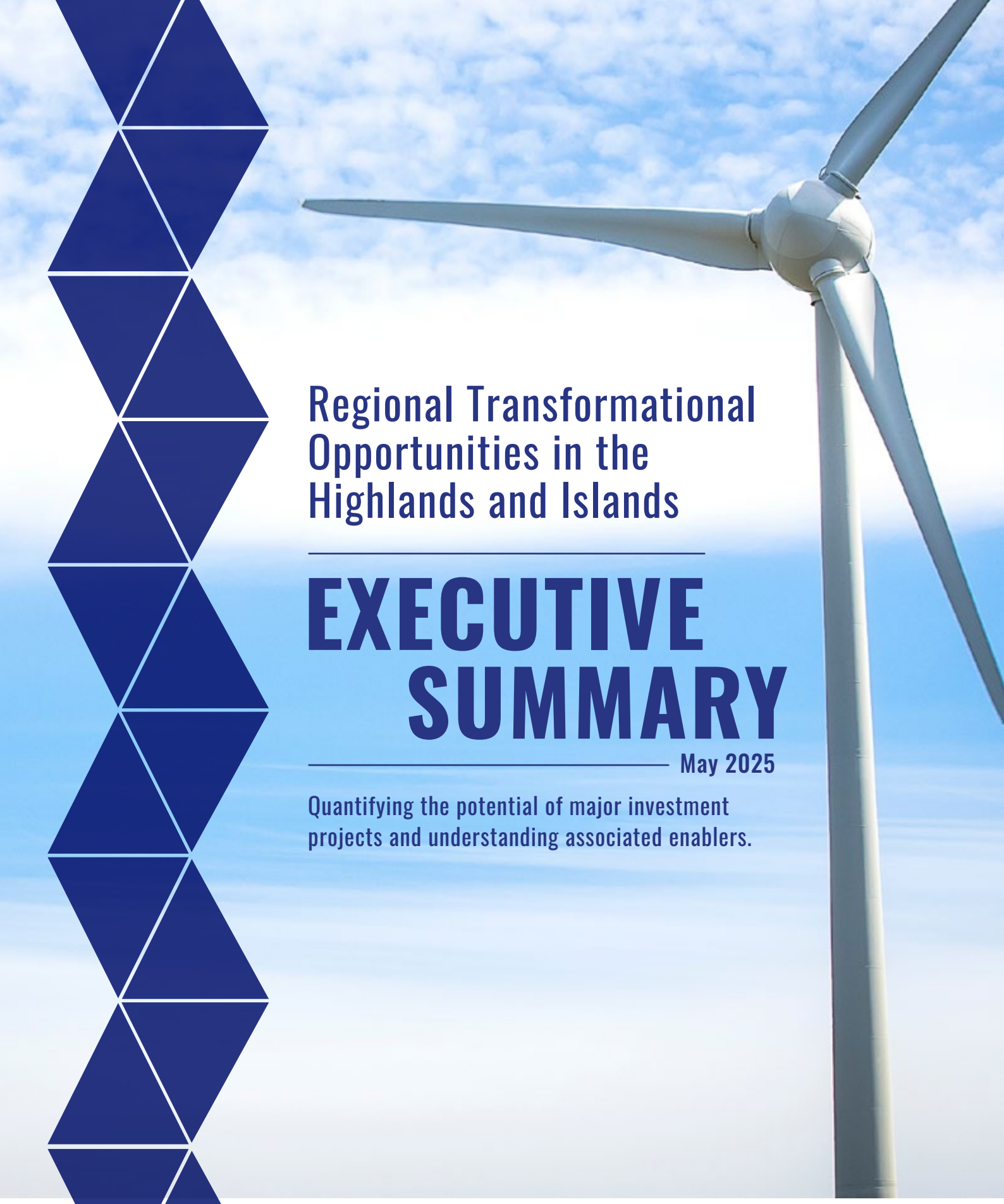


Regional Transformational Opportunities in the Highlands and Islands

EXECUTIVE SUMMARY

May 2025

Quantifying the potential of major investment projects and understanding associated enablers.

ekosgen
Part of Insight

HIREP

HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

Kishorn

Executive summary

Introduction

ekosgen, part of GC Insight, was commissioned by Highlands and Islands Enterprise (HIE) on behalf of the Highlands and Islands Regional Economic Partnership (HIREP) to undertake research to better understand the breadth of economic opportunities across the Highlands and Islands.[1] The study focused on the opportunities with the greatest potential to bring transformational change to the region, this being defined as opportunities which will bring clear and substantial shifts and major cross-cutting impacts at scale, rather than more localised and incremental changes.

Throughout this report they are referred to as Regional Transformational Opportunities (RTOs). The study sought to identify and quantify (where possible) strategic projects and investments planned or proposed for the region over the period 2025 to 2040. RTOs covered within the study included[2]:

- Offshore wind
- Onshore wind
- Hydro pumped storage
- Green hydrogen
- Marine energy
- Space
- Marine biotechnology and processing
- Life sciences, digital health and social care
- Natural capital
- Critical infrastructure developments

The study did not seek to capture all regional activity and nor did it include public sector capital investments such as schools, roads, hospitals, housing, etc. although it does recognise that such projects also provide competition for resources, exacerbating pressure points in terms of some enablers.

The work involved: a comprehensive review of literature and data of relevance to the RTOs in the region; an extensive data gathering exercise to collate intelligence on proposed projects; a consultation programme with key informants to explore challenges and opportunities around RTOs, and to verify project information. It also included locational and timeline mapping, economic assessment and modelling, and gap analysis.

Data for investment values, development timescales, construction phase and operational employment was sought, but not available for all projects. Data gaps were addressed using proxies or estimates based on a range of different data sources, including industry intelligence. Analysis is based on the projects identified and associated information available at the point in time of the research fieldwork (April to December 2024). Operational and maintenance jobs are additional to those that may already be in existence and relate directly to the project/investment and not to the wider supply chain.

1 The region is defined by the Highlands and Islands Regional Economic Partnership (HIREP) geography – the local authority areas of Highland, Moray, Argyll and Bute, Orkney, Shetland and Na h-Eileanan Siar, along with Arran and Cumbrae from North Ayrshire.

2 Sectors such as Aquaculture, Food and Drink, Tourism and the Creative Industries sat outwith the study parameters, save for exceptional investments which were perceived as transformational.

Sumitomo

The opportunity

Collectively, the RTOs present a once-in-a-generation opportunity. The scale of investment across the c.250 projects identified is potentially larger than previous waves of significant investment – between 1943 and 1965, £5.6bn (2023 prices) was invested in hydro-electric generation in the region, and between 1965 and 1980, capital expenditure on exploration and development of oil and gas resources on the UK continental shelf totalled around £78bn (2023 prices).

The potential investment pipeline – the overall economic opportunity – is over **£100bn**. It is expected that this will support over **114,000** FTE job years[3] in construction, around a further **18,000** direct FTE operational and maintenance jobs by 2040 and generate more than **£76.6bn** in GVA.

3 A job year is one job for one year. If that job lasts two years, that would equate to two job years.

Total potential investment impact:

Investment value:
£100.4bn

251
Projects

GVA
£76.6bn

Direct: **£41.73bn**
Indirect/induced: **£34.88bn**

Construction employment
114,040
FTE job years

Direct operational employment
17,930
FTEs

This regional opportunity is largely but not exclusively energy driven, with offshore wind accounting for the largest share of RTO investment (40%). Pumped storage hydro (13%), onshore wind (11%) and green hydrogen (9%) together account for a further third. Private sector investment in supporting infrastructure such as ports and harbours and SSEN's Pathway to 2030 Grid Upgrade is also marked, accounting for over a fifth of potential investments. However, the real value is in the aggregate impact of all the RTOs. This is not only in terms of the sheer scale of the economic potential, but also the spread of investments across a number of different sectors. This multi-sectoral project portfolio reflects a mixed-economy model which will help to diversify the regional economy, driving growth and building resilience.

Economic potential by RTO/Sector

Sector	Total Investment (£)	FTE Job Years (DCI)	Estimated Direct GVA (£)	Estimated Indirect/ Induced GVA	Direct, additional operational employment
Offshore Wind	£40.58bn	17,830	£19.40bn	£16.63bn	1,870
Supporting Infrastructure: Grid	£20.00bn	4,280	£6.79bn	£5.82bn	-
Pumped Storage Hydro	£13.15bn	18,000	£4.46bn	£3.83bn	220
Onshore Wind	£10.89bn	26,320	£3.70bn	£3.17bn	6,260
Green Hydrogen	£9.10bn	17,580	£4.67bn	£3.65bn	3,170
Marine Energy	£2.86bn	12,580	£1.35bn	£752.0mn	70
Supporting Infrastructure: Enablers	£1.91bn	7,490	£647.2mn	£554.8mn	5,760
Life Sciences and Digital Health and Social Care	£449.4mn	2,060	£212.2mn	£181.4mn	120
Natural Capital	£400.0mn	2,900	£53.7mn	£76.1mn	-
Space	£84.3mn	690	£40.3mn	£34.6mn	150
Marine Biotechnology and Processing	£39.3mn	160	£12.6mn	£10.8mn	120
Other	£892.8mn	4,160	£395.1mn	£165.9mn	210
Total Highlands and Islands	£100.35bn	114,040	£41.73bn	£34.88bn	17,930

Notes: Supporting infrastructure: Enablers typically includes harbour upgrade/expansion investment, research and innovation facilities and sectoral hubs/business premises. Other includes the Clyde Engineering and Innovation Cluster Development and significant, innovative aquaculture projects.

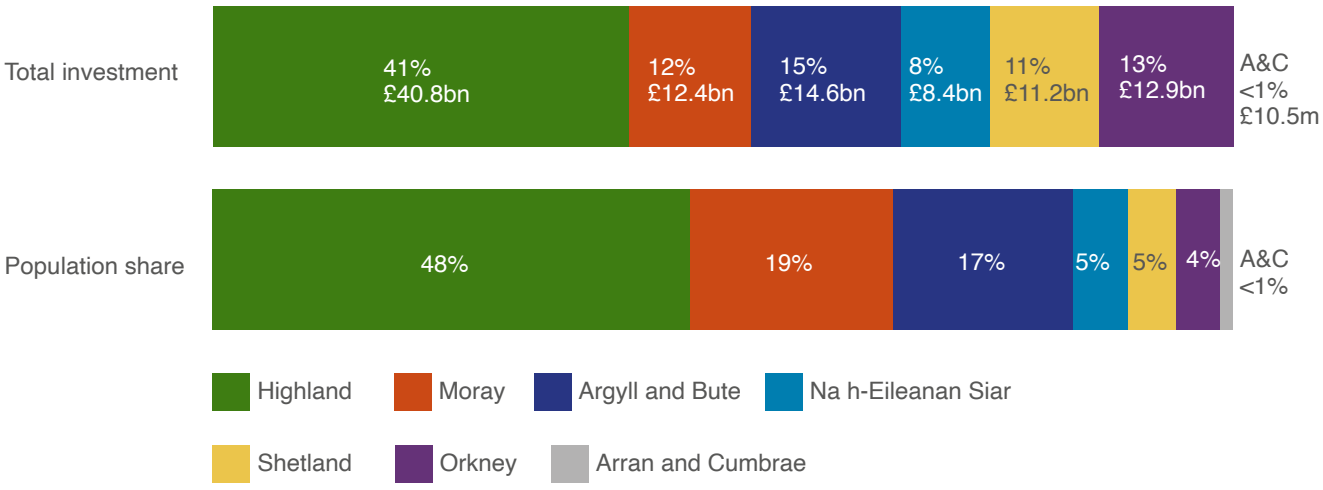
Job year and employment figures have been rounded to the nearest 10. Totals may not sum due to rounding.

Operational employment represents additional, direct employment associated with the RTO projects/investments only. It does not include supply chain impacts. Proxies and modelling have been used where data on likely operational jobs was not available for projects.

It is assumed that new grid infrastructure delivered by projects in scope for this study is maintained by the incumbent workforce. For natural capital it assumed that jobs associated with the projects/investments identified are time-bound (not permanent).

Projects are generally well dispersed across the region's local authority areas. Highland accounts for over two-fifths (41%) of the total potential investment, whilst Argyll and Bute accounts for around 15%. The remainder is fairly well distributed across other local authority areas. The three island local authority areas have a disproportionately high level of potential investment relative to their population share, while the level of investment in Arran and Cumbrae is lower, reflecting the smaller geographic area covered and the dominance of more traditional sectors within these local economies.

ECONOMIC POTENTIAL BY LOCAL AUTHORITY



Taking into consideration the current status of projects and recognising the likelihood that not all projects will come to fruition – either as originally planned or in their entirety – an adjusted total investment pipeline of more than **£71bn**, and associated impacts, could be expected.

Status-adjusted impacts:

Investment value:
£71.28bn

71%
of potential

GVA
£54.14bn

Direct: **£29.48bn**
Indirect/induced: **£24.67bn**

Construction employment
79,360
FTE job years

Direct operational employment
12,760
FTEs

A range of scenarios (based on the status-adjusted estimates) provides a more measured picture of what may realistically be achieved in terms of investment, depending on policy context and implementation. The three scenarios are:

- **Scenario 1**: The status quo (no change to current policy, legislative or regulatory environment), plus grid upgrade constraints;
- **Scenario 2**: Policy-on (i.e. implementation of appropriate policy, legislation and regulation) – less-than-optimal policy environment, co-ordinated workforce planning, supporting infrastructure and enablers and short time frame for switch-on (e.g. 18-24 months);
- **Scenario 3**: Policy-on, with switch on over a delayed or longer time period (e.g. >5 years).

Proposed switches include legislation/regulation; evidence-based skills/ workforce planning; grid connection; infrastructure (ports and harbours; housing and transport); helix approach to collaboration; supply chain stimulation; and research and innovation. The 'switches' are drawn from the range of enablers identified through the consultation phase of the study and will be of no surprise to those living and working in the region.

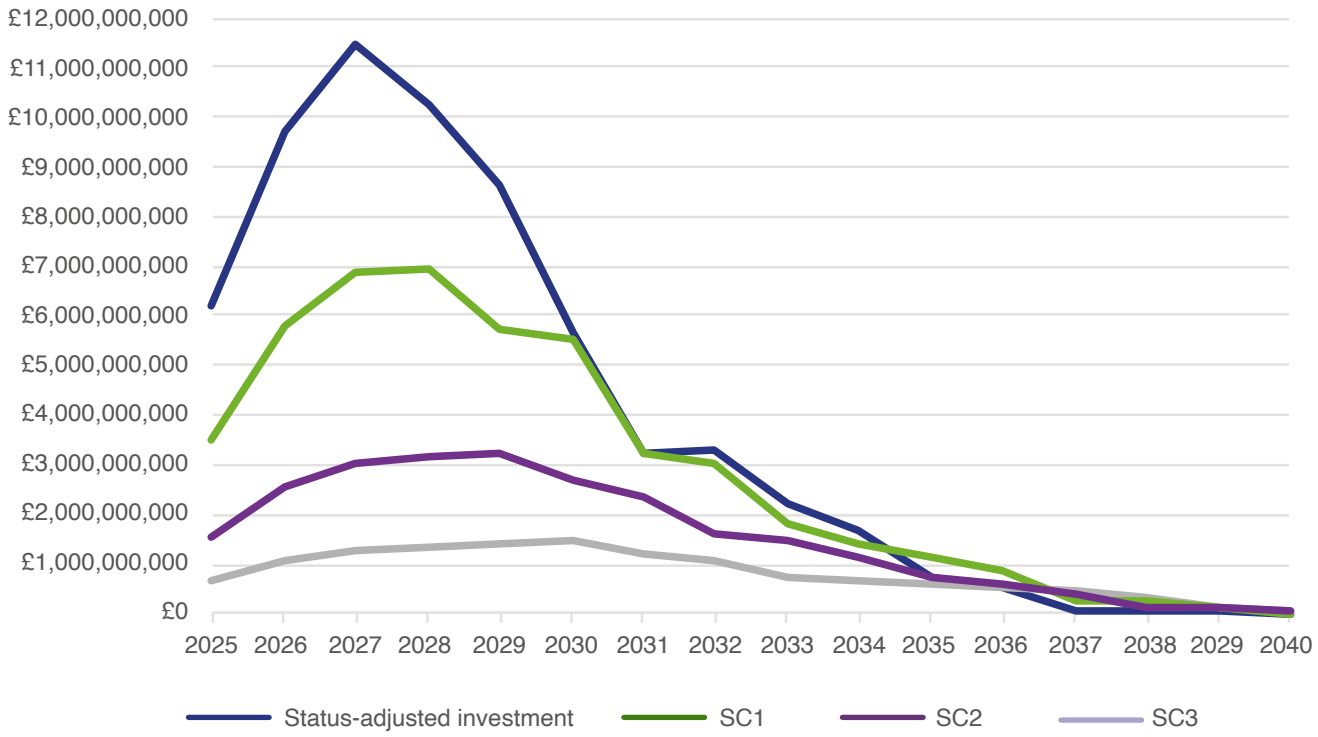
Under Scenario 1, the level of potential investment falls to around £13.9bn – around a fifth of the status-adjusted level. There is a similar decline in the associated jobs and GVA impacts. This illustrates how critical the planned grid infrastructure upgrades are for unlocking and enabling development in the region. Without this, many projects are simply not viable. Investment levels fall to around £50.7bn under Scenario 2 (around 71% of the status-adjusted estimate) and around £26.7bn under Scenario 3 (37% of the status-adjusted level). This illustrates the importance of the correct policy support.

Summary of scenarios

Scenario	Assumptions/basis	Investment Value (£bn)	FTE Job Years (DCI)	Total GVA (£bn)	Direct, additional operational jobs (by 2040)
Overall opportunity	All projects progress as planned and to the scale stated	100.35	114,040	76.6	17,930
Status-adjusted	Adjusted to reflect likelihood of project progression and completion, based on current status.	71.28	79,360	54.14	12,760
Scenario 1	No substantive change to current policy, legislative or regulatory frameworks, but barriers to delivery of planned electricity grid upgrades.	13.89	17,320	10.57	3,030
Scenario 2	'Policy-on' – short to medium timeframe (18-24 months) associated with policy 'switches' essential for catalysing or unlocking investment.	50.75	56,140	38.49	8,830
Scenario 3	'Policy-on' – as per Scenario 2 but switch on over a delayed or over a longer time period.	26.73	31,080	20.25	5,290

A flat spend profile was assumed for all projects indicating that the majority of investment impacts are scheduled to occur during the first five years of the time period, i.e. 2025-30. Beyond 2030, the majority of anticipated project investment is accounted for by offshore wind and pumped storage hydro projects. However, it is acknowledged that, in the absence of additional project information, there is an element of optimism bias being expressed by stakeholders. Consequently, as projects progress and come to fruition, the timeline investment profiles for projects and RTO sectors will likely be flatter and stretched over a longer time period.

RTO investment over time under each scenario



There are a number of co-dependencies across the RTO areas and projects. For example, opportunities in green hydrogen are reliant on renewable energy schemes, whilst the viability of renewable energy schemes is reliant on electricity grid infrastructure upgrades. The importance of grid infrastructure upgrades is clearly demonstrated by the limited impacts under Scenario 1.

There are also potential synergies across the RTOs in terms of skills supply and planning, supporting infrastructure and services, and supply chain services.

This investment timeline reflects the 251 projects identified in this study only. However, this is an evolving picture. New investment projects will continue to be announced and there will be further cycles of energy related investment – e.g. repowering of onshore wind farms, subsequent bidding rounds for ScotWind, further upgrading of conventional hydro-electric schemes to pumped storage hydro, decommissioning opportunities, etc. The investment presented may also stimulate longer-term investment in the region. Reducing uncertainties, and derisking where possible, will make future, longer-term investment seem a more attractive proposition for developers, assuming optimal policy conditions.

This opportunity does not reflect everything happening in the region. What is presented is largely private sector driven (save for some public sector contribution such as to Growth Deal activity and enabling infrastructure such as ports and harbours). Capital expenditure on public sector projects (e.g. schools, roads, hospitals etc) is additional to the impacts presented above. Supply chain jobs have also not been considered and these will create substantial additional opportunities across the RTO sectors.

Alongside this, catalytic impacts are likely for other regional and sectoral activity, with growth driving further growth and aspiration. This extends beyond the growth that is already evident and ongoing in traditional sectors of importance in the region, such as tourism, food and drink (including aquaculture) and creative industries.

Both public sector and additional sectoral activity will increase competition for people, skills, supply chains, etc. Reflecting this and given that the Highlands and Islands is not the only region chasing these opportunities, it is critical that a collaborative, holistic, and place-based approach is adopted in realising these RTOs. And this must happen at pace.

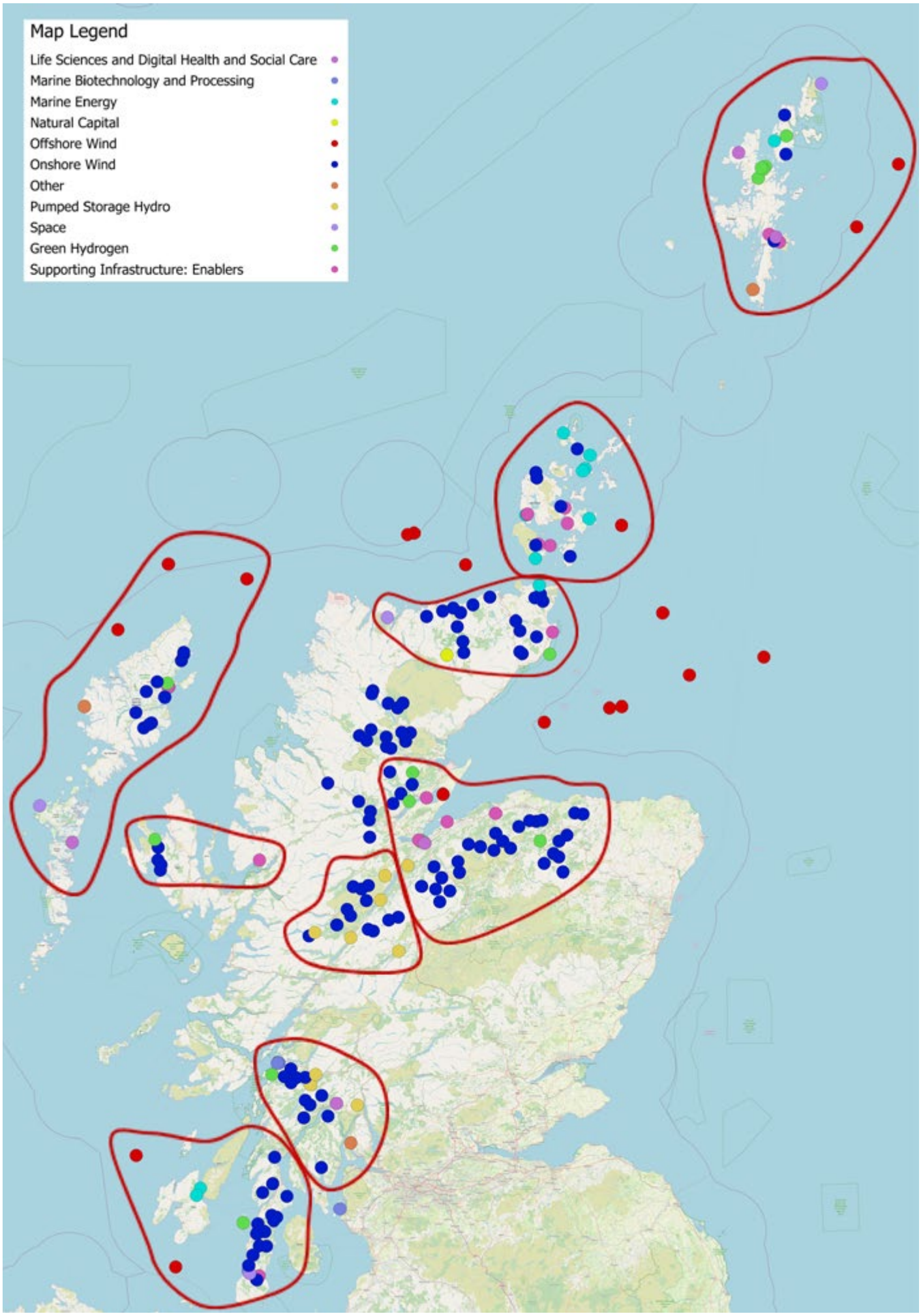
Lerwick port

The Important of place

There is clear clustering of potential investment activity:

- Orkney and Shetland –marine energy (Orkney), and onshore wind and offshore wind;
- Na h-Eileanan Siar – onshore and offshore wind – mainly focused on Lewis;
- The Great Glen – typically energy-focused around onshore wind and pumped storage hydro;
- Inner Moray Firth and Moray - energy-related investment, supporting infrastructure, and onshore wind;
- Caithness and North Sutherland - energy-related investment and onshore wind;
- Oban and Lorn – primarily onshore wind and pumped storage hydro;
- Kintyre and Islay –onshore wind and marine energy; and
- Skye and Wester Ross – onshore wind and supporting infrastructure.

RTO investment project clusters across the Highlands and Islands



These clusters, though loosely defined, help illustrate where opportunities will be focused and thus implications exist for employment and supply chain activities. Careful planning will be required around what needs to happen in and around these clusters to support the RTOs, for example in relation to skills, housing, and supporting infrastructure. However, it is equally important to note that the geographical boundaries of the clusters are fluid, and the reach of both upstream and downstream opportunities is far more extensive. This principle also extends to workforce and skills.

The demand for skills to support these projects will have a significant demographic impact. This is particularly important in light of current population projections that show that the population in the Highlands and Islands is projected to decrease by 5% between 2018 and 2043. In contrast, based on the status-adjusted estimates and assuming that all employment arising from the delivery of the project pipeline is additional, the temporary peak construction uplift anticipated is around 6% regionally (around 16,270 people) (ranging from c.5% in Argyll and Bute to almost 15% in Orkney), and around 5% regionally (c12,760 people) for operational employment (ranging from c.3% in Argyll and Bute to 9% in Na h-Eileanan Siar).

Estimated temporary and operational uplift in the Highlands and Islands (% based on working-age population) from RTO project pipeline, 2040[4]

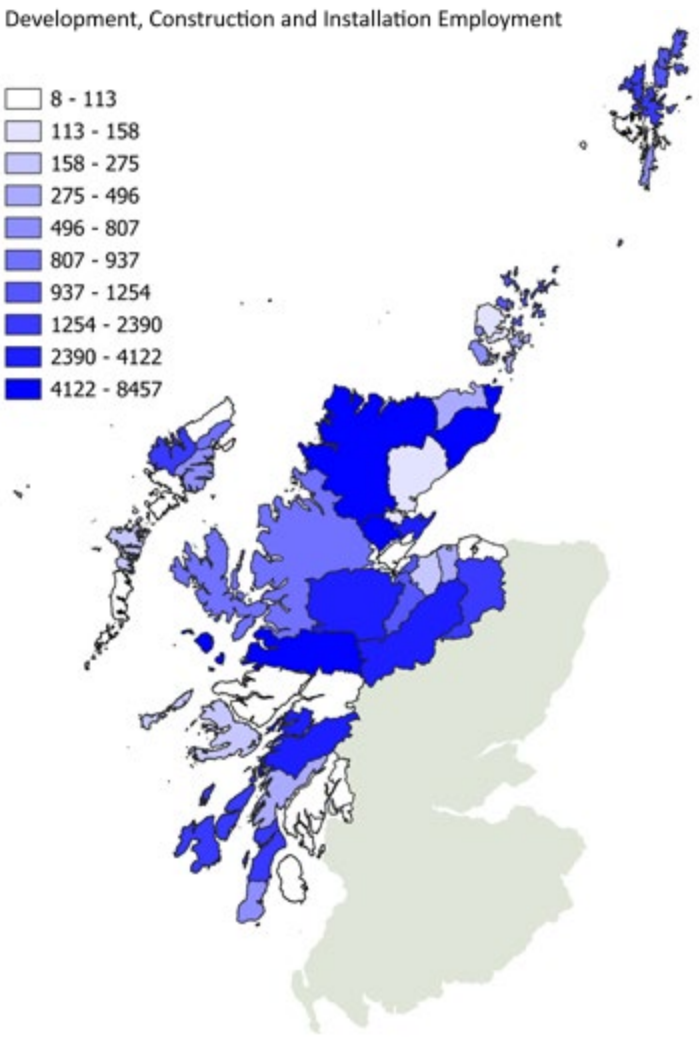
Area	Temporary increase in working age population during peak construction		Long-term increase in working age population based on operational employment requirement	
	N	%	N	%
Argyll and Bute	2,000	+4.8%	1,150	+2.8%
Highland	9,260	+6.8%	8,360	+6.1%
Moray	890	+1.7%	800	+1.5%
Na h-Eileanan Siar	940	+7.6%	1,120	+9.0%
Orkney Islands	1,800	+14.6%	560	+4.6%
Shetland Islands	1,370	+10.5%	760	+5.8%
Arran and Cumbrae	10	+0.3%	10	+0.4%
Highlands and Islands	16,270	+6.0%	12,760	+4.7%

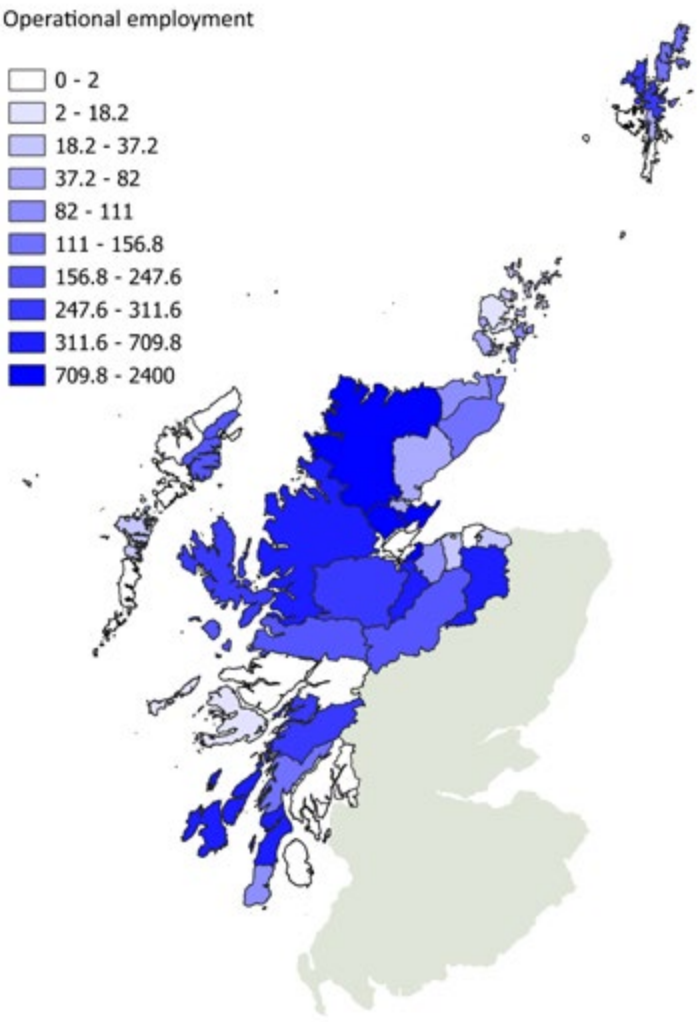
Source: ekosgen calculations based on: 2018-based sub-national population projections for Scotland (NRS, 2025), local authority data for North Ayrshire, and status-adjusted estimated employment impacts from identified project pipeline. Employment uplift figures rounded to the nearest 10. Totals may not sum due to rounding.

4 Based on the status-adjusted estimates and assumes that all employment arising from the delivery of the project pipeline is additional. Does not include any additional employment arising from supply chain impacts for the project pipeline or any other regional activity. It also does not take into consideration the anticipated replacement demand for skills. Population estimates do not include any family members who may accompany the new workers.

Analysis of employment by project location provides additional insight on where jobs may be located, based on ward level. It is important to note that they may not necessarily be dispersed across the ward but rather concentrated in small localities. This indicates that there will be concentration of temporary employment for development and construction phases in a number of areas in the region, including Shetland North, Sgìr Ùige agus Càrlabhagh in Na h-Eileanan Siar, the Cromarty Firth and North, West and Central Sutherland. Permanent operational employment is likely to be concentrated in areas including Culloden and Ardersier, Cromarty Firth and Tain and Easter Ross in Highland, as well as Speyside Glenlivet in Moray, and Kintyre and the Islands in Argyll and Bute.

Anticipated local-level location of development, construction and implementation (DCI) employment and of operational employment





The peak annual construction workforce of 16,270 and operational employment of 12,760 should be seen as significant shortfalls in required employment. The existing construction workforce in the region stands at approximately 12,250 (2023 data) and has grown by approximately 14% in the period from 2021. This suggests either rapid growth is required in the sector, or there will need to be some reliance on imported contractors from outside the region, and possibly even outside of Scotland, for construction and development phases.

The existing pipeline of skills supply is showing signs of growing – particularly in Modern Apprenticeship framework starts in construction and engineering and other RTO related subjects. However, it remains insufficient to meet the expected demand for skilled workers from RTO investment projects. The need for a skilled workforce is a cross-cutting requirement for all the RTOs and they share many skills needs. This is particularly so in construction phases (for both general and specialist construction and engineering skills) but also in operations and maintenance (e.g. service technicians, skilled machine operatives) and the supply chain (e.g. transport and logistics).

Starts and enrolments in RTO related subjects, 2023-24

1,015	9,439	3,030
Modern Apprenticeship starts	Further Education enrolments	Higher Education enrolments

Source: MA starts - SDS (2025). MA starts not available for Arran and Cumbrae; FE and HE enrolments at University of the Highlands and Islands - UHI (2024)

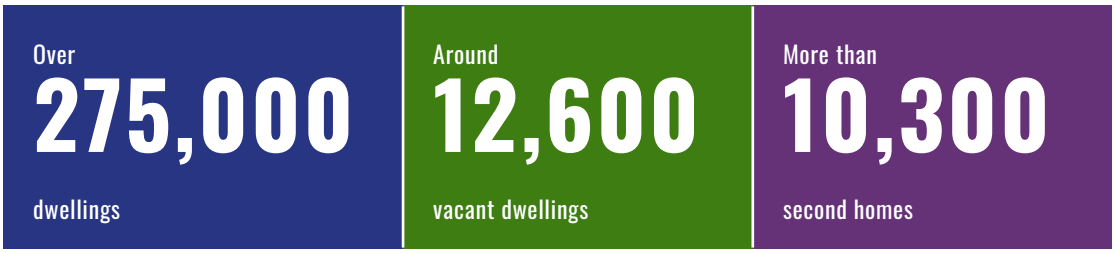
Skills shortages will be exacerbated by a tight labour market in the Highlands and Islands. There is competition for skills between the RTOs and with other sectors. As a result, there is an urgent need for a well-planned, strategic skills system response in terms of volume and specific types. However, uncertainty on specific future skills demand (in terms of nature, volume and timing) introduces an element of risk for education and training providers, and funders.

It is imperative that people are not only encouraged to stay or return to live and work in the Highlands and Islands, but pro-actively attracted to the region to meet skills needs. Reliance on contractors from outside the region, and possibly even outside of Scotland, should be minimised in order to ensure benefits can be realised and retained locally, or at least within the region. Innovative and potentially radical solutions may be required to connect the available workforce to RTO employment opportunities.

Seaboard villages

With a need for more workers, the region will need more housing to accommodate the workers and where relevant, their families. However, housing availability in the Highlands and Islands is already challenging and is heavily impacted by second homes and vacant properties. Meanwhile, private sector housing development tends to be concentrated in more urban or accessible rural parts of the region, due to factors such as higher construction costs, scarcity of appropriate land, and lack or required infrastructure.

Housing in the Highlands and Islands (2023)



Source: Dwellings – Energy Savings Trust Home Analytics Database (2023); Vacant dwellings and second homes – National Records of Scotland (NRS) Small Area Household and Dwelling Estimates 2023.

Some employers in the region have responded to housing challenges by investing in housing for staff to ensure they have the workforce they need. Innovative approaches to housebuilding will undoubtedly need to be part of a sustainable solution to the region's housing problems, and to support the realisation of the RTOs. Considering housing as a key enabler of the RTOs and economic growth presents an opportunity to increase the supply of social housing alongside other types of tenure and so deliver sustainable strategic benefits.

Analysis based on existing housing need and demand and the additional requirement related to the RTO opportunities identified in this research has been undertaken to provide an illustration of what might be required to support realisation of the region's economic potential. It estimates that there is a regional housing need and demand of around 32,300 to 36,100 housing units over the next ten years.[5] Should private and social sector completions continue at current levels (around 2,090 annually across the region between 2019-20 and 2023-24)[6], this would provide around 58%-65% of this total (approximately 20,930 units). This suggests a potential additional requirement of between 11,355 and 15,180 housing units across the region over the next ten years.[7]

Along with affordable housing provision from local authorities and other housing providers, a continued private sector response, beyond current levels, will be critical. Re-purposing existing stock, for example by bringing empty homes back into use, will also be important in helping to address supply challenges. It will also be important to ensure housing is prioritised in the areas most pivotal to the realisation of economic opportunity, and this will be picked up through the planning process as local authorities update their HNDAs, local housing strategies and local development plans to reflect the changing demand. There is also a need for a strategic approach to consider what housing is required in construction phases across the region.

While housing availability and affordability is one very important factor in supporting population growth, there are also others to consider. This includes access to services, which is a critical factor in supporting population growth aligned with the RTO opportunities.

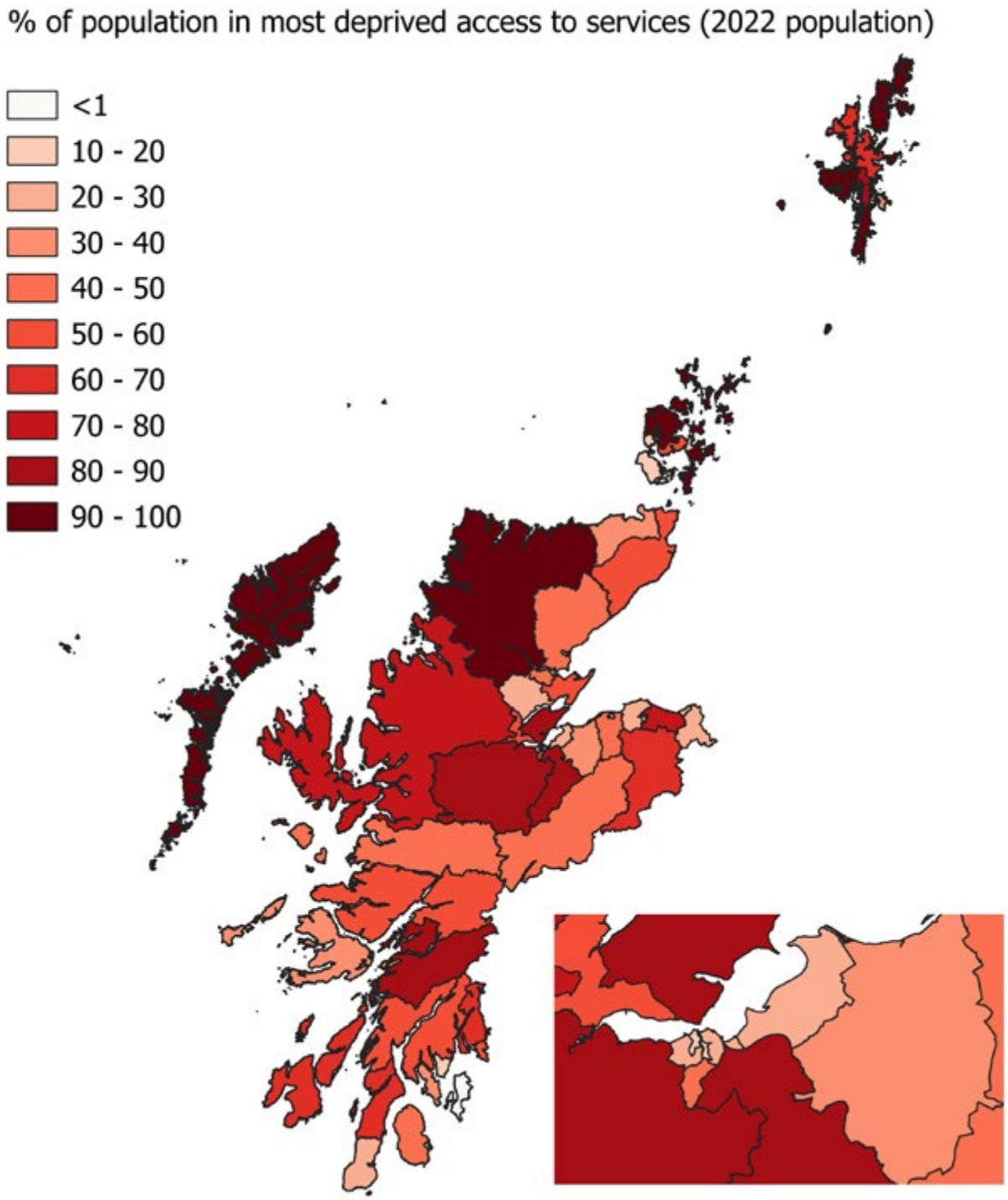
Some of the ward areas with the highest levels of expected operational employment are also those with relatively poor access to services. As demand increases in some areas, this may have positive implications in terms of the viability of services which have been eroded as populations have declined such as education, health, public transport, community facilities and retail. This in turn can enhance the attractiveness of an area.

5 Existing housing demand is based local authority Housing Need and Demand Assessments (HNDAs). The timeframes and assumptions used for HNDAs vary, however the cumulative picture has been used to provide an indicative estimate of demand over a 10-year period. The regional estimates exclude Arran and Cumbrae as it was not possible to estimate demand for the area.

6 Scottish Government Private and Social Sector Completions by Local Authority - financial year.

7 The range provided is based on the provision of 0.7 homes per worker and 1 home per worker and it is assumed that RTO need is not already captured in HNDAs.

Proportion of population (by ward) located in the lowest quintile of SIMD Access to Services Domain



Place-based planning will be critical to make a case to augment or resurrect services and thus ensure that provision of services is sufficient to address the needs of growing populations.

Enablers

Along with housing, skills and service provision, to support the realisation of the RTOs and ensure that the value is captured and fairly distributed, there are a number of supporting infrastructure requirements:

- Transport infrastructure: Transport is a critical enabler across all RTO sectors, and this extends across all major transportation modes. The scale of development means that across the road, rail and sea transport network there will be increasing demand. The upgrading of key arterial routes such as the A9, A96 and A82 and routes such as the A83 (from the Rest and Be Thankful down to Campbeltown), A85 into Oban and A890 to Kishorn are all critical to meeting the needs of proposed developments as well as those of existing businesses and communities. Also critical is investment in the region's rail infrastructure, ferries vessel replacement and enhanced resilience of ferry routes and air services (including inter-island air and sea links). Additional freight capacity, particularly on routes to Lewis, Harris, Orkney and Shetland is also a likely requirement to ensure that movement can be accommodated at key points in time, without detrimentally impacting on passenger capacity on ferries.
- Grid capacity and connection: Grid improvements such as through the National Energy System Operator (NESO)'s Pathway to 2030 and SSEN Transmission's Accelerated Strategic Transmission Investment (ASTI) programme are fundamental enablers for RTO projects. The scale of energy-related developments and those that depend on enabling grid infrastructure mean that grid upgrades to increase capacity are vital to the realisation of proposed developments. Without this increased capacity, then the negative impact of projects not coming forward is stark (as demonstrated by Scenario 1). Even with the required grid infrastructure, grid connection charges can be prohibitive and act as a disincentive to investment in renewable energy development. While green hydrogen systems and alternative offtake routes offer additional ways of transporting and using energy, there are constraints to their use including current ability to be used at scale.
- Ports: To enable growth in key sectors, there must be adequate port infrastructure in the Highlands and Islands. Recognising that ports are a critical enabler to unlocking growth, there has and continues to be investment in ports and harbours in the region, including Buckie, Stornoway Deepwater Terminal, and a number of sites within the Inverness and Cromarty Green Freeport (ICGFP) zone. In upgrading and developing ports it will be important to plan for future expansion and development of both offshore and onshore activities. This must not displace existing port activity and the requirements of other sectors for port capacity and handling services now and in the future.
- Planning: The research highlighted the critical role of planning in supporting the development of RTO projects. The planning process is generally considered to be lengthy and very often, complex. This can delay projects and also make it difficult to have a clear and confirmed timeline for construction. Addressing both the capacity and complexity of the various planning regimes within which RTO projects are being developed is vital to avoiding unnecessary delays that impact on the RTOs and increase the risk to investors and the supply chain. Changes are underway, and the Scottish Government Planning Hub has been established to support and speed up planning decisions and address planning constraints in local authorities. In addition, Masterplan Consent Areas will allow local authorities take a more strategic and localised approach to planning. However, given the importance of Grid Infrastructure upgrades to the realisation of opportunity across the region, reforms to Scottish electricity infrastructure consenting are needed as a matter of priority.
- Digital and mobile connectivity: It has long been recognised that improving the digital infrastructure of the Highlands and Islands is key to ensuring the long-term future of the region. High quality and reliable digital connectivity is absolutely critical for the RTOs to achieve their potential. It also impacts on regional attractiveness.

Inverness airport, train station

Key observations on specific RTOs

As discussed, the real value is in the strength and mix of the RTOs. However, each RTO has substantial potential in its own right.

Offshore Wind

Offshore wind is an important and growing sector for the region – it will be a catalyst for significantly increasing renewable energy production. Investment project activity in offshore wind is spread across the Highlands and Islands with a cluster of supporting infrastructure around the Inverness and Cromarty Firth Green Freeport, on the west coast and in the Northern Isles. Offshore wind in the Highlands and Islands should be developed as a cornerstone of an integrated energy system that draws on the range of marine and land-based renewable energy sources to deliver consistent, reliable, affordable, and secure energy.

Grid connections and charging, port infrastructure and energy storage will be key to maximising the potential of offshore wind in the Highlands and Islands. Smooth, efficient and timely planning and regulatory consents will also be critical. With a strong pipeline of new projects, it will be important that there is an adequately skilled workforce across the manufacturing, construction and operations and maintenance phases, supported by evidence-based skills planning. Supply chain development will also be important to maximise the local content and value in the region and in Scotland.

Green Hydrogen

While green hydrogen is a relatively nascent sector, Scotland has the potential to provide up to 10% of Europe's green hydrogen by the mid-2030s. The region's potential for renewable energy generation, and levels of constrained energy in particular, as well as existing pipeline infrastructure makes the region well placed to become an exporter of green hydrogen. There is a strong pipeline of green hydrogen projects across the region, but significant investment will be required to enable these opportunities.

There is a strong interdependency with renewable energy generation. Without renewable energy, there is no opportunity for green hydrogen. However, there is currently a lack of infrastructure for off takers to utilise green hydrogen at scale in Scotland as well as a lack of clarity on price and security of supply. As well as developing production, infrastructure to support green hydrogen uptake, transportation and export is critical for sector development.

Beatrice wind farm

Marine Energy

Scotland is a global leader in wave and tidal energy, particularly in the Highlands and Islands. As marine energy technologies advance and investment grows, marine energy has the potential to become a cornerstone of the UK's renewable energy mix. Innovation is being driven by the need to reduce costs and achieve efficiencies so that the technologies are commercially viable. This is being driven by globally significant assets such as the European Marine Energy Centre (EMEC), around which there is an opportunity to create a growth cluster in marine energy and offshore wind.

A wave and tidal energy sector that is underpinned by a strong local supply chain and maximises sustainable growth opportunities should be pursued. Key enablers to help achieve this include a skilled workforce, grid connection, port infrastructure and facilities, and digital connectivity. Industry and partners should examine what potential synergies can be achieved at various stages of construction and operations and maintenance to achieve efficiencies, reduce cost, and de-risk investment.

MeyGen project turbine being prepared for deployment at Nigg Energy Park

Space

Scotland has a strong base for the manufacture and innovation of space technology, with key assets and locations in the Highlands and Islands. The geography and economic conditions of the Highlands and Islands make it well suited to offer orbital, and sub-orbital launches. There is strong potential for collaboration with European and international companies for Scotland to offer launch options.

Accelerating the development and market readiness of launch sites in the region is a key priority to secure potential impacts and a segment of this growing market. The sector within the region is comprised of only a small number of companies, and the failure of one or more of these could have a significant impact on the sector overall. Thus there is a need to stimulate the development of the space sector to enable it to grow sufficiently by broadening and strengthening the regional space ecosystem and supporting supply chain development. Internal competition between spaceport developments must be managed, so that it does not negatively impact on the sector's development.

Marine Biotechnology and Processing

The Highlands and Islands is rich in biomass from marine and terrestrial sources. It has a vast and under-used natural resource in seaweed and microalgae, putting it in a strong competitive position. Marine biotechnology remains a relatively nascent sector, albeit with strong growth potential. The Highlands and Islands has a clear competitive advantage through the scale and quality of its available natural resources. There is a need to ensure that the regulatory framework for marine biotechnology is based on current research to enable business start-ups and growth.

Alongside this, there is a need to identify the balance between the sustainability of natural resources and the stocks required for marine biotechnology activity to capitalise on the value of the opportunity that exists. Provision of enabling and supporting infrastructure and wider investment to foster growth in the sector is necessary, as is public and private sector funding to mitigate risk and encourage innovation and entrepreneurship. As part of stimulating growth in the sector, a priority is facilitating the interface between science and industry to allow for a greater degree of technological and knowledge transfer between academia and business.

Horizon Seaweed, Wick

CorporateHealth International UK Ltd

Life Sciences, Digital Health and Social Care

Life sciences, digital health and social care is a large and complex sector, and the Highlands and Islands has some strong and valuable assets in this sector in terms of research, innovation, and commercial operations. Changes in demographics and the needs and expectations of consumers are driving change and creating opportunities for new technologies, treatments, and medicine. Thus there is substantial potential for growth and development. There is a significant opportunity for animal health, agritech and aquaculture (AAA) in particular with increased global demand for responsibly and sustainably produced animal protein and natural ingredients/products.

Clarity on the value proposition of the Highlands and Islands is needed to establish it as a focused, place-based, life sciences hub with high value and demonstrable specialisms. The region could also establish itself as a life sciences test hub offering trials and data collection in clinical settings. There is a need to better support and encourage commercialisation of research and innovation, so that high value activities and jobs are retained in the region.

Onshore wind and pumped storage hydro

As the backbone of the energy transition and to meet our energy security needs, a huge increase in variable power generation in the form of wind power, including onshore wind is required, in turn increasing the need for longer duration energy storage such as pumped hydro storage. There has been rapid growth of the onshore wind sector in the region and the associated supply chain, creating jobs and a wealth of knowledge and expertise. Continuing to support the supply chain is essential to build capacity and capability for the growing market. Maintaining the infrastructure investment and capacity for onshore wind is also critical. Innovative solutions to onshore wind component transport and onsite construction techniques need to be explored if many of the remote rural high-capacity wind sites are to be accessed by the industry.

The geography of the Highlands and Islands lends itself to the development of pumped storage hydro projects and a new surge in large-scale pumped storage hydro schemes demonstrates the scale of the opportunity that the region's hydrological resource offers. This includes the future potential to convert current hydropower projects into pumped storage hydro. However, access to a stable and consistent framework for investment, competition for resources including technology, supply chain and workforce and skills are constraints to development. There is also a need to explore solutions to remove transport related barriers arising during the construction of projects.

Other transformational natural assets

The wealth of natural resource assets in the region puts it at the vanguard of Scotland's response to the Climate Emergency, and for measures in pursuit of Net Zero targets. The region is well-placed to exploit opportunities offered to it through use of its natural resources. Peatland and forestry are key assets. The UNESCO World Heritage designation for the Flow Country is an additional opportunity for habitat restoration, peatland carbon sequestration and selling high-prestige carbon credits.

Opportunities to secure benefits from the region's natural capital resources should be pursued in as responsible and sustainable a manner as possible. There is a need for strategic actors to navigate between free market conditions and an interventionist approach, ensuring social license is achieved at all times. Whilst building a critical mass of activity is necessary to realise the opportunity, consideration must be given to how best to manage natural resources in light of the Climate Emergency, and the need to improve resilience in the face of climate change impacts.

Hydro Ness, Inverness

Inverness campus

Considerations for the future

For sustainable economic growth in the Highlands and Islands driven by these RTOs, there is a need to take a place-based approach to removing the barriers and support their development. Common barriers and constraints include the need for enabling and supporting infrastructure such as housing, transport, ports, and grid infrastructure. Other anticipated constraints relate to having the volume and types of skills needed for construction and operation and maintenance, accessing finance, and achieving social licence.

If these issues are addressed, it is not just the RTOs that will benefit, all sectors and industries stand to gain, along with communities, local areas and employers. The value that the RTOs could deliver individually and together is undoubtedly transformational and would have meaningful impacts for Scotland and the UK.

There must be a shared and agreed acceptance of the economic reality that there will be trade-offs. Decisions will need to be taken to drive growth, but some options may need to be sacrificed for another.

The combined potential of the RTOs is arguably unprecedented in the Highlands and Islands and it will be best achieved by taking a holistic approach, recognising the synergies between the RTOs and the intersection of constraints and enablers such as housing, ports and transport.

Stakeholders should plan and work towards a multi-model economy with a basket of diverse, strong and innovative sectors that are forward looking. This will ensure a healthy, strong, resilient and sustainable regional economy that will be a very attractive and competitive destination for people, industry, and investment.

The RTOs and enablers such as transport, housing and planning cut across a range of functions and areas. Rather than working in silos, there needs to be joined-up thinking, working and resourcing across governments and relevant agencies, to arrive at an integrated approach to solutions which make best use of resources.

There is considerable scope to proactively seek out and support the development and adoption of synergies across RTOs and their supply chains. This will include co-location to alleviate pressures on land and in the marine space, and the Orkney Research and Innovation Campus (ORIC) is a good example on this. Alongside this, a vital consideration is how to pursue growth and at the same time ensure the sustainable management of natural resources and biodiversity on land, and in seas and rivers. Many of the RTO sectors are highly dependent on the region's natural capital. This must be done responsibly and having secured the necessary social license.

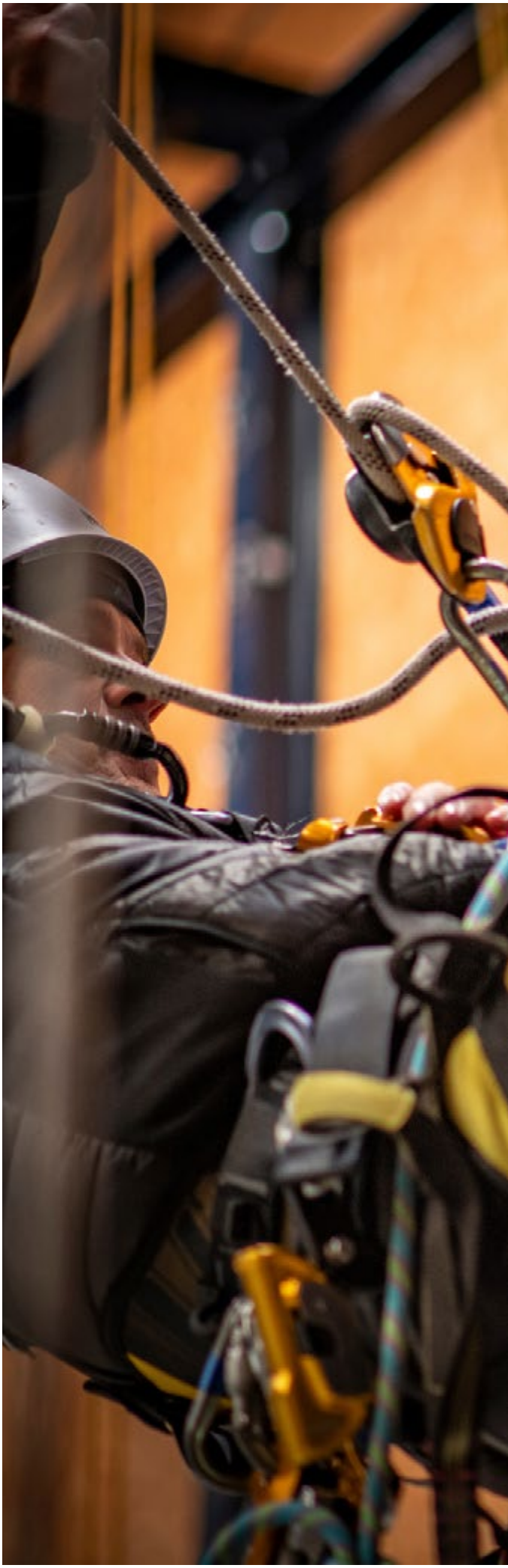
The skills system will play a central role in realising the ambitions of the RTOs. The employment and enterprise development opportunities that will flow from the RTOs and their supply chains have the potential to retain talent in the region, and also attract it.

There is already close working between education and industry to plan skills development in terms of new entrants and to reskill and upskill staff. However, there is a sense that this has not yet translated into increased provision at the scale that will be required. Taking a lateral view to skills and workforce development, including with regard to employability and targeting those currently outside the labour market, will help better meet the needs of industry and spread the benefits to a wider population.

There is significant opportunity in renewable energy in the RTOs not just economically but in terms of energy security, net zero and social value. A systems approach to renewable energy will ensure a clean, secure and resilient energy supply mix. Achieving this will require a shift in thinking and new ways of working at every stage.

There is currently a high degree of information asymmetry in the region and within the RTOs. There is a great deal of anticipation of what is to come, but also a degree of uncertainty. Organisations are reluctant to invest without certainty, yet conversely opportunities may be lost through a lack of readiness. A cross-sectoral effort is needed to provide a more detailed, aggregated timeline of when proposed projects will come on stream. It is acknowledged that there is always going to be some adjustments in project timescales, and this should therefore be monitored and reflected in any such timeline or roadmap.

Given this imperfect information, there should be a review of the attitude to risk in public, private and education sectors specifically for the RTOs. Partners then need to work together to explore how risk can be shared and alleviated so that exposure by any one organisation is minimised. This includes through intangible investments (e.g. R&D, Intellectual Property, brand equity), which can provide long term financial benefits and competitive advantage, but that are often excluded from quantified assessments of investment.



Auora Energy Services, Inverness

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