BiGGAR Economics

Technical Appendix 12.1
Beinn Ghlas Wind Farm Repowering
Maximising Benefits

A report to

nadara

July 2025

BiGGAR Economics

Contents

1. Executive Summary

This report evaluates whether the Proposed Development aligns with the National Planning Framework 4 (NPF4), which requires energy projects to demonstrate that they "maximise net economic impact". The assessment considers Nadara's (the Applicant) actions and commitments in areas such as **supply chain development**, **skills development**, **the empowerment of communities** and **the environmental protection and enhancement,** focusing on both direct contributions and how the Proposed Development enables positive impacts.

Supply Chain

The Applicant has committed to supply chain development actions which are routed in the needs and context of the Argyll and Bute economy and will build the capacity of the local supply chain. These commitments include the **supplier registration page** to keep suppliers informed of opportunities, factoring local economic benefits into tender evaluations and **engagement with Mid Argyll Chamber of Commerce** to raise awareness in local businesses around opportunities. A **contractor open day** or **'Meet the Buyer'** event will also be held in the future.

Skills

The Applicant is taking a proactive approach to local skills development, mindful that this is an important requirement of its supply chain development. It has **delivered a STEM workshops** locally in Taynuilt Primary School, using **innovative processes** such as 3D modelling software to design wind farms. It also **fosters talent in the sector** through the UK Support Scheme for Sustainable Energy Studies.

Community Empowerment

The Applicant is committed to the delivery of local economic benefits through the offer of £5,000 per installed MW each year in community benefits, which could result in **up to approximately £168,000[1] each year**. The Applicant has **invested resources to develop their understanding of the local needs and aspirations** that can be supported through the community benefit funding and other benefits. This has included **public consultation** to identify opportunities perceived by communities and receive feedback.

[1] Based on 7 turbines with capacity of approximately 4.8 MW. The value of the community benefit fund will depend on the installed capacity.

Environmental Protection and Enhancement

The Applicant has committed to achieving **maximum reuse, recirculation and recyclability of the existing wind farm components** as part of the **Outline Circular Decommissioning Strategy** developed in partnership with Reblade[2]. An **Outline Biodiversity Enhancement and Habitat Management Plan (OBE-HMP)** is proposed to support positive effects for biodiversity. The Applicant is also committed to engaging with **Argyll and Bute Renewable Energy Alliance (ABRA)** to consider renewable development challenges and opportunities in the local area.

Economic Impact

The Proposed Development's development and construction activity could generate:

- £3.0 million Gross Value Added (GVA) and support 34 job years[3] in Argyll and Bute; and
- £8.7 million GVA and 103 job years across Scotland.

It will also support economic activity while in operation by generating:

- £0.3 million GVA and supporting three jobs in Argyll and Bute; and
- £1.1 million GVA and nine jobs across Scotland.

The Proposed Development will contribute to public finances through the payment of non-domestic rates (up to £408,900 annually)[4]. The economic activity, and the commitments outlined, will contribute to the **human, economic, social and natural capital** of Argyll and Bute, increasing the resilience of communities and supporting long-term economic development. The assessment has found that the approach is:

- **place-based** and rooted in the context of Argyll and Bute;
- **innovative** in its approach to maximising benefits;
- **collaborative** with other developers, communities and public bodies;
- **transparent**, including a commitment to impact evaluation;
- **flexible** enough to meet the evolving needs of the community; and
- **deliverable** and an environment will be created to allow communities to deliver those benefits which are enabled by the wind farm.

The Applicant has proposed a broad package of measures aligned with NPF4 Policy 11(c) to "maximise net economic impact". These initiatives reflect Scottish Renewables Guidance and address key themes including supply chain development, skills, community empowerment, and environmental protection and enhancement. These are expected to deliver significant economic and community value.

[2] Nadara and Reblade (2025). Outline Circular Decommissioning Strategy. Available at: https://nadara.com/wp-content/uploads/sites/132/2025/04/Nadara-Circular-Decommissioning-Strategy.pdf

[3] A job year is one year of work for one person.

[4] Non-Domestic Rates are a property-based tax charged on all business properties. The proceeds are paid into a national pool administered by the Scottish Government for redistribution to local authorities.

2. Introduction

BiGGAR Economics was commissioned by Nadara to undertake a socio-economic assessment for the repowering of Beinn Ghlas Wind Farm in Argyll and Bute.

2.1 Background and Study Aims

Beinn Ghlas Wind Farm began operations in 1999. Located southwest of Taynuilt in Argyll and Bute, the wind farm is comprised of 14 turbines and currently has a total installed capacity of 8.4 MW.

Nadara is proposing to repower Beinn Ghlas Wind Farm. Plans to repower Beinn Ghlas Wind Farm would result in a reduced number of turbines and higher installed capacity. It is expected that the repowered wind farm will be comprised of up to 7 turbines with a total generating capacity of approximately 33.6 MW.

The aim of this report is to outline the opportunities presented by the repowering of Beinn Ghlas Wind Farm for maximising socio-economic benefits within the local communities, region and Scotland as a whole, in line with the requirements of the NPF4 Policy 11(c). This states that *"development proposals will only be supported where they maximise net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities"*.

The evidence of this report will support Nadara's engagement programme with local stakeholders.

2.2 Report Structure

The remainder of the report is structured as follows:

- section 3 considers a series of initiatives that help maximise economic benefits under the requirements of the NPF4 Policy 11(c) and an assessment following the Scottish Renewables Guidance;
- section 4 summarises the estimated economic impacts from the repowering of Beinn Ghlas Wind Farm;
- section 5 provides a conclusion of the assessment, outlining the main findings.

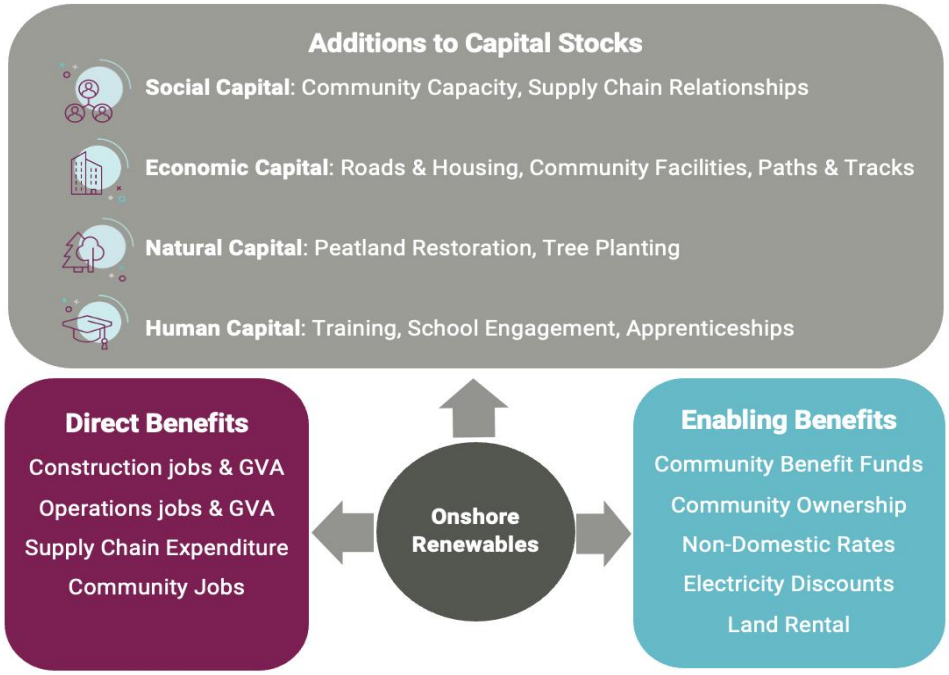
3. Maximising Economic Impacts

Early engagement with communities and businesses helps developers maximise socio-economic benefits across a development's lifecycle.

3.1 Approach

This report considers how the Applicant will maximise the net economic impact of the Proposed Development. This will consider the different types of benefits that are generated by onshore wind projects. Examples of these are given in Figure 3.1.

Figure 3.1: Understanding the Benefits of Onshore Renewables



Source: BiGGAR Economics.

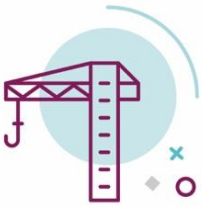
Whilst there is currently no definition on what maximisation of net economic impact means, best practice is being established and in 2025,Scottish Renewables has published guidance[5], to support developers in delivering and maximising benefits. This guidance identifies **six principles** that can be used to make a judgement on whether the Proposed Development is maximising net economic impact. These include:

[5] Scottish Renewables (2025), Maximising Net Socio-Economic Benefit of Renewable Energy Guidance and Reporting Framework: Guidance for developers to comply with NPF4 Policy 11c.

- **Place-Based:** every project and every community is different so packages of benefits that are tailored around the needs and capacity of the community in question are likely to generate greater benefits than a standardised approach;
- **Innovative:** many of the benefits that have been realised by wind farms to date have happened because of innovation at the project level. To maintain this culture of continuous improvement, it is important that developers to continue to innovate;
- **Collaborative:** many of the benefits of wind farm developments are not directly within the gift of developers. They will require input and support of others in the public, private and third sector to realise, making a collaborative approach essential;
- **Transparent:** effective collaboration requires the parties involved to trust each other, and an open and transparent approach is crucial for establishing this trust;
- **Flexible:** a lot can change between project inception and completion, and these changes can make a big difference to the benefits ultimately realised. A flexible approach that responds positively to such changes is therefore important;
- **Deliverable:** providing communities with realistic expectations about what can be delivered during the construction and operation phase of a project will help achieve trust with relevant stakeholders. This will positively impact relationships for future renewable projects.

These principles highlight that in considering whether the Proposed Development aligns with the policy intention of NPF4 Policy 11(c) to "maximise net economic impact", it is necessary to account for both the economic impacts that are expected and the approach that the Applicant is taking to ensure these benefits are consistent with community needs. The focus of the assessment is on proposed approaches across four themes: **supply chain, skills development, community empowerment and environmental protection and enhancement**. These themes are broken down in separate sections below for the assessment in this report.

3.2 Supply Chain Development



Supply Chain Development can contribute to the development of **social capital**, in addition to the more obvious contribution to financial capital within these businesses. To maximise benefits, developers need to:

- **research the local business base**, to understand the capacity to provide the goods and services needed and identify opportunities to support supply chain development;
- take reasonable steps to **maximise local supply chain content,** including working with Tier 1 contractors to make use of local suppliers;
- adopt **progressive procurement practices** that make it easier to make use of small local businesses and social enterprises; and
- supporting efforts to **increase regional supply chain capacity** and clusters of expertise.

Applicant's Actions and Commitments

The Applicant will increase the local economic impacts associated with the Proposed Development by engaging proactively with local suppliers to make sure that they are aware of the opportunities associated with all phases. In the lead-up to construction,

the Applicant will undertake a series of actions to focus on those areas where the chances of delivering local content are the largest. These include:

- inclusion of a supplier registration page on the Proposed Development's website to keep suppliers informed of opportunities during all phases of the repowering of the wind farm;
- organisation of a contractor open day / 'Meet the Buyer' event;
- consideration of local content in Tier 1 tendering which could encourage contractors to consider local content in their decisions;
- engagement with Mid Argyll Chamber of Commerce, the local chamber of commerce, to raise awareness in local businesses around the opportunities associated with the Proposed Development;
- active engagement with local businesses, including those with transferable skills from other sectors, aims to increase participation in all phases, support skills development and align with the Onshore Wind Sector Deal's goals for supply chain visibility and collaboration.

The partnership with Reblade to create the Outline Circular Decommissioning Strategy also supports the process for identifying local suppliers needed for decommissioning.

3.3 Skills Development

Skills development is one of the key ways in which communities can build up **human capital** such as skills, knowledge, health/wellbeing which can be reflected in higher potential lifetime earnings and future income levels. For maximising benefits through skills development this means developers need to:

- **Adhere to progressive employment and recruitment practices** that meet or exceed current industry best practices;
- **Understand the local labour market** and its capacity to provide the skills needed in the short and longer term, and identify important skills gaps;
- **Build relationships with education and training providers** and work with them to implement the national skills strategy and
- Work collaboratively with relevant training/education partners and community bodies to **develop bespoke labour market development solutions**, including apprenticeships.

Applicant's Actions and Commitments

There may be scope to repurpose turbine components for use as teaching tools at Argyll College UHI, enhancing learning opportunities. The Applicant will encourage local suppliers to take part in the Scottish Government's Young Person's Guarantee, which connects 16- to 24-year-old people with jobs, training and education. Further support is provided through the Applicant's UK Support Scheme for Sustainable Energy Studies, which offers financial assistance to students aged 16 and over who live or study within 50 miles of the Applicant's wind farms. The scheme helps cover costs such as accommodation, course materials, travel and laptops. In 2023, seven students

received support, showing the Applicant's continued investment in building the future renewables workforce.

While not held in Argyll and Bute, the Applicant, working with 3DW, delivered a STEM workshop at Strathaven Academy, where pupils explored the challenges of wind farm development through interactive mapping and modelling. A similar STEM workshop has taken place in Taynuilt Primary and an invitation to run a workshop at Oban High School has also been extended to support education and promote careers in the renewables sector.

The Applicant has also engaged young women in energy careers through the S3 Girls in Energy initiative, previously hosting a visit from Fraserburgh Academy pupils to a wind farm site, where they heard directly from an Asset Manager. Similar opportunities will be considered for the Proposed Development. This approach aims to develop both short-term skills and long-term interest in the renewables sector.

3.4 Community Empowerment

Community benefit funding has the ability to build **social capital** in communities by providing residents with the resources needed to support networks, collaborate around shared objectives and enact change. To maximise benefits through community empowerment, a developer needs to consider actions such as:

- working with local communities to **understand local needs, aspirations, appetite and delivery capacity**;
- developing a **community benefit package tailored to local needs** that is consistent with best practice principles and (where feasible) a proposition for community ownership;
- working closely with local communities to **build trusted relationships** to help support the emergence of innovative ideas and approaches, for example by appointing a single point of contact to manage discussions;
- working with community bodies to **establish effective governance**, administration, monitoring and evaluation arrangements consistent with best practice and providing data to enable the national community benefit register to be regularly updated; and
- engaging with regional partners in the public and third sectors to identify and develop opportunities to **generate regional benefits**.
- setting out any steps taken to **collaborate with other developers** working on nearby projects to secure greater impacts from community benefit proposals, for example by linking up access tracks to create a local network of paths or setting up joint governance arrangements for community benefit funds.

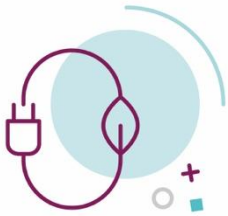
Applicant's Actions and Commitments

The Applicant is committed to continue supporting local communities providing by community benefit funding to maximise local economic benefits, the Applicant is committed to delivering £5,000 per installed MW in community benefits as part of the Proposed Development in line with the best-practice guidance on community benefits

from onshore wind issued by the Scottish Government[6]. This means that **local communities may receive up to £168,000[7] per year**. Based on the economic multipliers for the voluntary sector, it was estimated that the community benefit fund could support up to two jobs locally. The Applicant plans to replicate its Sustainable Communities Forum model of engagement for the Proposed Development. This brings together representatives from communities near wind farms and provides a platform for shared learning, celebrating local initiatives such as the preservation of cultural heritage and the creation of inclusive community spaces funded through wind farms. It also aims to explore the potential to provide local residents with electricity payment support through the Community Benefit Fund, in consultation with local stakeholders. While shared ownership is not currently proposed due to the scale of the development, the Applicant has committed to reviewing the feasibility of this post-consent.

3.5 Environmental Protection & Enhancement

Natural Capital is a term for nature's assets including forests, land and rivers that provide value both through commercial use and non-market benefits like recreation and landscape amenity. To maximise benefits through environmental protection and enhancement, a developer would need to:



- explaining what has been (and will be) done to **protect and enhance biodiversity**;
- explaining any **investment in local infrastructure** planned or undertaken to restore or improve local roads used during the construction stage;
- creating new leisure and recreational opportunities to **improve community access to green and blue spaces**;
- **planning for the future** by putting a process in place to ensure communities are consulted on decisions about how a site is used at the end of its operational life; and
- setting out any steps taken to **collaborate with other developers** working on nearby projects on planning and environmental issues.

Applicant's Actions and Commitments

The Applicant is committed to maximise reuse and recyclability of the wind farm components through innovative practices as part of the Outline Circular Decommissioning Strategy[8] developed with Reblade, supporting Scottish Government's Circular Economy, Just Transition and Net Zero goals. An OBE-HMP is also proposed in line with NPF4 Policies 3 and 11, to support positive effects for biodiversity. The Applicant is also committed to ongoing engagement with ABRA, which brings together public and private sector partners, to address regional renewable energy opportunities and challenges.

[6] Scottish Government (2019), Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments.

[7] Based on 7 turbines with a capacity of approximately 4.8 MW. The value of the community benefit fund will depend on the installed capacity.

[8] Nadara and Reblade (2025). Outline Circular Decommissioning Strategy. Available at: https://nadara.com/wp-content/uploads/sites/132/2025/04/Nadara-Circular-Decommissioning-Strategy.pdf

3.6 Assessment Summary

The Applicant's approach demonstrates strong alignment with **place-based** and **collaborative** principles. These are shown through:

- engagement with local businesses and the Mid Argyll Chamber of Commerce;
- working with local institutions and young people in ways tailored to the local educational landscape;
- tailoring the community benefit fund to local needs, with an adaptable delivery model;
- the Sustainable Communities Forum which brings communities together encouraging the exchange of ideas and building lasting relationships and networks;
- engagement with ABRA, ensuring environmental actions are locally relevant; and
- collaboration with Reblade to design the Outline Circular Decommissioning Strategy.

There are also commitments showing the **innovative** approach followed through:

- interactive workshops, virtual wind farm design activities and proposals to repurpose turbine components as part of the Outline Circular Decommissioning Strategy, and the promotion of STEM learning and renewables sector skills;
- the Sustainable Communities Forum that promotes best practice sharing and celebrates community-led outcomes; and
- partnership with Reblade on the Outline Circular Decommissioning Strategy, which prioritises reuse, recirculation and recyclability through innovative practices.

The Applicant's approach is also **transparent** which is shown through:

- the supplier registration page and direct outreach to raise awareness and provide access to opportunities;
- the delivery of interactive experiences and sharing of student support schemes;
- the Sustainable Communities Forum by creating space for communities' voice and feedback provision;
- the clear value and ongoing support which would be provided through the approximate £168,000 per year community benefit fund, continuing the positive impact seen with the existing wind farm;
- the detailed actions considered in the OBE-HMP and the Outline Circular Decommissioning Strategy;

The approach is also **flexible** and this is evident through:

- engagement with different age groups and adaptable delivery methods; and
- adaptation of actions to the capacity and interest of the communities.

The actions proposed, including a contractor open day / 'Meet the Buyer' event, are realistic, practical and within the Applicant's ability to deliver, reinforcing the overall **deliverability** of the approach. Some commitments are already in progress or have previously been undertaken by the Applicant.

4. Economic Impact Analysis

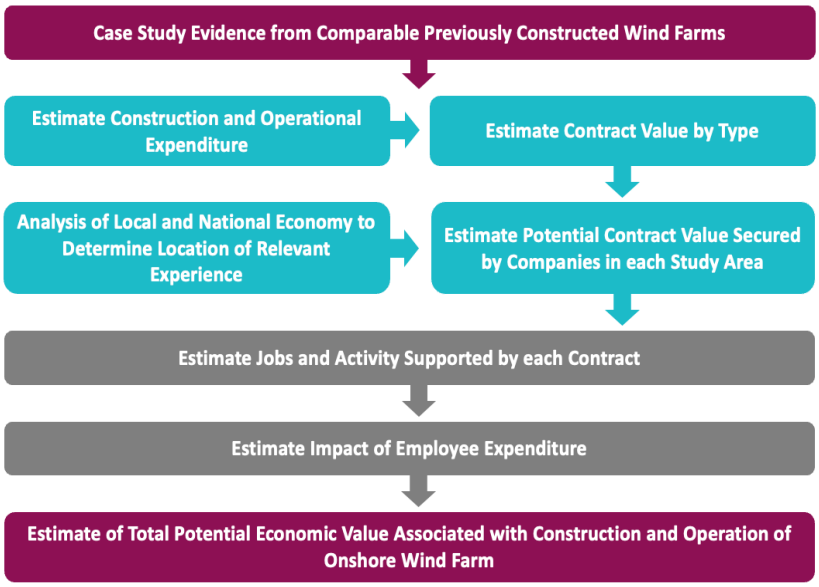
This section describes the economic impact methodology and estimates the economic impact from the construction and operations of the Proposed Development.

4.1 Economic Impact Methodology

1.1.1 Modelling the Economic Impact of Onshore Wind Farm Developments

The methodology employed to assess the economic impact of onshore wind developments aligns with widely accepted industry best practice. It leverages research, conducted by BiGGAR Economics in 2015 on behalf of RenewableUK[9], on the construction and operational costs from numerous onshore wind farm projects across the UK. The economic modelling approach is based on recent case study evidence from onshore wind projects across Scotland and the UK. It assesses impacts across the following stages: development and planning, turbines, balance of plant, and grid connection. Assumptions are adjusted to reflect the varying capacity of Scottish businesses to deliver contract work. The study areas considered are **Argyll and Bute and Scotland**. The steps followed for the economic impact assessment are illustrated in Figure 4.1.

Figure 4.1: Approach to Economic Impact – Onshore Wind Farms



Source: BiGGAR Economics.

[9] RenewableUK (2015), Onshore Wind: Economic Impacts in 2014.

1.1.2 Measures of Economic impact

The economic impacts are reported with respect to the following measures:

- **Gross Value Added (GVA)**: a commonly used measure of economic output, GVA captures the contribution made by an organisation to national economic activity; and
- **Employment**: this is expressed as years of employment (e.g. a job that lasts for 18 months would support 1.5 years of employment) for construction activity and as annual jobs for operations and maintenance contracts.

1.1.3 Sources of Economic Impact

The assessment will consider the following sources of economic impact:

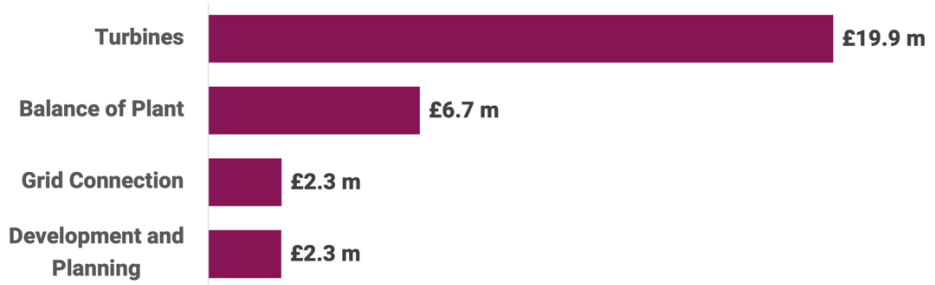
- **direct impacts**: the economic value generated through the contracts;
- **indirect impacts**: the impact from the spending of contractors within their supply chains; and
- **induced impacts**: the impact from the spending of those workers carrying out contracts for the Proposed Development and on behalf of its contractors.

All figures included in this assessment are based on 2024 prices.

4.2 Development and Construction

Based on the Proposed Development with 7 turbines for a generating capacity of 4.8 MW each, it was estimated that the **total construction and development expenditure could be up to £31.2 million**[10]. Capital expenditure (CAPEX) was then split into different contract categories. Turbine contracts are expected to involve the largest level of spending, equivalent to £19.9 million or 64 % of total construction and development costs, with balance of plant accounting for 22 % of spending, and development and planning, and grid connection accounting for 7 % each.

Figure 4.2: Development and Construction by Contract Type



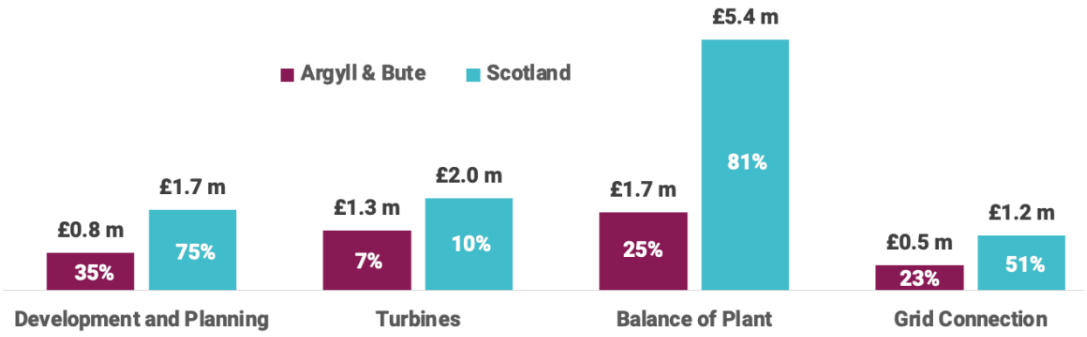
Source: BiGGAR Economics Analysis of case study evidence from comparable previously constructed wind farms.

To estimate the economic impacts from the construction and development of the Proposed Development, it was then necessary to make assumptions on the ability of

[10] This estimate accounts for the lower costs associated with repowering an existing site.

businesses within each study area to carry out contracts. Based on evidence from similar developments within Argyll and Bute, around 33 % of Capex (£10.4 million) could benefit Scottish businesses, with £4.3 million (14 %) awarded to Argyll and Bute businesses. Balance of plant contracts present the largest opportunity, with estimated expenditure of £5.4 million in Scotland and up to £1.7 million in Argyll and Bute.

Figure 4.3: Development and Construction Expenditure by Study Area (incl. % of Capex)



Source: BiGGAR Economics Analysis.

The economic impact assessment estimated GVA and short-term employment by analysing contract categories, assigning them to relevant Standard Industrial Classification (SIC) codes, and applying turnover-to-GVA and turnover-to-job ratios from the UK Annual Business Survey (ABS)[11]. It was estimated that development and construction contracts associated with the Proposed Development could generate £2.3 million direct GVA and 27 years of employment in Argyll and Bute and £5.4 million direct GVA and 67 years of employment in Scotland.

Table 4.1: Direct GVA and Employment by Contract Type and Study Area

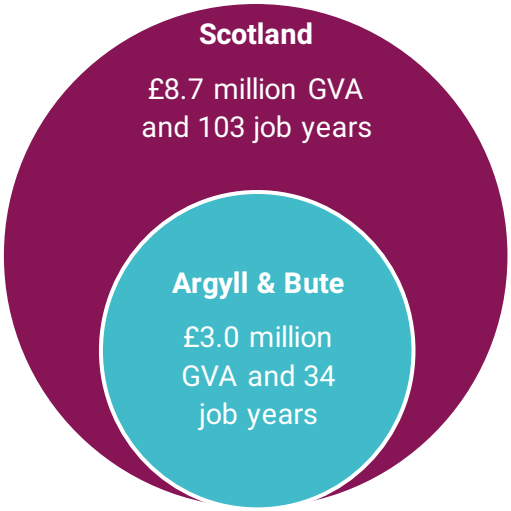
Expenditure Type	Argyll and Bute		Scotland	
	GVA (£m)	Years of Employment	GVA (£m)	Years of Employment
Development and Planning	0.6	2	1.1	9
Turbines	0.7	11	1.0	17
Balance of Plant	0.8	10	2.7	33
Grid Connection	0.2	4	0.5	9
Total	**2.3**	**27**	**5.4**	**67**

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

In addition to direct impacts, indirect and induced effects were calculated using Type I and Type II multipliers from the Scottish Government Input-Output Tables, capturing wider supply chain activity and employee spending. Adding up direct, indirect and

[11] ONS (2024), Annual Business Survey 2022

induced impacts, it was estimated that the construction and development of the Proposed Development could support:



Source: BiGGAR Economics Analysis.

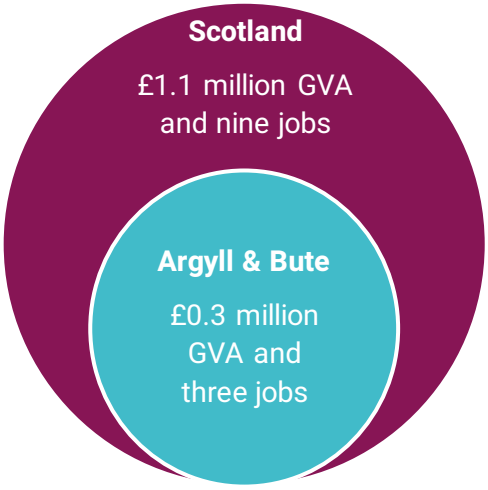
In Argyll and Bute, the development and construction contracts associated with the Proposed Development represent a significant opportunity for employment in the 'Specialised construction activities' and 'Land transport and transport via pipelines' sectors. The development could directly generate five job years in the first sector and about four in the second.

The Proposed Development is expected to create high-quality local jobs and maximise local spending during development and construction, aligning with NPF4 Policy 11(c).

4.3 Operations and Maintenance

The operation and maintenance impact of the Proposed Development is the impact that would persist throughout the lifespan of the Proposed Development. It was estimated that the **annual cost of operations and maintenance could be around £2.1 million** (which excludes community benefit payments and non-domestic rates). Following a similar approach to the development and construction phase, it was estimated that Argyll and Bute could benefit from £0.5 million in operations and maintenance contracts (25% of total), with Scottish businesses benefitting from £1.3 million (64% of total).

The total turnover generated in each study area was then divided by the turnover per GVA and turnover per job ratios of the sectors expected to carry out operations and maintenance contracts. As with the development and construction of the wind farm, the analysis also considered indirect and induced impacts. In this way, it was estimated that during its operation, the Proposed Development could generate each year:



Source: BiGGAR Economics Analysis.

During its operational lifetime, the Proposed Development is expected to support high-quality local jobs and maximise local spending, aligning with NPF4 Policy 11(c).

4.4 Economic Capital

Economic capital includes tangible assets such as cash, property and infrastructure used to support economic activity. The Proposed Development will contribute to building economic capital locally by generating income and profits for businesses and households, supporting future investment and employment. It will also form part of Scotland's energy infrastructure, adding long-term value to the national economic capital stock through the electricity it produces, representing one of the Proposed Development's most significant economic contributions.

4.5 Non-Domestic Rates

The Proposed Development is anticipated to contribute around £408,900 annually in non-domestic rates, providing additional revenue to public finances. Although the distribution of these funds is determined nationally, the contribution could support Argyll and Bute Council at a time of increasing demand for services and an estimated £11 million budget gap for 2025/26[12].

[12] Argyll and Bute Council (2025), Budgeting Pack 2025/26.

5. Conclusion

A comprehensive package of measures is expected to deliver both economic and wider benefits, in line with NPF4 Policy 11(c).

NPF4 Policy 11(c) states that energy projects will only be supported if they can demonstrate that they will "maximise net economic impact". The assessment of whether the Proposed Development aligns with this requirement is based on the commitments and actions that the Applicant has taken on **supply chain development, skills development, the empowerment of communities and environmental protection and enhancement** under the Scottish Renewables Guidance. This considered both what the Applicant has direct control over, and how it can enable others to have a positive impact across these areas. There is strong evidence that the Applicant is actively addressing all four themes through a comprehensive and well-considered approach.

The assessment has found that the Applicant's approach is:

- **place-based** and rooted in the context of Argyll and Bute;
- **innovative** in its approach to maximising benefits;
- **collaborative** with other developers, communities and public bodies;
- **transparent**, including a commitment to impact evaluation;
- **flexible** enough to meet the evolving needs of the community; and
- **deliverable** and an environment will be created to allow communities to deliver those benefits which are enabled by the wind farm.

The economic activity and the commitments under the four themes of the Scottish Renewables Guidance will enhance the **human, economic, social and natural capital** of both Argyll and Bute and Scotland as a whole.

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