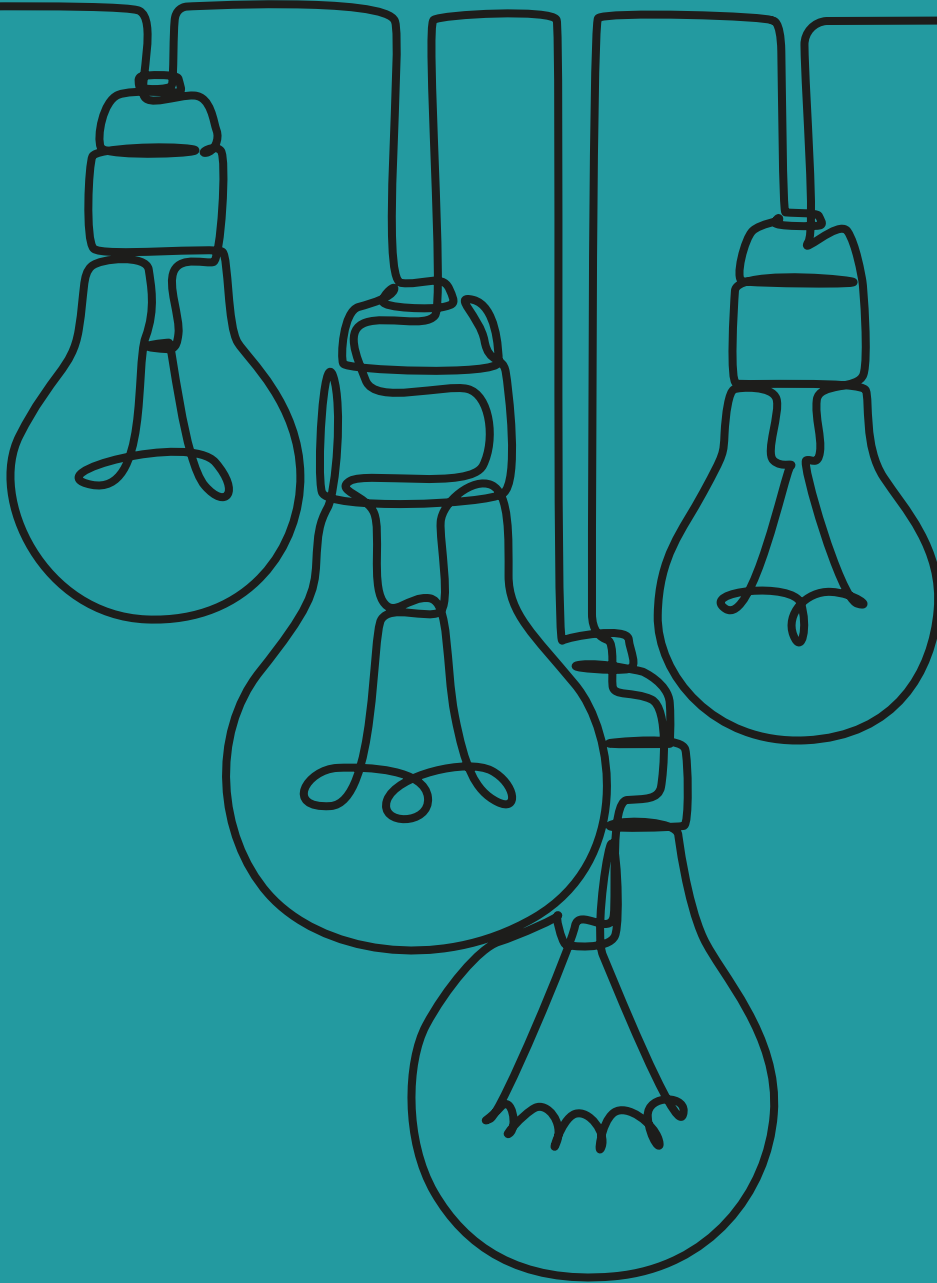




Llywodraeth Cymru
Welsh Government



WALES INNOVATES: CREATING A STRONGER, FAIRER, GREENER WALES



Print ISBN: 978-1-80535-497-0
Digital ISBN: 978-1-80535-498-7
WG44250
© Crown copyright 2023

Contents

| | |
|----------------------|----|
| Ministerial Foreword | 2 |
| What is Innovation? | 3 |
| Introduction | 8 |
| Missions: | |
| Education | 9 |
| Economy | 16 |
| Health and Wellbeing | 30 |
| Climate and Nature | 41 |



Ministerial Foreword

It's entirely fitting that the Welsh Government has produced a new Innovation Strategy at this particular time, for Wales is facing a new and developing research, development and innovation (RD&I) landscape.

For almost the whole of our devolution journey, we were simultaneously integrated into the UK RD&I ecosystem as well as the recipient of hundreds of millions of pounds of EU Structural Funds which placed a high priority on Research and Innovation.

It wasn't an especially neat arrangement but it did deliver a degree of autonomy for Wales on how support for RD&I was allocated and projects were match-funded.

With the winding up of the existing EU programmes this year, and uncertainty over our engagement with future EU scientific initiatives, things will all change.

The loss of RD&I funding is real, but bemoaning the fact is not productive. It's a reality check, for sure. There will be less money...and Wales will have less control over it.

But the goal of this Strategy is to point the way to a different approach to innovation in the future. If we can't compete in everything, we can adopt a mission-based attitude. If we can't support all research, we can prioritise work that is translational. If we don't have all the actors in this space that we'd want, the ones we do have can act with collaboration and discipline towards shared priorities.

And by acting like this, our innovation ecosystem can develop larger and more compelling RD&I propositions to leverage greater support from the responsible UK-wide agencies. The Welsh Government will always help those agencies where opportunities arise for Wales to deliver genuine innovative benefits to the UK.

This is the central narrative of the Strategy and it's in our control, as is the ability to develop a cross-government approach to ensure that investment in research and innovation – from whatever department it originates – aligns in a consistent and co-ordinated way.

Apart from this direct action, government can act as a crucible, using its convening power to bring about the collaboration within the ecosystem necessary to scale up support for game-changing RD&I projects.

The underlying message of the Strategy is that innovation is not an end in itself, but that developing a culture of innovation is. With such a culture, innovation becomes a tool to enrich our education, our economy, our health and wellbeing, and our environment.



Vaughan Gething

Vaughan Gething MS
Minister for Economy

What is Innovation?

Innovation can be defined as the creation and application of new knowledge to improve the world.

It has a **purpose**: It creates value by taking risk, embracing learning and failure while striving to make things better, by making a positive difference to people's lives through social, cultural, environmental and economic impacts.

It is **inclusive**: Anyone can be innovative and everyone should have the opportunity to be entrepreneurial and to access its benefits.

It is **flexible**: It flourishes with diversity. Everyone can be enabled to innovate in a way that works for them.

It is **cultural**: Ways of innovating matter. The 'How' of innovation is as important as the 'What' and often collaboration is more important than competition.

What is our Vision?

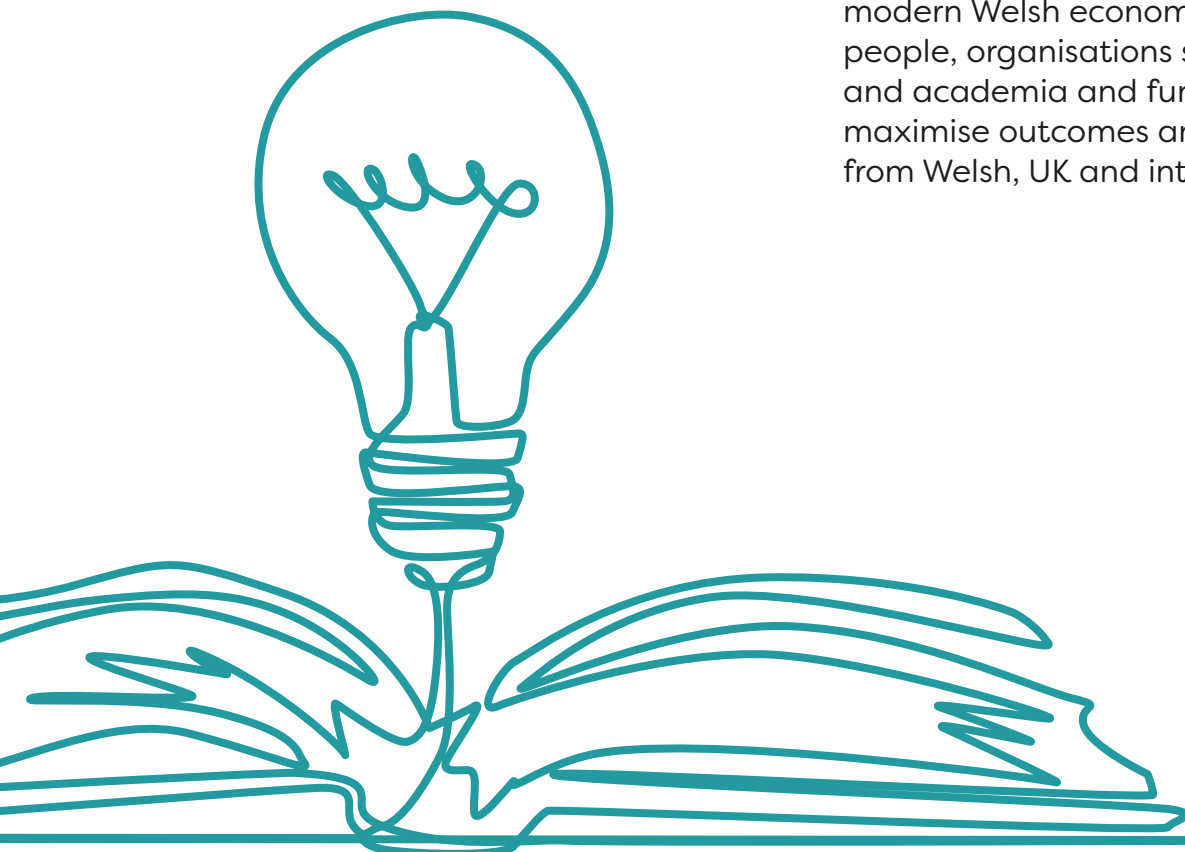
To create and nurture a vibrant innovation culture for a stronger, fairer, greener Wales.

It is dependent on our shared mission to secure greater wellbeing for the future generations of Wales; an integrated new strategy to guide government, business, third sector, academia and people to deliver ambitious, but achievable goals.

This will require a degree of discipline going forward from all innovation stakeholders to ensure their plans align with this coherent vision.

We recognise the barriers facing innovation which range from periods of restrained public finances, to a traditional culture of silo working within sectors and organisations.

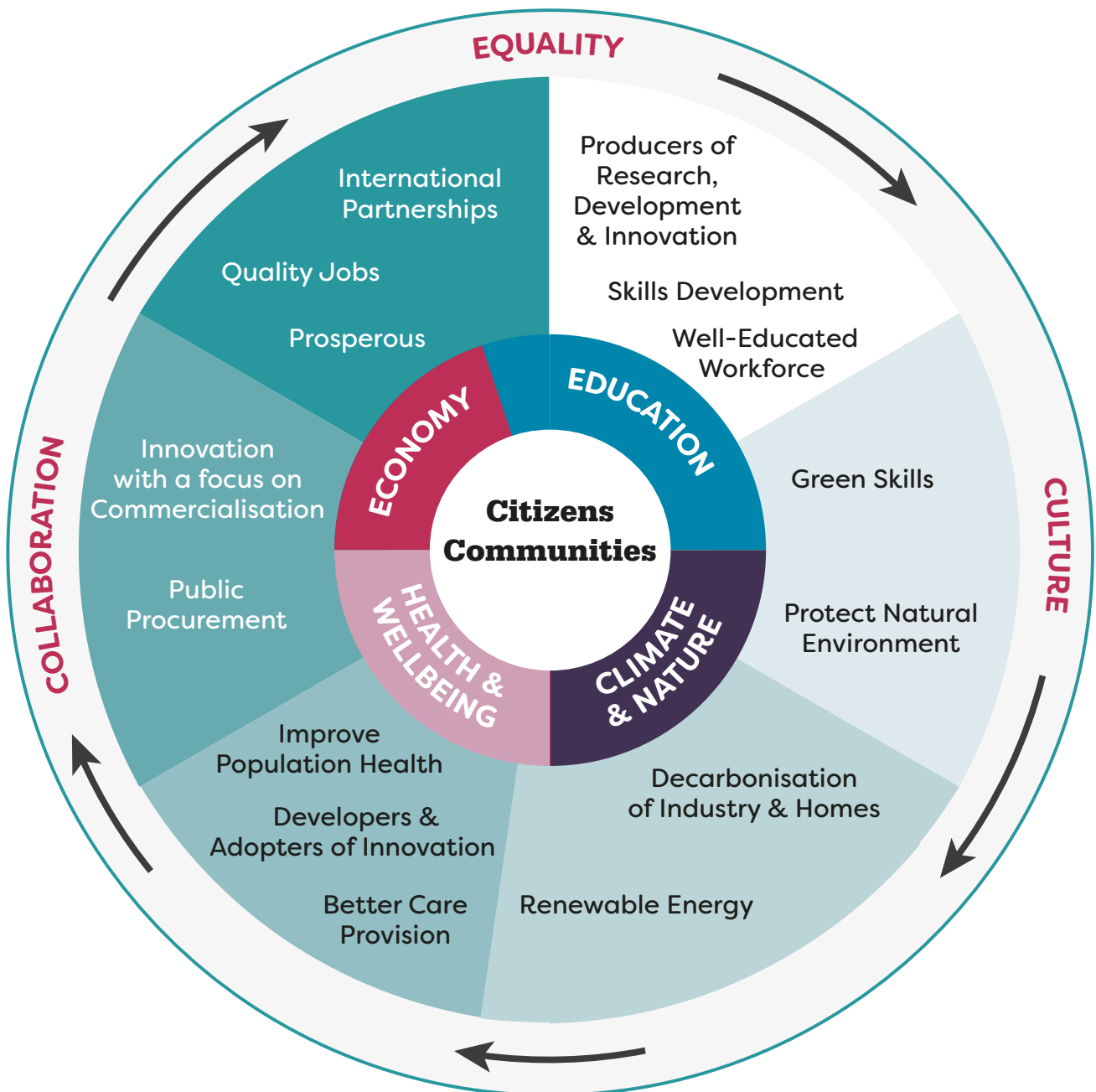
It seeks to use innovation to deliver impact and value for citizens in a modern Welsh economy by coordinating people, organisations such as business and academia and funding bodies to maximise outcomes and investment from Welsh, UK and international sources.



How will our vision be delivered?

A cross-government vision of innovation can touch every part of our lives. But to make measurable progress, our aims are grouped into four specific missions: for Education, the Economy, Health and Wellbeing, and Climate and Nature.

Innovation Missions



We will publish an Action Plan which will include a limited amount of specific and measurable mission goals, to take forward each of these missions.

To ensure the inclusivity, flexibility and cultural elements of our definition, each mission will have underpinning commitments to geographic and demographic equality; a thriving innovation culture; and a joined up, collaborative way of working.

The objectives of our vision will correspond with our Programme for Government¹:

- a stronger and more resilient economy.
- raised educational standards, particularly in tertiary education and research.
- effective, sustainable health and care with better services for vulnerable people.
- to respond to the separate emergencies of climate and nature in everything we do.

The innovation ecosystem

The ecosystem, as described below, has the capability and capacity to drive RD&I activity which can make a real difference to the citizens of Wales, within the missions we have set out.



¹ <https://gov.wales/programme-government>

Government

The role of Government is to set the vision and priorities for the innovation ecosystem to act upon. Government bodies also operate functions to provide advisory and financial support for innovation – sharing risk and stimulating activity over the horizon.

The Welsh Public Sector

Local Authorities, NHS Bodies, Regulators, Corporate Joint Committees. Their role is to collaborate with other sectors, stimulate and support innovative activity. They also have a duty to be innovative from within, improving their service delivery for the communities and citizens they serve.

Industry

Entrepreneurs, SMEs and Multi-national organisations invest in RD&I, often in collaboration to bring new products, processes and service forward for commercialisation, profit generation and economic growth.

The Third Sector

Much like industry social enterprises and charities invest in RD&I to develop new products, processes and services for public benefit.

Citizens Communities

Funding Providers

The funding landscape for innovation is mixed. Government and wider public sector bodies can provide grant funding to share the risk of innovation, alongside private investment by industry or by institutions such as the Development Bank of Wales, British Business Bank, Venture Capitalists and commercial banks.

Schools, Colleges, Universities

Their role is to create an environment where learners can develop the skills needed to participate in research, development and innovation, and support the next wave of innovations coming over the horizon. For example, mSparc, Wales' first science park provides apprenticeships through its skills academy and business support to those seeking to innovate in areas such as Agri-Tech and low carbon energy generation.

Research Organisations

These are often education providers such as Universities, but can also be public sector research organisations. They undertake curiosity research, generating an evidence base for further development and innovation. They often work in partnership with the public sector and industry to support the innovation process to commercialisation.

Innovation Assets

We have many assets in Wales that contribute to the innovation landscape and undertake several functions within the ecosystem. Some examples are listed below:

AMRC – member of the high value manufacturing catapult supporting the manufacturing community to access advanced technologies.

Health Technology Wales – NHS Wales own health technology assessment body, assessing new products and services aimed at the health and care system for their clinical and cost effectiveness.



Roles, functions and mechanisms for implementation

The Welsh Government, through its people and financial resources, will support the ecosystem to deliver. We will provide dedicated leadership in critical areas, using our convening power as a government to co-ordinate effort and deliver real outcomes for our citizens.

We will further develop the central Innovation Team who will be responsible for bringing together innovation leads to work together collaboratively across Welsh Government departments and policy areas. We will ensure appropriate ownership and oversight at senior levels for implementing the Strategy within government.

The Commission for Tertiary Education and Research and its Innovation Sub-Committee will also have a key contribution to make in delivering this Strategy given it has a leading role in promoting innovation in Wales.

We will share the burden of risk, by making key investments from within our own budgets, where appropriate. We will also work more collaboratively with UK Government in order to bring investment into the Welsh RD&I ecosystem, to drive progress against our shared objectives.

Monitoring and Evaluation

We will track the course of the missions, through our Action Plan, which will be developed through ongoing engagement with Plaid Cymru under the Co-operation Agreement and our stakeholders.

A lot of innovation activity can be slow to yield actual outcomes but we will review progress at the end of year one, reflecting back on what's changed and how our ecosystem is transitioning away from direct EU funding towards a more leveraged, competitive RD&I model.

We will run structured evaluations at years three and five to consider where measurable outcomes, linked to our missions and goals, have been delivered, in areas such as healthcare outcomes, decarbonisation, resource efficiency and the economy.

The implementation of this strategy will be overseen by our impartial Innovation Advisory Council for Wales who will be a source of ongoing constructive challenge and assurance.



Introduction

There has been significant progress in RD&I in Wales since our last innovation strategy in 2013. But our evidence^{2 & 3} showed that much of it was happening in an increasingly complex landscape, by diverse actors in discrete projects, without necessarily understanding how they might fit together. This is why we present our first integrated, mission based strategy.

Whilst the public sector is a key enabler and funder of RD&I activity, it became clear that investment in innovation is being made in many different parts of our society and economy, and by many different actors within a broad and diverse ecosystem.

Wales has a unique set of goals, set out in our Wellbeing of Future Generations Act 2015⁴, which could be used to guide our innovation priorities and their underpinning themes, helping everybody to see where their efforts can align with the bigger picture.

We have engaged extensively in how to develop a new strategy which drives a culture of innovation in Wales. These were the most common aims:

- A strong and inclusive research base committed to research with translational outcomes.
- Enable Welsh organisations, businesses and universities to form consortia, to compete more effectively for UK and international research and innovation funding.
- Develop a more flexible approach to funding businesses who undertake RD&I.
- Use procurement as a lever to increase innovation in the public sector.
- Accept and share risk by supporting innovation across the ecosystem.
- Drive innovation in our health system.
- Develop an innovation programme for social care.
- Nurture innovation skills in our young people, using the new inclusive curriculum throughout their educational journey, and into the workplace.
- Use innovation to improve resource efficiency, reduce carbon emissions and develop the potential for carbon capture and storage.
- Protect our natural environment, improve water and air quality, and allow room for biodiversity and natural systems to regenerate.
- Support more people to participate in, and benefit from innovation, regardless of their demographic or where they live.

2 <https://businesswales.gov.wales/innovation/sites/innovation/files/documents/AMPLIFYFI%20Report%20final%20version.pdf>

3 https://businesswales.gov.wales/innovation/sites/innovation/files/documents/MASTER%20COPY%20-%20Scoping%20innovation%20policy%20in%20Wales_final%20report_19th%20May%20final.pdf

4 <https://www.futuregenerations.wales/about-us/future-generations-act/>

Education

The Mission:

An education system that supports the development of innovation skills and knowledge throughout people's lives in Wales.

Schools, colleges, universities and research organisations create knowledge through research. This research can lead to commercialisation, create societal value, and support a stronger economy.



The foundations of a culture of innovation lie in our schools, colleges and universities.

Our new Curriculum for Wales⁵ will prepare learners for work in knowledge-based careers. It supports learners to be resilient, creative and ambitious, requiring them to solve problems, engage with different information and work independently. This will prepare our young people for the opportunities and challenges of an ever-changing economy and ensure learners have opportunities to develop as enterprising, creative contributors, ready to learn throughout their lives. STEM subjects are also integral to the Curriculum, which includes Science and Technology, and Maths and Numeracy as two of its six Areas of Learning and Experience.

We will continue to support digital learning through our network of learning providers in further education, work-based providers and for adults within community learning settings. A further £8 million will be invested in the next three academic years in line with our Digital 2030⁶ strategic framework.

Digital skills and STEM subjects will be essential to master new knowledge and the skills needed for our workforce in the fourth and fifth industrial revolution.

Schools benefit from digital collaboration



The Welsh Government has developed the Hwb⁷ digital learning platform which aims to improve the use of digital technology for teaching and learning in all schools across Wales. It provides all learners, teachers, maintained schools and colleges, and other stakeholders with access to a range of bilingual digital infrastructure, tools and resources including an all-Wales Microsoft Education licensing agreement that is helping to transform digital teaching and learning in Wales.

To ensure all our schools are equipped with the right EdTech infrastructure, we have provided funding to enable local authorities to upgrade the infrastructure in all maintained schools across Wales. Further investment since 2020 has enabled local authorities to purchase an additional 240,000 new end-user

5 [Curriculum for Wales – Hwb \(gov.wales\)](https://www.gov.wales/curriculum-for-wales)

6 <https://www.gov.wales/digital-2030-strategic-framework>

7 <https://hwb.gov.wales/>

devices which will enable schools to further exploit the transformational benefits digital and technology can have on education.

Hwb is now more than just a platform; it is key to transformational changes to education, ensuring digital is at the heart of the new Curriculum for Wales. The Hwb EdTech programme is focusing on how these investment programmes are able to support schools in embedding digital learning in the classroom, as well as embedding the way digital and ICT is delivered in schools.

The Welsh Government will continue to partner with the WJEC to deliver the Wales Innovation Awards, providing opportunities for young people in schools and colleges to be recognised for their technological innovations and to see the relevance of design and technology.

Innovation award leads to dream job for Joe



Joe Ringrose has become a full-time electronics design engineer at Flintec Ltd., Cardiff, by completing a four-year apprenticeship, following his win

at the student Innovation Awards. As part of his GCSE Design and Technology coursework, Joe designed and created a washing line alarm device that could detect rain. After news of his win appeared in the local paper, he was approached by the company and encouraged to apply to their apprenticeship programme.

“The media recognition I received after winning led me to the career I’m in now, and I love it. I didn’t want to do A-levels and was looking for an apprenticeship that allowed me to develop my passion for design and technology.”



Fostering a culture of Innovation is vital to ensure that young people have a springboard into high-quality, skilled apprenticeships and careers in Wales.

Tertiary education has a crucial role in Welsh research and innovation. We are creating a more strategic, collaborative, and joined-up education and research sector with the Commission for Tertiary

Education and Research (CTER)⁸. The legislation to establish the Commission also places a duty to promote research and innovation, promote competitiveness and increase participation in RD&I from under-represented groups.

The Commission has a key role in the implementation of this strategy and will be the first national steward for the whole tertiary education and research sector, bringing responsibility for overseeing Wales' higher and further education, school sixth forms, apprenticeships and research and innovation together in one place.

Their aim is to support learners and provide them with the knowledge and skills for lifelong learning, development and success. It will be responsible for the future strategy, funding and oversight of our higher and further education providers, to align education, skills, and training with research and innovation, ensuring tertiary education providers deliver the skills that employers and the workforce need.

Research groups in the academic, private and public sectors have been dependent on EU Structural Funds to support research and innovation activities. A transition to alternative funding sources, including UK Government, UK Research & Innovation (UKRI), charities and businesses is necessary. It will require a strategic approach which focuses on areas of

strength which are internationally competitive and aligned to our priorities set out in this strategy, and our Programme for Government⁹.

Higher Education Funding Council Wales (HEFCW) already provides funding via the £15m Research Wales Innovation Fund¹⁰, to enable innovation and engagement activities at Welsh Universities such as cross-sector collaboration aimed at closing Wales' productivity gap through knowledge exchange, workforce development, public engagement, attracting investment and supporting post pandemic recovery.

HEFCW is also exploring how a more strategic approach can be developed to help maximise grant capture from other sources. Welsh Government will continue to work with HEFCW (and in the future its replacement, CTER), Wales Innovation Network (WIN)¹¹, universities, and the wider tertiary education sector to support a collaborative approach to optimise the value of research and innovation funding for our priorities.

Building on past success, the next phase of the Sêr Cymru research programme will allocate £10m to 2025 on a competitive basis to strengthen the science research base in Wales and increase leverage from UK-level funding sources. This supports our goal of fostering skills and expertise amongst researchers in Wales and encourage the retention and arrival of high-calibre scientists.

⁸ <https://gov.wales/tertiary-education-and-research-commission>

⁹ <https://gov.wales/programme-government>

¹⁰ <https://www.hefcw.ac.uk/en/our-responsibilities/research-innovation-and-engagement/research-and-innovation-initiatives/>

¹¹ <https://uniswales.ac.uk/our-work/wales-innovation-network>

Previously, Sêr Cymru has supported a broad range of topic areas, but the themes for this next phase will be closely aligned with Welsh Government policy priorities, as well as the strengths identified by this strategy, the Wales Innovation Network and HEFCW. The next phase of projects will look to encourage research in new or evolving technologies for ‘real world’ applications and industry collaboration, after which other innovation-focussed programmes can take the research to market or into practice.

We will continue to work with our business community to offer Knowledge Transfer Partnerships (KTPs)¹², delivered with Innovate UK. These will provide opportunities to link innovative businesses with academia to work on projects led by graduates, helping them improve their competitiveness, productivity and performance.

Lives of vulnerable children transformed



Some children, particularly those with additional needs, often wait the longest to be adopted. Not only is this detrimental for the child, but the cost of a child remaining in long term foster care is also significant.

The Adopting Together Service, born out of a Knowledge Transfer Partnership between St David’s Children Society and Cardiff University¹³, prioritises those children who have been waiting longest. By bringing together different stages of the adoption process into one service, it has reduced the time it takes to find a suitable family and ensured they receive the support they need as they create a new one.

In addition to the lifelong benefits to the child and the adoptive family, a recent analysis has calculated the social return on investment of adoption, as opposed to staying in foster care, is £1.3 million¹⁴.

¹² <https://businesswales.gov.wales/expertisewales/search-expertise-within-universities-and-colleges/knowledge-transfer-partnerships-ktp>

¹³ <https://businesswales.gov.wales/innovation/st-davids-children-society>

¹⁴ <https://cvaa.org.uk/wp-content/uploads/2022/12/CVAA-The-value-of->

Aligning innovation, employability and skills

Evidence shows that innovation, entrepreneurship and employment are related. The Organisation of Economic Cooperation and Development (OECD) found that deployment of new technologies has historically led to net job creation and increased productivity¹⁵.

But innovation can be disruptive and jobs can be lost as well as created. This complicates public policy responses, but like other structural challenges, it offers an opportunity to improve the skills of people to move out of declining or vulnerable sectors, as well as an opportunity to mitigate inequalities and increase productivity.

Our skills and employability priorities must underpin our innovation strategy if prosperity is to be shared by all. These priorities are set out in *Stronger, Fairer, Greener Wales: a plan for employability and skills*¹⁶, and the more recent *Net Zero Skills Action Plan*.

- A Young Person's Guarantee: giving everyone under 25 the offer of work, education, training, or self-employment.
- Tackling economic inequality: improving labour market outcomes for Black, Asian and Minority Ethnic communities, women, disabled people and those with low skills.

- Promoting Fair Work: encouraging employers to make work better, fairer and more secure.
- Raising skill and qualification levels, and the mobility of the workforce.

We support programmes which help translate the nurture of innovation into the world of work and enterprise.

Developing creativity and enterprise in young people as they transition through education helps them apply their skills in the workplace, or indeed to become the next generation of entrepreneurs. Big Ideas Wales¹⁷ works with young people in schools and beyond to raise aspirations and develop commercial ideas. Experienced entrepreneurial role models encourage innovative thinking and growing new sustainable businesses. Wales has the highest graduate start-up rate per capita in the UK¹⁸, we will continue to work with Further and Higher Education institutions, who play a key role in developing the entrepreneurial ambitions of students and graduates.

The Regional Skills Partnerships (RSPs)¹⁹ are central to understanding the employment and skills needs of the future. They collate labour market intelligence from employers, providing an evidence base to inform decision making.

15 <https://www.oecd.org/sti/ind/2759012.pdf>

16 <https://gov.wales/stronger-fairer-greener-wales-plan-employability-and-skills>

17 <https://businesswales.gov.wales/bigideas/>

18 <https://uniswales.ac.uk/sites/default/files/2021-10/Graduate-Start-Ups-in-Wales-English%20%288%29.pdf>

19 <https://businesswales.gov.wales/skillsgateway/skills-development/regional-skills-partnerships>

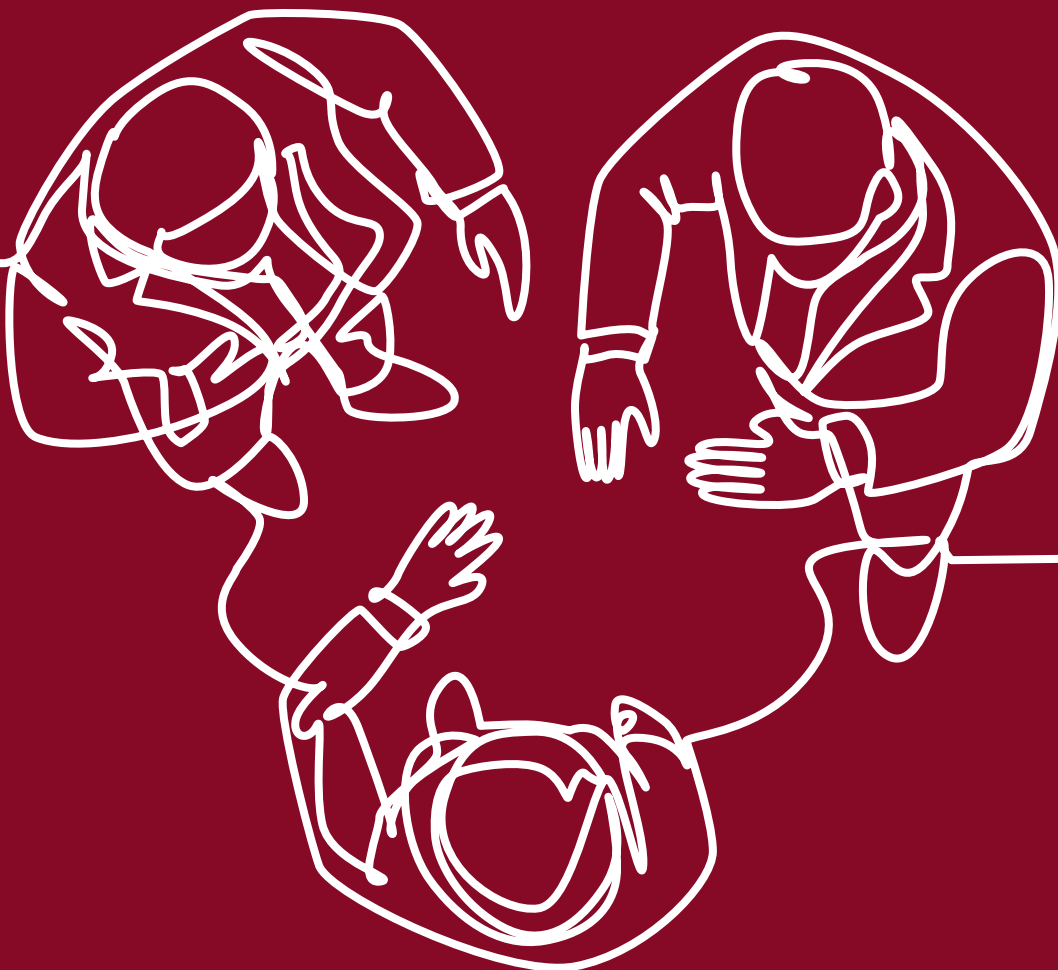
As part of the Young Person's Guarantee, we continue to work with Further Education institutions to develop Employment and Enterprise Bureaus to provide wrap-around support to ease the transition from learning to work.



Economy

The Mission:

An economy that innovates for growth, collaborates across sectors for solutions to society's challenges, adopts new technologies for efficiency and productivity, uses resources proportionately, and allows citizens to share wealth through fair work.



Our strategy for an innovative economy doesn't sit in a vacuum and recognises Wales' position within the UK and beyond. This is not just because we share national RD&I assets, we share an integrated economy.

UK Context

We acknowledge at the outset the parallel nature of the Welsh context and UK ambitions for mutual progress in innovation across the UK RD&I spectrum. In July 2021, the UK Government published its Innovation Strategy²⁰ and it is in that context that our strategy will align.

The UK Government has committed that by 2030, domestic public investment in RD&I activity outside the South-East of England will increase by at least 40%, and over the current Spending Review period by at least one third. We also agree with the UK Strategy on the importance of RD&I activity to be commercially focused, place based, and outcome centred to deliver the goals in our Wellbeing of Future Generations Act, while recognising the importance of fundamental research in areas of priority.

Clearly, the UK Government distributes much more RD&I funding than Wales ever can. In addition to our own investments, we must compete to attract more competitive funding to support delivery of the UK strategy, as well as our own innovation priorities. To this end, the Welsh Government and Innovate UK are

committed to working collaboratively on a memorandum of understanding (MOU) aligned to this strategy.

The Welsh Dimension

With a greater proportion of SMEs and a smaller proportion of large corporate R&D practitioners²¹, particularly those headquartered here, Wales has not achieved its potential in traditional UK competitive bid funding rounds. For example, more recently, approximately 3%²² of Innovate UK competitions budget is invested in Welsh activity, concentrated in the south of the country. Our aim is to consistently achieve 3% in three year's time (2026), with a more even geographical spread. This represents Wales' proportion of the business population, with a view to increasing this to 5% in seven years' time (2030). We will apply similar targets to other sources of innovation funding in due course, including other Research Councils within the UKRI structure.

If Wales is to increase its share of competitively awarded funding, we need to collaborate on our shared strengths and ambition to make compelling proposals to UK Government, UKRI, charities, industry and international award schemes. This is likely to be challenging and we need to scope out ways to support and facilitate this transition. The Wales Innovation Network (WIN) was established in response to Professor Graeme Reid's

20 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009577/uk-innovation-strategy.pdf

21 <https://gov.wales/size-analysis-businesses-2021>

22 <https://www.ukri.org/publications/innovate-uk-funded-projects-since-2004/>

2020 report, 'Strength in Diversity'²³, which recommended the creation of a new initiative to tap into the diversity of Wales' RD&I capacity through cross-sector collaboration.

Leveraging wider sources of Innovation funding

The media.cymru consortium, part of the South Wales Clwstwr²⁴, is made up of public sector, private sector and academia. Led by Cardiff University, it has secured a £50 million programme to grow the Creative Industries sector through RD&I in the Cardiff Capital Region.

The programme, supported by UKRI, Welsh Government and Cardiff City Region Deal will run until 2026, driving inclusive and sustainable economic growth.

Clwstwr have already moved from 22% female-led projects to 66% in 2021 and media.cymru has specific goals to improve equality and diversity as well as targets and specific actions to increase bilingual projects and diversify production, including neurodiversity.

We want more of our entrepreneurs and innovators, from all groups in society, enjoying success from UK and international funding and partnership opportunities. The Innovate UK

competitions which support more equality in innovation are an example of where we will support people to develop their ideas into strong proposals and build the skills they need to attract investment from a range of sources. We will ensure support is accessible and offers something to all innovators in our society.

Alongside a transition towards more investment from UK Government and beyond, we will continue to provide support to our business community to innovate. We will expand our offer to include Micro, Small and Medium sized businesses with funding and advice. We will develop a new, flexible, rapid advice and funding offer which will be ready for launch in 2023. The offer will be fair and accessible with a simple and transparent application, assessment and monitoring process. In designing our offer we will engage and test with a diverse range of innovators to ensure it is visible and inclusive. It will also be available across Wales and extended to include social enterprises and the public sector.

Over the next three years we will invest at least £20 million of grant funding, for innovative developments and the adoption of new innovation, in organisations in Wales. This support will align with delivery of the principles set out in our economic contract and wider policy priorities such as encouraging the use of Welsh, fair work, equality, decarbonisation and protecting our natural environment. We will support organisations to understand their

23 <https://uniswales.ac.uk/sites/default/files/2021-09/Strength-in-Diversity-Professor-Graeme-Reid-FINAL.pdf>

24 <https://clwstwr.org.uk/>

carbon footprint by identifying the most appropriate measurement tool for them, and supporting them to adopt technologies and new approaches to reduce their carbon output. We will work with trade unions to engage with the voice of the workforce on this journey.

We will also use procurement to drive further investment in innovation. With £7 billion spent annually by the public sector in Wales²⁵ there is significant scope to consider alternatives to conventional purchasing methods and, wherever possible, to buy innovatively.

As an example we will apply innovative thinking to food procurement and supply chains to create a more sustainable food system; reduce the carbon impact of food provision; support indigenous producers/suppliers; and increase the amount of Welsh food onto school and hospital plates.

The Wales Procurement Policy Statement (WPPS) 2021²⁶, sets out a vision for public sector procurement in Wales. It puts our well-being goals at the heart of procurement processes. The key principle of WPPS is to align our ways of working and widen involvement to support innovative and sustainable solutions through procurement. Included is a new competitive flexible procedure, which gives contracting authorities the ability to design and run a procedure that suits the market in which they are operating and will drive greater opportunity for innovation.

Changes to the procurement regime will seek to achieve closer working between

industry, government and academia to drive research, enhance investment and promote innovation and productivity. A digital and integrated system will also link different data sets using automation and data analytics to increase visibility into what Government is procuring and where there are additional opportunities to innovate.

Small Business Research Initiative

The Welsh public sector has become an active player in developing and road testing solutions to some of society's biggest problems by using collaborative, challenge-led procurement to engage with industry; the Small Business Research Initiative (SBRI).

The public sector uses SBRI to publish difficult challenges, allowing suppliers to propose innovative solutions; either new ideas or tried and tested products from other sectors or countries.

We will continue to expand the use of this kind of innovation with the support of our SBRI Centre of Excellence at Betsi Cadwaladr University Health Board. To date, more than 50 Welsh businesses have secured contracts to develop new solutions to the challenges posed.

Recently, the Cardiff City Region Deal and the Mid Wales Growth Deal have also developed challenge-

²⁵ <https://www.gov.wales/wppn-07-21-sme-friendly-procurement-html>

²⁶ <https://www.gov.wales/welsh-government-wales-procurement-policy-statement-action-plan>

led programmes and NHS Wales is proving a successful test bed for the new technologies and processes, trialling projects with the potential to save the health and care services in Wales £5.8million each year.

The Welsh public sector has long championed the use of challenge led procurement, and the Small Business Research Initiative²⁷, an innovative procurement mechanism that enables the public sector to work with industry partner on supplying unique and novel solutions to unsolved public sector challenges.

Women in Innovation



Deborah Coughlin is an entrepreneurial inspiration, whose business, Method X Studios, uses innovative technical apps to improve mental health and social inclusivity.

Mental health conditions are a burden for patients and health services and evidence shows that there are social patterns to their incidence and severity: People in the lowest socioeconomic groups have higher rates of mental ill-health than those in the highest groups.

Method X produces entertaining and educational digital content on mental well-being for an app which is free to download from Apple Store or Google Play. The content has been independently peer reviewed positively against six recognised well-being outcomes.

Deborah is a recent winner of Innovate UK's *Women In Innovation* Awards, cited for bringing tech, science, research and media together to help solve one of healthcare's most chronic problems.

The Business Wales service²⁸, alongside programmes such as the SMART Digital Accelerator²⁹, will ensure innovators have access to relevant advice and guidance to reach their full potential by building confidence and inspiration. It can create the conditions for businesses to start and grow, contributing increased productivity, resilience, decarbonisation and sustainability to the Welsh economy.

Our support will compliment wider investment opportunities from the Development Bank of Wales and British

27 <https://www.ukri.org/wp-content/uploads/2022/05/UKRI-130522-AnEvaluationoftheSBRIJanuary2022-WEB-FINAL.pdf>

28 <https://businesswales.gov.wales>

29 <https://www.uwtsd.ac.uk/smartdigitalaccelerator/>

Business Bank³⁰ to deliver against our wider policy commitments, for example the circular economy and adoption of new cleaner and digital technologies by organisations.

The Development Bank of Wales has ambitious plans to increase investment over the next five years to ensure that Welsh businesses have on-going availability of capital. This includes a £20 million Wales Technology Seed Fund, supporting start-ups moving from proof of concept to commercialisation; the £8 million Angel Co-investment Fund, and the £500 million Wales Flexible Investment Fund, supporting innovation from early stage through to large scale growth³¹. The Bank also supports our wider policy agenda with a clear remit to support the transition to net zero, and will deliver a Decarbonisation Fund with competitive terms. The Fund will support businesses wanting to invest in decarbonisation infrastructure, including renewables.

We will ensure that everyone, regardless of their background or circumstances, has the opportunity to participate in innovation, by innovating themselves, by influencing where innovation happens or by enjoying the tangible benefits of innovation, whether that be through fair work, improved health services or a green transport system. We will raise awareness across Wales of what innovation is and the opportunities it presents.

We will support those organisations who are new to innovation, whether through the development of new products, services or processes, or the adoption of new innovation to harness the benefits it can bring to citizens, the economy and the natural environment in which we live. We will expand our Digital Accelerator advisory support to help organisations, implement more efficient processes within their business and to identify energy saving and decarbonisation technologies.

Regional Innovation

Our commitment to a more equal Wales recognises that there needs to be a fairer geographical distribution of investment in innovation activities. Wales has four recognised economic regions, each leading on the development and delivery of their own City or Growth Deals.

Population levels, business communities and RD&I infrastructure and assets vary, so each has developed a distinct Regional Economic Framework (REF)³². They set out the distinctive strengths of the regions, and aim to address local inequality, recognising that innovation is a key tool in strengthening their economies.

We will encourage investment in assets such as AberInnovation³³, mSparc³⁴ Food Centres and the Advanced Manufacturing Research Centre Cymru (operated by University of Sheffield

30 <https://www.british-business-bank.co.uk/>

31 <https://developmentbank.wales/about-us/funds-we-manage>

32 <https://gov.wales/regional-economic-frameworks>

33 <https://aberinnovation.com/>

34 <https://m-sparc.com/>

AMRC)³⁵, as well as Universities themselves, wherever they align to our priorities and strengths. They play a key role in attracting investment from outside Wales, developing capacity across sectors to innovate and contribute to the local economy in terms of high quality jobs and training opportunities.

The Local Government and Elections (Wales) Act 2021 provided for the establishment of four new Corporate Joint Committees (CJCs)³⁶ for our city and growth deal areas. These will provide a consistent and accountable mechanism to support regional collaboration between their local authorities.

CJCs are designed to provide flexibility and enable local discretion. How they deliver operate and employ staff will be determined by their members. This flexibility means CJCs will be well-placed to deliver local and regional innovation priorities as part of their power to improve the economic well-being of their region.

Innovation Priorities

We continue to learn from the successes of other countries across the world where different approaches to RD&I have been applied, and assess their relevance to Wales.

Israel, Singapore and Taiwan have structures which focus public funding in such a way as to create critical mass

which pulls in industrial and business sector RD&I endeavour and funding. These countries marry public and private investment for RD&I which promotes growth, attracts talent and drives economic endeavour.

Another model is the science and technology campuses such as the Science and Technology Facilities Council (STFC)³⁷ campuses at Harwell and Daresbury and the UK Atomic Energy Authority³⁸ campus at Culham. Both have received public sector investment to create a critical mass of high-tech science, attracting scientists, technologists, engineers, technicians and support staff. Wales has fledgling science and technology groupings which could be grown into bigger assets on the Harwell and Culham model with the right vision and focus, for example Bangor University's M-Sparc³⁹ on Anglesey, Aberystwyth University's Innovation and Enterprise Campus, AberInnovation⁴⁰ and Swansea University's Bay Campus and Cardiff University's Compound Semiconductor Institute.

The challenge for Wales is to recreate some of this success; opportunities exist around clusters such as Compound Semiconductors, FinTech, Digital and AI, steels and metals and health tech in South Wales, agri-tech in Mid and North Wales, optics, photonics and optoelectronics pan-Wales, and nuclear in North Wales.

35 <https://www.amrc.co.uk/>

36 <https://research.senedd.wales/research-articles/collaboration-nation-what-are-corporate-joint-committees-and-what-will-they-do/>

37 <https://www.ukri.org/councils/stfc/>

38 <https://www.gov.uk/government/organisations/uk-atomic-energy-authority>

39 <https://m-sparc.com/>

40 <https://aberinnovation.com/>

*A Manufacturing Future for Wales*⁴¹, launched in 2021, provides a framework to future-proof manufacturing capability in Wales. It identified specific, targeted actions to develop long-term resilience with a skilled and flexible workforce delivering the products, services and technologies for our future economy.

Embracing the technologies that Industry 4.0 brought which included automation, digitalisation and a more connected society, we will encourage businesses and industry towards adopting Industry 5.0 principles⁴². We will identify and evaluate opportunities for creating and growing nationally important assets based around these key science and technology strengths and prospects in both Industry 4.0 and Industry 5.0.

The Manufacturing plan also addresses the issues of climate change and the need to decarbonise. In 2019, the industry and business sector accounted for 38% of Welsh emissions, at 14.83 MtCO₂e⁴³. The full list of the policies, proposals and commitments for how we will reduce emissions are set out in our *Net Zero Wales, Carbon Budget 2 (2021 to 2025)*⁴⁴ plan.

The Wales Infrastructure Investment Strategy⁴⁵ (WIIS) sets out a 10-year vision for the outcomes that our infrastructure investments should enable, and has been designed specifically to support the delivery of a zero

carbon economy. The WIIS makes it clear that we will support innovation through our infrastructure investment, whether that is supporting innovation in renewable energy technology, investing in innovative housing and accommodation to meet care needs, or through strategic infrastructure investment which will support Welsh businesses to become more resource-efficient and avoid unnecessary waste, in turn enabling them to become more productive and competitive.

Working with the Wales Innovation Network, we have identified the following areas of strength and priority, which are important to Wales (see *Priority Themes Analysis paper which is being published alongside the strategy*). The priorities will underpin our RD&I investment decisions:

- Digital Transformation
- Net Zero and Decarbonisation
- Agri-Tech, Food and Rural Economy
- Creative Industries and Media
- Population Health and Biotech
- Materials and Manufacturing

We will work with UK Government, industry, business, academia, education providers, local authorities and communities to prepare proposals that seek a blend of public and private finance and present these to UK Government for collaborative support. One example is our Global

41 <https://www.gov.wales/manufacturing-future-wales-framework>

42 https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/industry-50_en

43 <https://www.gov.wales/net-zero-wales-carbon-budget-2-2021-2025>

44 <https://www.gov.wales/net-zero-wales-carbon-budget-2-2021-2025>

45 <https://www.gov.wales/wales-infrastructure-investment-strategy-2021>

Centre of Rail Excellence⁴⁶, which brings together a blend of public and private finance to create a UK national and international facility in Wales. The Centre is part of our underpinning themes by supporting innovation in cutting-edge green technologies. A further example would be our own High Value Manufacturing Catapult Centre⁴⁷.

These examples demonstrate how major RD&I and test facilities can be envisioned and developed in a way that brings socio-economic, sustainable, commercial and industrial opportunities to Wales, while delivering for the wider UK.

Digital Innovation

Our Digital Strategy for Wales, 2021⁴⁸, sets out a vision and ambition for a coordinated, inclusive, digital approach across sectors. It outlines how we will use digital and data to improve the lives of people in Wales in six mission areas, public services, inclusion, skills, economy, connectivity and data.

The Digital Strategy's ambitions for the economy, skills and data missions closely align with innovation. The aim is to ensure that people, businesses and public services have the skills and confidence to embrace the opportunities that digital technologies and innovations can offer.

This will ensure that Wales can retain new talent, stand out in global competition for new markets and industries, and, foster

a culture of innovation and collaboration – using the potential of data, artificial intelligence (AI) and the Internet of Things (IoT) to benefit all of our people. To this end, we are supporting the Wales Data Nation Accelerator⁴⁹ (Wales DNA) project, a pan-Wales initiative led by four of Wales' biggest universities. It aims to promote economic and social transformation through support for innovation in data and Artificial Intelligence (AI). Its approach is focussed on raising skills, collaboration and critical mass, positioning Wales for long term success through data science and AI.

We will work alongside public, private and third sectors to champion the use of data-driven innovation, data science and new sources of data. We will continue to work with our partners in academia to consider how best we can continue to support the on-going Wales DNA proposal, including how we might leverage and maximise all potential sources of funding to progress our data and AI ambitions. We will seek to leverage the wider targeted benefits of the UKG's AI Strategy⁵⁰ and its related Action Plan. Wherever technology such as AI is used, we will ensure it is done so in an ethical, responsible and inclusive way, aligned to the the underlying principles of the Digital Strategy for Wales.

Innovation also plays a significant role in digitally connecting up our communities.

46 <https://tfw.wales/projects/gcre>

47 <https://hvm.catapult.org.uk/>

48 <https://www.gov.wales/digital-strategy-wales-html>

49 <https://dnawales.cf.ac.uk/about/>

50 <https://www.gov.uk/government/publications/national-ai-strategy>

Research by Digital Communities Wales⁵¹ (DCW) shows that the level of digital exclusion in Wales is higher than in the UK, with 7% of the population, 180,000 people, not using the internet⁵². A higher proportion of digitally excluded people are older people, people with no qualifications and people who are economically inactive.

There are clear public policy and equality reasons for improving digital inclusion, as well as a strong business case. The benefits of being online for people include:

- time and costs saved through accessing services digitally
- improved health and wellbeing – self-care and reduced loneliness
- increased opportunities for employability

The Digital Strategy makes a clear commitment to explore a minimum digital living standard for Wales. This standard would look to consider the type of device, broadband speed and/or mobile data required, and the recognised five basic digital skills, which, as a minimum, are needed to be digitally included in a modern Wales.

DCW has developed a programme which focuses on the impact of digital exclusion in Welsh communities, with over 1,648 organisations from across Wales already engaged. DCW also works to support the Welsh language, engaging across Wales to explore the opportunities for Welsh language and communities in the digital age. We are

committed to making Cymraeg easy to access, we fund the development of new Welsh language technologies, requiring them to be released under a suitably accommodating open licence for use, reuse and embedding in other companies' products. Our expectation is that any funded digital development is done so in a way that enables multi-lingual use.

Helo Blod⁵³ – Innovation for Cymraeg

Helo Blod have developed a bi-lingual technology toolkit, which is easily accessible by all, in response to feedback from businesses. This toolkit can be used for all public sector procurement and grant applications.

By innovating in this way it creates a high-quality user experience in English and Welsh, companies can build capacity for creating multilingual products, increasing their sales potential and enabling the language to bring economic benefits to Wales.

Helo Blod's aims and experience in bilingual innovation in Wales can create value for companies across the world. One example of this is Microsoft's Live Human Interpretation functionality in Microsoft Teams which Helo Blod jointly developed with Microsoft. It will benefit bilingual language communities and organisations around the globe.

51 <https://www.digitalcommunities.gov.wales>

52 <https://www.digitalcommunities.gov.wales/digital-inclusion-in-wales-2/>

53 <https://businesswales.gov.wales/>

Towards a Circular Economy

We cannot separate our ambitions for prosperity from our environment: they sit alongside each other in the Well-Being of Future Generations Act.

The circular economy is based on three principles: Eliminating waste and pollution, circulating products and materials, and regenerating nature. Moving to a circular economy is one of the great innovation opportunities of our time.

A circular economy improves economic and social outcomes. It can improve productivity, increase raw-material resilience, create employment and increase competitiveness. Social benefits include shortening supply chains, reducing the health impacts of emissions and distributing resources more fairly. It can provide opportunities for communities to share resources, helping revitalise places.

45%⁵⁴ of global emissions and 90%⁵⁵ of species loss are due to goods and services made and used in our daily lives, the foundational economy. We are now working on an approach which keeps resources in use for as long as possible and avoids waste.

Our strategy, *Beyond Recycling*⁵⁶, has key ‘missions’ for innovation. They require cross-government action and changes in approach from citizens and partners.

Innovation in business systems for waste avoidance, re-use and repair:

To tackle the climate emergency and nature crisis, we must address unsustainable consumption of resources. Innovation can increase resource efficiency through waste avoidance, customers paying for services instead of buying equipment themselves, better product maintenance, re-use, re-purposing, repair and re-manufacture across the economy.

Businesses need support to thrive by adopting business models that avoid waste and value resources such as leasing goods and finding worth in materials considered waste. By autumn 2023, new regulations will require all business, public sector and third sector premises to separate recyclable waste which will be an added driver to avoid waste in business systems.

Every business in Wales can access practical advice on improving their resource efficiency by, for example, reducing their waste or improving the eco-design of their products and packaging through support provided by Business Wales, Food and Drink Wales, Farming Connect, WRAP Cymru and the Food Innovation Centres.

Innovation in materials use for resilience and to achieve net zero:

We need to substitute high carbon, energy-intensive materials with sustainable, low carbon, resource-efficient ones. This means using fewer materials in products, using renewable

54 <https://ellenmacarthurfoundation.org/completing-the-picture>

55 <https://www.gov.wales/beyond-recycling-0>

56 <https://www.gov.wales/beyond-recycling-0>

materials where possible, and using as high a recycled content as possible.

The Welsh Government has a joint responsibility alongside the UK Government to support the transition to net-zero and so support for innovation needs to be focused on resource efficiency and encouraging businesses to decarbonise. We will work to embed this in the terms of our financial and innovative procurement mechanisms.

Innovative product design with a whole-life approach:

By reducing the carbon footprint of supply chains and buying lower-carbon products we can take a whole-life approach and by encouraging better product design, we can make products which last and which consumers want to buy. We need products that can be easily serviced, maintained and repaired to extend their useful life.

We need to reduce the overall quantity of materials we use in products by applying lean thinking and multi-functionality. This includes implementing sustainable supply chains, promoting the efficient use of natural resources, and collaborating on shared international challenges.

Digital innovation for resource efficiency:

Digital and 'smart' technological solutions can facilitate resource efficiency, materials redistribution and re-use. For example, product digital passports can help ensure that the products and the materials they contain can either be safely re-purposed or safely recycled – as the chemical composition will be known. Unique digital marking of products and components can help track their use and

can help them be collected together at end of life to create economies of scale. Building information modelling (BIM) can record all of the components used in a building, to facilitate dismantling and end of life re-purposing and reclamation. BIM can also be used to help reduce waste during construction.

Shorter and resilient supply chains:

A circular economy needs to start from the bottom up and there is much that can be achieved within the foundational economy, which provides the essential goods and services for everyday life.

Food in particular is a critical foundation economy sector, the fragility of which was demonstrated during the Covid pandemic and can still be seen due to the current situation in Ukraine and high energy and fuel costs. Supply chain disruption, food shortages and increasing food prices all highlight why we need to build strong, local supply chains and ensure we are self-sufficient, rather than reliant on long, global supply chains.

We need regional economic development to transition to a circular economy which encourages shorter supply chains and a more local and regional focus on sourcing materials. Where supply-chains are necessarily longer, we need to encourage measures which ensure they are fair, ethical and sustainable.

We will work with the Valleys Taskforce and City and Growth Deal Regions to encourage the development of resource efficient infrastructure, encouraging place-based solutions which align with priorities in the Regional Economic Frameworks.

Positioning Welsh businesses for low carbon markets:

Businesses need to take advantage of investments that value lower carbon alternatives, re-use and remanufacture. This requires an understanding of supply opportunities for future investment plans. Support such as our Backing Local Firms Fund will enable businesses to develop green skills and attain relevant accreditations, generating the new jobs of a greener future.

International Partnerships

International collaboration is another dimension in our economy mission. In 2020 the Welsh Government launched a new International Strategy⁵⁷. It has three aims: raising Wales' global profile; growing the economy through international trade and inward investment; and establishing Wales as a globally responsible nation. Innovation can play a key role in all three of the Strategy's aims.

The Vanguard Initiative⁵⁸

Our membership of the multi-national innovation platform, the Vanguard Initiative (VI) for European regions, promotes Wales' global profile of strengths in innovation. VI is a network of 37 industrialised European regions with a focus on innovation collaborations, strengthening Europe's global competitiveness. It supports our International Strategy and

members include key priority partner regions like the Basque Country and Baden-Württemberg. VI is an influential network, particularly in the EU policy arena.

Engagement with platforms like VI has led to numerous international collaborative activities and has provided businesses with the opportunity to engage with over 30 EU and global regions including Webinars, Events, Conferences, Open Innovation and International Knowledge Transfer activities.

Our international engagement is strengthened by strategic agreements with priority regional partners, such as the Memorandum of Understanding with the Basque Country and Declaration of Intent with Québec, as well as close working relationships with others including membership of the Massachusetts Institute of Technology International Liaison programme⁵⁹, Baden-Württemberg's e-Mobil cluster and Catalonia, have all developed strong innovation strands and we will continue to use these to raise Wales' global profile.

By working with these regions, one-to-one or collectively, we help our businesses to network and collaborate across borders, as well as make a compelling case to businesses considering investment in the UK. We also build on the important partnerships

57 <https://gov.wales/international-strategy-for-wales-html>

58 <http://www.s3vanguardinitiative.eu/>

59 <https://ilp.mit.edu/>

formed through European programmes such as Ireland Wales⁶⁰ and Horizon Europe⁶¹ through our Agile Cymru⁶² approach.

We have previously used EU funding to incentivise collaboration, SMART Expertise has successfully developed a portfolio of collaborative projects involving international partners. These have created and grown capacity in key areas of strength for Wales.

Wales was an early adopter of the EU concept of Strategies for Smart Specialisation (S3)⁶³, which focuses policy support and investments on key national and regional priorities. The next iteration S4⁶⁴ – Partnerships for Regional Innovation (PRI) – introduces multi-level governance and cross-departmental sustainability, turning them into whole-government instruments of change. This aligns well with our strategic approach.

Global Wales has also supported Memoranda of Understanding with Vietnam and Telangana State in India which include a focus on innovation and entrepreneurship, with discussions underway with Research Foundation Flanders (FWO) to establish a pilot R&I programme.

Global Wales⁶⁵

Our Global Wales partnership, led by Universities Wales, supports the university sector with export and the development of international networks. To date, it has secured the UK's only partnership with T-Hub in Hyderabad, the world's largest innovation campus for start-ups.

60 <https://irelandwales.eu/>

61 https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

62 https://gov.wales/sites/default/files/publications/2022-09/agile-cymru-guidance_0.pdf

63 <https://s3platform.jrc.ec.europa.eu/home>

64 <https://www.interregeurope.eu/news-and-events/news/smart-specialisation-strategies-for-sustainable-and-inclusive-growth-s4>

65 <https://uniswales.ac.uk/our-work/global-wales>

Health & Wellbeing

The Mission:

A coherent innovation ecosystem where the health and social care sector collaborates with industry, academia and the third sector to deliver greater value and impact for citizens, the economy, and the environment.



The innovation ecosystem will support NHS Wales and social care to deliver their recovery strategies from the pandemic. It will target new and different ways of working, identify opportunities to bring additional value to patients, lever additional funding and better support the adoption of innovation at scale. It will be underpinned by clear infrastructure and a robust policy framework to create a culture of innovation at all levels of the health and social care system.

Applying innovation to support COVID-19 recovery and system priorities

The COVID-19 pandemic has irreversibly altered the provision of health and social care services. As well as creating major new pressures, COVID-19 has offered new opportunities for health and social care services to think differently about priorities and promoted the need for further innovation to support health and social care delivery.

This new learning was published in the NHS Wales COVID-19 Innovation and Transformation Study Report, 2021⁶⁶. The study evaluated a huge range of health and care practitioner feedback and presented examples where rapid service change, transformation and innovation had taken place.

Whilst a huge amount of work is underway across health and social care to mitigate the impact of COVID-19 through reset and recovery, it is more crucial than ever to prioritise support

and investment in innovation through new ways of thinking and working. We must fully utilise innovation to solve our live system pressures: keeping people in their own home, supporting more people to access treatment, tackling patient backlogs, and developing services which are sustainable for the long term. Innovation underpins the delivery of our National Clinical Framework⁶⁷ and its vision for the strategic and local development of NHS clinical services.

The learning gained from COVID-19 is also influencing our thinking and planning for future pandemics. The adoption of innovation will include how we undertake research, surveillance, vaccination and testing developments as well as the integration of behavioural science.

Aligning the health and social care innovation ecosystem

We have commissioned and analysed a broad range of internal and external evidence from across the health and care sector. This includes submissions from NHS Wales organisations, Social Care Wales, a range of ecosystem partners delivering innovation and leaders across Wales. This evidence clearly tells us that Wales has a strong policy rationale for a new development phase of the health and social care innovation ecosystem, that builds on our success to date.

66 <https://www.nhsconfed.org/publications/nhs-wales-covid-19-innovation-and-transformation-study-report>

67 <https://www.gov.wales/national-clinical-framework-learning-health-and-care-system>

The key themes that emerged from the evidence and the consultation:

- We need to bring greater coherence and alignment to our existing health and care innovation infrastructure. This will enable health and care organisations to generate innovation ‘pull’ based on areas of need. This provides a platform to collaborate with the external innovation environment, to provide more relevant innovation ‘push’ based solutions.
- More strategic leadership for innovation is required, with a consistent message to support innovation at all levels, to drive a more supportive culture for innovation across the ecosystem.
- We must better support innovation adoption and scale across the system, by creating the appropriate supporting infrastructure, that can share and support the uptake of good practice, through a range of local and national network.
- A more strategic approach to innovation funding is required; to maximise the existing funding envelope, realign funding to a new innovation ecosystem direction and support income generation from innovation activity.
- To embed new ways of working across pandemic recovery and system priorities, we must build capacity for innovation at all levels of the workforce and system.
- To increase the impact and reach of innovation, we must integrate innovation approaches through other policy areas and delivery mechanisms.

- To involve Welsh patients in the design and delivery of innovation and new ways of working, supporting better health outcomes right across the health and social care system.

Co-ordinating health and care priorities with the wider economy and community innovation capability

There is significantly more innovation capability and structure in our health and care system now than a decade ago. We will continue to improve the coordination and alignment of existing initiatives, partners and platforms. This will provide a clearer system offer generating innovation ‘pull’ from health and social care organisations; working in partnership with a dynamic external innovation environment, providing innovation ‘push’.

We will use existing regional, national and international networks to support increased sharing of innovation best practice. Key mechanisms will be:

- Annual assessment of University Health Boards and trusts through the NHS Wales planning framework, with innovation as one of the three key criteria.
- The NHS Executive for Wales will have a specific value and innovation function. The NHS Executive will provide more consistent leadership and central direction, align priorities and co-ordinate a pan-Wales approach to key priorities. This will include supporting the adoption of value-based healthcare and innovation.

This approach will bring greater coherence, remove duplication, and create a more optimal environment for innovation to flourish. We will further map our known strengths, linked to priorities within this strategy, and develop opportunities for appropriate investment to support our national and regional plans.

Our innovation agenda must also balance priorities in areas such as preventative health, diagnostics, reducing waiting lists and addressing mental health with transforming our services and supporting a sustainable and talented workforce. We will increase awareness of sources of innovation support to maximise the impact of activities in these areas.

Leadership and culture

We will strengthen support for leaders to explore new approaches that improve resilience to the pandemic's impacts and help to meet our most urgent health and care priorities, through a collective Welsh Government, NHS Wales and Social Care approach.

Innovation and best practice needs to be disseminated more effectively across the public sector. Our health and social care leadership can positively support the development of a 'culture of collaborative innovation' that encourages focused and meaningful engagement with industry and academic partners to drive the adoption

of innovative ideas. We will align innovation leadership development with existing good practice approaches such as those provided by Health Education Improvement Wales and Improvement Cymru and others. This includes opportunities to influence culture change and stimulate innovation at a system-wide level, linked to skills, capability and capacity development.

We will encourage and support health and social care leaders to recognise and manage effectively the risks associated with doing new and different things, including risk assessment and mitigation approaches. We expect Health and Care organisations to directly engage with patients on innovation, through all appropriate channels.

Infrastructure

Additional Innovation infrastructure will be established to build upon the successes of our existing national Research, Improvement and Value Based Healthcare⁶⁸ programmes and networks, in addition to national programmes such as Allied Health Professions⁶⁹, the Healthcare Science Programme⁷⁰, and Major Health Condition delivery teams.

The NHS Wales Innovation network supports existing 'co-funded, jointly agreed and needs based' national projects such as the Innovation and Transformation Intensive Learning Academy⁷¹, the COVID-19 Innovation and Transformation Study, Bevan

68 <https://vbhc.nhs.wales/>

69 <https://gov.wales/allied-health-professions-ahp-framework>

70 <https://heiw.nhs.wales/our-work/healthcare-science-cymru/>

71 <https://www.swansea.ac.uk/som/innovation-academy/>

Innovation Exemplar programme⁷², the Commercialising Innovation Review and Welsh Health Hacks. We will continue to grow this network providing additional support to all Wales innovation projects that meet system need, enabling dissemination and knowledge transfer through the networks growing range of stakeholders.

Health Technology Wales⁷³ will continue to provide a horizon-scanning and Health Technology Assessment function for new technologies across health and social care.

We will ensure that innovation infrastructure supports local, regional and national activity, networks, funding calls, events, capability building and knowledge transfer.

Funding

We will seek to secure longer-term models of innovation funding, informed by the success of more stable research and improved funding approaches.

Working with stakeholders and UK Government, we will explore opportunities for developing innovation centres of excellence that link our health and care priorities with academia and industry, turning our life sciences strengths into commercial value.

A clear commercial direction will be set for health and social care innovation.

This encourages an appropriate management of intellectual property and the generation of new value and income streams. We will facilitate the development of policies that work across health and social care in the transfer of know-how and exploitation of assets.

A single funding portal to access health and care innovation funding will be developed, including mechanisms for innovative procurement. This will complement the co-development of a UK Innovative Devices Access Pathway⁷⁴.

Building capacity and capability

Innovation capacity and capability must be developed across the entire health and social care workforce to support new ways of working and thinking that can further strengthen innovation, embedding it into pandemic recovery and to meet our system priorities.

Through assets like our Intensive Learning Academies^{75 76 77}, we will develop a common training programme for innovation. This will include core innovation concepts, creative thinking and development routes, assumption challenging, awareness-raising of existing initiatives and support tools. Innovation training should be professionalised and provided at a range of levels from foundation through practitioner and expert to champion.

72 <https://www.bevancommission.org/programmes/bevan-exemplars/>

73 <https://healthtechnology.wales/>

74 <https://www.england.nhs.uk/aac/wp-content/uploads/sites/50/2022/03/Innovative-devices-access-pathway-IDAP.pdf>

75 <https://www.southwales.ac.uk/business-services/professional-development/leading-digital-transformation/>

76 <https://www.bangor.ac.uk/applied-learning-for-preventative-health-academy-alphaacademy>

77 <https://www.swansea.ac.uk/som/vbhc-academy/>

A policy framework will provide underpinning tools and resources, to support innovative activity more consistently. This will include an innovation assessment model, contract templates, industry/university engagement models, an innovative procurement mechanism, and revenue creation guidance.

An Innovation, Technology and Partnerships Programme

We support the health and social care innovation agenda through our Innovation, Technology and Partnerships funding programme. Adopting learning from Health and Care Research Wales, Improvement Cymru and Value-Based Healthcare, the programme has a focused delivery approach through the following pillars:

| |
|----------------------------------|
| Infrastructure support |
| System leadership and skills |
| National policy framework |
| Strategic funding and investment |
| Promoting and enabling |

Supporting innovation in social care

Social care has a broader set of ambitions to support wellbeing as defined in the Social Services and Well-being (Wales) Act 2014⁷⁸.

The way that social care is organised is complex. Around 1,300⁷⁹ external social care providers are commissioned by local authorities in Wales, and operating in a competitive market.

Social Care Wales⁸⁰ commissioned user research to understand how best to support innovation⁸¹. This found that the complex and dispersed nature of social care needs stronger sector unity to support innovation, which Social Care Wales is well-placed to facilitate. It identified three broad actions that support the specific needs of innovation in social care:

- Act as a convener to nurture collaborative relationships, sharing learning, support, challenges, and progress.
- Develop platforms to share ideas and resources.
- Build innovation into social care practices and contracts.

Therefore, Social Care Wales will pursue collaborative working relationships with the existing innovation landscape, making the most of available opportunities to support ‘push’ and ‘pull’ initiatives and adapt that for social care. In turn, social care can be a fertile source of new ideas that are transferrable to health care and other sectors.

78 <https://gov.wales/sites/default/files/publications/2019-05/code-of-practice-in-relation-to-measuring-social-services-performance.pdf>

79 https://socialcare.wales/cms-assets/documents/SCW_workforce_profile_2019_Commissioned-Services_final_EngV2.pdf

80 <https://socialcare.wales/research-and-data>

81 <https://ylab.wales/socialcareinnovation>

A Social Care innovation plan

Social Care Wales is developing a social care research, innovation and improvement plan to promote the vision of the Social Services and Wellbeing (Wales) Act, this strategy and *A Healthier Wales*⁸². This will include:

- **Communities of practice** to support social care innovation. The communities will have dedicated Community Managers to build relationships, energy, and momentum for change. The communities will have a dedicated digital platform where people can share, learn and communicate.
- **Coaching support for innovation** through a new team of coaches to build relationships, confidence, and skills in innovation. The coaches will support local teams to develop, adapt and adopt innovations.
- **An approach to skills building** that embeds innovation into practice. This will identify the skills people need, and those they have, where they can access skills development and any gaps or further development needed.
- **A website** providing a collaborative space to showcase pilots, new approaches and emerging good practice and provide the information, tools and support people need to innovate.
- **Evaluation support** so people innovating in social care can access advice on, and support for evidence-informed, consistent evaluation that

can support the spread and scale of innovations.

- **Developing partnerships** to collaborate with other organisations nationally and internationally, learning from others and sharing what we have learnt.

Supporting digital transformation in health and social care

Digital infrastructure is a key enabler for improvements in the use of health data, providing services digitally and artificial intelligence. Our Digital Priorities Investment Fund (DPIF) has contributed to the development of a range of innovative collaborations in the health service, many of them in mitigating the impacts of COVID-19.

Further improvements in data quality, accessibility, inclusion and standards are required, in order to include data driven innovation and the adoption of greater automation and artificial intelligence solutions. A Digital Health and Social Care Strategy for Wales is being developed to accelerate the ambitions in *A Healthier Wales*⁸³, and in alignment with the national direction set for digital services in *A Digital Strategy for Wales*⁸⁴. It aims to 'optimise the use of digital services and patient/user data' by improving population health, wellbeing, deliver better quality and more accessible services centred on citizens and their needs.

82 <https://gov.wales/healthier-wales-long-term-plan-health-and-social-care>

83 <https://gov.wales/healthier-wales-long-term-plan-health-and-social-care>

84 <https://gov.wales/digital-strategy-wales>

Health and Social Care research

Health and social care research into the sector has the largest investment in the UK by government, the public sector and industry. It is well known that research investments produce innovations that make real differences to health outcomes and to the lives of patients and people in our communities. In addition, research across both academia and industry (pharmaceuticals, medical devices, diagnostics, and medical information technology sectors) creates new products and services that bring high value jobs and prosperity to our economy.

Aligning research and innovation activities is vital if Wales aims to make our health and care services more effective, efficient and productive, which improves care and can lead to saving and reinvesting resources.

In Wales, health and social care research is primarily funded by Health and Care Research Wales (HCRW)⁸⁵ and HEFCW, which plays an important part in enabling NHS Wales and universities to access larger streams of funding from a range of sources.

HCRW's forthcoming *Research Matters: our plan for improving health and care research in Wales*⁸⁶ provides a concise and realistic assessment of the current state of our health and social care research and sets out our ambitions and

the actions we will take over the next three years to achieve these.

Key investments will be made in: establishing an evidence centre with a synthesis and rapid evaluations programme; implementing the UK strategy for clinical research which includes using digital technology to enhance recruitment to studies; establishing a faculty to build a sustainable research workforce; implementing the cancer strategy for Wales; establishing a centre for adult social care research, as well as further investments in funding schemes that address clinical, social care, and patient and public need.

Innovation and Procurement

The way that public bodies procure goods and services is changing with the introduction of the UK Government's Procurement Bill⁸⁷, which will repeal and replace the various existing procurement regulations. Separately, there are also proposals to change the way health care services are procured in England as a result of the introduction of the UK Government's Health and Care Act and proposed Provider Selection Regime (PSR)⁸⁸.

These changes may impact on the procurement of health and care services in Wales by requiring NHS Wales

85 <http://www.healthandcareresearchwales.org/>

86 <http://healthandcareresearchwales.org/about/news/research-matters-our-plan-improving-health-and-care-research-wales>

87 <https://www.gov.uk/government/publications/the-procurement-bill-summary-guide-to-the-provisions/the-procurement-bill-a-summary-guide-to-the-provisions>

88 <https://www.gov.uk/government/consultations/provider-selection-regime-supplementary-consultation-on-the-detail-of-proposals-for-regulations/provider-selection-regime-supplementary-consultation-on-the-detail-of-proposals-for-regulations>

procurers and commissioners to adapt their procurement practices to align with these emerging changes.

The detail of the changes is still being developed but will seek to provide a framework to allow more flexibility to arrange services that best promote the interests of patients, resources and public finances. As a result, the changes will provide an opportunity to explore how we can introduce more flexible procurement practices and increase innovation in the delivery of health care services in Wales.

This will include exploring how NHS procurers and service providers collaborate and innovate with Welsh based SMEs to develop services fit for the future. It could also provide opportunities to bring about wider social value benefits which benefit citizens and communities whilst strengthening the Foundational Economy.

Meeting our Net Zero target across Health and Social Care

There is a significant challenge for the Health and Social Care sector in delivering against the ambition for the public sector to be collectively Net Zero by 2030 and the all Wales legislative target of Net Zero by 2050 as the NHS Wales Carbon Footprint 2018/19 was estimated to be

1,001,378 tCO₂e and is approximately 2.6% of Wales' total emissions⁸⁹.

The Health and Social Care Climate Emergency National Programme⁹⁰ was established in Autumn 2021 to have oversight for the H&SC response to the Climate Emergency, to deliver the H&SC contribution, to meet the ambition for a collectively Net Zero Public sector by 2030 and a Net Zero Wales by 2050, and to ensure our Health and Social Care systems are resilient and prepared to respond to the impacts of climate change.

In March 2021 the *NHS Wales Decarbonisation Strategic Delivery Plan*⁹¹ was published and in July 2022 the *Social Care in Wales Decarbonisation Routemap*⁹² was also launched, along with the *Greener Primary Care Framework*⁹³ to support our response across the health and social care system.

The Innovation Action Plan

As previously mentioned there will be a cross-Government action plan to deliver this work, the health mission will be framed underneath three priority areas:

1. Creating greater coherence across the innovation system – where every partner has a clear role.
2. Focusing innovation activity from health and social care organisations towards priorities and need –

89 <https://www.gov.wales/sites/default/files/publications/2021-03/nhs-wales-decarbonisation-strategic-delivery-plan-2021-2030-summary.pdf>

90 <https://www.gov.wales/health-and-social-care-climate-emergency-national-programme-scheme-guidance>

91 <https://www.gov.wales/sites/default/files/publications/2021-03/nhs-wales-decarbonisation-strategic-delivery-plan.pdf>

92 <https://www.gov.wales/decarbonising-social-care-wales>

93 <https://primarycareone.nhs.wales/topics1/greener-primary-care/>

generating an 'Innovation Pull' to the wider innovation system.

3. Creating an 'adoption ready' pipeline of innovation from the wider system into health and care at scale – creating an 'Innovation Push' offer.

We will use value-based healthcare metrics to measure the health and social care impact of innovation activity:

- improved patient outcomes (PROMS – Patient Reported Outcome Measures)
- improved patient experience (PREMS – Patient Reported Experience Measures)
- improved resource efficiency (via a new suite of resource efficiency measures)

The health and social care innovation ecosystem can also deliver significant economic impact from new and different ways of working and we will develop a set of performance and impact metrics for our recently rebranded Innovation, Technology and Partnerships programme. These metrics will be consistent with the economic impacts and measures agreed as part of the broader strategy.

Patients benefit from improved services



Lymphoedema is a chronic swelling which can affect any part of the body in the young and old. Despite there being over 25,000 sufferers, awareness is poor both in health care workers and those who have it until the consequences of lymphoedema like repeated infections, wounds and falls emerge.

Improved patient experience and outcomes for those suffering with the condition is a result of the innovative work of the Lymphoedema Wales Clinical Network. This includes the development of data capture tools, clinical education for collaboration and improving competence in compression management with care nurses, a Cellulitis Improvement Programme, and a Development of Patient Reported Outcome Measure for Lymphoedema (LYMPROM).

Embedded in the delivery of lymphoedema services across Wales is the aim to reduce waste, harm and variation, as well as enhancing awareness to improving the health and well-being of the people in Wales.

The Welsh Life Sciences sector – innovation delivering cross-cutting themes

The Welsh life sciences and healthcare industry is built on an excellent science base and a business-friendly environment, both of which are critical for economic growth and delivering better patient outcomes. The sector currently employs more than 12,000 people, in over 260 companies, ranging from SMEs and start-ups to large blue chips, with an approximate turnover of £2.6 billion⁹⁴. The skills and recruitment opportunities in life science companies can provide chances of shared and degree apprenticeships and co-ordinating activities can help build on our approach to the Foundational Economy, assisting local supply chains, local delivery and logistics services in the sector.

There is a virtuous cycle between the economy and health that is arguably never more evident than when operating through the lens of innovative life sciences companies working in close collaboration with our health and care providers. This two-way relationship is particularly relevant for the long-term sustainability of the NHS in Wales, driven by ‘*A Healthier Wales*’, which identified the adoption of new therapeutic approaches and use of new technologies as needing to progress at pace and with purpose through a complex system and

funding challenge. Importantly, Wales has a strong competitive advantage in diagnostics, mental health, wound healing, regenerative medicine and genomics.

Welsh Government is working closely with the Office for Life Sciences to determine how these recognised international strengths can play a meaningful contribution in implementing the core healthcare missions of the Life Sciences Vision. This is part of a significant opportunity to enhance Wales’ position in health and care research and life sciences innovation. Improving Wales’ proportionate share of UK level innovation funding would bring benefits for our economy, universities, industry and communities.

Key to this is making the NHS in Wales our most powerful driver of innovation – through the development, testing and adoption of new innovations in health and care at a population scale, using new technology to get diagnosis and treatment right first time, and building genuine trust between the NHS and the sector about what can be achieved by working closely together. The Life Sciences Hub Wales, a key asset of the Welsh Government, helps to convene and strengthen this relationship providing a single point of contact to help innovators and business to navigate the integrated NHS and social care system in Wales, and help drive forward real-world challenges.

94 <https://www.gov.uk/government/statistics/bioscience-and-health-technology-sector-statistics-2021>

Climate and Nature

The Mission:

Optimise our natural resources for the protection and strengthening of climate and nature resilience. We will focus innovation efforts of the ecosystem towards tackling the climate and nature crises simultaneously ensuring a just transition to a wellbeing economy.



Natural resources are essential for the air we breathe, the water we drink and the food we eat. They enhance the quality of the places where we live, work and visit and provide the landscapes and biodiversity that make these areas special. Thriving natural resources are also healthier for people, their communities and the economy, but demands on them are increasing. We need to change the way we do things so that we continue to benefit from our natural resources now and in the future⁹⁵.

Innovation is vital for tackling the impact of climate change, the nature crisis, and reducing pollution and environmental incidents in Wales. NRW's SoNaRR Report of 2020⁹⁶ sets out the scale of these challenges starkly. Hence the urgent need to transform the food, energy and transportation systems in Wales to start to move from a degenerative economy to a nature-positive and Net Zero one.

To tackle these environmental challenges decisively requires a just transition to a Well-being Economy. This needs technological innovation, but also social and financial innovation. So, it is important to look across all sectors for their impact both positive and negative, and to assess every set of innovation opportunities, looking at potential benefits and disbenefits. This will require integrated partnership working across the public and private sectors, and civil society organisations, all of which have a role to play in promoting sustainable

development and protecting the environment. Skills are a recognised driver to supporting the Just Transition. Our Net Zero Skills Action Plan sets out the key actions to take this forward.

Social innovation can be used to encourage individuals and organisations to adopt more sustainable lifestyles and to reduce their environmental footprint, whilst innovations in renewable energy, sustainable transportation, and regenerative agriculture can help to reduce greenhouse gas emissions and protect natural habitats.

Adopting a mission-oriented innovation strategy that includes addressing the nature crisis, and the pollution and climate emergencies is just another step forward on this journey. We can measure our progress by reporting on:

- How nature is recovering (tackling the nature emergency)
- Reduction of greenhouse gas emissions (tackling the climate emergency)
- How resilient communities are to climate change (tackling the climate emergency)
- How harmful pollution is being prevented (reduction in levels of pollution and incidents)

95 <https://www.gov.wales/sites/default/files/publications/2019-05/environment-wales-act-2016-sustainable-management-natural-resources.pdf>

96 <https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en>

Meeting our Climate Change Targets

Innovation in the power system

Our energy system is fundamental to almost every area of life, yet the system in Wales remains reliant on fossil fuels. We are committed to scaling up renewable generation to drive forward the significant change to the carbon intensity of the energy we use. Much of this will be driven by greater electrification of heat and transport, more flexible use of generating technologies, energy demand, storage and low carbon fuels. Our vision is for a decarbonised energy system providing wider economic and social benefits.

Innovation will support a significant increase in the deployment of renewables which drive low-cost and accelerated electrification. The economy will also need to become more resource and energy-efficient with cost effective technologies removing emissions from the atmosphere. Hydrogen will play a significant role, as innovation reduces costs and enables fuel switching.

Innovation will be integral to:

- new power storage and smart technologies which use renewable power more efficiently, for both industrial and domestic use
- new infrastructure design; offshore wind platform design, mooring and anchoring technologies in Welsh waters
- wider behavioural change, creating demand for more efficient products and regulation to encourage efficient manufacturing

- reducing our energy needs, through energy efficiency in manufacturing and in our homes
- re-balancing costs between power sources, ensuring low carbon energy is cheaper than energy that emits carbon
- a more integrated energy system, technologically and regulatory
- supporting ways communities can receive long term benefits from their natural assets.

This will require actions from ourselves as a Government and others. The UK Government should continue to extend funding for innovation that drives relevant network changes and introduce energy efficiency regulation. Business needs to invest in new technologies to reduce the power and heat used to produce their goods and services.

In the short to medium-term, the Welsh Government will focus on continuing a regionally planned approach, not a top-down and market-driven one, delivering in a socially equitable way, leaving nobody or place behind. It will work with regions and local partners to identify opportunities which support innovation in local area energy plans.

Future Gas and Electricity Networks

The Welsh Government has established a project with energy network operators in Wales, along with Ofgem, to develop a long-term plan for the energy networks in Wales.

It will look to 2050 to understand the the kind of networks needed for a net-zero energy system to serve our communities and places and help inform *Future Wales; our National Plan*⁹⁷.

The Energy Systems Catapult⁹⁸ will lead this work and develop a joint view across all participants for our likely future energy needs in 2050. It will bring together new thinking across the gas and electricity networks and the transmission and distribution networks.

We aim to be the first country to have a joined-up approach to developing gas and electricity networks, enabling opportunities for innovation and greater prosperity.

We expect the work to identify several Future Energy Scenarios for Wales by summer 2023, and we will work closely with network companies and Ofgem, looking to Ofgem's Strategic Innovation Fund⁹⁹ to trial new ways of using networks to maximum effect.

The rural areas of Wales are not on the gas network and many areas will suffer from inadequate grid infrastructure. Local solutions for energy generation and storage to power transport and heating will be required.

Innovation in Heating and Cooling our Buildings

Innovation can help drive down the costs of new, highly insulated, low-carbon buildings and the retrofit of existing buildings by creating new business funding models.

'Heat as a service' which uses bill-payer funds over a long period to pay for deep retrofit and mass deployment of heat pumps, or blending low-cost loans, grants from government and third sector, and financial incentives from, for example, mortgage providers, can all enable behaviour change.

In-home, data-driven innovation, automation and AI can be used to monitor and deliver interventions to support carbon reduction.

Again, heat and cooling systems will require action from ourselves as a Government and others. The UK Government should encourage the development of technology to meet new efficiency standards, market gaps and new business models. Business can invest to develop new technology and collaborate to create the new business models. Banks, building societies and mortgage lenders need to develop new lending instruments to incentivise homeowners and buyers to decarbonise properties.

In the short to medium-term, the Welsh Government will focus on our Optimised Retrofit Programme: ORP3¹⁰⁰ which will deliver £70 million worth of funding to

97 <https://gov.wales/future-wales-national-plan-2040>

98 <https://es.catapult.org.uk/>

99 <https://www.ofgem.gov.uk/strategic-innovation-fund-sif>

100 <https://gov.wales/optimised-retrofit-programme>

social sector landlords to decarbonise homes. Channelling ORP investment through social landlords has supported a ‘testing and learning’ approach to how to decarbonise homes effectively and efficiently. As well as evaluating the technical and tenant aspects of the work, actual costs are being monitored and used in the assumptions of future models of residential decarbonisation. This will provide the springboard to start the decarbonisation of homes in other tenures as we move forward. A Development Bank of Wales pilot will incentivise owner-occupiers to decarbonise their homes. We will also mainstream learning and embed effective working practices from the Innovative Housing Programme.

Innovation in the transport system

As with the power system, innovation in transport will require action from others. The UK Government needs to regulate to drive technological and market innovation, supported by appropriate funding. Business can lead with implementation of new technology to further stimulate markets.

We envisage a move away from individual vehicle ownership to shared solutions, including car-sharing, car clubs and bike-sharing as demand-responsive travel options. Mobility as a service (MAAS) which enables people to plan, book, pay for and use different types of transport, based on passenger demand rather than a fixed timetable, all provide opportunities for new and innovative service delivery models.

There are significant opportunities for improved air quality from a wholesale shift to zero-emission vehicles. Congestion and issues related to a sedentary lifestyle can also be tackled.

Transport offers innovation opportunities in: the manufacture, energy density, and recycling of battery technology; zero-emission technologies for aviation, shipping, and heavy-duty vehicles; connected and autonomous vehicles; and micro-mobility, drone and other technology which is transforming freight and logistics. Integrating public transport and active travel will help the public use these modes of travel more effectively.

Wales paves road to zero waste with recycled nappies¹⁰¹



As part of Wales’ bid to become a zero waste nation by 2050, fibres from 4.3 tonnes of dirty nappies have been used in trials to resurface a stretch of road on the A487 between Cardigan and Aberystwyth.

Fibres recycled from used nappies have replaced materials used to make asphalt that are normally

¹⁰¹ <https://www.nappicycle.co.uk/>

shipped in from Europe and beyond. The aggregates were locally sourced, sustaining local jobs and cutting carbon by shortening the supply chain.

Each year 143 million nappies are thrown away in Wales, if the trial proves successful, the initiative could be scaled up – reducing waste, tackling climate change and creating green jobs in the process.

*Llwybr Newydd*¹⁰² – The Wales Transport Strategy – sets out a vision of a better Wales for generations to come. It includes commitments to:

- support digital and other innovations that improve asset management and maintenance and reduce congestion;
- look at options for a transport ‘open data’ store, to improve journey planning and booking, develop integrated ticketing, and improve real-time information for passengers;
- explore future infrastructure improvements that reduce carbon emissions – including for new fuels such as hydrogen – technology that facilitates more sustainable aviation and cargo operations, and materials that improve service life, speed of construction and maintenance and reduce environmental impacts;
- work with ports in Wales to identify opportunities for future economic development such as offshore renewable energy and innovations in decarbonisation;

- encourage more freight onto rail and plan a future for the Welsh supply chain through logistics hubs and shared transport solutions in line with priorities in the Wales Marine Plan. We will also work with the sectors on solutions to address the impacts of a huge growth in last-mile deliveries.

In the short to medium-term, the Welsh Government will focus efforts on a shift to active and public transport, trialling battery electric trains, zero-emission taxi pilots and car clubs, e-bike rental schemes, hybrid hydrogen transport, on-demand public transport, grid connections for Electric Vehicle charging and rurality, and road surface innovation.

Smart Living

The Smart Living initiative is integral to driving innovation in the energy system. It pilots new approaches which combine whole-systems thinking with place-based solutions. This holistic approach is enabling decision-makers to understand the complex challenges posed by our net-zero target and to innovate to meet them.

Smart Living is currently operating two pilot whole-systems schemes, using an open competition model (Small Business Research Initiative – SBRI) to bridge the gap between development and deployment phases of innovative projects.

The Whole-system Business Research Innovation for Decarbonisation SBRI

102 <https://gov.wales/llwybr-newydd-wales-transport-strategy-2021>

(WBRID) is a challenge initiative for whole-system innovative ideas. It funded four local authorities across two phases, challenging business to help communities and the public sector to integrate different energy sources and sectors on a whole-system basis.

The focus was on addressing key barriers identified as part of Smart Living and other innovation research. Results from the pilot will inform future opportunities for funding support.

The Hydrogen Business Research and Innovation for Decarbonisation SBRI (HyBRID) is addressing opportunities for the deployment of hydrogen by developing research and innovative solutions deriving from the ten objectives of the Welsh Government's Hydrogen Pathway report. Phase 1 drew on a fund of £2 million and supported 17 feasibility projects.

Innovation in the food system

By taking a circular economy approach to how we grow and process our food we can reduce carbon emissions, protect existing habitats, create more space for nature and produce healthy, affordable food.

Agriculture accounts for 14% of the emissions in Wales (2019) at 5.3MtCo₂e¹⁰³, the level has remained stubbornly around this amount for many years. There is no one action to

take to reduce carbon emissions in the food sector, it takes lots of little actions in all aspects of the process, from sources of inputs, farming practice, transportation of goods on and off farms, to manufacturers and on to distribution to consumers and reducing and re-using any waste products along the way.

To tackle this challenge will take collaboration between businesses up and down the supply chain, academia and public sector and innovation in the way we produce food, what we eat and the sources of food and feed and how we deal with waste products throughout the process.

We need innovation in food processing and transportation to deliver fresh, nutritious food to our schools and hospitals. We aim to produce food products with lower sugar, salt and processed fats to deliver our long term obesity strategy *Healthier Weight Healthier Wales*¹⁰⁴, at affordable prices to enable everyone to benefit from a better diet.

We need innovation across all farming systems to reduce greenhouse gas emissions, reduce pollution and chemical applications to protect nature. Those practices need to be efficient to enable us to make more space for nature to enable us to reverse the decline in biodiversity in Wales, whilst ensuring we do not off-shore our emissions and impacts on nature to the rest of the world. Innovation is crucial in this mission as we have never tackled these challenges simultaneously before.

¹⁰³ https://www.wwf.org.uk/sites/default/files/2022-02/WWF_land_of_plenty_Wales_0.pdf

¹⁰⁴ <https://www.gov.wales/healthy-weight-strategy-healthy-weight-healthy-wales>

The Agriculture Bill (2022)¹⁰⁵, establishes Sustainable Land Management as the legislative framework for future agricultural policy. This policy framework focusses on the complementary objectives of supporting farmers to produce food sustainably, alongside taking action to respond to the climate and nature emergencies, contributing to thriving rural communities and keeping farmers on the land.

To drive change in how we use our land, we need to ensure that the right incentives are designed into the future Sustainable Farming Scheme (SFS)¹⁰⁶. The SFS contains proposed actions such as farmers actively managing a proportion of their land to maintain and enhance semi-natural habitats, prioritising designated sites where they exist, and creating new habitat features where semi-natural habitats do not exist.

This is a shared endeavour across the UK. Welsh Government has partnered with the other Devolved Governments, Defra and the UKRI in a joint funded large scale research programme ‘Building a Green Future – Transforming Agriculture for climate, nature and people’. The programme aims to support collaborative and transdisciplinary proposals in these themes and via a research hub, in line with our innovation strategy goals for Wales. The opportunities for Wales for funding impactful research and business development from this fund is considerable.

In the absence of the EU vision and strategy frameworks, along with greater divergence in devolved policy areas and decreasing funding, in the future, this type of themed and shared research programme is likely to be a model for funding research in agriculture, environment and climate change arenas.

Land Management

A network of Nature Recovery Exemplar Areas across a range of semi-natural habitats will be created to demonstrate how effective action can be taken to halt biodiversity loss and aid nature recovery. We will also explore the use of a new concept: Other Effective Area-based Conservation Measures (OECM).

National Parks and AONBs will develop a prioritised action plan for nature restoration, embedding it in strategic planning.

We will take a strategic spatial approach to planning underpinned by robust evidence, such as Area Statements, supporting planners and developers through improved planning guidance and tools. This will enable more effective screening of planning applications to better understand the potential impacts from proposals.

Nature recovery

The *Nature Recovery Action Plan for Wales, 2021*¹⁰⁷, considered the growing evidence around the scale of the loss of biodiversity and the changing

105 <https://www.gov.wales/agriculture-wales-bill-2022>

106 <https://www.gov.wales/sustainable-farming-scheme-guide>

107 <https://www.gov.wales/sites/default/files/publications/2020-10/nature-recovery-action-plan-wales-2020-2021.pdf>

Welsh policy context. This includes the legislative framework and the Natural Resources Policy¹⁰⁸, the expected impacts of our exit from the EU, the escalating ecological crisis and the need to respond urgently, alongside the response to the climate emergency. The Covid pandemic has placed fresh emphasis on the need to clarify the urgent priorities for biodiversity and a green recovery.

Maintaining and Enhancing Resilient Ecological Networks

The Plan recognises the need for spatial action to deliver benefits for biodiversity, species and habitats, avoid negative impacts and maximise our well-being, across our land and seascape, by addressing the root causes of biodiversity loss, and targeting interventions to help species recover where necessary.

The Plan recognises the value of biodiversity in our accounting and decision making across sectors and portfolios, and demonstrates that value through support for skills, capacity and governance. Actions address the need to improve our evidence and monitoring for the long term, and to understand the role that nature plays in our lives and well-being.

Current funded actions by multiple partners are collected in a delivery plan to be monitored and reviewed annually. Five immediate priorities have been identified:

- Aligning the responses to the climate emergency with the biodiversity crisis

- Addressing the post-EU funding gap for agri-environment measures
- Providing spatial direction for targeting action for biodiversity
- Improving the condition of the Protected Sites Network
- Exploring new and sustainable funding mechanisms for biodiversity action.

During 2022, a deep dive considered the 30x30 target. 30x30 refers to protecting and effectively managing at least 30% of our land, freshwater and sea for nature by 2030. It is one of several targets which form part of the Global Biodiversity Framework (GBF)¹⁰⁹, agreed at COP15 in December 2022.

By taking a circular economy approach, we aim to reverse the decline of biodiversity in Wales and around the world by taking a circular economy approach to all we do, to make space for nature and ensure that any waste products produced from our manufacturing and the way we live are not harmful to nature.

Wales is famous for its wonderful landscape and habitats, but that landscape is sadly depleted of biodiversity. The three main factors driving biodiversity loss are climate change, pollution and habitat loss. Innovation is needed to tackle the impacts of pollution from the past, such as our old mines and industrial sites alongside innovation in manufacturing and chemicals that we use in everyday life that do not persist in the environment causing unforeseen damage to species and habitats in the future.

¹⁰⁸ <https://www.gov.wales/natural-resources-policy>

¹⁰⁹ <https://jncc.gov.uk/news/new-global-biodiversity-framework-adopted/>

Wales needs investment in nature. Recognising and valuing the services that nature provides us now and could provide significantly more in the future in the form of nature based solutions. To achieve this we need innovation in business models and finance that value and invest in nature to secure these services for future generations. This requires collaboration across sectors, land owners, businesses, academia and public sector. Innovation is needed in:

- Financial models and loans
- Business models and accounting
- Land use management
- Cost effective technology for monitoring and measuring the benefits from nature based solutions, from Earth Observation to tools to measure nutrients in soil and water in the field.

Identifying and securing private investment will boost our efforts to tackle nature recovery, but this does not come without risk, particularly to local communities. To mitigate these risks, we will develop principles for responsible investment to ensure that any additional funding supports our ambitions for nature recovery and our wider Well-Being goals.

Wales needs to consider its resource demands on biodiversity across the world, demand for products that we can not grow or produce in the UK or Europe can drive biodiversity decline elsewhere. We need to think about the sources of all of the materials we use, looking for innovation to substitute materials derived

from unsustainable sources abroad, either via recycling or completely new sources.

Forestry

Woodland creation is an essential tool in our fight to combat climate change. Trees capture carbon as they grow and by using timber to create high value, long lasting products we can lock that carbon away for the product's lifetime.

Planting more trees is not only essential to help avoid catastrophic climate change but will provide a wide range of other benefits to Wales, including creating 'green' jobs, helping to address the nature emergency, increasing well-being, and mitigating flooding and air quality issues.

Meeting net zero, particularly in the construction sector, will also mean using much more timber in Wales. 80% of the timber used in the UK is imported and only 4% of the 1.5 million m³ of harvested Welsh timber is processed to be used as construction graded timber¹¹⁰. There is real opportunity for timber processors and manufacturers in Wales to contribute to a 'wood economy' in Wales, creating new jobs in rural Wales as well as building an innovative supply chain for high value added, longer life uses.

In the Trees and Timber deep dive¹¹¹, the task force considered what changes are required across the timber supply chain to encourage greater use of Welsh timber and fibre in construction. Contrary to some perceptions, Wales is capable of growing high quality timber and there is an opportunity to increase the amount of

110 <https://woodknowledge.wales/home-grown-homes/>

111 <https://www.gov.wales/trees-and-timber-deep-dive>

Welsh wood used in higher value added areas. This requires a strategic approach to coordination across the supply chain to ensure there is a stable supply of Welsh timber, an innovative processing sector, and stable demand from end users such as Housing Associations.

The discussions of the deep dive form a starting point for the development of a timber industrial strategy for Wales. This will build on the success of the Modern Methods of Construction Strategy and the Home-Grown Homes project led by Woodknowledge Wales¹¹². It will include looking at the role of NRW, who have committed to selling up to 30% of their timber through alternatives to the current model focussed on sale for highest financial value. On the demand side, an important first step to stimulating greater demand is enabling lifecycle analysis of the carbon in a building, including ‘embodied carbon’ in construction materials.

To increase the use of Welsh timber and timber products to replace materials currently sourced from unsustainable sources. To do this we will need innovation in:

- Building styles, materials and construction techniques, replacing the use of carbon intensive materials such as cement and plastics in building construction and fittings.
- In the use of timber or wood products in all industries, from energy

generation to pharmaceuticals to fibre products and plastics replacement.

- Innovation in the use of parts of the tree.

To tackle climate change and the nature crisis, planting of broadleaved trees would be most beneficial. Innovation is needed to use products from broadleaved forests as they grow.

Marine

The first Welsh National Marine Plan¹¹³, published in 2019, provides a clear vision and policy framework for the sustainable management of our seas. The Marine Area Statement¹¹⁴ provides further detail on the priorities, collectively agreed actions needed to build the resilience of our seas and the wider benefits this can provide.

Key outcomes sought from marine proposals to the Green Recovery process, aligned to objectives in the Welsh National Marine Plan.

We are a coastal nation and our marine environment more than doubles the size of Wales. A recent ONS Report¹¹⁵ values the UK’s marine natural capital assets at £211 billion. We gain numerous tangible benefits from our seas in the form of healthy food, renewable energy, and building materials, along with associated employment. Our ability to work remotely during the pandemic and continue to engage globally, is reliant on

¹¹² <https://woodknowledge.wales/>

¹¹³ <https://www.gov.wales/sites/default/files/publications/2019-12/welsh-national-marine-plan-overview.pdf>

¹¹⁴ <https://naturalresources.wales/about-us/area-statements/marine-area-statement/?lang=en>

¹¹⁵ <https://www.ons.gov.uk/businessindustryandtrade/tourismindustry/articles/coastaltownsineotlandandwales/2020-10-06>

| ENABLERS OF A BLUE RECOVERY (All WNMP Objectives) | |
|---|--|
| <ul style="list-style-type: none"> • Sustainable funding and financing that supports delivery of blue recovery objectives • Capacity in coastal communities that enables joined up engagement and involvement in planning for the future | |
| NATURE BASED SOLUTIONS (WNMP Objectives 1, 6, 7, 8, 9, 10, 11, 13) | TRANSFORMING SOCIO-ECONOMIC SYSTEMS (WNMP Objectives 2, 3, 4, 5, 6, 7, 8, 12, 13) |
| <ul style="list-style-type: none"> • Improved condition of Wales MPA network supporting a resilient marine ecosystem • Delivery of a cross Wales programme of active marine and coastal restoration that delivers blue carbon and enhances biodiversity • Where we are investing in a coastal defence, nature-based solutions have been considered and implemented where appropriate | <ul style="list-style-type: none"> • Marine planning process that delivers nature recovery • Sustainable deployment of marine renewables through an improved evidence base • Sustainable fisheries and aquaculture sector supported by increased market for seafood consumption in Wales that delivers benefits to health and well-being benefits • Strong and sustainable coastal tourism sector • Reduced marine litter |

subsea telecommunications cables that link us to the rest of the world. Tourism is a key economic sector in Wales and the attraction of our dramatic coastline, seascapes and wildlife plays an important role. We have a number of first class marine research departments in Welsh Universities, providing high quality employment and undertaking R&D and evidence collection that is fundamental to sustainably managing our marine environment. Our ports and harbours provide gateways for sustainable growth around our coasts.

Our marine environment offers many opportunities in developing new products from marine resources, such

as seaweed and other aquaculture products to developing marine nature based solutions such as the potential of seagrass for carbon sequestration.

To deliver these objectives we need innovation in:

- Aquaculture and fisheries management
- Technology for monitoring and understanding the marine environment, for understanding the impacts of development, the impacts of climate change on ecosystems and the opportunities these might present.

Awareness raising

We will be publishing our Strategy for Public engagement and action on climate change (2022-2026), although the development of the Strategy was driven by the commitment in Net Zero Wales to engage society in action to decarbonise, it also sets out the importance of building greater public awareness around the need to adapt our homes and communities to the unavoidable impacts of climate change. The strategy also reflects:

- the important inter-relationship between the climate and nature emergencies;
- the twin-challenge of tackling the energy crisis and climate change; and
- the importance of social justice in the way our approach to the climate emergency is delivered.

We will also strengthen the connection between local communities and nature, helping people understand the actions they can take that will make a difference. We will ensure we have the right skills and expertise for the green jobs needed for nature recovery, now and in the future. We will expand and enhance schemes to strengthen the capacity and capability of the public, private and third sector to accelerate delivery for nature recovery.



Notes

