Economic Partnerships (REPs) are collaborations led by local authorities, the private sector, education and skills providers, our economic agencies, and the third sector. Evolving from the City Region and Growth Deals Programme, they perform a broader, strategic role using Deals and other significant regional interventions and investment to catalyse further economic growth across several economic drivers and enablers.</p> <p data-bbox="466 591 1476 784">To date, REPs have focused on establishing an economic vision for their region, inclusive governance and clear delivery plans. Agile REPs provide a vehicle to engage with and deliver Scottish Government and UK Government policy areas which are seeking greater synergy with regional opportunities.</p> <p data-bbox="466 819 1476 1014">NSET and the Regional Economic Policy Review carve out a more explicit and enhanced role for REPs in Scotland's economic transformation, with the UK Government and Scottish Government seeking to use these structures to deliver strategically and regionally significant investments of scale.</p>

Contribution

Innovation Centres

Scotland's Innovation Centre (IC) programme, launched in 2012 and funded in partnership by the Scottish Funding Council, Scottish Enterprise and Highlands and Islands Enterprise. The ICs work with Scotland's colleges, universities and research institutes to address demand from, and the opportunities and challenges facing, the private, public and third sectors.

The seven current ICs are focused on different areas but are united in the aim to enhance innovation and knowledge exchange across key economic sectors to create jobs and deliver economic and societal benefit. They add value through collaborative projects, consortia building, secondments, industrial studentships as well as providing spaces for collaborative work and shared access to equipment. ICs also support skills and training to develop the next generation of researchers and knowledge exchange practitioners through masters and post-doctoral level provision.

The Seven Innovation Centres are:

The Data Lab – Scotland's Innovation Centre for data and AI. They help companies, organisations and individuals capitalise on the opportunities that exist within the field of data science – working with them to grow their operations, develop innovative new projects and ensure they have the data skills needed for the future.

BE-ST – 'Built Environment – Smarter Transformation' have a goal of accelerating Scotland's built environment's transition to net zero. They aim to provide the connections, infrastructure and culture needed to solve the sector's most pressing challenges. They bring together world-class academia, government bodies and industry at all levels to future-proof the commercial and environmental road forward for the built environment.

CENSIS – Scotland's Innovation Centre for sensing, imaging and Internet of Things (IoT) technologies. They work with private and public organisations of all sizes to de-risk and accelerate innovation and overcome technology barriers to achieve business transformation.

SAIC – Sustainable Aquaculture Innovation Centre work to reduce the environmental footprint and help boost the economic impact of aquaculture. They bring together the needs of businesses and academia, supporting commercially relevant, collaborative research.

Contribution

IBioIC - Industrial Biotechnology Innovation Centre is a networking and support organisation that connects industry, academia and government to bring biotechnology processes and products to the global market. They do this by offering scale-up facilities, talent development, funding provision, and promotion of Scotland's unique assets.

PMS-IC - Precision Medicine Scotland Innovation Centre is the national centre for accelerating the advancement and adoption of precision medicine. PMS-IC brings together industry innovators, clinicians and world-class researchers to collaborate on opportunities.

DHI - Digital Health and Care Innovation Centre. The DHI was set up to harness innovation to seek and solve key challenges for health and care sector in order to help Scotland's people live longer, healthier lives and to help Scotland's economy grow. DHI is a national resource that combines leading industry and academic expertise (with health and social care experience) to support essential transformation of health and care services in Scotland.

Net Zero Technology Centre

Net Zero Technology Centre based in Aberdeen are aiming to bring the energy industry to a place of digital and automated decarbonised future by developing technologies that that reduce emissions and reach the stage of a fully integrated energy system.

National Manufacturing Institute Scotland

The National Manufacturing Institute Scotland (NMIS) is high performing industry-led research and development group with a mission to make Scotland a global leader in advanced, sustainable manufacturing.

From its specialist centres and landmark headquarters alongside Glasgow's international airport, its teams of the best and brightest engineers work with industries large and small to unlock big productivity gains, develop new products and processes, transform the skillset, win new orders and grow their businesses.

Medicine Manufacturing Innovation Centre

The Medicine Manufacturing Innovation Centre (MMIC) is a collaboration between CPI, University of Strathclyde, UK Research and Innovation, Scottish Enterprise and founding industry partners, AstraZeneca and GSK. The aim of the centre is to accelerate the development of a new generation of medicines manufacturing processes and to help companies integrate these within their existing models. MMIC will enable industry, academia, healthcare providers and regulators to work collaboratively to address challenges and maximise technology opportunities within the medicines supply chain.

	Contribution
Innovation Districts	An innovation district is a concentrated area of physical spaces that cluster and foster interactions between businesses, entrepreneurs, start-ups, research organisations and academia. They combine economic, physical and networking assets to encourage research and development, innovation. They accelerate the growth of businesses and encourage investment. The Brookings Institution highlights density, proximity, accessibility and mixed-use spaces can help create an Innovation District environment optimised for collaborating, networking and living.
Scottish Development International	With a network of more than 30 global offices, Scottish Development International (SDI) promotes Scotland as a place for investment and trade. Securing more international trade and investment is important in helping to create a more dynamic and globally competitive economy. SDI helps more businesses from around the world do business in or with Scotland. It also supports innovative and ambitious Scottish companies grow and export through international trade. Scottish Enterprise delivers SDI services in close coordination and partnership with the Scottish Government, Highlands and Islands Enterprise and South of Scotland Enterprise.
Scottish Funding Council	<p>The Scottish Funding Council (SFC) is Scotland's tertiary education and research authority. SFC's ambition is to make Scotland an outstanding place to learn, educate, research and innovate - now and for the future.</p> <p>SFC invests around £2 billion of public money annually in pursuit of its purpose which is to sustain a world-leading system of tertiary education, research and innovation that enables students to flourish; changes lives for the better; and supports social, economic and environmental wellbeing and prosperity.</p>
Scottish Health Innovation Partnership	Working alongside NHS Scotland, The Scottish Health Innovation Partnership aim to accelerate and commercialise healthcare innovations. The Innovation Together Strategy is a five-year strategy set around a number of strategic commitments which match the aims of Scotland's National Performance Framework.
Transport Scotland	Transport Scotland is the National Transport Agency for Scotland and seeks to deliver a sustainable transport system that will benefit all Scotland. They will support Scottish Government's aim of increasing sustainable economic growth.

	Contribution
Marine Scotland	Marine Scotland is responsible for the integrated management of Scotland's seas. It works closely with delivery partners NatureScot and the Scottish Environment Protection Agency to ensure compliance with regulation, promoting sustainable, profitable and well-managed marine sectors including sea fisheries, aquaculture, marine renewables, freshwater fisheries and marine planning, embedded with sound environmental management. It's scientific resource ensures a robust evidence base upon which policies are developed. It is also responsible for the Marine Fund Scotland which delivers on Scotland's Blue Economy Vision and which supports innovation at an individual project level.
Skills Development Scotland	The national skills body for Scotland is Skills Development Scotland (SDS). By assisting individuals and companies in developing and utilising their abilities, SDS support Scotland's sustainable economic growth and collaborate with a number of partners to offer services that have the greatest positive impact on Scotland's citizens, businesses, and economy.
CivTech	CivTech leverages the power of the public purse to drive innovation in the public and third sector while creating sustainable high growth potential businesses. The programme takes real problems faced by government departments, public sector organisations and charities in Scotland, and invites innovative companies of any age or stage to work hand-in-hand to create the solution. The programme provides both funding and practical support for public and third sector organisations with a need they cannot meet through the market. It also supports innovative business to develop solutions to the challenges set and business proposition that will enable them to grow and scale.
Scotland Innovates	Scotland Innovates is a supplier-led innovation service, which provides an online portal for current and new suppliers to submit information on innovative products and services to the entire Scottish Public Sector for consideration. The service aims to identify appropriate public sector routes to market and provides helpful feedback for all received submissions. In addition to providing a centralised link to the Scottish Public Sector, the Scotland Innovates website includes guidance, news, innovation case studies and information on upcoming events.
GlobalScot	Scottish Business Network represents Scotland's Global Business Diaspora. The non-profit voluntary community was developed with the goal to unite the diaspora for the benefit of Scotland. Members of the community look to work and support innovative ventures in Scotland by sharing their experience, expertise, funding and networks. www.sbn.scot

Contribution	
UK Government	The UK Government works with Innovation Institutions across the UK to stimulate Research and Development (R&D) and drive growth, productivity and wellbeing. The UK Innovation Strategy is the UK Government's plan to create the optimal conditions for increased private sector investment in Innovation across the UK. It is backed by increased public investment in R&D of £20 billion per annum by 2024/25. While this strategy applies to the whole of the UK and includes areas of action that are reserved (e.g. new Visa routes for innovation), it sits alongside important work being taken forward by the devolved administrations and delivery partners, including this Strategy (Scotland's National Innovation Strategy).
UKRI	UKRI is an organisation that brings a number of disciplinary research councils together and work in innovative ways to deliver an ambitious agenda.
Innovate UK	Innovate UK is the UK's innovation agency. They provide businesses throughout the UK with the expertise, connections, facilities and funding needed to test, demonstrate and scale the most innovative products, services and systems.
Catapults	Catapults are designed to support innovation and de-risk the transition from research to commercial delivery through the provision of R&D infrastructure, specialist knowledge and expertise, partnership and collaboration building capabilities, and business support. Three of the UK's nine catapults have sites based in Scotland: Offshore Renewable Energy Catapult, High Value Manufacturing Catapult and Cell and Gene Therapy Catapult.

Case Study - ONE BioHub – an innovation hub transforming life sciences

Innovation and entrepreneurial growth are at the heart of north east Scotland's vision for life sciences growth. The Aberdeen city region already has a distinctive cluster of life sciences businesses tackling global health challenges, from neurodegenerative diseases and diabetes to antimicrobial resistance and cancer.

Private sector economic development catalyst Opportunity North East is working with the University of Aberdeen, Robert Gordon University and NHS Grampian to turn world-leading research and ideas into spin-out and start-up businesses. Creating ONE BioHub as the focal point and innovative place to support bio-entrepreneurs commercialising next generation solutions.

Over the past six years Opportunity North East has worked with partners to transform the regional ecosystem while developing the £40 million ONE BioHub as the new and iconic sector innovation hub. ONE has funded, developed and delivered pre-commercialisation and accelerator support, leadership programmes on commercial skills and created one of the most engaged life sciences networks in the country, while raising the region's profile with investors, strategic partners and industry leaders in the UK and internationally.

Opening in spring 2023, ONE BioHub provides the infrastructure, facilities and specialist business support and ecosystem to inspire ambition, give people skills and knowledge to turn research into businesses and support them at each stage of the entrepreneurial journey.

ONE BioHub is on the Foresterhill Health Campus in Aberdeen, one of Europe's largest co-located healthcare, life sciences and teaching sites – where the commercial, clinical and research community tackles modern health epidemics. ONE BioHub provides laboratories, incubation and collaboration space and custom fit-out accommodation over five floors, specialist business support programmes, and access to expert networks and investors. Tenants will be spin-outs, start-ups and scaling businesses bringing new drugs, treatments, therapies and technology to market. It will ultimately accommodate up to 400 people. ONE BioHub is led and co-funded by Opportunity North East with co-investment from the UK Government, Scottish Government and Scottish Enterprise. NHS Grampian and the University of Aberdeen are strategic partners and ONE BioHub is a key industry innovation project in the Aberdeen City Region Deal.

The partners share a vision to create a home for successful life sciences companies. From where they will drive regional economic diversification and create high-value jobs, contribute to national growth and improve the world's health.

Dr Deborah O'Neil OBE FRSE is the founder and CEO of NovaBiotics - a leading clinical-stage biotechnology company in Aberdeen. She chairs the life sciences board at Opportunity North East and BioAberdeen, the not-for-profit delivering ONE BioHub.

Deborah said: 'Opportunity North East is transforming the regional ecosystem working with partners in both universities and NHS so that innovation from those world-leading ideas factories is commercialised. BioHub addresses the lack of specialist infrastructure for company spin-out, creation and growth that is known to be a major barrier for the sector. It combines the innovative place, space and entrepreneurial support that will ensure next generation bio-entrepreneurs flourish here and innovation reaches the market, transforms healthcare and improves patient outcomes.'

12. Innovation Assets

For Priority Areas

Scotland comprises a number of institutions and assets, around which existing cluster development activity can be found for each of the innovation priority areas.

The following asset maps set out some of the key actors and assets from across Scotland that signal the breadth of Scotland's innovation expertise in each of the innovation priority areas. The maps cover the eleven vertical sector innovation priority areas, and the two broader horizontal themes of Data & Digital Technologies and Advanced Manufacturing that provide cross-sectoral supporting and enabling infrastructure for each vertical sector.

Each asset map provides a snapshot of the variety of assets across Scotland at the time of publication, and locations are approximate.

Scotland's Innovation Assets

These maps are intended to provide a snapshot of the variety of innovation assets in the innovation priority areas across Scotland, **at the time of publication**.

Locations are not exact.



Hydrogen Generation, Storage and Transport

Hydrogen Generation, Storage and Transport Assets

Argyll & Bute

- Machrihanish Airbase Community Company (MACC) - Hydrogen Futures*

Lanarkshire

- ILLI Group (9 battery storage development projects across Scotland)*

Glasgow City Region

- The Power Network Demonstration Centre
- Offshore Renewable Energy Catapult
- Energy Technology Partnership
- Driving the Electric Revolution Centre of Excellence
- Project PACE EV Charging Initiative
- Whitelee Green Hydrogen Project
- HY2GO Project

Ayrshire

- National Energy Research Demonstrator Project
- Hunterston Port and Resource Centre (PARC)*

Islands

- Surf 'n' Turf and BIG HIT, Orkney
- ORION Clean Energy Project
- Outer Hebrides Energy Hub
- Islands Centre for Net Zero

Dumfries & Galloway

- Chapelcross Initiative

Inverness & Highland Region

- PowerHouse
- Inverness and Cromarty Firth Green Freeport**

Edinburgh City & South East Scotland Region

- Logan Energy*
- Forth Green Freeport**
- Scottish Energy Centre - Edinburgh Napier University

Aberdeenshire, Aberdeen City Region and North Sea

- Hydrogen Coast
- St Fergus Gas Terminal
- Carbon capture and storage, North Sea
- Net Zero Technology Innovation Centre
- Europe's largest hydrogen bus fleet
- Centre for Energy Transition - University of Aberdeen
- Energy Transition Institute - Robert Gordon University
- Huntly Development Trust - green hydrogen production
- Aberdeen Hydrogen Hub
- Acorn Carbon Capture and Storage
- Hydrasun*
- Xodus*
- Wood PLC*

Tay Cities Region

- Michelin Scotland Innovation Parc
- Hydrogen Accelerator
- Enterprise area for low carbon & renewables - Dundee
- Port & Claverhouse
- Eden Campus, leading battery chemistry and fuel cell research - University of St Andrews

Fife

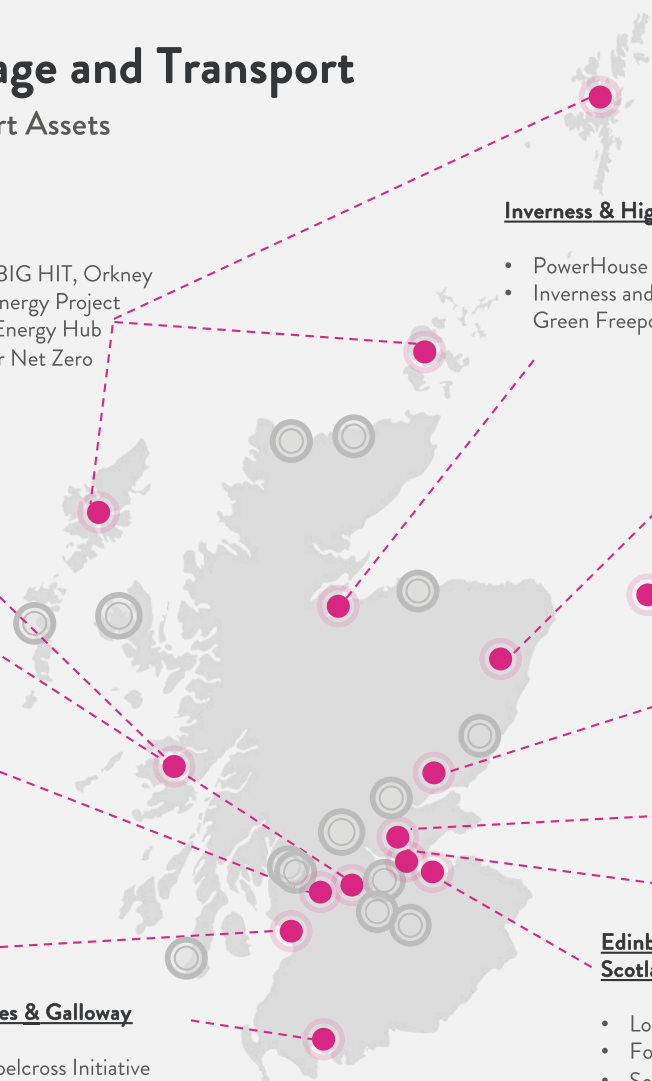
- Fife Hydrogen Demonstration Project/Methil Energy Park
- H100 Hydrogen Network

Falkirk

- INEOS Low-Carbon Hydrogen Plant, Grangemouth**

*One of the innovative firms operating in Scotland

**Under development



Floating Offshore Wind

Floating Offshore Wind Assets

Islands

- Orkney Marine Renewables Energy Cluster
- European Marine Energy Centre, Orkney

Inverness & Highland Region

- PowerHouse
- Inverness and Cromarty Firth Green Freeport**
- Centre for Energy and the Environment (CfEE)

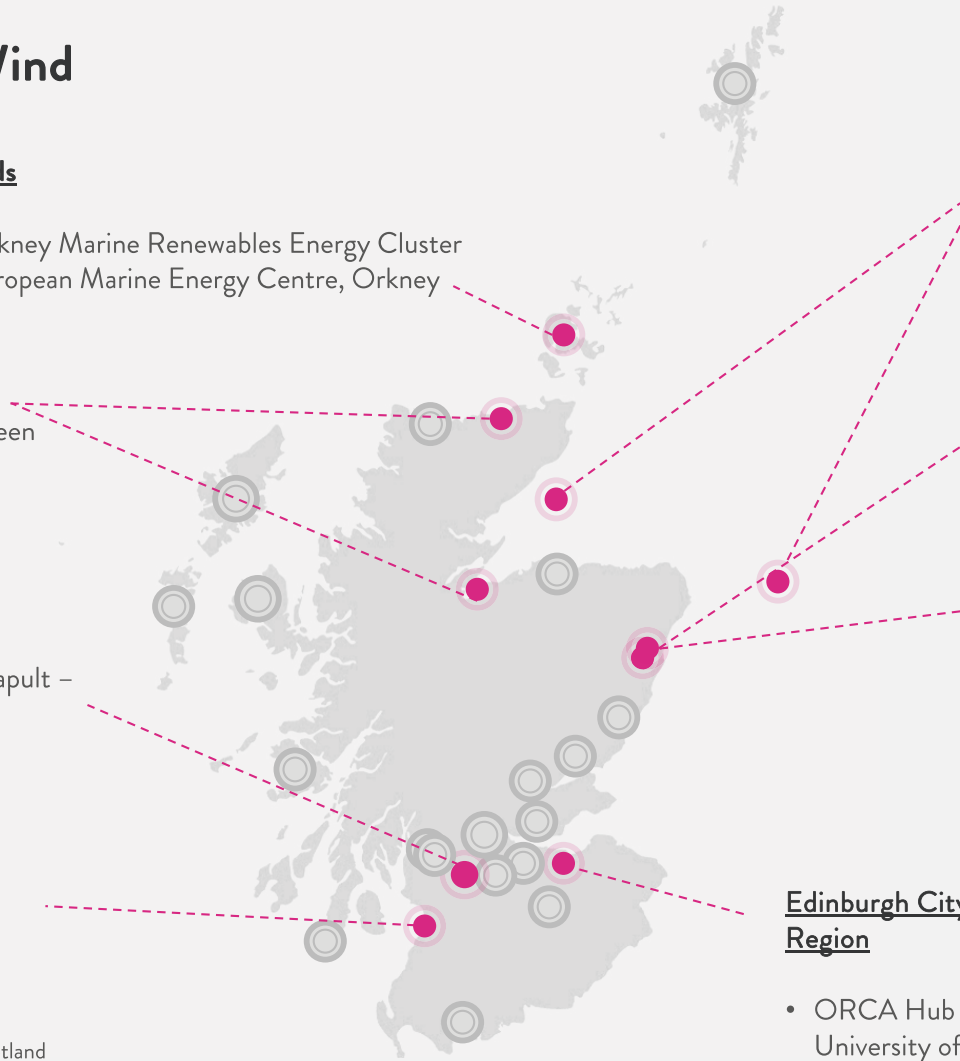
Glasgow City Region

- Offshore Renewable Energy Catapult – University of Strathclyde
- Energy Technology Partnership

Ayrshire

- Centre for Research into Low Carbon Energy and the Circular Economy (Hunterston)

*One of the innovative firms operating in Scotland
 **Under development



North Sea

- Beatrice offshore windfarm (world's 4th largest)
- Scotwind sites

Aberdeen City Region

- National Decommissioning Centre - University of Aberdeen
- Energy Transition Institute – Robert Gordon University

Aberdeenshire

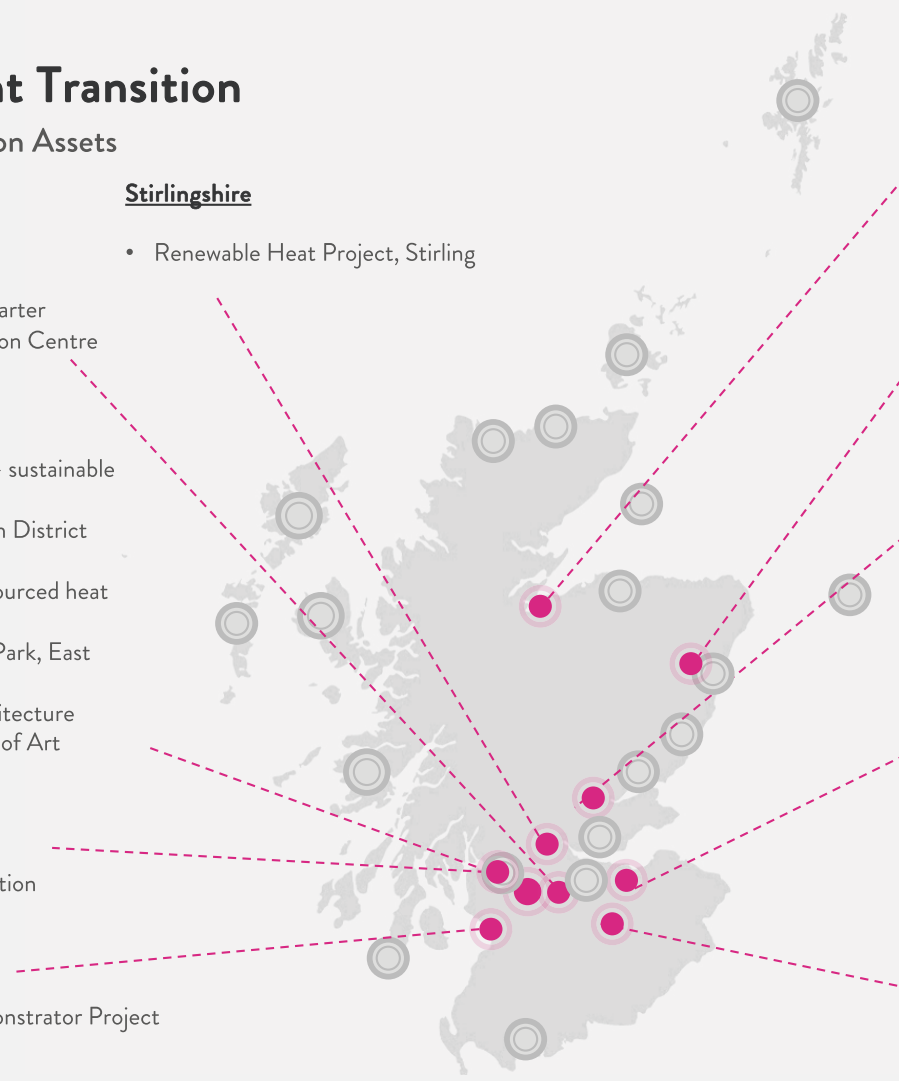
- Subsea Engineering Cluster (inc):
 - TechnipFMC
 - Aker Solutions
 - GE Oil & Gas
 - Subsea 7
 - Bibby Offshore
- Energy Transition Zone - Floating Offshore Wind Centre of Excellence
- Wood PLC*

Edinburgh City & South East Scotland Region

- ORCA Hub - Heriot Watt University and University of Edinburgh
- Forth Green Freeport**

Built Environment Transition

Built Environment Transition Assets



Lanarkshire

- Built Environment - Smarter Transformation Innovation Centre (BE-ST)

Stirlingshire

- Renewable Heat Project, Stirling

Glasgow City Region

- Glasgow Caledonian University – sustainable environment expertise
- Clyde Gateway Green Innovation District
- Hillpark District Heating
- Queen’s Quay – largest water-sourced heat pump in the UK
- Scottish Enterprise Technology Park, East Kilbride
- Mackintosh Environmental Architecture Research Unit - Glasgow School of Art
- Energy Technology Partnership

Renfrewshire

- Advanced Manufacturing Innovation District Scotland

Ayrshire

- National Energy Research Demonstrator Project

*One of the innovative firms operating in Scotland

Inverness & Highland Region

- AMCF – Make It Smart Hub
- Fit Hub (Pan-Highland)

Aberdeenshire

- Scott Sutherland School of Architecture and Built Environment - Robert Gordon University

Perth & Kinross

- Power Circle, Blairgowrie*

Edinburgh City & South East Scotland Region

- Sustainable Construction Centre - Edinburgh Napier University
- Mitsubishi Heat-Pump Factory, Livingston
- Sunamp Heat Batteries, East Lothian
- Edinburgh Centre for Carbon Innovation
- EastHeat*
- Trimble Technology Lab - Edinburgh Napier University
- Artus*

Scottish Borders

- Borders College Flagship Heat Project
- Kibosh*

Decarbonisation of Transport

Decarbonisation of Transport Assets

Islands

- CalMac Ferries*
- Sustainable Aviation Test Environment, Orkney
- ReFLEX, Orkney

Stirlingshire

- Zero Emission Centre for Excellence for Sustainable Transport

Perth & Kinross

- Perth Innovation Highway and Perth West

Glasgow City Region

- Driving The Electric Revolution Centre of Excellence
- Project PACE EV Charging Initiative
- Energy Technology Partnership

Lanarkshire

- Power Networks Demonstration Centre, Cumbernauld
- Mossend International Railfreight Park*

Aberdeenshire

- Huntly Development Trust – Low Carbon Transport Hub
- 5G Hubs

Tay Cities Region

- Michelin Scotland Innovation Parc
- UK's largest electric taxi fleet

Edinburgh City & South East Scotland Region

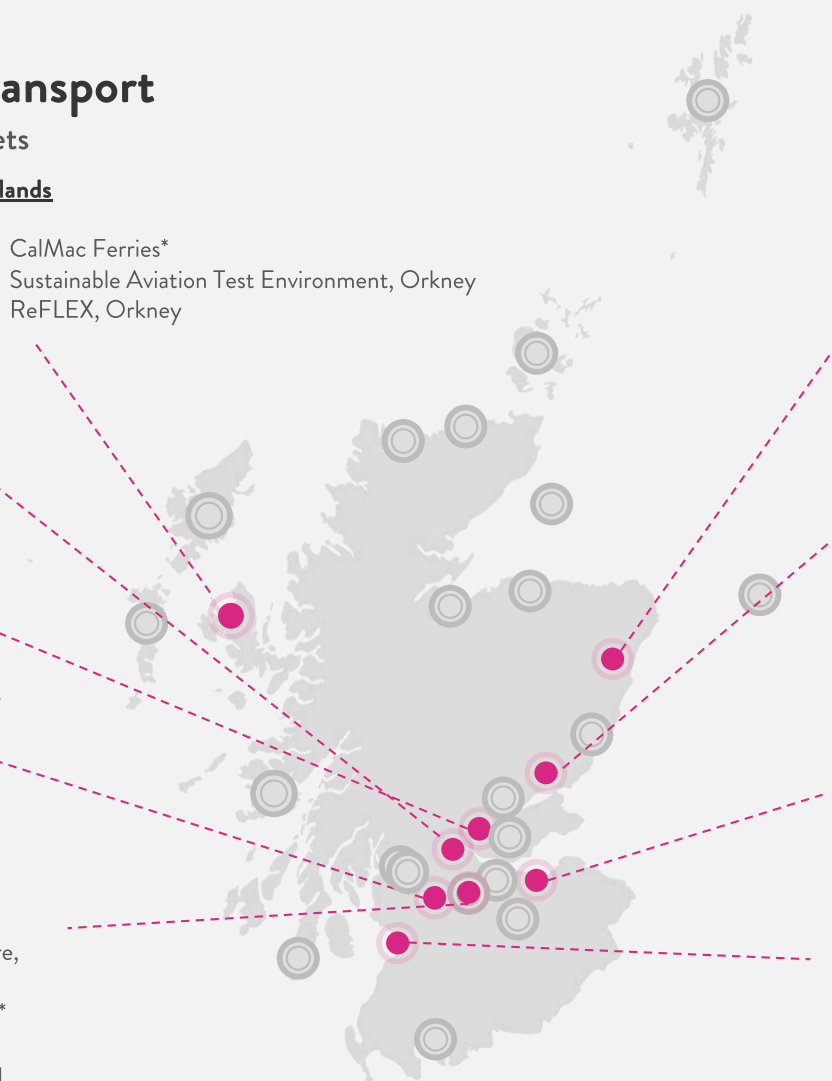
- Industrial Decarbonisation Research Centre and world leading in transport logistics - Heriot Watt University
- Transport Research Institute - Edinburgh Napier University
- Forev (EV technology across Scotland)
- Alexander Dennis*
- Project CAVforth
- Forth Green Freeport**

Ayrshire

- Spirit Aerosystems Aerospace Innovation Centre

*One of the innovative firms operating in Scotland

**Under development



Digital Health

Digital Health Assets

Inverness & Highland Region

- Inverness Campus Life Sciences Hub
- LifeScan*
- NHS Highland RD&I
- University of the Highlands and Islands
 - Clinical Innovation Suite
 - Life Sciences Innovation Centre

Islands

- Skyelab

Glasgow City Region

- Digital Health and Care Innovation Centre (DHI) - University of Strathclyde and Glasgow School of Art
- Queen Elizabeth University Hospital Campus
 - ICAIRD
 - Clinical Innovation Zone
- Centre for Sustainable Delivery

Lanarkshire

- BioCity - MediCity

Moray Region

- Moray Rural Centre of Excellence in Digital Health and Social Care - University of Strathclyde and Glasgow School of Art

Aberdeen City Region

- Aberdeen Bio-Therapeutics Hub For Innovation (BioHub)
- NHS Grampian
- The Aberdeen Centre for Health Data Science - University of Aberdeen
- Abertay University
- Grampian Data Safe Haven - University of Aberdeen And NHS Grampian
- Robert Gordon University

Tay Cities Region

- Dundee Biomedical Quarter
- Health Informatics Centre - University of Dundee

Edinburgh City & South East Scotland Region

- Edinburgh BioQuarter**
- Midlothian BioCampus
- Data Centre of Excellence
- Queen Margaret University Innovation Hub
- Medical Device Innovation Centre - Heriot Watt University
- Cell and Gene Therapy Catapult
- Centre for Regenerative Medicine



*One Of The Innovative Firms Operating In Scotland

**Under Development

Future Medicines Manufacturing

Future Medicines Manufacturing Assets

Glasgow City Region

- Advanced Manufacturing Innovation District Scotland
- Medicines Manufacturing Innovation Centre
- National Manufacturing Institute Scotland
 - Advanced Forming Research Centre
 - Lightweight Manufacturing Centre
- Industrial Biotechnology Innovation Centre (IBiolC)
- CMAC - University of Strathclyde

Stirlingshire

- Industrial Biotechnology Cluster, Grangemouth

Ayrshire

- Irvine Life Sciences Enterprise Area
- Digital Processing Manufacturing Centre

Inverness & Highland Region

- Life Sciences Innovation Centre, Inverness Campus**
- NHS Highland RD&I
- University of Highlands and Islands Life Sciences Innovation Centre

Aberdeen City Region

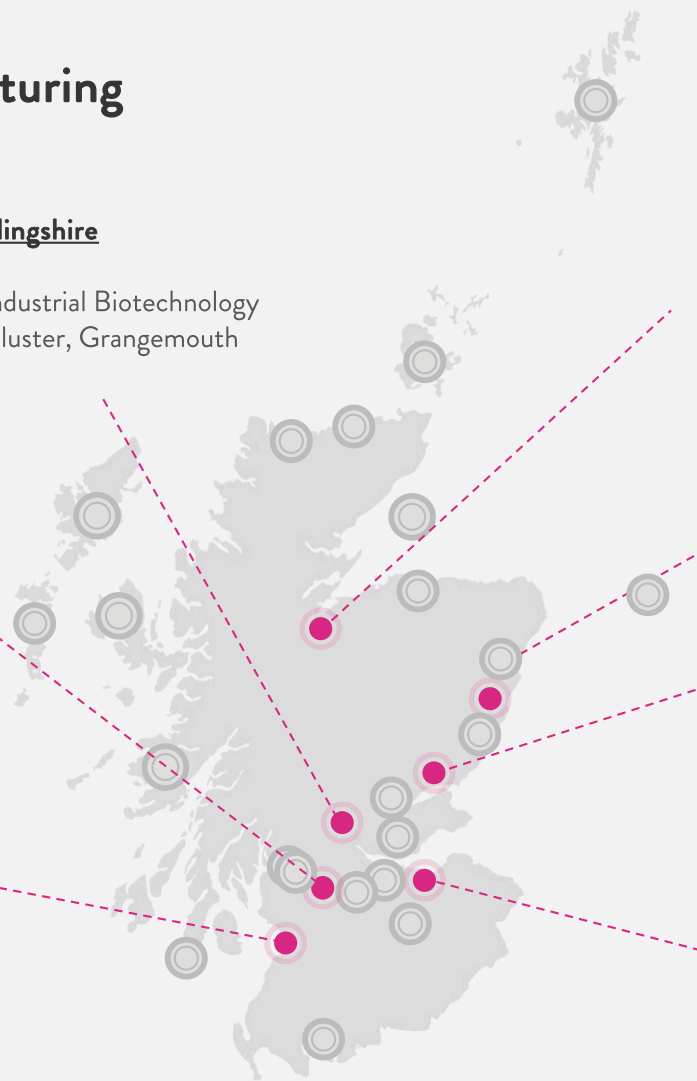
- NHS Grampian
- Abertay University
- Aberdeen Bio-Therapeutics Hub for Innovation (BioHub)
- Scottish Biologics Centre - University of Aberdeen

Tay Cities Region

- Rosyth Advanced Manufacturing Park
- University of Dundee – Drug Discovery

Edinburgh City & South East Scotland Region

- Medical Devices Manufacturing Centre - Heriot Watt University (offshoots in Glasgow & Aberdeen)
- Advanced Therapies Manufacturing Cluster
- Axol Bioscience*



*One of the innovative firms operating in Scotland
 **Under development

Precision Medicine

Precision Medicine Assets

Glasgow City Region

- Digital Health and Care Innovation Centre (DHI)
- Queen Elizabeth University Hospital Campus
 - Imaging Centre of Excellence
 - Precision Medicine Scotland Innovation Centre (PMS-IC)
 - Clinical Innovation Zone
- Precision Medicine Living Lab - University of Glasgow
- Medicines Manufacturing Innovation Centre
- Glasgow Riverside Innovation District
- CENSIS Innovation Centre
- Glasgow Clinical Research Facility

Renfrewshire

- University of the West Of Scotland – Medical Science expertise

Lanarkshire

- BioCity - MediCity

Ayrshire

- Irvine Life Sciences Enterprise Area

Inverness & Highland Region

- Inverness Campus Life Sciences Hub

Aberdeen City Region

- NHS Grampian
- University of Aberdeen
- Abertay University
- Aberdeen Bio-therapeutics Hub for Innovation (BioHub)
- The Centre for Genome-Enabled Biology and Medicine - University of Aberdeen
- Health Service Research Unit – University of Aberdeen

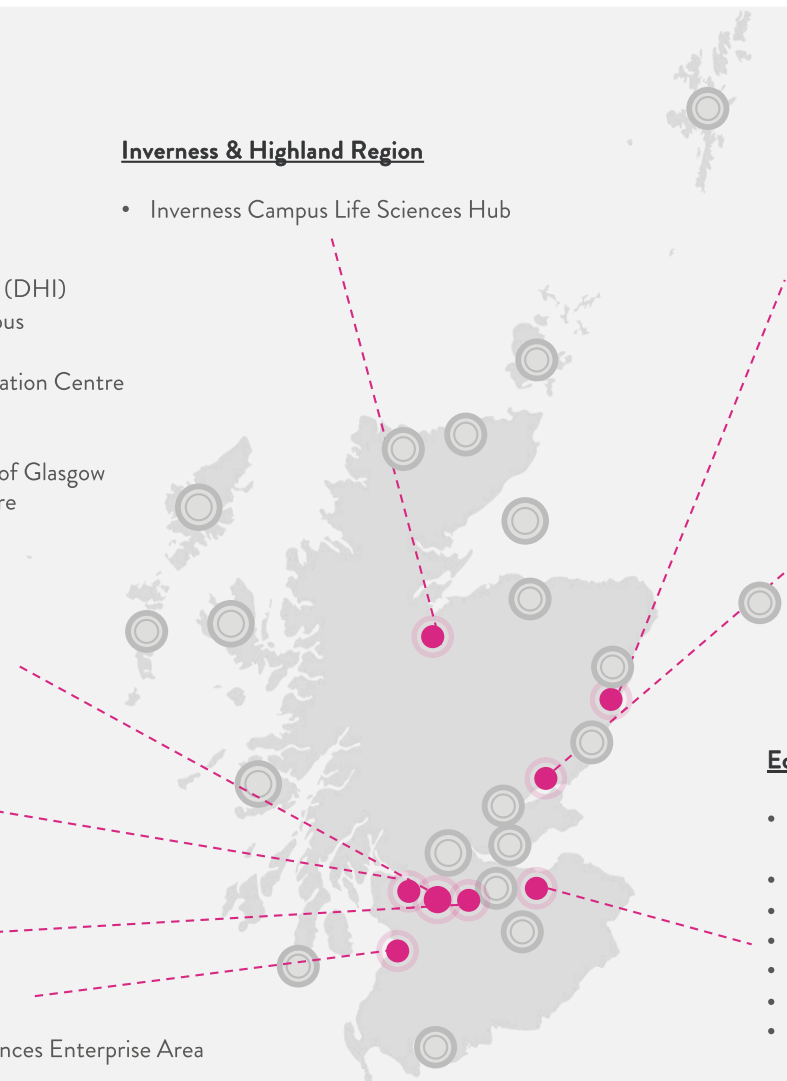
Tay Cities Region

- Tay Cities Deal focus on Healthtech sector growth – Tay Life Sciences Innovation District
- University of Dundee
- Tay Cities Biomedical Cluster
- Dundee Medipark
- NHS Permissions Coordinating Centre
- Tayside Clinical Trials Unit

Edinburgh City & South East Scotland Region

- Scottish Health Technologies Group, Health Technology Assessment
- Edinburgh BioQuarter**
- Midlothian Roslin BioCampus
- Advanced Therapies Skills Training Network (Roslin CT)
- Centre for Regenerative Medicine
- Cell and Gene Therapy Catapult
- Edinburgh Clinical Research Facility (NHS)

**Under development



Data and Digital Technologies

Data and Digital Technologies Assets

Stirlingshire

- Stirling Tech Scaler Hub**
- Scotland's International Environment Centre - University of Stirling

Glasgow City Region

- Technology and Innovation Centre - University of Strathclyde
- The Hunter Centre for Entrepreneurship / Growth Advantage Programme - University of Strathclyde
- Imaging & Internet of Things Tech
- Scotland 5G Centre
- Glasgow Tech Scaler Hub**
- The Data Lab Glasgow

Ayrshire

- S5G Connect – HALO Kilmarnock

Dumfries & Galloway

- Dumfries Tech Scaler Hub**
- 5G Rural Testbed Centre, The Crighton

Inverness & Highland Region

- Capgemini*
- Inverness Tech Scaler Hub**
- Scotland 5G Centre
- Hello Digital
- The Data Lab Regional Hub

Aberdeen City Region

- KPMG**
- ONE Techhub
- Aberdeen Tech Scaler Hub**
- The Data Lab Aberdeen
- Robert Gordon University
- Aberdeen 5G Hub
- National Subsea Centre

Tay Cities Region

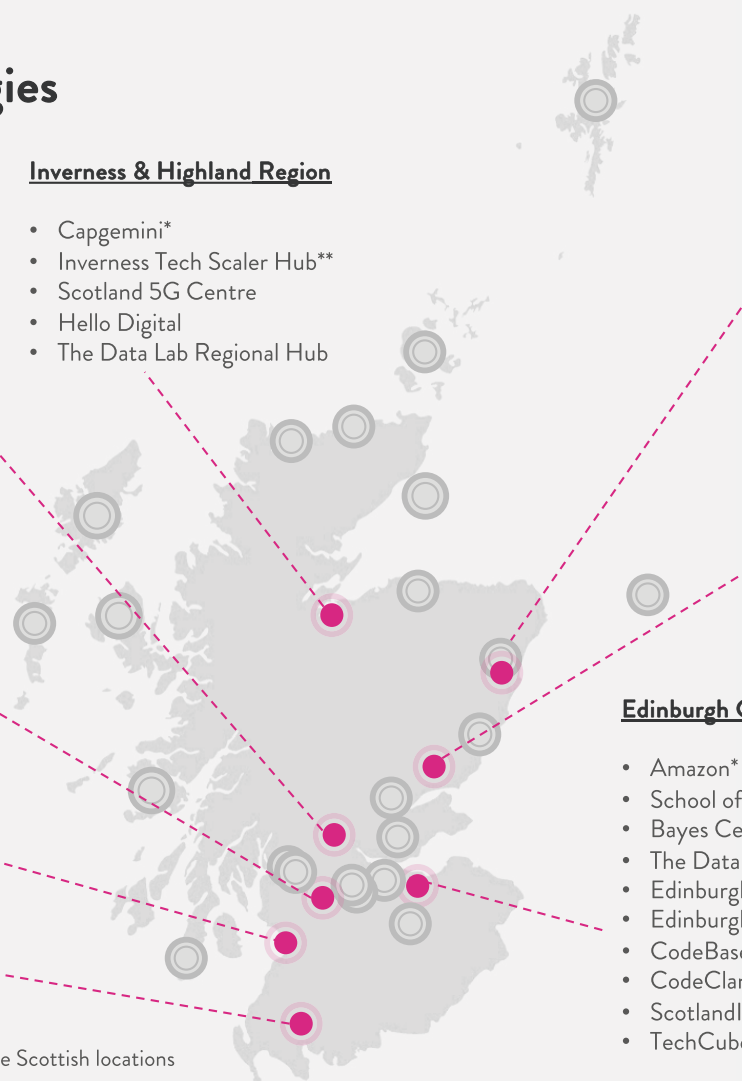
- NCR, R&D Centre of Excellence
- Aviva, Digital Commercial Training Hub
- Dundee Tech Scaler Hub **
- 5G Centre
- cyberQuarter - Abertay University
- Digital Media Park
- Seabraes Zone – commercial space for digital tech companies

Edinburgh City & South East Scotland Region

- Amazon*
- School of Informatics, Data Driven Innovation - University of Edinburgh
- Bayes Centre for Data Science and Innovation
- The Data Lab
- Edinburgh Napier University – cyber security
- Edinburgh Tech Scaler Hub**
- CodeBase
- CodeClan Digital Skills & Coding Academy
- ScotlandIS – Membership and Cluster Management Organisation
- TechCube – collaborative business hub

*One of the innovative firms operating in Scotland with multiple Scottish locations

**Under development



Quantum Technologies and Photonics

Quantum Technologies and Photonics Assets

Renfrewshire

- National Manufacturing Institute Scotland
 - Advanced Forming Research Centre
- The Institute of Thin Films, Sensors and Imaging - University of the West Of Scotland

Glasgow City Region

- University of Glasgow
 - QuantIC – quantum tech hub in quantum enhanced imaging
 - James Watt Nanofabrication Centre
- CENSIS Innovation Centre
- Scotland 5G Centre
- Fraunhofer Centre for Applied Photonics
- The Data Lab, Glasgow
- The International Max Planck Partnership (IMPP)
- M Squared Lasers*
- Coherent Technologies*
- Institute of Photonics - University of Strathclyde
- National Physical Laboratory

Inverness & Highland Region

- AMTE Power's Cell-Ageing Facility

Fife

- PowerPhotonic*
- Optos*

Aberdeenshire

- The Data Lab, Aberdeen
- Digital Incubator - Robert Gordon University
- Biomedical Imaging Centre - University of Aberdeen

Tay Cities Region

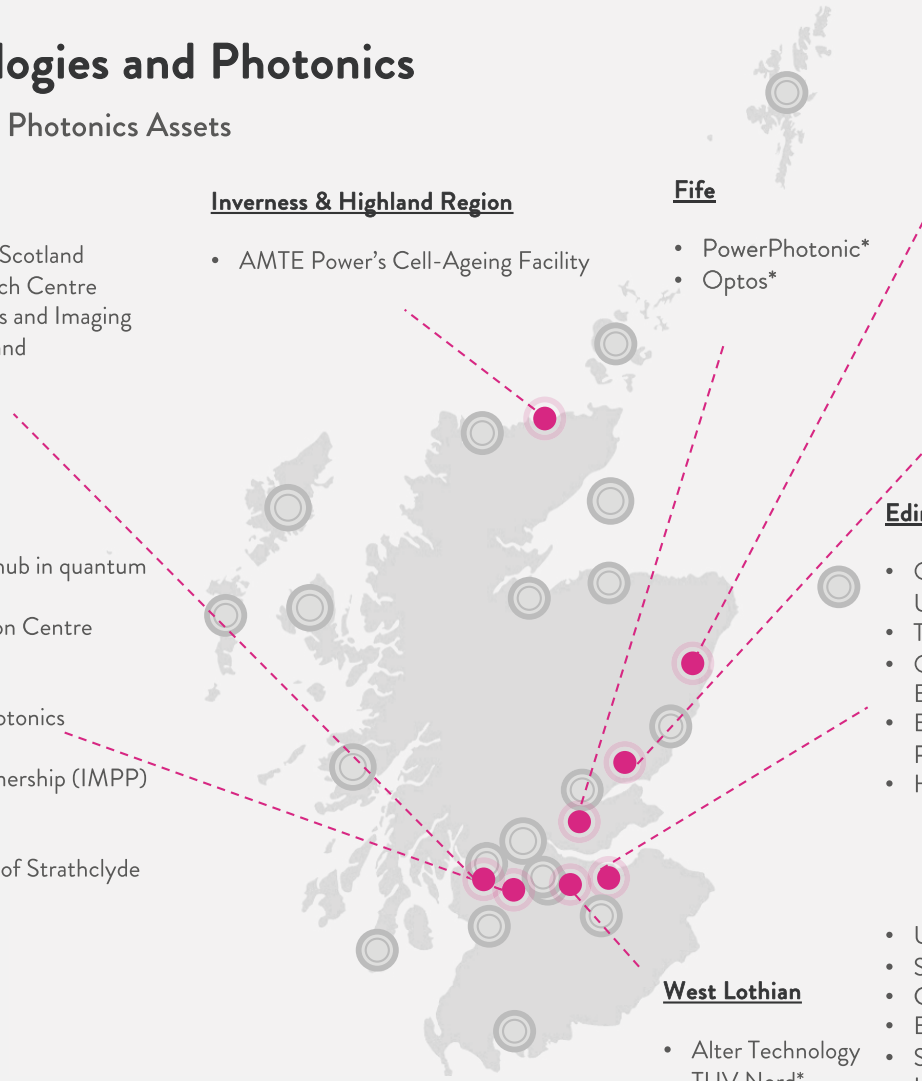
- University of St Andrews
 - Centre for Designer Quantum Materials
 - Ultra-Low Vibration Facility
- Applied Laster Technology Laboratory - University of Dundee

Edinburgh City & South East Scotland Region

- Quantum Software Lab and Scottish Microelectronics Centre - University of Edinburgh
- The Data Lab Innovation Centre
- Quantum Computing Application Cluster – University of Edinburgh, University of Strathclyde, University of Glasgow
- EPSRC Centre for Innovative Manufacturing in Laser-Based Production Processes
- Heriot Watt University
 - Institute of Photonics and Quantum Science
 - Quantum Photonics Laboratory
 - Centre for Innovative Manufacturing in Laser-Based Production Processes
- UK Astronomy Technology Centre
- Scottish Microelectronics Centre
- Chromacity*
- Edinburgh Instruments*
- Skylark Lasers*
- Leonardo*

West Lothian

- Alter Technology
- TUV Nord*



*One of the innovative firms operating in Scotland

Fintech and Financial Services

Fintech and Financial Services Assets

Glasgow City Region

- FinTech Scotland
- Morgan Stanley*
- Barclays*
- Atos**
- J.P. Morgan, European Technology Centre
- University of Strathclyde - developed the UK's first Fintech qualification
- University of Glasgow - Fintech Society
- AutoRek*
- Encompass*
- Nude*
- Virgin Money*

Ayrshire

- HALO - Barclays Eagle Lab

Tay Cities Region

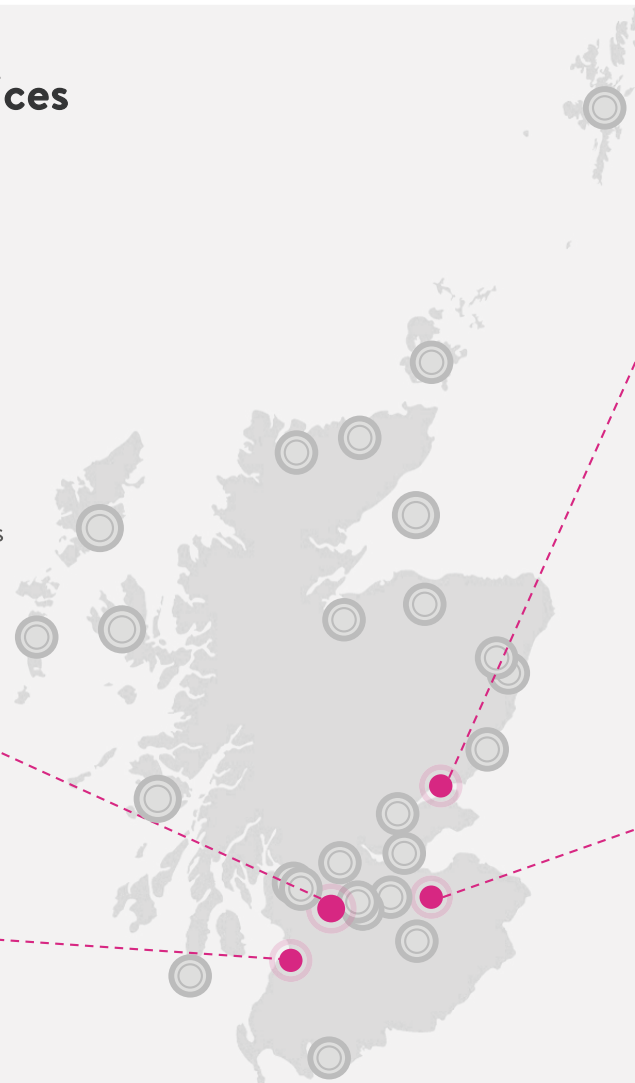
- NCR, R&D Centre of Excellence
- Aviva, Digital Commercial Training Hub
- Lloyds Banking Group
- Broker Insights*
- Embark*

Edinburgh City & South East Scotland Region

- Smart Data Foundry
- Fintech Scotland
- Lloyds Banking Group, Digital Technology Hub
- University of Edinburgh Bayes Centre and Futures Institute (EFI)
- Bayes Centre for Data Science and Innovation, RBS Data Team
- NatWest**
- Modulr*
- FNZ**
- Adarma
- Tesco Bank**
- M&G Prudential*
- Baillie Gifford**
- Direct ID*
- Amiquis*

* One of the innovative firms operating in Scotland

**With multiple Scottish locations



Advanced Manufacturing

Advanced Manufacturing Assets

Argyll & Bute

- Clyde Engineering and Innovation Centre

Renfrewshire

- Advanced Manufacturing Innovation District Scotland
- Medicines Manufacturing Innovation Centre
- National Manufacturing Institute Scotland
 - Advanced Forming Research Centre
 - Lightweight Manufacturing Centre

Stirlingshire

- Falkirk Grangemouth Investment Zone
- Scottish Aquaculture Innovation Centre (SAIC)

Glasgow City Region

- Small Satellite Manufacturing Cluster
- Continuous Manufacturing and Crystallisation Centre - University of Strathclyde
- Industrial Biotechnology Innovation Centre (IBioIC)

Ayrshire

- i3 Centre for Excellence for Digital Automation
- Ayrshire Manufacturing
- Hunterston Port and Resource Centre (PARC)
- Spirit Aerosystems Aerospace Innovation Centre

Inverness & Highland Region

- AMCF – Make It Smart Hub, Inverness
- Advanced Manufacturing Centre, Fort William
- Life Sciences Innovation Centre - University of the Highlands and Islands

Moray Region

- Manufacturing Innovation Centre, Moray (MICM)**
- Moray Aerospace, Advanced Technology and Innovation Campus**

Aberdeenshire

- Subsea Engineering Cluster (Inc):
 - TechnipFMC
 - Aker Solutions
 - Subsea 7
 - Bibby Offshore

Tay Cities Region

- Michelin Scotland Innovation Parc
- Rosyth Advanced Manufacturing Park

Fife

- Arrol Gibb Innovation Campus

Edinburgh City & South East Scotland Region

- Skyrora – designers, manufacturers and deployers of rockets*

Lanarkshire

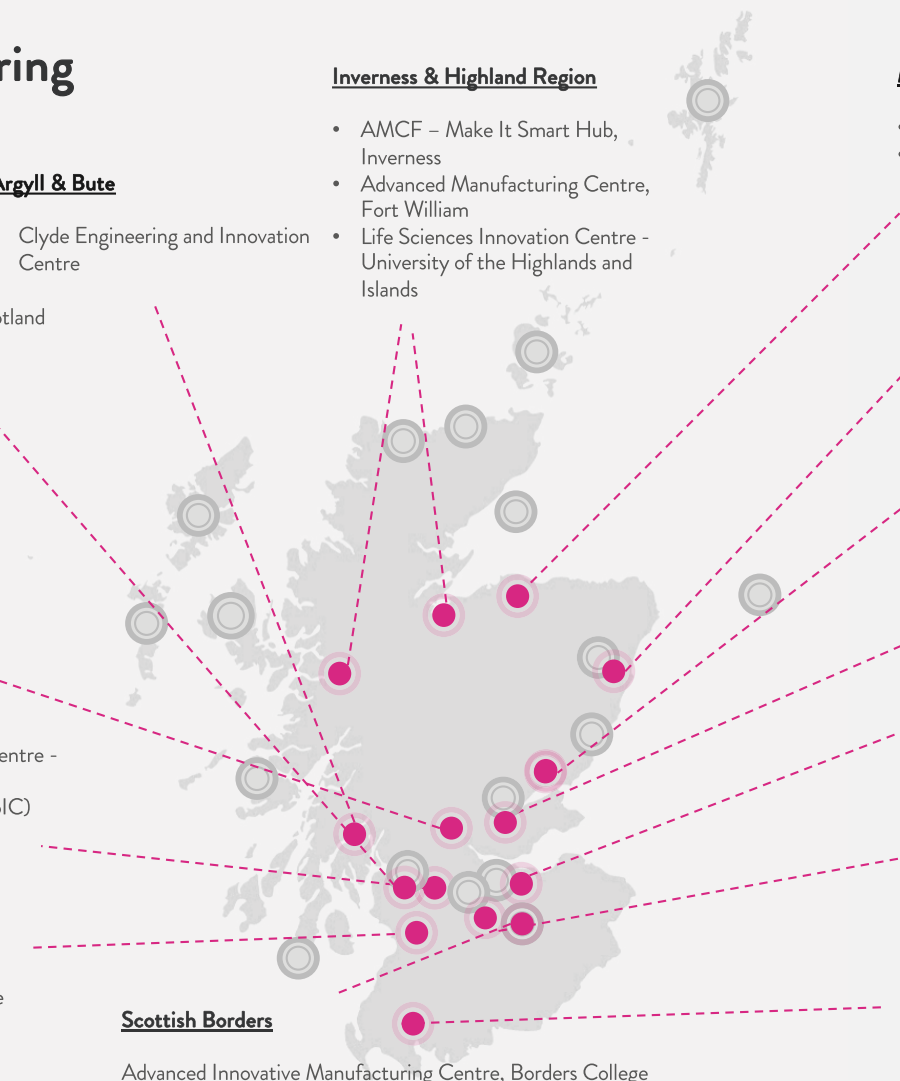
- TUV SUD – National Engineering Laboratory
- Built Environment Smarter Transformation Innovation Centre (BE-ST)

Dumfries & Galloway

- Advanced Innovative Manufacturing Centre, Dumfries and Galloway College

Scottish Borders

Advanced Innovative Manufacturing Centre, Borders College



*One of the innovative firms operating in Scotland
 **Under development

Small Satellite Space

Small Satellite Space Assets

Islands

- Spaceport 1 in Western Isles**

Glasgow City Region

- Small Satellite Manufacturing Cluster
- Tontine – Space and Tech Business Growth Accelerator
- Integrated Space and Exploration Technology (I-SET) Laboratory – University of Glasgow
- AAC Clyde Space*
- Spire Global Data & Analytics*
- Alba Orbital*
- M Squared Lasers*
- Walker Precision Engineering*
- Craft Prospect*
- Hypervine*
- Krucial*
- Castle Precision Engineering
- CENSIS Innovation Centre

Renfrewshire

- National Manufacturing Institute Scotland

Ayrshire

- Aerospace Cluster (Inc):
 - Spirit Aerosystems Aerospace Innovation Centre
 - Chevron Aircraft Maintenance
 - Bae Systems Regional Aircraft
 - Collins Aerospace
 - Prestwick Spaceport
 - Mangata Networks
 - Aerospace and Space Technology Application Centre**
 - Aerospace Digital Visualisation Suite

Inverness & Highland region

- Space Hub Sutherland**

Moray Region

- Orbex*

Islands

- SaxaVord Spaceport**

Aberdeen City Region

- University of Aberdeen Planetary Sciences Group

Tay Cities Region

- STAR Dundee*
- Smiths Interconnect – microwave connectors and components*
- Bright Ascension
- Dundee Satellite Station
- WL Gore*

Edinburgh City & South East Scotland Region

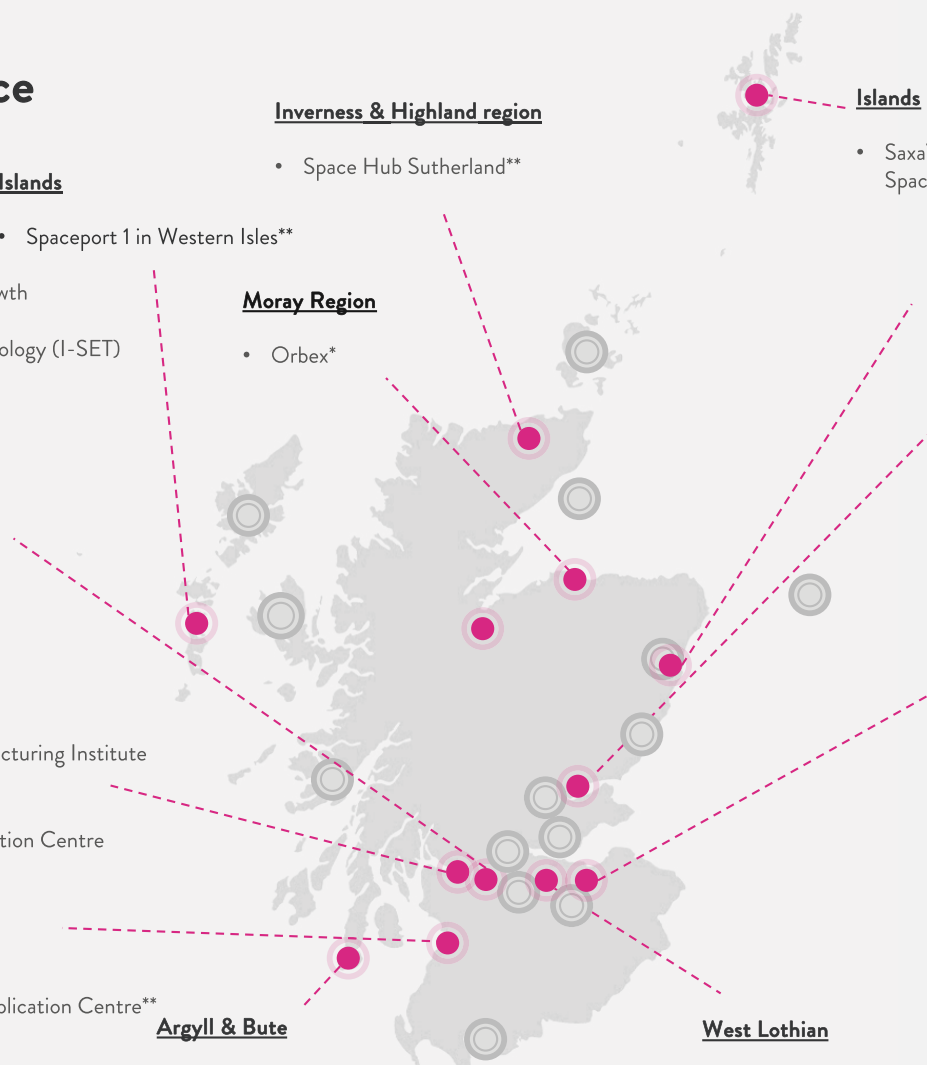
- Higgs Centre for Innovation
- UK Astronomy Technology Centre
- Skyrora – designers, manufacturers and deployers of rockets**
- WL Gore – Cables For Space Missions*
- Alpha Data*
- Honeywell Aerospace*
- Celestia UK*
- Sofant Technologies*
- Ecometrica*
- Earth Blox*
- Global Surface Intelligence*
- Earth Observation And Data Analysis Cluster
- Hylmpulse*

Argyll & Bute

- Machrihanish Spaceport **

West Lothian

- Alter Technology*

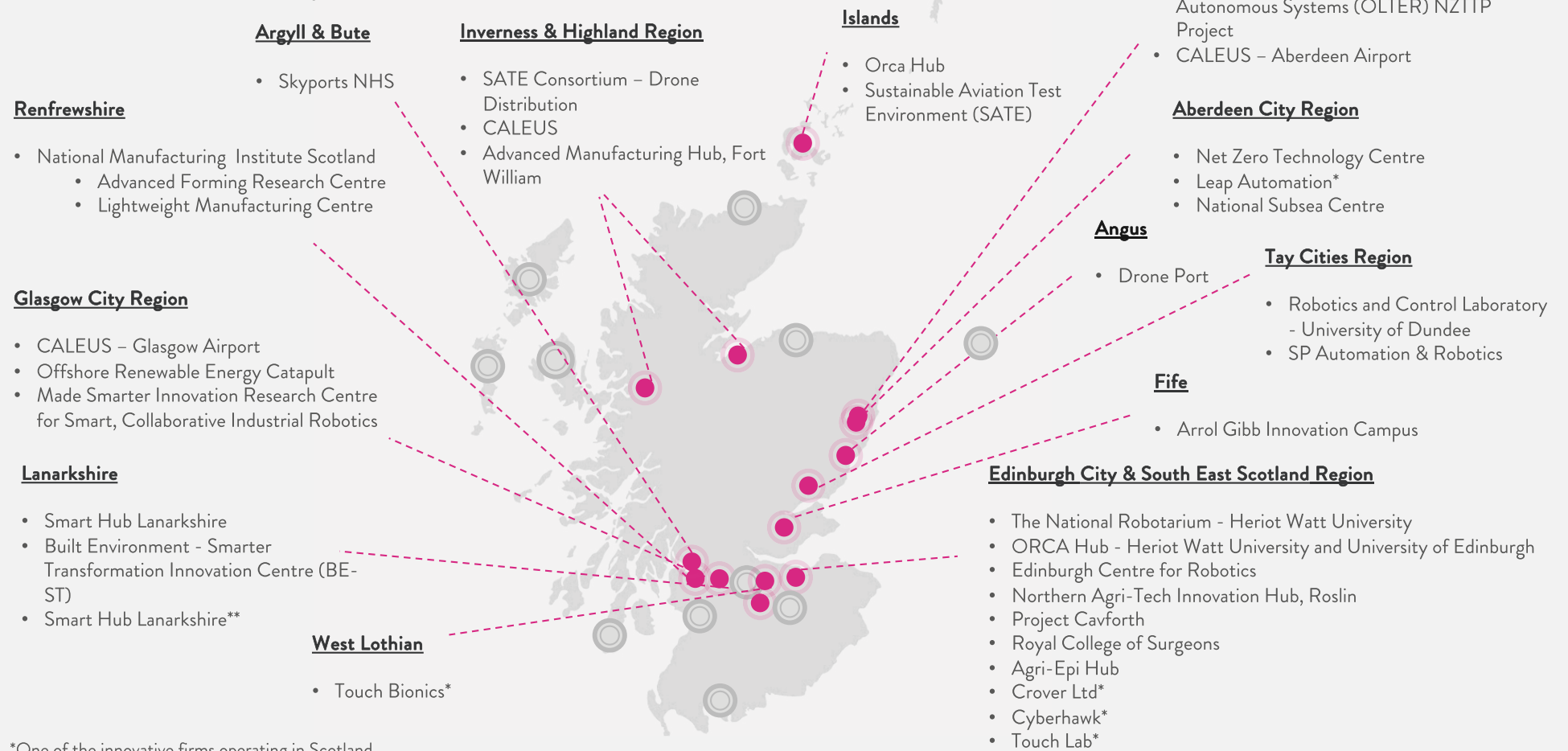


*One of the innovative firms operating in Scotland

**Under development

Robotics and Autonomous Systems

Robotics and Autonomous Systems Assets



*One of the innovative firms operating in Scotland

13. Glossary Of Terms

Term	Definition
Adoption and Diffusion	Adoption refers to the use of an already existing style of innovation by an organisation. Diffusion is a measure of the rate of adoption of Innovation.
BERD	Business enterprise expenditure on R&D (BERD) is the measure of R&D expenditures within the business enterprise sector during a specific reference period.
Commercialisation	Commercialisation refers to the act of turning an idea into commercial products or services.
GCIP	GCIP is an investment driven recovery plan that emphasizes the importance of Private Capital Investment and is one of three pillars focused on internationalising the Scottish Economy along with the Export Growth Plan and the Inward Investment Plan.
HERD	Higher Education Research and Development (HERD) is the total expenditure on higher education research and development in Scotland. HERD is a sub-category of total Gross Expenditure on Research and Development (GERD) in Scotland, which also includes Business Enterprise Research and Development (BERD), Government Research and Development (GoveRD) and Private Non-Profit Research and Development (PNP).
Innovation	Innovation is the process of creating something new or improving upon something that exists already. It can be a new product or service or process that increases efficiency, improve quality, or create new value for customers. It can happen in a variety of forms, from incremental changes to radical breakthroughs and can be driven by advancements in technology and changes in regulation/policies.
Innovation Clusters	Clusters are more productive than other parts of the economy, they drive innovative behaviours and help to attract investment and talent. When interconnected business, suppliers, universities and research organisations work and operate together they can grow and gain a competitive advantage over other places.

Term	Definition
Inward Investment Plan	Scotland's Inward Investment Plan sets out our ambition for Scotland as a leading destination for inward investment aligned with our values as a nation.
Investor Mindset	Having an investor mindset is a mental approach that prioritises careful analysis and planning in making important investment decisions. It involves understanding and managing risk and having clear goals.
Knowledge Exchange	This is the process that academic researchers, staff and other communities use to increase the rate of research. This process encourages these parties to share new ideas and areas of expertise between each other.
NESTA	NESTA is an innovation foundation based in the UK, that promotes innovation across a wide range of industries through programs, investments, policy and research.
Net Zero	Net zero is a target of completely negating the amount of greenhouse gases produced by human activity, to be achieved by reducing emissions and using methods of absorbing carbon dioxide from the atmosphere.
NSET	Scotland's National Strategy for Economic Transformation (NSET) sets out the priorities for Scotland's economy as well as the actions needed to maximise the opportunities of the next decade to achieve our vision of a wellbeing economy.
Pre Seed	Pre-seed is the funding that helps create a business's new product and find the right product-market fit.
Primary Innovation Pipeline	Primary Innovation Pipeline refers to the stages and processes through which a company generates and develops new products, services or ideas. It starts with having an idea, followed by research and development, testing and commercialisation.
Private Sector Investment	Private sector investment is the process of investing in a business that are privately owned and not publicly traded.
Public Sector Investment	Public Sector Investment refers to the investment of funds in to publicly traded organisations such as Educational institutions, Healthcare facilities and Transportation.
R&D	Research and development (R&D) defines the action that organisations undertake to innovate. This is usually the first step an organisation will take in the innovation process.
Seed	Seed funding is there to assist the growth of a new product through market research and product development.

Term	Definition
Scotland's Innovation Ecosystem	An innovation ecosystem is made up of a large and diverse range of resources and participants – from the public sector, private sector, academia and regional communities – that contribute to co-creating valued goods and services through innovation.
SME	Small and Medium sized Enterprises that traditionally consist of no more than 500 employees.
Spin-Outs	A spin-out is when an already existing business splits up the parts within itself to create a new company or area focused on a specific line of work.
Start-Ups	A start-up refers to a completely new business that wants to bring new ideas to a market and create innovative products and services.
STER	Review of the Scottish tech ecosystem by Mark Logan, commissioned by the Scottish Government, with recommendations on how to develop a world-class tech sector.
Systems Approach	A systems approach is a method of analysing and designing complex systems that takes into account all elements and their interactions to produce a desired outcome. It considers the system as a whole and its parts, focusing on how they work together to achieve goals.
Tech Scalars	Tech scalars combine best practice in incubation, intensive founder education in Internet Economy best practice, ecosystem social infrastructure, and integrated funding. Access to all services will be provided both physically and in a fully-virtualised form, enabling country-wide participation in Scotland's high-technology economy.

14. Acknowledgements

Developing this Strategy has been a significant and collective effort and we are grateful for the advice, expertise and insight received from across Scotland's innovation ecosystem.

We have had widespread engagement across the country with businesses from a range of different sectors and sizes, Industry Leadership Groups, all of our universities and colleges, our innovation centres, and our enterprise and skills agencies. We also conducted a Call for Evidence where we had over 60 responses and engaged with experts and leaders from across the ecosystem in working groups and workshops. We are indebted to all these colleagues and organisations for their time, expertise and insight which has helped us develop this Strategy.

This work has been guided by a senior group of innovation experts and leaders – our Innovation Strategy Steering Group, which comprised:

- **Professor Sir Jim McDonald, Principal of Strathclyde University (co-chair with Scottish Ministers)**
- **Christina Boswell, Vice-Principal of The University of Edinburgh**
- **Paul Atkinson, Founder and Chair Par Equity**
- **David Farquhar, CEO IGS**
- **Deborah O'Neil, Founder and CEO NovaBiotics**
- **Graeme Malcolm, Founder and CEO M Squared Lasers**
- **Jahan Ali, Director of Research and Technology Spirit Aerosystems**
- **John Fingleton, Entrepreneur**
- **Elsbeth Finch, Founder and CEO – IAND**
- **Stephen Ingledew, Exec Chair FinTech Scotland**
- **Adrian Gillespie, CEO Scottish Enterprise**
- **Karen Watt, CEO Scottish Funding Council**
- **Jane Martin, Managing Director Innovation & Investment Scottish Enterprise**



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