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Turning rhetoric into reality: Decarbonising the Foundational Economy

crew Regeneration Wales Adfywio Cymru

MAKING WALES BETTER iwa GWNEUD CYMRU WELL

About the author

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Foreword

This report is the last in our series of papers produced through our collaboration with CREW on the foundational economy in Wales. In working with CREW, we have been able to situate our work on this topic within the wider legacy of regeneration and community development in Wales, and have been able to demonstrate the strength of Wales' civil society sector for developing ideas to inform government policy.

Throughout our collaborative project, we have worked to build on growing policy interest in the foundational economy by examining some of the policy areas that are controlled within Wales, whether by the Welsh Government, or by local and regional government bodies, public bodies and regulators or Wales' civil society institutions.

The foundational economy is an important intervention in Welsh economic development policy. It has grown in influence during a time of upheaval. Established practices and strategies for economic development have faced increasing criticism, as improvements in living standards have slowed over the last decade. At the same time, citizens and governments have become more interested in well-being and in non-monetary ways of valuing ourselves and our actions. This re-evaluation has come in a period of political disquiet, in which established allegiances have been broken and trust in key institutions has fallen.

We see this period of upheaval as an opportunity to take Wales out of an era dominated by relative economic decline and into an era of collective action towards the common good. Nowhere is this more evident than in responding to the huge challenge of decarbonisation, which this report addresses in detail.

Auriol Miller
Director of the IWA

Introduction: Lessons from the last transition

Introduction: Lessons from the last transition

As we move through the next decade, we will all see significant changes in our everyday lives that arise from the challenge of decarbonisation. This will be an area of public policy that will be immediately visible to every person living in Wales, and to most people living around the world. As a highly developed economy in global terms, Wales has a responsibility to play a leading role.

Wales' experience can already provide lessons for the rest of the world, though not all of these lessons are positive. Wales was one of the world's first fossil fuel economies. Throughout the 19th century the mining of coal, its transportation and its uses in the iron and later steel industries utterly transformed Wales from a rural society with a small and dispersed population into an industrial society at the heart of an international trading system. It left a permanent mark on our physical and human geography so that today half of Wales' population lives in the narrow valleys where coal was mined or in the port cities where it was shipped. It shaped our institutions, as Wales developed a new and modern sense of identity within Britain, and fired a radical desire for social change. It also put Wales at the heart of an international empire that brought untold riches as well as immense suffering.

Coal production peaked in the 1920s. Unlike the fossil fuel economies of today, Welsh coal did not decline because of decarbonisation, but because of competition from around the world as new markets were opened up, successive economic crashes and crises suppressed demand and the Empire and its captive markets collapsed. Though the reasons were different, the experience of that decline informs many of the fears of today's fossil fuel economies about their own futures. Along with other coalfields in Yorkshire, the Midlands, Scotland, Durham, and further afield in northern France, southern Belgium, the Ruhr region of Germany and the Appalachian mountains in the United States, Wales has become a by-word for economic decay. The challenges of shifting a workforce from such a dominant industry into new and very different industries, often which require new and higher skills and even require people to move to new places, have been a part of life in Wales for decades.

What can the world learn from Wales' transition away from coal? The negative lessons are very clear. The first wave of decline, in the mass unemployment of the 1930s, saw a huge loss of population from Wales and from the coalfield in particular. The rapid acceleration of the decline in the 1970s and 1980s was associated with immense political strife, leaving many people in Wales with the belief that their government in London was at war with them, and creating a feeling of distrust that still remains today. Productivity remains very low by western European standards, with knock-on effects for earnings and wealth.

However, there are also examples of successes in how Wales has managed this transition. From high levels of unemployment and economic inactivity in the 1980s and 1990s, Wales now has lower unemployment than the UK average, and has notably avoided the high youth unemployment and structural unemployment that has plagued other parts of Europe since 2008.

Wales is now an economy dominated by services and, despite wider concerns about productivity, has a small number of sectors and clusters that are globally competitive and which create high skilled and well-paid jobs.

An awareness of these lessons, both positive and negative, will be increasingly important over the next decade as Wales moves into a new phase of decarbonisation. Having reduced our production of fossil fuels, we must now radically reduce our demand for their use, both here at home in the way we heat our buildings, produce our food and transport ourselves and our goods, and in the carbon that is embedded in the things we buy from elsewhere.

At the IWA, our work in this area has been informed by discussions with a wide range of people in Wales, including:

- Universities, further education colleges and education bodies
- Sector bodies for high-carbon industries
- Business owners and workers and
- Elected representatives and civil servants.

As the Climate Change Committee has recognised[1], devolved competences make up about 40% of the policy actions that are needed to achieve decarbonisation, and stakeholders in Wales will have to work constructively with UK Government and public bodies to ensure that their respective policies complement each other. This report therefore presents an overview of the range of tools that policy makers in Wales have available to them to support firms, institutions and workers through the decarbonisation transition.

1 Welsh Government, (2021) Net Zero Wales Carbon Budget 2 (2021-25)

Modelling decarbonisation

Modelling decarbonisation

The pathway to a decarbonised economy includes some major uncertainties, something that the UK Government has recognised in its Net Zero Strategy[2]. Nonetheless, there have been numerous attempts to model potential impacts both for emissions reduction and for industries, sectors, local economies and jobs.

Many of these models use the same kinds of methodologies that are often used in economic development policy, including projections about the growth of particular sectors. For instance, the International Energy Agency has modelled an overall increase in demand for labour in energy sectors as a result of the move to renewables, and confidently states that the sector will see a net increase in employment globally[3].

Modelling future economic trajectories is, however, notoriously difficult. Technological changes, political events, natural disasters and pandemics are almost impossible to predict yet can have fundamental impacts on the economy, as we are all acutely aware. In looking across the various models of decarbonisation, we can therefore identify two broad sets of conclusions, each of which is informed by data but also by potential biases.

The optimistic view

Both Welsh and UK governments, and all major parties in the UK, have generally put forward an optimistic vision for what this next phase of transition to 2035 will look like. It is assumed that the need to replace a large number of high-carbon goods with low-carbon goods (for instance, replacing petrol or diesel vehicles with electric vehicles) will increase demand for manufacturing, and that the need to reduce transport emissions will drive a 're-shoring' (as opposed to 'off-shoring') of manufacturing capacity in advanced economies such as the UK.

Based on these and other assumptions, the UK Government's Net Zero Strategy claims that 440,000 jobs will be created in the UK by 2035 as a result of actions taken towards decarbonising the economy[4]. There is a strong suggestion by the UK Government, and in recent work by the Social Market Foundation[5] and the Grantham Research Institute on Climate Change and the Environment[6], that many of the 'green jobs' that will be created will be in construction, engineering, and manufacturing.

2 Department for Business, Energy and Industrial Strategy, (2021) Net Zero Strategy: Build Back Greener

3 International Energy Agency, (2021) Net Zero by 2050 – Analysis

4 Reuters, (2021) Britain to create 440,000 new jobs with net-zero strategy - minister

5 Social Market Foundation. (2021) Zeroing in: Net Zero disruption and opportunity at a local level

6 Grantham Research Institute on climate change and the environment, (n.d.) Investing in a just transition - global project overview

Case studies:

Gas boiler installation and maintenance

We spoke to training providers, industry bodies and individual boiler engineers working in the gas industry about the transition to net zero. Our findings generally support a more pessimistic view of the economic impacts of the transition on this sector.

Gas boilers are currently used for heating in 85% of UK homes[7], and support a installation and maintenance workforce of around 140,000 across the UK[8]. The UK Government has announced its strong expectation (though not an explicit legal requirement) that no new gas boilers will be installed after 2035.

Replacing gas boilers will require a mix of solutions, including potential use of hydrogen, combined solutions such as neighbourhood heat networks and the use of electric-powered heat pumps. Heat pumps are a relatively recent technology that work by extracting residual heat either from the outside air or from underground, typically using this to heat water for a central heating system.

The UK Government has set a target for the UK to install 600,000 heat pumps per year up to 2030[9]. This will clearly create new demand, both for manufacture and installation – the latter of which is a highly grounded activity. The Heat Pump Association, a trade body, anticipates that this will require around 50,000 trained heat pump installers[10]. The UK's Climate Change Committee, which advises government on the pathway to decarbonisation, has suggested that changing demand for heat and energy could create up to 200,000 jobs between 2020 and 2050[11].

These models are informed by observations of recent trends, but also by anticipation of the need for new infrastructure and technologies and by theorisation of potential changes to international supply chains and what is often called the 'global division of labour'[12]. Whereas recent decades have seen off-shoring of manufacturing and other labour intensive industries from the more advanced economies to developing economies, it is proposed that increasing fuel costs for shipping under decarbonisation, particularly for large infrastructure that is needed in areas like rail, or wind turbine production, will see an effective 're-shoring' of manufacturing.

7 Climate Change Committee, (2016) Heat in UK buildings today

8 Gas Safe, (2018) Ten years of keeping people gas safe

9 Department for Business, Energy & Industrial Strategy, (2021) Plan to drive down the cost of clean heat - GOV.UK

10 Heat Pump Association, (2019) Delivering Net Zero: A roadmap for the role of heat pumps

11 UK Climate Change Committee, (2021) Sixth Carbon Budget

12 Lachapelle, E., MacNeil, R. & Paterson, M. (2016) The political economy of decarbonisation: from green energy 'race' to green 'division of labour', in New Political Economy

This points towards a potential opportunity for regions in the more advanced economies that have retained manufacturing sectors and capacity, such as Wales. The UK Government has subsequently recognised the South Wales Industrial Cluster as an important region for strategic investment in infrastructure, including investing in hydrogen to support steel-making and wider manufacturing.

The pessimistic view

Despite policy makers' optimism, there are a number of reasons to question whether or not the decarbonisation transition will have positive effects on the economy of places like Wales.

Much of the transition relies on the manufacture of new goods that will replace older, more carbon-intensive goods. Yet while there are benefits to producing certain things, like wind turbines, closer to the point where they will be used in order to save on transportation costs and emissions, many other goods are already being produced in ways that conform to existing, highly globalised supply chains – as an example, around 92% of solar panels are produced in south east Asia[13]. Wales faces a significant challenge in that many of the economic opportunities being created by decarbonisation are, to date, being captured by some of the largest firms, operating across national boundaries.

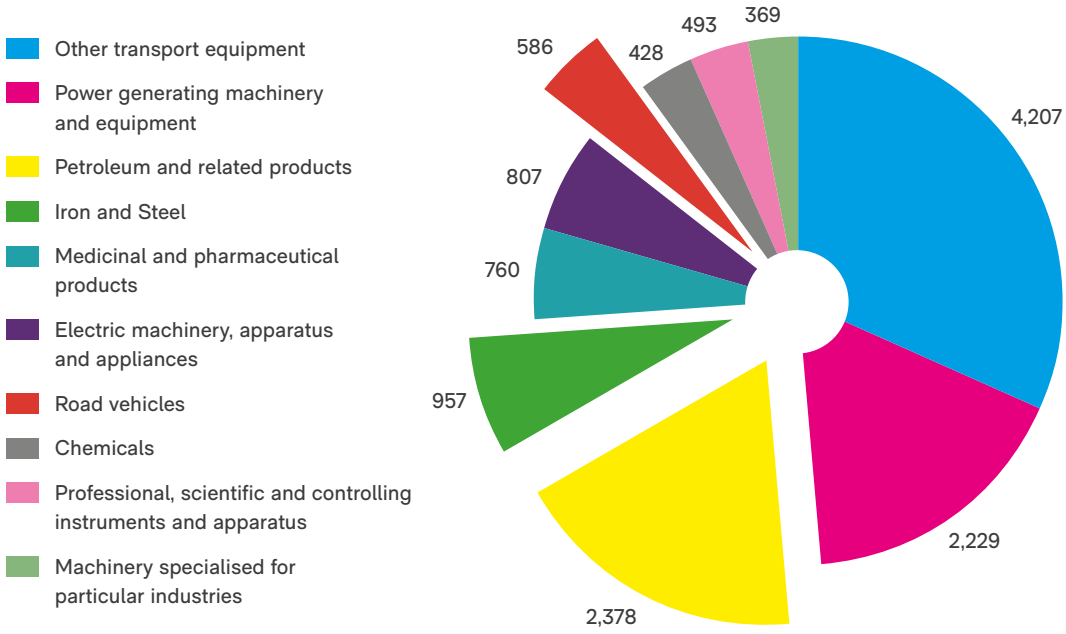
The experience of the Welsh economy of recent decades, which has been the subject of extensive analysis from a foundational economy perspective[14], suggests that any employment opportunities created through manufacturing are likely to be concentrated at the lower end of the value chain, and that, rather than seeing Welsh-owned firms or Welsh-developed technologies taking a lead, jobs will be concentrated in assembly or distribution.

If the potential benefits to Wales of reshoring may be overstated, then it is also possible that the potential threats are being understated. Around a quarter of Wales' most important exported goods are heavily reliant on carbon emissions either directly (petroleum) or in their energy use in production and further use (iron and steel, motor vehicles).

13 ibid

14 Brill L., Cowie, L., Folkman, P., Froud, J., Johal, S., Leaver, A., Moran, M. and Williams, K. (2015) What Wales Could Be, CRESC and FSB Wales

Figure 1: Wales' top ten export goods (£m), 2019



Source: Welsh Government statistical bulletin[15]

By contrast, the emphasis from modelling on construction and utilities suggests that much of new job creation will be focused on non-tradeable sectors. Activities like construction, building adaptation, utilities and installation and repair are all grounded in the places where they are delivered, and the growth of firms and sectors is limited by the size of domestic markets.

There is a rich debate about what this kind of shift could mean. Exports have long been associated with economic development at regional and national levels. There is evidence that exporting encourages firms to engage in new technologies and processes, improves their access to capital and allows them to access bigger markets that domestic tradition[16]. There is some evidence that this translates into improved wages for workers compared to work in non-tradeables[17]. The Welsh Government has long recognised this through its targeted support to raise exports[18].

15 Welsh Government, (2020) Welsh goods exports, 2020

16 Isaakson, A., (2007) Determinants of Total Factor Productivity: A Literature Review, United Nations Industrial Development Organisation

17 Black, J., Spowage, M., Cooper, B., Watts, R. & McGeoch, A., (2021), Estimating the relationship between exports and the labour market in the UK, Department for International Trade.

18 Welsh Government, (2020) Export Action Plan

Much of the literature on the foundational economy argues that exports are not an effective measure of the well-being of a society. Many foundational, non-tradeable sectors provide high quality employment, particularly health care and aspects of education. However, there are clearly implications to be worked through for any economy that finds itself less competitive in global markets, particularly if it continues to rely on imports for much of its consumption as Wales does, including for essentials such as food. In the case of Wales within the UK, declining exports would not only impact wages within the Welsh economy but would impact the Welsh Government's nascent ability to support itself through taxes. If UK exports were to become more dominated by services than they are currently, we could anticipate a continuation of current regional dynamics, with a concentration of high-value activity in the south east of England and peripheral regions like Wales relying moreso than currently on foundational sectors, whose own resilience would be highly reliant on political support for fiscal redistribution in England.

In this sense, policy makers in Wales need to start to consider the potential for job creation and job losses in terms of quality and not just quantity.

Recommendation 1: Economic intelligence

In its 2021-25 Carbon Budget the Welsh Government has committed to generate new forms of labour market intelligence, making specific reference to Regional Skills Partnerships' (RSP) role in identifying both skill needs and growing sectors.

This regionalised approach is welcome, and addresses some of the concerns that some commentators, including the IWA, have raised about the breadth and quality of data that is available to inform economic development policy. Regionalising this data exercise will empower Wales' regional bodies to play a greater role and will better reflect regional specificities – for example, in relation to key industrial investments by the UK Government in the South Wales Industrial Cluster and for off-shore wind in north Wales.

The Welsh Government and RSPs need to ensure that the intelligence that informs their decisions and policies is reflective of the breadth of experiences within affected industries. This can be strongly informed by engagement with social partners, including trade unions, individual workers and third sector organisations. Doing so will help to present a more rounded picture of the dynamics within declining and rising industries, and will also enable civil society organisations to be more effective in playing their own role in supporting labour market transition. Many of Wales' third sector organisations, including the IWA, were formed during the deindustrialisation transition and it is vital that they are able to bring their expertise and resources to supplement the work of public bodies in providing support for those transitioning between sectors of the labour market.

There is also a need to adapt existing processes for engaging with firms to ensure that labour market intelligence accurately reflects the experiences of SMEs, and particularly of microfirms. These firms are particularly prevalent in industries which are expected to grow, such as utilities

and construction, yet time and resource pressures mean that they rarely engage with policy makers on issues like skills planning or consultations. New and innovative methods for engaging with these businesses should be explored, including through funding research and boosting the sample sizes for existing business surveys in Wales.

This economic intelligence should also inform accurate reflections on the possibility of job losses, including through future Carbon Budgets and through impact assessments for relevant policy decisions. It is striking how little evidence exists on the risks to key sectors and how little this features in policy documents, but governments have a responsibility to be honest with the public. A key lesson of the deindustrialisation transition is that a lack of engagement with affected workers and communities can lead to lingering resentments and a lack of trust in institutions, and high quality labour market intelligence provides an opportunity to anticipate potential unintended consequences and therefore plan ahead.

Support for labour market transition

Support for labour market transition

Economic policy often assumes that workers, business owners and consumers make rational decisions based on their desire to maximise their economic utility, in response to the information that they have available to them. Research on the foundational economy has highlighted a number of limitations of these assumptions.

In particular, research on the foundational economy has highlighted that many business owners in foundational sectors are less motivated by business growth than might be the case in, for example, fast growing sectors like digital technologies or advanced manufacturing[19]. Instead, many business owners in sectors like construction or utilities are motivated by the desire for stability.

This has significant implications for how the decarbonisation transition will impact the foundational economy. Many conventional approaches to decarbonisation assume that market signals will do some of the work of encouraging firms and consumers to reduce their emissions, particularly once technological developments have reduced the cost of things like renewable energy, and/or as pricing mechanisms for carbon become more extensive. Yet the evidence we found from speaking to businesses owners in carbon-intensive industries suggests that these businesses are likely to hold out in their response to the transition.

19 Brill et al., (2015)

Case study:
Preparing for transition

We undertook a short telephone survey with a small number of motor mechanics around Wales, in which we asked them about their awareness of the UK Government's commitments to ban the sale of petrol and diesel vehicles from 2030, with sales of some hybrid vehicles allowed until 2035. We discussed potential scenarios for their work as a result of these changes, including options for retraining to be able to work on electric vehicles, continuing to work on 'legacy' petrol and diesel vehicles, and leaving their industry.

Only one of the people we spoke to said they would retrain, and most respondents believed that the transition from petrol/diesel to electric vehicles would not happen in the anticipated timescales. None of the people we spoke to had received any information from the UK Government, or from any other public body, about the potential impacts of these proposed regulations.

This pattern is replicated across the whole industry. The Institute of Motor Industries (IMI) has conducted several surveys of motor mechanics in the UK and reported that as of 2020 only 5% have received training or gained qualifications in repair and maintenance of electric vehicles. The IMI argues that this lack of skills is likely to present problems as the UK transitions to banning sales of petrol and diesel cars in 2030. The IMI and the RAC have both called for greater incentives and government support for this retraining effort. (It should be noted that the IMI is an awarding body and therefore stands to benefit from any increased uptake of qualifications[20].)

This suggests that the regulatory signals that governments are using are not reaching far enough into the affected industries, but also that these signals, even when presented, are not yet having the desired effect of encouraging changes in behaviour and investment in new skills.

Even if the will to change were there, it is unlikely that there would be like-for-like shifts in jobs between declining and growing sectors. Taking the example of motor repair, Electric Vehicles (EVs) require a qualitatively different form of maintenance due to the absence of an internal combustion engine, instead requiring specialist skills in diagnostics for the digital technologies used in the vehicle, as well as battery maintenance, and some maintenance of moving parts such as brakes and wheels.

This will create a qualitatively different labour market in the motor industry. The industry has in the past been regarded as an important source of employment, particularly for young men from working class backgrounds[21]. What will replace it will be a more 'credentialised' industry where employees will be expected to hold a greater number of qualifications: in addition to demonstrating working knowledge of motor vehicles, there are already additional qualifications to support work on EVs, and there are strong suggestions that certain aspects of diagnostics and repair may require formal electrical engineering qualifications.

20 Auto Express, (2020) Just 5% of mechanics can work on electric cars

21 Goodwin, J & O'Connor, H., (2007) Engineer, mechanic or carpenter? Boys' transitions to work in the 1960s, in Journal of Education and Work 18:4

There is a strong risk that the costs of this process of retraining will fall on those least able to pay. Current qualifications for EV maintenance can cost between £500 - £1,000, and the time commitment for completing these qualifications implies an opportunity cost in the time out of paid employment.

The challenge for policy makers in Wales is therefore to create the right incentives that encourage firms and workers to make the changes necessary to secure a place for themselves within a decarbonised economy. Not doing so will likely see a greater dislocation of people as certain industries become unsustainable. Nonetheless, there is an immense opportunity for the Welsh Government to affect a step-change in how vocational education operates, with decarbonisation of the foundational economy as a key motivation.

Recommendation 2: Active labour market policies

Our interviews with business owners and industry bodies in carbon intensive industries in Wales have highlighted a lack of understanding of the realities of the coming transition and of the expectations of governments and regulators. As we have shown, certain industries are likely to be heavily affected, to the extent where assets will lose value, business models will become untenable and workers will lose their jobs.

The deindustrialisation transition saw the development of a range of tools to manage the transition of workers between industries. Often called Active Labour Market Policies, these have been described as a feature of wider policy interest in supply-side interventions, seeking to address unemployment and mismatches within the labour market through support for developing new skills, job-matching and job search services, and subsidisation of employment[22].

Wales has seen some relatively successful examples of active labour policy, most notably Jobs Growth Wales, which demonstrated evidence of having reduced youth unemployment in the years following the 2008-9 recession[23]. Jobs Growth Wales has now been adapted into the current Welsh Government's Jobs Growth Wales+ programme, which is targeted at 16-18 year olds and forms part of the Welsh Government's Youth Guarantee.

Over the coming decade to 2032 there is likely to be a renewed potential for Active Labour Market Policies in Wales to have an impact in response to the decarbonisation transition. The Welsh Government and its partners will need to design programmes to respond to the particular features of the transition, whilst learning lessons from previous iterations:

- Unlike Jobs Growth Wales and its successor programmes, future impacts may be greater when targeted at more established workers in the worst affected industries.
- Economic impacts from decarbonisation are likely to differ between regions and localities, and there is a strong rationale for devolving aspects of the design of labour market policies to Wales' regional bodies.

22 Berry, C., (n.d.) The hyper-Anglicisation of active labour market policy :

23 Ipsos MORI, Wavehill & WISERD (2016) Evaluation of Jobs Growth Wales: Final Report, Welsh Government

- Where Jobs Growth Wales was supported through the European Social Fund, future programmes may have to be designed in ways that allows for joint funding between UK, Welsh, regional and local governments.
- Future Active Labour Market Policies will need to be designed with closer reference to the incentives and disincentives created by welfare policy set at a UK level – there is some evidence that the aims of Jobs Growth Wales were made more difficult to achieve.

Recommendation 3: The Skills Action Plan

Of the policy levers that the Welsh Government holds to address decarbonisation, education and skills is one of the most important. As in the transition away from coal, re-skilling of the existing workforce will be an important investment and is recognised by the International Labour Organisation[24] as a core component of successful transition plans.

The Welsh Government intends to publish an employability and skills plan in early 2022 that will build on the policy commitments in its 2021-25 Second Carbon Budget. This plan[25] is intended to address the kinds of challenges that we have set out in this section of our report. We have summarised some of the key factors that should be addressed in the Plan.

Defining industry requirements

The Welsh skills system incorporates a number of mechanisms for engaging with industry, from advisory structures to the sector panels for qualification and apprenticeship design. Nonetheless, as we have highlighted in previous work on business support programmes, advisory panels are often difficult to access for firms with lower margins, greater time commitments, less flexible working hours and less experience of engaging with government. These challenges are particularly acute for grounded small and medium enterprises (SMEs) in foundational sectors.

Identifying skill needs will therefore need to explore more reflexive methods that are tailored to the features of the most affected industries, including some of the high-carbon industries we engaged with as part of our work. Perhaps more importantly, it is not clear that a set of nationally-defined priority sectors can satisfy the more region-oriented approach to skills. There is a particular opportunity to build on the expanded role of RSPs and their employer response groups in response to COVID-19[26] – this mechanism for rapid and responsive engagement could serve as a valuable way of managing key moments in the decarbonisation transition, such as the periods surrounding the phasing out of particular technologies.

We engaged with two of Wales' RSPs as part of our work. From these discussions, we identified significant concerns about a lack of funding to meet any further expansion of their responsibilities.

24 International Labour Organisation, (2015) Guidelines for a just transition towards environmentally sustainable economies and societies for all

25 See Policy 11 within the Welsh Government's Net Zero Wales Carbon Budget 2 (2021-25)

If RSPs are to play a greater role in identifying green skills, then there will also be a need for greater parity between the different partnerships. While some are well-embedded, others were established more recently and lack comparable resources.

Developing National Occupational Standards and reviewing existing qualifications

The Welsh Government and Qualifications Wales may find themselves limited in their ability to incorporate employer input and their own policy priorities into qualifications or indeed National Occupational Standards (NOS) due to cross-border implications[27]. Vocational qualifications offered in Wales tend to operate on a three-country (England, Wales and Northern Ireland) basis, and to date only a limited range of vocational qualifications have been reformed to address a specific Welsh dimension or Welsh policy concerns. In terms of NOS, their continued upkeep has been undermined by funding cuts and their influence has been weakened by the decision of the UK Government to move towards apprenticeship standards with end-point assessments.

The bodies involved in qualification development in Wales will therefore need to consider whether or not the Welsh Government's ambitions for managing the labour market transition as part of decarbonisation warrant a further break with the established three-country system. This could involve distinctive arrangements to create a greater number of Welsh qualifications. Conversely, there is an option to align more closely with the emerging vocational reforms in England, albeit losing policy control and influence over content. Either way, it appears that the status quo is not going to be sufficient for the development of new vocational qualifications that meet specialised and even regionalised needs.

Where evidence emerges that skill needs are not being met due to the costs to workers of retraining, the Welsh Government and Qualifications Wales should explore opportunities to make certain industry or 'vendor' qualifications eligible for public funding. This could take the form of targeted subsidies for industry training, as the UK Government has recently trialed in a limited way with the BEIS Skills Training Competition Scheme, or by engaging with industry bodies to facilitate their qualifications becoming regulated. This may be more impactful in sectors which are set to play an important role in Net Zero but which are relatively new, such as heat pumps, and could promote improved quality assurance and protection for learners as well as promoting uptake.

Developing government incentives or legislation/regulation to stimulate the skills demand

Recent work on the foundational economy has challenged a dominant policy narrative that improving skill supply is an effective means of stimulating economic development, highlighting the weak demand for skills that is a strong feature of much of the Welsh economy (and which contributes to the low-skill equilibrium).

It is therefore welcome that the Welsh Government is opting to address skill demand as part of its Skills Action Plan. This represents a further embedding of the importance of firms in the skills system and in skills planning.

26 Economy, Infrastructure and Skills Committee - Fifth Senedd 20/01/2021 - Welsh Parliament

27 Laczik, A. & Fettes, T., (2020) Perspectives on National Occupational Standards: What do users think?

However, achieving this valuable aim is likely to require strong coordination between different Welsh Government departments, with local and regional bodies, and with the UK Government (particularly in relation to areas like capital investment for large firms and for innovation). The Welsh Government's own analysis through its 2021-25 Second Carbon Budget does not reflect this at present – indeed, it is striking that Economy is identified as the only department with defined responsibility for the Skills Action Plan (raising questions about how it intends to exercise many of the qualification development functions set out above, which rest with Education & Welsh Language).

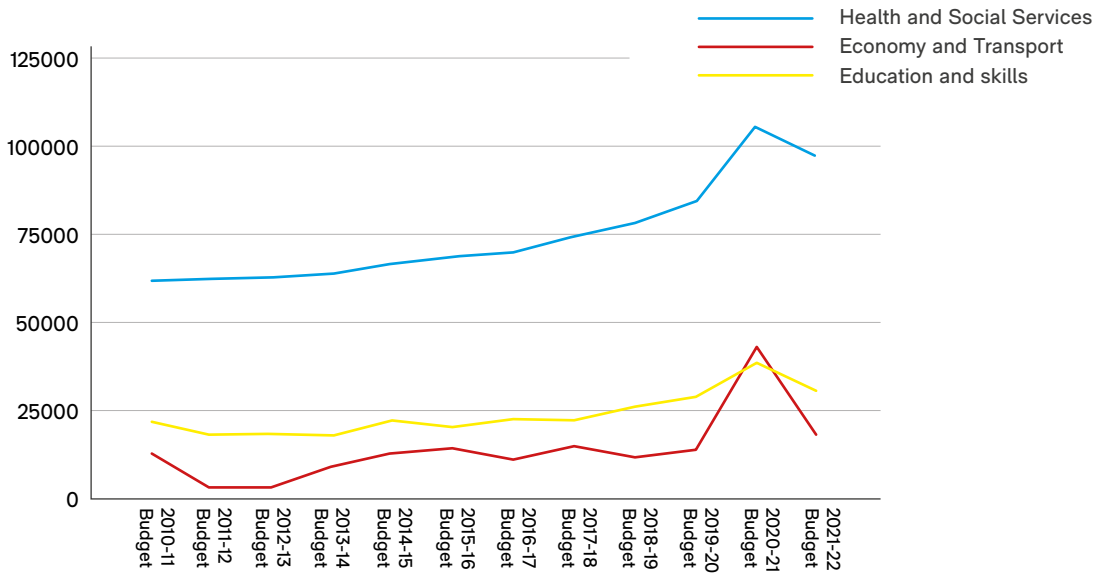
Ultimately, aside from certain taxes, the Welsh Government's direct influence on business is likely to be more limited than will be the case for local authorities. As we discuss later in this report, there are opportunities for local authorities to play a stronger role in using procurement and business rates to incentivise investments in skills and innovation – but doing so will require a shared understanding of this objective.

Recommendation 4: Funding for lifelong learning

Design of new institutions, curricula and qualifications will not have a significant impact on the delivery of the Welsh Government's decarbonisation plans unless sustainable funding can be made available that will meet the expanded remit of the skills system.

Education and skills budgets in Wales (which cover spending on further and higher education) have not kept pace with growth in other policy areas, particularly health and social services and particularly between 2010-11 and 2017-18, when the budget was reduced in real terms (see figure below).

Figure 2: Allocations to selected departments in Welsh Government final budgets (£000s)



Sources: Budget motions, Senedd archive

Funding issues are greatest in relation to apprenticeships, where the loss of European Structural Investments is likely to be particularly impactful. The Minister for Economy Vaughan Gething MS indicated at the IWA's virtual Economy Summit on 30 November 2021 that it would be difficult on the basis of current post-Brexit funding arrangements to fulfil commitments on delivering large numbers of new apprenticeships across this government. The National Training Federation for Wales have highlighted the absence of any clarity on funding for apprenticeships as part of the development of the Tertiary Education and Research (Wales) Bill[28].

The Welsh Government's capacity to reallocate from its existing budget is relatively limited. We believe that the challenge of decarbonisation requires a much more ambitious injection of funding for education and skills. This could be achieved by several different mechanisms.

1. Funding from the UK Government

The Welsh Government could have several reasons to anticipate that the coming years might see an increase in Barnett consequentials as a result of increased funding on education in England. First, there is the commitment in the UK Government's own Net Zero Strategy to address many of the skills challenges that have been discussed in this paper, and which the Welsh Government hopes to address as part of its Skills Action Plan.

In the more immediate period, the UK Government is in the process of developing its Skills Bill which will set out reforms and new commitments for post-16 education in England. Of particular relevance to Wales and to education funding are the proposals for funding higher and further education. These include the proposal that, from 2025, the UK Government will make student loans available not only for degrees but also for vocational courses and for individual modules, provided these are at National Qualifications Framework levels 4 to 6 (or roughly equivalent to a higher education qualification). This would in turn result in increased spending that the Welsh Government could seek to replicate in Wales.

2. Re-organising student finance

However the Welsh Government could go further in reorienting its student finance offer to enable more uptake for lifelong learning (and specifically for those sectors most impacted by decarbonisation). Professor Gerry Holtham, a former advisor to the Welsh Government (and former IWA trustee), has argued for an expanded student finance settlement that makes tertiary education free for those who commit to working in Wales for a period of time after completing their studies[29], both incentivising graduates to remain in Wales and reducing the potential costs of upskilling.

If budgets for education and skills remain tight, a more controversial solution would be to seek to create a more strategic approach to funding higher education by reducing

28 Children, Young People, and Education Committee 09/12/2021 - Welsh Parliament

29 Holtham, G., (2021) Rejuvenating Wales, Lecture for the IWA

financial support for Welsh domiciled learners studying at Higher Education Institutions (HEIs) elsewhere in the UK. This generous offer for students accessing HE contrasts sharply with the thresholds applied in accessing support for shorter programmes of vocational training: notably, support for accessing further education through the Welsh Government Learning Grant is only available to people with a household income of £18,371, well below the Welsh median[30].

This approach would undoubtedly face opposition, but would bring Wales in line with reforms in Scotland, and indeed a former Education and Skills Minister has even indicated that the generous support offer for Welsh domiciled learners was not intended to be a permanent solution[31]. Reducing support for these learners would be likely to boost demand for places at Welsh HEIs and facilitate better planning of funding between years, and any savings could be used to expand the provision of further and vocational education to those living and working in Wales.

30 Income estimates for small areas, England and Wales - Office for National Statistics

31 https://twitter.com/LeightonAndrews/status/946335507503550464

Engaging the private sector

Engaging the private sector

One of the most important debates surrounding decarbonisation addresses the relative roles of markets and governments in influencing change. On one side of this debate, it has been argued that firms are more innovative and responsive than governments, and therefore with the right regulatory signals, will be most effective at developing new technologies and processes that will reduce the need for carbon emissions. On the other hand, critics argue that many firms are ultimately motivated by profitability, and therefore will continue to encourage carbon emissions for as long as it is economically viable to do so.

To date, policy makers around the world have not taken a strong position on these debates. A study of decarbonisation policy across Europe has highlighted that governments have not in general opted for the kinds of regulatory signals – like carbon pricing – that would encourage firms to lead on innovation for decarbonisation, instead taking a more piecemeal approach that seeks to regulate individual technologies. In Wales, this is evident in the combination of policies that are put forward by the Welsh and UK Governments to support the transition to Net Zero:

- the UK-wide Emissions Trading Scheme, which is limited to specific sectors or types of firms
- a number of 'hard' regulatory directives, such as banning sales of petrol and diesel vehicles and of new gas boilers
- a larger number of 'soft' encouragements through public information and education campaigns.

Focussing on the limited 'hard' regulations, we heard from industry bodies in both gas supply industries and in the motor industry. Unlike many people working in their industries (see case studies in this report), sector bodies were aware of the UK Government's commitments. They provided some fairly optimistic long term visions for their sectors: in relation to gas networks and infrastructure, there was a strong hope that use of hydrogen for heating buildings would create a new purpose for these assets. However, much like workers, these bodies and many of the firms they represented were uncertain of what exactly they should be doing to prepare for these hard regulatory deadlines. All of the bodies we spoke to highlighted their need for more information from governments before they could take meaningful action.

Governments have decided to take the lead themselves in deciding which technologies will be needed to satisfy the transition. On one hand, this is intended to ensure that firms and consumers are given a clear message about the use of what are widely recognised as unsustainable technologies and processes. Yet it is a highly risky approach for a number of reasons. First, it creates a risk that governments, who lack specialist knowledge about engineering and technology, will be open to regulatory capture, as firms fight to influence decisions about when technologies should be restricted, or about which technologies should receive public backing.

Rather than investing in R&D to find ways to reduce emissions, firms may be incentivised to invest in influencing policy instead.

There are many examples of carbon-intensive industries doing just that – including the steel industry which is so important for the Welsh economy. The sector in Wales and across the UK has not invested enough in R&D[32] and is reliant on exemptions from key environmental regulations and financial support from the UK's governments to subsidise its massive energy costs. The creation of the Steel Science Centre through the Swansea Bay City Region is a recognition of this, and of the need for public investment to kick-start innovative research but, as we will see later, there are challenges in funding which limit capacity.

Second, the governments' approach creates a risk to the process of technological diffusion, as it disempowers firms in favour of governments themselves: the normal process of creative destruction, motivated by competition between firms, is replaced by a process of regulation in which governments are both banning certain technologies and subsidising others.

These impacts could compound existing structural problems in the process of technological diffusion, which result in limits to the spread and uptake of new technologies. An analysis of the economic impacts of the Welsh Government-funded rollout of Superfast Broadband[33] noted that firms in the foundational economy were less likely than firms in other sectors to adapt their business models and practices as a result of improved internet access, suggesting a broader lack of engagement with new technologies. If these patterns were replicated in the diffusion of new low carbon technologies, for example for energy generation, energy efficiency or transport, it could result in unnecessary emissions through the 2030s.

To ensure that these risks do not come to pass, governments, including here in Wales, need to do more to encourage firms to engage meaningfully with the immense challenge of decarbonisation, a challenge that requires the combined efforts and resources of both the public and private sectors.

Recommendation 5: Specialist skills for analysing emissions

The Welsh Government and other public bodies have already begun to embed decarbonisation into their interactions with business. Local government procurement in Wales has made impressive steps towards the embedding of sustainability goals through the use of the TOMs framework[34], a set of metrics that can be used in scoring tender applications for public procurement and which includes environmental sustainability as one of its five themes of social value. The TOMs framework proposes metrics such as carbon emitted and road miles travelled (based on DfT TAG data). Meanwhile, the Welsh Government has incorporated environmental

32 Department for Business, Energy and Industrial Strategy Research Paper Number 26, Future capacities and capabilities of the UK steel industry

33 Reynolds, L., Henderson, D. and Roche, N., (2018) Superfast Broadband Business Exploitation Project Horizon Scanning Report: Digital technologies and future opportunities for the foundational economy in Wales, Cardiff: Cardiff University

34 See https://www.wlga.wales/procurement

sustainability into its Economic Contract, creating different forms of conditionality for the businesses it supports through economic development investments in what it calls a 'something-for-something' agenda:

> *'...we'll strengthen the approach of Business Wales with enhanced information and support designed to help businesses meet these challenges. And we'll also be using our refreshed economic contract to strengthen our something-for-something approach, challenging those we support to ensure that Welsh public money is used to contribute to our journey to net zero. We will deepen the requirements with clear indicators and minimum standards that must be met to achieve a contract.'*
> Economy Minister, Vaughan Gething MS[35]

UK Government regulations require companies that are listed on the London Stock Exchange, and certain other large companies, to report on greenhouse gas emissions, including indirect emissions. As well as satisfying a regulatory requirement, UK Government has argued that this practice is valuable for businesses in reducing costs and establishing their green credentials.

However, further moves to embed these targets and expectations will be weakened by the challenges firms face in analysing their own carbon footprint. The UK Departments for Business, Energy & Industrial Strategy[36] and Environment, Food & Rural Affairs[37] have both highlighted the challenge of analysing indirect or 'Scope 3' emissions that occur upstream in businesses supply chains, being highly complex and typically requiring specialist skills. Despite this complexity there are important reasons to encourage this kind of analysis: Scope 3 emissions offer the greatest opportunity for emissions reduction, particularly for firms in service sectors and firms in open economies such as Wales[38].

Many businesses in public procurement supply chains, particularly in local government, are unlikely to hold the kinds of skills necessary for assessing Scope 3 emissions in-house, and the existing market for carbon emissions analysis is both relatively limited, either relying on calculator tools that focus on Scope 1 and Scope 2 emissions, or on specialist private sector services that are prohibitively expensive, often focussed on providing services for investors and venture capital rather than SMEs[39]. This will create greater difficulty for the Welsh Government in achieving its aims of playing a globally responsible role within the decarbonisation process.

This is an area that is ripe for policy intervention. The Local Government Association in England has developed a basic tool for emissions calculation, but notes the continued challenge of capturing Scope 3 emissions, noting that this complex task can be improved through sector-

35 Plenary 02/11/2021 - Welsh Parliament

36 Department for Business, Energy & Industrial Strategy, (2018) Impact assessment: Streamlined energy and carbon reporting framework

37 Hillary, R. & Burr, P,. (2011) Evidence-based Study into the Benefits of EMSs for SMEs, Department for Environment, Food and Rural Affairs

38 Shrimali, G., (2021) Scope 3 Emissions: Measurement and Management, Stanford Sustainable Finance Initiative

39 The Greenhouse Gas Protocol is one such initiative developed in collaboration with the UNEP Finance Initiative - Guidance for the financial sector: Scope 3 accounting and reporting of greenhouse gas emissions

specific engagement in sectors like social care[40]. There has been strong suggestion that the reporting of Scope 3 emissions can be enhanced by continued use, which will inform standardised measures for different goods and services, in turn allowing easier assessment of emissions and informing policy to reduce emissions.

Welsh Government and local government should invest in potential tools and research support to create a knowledge base that can be drawn on by firms involved in procurement, the Economic Contract, and the wider private sector in Wales. Doing so would also contribute to an important set of green skills within Wales, and might create opportunities for further commercialisation.

Recommendation 6:
Financial incentives for innovation, translation and commercialisation

We have previously called for a step change in the metrics associated with business support, away from numbers of jobs supported and towards factors that influence productivity and social value[41]. In line with this, we believe there is a strong rationale for a greater proportion of the spending on business support in Wales to be targeted at funding businesses to innovate, recognising that this will contribute to longer term resilience and job creation.

The success factors for translation and commercialisation of innovation are different from those that support R&D. In Wales, support for businesses to engage with innovation include UK Government programmes such as Treasury support for innovation tax credits and the funding and support offered through Innovate UK. Yet the general takeup of this support remains limited, and is concentrated among larger firms and those working in frontier sectors.

Welsh businesses face a number of challenges in engaging with decarbonisation. As discussed elsewhere in this report, many SMEs and particularly those in foundational sectors lack the resources and motivation to invest in skills, new materials and innovation.

1. **Business support programmes**
   Support for business innovation makes up only a small fraction of the Welsh business support offer, significantly lower than support for inward investment and entrepreneurship. This could be expanded to fill gaps in existing support offered by Innovate UK, particularly for SMEs and firms outside of priority sectors. This could also be achieved as part of a wider reorientation of business support programmes away from job creation as a key metric and towards a wider set of metrics, including innovation and contributions to decarbonisation, as we have discussed in other work on the foundational economy[42].

40 Local Government Association, (2021) Scope 3 greenhouse gas emissions for social care: Guidance for local authorities

41 Watkins, J., (2021) A better balance: Business support for the foundational economy, IWA

42 ibid.

2. Challenge funding

The Welsh Government has previously explored Challenge Funding as a mechanism of supporting social innovation, particularly through its Foundational Economy Challenge Fund. This has generated some impactful insights and learning, particularly in social care.

However, this initial Challenge Fund, and the follow up announced by the current Welsh government, have been dominated by public sector bodies[43]. In part, this reflects the challenging conditions of delivering projects through a pandemic, which caused some projects to withdraw. It also partly reflects the nature of business engagement with government and the limited awareness that many businesses have of government interventions, particularly those in foundational sectors.

Nonetheless, Challenge Funding presents an enormous opportunity to encourage innovation and new thinking in a relatively risk free environment. The Welsh Government should look to learn from existing experiences of private-sector oriented challenge funds from Innovate UK and, in Wales, from NESTA.

3. Non-domestic rate relief

Non-domestic rates, or business rates, have been widely debated as a mechanism for supporting high street retail in view of the increasing challenge of online retail. The social value of high streets has been recognised in Wales across the political spectrum, and rate relief along with revaluation have been seen by businesses as a central component of support to make their business models more sustainable – something we heard strong reflections on as part of our *Re-Thinking Wales* series of discussions in 2020[44] and as part of our extensive work with the Carnegie UK Trust on local data through Understanding Welsh Places[45].

Relief schemes require other investments to make up for budget shortfalls. As a result, policy makers across the UK face challenges in managing the eligibility for rate relief. The Welsh Government opted to exclude businesses with a rateable value of over £500,000, while the Scottish Government has developed a Small Business Bonus Scheme to provide extra support based on rateable value[46]. Nonetheless, rateable value remains a very rough proxy measure of the social value component of a business.

The UK Government in its 2021 Autumn Statement committed to a new form of rate relief designed to suspend changes to rateable value for any investments that seek to improve energy efficiency or otherwise reduce carbon emissions[47]. The Welsh Government should seek to implement a similar scheme in order to encourage

43 £2.5 million funding boost to back businesses in the everyday local economy | GOV.WALES

44 See our discussion with then-Minister for Economy Ken Skates MS

45 Understanding Welsh Places

46 Scottish Government, (n.d.) Business rates relief

47 Autumn Budget and Spending Review 2021: documents - GOV.UK

investments in commercial properties, but could go further by creating a rate relief multiplier that responds to reported emissions on a yearly basis. This would allow for high street businesses to embed practices of carbon reporting that are currently used for large firms, and would encourage these firms to use their specialist knowledge to develop solutions.

Doing so would arrive at a more nuanced approach to the use of business rates to support social value, rather than supporting a business because it has a physical presence even where its retail offer supports high carbon emissions.

4. Land Transaction Tax relief

Through its Net Zero strategy the Welsh Government has recognised the enormous challenge of increasing the energy efficiency of Wales' ageing housing stock. Optimised Retrofit and other targeted investments, as well as the strong commitment of Wales' social housing providers, have resulted in progress in the decarbonisation of social housing, but the decarbonisation of private housing will require a different set of levers.

At present, house prices do not accurately reflect energy efficiency or potential carbon emissions. The EPC ratings system remains a relatively blunt metric, and does not have a strong influence on price. The UK Green Building Council[48] has proposed reforms to Stamp Duty to help to create a market for investment in energy efficiency in private homes. This would be achieved by altering stamp duty at the point of sale to reflect energy efficiency, effectively reducing the price to buyers of more efficient homes. This would both incentivise sellers to make improvements to reduce the effective cost to buyers without reducing their own payments, as well as providing buyers with a saving that could encourage them to make further investments.

Of the devolved taxes, the Land Transaction Tax (which replaced Stamp Duty in 2018) has been the one that the Welsh Government has been most confident in adapting to meet Welsh circumstances, such as setting Welsh rates and bands and adapting the conditions of the Land Transaction Tax holiday in 2020 in response to recognised differences in property prices in Wales compared to England. This is therefore an area where the Welsh Government could rely on precedent to set a distinctive approach and take meaningful action.

48 UK Green Buildings Council (2021) A housing market catalyst to drive carbon emission reductions Low energy adjustment to Stamp Duty Land Tax

Innovation

Innovation

Welsh and UK Government plans for decarbonisation emphasise the importance of manufacturing and construction jobs. But in doing so, they put Wales in competition with a wide range of countries and regions around the world with a variety of assets that make them just as competitive in these sectors. As in previous transitions, there is a risk that we are aiming to compete on cost rather than emphasising job quality, and that we are missing out on the opportunities to play a more substantial role higher up the value chain.

Wales is an underperforming advanced economy and, beyond simply competing for manufacturing, should aim to maximise its assets within the global division of labour by contributing to knowledge generation. There is evidence that Welsh research and development (R&D), while facing limitations that will be discussed below, has international influence by contributing to international collaborations and gaining interest and citations. Maximising the contribution of Welsh R&D to the challenges of decarbonisation is an effective way of playing a globally responsible role, building on evidence that investment in R&D in advanced economies by well-developed research institutions and networks can have significant contributions to well-being elsewhere in the world, particularly through sectors like health[49].

However, innovation is one of the Welsh economy's great weaknesses. Despite the strong impacts of selected pockets and clusters of R&D and business innovation, Wales has the lowest per head spend on R&D of any of the UK's nations and regions[50]. In the immediate future, Wales needs to improve its R&D performance, notably by doing more of it. However, in doing so there are opportunities to rethink what innovation is for by bringing a wider range of partners into the innovation process.

Recommendation 7: New approaches to innovation funding

In the past, the European Regional Development Fund provided seed funding for key R&D clusters, as well as funding wider research. Partly as a result, Welsh HEIs have been under-represented in the funding awarded by UK based research councils (those covered by UKRI)[51]. This now has to change, and quickly. The Reid and Diamond reviews set out the nature of the challenge – that Welsh HEIs have to shift from a mentality based on grant funding in order to become more successful at winning investment through competitive funds awarded within the UK.

This represents a different way of working that will require policy support. Only around 30% of bids to UKRI are accepted. Wales typically submits the lowest per capita number of bids of any of

49 Jones, B.F. & Summers, L.H., (2020) A Calculation of the Social Returns to Innovation*, NBER

50 Research and development spending - House of Commons Library

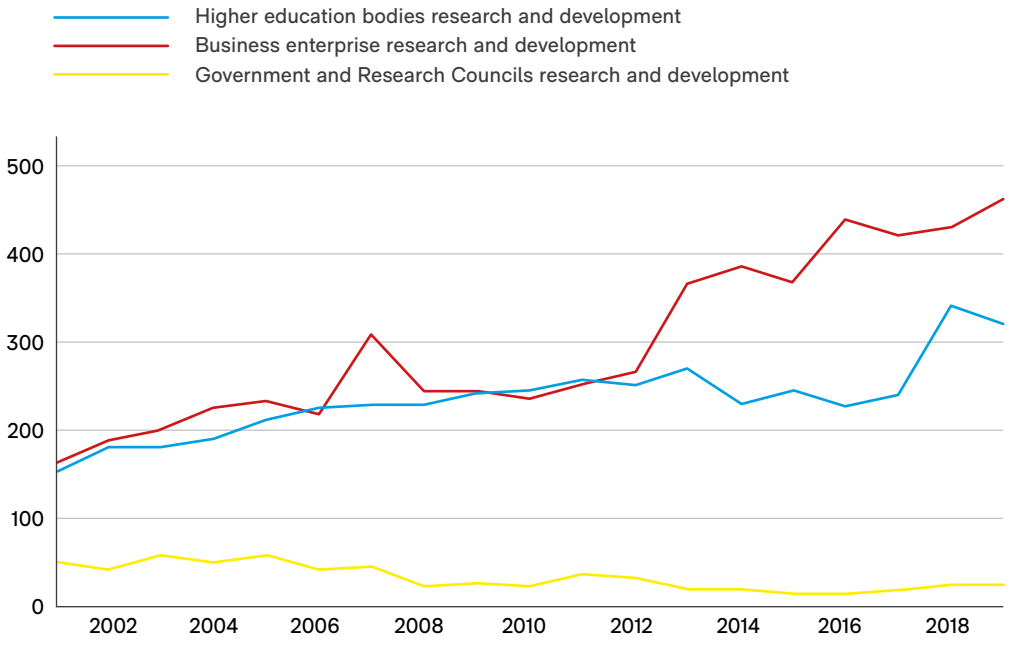
51 See comments by Professor Chris Thomas, Economy, Infrastructure and Skills Committee 15/11/2018 - Welsh Parliament

the UK's nations and regions, and has been heavily reliant on Cardiff University for the number of and value of bids awarded. There is strong evidence that the ability to compete for UKRI funds is influenced by non-hypothecated government funding, which allows HEIs to develop and explore ideas in a flexible and responsive way, before developing these ideas into bids. The Reid Review gave a clear recommendation that non-hypothecated funding must increase in Wales to manage this transition.

Despite commitment to the recommendations of the Reid Review, no Welsh Government since that time has met the recommendation for non hypothecated funding. The experience of Scotland, where the Scottish Government spends several times the amount provided by the Welsh Government for innovation, demonstrates that this is not a feature of the devolved settlement but is an ongoing policy choice by the Welsh Government.

Nor is this a problem of Welsh researchers lacking willing business partners to identify opportunities, as the last decade has seen Welsh business investment in innovation pull away from the combined public sector investment.

Figure 3: Research and Development expenditure in Wales



Source: StatsWales[52]

52 Stats Wales: Research and development expenditure in Wales by expenditure type and year

Four years on from the Reid Review, the Welsh Government needs to make a firm commitment to innovation by committing greater funding. Particularly important is Quality Research (QR) funding, which is distributed by the Higher Education Funding Council for Wales (HEFCW) on the basis of formulas that are informed by previous research outputs and impacts. This funding is strongly linked with the capacity to explore and develop new ideas that, in time, result in a greater number of bids to UKRI and a greater success rate in applications.

The new Tertiary Commission will largely take on the existing responsibilities of HEFCW, but the proposed Bill that will go through in the Sixth Senedd does not make commitments on research funding arrangements. Indeed, representatives from HEFCW have raised concerns that the proposals in the Bill, in particular the powers given to the Welsh Government to invest in innovation outside of the Commission, could place pressures on QR funding[53].

The Welsh Government should remove these ambiguities to make clear that any additional funding for research will sit outside of the arrangements for funding by the Commission. In addition, the importance of the next decade to 2032 for Welsh innovation – both in view of the need to transition to new UK-based funding and to meet the challenge of decarbonisation – warrants a significant step-change in investment. The time limited nature of this investment, combined with its potential for longer term return on investment, makes it a good potential use of the Welsh Government's borrowing powers, which remain under-utilised[54]. To be truly bold, the Welsh Government should follow the EU[55] and the UK Government[56] in committing a fixed ambitious proportion of its total budget to be spent on innovation.

Recommendation 8: Research for social missions

Even where there is widespread agreement on the need to increase investment in innovation in Wales, both the Welsh Government and the new Tertiary Commission need to consider the ways in which innovation can actually create a positive impact in people's lives. It is a question not just of 'how much', but of 'what' and 'why'.

Innovation is typically regarded as a way of addressing the challenges of an underdeveloped economy. Dominant theories of economic growth all emphasise the importance of innovation in driving competition, productivity and therefore improvements in living standards, and there is strong evidence of a positive relationship between innovation and productivity.

Nonetheless, recent years have seen deeper critical assessment of the relationship between innovation and societal well-being. Literature on the foundational economy has been an

53 See evidence from Bethan Owen, Children, Young People, and Education Committee 18/11/2021 - Welsh Parliament

54 Barry, S., (2021) The Welsh Government is significantly under-utilising its borrowing powers - Business Live

55 See European Commission, (n.d.) Investing in European Research - The 3% objective: brief history

56 See Department for Business, Energy & Industrial Strategy, (2017) Industrial Strategy: building a Britain fit for the future, and also discussion in Office for National Statistics, (2019) Research and development expenditure by the UK government: 2019

important part of this re-evaluation, highlighting both the relative lack of new jobs being created by innovative, frontier sectors and the geographical concentration of these jobs in ways that do not benefit more peripheral economies such as Wales'[57].

A similar argument has been developed by a range of scholars who are more critical of established theories of economic development:

- Rodrik[58] has questioned the impacts on aggregate productivity of high-tech sectors, noting their impact in developing countries of pushing more workers towards low-productivity inter-personal services.
- Mazzucato[59] has reassessed the commercial and social value and the application of private sector innovation spending, noting the important role of the state and of public bodies in funding and undertaking research in fields such as health, digital technologies and transport.
- Mangabeira-Unger[60] has highlighted the 'insularity' of the so-called knowledge economy, noting that the lack of diffusion of digital technologies to many sectors of the economy is driving income inequality and creating political tensions between people and places that are linked to the rise of populist and anti-system parties.
- In the UK context, a report co-authored by Professor Graeme Reid, who authored the influential review of innovation funding in Wales, has highlighted the limitations of innovation funding as a tool of regional development, noting the importance of intra-regional difference in spending, employment and wider impact.

Therefore, while there are good reasons to want to increase funding for innovation in Wales there are also reasons to question whether the existing innovation system is contributing enough to societal well-being. There are several things that policy makers in Wales could do to boost this contribution.

1. Bringing in new partners

In order to boost the capacity for innovation in Wales, the Welsh Government has a key role to play as a coordinator of a wide range of policy programmes and institutions. At present, innovation policy exists in a series of disparate silos, including the strategies and funding led by HEFCW (soon to be the Tertiary Commission); the extensive investment in health related innovation through Health and Care Research Wales; the support for business innovation through Business Wales; and the often-overlooked work of the FE sector in supporting translational research, particularly in SMEs. The

57 Bentham, J., Bowman, A., de la Cuesta, M., Engelen, E., Ertürk, I., Folkman, P., Froud, J., Johal, S., Law, J., Leaver, A., Moran, M. & Williams, K., (2013) Manifesto for the foundational economy, CRESC Working Paper no. 131

58 See McMillin, M., Rodrik, D. & Sepulveda, C. eds., (2016) Structural Change, Fundamentals, and Growth: A framework and case studies, IFPRI, and Rodrik, D., (2010) Growth-reducing structural change

59 Mazzucato, M., (2018) The Entrepreneurial State: Debunking Public vs. Private Sector Myths, Penguin

60 Mangabeira-Unger, R., (2016) The Knowledge Economy, Verso books

new Wales Innovation Network established by Universities Wales is a promising step forward[61], and the Tertiary Commission should look to support this body into the future to encourage greater engagement in research by all of Wales' HEIs.

Better strategic alignment between Wales' varied innovation-promoting bodies, including the HE-focused bodies and funds discussed above, as well as Business Wales, Innovate UK in Wales and the extensive and highly successful Health and Care Innovation Wales, could encourage a better understanding of the skills and assets of the Welsh innovation workforce. Certain researchers will progress in their careers through a variety of these bodies, as well as moving into and out of Wales, but there is limited understanding of the complexity of this workforce, and the proposed Tertiary Education Bill does not adequately reflect research in its definition of the tertiary education workforce, for whom it will have responsibilities for professional development.

To demonstrate a real commitment to both boosting Wales' capacity for innovation and achieving our shared decarbonisation goals, the Welsh Government should also consider creating a research fund outside of QR with targets for research outputs that address decarbonisation as part of its forthcoming Innovation Strategy, linked to the commitments in its 2021-25 Second Carbon Budget. Crucially, this could be open to access by Wales' further education institutions. This would meet the long term aspirations of the Reid Review for the sector to become more embedded in innovation while creating its own set of criteria and performance metrics.

2. Co-developed strategic goals, based around the Well-Being of Future Generations Act

One of the areas of innovation where Wales has significant successes is in the application of research to social value. An analysis of Welsh R&D-related publications indicated that Wales outperforms other nations of the UK, and many other European nations, in terms of the proportion of research outputs that address the UN Sustainable Development Goals, and in terms of the weighted impact of these publications in the global research community[62], with evidence that Welsh research 'punches above its weight' in terms of international publications[63].

Wales is therefore doing something right in terms of turning R&D towards recognised social challenges. Nonetheless, many of these successes appear to have been a result of individual researchers and institutions, and of their international collaborations, rather than a concerted effort from the Welsh Government.

61 Wales Innovation Network aims to raise research profile of nation's universities - University Business

62 Elselvier, (2021) UN SDG goals: Wales' research performance with UK and global comparators

63 Wales' highly efficient research sector "punches above its weight" – new report | GOV.WALES

Previous innovation policy, notably the 2013 Innovation Wales strategy, has placed social missions such as decarbonisation within a framework that aligns with sector policy, typically seeing decarbonisation as a 'sectoral' concern, strongly linked to sectors like energy generation. There is an opportunity with the new Innovation Strategy to do things different by moving away from sectors and towards themes.

Doing so would better reflect the role that the Welsh Government's strategy plays in relation to other strategic policy in Welsh research and innovation. The most important drivers of innovation funding will be priorities set by the UK Government as reflected through the work of research councils and UK Research and Innovation (UKRI). In addition, the Tertiary Commission Bill gives the Commission responsibilities for setting priorities. Within this already complex policy framework, care must be taken to protect the independence of research institutes and HEIs and their capacity to respond to the specific skills and capacities of the Welsh research workforce.

In this crowded context, the setting of additional research priorities by the Welsh Government, particularly if these conflict with UKRI priorities, is likely to have limited impact, and might even potentially create confusion. Instead, Welsh Government's overall strategy could move away from specifying sectors, leaving the process of identifying sector-based opportunities to HEIs, industry and the Commission, as well as the overarching framework set at a UK level. In its place, Welsh Government strategy could focus on themes of social mission and impact.

A strategy that addresses themes that are strongly linked to the Welsh Government's social goals could help to shape the specific questions used to inform research projects, and could help to encourage translation into new applications. While maintaining the independence of the Tertiary Commission and of HEIs, a Welsh Government innovation strategy that emphasised well-being could inform government support for networking and convening in order to identify opportunities for Welsh research to be applied by business and public services.

3. Making use of public data

The Optimised Retrofit Programme for the decarbonisation of social housing in Wales provides an opportunity to inform ongoing R&D and address a number of weaknesses in existing data. The Independent Review on Decarbonising Welsh Homes[64] noted that the picture of energy efficiency largely relies on EPC ratings, and the collection and updating of these is linked to house sales and limited to the last 12 years or so. This presents a relatively weak baseline for designing investments, as well as a limited basis for impact evaluation.

64 Decarbonisation of Homes in Wales Advisory Group, (2019) Independent review on decarbonising Welsh homes: report

The Welsh Government has already invested in research which provides a more detailed baseline, both through the Welsh Housing Conditions Survey[65] and through commissioned research based on national datasets and case studies[66]. In order to generate additional value from the data collected as part of the Optimised Retrofit Programme, the Welsh Government, housing associations and local authorities should explore ways of making more of this data publicly available, while managing risks to privacy. The Open Data Institute has specifically highlighted the opportunities available to housing associations to collate and potentially standardise data about property characteristics in a way that could inform the design of retrofit programmes[67]. There is a particular opportunity to utilise data collected from the UK's Smart Meters[68], and both the Welsh Government and housing associations should explore how this can be used over a longer timeframe to evaluate buildings efficiency.

This data resource will become particularly important over the next decade as the burden of retrofit starts to fall more heavily on the owner-occupier and private rental sector. At present, there is very little data or trustworthy advice to inform citizens' own choices about investing in retrofit. The Welsh Government should ensure that relevant research and evaluation outputs from the Optimised Retrofit Programme are used to inform a set of materials aimed at the private sector.

65 Welsh Housing Conditions Survey | GOV.WALES

66 Green, E., Lannon, S., Patterson, J., Varriale, F. & Iorwerth, H., (2019) Decarbonising the Welsh housing stock: from practice to policy, in Buildings and Cities

67 Open Data Institute, (2021) Tackling the climate crisis with data: what the built-environment sector can do

68 Data Communications Company, (2021), Data for good

Concluding remarks

Concluding remarks

Our work on this report derives from the discussions we have had with different people around Wales, who have brought widely differing perspectives on the decarbonisation challenge. Chief among our findings has been a sense that very few individuals and organisations are achieving their full potential in terms of reducing their impact on the environment. There is clearly a great deal of work to do.

We have also noted that policy makers, in Wales and elsewhere, have so far emphasised the opportunities of decarbonisation, especially in terms of 'green jobs'. The optimistic take on what a Net Zero economy will look like is clearly valuable for winning support, and has a basis in evidence. However, there is strikingly little analysis, modelling, public engagement or policy development that reflects the potential for significant disruption.

Both the opportunities and threats of decarbonisation will be determined by place, and impacts may be felt unevenly for different places and people in Wales. This strengthens arguments for the principles behind devolution. While decarbonisation is a global challenge, the economic impacts and the demands for support will be highly localised. A theme that cuts across many of our recommendations is the need to strengthen the capacity and powers of regional bodies within Wales.

Another theme that cuts across our recommendations is finance. Paying for the transition is likely to require a step-change in public finances. Whether local governments seeking regional development funding, or Welsh universities applying for research grants, there is a greater need to engage with funding opportunities from outside of Wales. In addition, decarbonisation is likely to push future Welsh Governments to use the growing fiscal firepower that they have in order to meet highly localised challenges. Depending on political dynamics at a UK level, this may have to happen sooner rather than later.

However, as policy makers in Wales begin to make difficult choices on regulation, support and funding, they have an additional resource in the form of the trust that the public has placed in them, both in support of government action on climate change and in response to extraordinary government action to respond to the recent and ongoing crisis of COVID-19. This trust needs to be honoured through transparency and honesty about the actions required and about the potential positive and negative impacts.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