

Welsh Government draft Innovation Strategy

Consultation response

About Universities Wales

Universities Wales represents the interests of universities in Wales and is a National Council of Universities UK. Universities Wales' membership encompasses the Vice Chancellors of all the universities in Wales, and the Director of the Open University in Wales.

Our mission is to support a university education system which transforms lives through the work Welsh universities do with the people and places of Wales and the wider world.

Universities Wales welcomes the opportunity to respond to the Welsh Government's draft innovation strategy. Some questions have been grouped for responses.

Summary

1. Universities Wales welcomes the opportunity to respond to the Welsh Government's draft Innovation Strategy.
2. Welsh universities are major deliverers of research and innovation activity in Wales. The work undertaken by Welsh universities has a tangible impact on people and communities across Wales while also supporting Welsh productivity and both directly and indirectly generating jobs. Welsh universities have consistently delivered high impact as measured through the 2014 and 2021 Research Excellence Framework exercises.
3. As well as operating in their local communities across Wales, Welsh universities also operate internationally: attracting and retaining talent, building international research and innovation partnerships, and securing investment to Wales.
4. The creation of an Innovation Strategy for Wales provides an opportunity to succinctly articulate the key challenges that Wales will seek to address through enabling partners across government, business, universities and the public sector. In doing so, the Strategy can promote a culture of innovation and help construct a narrative around our ability to find solutions to the challenges we face.
5. There is an opportunity for the Strategy to outline a set of specific missions for the Welsh innovation ecosystem to be directed towards. There is substantial alignment between research and innovation strengths in Wales and the challenges we face including in the domains of net zero, manufacturing, digital, health and well-being and culture. Similarly, there is alignment between these areas and the priorities of a range of funders including Innovate UK.

6. We would welcome a greater recognition in the Strategy of the ways in which universities can serve as regional anchors for innovation. Universities' links with communities, businesses and the public sector, as well as the resources and facilities that universities host, can provide a sound basis for developing the innovation ecosystem within Wales. It is crucial that the Strategy takes a clear-eyed view of Wales' strengths, infrastructure and assets as this will have implications for which models in place elsewhere in the world are likely to be effective in the Welsh context.
7. The Strategy should consider the key characteristics of a successful innovation environment including collaboration. Through the Wales Innovation Network, Welsh universities have already laid the groundwork for strengthening and building upon collaborative projects across Wales. It is crucial that the Strategy also recognises the role of basic research, including funding streams such as quality-related research funding (QR), in enabling successful innovation.
8. Another key area for the Strategy should be talent. Developing, attracting and retaining talent will be crucial to Wales' success in delivering the Innovation Strategy. This is particularly important at a point where we face a cliff-edge to European Structural and Investment Funds and uncertainty over the UK's association to Horizon Europe.
9. As well as attracting and retaining talent, the Strategy should consider the role of higher-level skills development in fostering a culture of innovation and facilitating knowledge exchange. Programmes such as degree apprenticeships have an important role to play in this area.
10. There should also be a further exploration of the role that our international activity, including that set out in Wales' International Strategy, will play in delivering the Innovation Strategy's ambitions. For example, the Global Wales partnership has been developing key international relationships including the UK's only partnership to date with T-Hub in Hyderabad, the world's largest innovation campus for start-ups.
11. The current funding environment contains a number of uncertainties which present significant risks to sustaining our existing research and innovation activity including the innovation projects funded by European Structural and Investment Funds.
12. It is crucial that the Strategy pays heed to the importance of sustaining our existing research and innovation infrastructure, without which the sector's ability to secure outside investment, including through UKRI, would be significantly impaired. The loss of this infrastructure would be a key threat to the successful delivery of the Strategy's aims. It is imperative that a focus on missions, which is welcome, does not also restrict or inhibit the broader research and innovation effort.
13. Wales faces significant challenges including the pressures placed upon healthcare, the impact of digital technologies on the workplace and occupation levels in Wales, energy security, and the impact of climate change on our people and places. These challenges demonstrate the need for and importance of an Innovation Strategy that is able to articulate how we will use our assets in Wales to find solutions to these challenges. Welsh universities have a long history of operating across Wales, working with

communities, the public sector and businesses in delivering education, research and innovation. We look forward to working with Welsh Government to develop this Strategy and supporting a culture of innovation in Wales.

Consultation questions

Questions 1, 2 and 3

What would you like the Innovation Strategy to achieve in the short (1 year), medium (2 to 5 years) and long term (5+ years) in relation to:

- Economic growth
- Skills development
- Social equity
- Climate and environment

Other

1. The Innovation Strategy presents an opportunity to articulate the key challenges that Wales will seek to address through enabling partners across government, business, universities and the public sector. In doing so, the Strategy can promote a culture of innovation and help construct a narrative around our ability to find and implement solutions to the challenges that we face. It can also set out the ways in which different parts of Welsh Government will be utilised to support the missions that the strategy outlines.
2. A strategy that delivers upon this would support economic growth, provide opportunities for the benefits of research and innovation to be spread across Wales' regions and ensure Wales is well-placed to tackle the global challenges we face including in relation to the climate and environment.
3. In the short term, there is an opportunity to provide a clear framework through which to focus actors in the innovation space on Wales' ambitions and the outcomes we want to achieve. This could include the structures and policies of government, the commitments made in Welsh Government budgets and confirming a set of missions that are specific and which include the actions that will be undertaken and the partners that will be involved. In the short term we would expect to see the contribution that universities can make articulated within the Strategy. In particular, the role of universities as anchors through which clusters can be established and grown.
4. There is also, in the short term, a need for clarity on future actions in relation to skills development, including what Welsh Government and other partners will do to support and develop talent retention and acquisition. The link between skills development and research and innovation should not be understated. This, of course, includes how research and innovation informs teaching and learning but also the ways in which we attract

research and innovation staff. Recent developments, including the UK's uncertain relationship with Horizon Europe and the cliff edge of European Structural and Investment funds, has exerted pressure on our ability to retain researchers. In the short term, consideration will need to be given to how we can meaningfully address this.

5. In the medium term, we would want a clear sense of progress in the delivery of the activities outlined under the Strategy's mission. For example, this could include an increase in collaborative activity between different actors – business, universities, government – in areas related to the missions that are ultimately identified. We would also hope to see universities and partners securing greater investment to Wales in part driven by the focus and drive placed on priority areas in the Strategy. In the medium term we would expect to see the coordination and facilitation delivered through the Wales Innovation Network enabling greater collaboration between universities as well as other stakeholders.
6. In the long-term we would expect to see innovation embedded in Welsh Government operation across different departments and informing future policy development across the various portfolios of government. In doing so, we would hope that budget-setting would be informed by the innovation activity and strengths of Wales.

Question 4

We set out some high-level objectives that underpin our vision in the draft strategy. We recognise that Wales cannot be a global leader of innovation in all areas. Is there a specific mission or missions, linked to economic sectors or areas of social outcome where you think activity and resources should be concentrated?

7. We support the strategy taking a focused approach on the areas of activity where Wales has existing strengths and/or that will deliver economic or social outcomes that Wales needs. As drafted, the Strategy is very broad and would benefit from a greater sense of focus in how the strategy is structured, how the missions are conveyed and in the measures that are proposed. There is an opportunity for the Strategy to clearly and succinctly outline a narrative for innovation in Wales.
8. There is a wide array of research and innovation activity delivered across Wales that bring benefits to people and places. The Wales Innovation Network (WIN) was formed as a result of Graeme Reid's report on collaboration in research and innovation in Wales – 'Strength in Diversity' – and its aim is to facilitate greater collaboration across Welsh universities while providing a single voice for Welsh universities with partners and funders in Wales and wider¹.
9. Work undertaken by WIN has identified the areas of work that universities feel provide the best opportunities for collaboration in areas of strength

¹ <https://uniswales.ac.uk/sites/default/files/2021-09/Strength-in-Diversity-Professor-Graeme-Reid-FINAL.pdf>

and of social and economic importance to Wales. The output of this work will include a list of projects that have been identified through a series of criteria including scale, quality and distinctiveness. The projects will also be underway or at an advanced stage of planning. The thematic areas we expect the projects to fall into include:

- a. Net zero / Energy capture and storage / Decarbonisation
- b. Knowledge exchange with SMEs
- c. Advanced manufacturing (compound semiconductors)
- d. Digital including data and supercomputing
- e. Population health and biotech
- f. Creative industries/media including sustainable growth
- g. Welsh culture, language and heritage

10. Welsh research and innovation has consistently delivered high impact as measured through REF2014 and REF2021. In the most recent exercise, Welsh universities led the UK for the proportion of research whose impact is considered internationally excellent or world-leading. A set of case studies on high-impact projects from Welsh universities is appended to this response and includes:

- The HUG product developed by Cardiff Metropolitan which provides comfort to and increases the well-being of people living with advanced dementia. As a result of studies into the product, it is now prescribed on the NHS.
- The Addictions Research Group at University of South Wales has been conducting research to improve accurate identification, assessment and treatment of those with Alcohol Related Brain Damage. The work has underpinned the Welsh Government's substance misuse treatment framework (SMTF) which also informed the development of a SMTF for the whole of the UK.
- Researchers at Cardiff University developed a tool which identifies households most in need of support to heat their home. The unique mapping system can establish, for the first time, where targeted energy saving measures would deliver maximum reduction in waste energy usage. As of August 2021, the mapping system has been used to target and assist 3,000 vulnerable households.
- Wrexham Glyndwr University's Precision Optical Systems Group which delivers highly complex optical components and systems to a number of industry leading organisations within the science base, precision engineering, aerospace and defence sectors.

11. Further work is underway to analyse the impact case studies produced through REF2021 and will provide a useful basis to inform the development of the Innovation Strategy.

12. Some consideration should be given to how UK-wide bodies are prioritising investment. InnovateUK has committed to running programmes across Net zero plus, health and wellbeing, and technologies. The Innovation Strategy

includes a number of areas of alignment with these domains which should be capitalised on.

13. However, it is important that in setting missions the Innovation Strategy is wary of how it seeks to 'concentrate' resources. For example, prioritising specific project funding over the investment that secures our infrastructure would be short-termist and likely undermine the ability for strengths and activity to emerge in areas we may not yet have considered. The Research and Innovation infrastructure in Wales is highly dependent on funding streams such as quality-related research funding which provides the basis on which institutions are able to win competitive funding.

Strengths in Wales

In Professor Graeme Reid's [Strength in Diversity](#) report, he suggested Welsh university research can be characterised by:

- Strong performance
- Modest scale, and
- A diverse range of institutions.

Work by the **Wales Innovation Network** is underway to identify projects that provide the best opportunities for collaboration in areas of strength and of social and economic importance to Wales. We anticipate that the projects will fall under these thematic areas:

- a. Net zero / Energy capture and storage / Decarbonisation
- b. Knowledge exchange with SMEs
- c. Advanced manufacturing (compound semiconductors)
- d. Digital including data and supercomputing
- e. Population health and biotech
- f. Creative industries/media including sustainable growth
- g. Welsh culture, language and heritage

The **REF2021** indicated strong performance from Welsh universities across a broad range of subjects, including:

- Allied Health Professions, Dentistry, Nursing and Pharmacy
- Psychology, Psychiatry and Neuroscience
- Earth Systems and Environmental Sciences
- Architecture, Built Environment and Planning
- Archaeology
- Education
- Sport and Exercise Sciences, Leisure and Tourism
- English Language and Literature

- Communication, Cultural and Media Studies, Library and Information Management

Welsh research scored particularly well on the **impact**, defined as ‘an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia’. 89% of Welsh research was considered internationally excellent or world leading in terms of impact². This is higher than the UK average and, among the UK nations, is joint highest alongside Northern Ireland.

The 2018 UK Tech Innovation Index shows clusters in Wales, together with the South West of England, have significant strengths in areas including AI and Data, Clean Growth, Advanced Manufacturing and Ageing Society. Similarly, the Horizon 2020 unit at the Wales European Funding Office highlighted strengths in Wales that include: engineering and advanced manufacturing; catalysis; energy systems; food and agriculture; environment; life sciences.

As well as strengths in particular research areas or sectors, the Regional Innovation Scoreboard also finds that Wales outperforms the European average in collaborating with SMEs, lifelong learning, and scientific publications. The collaboration with SMEs is notable given the higher proportion of these kinds of businesses in Wales compared to the UK as a whole, accounting for 62.4% of employment in Wales³.

The **Higher Education Business and Community Interaction** survey demonstrates that Wales has a higher rate per capita of graduate start-ups than other nations in the UK⁴ and strong academic-business engagement with SMEs.⁵

Question 5

What impact, positive or negative, do you think the Innovation Strategy will have on Wales?

14. An Innovation Strategy that is focused on a set of key missions, underpinned by an understanding of actors, assets and programmes of work, would undoubtedly benefit Wales. The benefits of such an approach would be far-reaching encompassing direct and indirect economic benefit, improvements in public services, tangible benefits on people’s lives as a result of innovation finding solutions to the problems that we face, and strengthening Wales’ place in the world. Furthermore, there is an opportunity to help promote a culture of innovation and one that recognises that there should be a tolerance for failure in an innovative ecosystem.

² [Results and submissions : REF 2021](#)

³ <https://gov.wales/sites/default/files/statistics-and-research/2019-12/size-analysis-active-businesses-2019-503.pdf>

⁴ [Intellectual property, start-ups and spin-offs | HESA](#)

⁵ [Business and community services | HESA](#)

15. There are underpinning risks to this approach. The Innovation Strategy could focus either too narrowly on what activity should be supported or too broadly across a range of goals. Both of these approaches would mitigate its success and, in a worst case scenario, undermine existing areas of success. To mitigate this risk, the Innovation Strategy will benefit from continued co-production with partners across the research and innovation ecosystem as well as demonstrating a clear commitment of the role that different parts of Welsh Government will play in its delivery.
16. There is also a fundamental risk inherent in the Strategy's assertion that there needs to be a rebalancing in government-funding for basic research and applied industrial innovation. As outlined elsewhere in this response, the imbalance described in the Strategy is not the result of an over-investment in university research and innovation, which when compared to other nations is towards the lower end of the distribution, but rather shortfalls in other areas including business enterprise research and development (BERD). It should also be noted that recent data from ONS highlights that business R&D is likely underestimated in Wales and the other UK nations, with figures in Wales likely to double through a new methodology⁶, which would suggest it would be helpful to exercise caution in drawing conclusions on the balance of funding.
17. Stimulating an increase in private research and innovation should be an aim of the Strategy. However, redirecting resources from higher education research and innovation would damage our innovation infrastructure, pose a threat to our ability to retain talent, and impact Wales' ability to secure funding.

Question 6

What new actions are needed from the Innovation Strategy?

18. There is scope for the Innovation Strategy to, through the Missions, better articulate the problems that Wales is facing and how the strategy will marshal resources to address those problems. There is scope to consider challenges including net zero, energy more broadly, advanced manufacturing, digital, media and culture, and population health.
19. The Strategy could expand upon support for SME innovation, including the role of partners such as universities in facilitating that activity including through multi-SME clusters. Welsh universities have a strong track record of engagement with SMEs including through multi-university programmes such as:
 - [KESS2](#), led by Bangor University in partnership with all universities in Wales, which aims to increase the research capacity of SMEs

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<https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/articles/comparisonofonsbusinessenterpriseresearchanddevelopmentstatisticswithhmrcresearchanddevelopmenttaxcreditstatistics/2022-09-29#overview>

across Wales by linking partners with a PhD or research master's project.

- [ASTUTE 2020](#), led by Swansea University in partnership with Cardiff University, Aberystwyth University and UWTSD, which provides resources, facilities and advice to the Welsh manufacturing sector to stimulate ideas and embed sustainable technologies.
- [BEACON](#), led by Aberystwyth University in partnership with Bangor University, Swansea University and University of South Wales, which supports businesses, mainly SMEs, in transforming Welsh natural resources and waste into products and by doing so provides opportunities for low carbon growth and local resilience.

20. In addition to support for SMEs, the Strategy could utilise the role of universities in communities across Wales to provide a gateway for other partners, including individuals, to access support. Welsh universities already support a range of knowledge exchange and entrepreneurship activities would provide a foundation for this work.
21. Welsh universities have the highest per capita rate of graduate start-ups in the UK, accounting for 12.9% of the UK's active graduate start-ups⁷. The support for this activity across Welsh universities includes practical assistance on office space, bursaries to help with setup costs, mentoring, and support in identifying and securing investment opportunities. This work provides a solid foundation for expanding the ways in which universities can support start-ups and spin outs.
22. The role of universities in providing a gateway for individuals to access information and support could be expanded further. Welsh universities have put in place a range of community engagement activities as part of their civic mission work which could help support the aims of the Strategy. Universities Wales also facilitates the Civic Mission Network which brings together the nine universities in Wales to provide for best practice discussion and a way for external groups to engage with the sector as a whole.
23. The Innovation Strategy highlights the need for international links, but further actions could be included to draw links with the Welsh Government's International Strategy and build upon activity underway where research, innovation and business partnerships are being formed internationally through programmes such as Global Wales.
24. There are a number of wider actions that could be included within the Strategy to support its aims. For example, further consideration could be given on the possibility of a Wales-level Innovation Accelerator. Similarly, there may be opportunities for Wales to capitalise on the development of Impact Acceleration Accounts (IAA) at UKRI.
25. Another area worth consideration is the implementation of University Enterprise Zones. A number of University Enterprise Zones have been established in England to help universities share knowledge and innovation with businesses. [An interim evaluation of this programme](#) was

⁷ <https://www.hesa.ac.uk/data-and-analysis/business-community/ip-and-startups>

published in 2020 highlighting where the programme has been successful and makes recommendations on the further development of the programme. This could provide helpful learning for the Strategy's ambitions in regional clustering.

26. As outlined in our response to question 8, the Innovation Strategy should engage with questions of funding. In particular, there are key actions that Welsh Government should consider including at a minimum, maintaining in real terms the current level of investment in core research funding and innovation funding. There should also be a consideration of opportunities to increase support, through pump priming, for key priorities. Crucial in a consideration of funding is the importance of sustaining and building upon our existing, successful research and innovation infrastructure. Doing so will be key to securing greater investment to Wales in the missions that will be identified in the Strategy.

Question 7

Which aspects of the Innovation Strategy should remain the same?

27. As outlined above, we believe the Strategy includes a range of constructive suggestions and a useful overview of the landscape but that it would benefit from a more succinct structure which more clearly conveys the aims and ambitions of the Strategy.
28. We welcome the recognition of universities as partners in innovation and the opportunities around existing clusters. This work could be expanded on with a greater emphasis on and articulation of the role of universities as regional anchors for innovation but also a further developed sense of the shape of regional clusters. For example, the strategy refers to compound semiconductors in Cardiff but this work extends along the M4 corridor.
29. We also welcome the commitment to work with existing higher education stakeholders including HEFCW and Universities Wales (including the Wales Innovation Network).
30. The Strategy notes that it will operate within the context of UK Government documents relating to innovation, industrial strategy and research and innovation. This is welcome positioning that acknowledges both the dual-support system and the ways in which securing additional investment to Wales is in part dependent on the interface between policy in Wales and the UK.

Question 8

What are the main challenges and barriers to innovation in Wales? What needs to be done to overcome these barriers?

31. Any discussion on challenges and barriers would be incomplete without considering the funding environment. Recent years have seen profound shifts in the funding environment and much of the funding environment is still subject to some uncertainty.

32. For innovation, the cliff-edge to European Structural and Investment Funds that we are now approaching presents a clear and urgent threat to the innovation activity that has been scaled up at Welsh universities over the programme period. Throughout the final ESIF programme in Wales, university-led projects were awarded more than £300m in funding⁸. Projects funded by ESIF include multi-university collaborations such as ASTUTE 2020, KESS 2 and BEACON which are outlined earlier in this response. Other examples include:

- Upskilling for Industry 4.0 - a programme led by University of Wales Trinity St David providing accredited qualifications to employees in the advanced manufacturing sector, helping participants to upskill in line with rapid technological change
- Centre of Excellence in Mobile and Emerging Technology (CEMET) - led by University of South Wales, programme working with businesses on the joint development and delivery of R&D projects, translating academic knowledge and research into commercial product development, addressing barriers to innovation.
- Data Innovation Accelerator – data science and analytics collaboration between SMEs and Cardiff University to develop and grow businesses, particularly working with companies specialising in ICT and cyber security, advanced materials, energy and eco-innovation.
- SESS – Low carbon energy storage initiative, working alongside businesses to help drive innovation and develop new products, technologies and processes for the commercial market, led by University of South Wales.
- Yr Hen Goleg – led by Aberystwyth University, providing business units for SMEs and social enterprises within the iconic Hen Goleg on the sea-front in Aberystwyth.

33. Although universities have taken steps to seek continuity funding where possible, and support from Welsh Government and HEFCW via the Wales Innovation Network was welcome in this regard, much of this work remains under threat.

34. Replacement structural funds, through the UK Shared Prosperity Fund, have a different locus to ESIF which limits the extent to which these funds can be fully leveraged as a replacement. Similarly, the distribution structure via local authorities makes it challenging to sustain the regional or national projects that were undertaken via ESIF.

35. It is also important to consider how the historic funding environment in Wales has provided challenges to building our innovation ecosystem. As

⁸ <https://gov.wales/eu-structural-funds-programme-2014-2020-commitment-and-spend>

was highlighted in Sir Ian Diamond's review of higher education funding for Welsh Government the dedicated support stream for higher education innovation was removed in Wales in 2014-15 while equivalent funding streams continued in the other UK nations. The reinstatement of this stream in 2019 through RWIF was very welcome but it will take time for the system to recover.

36. It is also crucially important that the development and implementation of the Innovation Strategy recognises the role and function of different funding streams. For example, alongside RWIF, Quality-related Research funding via HEFCW also provides a crucial role in providing for research infrastructure across Welsh universities. This infrastructure is crucial to the research and innovation pipeline and the Welsh Government should aim to, at a minimum, maintain this funding at real-terms.
37. Alongside the Diamond review, Professor Graeme Reid undertook a review of government funded research and innovation which was published in 2018. The Reid review's recommendations echoed those of Diamond's although with an additional emphasis on the correlation between unhypothecated research funding and a country's ability to secure additional funding. Reid recommended continued support for QR funding along with an additional fund to reward those institutions who are successful in securing additional investment and enhanced support for innovation. Much of this review remains relevant for Welsh Government to consider in the development of the Innovation Strategy.
38. In particular, when the Strategy discusses 'rebalancing' and 'addressing the current inequity of public sector investment in RD&I', it overlooks the comparatively low levels of core research and innovation funding in Wales and where the imbalance originates from. Crucially, in funding for core research and innovation, Wales has consistently invested a proportionally lower amount than other UK nations. It also potentially underestimates the risk that shifts from core research and innovation funding would have for the entire ecosystem in Wales.
39. It is worth highlighting that the balance between higher education R&D expenditure and business and enterprise R&D in Wales is consistent with Scotland and many regions of England. This issue is explored further in other questions.
40. A further challenge to innovation in Wales is the need to foster the right culture: one that reflects key ways of working including collaboration, long-term, and prevention. Welsh universities are working to support greater collaboration through the formation of the Wales Innovation Network which aims to facilitate greater collaboration between universities as well as with wider stakeholders, providing a clear entry point for other partners to speak to the Welsh sector as a whole.
41. Universities are also well-placed to support the creation of the right culture in other ways. As outlined in our response to Question 6, Welsh universities have a strong record of supporting graduate start-ups and student entrepreneurship with the highest per capita graduate start-up rate in the UK. As well as building on this work, Welsh universities can support innovation and entrepreneurship through teaching and learning

activities. This includes the ways in which links are drawn between institutions' research and innovation activity and its education provision as well as the ways that a culture of experimentation can be promoted.

42. The links between education and innovation are well-demonstrated through the multi-university [Partnership for Innovation in Education project \('PIE'\)](#) which brings together universities, colleges and industries to share and develop ideas. The project was made of four themes: creative, compound semiconductors, design and a cross cutting theme of digital and part-time study.
43. As well as ensuring that our graduates who enter the workforce in Wales are emersed in a culture of innovation, there is a broader question for Wales on how we retain and acquire talent. Higher education is a highly porous sector. Around half of our undergraduates come from outside Wales and a third of Welsh 18 year olds who enter higher education do so in an institution outside Wales⁹.
44. Staff, like the student body, are also highly mobile. No strategic approach or amount of investment can secure outcomes without people. Ensuring we have the conditions to attract and retain talent will be essential in the success of this strategy. The cliff-edge of ESIF funding, described above, presents a risk to our existing talent base. Ongoing uncertainty over association to Horizon Europe similarly presents risks in this area.

UNIVERSITY FUNDING ENVIRONMENT

Welsh universities are funded to undertake research and innovation activity by the dual support system which consists of **core funding for research** from Welsh Government distributed via HEFCW. Primarily this is made up of quality-related research funding, which provides the foundations on which other projects can be built, and RWIF funding which supports innovation and knowledge exchange activities. There are equivalents to these funding streams in every UK nation. Notably, Wales did not have RWIF funding (or equivalent) between 2013 and 2019.

UKRI and its constituent councils also provide **competitive funding for universities on a UK-wide basis**. QR funding is essential in enabling Welsh universities to compete for this funding.

Notably, UKRI only funds 80% of the full economic cost of the projects it funds meaning universities require QR funding to provide the match funding.

The below sets out what the Wales-equivalent levels of funding are in England, Wales and Scotland. These funds determine the extent to which universities in each nation are able to complete for additional funding.

When you adjust government-funding for university research and innovation across the UK by population to enable comparisons, Wales has lower investment in QR and knowledge exchange than Scotland and England.

⁹ <https://www.hesa.ac.uk/news/25-01-2022/sb262-higher-education-student-statistics/location>

Wales-equivalent funding by UK nation (based on Barnett population share) (£ms) (2022-23)						
Funding Type	Research England		HEFCW		Scottish Funding Council	
QR	£	110.60	£	90.60	£	164.50
Other research funding	£	8.20	£	0.30	£	-
Knowledge exchange funding	£	18.40	£	15.00	£	8.90
Total	£	137.20	£	105.90	£	173.40

It is also worth noting that the balance between higher education research and innovation and business research and innovation in Wales is not an outlier when you consider the balance in Scotland and in many regions of the UK¹⁰. Understanding where our research and innovation assets are located in any approach that seeks to secure, sustain and build upon our existing research and innovation success.

Nation	Government & UKRI ¹	Higher Education ²	Business ³	Private Non-Profit ⁴
England	7%	22%	69%	2%
Wales	3%	41%	56%	1%
Scotland	7%	41%	51%	2%
Northern Ireland	3%	22%	75%	0%

- **Question 9**
- The Innovation Strategy aims to achieve a more prosperous Wales through introducing new products and services, job creation, spend in the Welsh economy and productivity. An ecosystem where innovation becomes everyone's responsibility.
- a. Do you believe the proposed Innovation Strategy has set out clear objectives to achieve this outcome? If not, what is missing?
- b. What impact, positive or negative, do you think innovation can have on helping improve the economic prospects and well-being of the people of Wales?
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45. Research and innovation plays a crucial role in supporting productivity both directly and indirectly. For our views on how the Innovation Strategy could support this aim, please note our response to questions 6, 7 and 8.

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<https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukgrossdomesticexpenditureonresearchanddevelopmentregionaltables>

Question 10

The Strategy aims to grow a more Resilient Wales which aims to improve a healthy natural environment, adopt circular economy principles and increase our capacity and capability in adapting to change.

Do you believe the proposed Innovation Strategy has set out clear objectives to achieve these outcomes? If not, what is missing?

46. Please note our response to previous questions. We would also highlight a range of existing activities including:

- a. [BEACON](#), led by Aberystwyth University in partnership with Bangor University, Swansea University and University of South Wales, which supports businesses, mainly SMEs, in transforming Welsh natural resources and waste into products and by doing so provides opportunities for low carbon growth and local resilience.
- b. ZERO2FIVE Food Industry Centre, led by Cardiff Metropolitan University, is an internationally excellent and world leading innovation centre, as evidenced in part by the last two Research Excellence Framework exercises. The Centre provides food businesses with technical, operational and commercial support to enable them to compete more effectively. Recent examples of the Centre's innovation excellence are the KITE and HELIX Knowledge Transfer Programmes, funded by the European Agricultural Fund for Rural Development and the Welsh Government, which have helped to retain and create skilled employment in some of Wales' less prosperous regions.

Question 11

An equal Wales is an objective of the Innovation Strategy. This proposes a transparent innovation ecosystem that ensures inclusivity in all Research, Development and Innovation activity and a fairer distribution of investment where all regions in Wales feel the benefit from increased innovation activities.

a. Do you believe the proposed Innovation Strategy has set out clear objectives to achieve these outcomes? If not, what is missing?

b. Do you believe the strategy has the potential to positively impact every region in Wales? If not, what actions are needed?

c. Are there any existing inequalities within the Research, Development and Innovation sector that have not been highlighted in the draft strategy? How could the strategy address these inequalities?

d. Are there any under-represented groups that have not been identified as priority groups within the strategy?

e. In the context of the UK levelling up agenda, how can we further consider Welsh regional diversity within the development of this strategy?

47. In delivering an equal Wales, ensuring universities are fully utilised as regional anchors is a key way through which to ensure a fairer distribution. Universities provide a good geographic coverage of Wales with institutions already operating collaborative partnerships across all regions of Wales. The Strategy could better incorporate this in its objectives.

48. An important facet of this is incorporating an understanding of the regional differences into the strategy. All universities have different research and innovation strengths, in part driven by their sense of place and their proximity to other sectors and/or local characteristics (i.e. access to bodies of water). A successful approach to innovation will recognise this diversity and consider how to create a facilitative and enabling, rather than prescriptive, environment.

49. In supporting an equal Wales, universities' role in communities could be further leveraged. As outlined above, universities undertake a range of public engagement and civic mission activities in their local area which could be built upon to further involve citizens in the Innovation Strategy and its objectives. Many of these activities are recorded in universities' Research Wales Innovation Fund strategies.

Question 12

The Innovation Strategy aims to promote a globally responsible Wales through decision making processes that take account of the impact of our innovation activities on global wellbeing, as well as a collaborative approach to working in partnerships internationally to share knowledge, skills and undertake projects with a social purpose.

Do you believe the proposed Innovation Strategy has set out clear objectives to achieve these outcomes? If not, what is missing?

50. Our universities operate locally, nationally and internationally with longstanding international research and innovation relationships and are well-placed to deliver the Innovation Strategy's aims in this area.

51. Universities also deliver research and innovation activity that supports global wellbeing and sustainability including through ODA support. For example, as highlighted in the recent REF exercise, research at Bangor University led to two effective intervention programmes to improve early childhood outcomes in low and middle income countries: the Irie Classroom Toolbox which is a violence prevention programme being implemented in Jamaica and the Group Reach Up and Learn programme to improve parenting skills in seven countries across South Asia, the Middle East and South America.

52. International collaboration has been a key priority for Welsh higher education over a number of years. Through the Global Wales partnership, we have recently undertaken 'Global Wales III' our third flagship international programme. Through Global Wales' activity we have facilitated inward delegations, memorandums of understanding, and partnerships with a range of international partners.
53. This has included securing the UK's only partnership to date with T-Hub in Hyderabad, the world's largest innovation campus for start-ups, MoUs with Vietnam and Telangana State in India which include a focus on innovation and entrepreneurship, and discussions are underway with Research Foundation Flanders (FWO) to establish a pilot R&I programme.
54. Universities also remain part of the European Higher Education Area and as such remain engaged with European developments and partners. University activity in this way complements the work undertaken by Welsh Government with the Vanguard Initiative which seeks to encourage economic growth through smart specialisations. Networks of partners in Wales including government and universities can build collaboration and engagement.

Question 13

The proposed strategy aims to create cohesive communities which will see greater cross sector collaboration, greater community connectivity and adoption of digital technologies, and the aligning of activities towards delivering for our communities in Wales.

Do you believe the Strategy will support this ambition? If not, how can we achieve this?

55. Universities play a key role in their communities across Wales, embedded within the history of those communities and with longstanding partnerships with public services and business. Given this, universities are well-placed to offer hubs to support greater community connectivity.
56. In terms of the adoption of digital technologies, as well as the projects outlined above such as KESS 2 which supports links between SMEs and researchers, there is scope for the Strategy to consider the role for higher level skills development in achieving this aim.
57. We would encourage the Strategy to look more broadly beyond adoption of digital technologies in relation to creating cohesive communities. There is an opportunity to look at how the role of physical estates and shared spaces can support innovation and cohesive communities. In particular, citizen involvement through universities' business and community interaction activities has the opportunity to foster a culture of innovation.

Question 14

The new Innovation Strategy wants to achieve a Healthier Wales through a more coherent and aligned innovation ecosystem that targets new and different ways of working, supports recovery strategies from the pandemic and enables greater adoption of innovation.

This will be underpinned by a Health and Social care system that collaborates across industry, academia and the third sector to deliver improved healthcare value by developing, sharing, procuring and adopting innovative practice and technology.

Do you believe the strategy will support this ambition? If not, what additional activities need to be included?

58. We welcome the focus on health within the Strategy. There may be further scope for the Strategy to reflect a preventative approach to health in line with the ways of working in the Well-being of Future Generations Act. As outlined above, we expect population health to be a thematic focus for the work of the Wales Innovation Network.

Question 15

As part of Welsh Government commitment to a vibrant culture and thriving Welsh language, the proposed Innovation Strategy looks to ensure multi-lingual development as standard.

Do you agree that the strategy outlines the ways in which it hopes to successfully create the right conditions to increase the use of the Welsh Language across all proposed innovation activities? If not, what additional activities should be undertaken?

59. We support the Strategy's consideration of the conditions to increase the use of the Welsh Language across proposed innovation activities. Welsh universities have a long history of research and innovation in the areas of Welsh language, society and culture. This history informed the success of these areas in our REF2021 performance. This work could have a place in supporting a vibrant culture in Wales more broadly.

Question 16

The strategy aims to create a culture of innovation in Wales, one which collaborates, shares risk, encourages participation and supports the ecosystem to innovate.

a. What does an innovation culture mean to you? What is needed to develop an innovation culture in Wales?

b. Do you feel that you have the opportunity to participate in innovation? Please explain why you feel that you are able / unable to participate in innovation?

60. To further develop an innovation culture in Wales, we need to build on what is already working including the collaborative activity taking place locally, nationally and internationally. Both the Wales Innovation Network and Global Wales have already delivered benefits in the formation of innovation partnerships both within Wales and with international partners. Removing the barriers to collaboration should be a key approach for the Strategy.

61. Related to this is the creation of enabling environment. For example, sustaining a research and innovation infrastructure that is able to secure additional investment to Wales. Beyond sustaining the infrastructure, resource is also required to provide the 20% contribution to full economic cost that is required by UKRI grants which only cover 80% of FEC.

62. The Strategy correctly identifies the importance of different funding streams to supporting innovation highlighting the balance between foundational research and applied RD&I. However, the Strategy's discussion of 'rebalancing' and addressing the current inequity of public sector investment in RD&I, overlooks where the imbalance originates from.

63. When looking at UK and international comparators, the level of government-funding for basic research in Wales on a per capita basis is to the lower end of the distribution. This activity is not funded at the expense of other types of expenditure, such as BERD.

Funding Type	Research England	HEFCW	Scottish Funding Council
QR	£ 110.60	£ 90.60	£ 164.50
Other research funding	£ 8.20	£ 0.30	£ -
Knowledge exchange funding	£ 18.40	£ 15.00	£ 8.90
Total	£ 137.20	£ 105.90	£ 173.40

64. Addressing the balance between these two funding streams should not see a funding redistribution from the existing allocation. Doing so would pose a substantial risk to our research and innovation infrastructure and undermine our ability to compete and bring additional investment to Wales.

65. Instead, the Strategy should engage with how to stimulate further investment in applied research and innovation including from the business community. R&D expenditure by UK businesses in Wales equals 1.8% of the UK total the lowest of the four nations. However, we would also note research data from ONS which finds that Wales' business R&D may be double the previously published figure and this may warrant further investigation¹¹.

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<https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/articles/comparisonofonsbusinessenterpriseresearchanddevelopmentstatisticswithhmrcresearchanddevelopmenttaxcreditstatistics/2022-09-29#overview>

66. Another dimension to the creation of a culture innovation is how we promote innovation across different sectors – private, public, third sector – while also securing and retaining talent for Wales. As outlined above, talent should be a key theme for the Strategy and will be fundamental to its success.

67. Another vehicle to create a culture of innovation is through the education provision that universities deliver to and for businesses. For example, the degree apprenticeship programme provides an effective vehicle for doing so as the degree apprentice will typically have to complete an applied project within their place of work to achieve the degree. Similarly, the apprentice will bring their understanding and knowledge of their business environment to the university. In this way, degree apprenticeships provide a highly effective means of knowledge exchange between employers and universities. The Strategy may wish to consider how these programmes could be expanded to further support innovation.

68. There is also the opportunity to build upon Wales' success in generating student and graduate start-ups, as highlighted earlier in this response.

Question 17

Do you think this Innovation Strategy would positively impact you? If not, how could this be changed?

Question 18

Alongside the final strategy we plan to publish an action plan which will address resourcing and implementation of the strategy. The Commission for Tertiary Education and Research will have a leading role to play in the implementation of the strategy, as will the Welsh Government and other bodies and partners. Wales currently does not have one lead body responsible for the coordination and delivery of our innovation system. Turning to implementation, how would you like to see this strategy implemented?

69. We would expect to see the five ways of working outlined in the Well-being of future Generations (Wales) Act being key characteristics of the implementation of the strategy. Ways of working such as a long-term approach, prevention and collaboration are, similarly, important to the success of an innovation eco-system. For example, this would include an awareness of how investments in the short term can build productivity, employment and wider benefits in the medium to long term. Similarly, it would include a recognition of the risks associated with prioritising short-term project funding over investment in long-term research and innovation infrastructure.

70. We would also hope to see the knowledge and experience in the Higher Education Funding Council in Wales in relation to the funding of research and innovation benefit the operation of the new Commission for Tertiary Education and Research.

Question 19

Which stakeholder group would you consider yourself to represent:

- research organisations/academic institutions
- private sector
- citizen
- third sector
- community group
- public sector

71. Research organisations/academic institutions.

Annex – Case studies

REF case studies

Aberystwyth University researchers have provided evidence on biomass crops and land use to help the UK Government develop a net zero policy. AU research is also helping to de-risk investment by industry. The Energy Technologies Institute (ETI) have estimated that the costs of the UK energy system would be up to £44 billion higher per year by 2050 without bioenergy. Engagement with industry through the NFU, and with other biomass supply chain actors, is helping to create an environment in which agriculture can become net zero by 2040.

UK Sport commissioned a collaborative team led by **Bangor University**, with **Cardiff Metropolitan University** and Exeter University, to understand the development profile of its most successful athletes. Comparing serial-medalling, super-elite athletes to matched, non-medalling elite athletes revealed important commonalities and differences in terms of: demographic variables; practice, training, and competition histories; and psychosocial experiences, development, and personality. Consequent to these findings, UK Sport implemented changes to athlete development and all 42 of UK Sport's National Governing Bodies subsequently implemented the findings to enhance their talent development programmes.

Design researchers at **Cardiff Metropolitan University** have created a HUG™ product which is designed to provide comfort and increase wellbeing in people living with advanced dementia. It has a beating heart, plays music, and it has weighted limbs that give the sensation of giving and receiving a cuddle. In a care home study, people who used the HUG™ for six months showed an 87% increase in their wellbeing. As a result, HUG™ is now prescribed on the NHS. A spin-out company was launched in 2020, backed by over £105K investment capital from sources including a Crowd Funding campaign and the UK Alzheimer's Society.

<https://www.cardiffmet.ac.uk/about/who-we-are/Pages/hug.aspx>

The London Ambulance Trust is responsible for responding to urgent and emergency medical situations within the UK's busiest ambulance service. Researchers at **Cardiff University** worked with the Trust to improve efficiency. Using mathematical modelling, the team was able to use the data to help London Ambulance service develop a forecasting suite that predicts resource requirements as far as 14 days in advance which enabled informed and proactive decisions to be made about staffing. Innovative mathematical modelling by researchers at Cardiff University is also delivering improved cancer outcomes and a new NHS contact service. <https://www.cardiff.ac.uk/research/impact-and-innovation/research-impact/saving-lives-with-maths>

At **Swansea University**, Professor Kirsti Bohata's research into LGBTQ+ literature from Wales reveals that queer people have made an important contribution to the literature and history of Wales and the world. As a result of Professor Bohata's research, S4C and BBC Radio Wales have both commissioned producers to make documentaries on Amy

Dillwyn and queer theatre company, Living Histories, used Bohata's research to create 'A Moral Amazon: the story of Amy Dillwyn' which has featured at lesbian festivals and LGBTQ+ events. <https://www.swansea.ac.uk/research/research-highlights/culture-communication-heritage/lgbtq-literature/>

Alcohol Related Brain Damage (ARBD) is an under-recognised but treatable condition associated with debilitating cognitive and physical deficits. Since 2015, the Addictions Research Group at the **University of South Wales** (USW) has been conducting research to improve accurate identification, assessment, and treatment of the condition. Their work has underpinned the Welsh Governments' Substance Misuse Treatment Framework (SMTF), which was used to inform the development of a SMTF for the whole of the UK. The research has also been endorsed by the Royal College of Psychiatrists in Wales and influenced professional practice and staff awareness of ARBD in The Pobl Group (the largest not-for-profit Housing Association in Wales).

Research is being conducted on new and updated entries by the team at the **University of Wales Trinity St David (UWTS)**'s Centre for Advanced Welsh and Celtic Studies for Geiriadur Prifysgol Cymru (GPC), a historical dictionary similar to the Oxford English Dictionary, the acknowledged authority on the spelling, derivation and meaning of Welsh words. It is influential in many areas of the Welsh public sphere, providing the lexical infrastructure of the language necessary to produce terminology for bilingual documentation in fields such as government, education, health, law, and business. GPC's impact has increased dramatically leading to the Dictionary's funding by Welsh Government from 2016 as an essential part of its Cymraeg 2050 strategy to increase the number of Welsh speakers to one million by 2050. The Centre has also participated in two linked AHRC-funded research projects focusing on travel writing that have directly benefited the heritage, tourism, arts, and education sectors in Wales. The impact of this was recently cited in the House of Commons.

Wrexham Glyndwr University created the Precision Optical Systems Group within Glyndwr Innovations Ltd. (GIL), a wholly owned subsidiary company of the University, to deliver the high-value optical surface manufacturing capability developed at the University. Starting in December 2015, the group has built a reputation for delivering highly complex optical components and systems to a number of industry-leading organisations within the science base, precision engineering and aerospace and defence sectors, including Trioptics (France), Thales (France), Leonardo (UK), Centro de Estudios de Fisica del Cosmos de Aragon (CEFCA, Spain), Green Optics (South Korea) and Oxford University (UK). It has also continued to develop new polishing and metrology methods for these sectors and benefited collaborators such as Zeeko, IDOM, BAE Systems, and DIOPTIC.

Research on medical image analysis at **Aberystwyth University** has led to a wide range of impact. It has enabled developments in healthcare informatics, especially around commercial orthopaedics' segmentation software, the international deep endometriosis standard, MS/stroke segmentation and stroke rehabilitation, and retinal disease treatment. It has resulted in changing practices with newly introduced international standard in the relevant healthcare sector, and in benefiting the commercial sector with improved tools that in turn enhance patient outcomes.

Millions of children in low- and middle-income countries (LMIC) experience inadequate learning opportunities and harsh punishment by caregivers. These are important risk factors for poor child development. Research at **Bangor University** led to two highly effective intervention programmes to improve early childhood outcomes in LMIC. The Irie Classroom Toolbox is a violence-prevention programme that is being implemented nationally in Jamaica. The Group Reach Up and Learn programme to improve parenting skills has been adapted for use in seven countries across South Asia, the Middle East and South America. Both programmes have proven benefits for caregivers' practices and children's development and have been implemented in partnership with over 5,500 teachers, over 7,000 mothers and reached over 500,000 children globally.

Research into the role of exercise and physical (in)activity on human cardiovascular structure and function has fundamentally underpinned understanding of cardiac health and disease in great apes. Since October 2010 researchers at **Cardiff Metropolitan University** have worked with European zoos, great ape sanctuaries in Congo, Zambia, Cameroon and Indonesia, and national and international veterinary teams and organisations to improve the understanding, diagnosis and management of heart disease in critically endangered great apes. The research has led to the generation of Pan African Sanctuary Alliance veterinary guidelines that veterinary professionals can use to identify cardiac disease in these critically endangered species. Collectively the work is contributing to the survival of the species.

Researchers at **Cardiff University** have developed a new tool which identifies households most in need of support to heat their homes. A team from the University's Welsh School of Architecture developed a unique mapping system to establish, for the first time, where targeted energy-saving measures, such as insulation retrofits, would deliver maximum reduction in waste energy usage. Using the tool, the team helped Warm Wales develop FRESH - a new mapping system for identifying homes at risk of fuel poverty. As of August 2021, FRESH has been used to target and assist around 3,000 vulnerable households across North Wales, Cardiff, Rhondda Cynon Taff, and Cornwall, and has saved £3.0m for people previously having difficulty meeting energy bills.

<https://www.cardiff.ac.uk/research/impact-and-innovation/research-impact/pinpointing-fuel-poverty>

Researchers at **Swansea University** developed a new assessment tool for 'neurobehavioural disability' (NBD) – the term used to capture the range of disabilities that often result in wholesale changes to a person's character or personality after acquired brain injury. The tool has seen widespread national and international adoption – it is available in seven languages and has registered users from at least 18 countries. It has also been adopted by several large sale providers of specialist ABI rehabilitation, with registered users from over 150 public sector services and private health providers in the UK alone, including over 60 NHS Trusts. <https://www.swansea.ac.uk/research/research-highlights/health-innovation/brain-injury-outcome/>

Research conducted at the Centre for Media and Culture in Small Nations at the **University of South Wales**, has helped transform the media landscape in Wales by informing the establishment of the Senedd Cymru/Welsh Parliament Culture, Welsh Language and Communications Committee (CWLCC) which provides democratic scrutiny

of devolved media policy. USW's research and recommendations also informed the UK Government review of S4C. The Centre's expertise in screen production systems also helped secure major new investment for innovation in Wales' screen sector. Its research and industry collaborations underpinned the creation of Clwstwr – one of only eight UK Creative Clusters – which leverages £1million annually of new investment for R&D in Welsh screen industries and has supported more than 60 industry/HE R&D projects.

Research by the **University of Wales Trinity Saint David's** Cerebra Innovation Centre (CIC) is helping to improve the lives of children with neurodevelopmental conditions. Led by Dr Ross Head, in collaboration with the national charity Cerebra, the Goto seat was originally designed in response to a parent's request for help taking their child to the supermarket. Due to the child's condition, they lacked the core strength to be able to sit in a standard supermarket trolley seat. Initial design and prototypes were made and tested with the child in a supermarket to assess suitability, support, adjustability and fit. The seat and a subsequent scooter design have significantly improved the lives of countless children living with severe conditions. This research has increased inclusion, integration, and interaction, and transformed the lives of many children and their families.

<https://cerebra.org.uk/cic/cerebra-and-leckey-goto-seat/>

<https://cerebra.org.uk/cerebra-innovation-centre-portfolio/scoot/>

Research carried out at **Wrexham Glyndŵr University** into the processes, activities and relationships which underpin effective 'arts and health' practice has directly contributed to the development and establishment of a burgeoning arts and health ecosystem in North Wales, and a growing community of practice allowing learning to be shared nationwide/internationally.

- *In-between-ness* was a practice-based research project that brought together key stakeholders to explore changes in patients' creative expressions prior to, during, and after treatment for depression. The research based on *In-between-ness* has delivered positive outcomes for the health and wellbeing of citizens, and for public understanding of how to best support those living with physical and mental health issues in North Wales and globally.
- *The Potential of Painting* project qualitatively investigated the potential of painting as a means of expression and communication for those living with dementia. The project contributed to new ways of communicating with people living with dementia, helping to de-stigmatise dementia and raise awareness and public understanding of the condition to combat isolation and give validation to the grief experienced.

European Structural and Investment Funded research projects

BEACON

BEACON biorefining and its extension projects support businesses, mainly SMEs, in transforming Welsh natural resources and wastes into products (chemicals, building materials, natural products), and by doing so provide opportunities for low carbon growth and local resilience.

Beacon is a project led by Aberystwyth University, in partnership with Bangor University, funded via ERDF and due to end in June 2022.

Beacon received £475,340 in ERDF funding and is worth £831,101 in total.

FLEXIS App

Building on the success of the FLEXIS project, FLEXIS App drives green and economic growth across Wales through industrial partnerships collaborating on the commercialisation of research to decarbonise future energy supply.

Key projects include:

- investigating and optimising the capture, storage and release of heat from industrial waste air streams using thermochemical storage materials;
- developing world-leading artificial intelligence and machine learning algorithms that power smart energy solutions for global application;
- developing and demonstrating a decarbonised combined heat and power system.

FLEXIS is funded by European Development Funds and is due to end in November 2022.

Knowledge Economy Skills Scholarships (KESS / KESS II)

- KESS is a programme led by Bangor University on behalf of the higher education sector in Wales, funded by European Social Funds, due to end in March 2023.
- KESS supports collaborative research projects, placing research master's and PhD students with external partners ranging from SMEs to large companies, social enterprises and public bodies, including Tenovus Cancer Care, Natural Resources Wales, Tata Steel, S4C, National Botanic Garden of Wales, Mencap Cymru, Halen Môn, Qioptiq Ltd., P&S Nano Ltd. and the Tidal Lagoon Swansea Bay.
- SMEs taking advantage of a KESS 2 project benefit from being able to focus skills towards a research area related to their business at a significantly lower cost than, for example, commissioning a research organisation to undertake such work. It is also more affordable for smaller businesses that may find the 25% cost implication of a Welsh Government

funded KTP to be prohibitive, given that overall cost can be £75-£90k per project year, whereas a Master's student placement in a small business in a KESS 2 project starting in October 2019 cost the organisation £3750.

- Successful projects so far have included:
- A partnership between a PhD student at Bangor University and the Savari Research Trust, developing a range of fungus-resistant tomatoes optimised for the Northern European climate
- A University of South Wales PhD student working in RUMM (Remote Utility Monitoring and Management) as a low carbon psychologist, identifying energy saving interventions based on behaviour change for large companies
- A collaborative partnership between the Brecon Beacons National Park Authority and Swansea University, involving a PhD student researching the rate of continuing carbon deposition and exchange in peat bogs – an area of conservation research of increasing importance

Bioinnovation Wales

Bioinnovation Wales helps employers address high level skills shortages in the agri-food and biotech sector by targeting people already working in the sector, offering bespoke qualifications and industry accredited skills tailored to industry needs.

Bioinnovation Wales is a project led by Aberystwyth University in partnership with Swansea University, funded by ESF and due to end in April 2023.

Circular Economy Innovation Communities (CEIC East and West Wales and the Valleys)

CEIC is a collaboration led by Swansea University in partnership with Cardiff Metropolitan University, funded by ESF due to end in December 2023.

The collaboration supports public service organisations to develop new methods, processes and tools to build towards net-zero, co-create solutions in partnership with other public service practitioners, and to create cohorts of Welsh public and third sector managers to enhance innovation knowledge and skills.

Technocamps

Technocamps is a project led by Swansea University in partnership with the University of South Wales and Bangor University, funded by ESF and due to end in September 2021¹²

¹² Some projects are still operating past their end date, due to an underspend during the pandemic

Technocamps works with 3,600 young people in secondary schools which do not currently offer computer science as an option at GCSE, or where the subject is only recently available.

The project enables pupils in these schools to build on their existing knowledge and enthusiasm for IT and computing

Achieve through work experience (GO Wales)

GO Wales is led by HEFCW in partnership with all Welsh universities as a pan-Wales project, funded by ESF until December 2022.

GO Wales provides opportunities to students in higher education who face barriers to securing work experience. GO Wales works with students to establish their needs and identifies employers who can provide work shadowing, tasters and placements.