

OPTIMISING CARBON SEQUESTRATION IN ARGYLL & BUTE

Readiness Evaluation

Work package review and workshop report
for

Highlands and Islands Enterprise

October 2022



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1 INTRODUCTION

OVERVIEW

1.1 Highlands and Islands Enterprise (HIE) are currently delivering a project that is looking to discern the value to the local economy of the carbon sequestration potential of Argyll & Bute, as part of an over-arching bid that Argyll & Bute Council has submitted to the UK Community Renewal Fund. The HIE bid is for £260,000 to take forward a project that aims to quantify the carbon sequestration potential of Argyll & Bute's extensive natural resources, as well as providing a vision and methodology for carbon sequestration investment to both underpin the local economy and support green recovery. The project is also looking at the wider replicability of carbon sequestration projects and articulating the potential to attract green financial investment to the region.

1.2 As part of this overall project, ekosgen, in partnership with Context Economics, were commissioned to evaluate the readiness of nature-based carbon sequestration and carbon emissions reduction suppliers in Argyll & Bute to engage the carbon credit market, and also discuss what could be replicable to other Scottish regions.

1.3 This commission forms one Work Package in a suite of outputs created for HIE as a result of this project, namely Work Package 7.1. This Work Package involves a review of the work undertaken by preceding work packages within the project to date, by analysing the successes of the work packages outputs against the stated aims of the respective work packages. The Work Packages that are in scope of this review are detailed in **Section 1** of this report.

1.4 This commission also involved the delivery of a workshop, in collaboration with HIE and HIE's other Work Package project partners to showcase their respective study findings, engage strategic partners, landowners, and all relevant stakeholders in carbon sequestration discussion, and to identify priorities for future activities. This workshop was facilitated on 4th October 2022 in Dunbeg. The key findings arising from this workshop are detailed in **Section 2** of this report.

REPORT OBJECTIVES

1.5 The purposes of this report are as follows:

- To present HIE with an assessment of Work Packages 1 to 6 in line with their stated objectives, providing HIE with a stock-take of each work package's outputs, the outcomes arising from these outputs, and any key learning that HIE should be mindful of;
- To provide a record of the workshop content in an accessible format, that can be easily interpreted by a range of different audiences, that can be incorporated into further documents HIE may publish in support of this project;
- To highlight and explore the key issues and points raised in discussion throughout the workshop delivered in Dunbeg on 4th October 2022; and
- To make policy and strategy recommendations for HIE and the wider project team on the basis of the findings from this Readiness Evaluation and the subsequent workshop findings, to address any gaps or issues that have arisen going forward.

REPORT STRUCTURE

1.6 The remainder of this report is structured into 2 sections.

1.7 **Section 1** presents a stocktake of the preceding Work Packages against their aims.

- Within Section 1, **Chapters 2 to 7** present each Work Package in turn, assessing their respective outputs against the original scope and objectives of the Work Package.

1.8 **Section 2** presents the findings arising from the workshop and the concluding remarks and recommendations made as a result of the Readiness Evaluation.

- Within Section 2, **Chapter 8** provides a summary of the workshop, as well as any key points arising from discussion at this workshop.
- **Chapter 9** provides the overarching conclusions, makes recommendations and suggested next steps for HIE to consider when taking this project forward.

SECTION 1

Review of work packages

2 WORK PACKAGE 1: SCOPING THE ARGYLL & BUTE CARBON SEQUESTRATION MARKET

Summary

- The first Work Package associated with this project, delivered by the Scottish Association for Marine Science (SAMS), provided initial scoping and background research analysis of current carbon sequestration market in Argyll & Bute.
- The output arising from this Work Package consisted of a report which also covered the other Work Package that SAMS were commissioned to deliver, Work Package 3.
- With regards to Work Package 1, the report considered: the state of the current carbon market in Argyll & Bute; identified opportunities within carbon sequestration supply for communities in Argyll & Bute; identified and located priority natural assets to secure carbon stocks at risk; and identified drivers and trends in demand for carbon trading.
- In each of the above considerations, the report acknowledged the roles of both the terrestrial environment (with regards to woodland creation, agroforestry practices and peatland restoration) and the marine environment (across seaweed and shellfish aquaculture) in sequestering carbon.
- The report also considered additional factors beyond the original terms of reference, to include risks to carbon stocks under business-as-usual scenarios.
- Ideally, there would have been a greater amount of time to digest the findings from Work Package 1 in order reflect on these to further shape the later Work Packages.

INTRODUCTION

2.1 This chapter sets out the review of Work Package 1: Scoping and Background Research. The reporting and outcomes of the Work Package are considered against the original scope and intended outputs. Observations on any difference between these are provided.

BRIEF AND SCOPE OF REQUIREMENTS

2.2 As the first stage of work for the project, the aim of Work Package 1 (WP1) is to assess and analyse the natural capital and current activity in Argyll & Bute with regard to carbon sequestration. This is to establish a baseline for carbon stores and the current market for carbon sequestration.

2.3 In achieving this aim, WP1 should establish the scale and nature of the natural carbon assets in the area, to inform the quantification of the carbon market in the Argyll & Bute council area. This includes existing natural capital and current carbon-related activity in Argyll & Bute. In particular, WP1 should:

- Provide an assessment of the existence and maintenance of carbon sequestration stocks in Argyll & Bute, with a focus on any high-value stocks that may be at risk from depletion or degradation;
- Consider potential opportunities for carbon sequestration, should be considered and mapped. This mapping should include intact and transformed natural capital; and
- Provide sector insights (with a focus on drivers and trends), and an analysis of risk for natural asset carbon storage.

2.4 This will therefore establish an important evidence base for future carbon sequestration activity in Argyll & Bute. This evidence base is considered critical for informing the development of the nascent carbon sequestration industry in the area, and for stimulating community wealth building opportunities – which is the ultimate driver for the project.

PLANNED OUTPUTS

WP1's intended outputs include the establishment of an evidence baseline that will provide an economic impact assessment of the carbon sequestration project in Argyll & Bute. This baseline of information was essential to underpinning the remaining work across the rest of the project's work packages. Specifically, the WP1 report needed to contain:

- A description of the state of the current carbon market in A&B;
- The identification of priority carbon sequestration supply opportunities for communities in A&B;
- The identification and location of priority natural assets to secure carbon stocks at risk; and
- Identification of drivers and trends in the demand for carbon trading.

WORK PACKAGE OUTCOMES AND OBSERVATIONS ON DELIVERY

2.5 The report delivered by SAMS combined the outputs from both WP1 and WP3. The report is essentially delivered in two parts – the outputs relevant to WP1 are contained in Chapter 2 of the report, summarised below.

A description of the state of the current carbon market in Argyll & Bute

- **Terrestrial environment:** There is a tentative **total carbon emissions reduction** of 916,830 tCO_{2e} across Woodland Carbon Code projects, and Peatland Code and Peatland ACTION projects, as well as Agri-Environment Climates Schemes and Forestry Grant Schemes.
- **Marine environment:** A description of the current potential for carbon markets within the marine environment, including across seaweed and shellfish aquaculture, and consideration of the potential for seaweed and shellfish to be included in Blue Carbon trading schemes.

The identification of priority carbon sequestration supply opportunities for communities in Argyll & Bute

- **Terrestrial environment:** Estimating that whilst Argyll & Bute is likely to be a **net carbon sink** of approximately 923 ktCO_{2e} yr⁻¹, it is considered that drained and undrained heather and grass dominated modified bogs, contributed together **nearly half of the total emissions** (317.4 out of 794 ktCO₂ yr⁻¹) despite covering only 20% of the land area. Nevertheless, there is potential for Argyll & Bute to supply carbon sequestration opportunities through degraded peatland restoration and existing identified opportunities for woodland cover expansion.
- **Marine environment:** There is extensive understanding about the degree to which the marine environment around Argyll & Bute is a natural carbon sink, taking into consideration seabed and sediments, and blue carbon habitats (e.g. macroalgae, kelps, saltmarshes, seagrass, intertidal furoid species, calcifying organisms, phytoplankton). However, despite the capacity of natural marine habitats to sequester and store carbon in Argyll & Bute, the marine environment is largely without equivalent management and ownership models to those of the terrestrial environment.

The identification and location of priority natural assets to secure carbon stocks at risk

- **Terrestrial environment:** Terrestrial ecosystems in Argyll & Bute are important carbon stocks. The combined above and below ground carbon stocks from the terrestrial ecosystems in Argyll & Bute is estimated to be between 160-270 MtC or 587-989 MtCO_{2e}. Total soil carbon stocks in Argyll & Bute hold more than 10 times Scotland's annual GHG emissions. Actively eroding peatlands are particularly at risk and should be prioritised for targeted management intervention. While approximately half of the aboveground biomass is held within woodlands and forests, above ground biomass from other land cover class is not negligible, and may need to be more accurately estimated (current estimates place it in a range of 76.7-89.2 MtCO_{2e}).

- **Marine environment:** Sediment stores in Argyll & Bute are understood to account for 24% of the total UK seabed with organic carbon, whilst saltmarshes in Argyll & Bute hold 9% of Scotland's total carbon held in saltmarsh soils (top 10 cm). However, the importance of marine sediments as carbon stores is emphasised by the report along with the role of phytoplankton fixation of CO₂ and as the primary source of organic carbon exported to marine sediments.

Identification of drivers and trends in the demand for carbon trading

2.6 The WP1 element of the report acknowledges the role that terrestrial carbon sequestration activity under both public and private financing mechanisms can play in achieving Net Zero ambitions. However, it also acknowledges that current targets set by the UK and Scottish Governments for 2050 and 2045 respectively will need to be exceeded to deliver on 2032 emissions reductions on the road to Net Zero.

2.7 Within the marine environment, the report identifies that there is significant demand and opportunity for carbon trading based on blue carbon, however "there are also significant risks and technical difficulties in the direct translation of the terrestrial market to the marine environment".

Overall WP1 outputs

2.8 The outputs from the WP1 work are clearly in line with the initial scope of the work. The authors have brought considerable insight and understanding to bear in their analysis, in both the terrestrial and the marine environment. The distinction between the two is appropriate given the different ownership and management issues, and the difference states of maturity in terms of markets for Carbon sequestration.

2.9 Indeed, the WP1 report goes beyond the original terms of reference (in relation to quantification of potential stocks at risk summarised above in the outputs above), to include risks to carbon stocks under business-as-usual scenarios. This is useful additional analysis.

2.10 Undoubtedly, the research has been challenging and there are several instances where the authors have been required to make estimates based on current understanding and available data. There has not always been the detailed information available at the Argyll & Bute geographical area, or of sufficient detail to provide robust quantifications. However, assumptions (where required) have been clear, proxy measures appropriate and a clear explanation has been given with respect to any caveats to be considered.

2.11 The sheer scale of the required work has also presented a challenge, and whilst every attempt has been made to capture current carbon sequestration activity in Argyll & Bute has been made, there are areas of activity that may have been missed, or underplayed. One such area is current grassland management undertaken by the farming community, where certain carbon sequestration activities are being undertaken. However, it was very much anticipated that future Work Packages would build on the initial baseline analysis carried out for WP1.

2.12 Overall, challenges in delivery, and any variations in the scope (which have been very minor, and additional rather than deductive), means there have been no negative consequences on the overall project. The only issue perhaps has been the time taken to prepare the report, and the subsequent impact on the timing for other Work Packages. Ideally there would have been a greater amount of time to digest the findings from WP1 in order reflect on these to further shape the later Work Packages.

3 WORK PACKAGE 2: ESTABLISHING AN EXTERNAL STAKEHOLDER GROUP

Summary

- Work Package 2 related to the provision of scoping and background research on the establishment of a steering group led by HIE to engage with local stakeholders.
- The establishment of an External Stakeholder Group (ESG) was agreed early on in the project's delivery, and the terms of reference reviewed and agreed in the first meeting of the ESG in January 2022.
- ESG meetings have since been held monthly during the lifespan of the project. ESG members were updated on each Work Package at each meeting, and advised on priorities accordingly.
- The ESG has been an exceptionally important part of the project, with members giving advice from a range of different institutional perspectives, sharing knowledge and concerns from different cohorts and groups interested in the project.
- The workshop meeting on 4th October 2022 was built around the ESG model and principles of engagement, and then expanded to wider stakeholders and interested parties identified over the course of the project.
- Given the perceived success of the ESG, stakeholders consider that the model of stakeholder engagement taken through delivery of Work Package 2 is a recommended approach to consultation and engagement for similar projects going forward.

3.1 This chapter sets out the review of Work Package 2: Establishment of an External Stakeholder Group (ESG) to act as a steering group for the *Optimising Carbon Sequestration* project (WP2). The outcomes of the Work Package are considered against the original scope and intended outputs. Observations on any difference between these are provided.

BRIEF AND SCOPE OF REQUIREMENTS

3.2 The aim of WP2 was to establish a steering group which will be constituted by public, private and community stakeholders. The intended aim of the ESG was to engage wider industry and community stakeholders across Argyll & Bute, encourage collaboration, and help to identify a variety of carbon sequestration opportunities in Argyll & Bute.

3.3 The ESG was also intended to oversee and provide direction and expert guidance to the *Optimising Carbon Sequestration* project. It was also intended that the ESG would contribute to promotion and awareness of the project, maximise stakeholder benefits from the project and act as a champion for the project with outside organisations and partners. Its specific objectives with regard to stakeholder engagement are as follows:

The establishment of the ESG was also expected to help embed community wealth building in future carbon sequestration activities through clear, area-wide direction and collaboration on opportunities for carbon sequestration.

PLANNED OUTPUTS

3.4 The planned outputs of WP2 were the establishment of the ESG, and a programme of monthly meetings to oversee project delivery and advise the HIE project team and internal working group responsible for delivery of the *Optimising Carbon Sequestration* project.

WORK PACKAGE OUTCOMES AND OBSERVATIONS ON DELIVERY

3.5 The establishment of the ESG was agreed early on in the project's delivery, and the terms of reference reviewed and agreed in the first meeting of the ESG in January 2022. ESG have since been held monthly during the lifespan of the project. Minutes of each meeting were taken and circulated for the ESG to review. Changes to the delivery timeframe (e.g. originally over a longer timeframe, then truncated to June 2022, before being extended to October 2022) has not disrupted engagement or enthusiasm from ESG members.

3.6 The ESG membership comprises:

- Argyll & Bute Council
- Argyll and the Isles Coast and Countryside Trust (ACT)
- Crown Estate Scotland
- Environmental Research Institute (ERI)
- Highlands and Islands Enterprise
- Imani Development (Project Managers)
- NatureScot
- NFU Scotland
- SAMS
- Scottish Environment Protection Agency (SEPA)
- Scottish Forestry
- Scottish Government
- SRUC

3.7 Throughout the programme of meetings, ESG members were updated on each Work Package, and advised on priorities accordingly. This was essential in some instances, for example Scottish Forestry advising on the Woodland Carbon Code, where there was very direct relevance to carbon sequestration approaches being considered under the project.

3.8 Where further technical input was needed, experts and external organisations were invited to contribute, including an expert on peatland, Roxane Andersen of the Environmental Research Institute (ERI) at North Highland College UHI. WP implementers also attended meetings and contributed as appropriate.

3.9 The ESG has been an exceptionally important part of the project, giving advice from different institutional perspectives, sharing knowledge and concerns from different cohorts and interested groups. Value was found in both the shared priorities of ESG members, and the technical knowledge sharing that the ESG enabled.

3.10 The ESG has had direct relevance in who constituted beneficiaries of the work. Through project delivery, it became clear that community wealth building is much broader than community ownership and required a wider capture of interests including farming and other rural sectors.

3.11 Despite there being a diverse range of views (e.g. some organisations seeing the whole subject of carbon sequestration as a potential threat to their members' interests, or potentially clashing with or duplicating their remit), these issues were tackled very positively and constructively through the forum that the ESG provided. Consequently, issues and challenges have been explored in detail, with ESG members able to fully engage with the different dimensions of each problem.

3.12 The pivotal project review meeting on 4th October 2022 (under WP7.1) was built around the ESG model of engagement, and then expanded to wider stakeholders and interested parties identified over the course of the project.

3.13 Given the perceived success of the ESG, stakeholders consider that the model of stakeholder engagement taken through delivery of WP2 is a recommended approach to consultation and engagement for similar projects. However, it is noted that it must be done in an open and collaborative manner, as has been achieved here.

4 WORK PACKAGE 3: ESTABLISHING OPPORTUNITIES

Summary

- Work Package 3 involved the scoping, background research and an expert review required to establish the viable opportunities for future carbon sequestration, in the region, from land and marine based resources.
- The report, delivered by SAMS as part of their role in delivering Work Packages 1 and 3, identified the range of terrestrial and marine resources that can sequester carbon, and whether or not there are established management mechanisms or investment vehicles to drive growth in sequestration.
- The Peatland Code and the Woodland Code are cited in the report as codes that help establish carbon sequestration. In peatland, areas where there can be improvements to the quality of peat (where degraded, peat releases carbon) stocks and in forestry, areas that could be used to plant woodland that can sequester carbon are set out in the report.
- For marine resources, it was found that there is less clarity as to whether human activity can enhance carbon sequestration. It is noted that seaweed is a large carbon stock, and that phytoplankton in Argyll & Bute's seas contain even vaster carbon stocks.
- However, there is currently no codes akin to the Peatland Code and the Woodland Code to be applied to marine resources, and it is currently uncertain as to whether human activity can improve these resources' ability to "lock in" carbon.
- Certain 'sweet spots' have been identified, where it is relatively viable to get good carbon outcomes at low cost or low sacrifice of land – for example degraded peat to well managed peatland or through engaging in silvopasture practices on grassland.

INTRODUCTION

4.1 This chapter sets out the review of Work Package 3: Establishment of technically viable opportunities. The reporting and outcomes of the Work Package are considered against the original scope and intended outputs. Observations on any difference between these are provided.

BRIEF AND SCOPE OF REQUIREMENTS

4.2 The aim of WP3 was to provide an expert review of technically feasible carbon sequestration opportunities in Argyll & Bute, building on the assessment of natural capital in Argyll & Bute, and in line with the Woodland Carbon Code and Peatland Code. Specific WP3 objectives include:

- Assessment of the viability of short-term, immediate opportunities within the existing Woodland and Peatland Carbon Codes;
- Examination of the plausibility of medium and long-term options for carbon sequestration, where data needs to be gathered or processes established, e.g. soil and marine;
- Evaluation of existing codes in line with stakeholder objectives.
- Establishment of principles for the government facilitation of carbon trading, realising community opportunities, and improving existing carbon codes.

4.3 Alongside an initial assessment of the technical viability of identified opportunities, WP3 aimed to prepare approaches for the development of soil and marine codes for carbon sequestration to be considered, and their credibility assessed, along with any potential constraints. Based on this, WP3 aims to make recommendations to guide developers through WP5 and WP6 outputs.

PLANNED OUTPUTS

4.4 WP3's intended outputs include a comprehensive and detailed report identifying and prioritising current carbon trading opportunities within the existing Woodland and Peatland Carbon Code trading systems. It was also anticipated that the report will identify future opportunities for trading codes in ecosystems including terrestrial, marine, freshwater, estuarine and agricultural systems.

WORK PACKAGE OUTCOMES AND OBSERVATIONS ON DELIVERY

4.5 The report delivered by SAMS combined the outputs from both WP1 and WP3. The report is essentially delivered in two parts – the outputs relevant to WP3 are contained in Chapter 3 of the report, summarised below.

Terrestrial environment

4.6 The report identifies opportunities through existing mechanisms such as the Woodland and Peatland Carbon Codes, Peatland ACTION, Agri-Environment Climate Scheme (AECS), Forestry Grant Scheme, Small Woodland Loan Scheme and Future Woodlands Trust. There has also been an identified uptake within the Woodland and Peatland Carbon Codes in Argyll & Bute. However, a number of barriers currently prevent more rapid or widespread uptake of some schemes. These include:

- Information asymmetry and a lack of understanding of carbon trading and carbon financing;
- Lack of skilled contractors across peatland restoration and forestry management;
- Cashflow challenges arising from the need for upfront capital;
- Matching demand with low supply;
- Difficulties around sequestration in small areas; and
- Lack of tree nurseries to supply

4.7 Further additional challenges are identified in relation to social perceptions (the so-called Green Laird), crofting and caution around the sale of carbon rights.

Marine environment

4.8 In relation to the marine environment, the range of outcomes is more limited, due to insufficient scientific understanding, technical capability for measurement, and a lack of bespoke framework for verification. However, the report recognises that there is potential value in taking a less market-oriented approach to securing environment services by allowing “the application of other frameworks to value the climate adaption or mitigation goods and services that these operations deliver”.

Market development and implementation strategy

4.9 Market development for the terrestrial sector considers community ownership, community wealth building, blended ownership models and the potential for an Argyll & Bute Community Wealth Fund. In terms of an implementation strategy, the outcome of the work was to suggest two pilot projects relating to woodland expansion and peatland restoration, which informed the scope of WP6.

4.10 Regarding the marine environment, the report acknowledges the complexity of marine classifications, as well as the extent to which the development of marine blue carbon markets lags the terrestrial environment equivalent. Consequently, the next step is to develop a series of codes equivalent to the Woodland and Peatland Carbon Codes (e.g. the UK Saltmarsh Code the start of this process).

Identification of needs and opportunities for additional trading codes

4.11 For the terrestrial environment, the work highlights the ongoing work around the development of a Hedgerow Carbon Code and a UK Farm Soil Carbon Code. However, that to avoid the potential multiplication of codes, the report recommends:

- Supports education or knowledge exchange programmes enabling landowners, farmers, land managing organisations to make informed decisions about which, if any of these options they should engage with;
- Considers a unified framework for applications where multiple projects under different codes could be possible; and
- Provides guiding principles around ethical carbon offsetting.

4.12 In relation to public and private sector funding, it is also recommended that Government considers investing in advisory roles for the development of applications for marketable carbon mirroring e.g. the Peatland ACTION project officer roles, on the basis that proportionally small investments in people on the ground working with landowners could unlock much larger investment from the private sector.

4.13 Finally, in relation to intact natural assets, it is recommended that Government:

- Uses the opportunity around development of new agri-environment schemes to consider mechanisms to support financial rewards for landowners and land managers who already manage their carbon-rich land sustainably; and
- Ensures that policy incentive for intervention associated with targets do not undermine existing carbon stocks with negative outcomes for climate.

Overall WP3 outputs

4.14 The outcomes of WP3 are in line with the original scope of the brief. It should be noted that the scope of requirements for WP3 were very ambitious, particularly within the timescales available, and so some parts of the original brief are touched upon in the WP3 report, rather than providing a very detailed analysis.

4.15 For example, whilst short, medium and longer-term options for current and future trading opportunities are identified in the report, the more detailed requirements (e.g. medium term options where data needs to be collected or generated) are included, but not to any very great extent. Similarly, the requirement for “recommendations on community action required to unlock future supply opportunities” is lightly referenced, as are “opportunities to increase the scale, where possible identify land ownership”.

4.16 As the report details, many issues are extremely complex (such as land ownership, detailed land uses, data availability), with significant interdependency. There are also clear challenges with respect to the lack of maturity in carbon trading markets (there really is no blue carbon trading market in place at present), and the need for stimulating of the market and significant further market development in relation to the terrestrial carbon trading.

4.17 The challenges – in terms of breadth of scope and ambition under WP3 – have meant many of the recommendations relate to further work and next steps, particularly in relation to government intervention in the market. As the WP3 report makes clear, considerable further work is required in order to capitalise on the potential in Argyll & Bute, and across a number of fronts.

4.18 In turn, this means that whilst two specific pilot projects were identified as an output of WP3 (firstly, the expansion of woodland on farmland and second, the restoration of peatland on Islay), a considerable lead-in time was likely to be required to work up and develop the pilot projects. The lack of maturity (even in the terrestrial carbon trading market) and issues such as the challenges of expanding woodland on farmland in many Argyll & Bute locations (hill farms in particular) and challenges around multiple interests (communities, landowners etc. in Islay) meant that the outcomes from subsequent Work Packages (notably WP6) was always likely to be ambitious within the timeframes available to the overall project.

5 WORK PACKAGE 4: ECONOMIC IMPACT

Summary

- Work Package 4 related to the exploring the potential realisation of carbon sequestration capacity in Argyll, as well as documenting the economic, social and environmental impact that can be achieved in Argyll & Bute.
- Outputs relating to this Work Package, delivered by ekosgen, were in the form of two reports.
- The first report drew on the findings of WP1 and WP3 regarding the carbon sequestration opportunities in Argyll & Bute, in order to quantify the economic opportunities and subsequent impacts of pursuing carbon sequestration.
- Based on the findings of the desk research for this report, a set of metrics for economic impact was developed. These comprised carbon units per hectare for different sequestration activity, carbon unit prices and likely take-up rates, and employment that could be supported by sequestration.
- The second report built on the findings of the first report outputs, as well as the business modelling work carried out in WP5, to develop and articulate a range of scenarios for carbon sequestration activity in Argyll & Bute.
- In total, seven scenarios were modelled, with a range of take-up rates and carbon prices considered. The scenarios presented impacts in terms of carbon revenue generated, job creation, along with observations on potential community, social and environmental impacts.
- The illustrative nature of the scenarios means that focus of impacts is on revenue and job creation, rather than considering multipliers and GVA at this stage. It is hoped that the “ideal” scenarios created as a result of this Work Package (and indeed, all other Work Packages) can be used to refine and create more complex scenarios in future.

INTRODUCTION

5.1 This chapter sets out the review of Work Package 4.1: Economic Impact (WP4.1). The reporting and outcomes of the Work Package are considered against the original scope and intended outputs. Observations on any difference between these are provided.

BRIEF AND SCOPE OF REQUIREMENTS

5.2 What does the brief or terms of reference say is the aim of the work package?

5.3 The aim of WP4.1 is to understand, map out and quantify the value of Argyll & Bute’s carbon sequestration capacity. To achieve this, the Work Package consists of research into the potential realisation of this capacity, and the economic, social and environmental impact that can be achieved in Argyll & Bute. This involves the collation and analysis of secondary research outputs, strategy documents and wider data and literature to establish a socio-economic baseline, and the basis on which the potential economic impacts are calculated. This data is required to be able to inform the socio-economic assessment, and develop the subsequent scenarios.

5.4 The carbon sequestration opportunity in Argyll & Bute and Scotland more widely is one that is attracting increasing interest, and this Work Package is a part of a wider attempt by HIE to quantify the potential carbon markets. By creating an evidence base, it gives HIE a strategy and methodology from which carbon sequestration can be sustainably managed and its benefits maximised.

5.5 Upon completion of the work package, a prospectus will be created to act as a leading document for future carbon sequestration activity in Argyll & Bute (WP4.2). Alongside the body of research

generated by the *Optimising Carbon Sequestration* project, this prospectus will be used to stimulate the local carbon sequestration market in Argyll & Bute, showcase the ways in which organisations are engaging and can engage with carbon sequestration.

5.6 How do the aims and objectives relate to the programme of work being delivered by Highlands and Islands Enterprise (i.e. the research programme supporting the Carbon Sequestration project), and to the Carbon Sequestration project as a whole (which is being delivered by Argyll & Bute Council)?

PLANNED OUTPUTS

5.7 WP4.1's intended outputs are the creation of two reports. The first report was to draw on the findings of WP1 and WP3 regarding the carbon sequestration opportunities in Argyll & Bute, to quantify the economic opportunities and subsequent impacts of pursuing carbon sequestration. Where possible the report was to present impacts in terms of employment, GVA, social value and employment over a 10-year period.

5.8 The second report WP4.1 was to draw on the first report's outputs as well as the business modelling work carried out in WP5. Its purpose was to develop and articulate a range of scenarios for carbon sequestration activity in Argyll & Bute.

WORK PACKAGE OUTCOMES AND OBSERVATIONS ON DELIVERY

5.9 The WP4 Economic Impact report has provided an overview of the socio-economic impacts likely to arise from carbon sequestration activities. The report focuses on impacts that could be realised under three different carbon sequestration approaches, specifically peatland restoration, forestation, and silvopasture.

5.10 To achieve this, the study drew on a desk review of secondary sources, research studies and available data regarding carbon sequestration and existing assets in Argyll & Bute. Based on the findings of the desk research, a set of metrics for economic impact was developed. These comprised carbon units per hectare for different sequestration activity, carbon unit prices and likely take-up rates, and employment that could be supported by sequestration.

5.11 Based on these metrics, a series of illustrative scenarios were developed to demonstrate the potential impacts arising from different carbon sequestration approaches, and at different scales. These scenarios, along with the metrics underpinning them, were tested with stakeholders including HIE, NatureScot and Scottish Forestry. Following feedback, the scenarios were revised to incorporate adjustments to carbon unit prices in higher-value carbon price scenarios, and to demonstrate the impact of an integrated approach.

5.12 In total, seven scenarios were modelled, with a range of take-up rates and carbon prices considered. Existing requirements on buffers and discounting for the Woodland and Peatland Carbon Codes to arrive at net sequestration rates were incorporated. Each scenario was considered under 'optimal' conditions for illustration – that is, no assumptions were made on:

- The degree of public sector intervention (neutral position assumed);
- Any ongoing cost of validation, verification and monitoring;
- Location of land for sequestration, or the configuration of any sequestration activity;
- The impact of environmental factors, e.g. soil type, on carbon sequestration rates; and
- The impact of structural economic conditions in Argyll & Bute.

Developed scenarios

5.13 The scenarios presented impacts in terms of carbon revenue generated, job creation, along with observations on potential community, social and environmental impacts. Four 'base' scenarios and

three 'enhanced' scenarios were developed. The base scenarios illustrate the impact of different carbon sequestration approaches under current market carbon prices (Table 4.1).

Table 4.1: Base carbon sequestration scenarios

Peatland restoration	Conifer forestation	Native woodland forestation	Silvopasture
<ul style="list-style-type: none"> 10% of degraded peatland in Argyll & Bute assumed to be restored, @ 90% rewetting and 10% revegetation Peatland carbon unit price of c.\$15 (£12.50) assumed c.4,950 hectares @ 200 units per hectare Carbon credit revenue: £8.7 million Job creation: up to 10 FTE¹ per annum for restoration work Net balance²: -£1.7m 	<ul style="list-style-type: none"> Assumes 10% of agricultural land set aside for forestation, with productive conifer planted at 2,500 trees per hectare Forestation carbon unit price of c.\$18 (£15) assumed c.51,000 ha @ 200 units per hectare Carbon credit revenue: £91.6 million Job creation: <ul style="list-style-type: none"> Set-up planting: up to 370 FTE per annum Operational: 1,000 FTE Net balance: -£86.5m 	<ul style="list-style-type: none"> Assumes 15% of agricultural land set aside for forestation, with native woodland planted at 1,600 trees per hectare Uplift on Scenario 2 uptake to reflect increased attractiveness of biodiversity gains Forestation carbon unit price of \$20 (£17) assumed c.76,300 ha @ 400 units per hectare Carbon credit revenue: £311.6 million Job creation: <ul style="list-style-type: none"> Set-up planting: up to 720 FTE per annum Operational: 1,600 FTE Net balance: -£200.1m 	<ul style="list-style-type: none"> Assumes 10% of agricultural land set aside for forestation, with native woodland planted at 400 trees per hectare Forestation carbon unit price of \$15 (£12.50) assumed c.17,400 ha @ 125 units per hectare Carbon credit revenue: £16.3 million Job creation: <ul style="list-style-type: none"> Set-up planting: 120 FTE per annum Operational: 1,700 FTE Net balance: -£9.8m

5.14 Building on the base scenarios, the enhanced scenarios demonstrate the impact of higher carbon prices, and greater levels of uptake across different sequestration approaches, as well as the impact of combined approaches.

Table 4.2: Enhanced carbon sequestration scenarios

Higher carbon unit price forestation	High carbon unit price forestation and silvopasture	Very high carbon value integrated carbon sequestration
<ul style="list-style-type: none"> Assumes 20% of agricultural land set aside for forestation, with native woodland planted at 1,600 trees per hectare Higher forestation carbon unit price of \$40 (£34) assumed c.102,000 ha @ 400 units per hectare Carbon credit revenue: £830.9 million Job creation: <ul style="list-style-type: none"> Set-up planting: 960 FTE per annum Operational: 2,100 FTE Net balance: +£148.7m 	<ul style="list-style-type: none"> Assumes: <ul style="list-style-type: none"> 25% of agricultural land set aside for forestation with higher value native woodland planted at 1,600 trees per hectare 20% of grassland/pasture converted to silvopasture, with moderately higher value native woodland planting at 400 trees per hectare Considerably higher carbon unit prices assumed <ul style="list-style-type: none"> Forestation carbon unit of c.\$60 (£50) Silvopasture carbon unit of c.\$30 (£25) c.127,300 ha @ 400 units per hectare, and c.34,800 ha @ 100 units per hectare Carbon credit revenue: £1,579.6 million Job creation: <ul style="list-style-type: none"> Set-up planting: 1,450 FTE per annum Operational: 6,100 FTE Net balance: +£674.6m 	<ul style="list-style-type: none"> Assumes: <ul style="list-style-type: none"> 30% of agricultural land set aside for forestation with higher value native woodland planted at 1,600 trees per hectare 25% of grassland/pasture converted to silvopasture, with moderately higher value native woodland planting at 400 trees per hectare Significantly higher carbon unit prices assumed <ul style="list-style-type: none"> Forestation carbon unit of c.\$100 (£85) Silvopasture carbon unit of c.\$40 (£35) Peatland carbon price of \$30 (£25) assumed c.152,700 ha @ 400 units per hectare, and c.43,500 ha @ 100 units per hectare Carbon credit revenue: £3,241.9 million Job creation: <ul style="list-style-type: none"> Set-up planting: up to 1,770 FTE per annum Operational: 7,500 FTE Net balance: +£2,132.5m

¹ Set-up and restoration work expressed on FTE basis after conversion from FTE job years

² Carbon revenue less set-up costs. Excludes annual operational costs, and any potential grant funding for set-up and operation.

5.15 However, the WP4 report also acknowledges the wide range of dependencies, considerations and other issues that will impact on the implementation of carbon sequestration activity in Argyll & Bute. This includes the impact of local economic capacity and structural economic barriers evident in the area, which will undoubtedly affect the extent to which potential impacts can be realised.

5.16 Drawing on the potential impacts and dependencies, the report also draws initial conclusions and recommendations to inform discussion of findings during the WP7.1 workshop. The findings of the WP4 report are arguably the more strategic of the project's outputs, and inform the project's overall conclusions and recommendations, as set out in Chapter 9.

Overall WP4 outputs

5.17 The main variance from the original scope of work was the production of a single report, rather than two reports. This was for ease of reporting and streamlining of outputs.

5.18 Second, due to issues of timings, the WP4.1 report did not draw as extensively on WP5 outputs as intended. This meant that the scenarios focused solely on the likely scale of impacts from carbon credit revenues, and sequestration in the case of additional community/social and environmental impact.

5.19 The illustrative nature of the scenarios means that focus of impacts is on revenue and job creation, rather than considering multipliers and GVA at this stage. This is a function of the metrics used, and the way in which these 'ideal' scenarios have been constructed. Nevertheless, the outputs from across all work packages can be used to refine and create more complex scenarios in future.

5.20 Stakeholder engagement to validate and feedback on the scenarios presented in the WP4.1 report was achieved. However, securing stakeholder input was challenging.

5.21 WP4 nevertheless provides a solid baseline of information and presents the maximum realisable impact to inform ongoing discussions around carbon sequestration activity in Argyll & Bute. It also provides policy makers with a clear indication of the potential impact of carbon sequestration activity, along with a set of dependencies and additional considerations, which must be taken into account. It also provides landowners with an illustration of possible revenue streams (such as increasing leisure and tourism opportunities with botanical and/or wildlife tours) and benefits (such as improved biodiversity, water quality and sheltering for livestock), but also highlights other issues that must be considered in weighing up whether to pursue carbon sequestration activities, such as the requirement for more stringent additionality testing to secure carbon financing if deciding to engage in thinning or felling for timber.

6 WORK PACKAGE 5: BUSINESS MODELLING

Summary

- Work Package 5 focused on the development of a proof-of-concept business model to inform landowner decision-making with regard to engaging in carbon sequestration activity and meeting growing market demand for carbon credits.
- Delivered by Azets, the outputs focused on the three sequestration approaches of forestation, peatland restoration and silvopasture, and developed scenarios for individual farms, farm enterprises (clusters or groupings of farms) and a facilitation agency.
- The modelling demonstrated that all three carbon sequestration approaches result in long payback timeframes, between 15-25 years.
- Mechanisms such as adopting a higher price for carbon, a higher degree of public interest to unlock supply of land for carbon sequestration, and grant support for private enterprises have potential to reduce payback timeframes.
- Inclusion of a shadow price for carbon can positively impact payback timescales for investment, and cumulative profit over a long-term period.

INTRODUCTION

6.1 This chapter sets out the review of Work Package 5: Business modelling for carbon sequestration across Argyll & Bute (WP5). The reporting and outcomes of the Work Package are considered against the original scope and intended outputs. Observations on any difference between these are provided.

BRIEF AND SCOPE OF REQUIREMENTS

6.2 The aim of WP5 was the development of a proof-of-concept business model, which is intended to enable landowners to understand and then potentially meet market demand for carbon sequestration.

6.3 The business model should develop three separate scenarios or example opportunities in Argyll & Bute. These were intended to highlight the nature of the carbon supply and then how this opportunity can be supported through supply, demand and transaction mechanisms. The creation of business models that can be seen to be feasible within the Argyll & Bute context helps to develop the carbon sequestration opportunity. Additionally, it was anticipated that this will also incorporate the wider economy and land management landscape of Argyll & Bute, highlighting how different industries and services would potentially interact with this carbon sequestration opportunities.

6.4 Through the required business modelling, WP5 had four specific objectives:

- Business modelling to provide a vision for carbon trading within the rural Argyll & Bute economy, demonstrating plausible carbon supply chains and building on the work prepared under WP1 and WP3.
- Assessment of the natural capital potential with regard to carbon trading for enterprises, modelling potential returns for enterprises.
- Undertake an assessment of the human capital potential, articulating and quantifying enterprises that could engage with carbon trading, and direct and indirect beneficiaries within the supply chain for the required land management practice.
- Provide an assessment of the social capital potential in Argyll & Bute in relation to carbon trading, providing insight on the capacity of communities to engage in carbon trades, and the likely uptake by landowners to engage with carbon trading opportunities. As part of this, it was also intended to provide a comparison of ownership funding models in terms of social objectives, e.g. community wealth building.

PLANNED OUTPUTS

6.5 The intended output was the creation of a business model that incorporated three different scenarios. This business model and its scenarios would therefore allow landowners to arrive at an informed decision regarding entering the market for carbon sequestration and carbon trading. These models were to demonstrate the economic feasibility of carbon sequestration opportunities from a landowner or enterprise perspective.

WORK PACKAGE OUTCOMES AND OBSERVATIONS ON DELIVERY

6.6 The output of WP5 is a proof-of-concept business model that demonstrates three core carbon sequestration scenarios, focusing on the approaches of forestation, peatland restoration and silvopasture. The scenarios covered:

- **Individual farm:** Modelling potential income and expenditure associated with carbon sequestration under an individual farm model of up to 50 Hectares;
- **Farm enterprise:** Examining the potential income and expenditure associated with carbon sequestration under a farm enterprise model (or cluster of farms) of up to 500 Hectares; and
- **Facilitation agency:** Considering the potential income and expenditure associated with a facilitation agency model, whereby the agency is responsible for the verification, validation and other costs in return for a percentage of the farmers carbon credit income.

6.7 The modelling demonstrates that all three carbon sequestration approaches result in long payback timeframes, between 15-25 years. Some mechanisms have potential to reduce payback timeframes, including a higher price for carbon, a higher degree of public interest to unlock supply of land for carbon sequestration, and a private interest premium (grants to offset sunk costs, in order to bring payback timeframes forward).

6.8 Importantly, the modelling highlights that a facilitation agency to assist individual farmers and farm enterprises with the administration and some of the initial costs of starting up carbon sequestration, and in turn help increase the supply, would be significantly loss-making. Without any public or private support, a facilitation agency would not break even until Year 27.

6.9 Inclusion of a shadow price for social value has a minimal impact on outlays for individual farm or farm enterprise business models, but sees a reduction (or at least maintenance) of payback period, and a positive impact on cumulative profit. It is worth noting, though, that social value impact would not be seen as a direct or tangible benefit to individual farmers. However, inclusion of social value in modelling for a facilitation agency, where understanding the impact of wider social and environmental value benefits is critical, reduces the maximum outlay required for set-up, and positively impacts on payback period (reducing from 27 years to 24) and cumulative profit over a 30-year period.

6.10 Overall, the WP5 outputs were in line with the scope of works, and the modelling template developed with the wider project management team, though reporting conclusions were high level. Nevertheless, WP5 delivered a detailed proof-of-concept business model with significant levels of detail regarding cost lines and income streams, etc. As such, WP5 represents a well-defined and potentially high-value output.

6.11 The model thus provides considerable opportunity for further exploration of the potential market and socio-economic value of carbon sequestration activities. This is a sound basis on which crucial discussions around the business viability and public interest delivery of carbon sequestration can now be had.

6.12 It was evident from the stakeholder workshop held on 4th October 2022 that landowners and community trusts must have such business modelling support from a formal source (e.g. facilitation agency), and in turn that agency must be shown to have a viable business model for its delivery.

7 WORK PACKAGE 6: IMPLEMENTATION PLANS

Summary

- Work Package 6 aimed to develop three pilot implementation plans to guide carbon sequestration activity in Argyll & Bute.
- The implementation plans are focused on: carbon market facilitation; landowner carbon sequestration management; and integrated community carbon management.
- There is significant distance between stakeholders, landowners and communities in terms of carbon sequestration. As such, there is a gap to carbon sequestration and trading readiness.
- The implementation plans will therefore set out suggested ways in which the intended pilots can be taken forward, covering key considerations for stakeholders, landowners and communities thinking about carbon sequestration activity.

INTRODUCTION

7.1 This chapter sets out the review of Work Package 6: Investment Plans (WP6). The reporting and outcomes of the Work Package are considered against the original scope and intended outputs. Observations on any difference between these are provided.

BRIEF AND SCOPE OF REQUIREMENTS

7.2 The aim of WP6 is the development and delivery of implementation plans for the three pilot projects identified based on the findings of WP4 and WP5. These plans are to be developed iteratively, providing opportunities for assessment and revision as the wider *Optimising Carbon Sequestration* project progresses.

7.3 It was anticipated that the outputs of WP6 will provide guidance on shaping the response of public sector organisations, as well as informing the steps to be taken by landowners and communities to take advantage of carbon sequestration opportunities that suit their needs.

7.4 In creating specific and relevant guidance for the implementation of carbon sequestration activity in the area, WP6 and its three pilot projects aim to match specific organisations and groups to opportunities to the most relevant carbon sequestration strategies. The pilot projects are:

- **Public sector carbon facilitation support:** Including an exploration what support currently is available to those looking to develop carbon sequestration activities in Scotland, what additional support is needed, and potential options for delivery of such support. This would draw on national and international case studies to inform potential options, and provide recommendations on the nature and scale of support required, and the ways in which HIE and strategic partners could act to support the development of carbon trading in the area;
- **Landowner carbon farming (sequestration) plan for individual landowners or farms (enterprise level):** This plan would explore the opportunities, costs and revenue potential for individual landowner enterprises or small clusters of enterprises of participation in the carbon market. This plan would establish the parameters for landowner carbon sequestration projects, and co-develop the process for establishing carbon sequestration projects; and
- **An integrated carbon management plan for sequestration in a community (community / local economy level):** Including demonstration of how a local socio-economic entity (such as an island community, well defined landscape, or grouping around a private or public sector interest) can achieve its goals in the carbon market. This plan would consider a suite of implementable scenarios, including the incorporation of added value activities (i.e. stacking of benefits). It was originally envisaged that Islay would be the focus of this pilot.

PLANNED OUTPUTS

7.5 The intended primary outputs of this Work Package are the three implementation plans detailed above. Alongside these, a brief statement on the readiness to implement the three respective carbon sequestration work programmes was required. For each implementation plan, a working group would be required to be identified to take identified actions forward.

7.6 Importantly, the implementation plans will be informed by the outputs of the previous work packages – and in particular, WP3, WP4 and WP5.

WORK PACKAGE OUTCOMES AND OBSERVATIONS ON DELIVERY

7.7 As the delivery of WP6 and other work packages of the wider Optimising Carbon Sequestration project has progressed, it has become clear that there is considerable distance between stakeholders, landowners and communities in terms of their thinking regarding carbon sequestration. There is a considerable degree of information asymmetry. This particular market failure was highlighted during the stakeholder workshop held on 4th October 2022 in Oban. As such, the scope for each implementation plan has been adjusted:

- **Public sector facilitation:** There is a need for a facilitation exercise to help bring together the supply side with the demand side, with a focus on social and economic objectives for Argyll & Bute communities. The focus of this implementation plan will therefore be much more short-term (focusing on the next 1-2 years), and will aim at stimulating active interest amongst the supply side of the carbon market, i.e. landowners in Argyll & Bute, as well as on the demand side, i.e. commercial organisations who may wish to purchase carbon credits and achieve net zero objectives.
- **Landowner carbon farming:** There is clear evidence that landowners in Argyll & Bute are not ready and in a position to undertake sequestration and carbon trading activities. There is a lack of understanding of the potential benefits from carbon farming, and a reluctance to engage with carbon sequestration, either based on perceptions (e.g. that it is not “for” typical landowners or farmers in Argyll & Bute, concerns that carbon farming is geared towards larger landowners, and that the Woodland Carbon Code is challenging and difficult to negotiate), or on previous experience of other land-use incentive schemes, such as the Agri-Environment Climate Scheme.
- **Integrated community carbon management:** Whilst the potential benefits of integrated carbon sequestration management are considerable, there is considerable evidence that communities in Argyll & Bute are not sufficiently prepared to undertake carbon farming activities. Significant development is work required, including information and practical support mechanisms, to help communities achieve carbon farming management that maximises use of local supply chains, generates community benefits and ensures community decision-making and control. Some communities (notably Islay) have all the right ingredients for successful integrated carbon management, whilst others need considerable intervention.

7.8 The implementation plans set out suggested ways in which the intended pilots can be taken forward. They cover key considerations for stakeholders, landowners and communities thinking about carbon sequestration activity, along with providing outline approaches for each, including a number of options for routes that can be pursued. They set out how agencies and intermediate support organisations can fill information gaps and provide appropriate support to suppliers.

7.9 Importantly, they draw on the discussion and outcomes of the workshop held on 4th October 2022.

8 COMPLETION PHASE

INTRODUCTION

8.1 In fulfilment of the project's suite of work packages, the following were also under completion during the preparation of this report:

WORK PACKAGE 7.1: READINESS EVALUATION

8.2 Undertaken by Ekosgen, this readiness evaluation was designed to maximise the benefit from taking a stock-take of work package outputs as a sense-making process, and to understand as fully as possible the status of all stakeholders identified through the project.

8.3 This report has been welcomed as fulfilling these objectives and informing future work as intended.

WORK PACKAGE 7.2: REPORT ON REQUIREMENTS FOR HIGHLANDS AND ISLANDS CARBON MARKET TURN-KEY FUNDING PLATFORM

8.4 Undertaken by Galbraith Group, this report sought to examine the requirements for supporting future implementation, exploring the modalities of support and what priorities should be given focus. The report has been completed on-time and reflects the depth of thought that and information has been prepared through the work packages, with both wide-ranging and focused recommendations. This has been in collaboration with Ekosgen in the preparation of this report.

WORK PACAKGE 4.2: INVESTMENT PROSPECTUS

8.5 What was envisaged as an investment prospectus for buyers in the design of the project has had to develop to reflect the requirements of the supply side, too. It is being prepared as key summary content for the project to transmit its findings. This has been in collaboration with Ekosgen in their preparation of and drafting of content for this report.

SECTION 2

Workshop findings

9 STAKEHOLDER WORKSHOP FINDINGS

INTRODUCTION

9.1 This chapter of the report features the key discussion points arising from stakeholders during conversations at HIE's Carbon Sequestration Workshop that took place at the Scottish Association for Marine Science campus in Dunbeg, Oban, on 4th October 2022.

9.2 The purposes of the workshop were to:

- Present the findings of each of the work packages relating to the Optimising Carbon Sequestration in Argyll & Bute project, and provide a stock take of how each of these work packages has progressed throughout the project;
- Understand the spectrum of interest from a wide range of stakeholders in carbon sequestration, to discover if stakeholders in the area are willing and prepared to engage in sequestration activity in Argyll & Bute; and
- Provide an opportunity for stakeholders to present their perspectives on carbon sequestration in Argyll & Bute in an open discussion to HIE, work package leaders, and the wider external stakeholder group for the project.

9.3 The stakeholders that were present came from a wide range of sectors and organisations, including: community trusts; landowners; private farmers; policymakers at both local and national levels; service suppliers; land use consultants; carbon brokers; and analysts.

9.4 It should be noted that the themes explored below are heavily interlinked with one another and should not be considered in isolation from one another, as discussion took place throughout the workshop, and every discussion point was considered from a holistic perspective.

KEY DISCUSSION POINTS

9.5 The following presents a summary of the key discussion points arising from the workshop:

- Argyll & Bute has high integrity land and must be used wisely and to maximum value;
- Apportioning what is best for different types of land use requires support;
- There is an opportunity for smart insetting vs offsetting, and stakeholders believe there is a premium for quality and provenance that A&B can capitalise on. Insetting may come to include 'local or community offsetting'. Carbon sequestration must be integrated with carbon reduction;
- A whole-economy and community wealth-building approach is strongly desired, beyond market forces. What works for community wealth-building needs more support and collaboration;
- Real and/or perceived trade-offs (winners and losers) in benefits realisation need work – there are upcoming policy choices (agricultural policies, carbon codes, community premium approaches under a carbon market facilitation agency) that could benefit all in most cases;
- Contracts and codes can be used but contracting could use some agency support to fully realise benefits;
- Cultural issues and the familiar economic dynamics of the Highlands and Islands economy must be considered in every decision; and
- Practical actions are clear – developing local support platforms, further piloting particularly with agricultural partners in local economic contexts.

Theme 1: Impact of geography and terrestrial environmental conditions on carbon sequestration

9.6 During the presentations regarding Economic Value and Natural Capital, it was documented that Argyll & Bute is well-placed to deliver sequestration activity. It emerged through the following discussion that Argyll & Bute has high integrity land, with the potential to bring significant further benefits such as improved biodiversity, that would be of value alongside sequestering carbon and that this land would be ideal areas of focus. This is distinct from high-quality land that is either already a carbon store and good at preventing emissions, or cannot store any significant additional carbon. This high integrity land aspect is explored further in the “Insetting vs Offsetting” theme below.

9.7 However, it was also stated that there is a high proportion of land in Argyll & Bute that is found on slopes. It was acknowledged that the ideal conditions for sequestration through forestry are found on flat land, and this is also the land that is best for grazing. Consequentially, there were concerns raised that the sequestration activity that would be delivered would displace agricultural activity and therefore farmers would lose out through the opportunity cost of planting trees on agricultural land. This is given further consideration in the “Cultural Issues” theme below.

9.8 As a result of this, it was noted that any framework that is designed for carbon sequestration needs to acknowledge and factor in the various ranges of activity on land, the range of land types available in Argyll & Bute and various other factors that influence the degree of carbon sequestration that is achievable or feasible in Argyll & Bute.

9.9 This aspect is particularly relevant for landowners that are looking to engage in silvopasture, in order to ensure the most optimum sequestration implementation model is adopted in each area, as opposed to applying blanket terms that may not necessarily work for each landowner and land type.

Theme 2: Insetting vs offsetting

9.10 There was a discussion around the terminology surrounding carbon offsets and insets. For the purposes of this workshop, offsetting was loosely defined as any sequestration activity that is delivered outside of an organisation’s region or externally from their operational activity. An example that was given was the sale of credits to large multinational companies (where the vast majority of their operations are delivered outside of Argyll & Bute) that purchase credits from an area in Argyll & Bute. By contrast, insetting was loosely defined as any sequestration activity that is in some way directly related to the landowner’s operations or operational area. An example that was given for this referred to business units within a landowner’s wider operations in Argyll & Bute purchasing the carbon credits, thereby internalising the sequestration activity to a company’s operational processes as a whole.

9.11 Given the high potential of the land available in Argyll & Bute to produce wider benefits such as improved biodiversity and to deliver opportunities for community engagement, it was posited that woodland carbon credits that are developed as a result of sequestration in Argyll & Bute could be promoted as a “premium” product to sell, as opposed to selling at the lowest feasible price.

9.12 Due to the high-end natural capital available in Argyll & Bute, it was suggested that certain stakeholders (specifically, local businesses) would take “pride” in sequestering carbon in Scotland, and Argyll & Bute in particular. It was therefore suggested, that if carbon credits from Argyll & Bute were offered at a premium price (given the higher than average quality land integrity), that local business owners should be given priority access to carbon credits created in Argyll & Bute. Businesses would then have first refusal, before being opened up to the wider carbon market.

9.13 This then led to discussion regarding the terminology of what exactly a “local” carbon market entails. Considering the operation of carbon markets is performed on an international level (with variations across national policy), clarity on locality was required. A loose definition for the purposes of this workshop was therefore provided, to mean any co-ordinated activities relating to carbon sequestration within a local catchment area. It was suggested that the workshop participants should first

consider local markets from the “micro” level of a single sheep farm’s actions in reducing net emissions, and then considering the ways in which to scale up this activity, their processes and consequently their carbon emissions reductions to the local community, then perhaps the council area, before considering it on a national or international scale.

9.14 It was also pointed out that, as a result of new standards, guidance and advice arising from Science Based Targets (SBTi) and the Greenhouse Gas Protocol, it is increasingly likely that landowners will be expected to inset rather than offset their emissions, delivering net emissions reductions onsite and keeping the carbon market as localised in this sense as possible.

Theme 3: Whole economy approach and community wealth building

9.15 There was a broad acknowledgement amongst all stakeholders that carbon sequestration, and by extension, emissions reduction, is only one factor when considering potential land use, and that there are other benefits that can be associated with activity that is intending to sequester carbon. This led to a discussion as to how best to articulate these other benefits. The largest focus of this discussion related to wider ecosystem services such as flood alleviation in peatland, increased natural capital or biodiversity gains as a result of reintroduction of native woodland. It was stated that there should be more work completed on articulating these benefits, and a broad consensus stating that the best way to articulate these benefits would be to find a way to monetise these other benefits in a similar nature to the sequestration activity’s respective code. One example of this given was the current development of biodiversity net gain (BNG) credits, arising from the UK Environment Act 2021.³ Alternatively, there was broad agreement that a site’s wider contributions to natural capital could justify a higher carbon price.

9.16 There was also discussion of the importance of considering the economy as a whole when developing any carbon sequestration activity and framing it within a low-carbon economy context as opposed to looking purely at the impacts on land use. Following the final presentation relating to developing a Carbon Sequestration Facilitation Agency Model, various models currently in operation were explored which factor in a whole-economy approach. This included the Landscape Enterprise Networks (LENs) model that has been adopted by Nestle in their UK and Ireland Sustainable Growth Agreement, with regards to activity in the South of Scotland.

9.17 The LENs model brings together private, public and third sectors within regional communities around shared interests which benefit the environment, communities and business. The emphasis is on identifying common interests and how best to make activity work for these interests, for the benefit of all involved.

9.18 Similarly, the Plan Vivo concept was also discussed. The Plan Vivo Foundation is a charity organisation that is focused on empowering communities to make best use of their resources, as they see fit. They do this through engaging with multiple participants and in multiple interventions, depending on the needs and priorities of the communities involved. Projects that are delivered by the Plan Vivo Foundation are held to the Plan Vivo Standard, ensuring that benefits are provided to both communities and the environment, as well as providing assurances to buyers of Plan Vivo certificates that emission reductions are real, additional and verifiable environmental benefits, as well as assurances that there are wider community benefits being realised as a result of the project.

9.19 Following discussions around community-based models, there was more generalised discussion on priorities for Community Wealth Building. Firstly, it was stated that there is a need for a shared understanding of Community wealth building as a concept, so that community benefits can be articulated and realised in a clear manner. It would therefore be prudent for Argyll & Bute Council to promote and clearly define their community wealth building policy more fully so that stakeholders are

³ The Environment Act 2021 makes provision for the Secretary of State to set up a system of statutory biodiversity credits that will be invested in habitat creation. The credits can be bought by developers as a last resort when onsite and local offsite provision of habitat cannot deliver the BNG required.

aware (and all know) what exactly and how the community benefits in Argyll & Bute are realised. This is further explored in the Benefits Realisation theme below.

9.20 Once all stakeholders are cognisant of Community Wealth Building as a concept, it was discussed that the next step should be to consider how to make carbon sequestration work for the communities. It was pointed out that sequestration activity will be most feasible and have the biggest impact in areas where there is a common interest. One example provided was the work undertaken in Glasgow City Council's Clyde Climate Forest project. This project has the ability to sequester carbon, but also contributes to flood alleviation, which then in turn impacts on various other sectors that are prominent in Glasgow, such as the insurance sector.

9.21 After discussion around the concept of Community Wealth Building and the various models that focus on realising community benefits, several potential areas of priority for community wealth building in Argyll & Bute were identified. These include retaining youth in the area through high quality employment (explored further in the "Cultural Issues" theme below), maintaining protected populations and industries, and giving consideration to the degree at which there is community or individual ownership for these projects in Argyll & Bute.

9.22 It was also stated that there is a need for carbon sequestration (and more generally, natural capital enhancement) projects to align with economic development policy at both local and national levels. Similarly, it was suggested that local authorities need to begin to look through the lens of natural capital when developing their economic development plans going forward.

Theme 4: Benefits realisation

9.23 Concerns were raised with regards to who is actually in receipt of the benefits attached to carbon sequestration, in instances where tenancy farmers would deliver the activity. The concern was that landowners (as proprietors of the land) would receive the benefits as opposed to the tenancy farmers. It was claimed that this activity would then minimise the farmers' agricultural yields without the tenancy farmer being in receipt of the benefits of sequestration activity.

9.24 To counter this, it was argued that the terminology around carbon credits is perhaps unhelpful, in that they are described in a way that is akin to a commodity of which there is ownership. Instead, it was suggested that credits should be considered as rather more like selling a claim about activity on the land and as such, the "owner" of the credit would be considered whoever completed this activity, whether that be the landowner or the tenant farmer.

9.25 If models that are developed are congruent to Community Wealth Building, then the model should be designed in a way that matches current and most relevant community interests. It was suggested that community benefits will be best realised if the proceeds from sales of carbon credits are handed over to pre-existing community development organisations, who would then be able to distribute this among the currently existing priorities within the community, as opposed to creating a new organisation with new priorities which would either duplicate the pre-existing communities' priorities, fail to capture the same priorities in the same way, or fail to prioritise them in the same manner as pre-existing community development organisations. Using these organisations would then ensure that the community benefits are realised in the most efficient manner, it was argued. This is further explored in the Organisational Mechanisms theme below.

Theme 5: Codes and contractual arrangements

9.26 With regards to the issue around quality of land, there was discussion around the potential of moorlands and grasslands in sequestering carbon. Based on empirical evidence of international carbon sequestration activity, there was an acknowledgement that while moorland may have more sequestration potential if the area is appropriately planned for and is well-maintained, it is currently the case that HIE and its Work Package Project Leads have been working within the remit of the pre-established Woodland Carbon Code and the Peatland Code, and that any activity delivered externally

from this carries a high strategic risk with no guarantees that tradeable carbon credits could arise from these in the near future.

9.27 It was, however, pointed out that the pre-existing codes do entail pre-established methods that could be applied in order to create a moorland or grassland code. This means that, while there would be a large amount of scoping work and valuation assessment needed for creating a carbon code relevant to moorland or grassland, the pre-established methods set out within the Peatland and Woodland Carbon Codes could be used as a base for methods outlined in any new codes. No new codes will be starting from scratch as a result, and therefore establishing new codes could be done comparatively quicker.

9.28 When considering implementing a new project, the resilience of the contractual model and implementation plan was called into question. With the legislative and economic conditions around peatland and forestation changing constantly with the inclusion of new mechanisms, updated guidance and range of opportunities to secure investment. It was pointed out that any models that are adopted in Argyll & Bute, and indeed elsewhere, should be cognisant of this and should be resilient to this changing funding landscape.

9.29 One proposed solution to this is the introduction of break clauses for contracts, which would enable either party in the contract to either change or revisit the conditions of the contract, or renege on the contractual agreement, subject to certain conditions. It was proposed that having a mechanism that would enable contracted parties to revisit the contracts over a certain time period, every 5 or 10 years for example, would be beneficial to both parties.

9.30 Another factor that was considered with regards to contracts was the nature by which they are designed. It was pointed out that bespoke contracts that are created by solicitors are developed individually for each project and as a result, each contract has its own set of unique clauses and factors designed into it. It was proposed that development of a standardised contract would be helpful, in that it would simplify the landscape and make it easier to understand for both buyers and sellers of carbon credits in what is at present still an encapsulated, nascent market. It was acknowledged that work is currently being undertaken with regards to this by a variety of legal professionals.

Theme 6: Cultural issues

9.31 Throughout the workshop, a range of various cultural issues were touched upon. The most prominent related to the models as they have been presented to farmers have only considered the situation from a purely business and financial perspective. As a result, other wider cultural issues (such as long-standing practices, ties to the land, financial necessity) and individual aspirations that farmers may have for the management of their land are not considered. These aspirations range from the impact sequestration activity may have on crop or pastoral animal choice, to having little enthusiasm to dramatically alter the purposes of the land being used.

9.32 It was proposed that further research and thinking into the cultural barriers to establishing a carbon sequestration project was required, in order to understand landowners' concerns and overcome these barriers, where possible. Post-workshop, the work of the Net Zero Farming in Oban project was explored; this is working with a small group of hill farmers in Argyll & Bute who have traditional hill farms but who are looking at ways in which they can better manage grassland to sequester carbon. This work of project is reflected in WP6 on Carbon Implementation Plans. In essence the project both acknowledges that many hill farmers are already positively managing their grassland to sequester carbon and also encourages new ways to sequester carbon within the confines of their particular hill farms (e.g. secure cattle grazing on upper slopes, planting along burns and modest tree planting where terrain and financial considerations in terms of any lost grazing land allows).

9.33 Concerns were also raised with regards to the role of government in sequestration activity. In particular, there were concerns that, from a landowner's perspective, the government is forcing sequestration upon them. It was raised that it felt as though farmers were being told that they have this

vast amount of land and as a result, they should be sequestering carbon rather than continuing with their farming practice. It was then explained that the Scottish Government's role in sequestration is to facilitate sequestration where there was support and desire for sequestration projects, and not to displace any current activity on land where farmers do not wish to engage. The New Agriculture Bill⁴ consultation will allow farmers and other stakeholders to feed into future arrangements for payments for environmental activities. Currently, there is a degree of uncertainty around how requirements for future agricultural payments may impact on take-up of carbon sequestration opportunities.

9.34 A further issue that was also discussed related to food security in Argyll & Bute. With the aforementioned issue of only roughly 7% of hill farms being viable without intervention, displacing agricultural activity for the purposes of farming carbon would therefore have the potential to have a detrimental impact on agricultural yields. As such, it may be the case that Argyll & Bute (or, to a wider extent, Scotland) would need to import more food which, in turn, would increase carbon emissions resulting from transporting this food. In order to ensure this does not run counterproductive to Scotland's Net Zero ambitions, further research may be required into the most optimum level of carbon sequestration activity, considering the carbon opportunity cost of having to import food.

9.35 A final cultural issue that was explored related to the need for high quality employment in the Argyll & Bute (and by extension, the Highlands and Islands) area in order to attract and retain young people. Consideration needs to be given to the role that carbon sequestration can have in this regard, in that job roles of young people that are currently farming will change significantly in order to accommodate for this sequestration activity, and as such they would potentially need to be retrained for these purposes. It was pointed out, however, that due to the large nature of forestry activity currently taking place in Argyll & Bute (representing nearly 30% of the land within Argyll & Bute, and 15% of Scotland's total forest cover), the region has a considerable baseline in activity relating to planting trees and is well-placed to deliver this training for current farmers.

Theme 7: Organisational mechanisms

9.36 The model that is to be adopted was also discussed in detail. It was acknowledged that models that work for some places may not work for others. The best approach, it was argued, varies greatly by area. Geographical catchments as an organising mechanism were cited as useful for considering regions such as Orkney and other islands, as it is much more possible for these areas to consider "hyper-local" issues and that these regions can, to a certain degree, be considered in isolation from other areas as it would allow these areas to focus specifically on issues that are important to them, without needing to consider the wider national or global impact to the same extent. This model, therefore, may be less appropriate to adopt in areas of mainland where supply chains, markets and economic activity are more sensitive to global considerations.

9.37 As a result, other organisational mechanisms for carbon sequestration that were discussed include industry groupings and community groupings. Industry groupings would involve mandated representatives from relevant sectors (or, if considering a whole-economy approach, all sectors) providing input to the sequestration activity to ensure that all activity works in the interest of all relevant stakeholders and thereby satisfying the needs of industry across Argyll & Bute. Community groupings would factor in the needs of the community in Argyll & Bute, and how best to satisfy these needs through carbon sequestration. Both groups together with the public sector stakeholders would then be able to consider activity from the aforementioned Community Wealth Building perspective,

9.38 A further concern was flagged about considering a community organisational mechanism, in that stakeholders have found that people in Argyll & Bute have become less and less engaged in community organisations, as evidenced by low turnout and low engagement at community development organisation meetings. It is therefore harder to decide how best to distribute benefits arising from carbon sequestration in the interests of the community. This has been evidenced by the profits arising from

⁴ <https://www.gov.scot/publications/delivering-vision-scottish-agriculture-proposals-new-agriculture-bill/>

local windfarms not being distributed, as it is unclear what exactly these proceeds should be funding in the community interest.

9.39 It was stated that it is hoped that with industry input and wider promotion of carbon sequestration and the potential benefits it can bring, that insights can be garnered into where exactly community interest lies. Further to this, it was stated that it is also hoped that landowners eager to work on carbon sequestration can develop a replicable pilot as a result of this project, that can effectively demonstrate community benefits arising from sequestration and then be scaled up for wider community benefits to be realised.

10 CONCLUSIONS, RECOMMENDATIONS AND NEXT STEPS

INTRODUCTION

10.1 This chapter presents conclusions for the project based on the review of Work Packages 1-6, and on the key discussion themes from the stakeholder workshop. These are accompanied by a number of considerations for future carbon sequestration activity. Following these, a series of priorities and recommendations are made to help inform and guide future carbon sequestration activity in Argyll & Bute.

CONCLUSIONS AND CONSIDERATIONS FOR FUTURE CARBON SEQUESTRATION ACTIVITY

10.2 The scale of Argyll & Bute's natural carbon assets presents an opportunity for the area with regard to carbon sequestration activity. Carbon sequestration represents not only an economic opportunity to stimulate the economy, but also an opportunity to secure wider community wealth building and environmental benefits. Achieving these could transform the region's economy and help to reverse the trends of a declining, ageing and sparsely located population.

10.3 The most feasible approaches to carbon sequestration in Argyll & Bute in the immediate future are terrestrial biological – that is, through forestation (including silvopasture) and peatland restoration. However, it is worth noting that the extent of Argyll & Bute's marine carbon assets mean that marine-based sequestration opportunities may be realised in future, as market mechanisms and regulatory frameworks for this develop.

10.4 A number of wider benefits can also be realised, including: improved biodiversity and habitat creation; flood mitigation; improved water and air quality; better soil and nutrient management and reduced erosion; shelter for livestock; sustainable timber production; more reliable stream flow for hydro-electrical generation; creation of skilled jobs; physical and mental health improvements; social well-being; and increased community engagement and community wealth building.

10.5 However, the project has identified a relatively high degree of information asymmetry, and a lack of readiness amongst many landowners and communities to take advantage of carbon sequestration opportunities. Additionally, as the business modelling demonstrates, the required outlay and returns on investment mean that payback periods on carbon sequestration projects are likely to be considerable in the absence of any public sector support. Thus there is a clear need for public sector intervention to stimulate and shape the carbon trading market in Argyll & Bute, and to reduce barriers to entry into the market for landowners considering engaging in carbon trading. In order to pursue carbon sequestration as a strategic opportunity for economic development and community wealth building in Argyll & Bute, a number of critical issues must be taken into consideration by strategic public sector bodies in shaping any intervention.

10.6 The capacity of the local Argyll & Bute economy, and the constraining effect of the structural inequalities and associated challenges, to support the uptake and expansion of carbon sequestration activities is a critical factor in realising any potential economic impact. This includes the impact of the area's geography, and longstanding – and well-documented – barriers to economic growth such as a lack of supporting infrastructure, e.g. housing, services, physical infrastructure. The realisation of any impacts and benefits, both economic, social and environmental, would therefore be reliant on the local economy's ability to support a nascent industry to develop.

10.7 Availability of information on carbon sequestration, and engagement with the subject by all parties, is critical. The evident information asymmetry means that many landowners, communities and other potential beneficiaries are unsighted on the principles, requirements or benefits of carbon

sequestration activity. Overcoming this and influencing decision-making of landowners will be important to implementation of any carbon sequestration activity.

10.8 Equally, landowners, and farmers in particular, will need to be influenced to encourage non-traditional modes of land management. There is at least some anecdotal evidence to suggest that there is a 'moral obligation' amongst landowners to maintain current modes of farming and land management, and not to be 'seen as the one' that shifts away from current practices. Further, the (negative) experience of some landowners of other support programmes e.g. the Agri-Environment Climate Scheme (AECS), where there is a perception of onerousness in administration and risk of not receiving payments, will also need to be overcome. Land holding size and tenure is also an important consideration. Land holdings in Argyll are typically small, and most Argyll tenures don't incorporate woodland, so there is a risk to land tenancy in pursuing carbon sequestration activity without any subsequent change in tenure agreements or legislation.

10.9 Existing farming activity and sequestration through forestation and peatland will need to be balanced. Finding a common ground for farmers and the ambition for forest sequestration will be important to avoid the sale of large portions of land to outside interests (e.g. large corporations) looking to quickly secure their own carbon credit needs without necessarily considering the local impacts that they could achieve. Further, additional consideration must be given to the existing carbon sequestration and biodiversity impacts already achieved through existing good agricultural practice in grazing and livestock management, for example. Any new scheme or approach should consider the impact in terms of not only potential amount of carbon sequestered, but of long-term impact on agricultural output and, ultimately, food security. As part of this, stakeholders must be mindful of ensuring continued critical mass of agricultural activity in Argyll & Bute. Anecdotal evidence suggests that current agricultural output in Argyll & Bute may be decreasing such that it is approaching a potential tipping point. For example, there may be potential for a situation where if one farm in a cluster (e.g. dairy) switches to carbon farming forestation, it may make it economically unviable for the remaining number to be served by a tanker, and so they lose their access to markets. Alternatively, a reduction in livestock in one area may impact on the viability of livestock markets in the area (currently Dalmally, Oban, Tiree, and Islay).

10.10 Consequently, the ability to minimise (or even negate) any potential impact on existing land use activities will be important, particularly for farms. There may be a significant difference between valley, ravine or gully planting (or planting on other marginal, peripheral land), or planting of shelter strips, and open planting, and even the configuration of silvopasture planting, in the ability to minimise the impact of sequestration approaches on existing agricultural and land management practices.

10.11 Requirements of future agricultural payment support are another important consideration. There is currently a lack of clarity concerning future agricultural payment support following Brexit. Current advice being given to farmers from NFU Scotland and other industry bodies is for farmers to hold onto any carbon credits they may have, since these might be needed to qualify for future agricultural payment support. This may therefore impact on the sale of credits through carbon trading where landowners do adopt sequestration activity. This is important to consider given the requirements of the net zero emissions targets for 2045, and the contribution that agriculture and land management must make to these targets.

10.12 Currently, landowners seeking to sequester carbon under the Woodland and Peatland Codes are required to contribute to a buffer as part of the approach to the management of risks and permanence, and to cover any unanticipated losses from individual project failures. However, the impact of climate change and extreme weather events may influence the perceived risk associated with carbon farming, and forestation in particular, given recent high-profile storm damage on woodland and forest plantations in Scotland. This, along with the discounting rate applied to account for a potential margin of error in measurement of carbon units means that the net amount of sequestered carbon under any given scheme may make projects unattractive.

10.13 The ability to stack benefits, rather than the current approach to bundling wider benefits with the carbon units when they are sold under the Woodland and Peatland Carbon Codes, may increase the attractiveness of carbon sequestration to suppliers – and also the price of such units, where wider benefits can be adequately quantified and evidenced. The World Bank shadow carbon price goes some way to providing a proxy measure for such benefits. However, other approaches, such as DEFRA’s Biodiversity metric 3.0 (v3.1) could be applied. Research has also been undertaken by Scottish Forestry in relation to the application of the Natural Capital Protocol to a forest creation project at Larriston in the Scottish Borders, which demonstrated values for natural hazard regulation, recreation, aesthetics and biodiversity alongside carbon benefits.⁵ Developing a standardised approach in line with this may help to unbundle and stack wider benefits with carbon sequestration projects. This could also help to take advantage of desired philanthropy and corporate social responsibility objectives from demand-side actors, and secure a greater level of local content and impacts. There is understood to be a growing market for philanthropic ambitions over and above the Carbon Codes, and there is merit in recognising the value of the Scottish ‘premium’ or ‘kudos’ attached to securing carbon credits in Scotland. This is particularly important to bear in mind where and when stacking benefits becomes possible. In turn, this may help to influence the carbon values that can (or should) be applied to projects. There is significant variation between existing market rates, estimates from the Bank of England and the World Bank (as included in scenarios above) and BEIS valuations. Current guidance for Scottish City and Regional Growth Deals includes carbon value estimates to inform managing carbon emissions associated with City Region and Growth Deal projects. The central estimate for carbon units in 2022 is £248 (low £124; high £373).

10.14 Finally, the extent of public sector support is also a significant consideration. Whilst there may be a recognition of the value of sequestration in response to the climate emergency, without additional public sector support, either for set-up costs or to support ongoing verification and monitoring, carbon sequestration may not be pursued. In the instances where it is, landowners may potentially choose sub-optimal sequestration options, or sell to outside parties. This brings with it the risk of investors looking to acquire land to achieve their own carbon offsetting ambitions, but potentially without any consideration of or appetite for achieving local environmental and societal/community benefits. Ultimately, this will determine the extent to which Argyll & Bute (and also other areas in Scotland) can navigate between free market conditions or an interventionist approach to influence the degree of local benefits (economic, social and environmental) that can be secured.

PRIORITIES AND RECOMMENDATIONS FOR FUTURE CARBON SEQUESTRATION

Proactive public sector intervention

10.15 It is clear from discussion of both opportunities and dependencies above that a proactive, interventionist approach to developing the carbon market in Argyll & Bute should be taken to nurture and grow a nascent sector with considerable potential for the area. There is a clear role for Argyll & Bute and HIE at the local and regional level respectively to ensure that an adequate business support environment is in place. There is also a role at the national level for Scottish Government and its agencies to provide the necessary policy and regulatory environment to encourage pursuit of carbon sequestration opportunities.

10.16 Public sector intervention can also help to shape the nature of the carbon sequestration market, to maximise local economic development and secure greater community wealth building, e.g. through building in requirements for local content; in wider benefits. This may help to mitigate against situations of large-scale land purchase for carbon sequestration by outside interests, with minimum return for local landowners and communities. With the exception of whisky and salmon production, Argyll & Bute’s economy is arguably already characterised by low-value commodities – carbon sequestration offers the opportunity to secure higher-value products. With this in mind, there is scope to build in carbon

⁵ <https://forestry.gov.scot/publications/988-forest-sector-final-report/download>

sequestration, along with other environmental and ecosystem services, into long-term local and regional economic development strategies, since taking such an approach would be commensurate with the objectives and principles of Net Zero, Just Transition and Scotland's National Strategy for Economic Transformation (NSET).

Recommendation 1: HIE, Argyll & Bute Council and strategic partners to consider appropriate measures to ensure that the carbon market in Argyll & Bute is developed to ensure optimum local impact and benefit, and contribute to effective community wealth building in Argyll & Bute.

Facilitating the carbon sequestration market

10.17 As part of the proactive approach by public sector actors to stimulate the carbon sequestration market, there is a need to explore in detail approaches to facilitation of the carbon market in Argyll & Bute. This is necessary to shape the way in which the local sector develops, to articulate standards and expectations of trade in carbon credits, and to engage local businesses. This must be done with a view to exploring ways in which local benefits can be stimulated, whilst at the same time fulfilling corporate social responsibility needs and securing ongoing social licence to operate for local businesses (rather than, for example, selling off carbon credits to international businesses). A carbon market facilitator can also ensure pricing structures and local content requirement for carbon credits to suit local needs. It is recognised that the outputs of both WP6 and WP7.2 will play an important role in beginning to articulate how a facilitating body or organisation may be structured.

Recommendation 2: HIE to consider outcomes and findings of WP6 and WP7.2 in exploring options for a local or regional carbon market facilitation agency, in line with Recommendation 1.

Securing landowner engagement

10.18 The evident information asymmetry regarding carbon sequestration means that securing landowner and farmer engagement in discussions regarding carbon sequestration (not only in Argyll & Bute but Scotland more widely) is a critical component. All strategic actors have a role to play. The 4th October stakeholder workshop was an important step. Part of this will include the clarification of terminology, concepts, etc. (e.g. what is meant by community benefits is often misunderstood). This will also help to determine the appetite for adopting carbon sequestration, and to better understand the way in which existing land uses and carbon sequestration approaches can complement each other. The ESG established through WP2 has an important role to play in delivering this, beyond the lifetime of the *Optimising Carbon Sequestration* project (with particularly important roles for Scottish Forestry, NFU Scotland and NatureScot). This will also include better understanding the dynamics of landowner-farmer/tenant farmer relationships.

Recommendation 3: HIE, in conjunction with project ESG members, to continue stakeholder engagement activity to raise awareness and help build momentum for future carbon sequestration activity, and to better understand the requirements of and dependencies for landowners and farmers in considering carbon sequestration approaches.

Exploring the role of carbon sequestration in sustainability of agriculture

10.19 Carbon sequestration has potential to revitalise the land-based workforce in Argyll & Bute. However, it remains unclear whether adoption of carbon sequestration techniques can increase the sustainability of agricultural livelihoods in the area. Further research is therefore required to fully understand the impact that carbon sequestration may have on farming income streams, building on the work to prepare a business model as part of WP5.

Recommendation 4: HIE, working with partners and relevant stakeholders, to explore additional research on the extent to which carbon sequestration can augment agricultural and other land-based economic activity, as part of any follow-on work from the WP5 business modelling.

Building a critical mass of activity

10.20 Given the nature of land holdings and tenures in Argyll & Bute, there is a need to explore ways in which projects can be organised to create critical mass of activity. Clusters of projects, drawing on learning from elsewhere in Scotland, is one means of achieving this. This sort of approach may lend itself to an enterprise-level cluster of farms, or to farms that are geographical proximate. Other approaches may be worth considering. For example, landscape-scale projects or programmes of activity grouped according to river catchment areas may be beneficial not only in securing carbon impacts, but also (stacked) environmental benefits such as flood mitigation.

Recommendation 5: Consideration should be given to the most effective way to achieve a critical mass of carbon sequestration activity in Argyll & Bute, building on the scientific evidence baseline established through the *Optimising Carbon Sequestration* report, and drawing on the expertise of ESG partners including SAMS, ERI, Scottish Forestry, NatureScot and SEPA.

Stacking benefits and articulating wider impacts

10.21 There is a need to explore ways in which social, community, environmental benefits can be unbundled from carbon credits, to secure maximum benefits for landowners, farmers and communities. Current Carbon Codes bundle additional benefits, with no scope for varying price according to wider social or environmental benefits secured over and above the sequestered carbon. In line with the ambition of project partners to ensure that carbon sequestration schemes are not pursued solely for carbon, accounting for additional benefits in any trading mechanism must be a priority. Taking a stacking rather than a bundling approach can potentially see increased revenue – enhanced further by the added value of Argyll & Bute (or Scottish) carbon credits – building on the kudos element, which plays to the burgeoning philanthropic market. Stacking benefits is the mechanism through which other environmental services can be built in, to secure increased benefits alongside increased revenue.

Recommendation 6: HIE, in partnership with Scottish Forestry and other partners, should explore novel mechanisms through which additional social/community and environmental benefits can be accounted for under future carbon trading schemes.

10.22 Alongside this, HIE and partners should also explore ways to better articulate the community, social, and environmental value that can be obtained through carbon credit trading, so that there is no ambiguity around what sequestration activity can bring, and carbon credits are not traded on the basis of carbon alone. This can help to influence landowner decision-making regarding carbon sequestration (particularly regarding positive externalities and how these are perceived by landowners and prospective deliverers of carbon sequestration activity). In addition, there is potential to influence the way in which current Carbon Codes are revised, and future Carbon Codes are developed, with regard to stacking versus bundling of benefits.

Recommendation 7: HIE and ESG partners to explore ways in which the wider community, social, and environmental value of carbon sequestration activity can be communicated – maximising the opportunity presented by WP4.2, but also in terms of influencing partners with responsibility for shaping Carbon Codes (e.g. Scottish Forestry).

Anticipating higher-level, strategic benefits

10.23 Whilst carbon sequestration offers opportunities to contribute to the achievement of Net Zero ambitions through carbon sequestration, additional more strategic benefits can also be achieved. Following conclusion of the wider project, there is a need to explore ways in which longer-term strategic ambitions can be achieved through carbon sequestration activities, and through the design of a facilitation/market scheme. This may include agricultural efficiency improvements, or the creation of multi-purpose forests, to more transformational ambitions around re-wilding, or the restoration of the Atlantic rainforest, for example.

Recommendation 8: HIE, Argyll & Bute Council and others to consider the ways in which the outcomes of the *Optimising Carbon Sequestration* project and subsequent carbon sequestration activity can contribute to regional transformational opportunities and ambitions.

This project is funded by the UK Government through the UK Community Renewal Fund

APPENDIX 1: WORKSHOP ATTENDEES

Table A1.1: Workshop Attendees

Name	Organisation
Genna Lugue	Argyll & Bute Council
Julie Young	Argyll Countryside Trust
Angharad Ward	Argyll Countryside Trust
Shelly Gould	Bute Community Forest
Freddie Ingleby	Caledonian Climate
Jura MacMillan	Caledonian Climate
Richard Whitcomb	Context Economics & Bute Community Forest
Alex Adrian	Crown Estate Scotland
Richard Weaver	ekosgen
Ross Mawhinney	ekosgen
Angus MacFadyen	Farmer & Argyll Isles Land Use Committee Member
Claire Simonetta	Farmer (Mull) & agricultural consultant
Jamie Dick-Cleland	Feochaig Woods
Eleanor Harris	Galbraith
James Lighton	Galbraith
Morag Goodfellow	HIE
Zoe Laird	HIE
Lucinda Gray	HIE
Chantal Geyer	HIE
Christine Rolin	HIE
Lewis MacDonald	HIE
Douglas Cowan	HIE
Rachel Forrest	HIE
Sandra Holmes	HIE
Andrew Parker	Imani Project Team
Myles Mander	Imani Project Team
Brian Menzies	Imani Project Team
Isla Farley (remotely)	Imani Project Team
Jane Millar	Isle of Gigha Heritage Trust
NFU Scotland	Lauren Worrell
Ross Lilley	NatureScot & Argyll Countryside Trust
Wendy Reid	North West Mull Community Woodland Company
Lara Zentner	<i>Organisation not stated</i>
Jenny Love	SAC Consulting
Mike Burrows	SAMS
Anja Wittich	SAMS Enterprise
Ross Johnston	Scottish Government
Louise Bond	SEPA
Alistair McVittie	SRUC
Leigh Eisler	SWMID