



NATURAL CAPITAL AND SCOTLAND'S RURAL COMMUNITIES

Optimising carbon sequestration for
community wealth building in Argyll and Bute



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THANKS TO OUR PARTNERS FOR USE OF THEIR PHOTOGRAPHS FOR THIS PROSPECTUS:

SAMS; Angharad Ward, Deb Baker and Steve Carter from Argyll and the Islands Coast and Countryside Trust (ACT); and Jenny Love.



INTRODUCTION

Climate change is high on the social and political agenda. As we work together as a society to reach net zero emissions in Scotland, there is a great deal of interest in the opportunities an economic green recovery offers to businesses, communities and local economies. Planning and mobilisation is underway with the UK Financing Nature Recovery initiative, and a just transition to net zero is embedded in the Scottish Government's National Strategy for Economic Transformation.

Rural Scotland has extensive natural assets which could have an important role in reducing excess carbon dioxide (CO₂) in our atmosphere. Landowners and managers are in a strong position to contribute to change and at the same time attract financial investment through carbon markets.

A partnership of private, public and community representatives in Argyll and Bute has been working together with research specialists to quantify the potential of carbon sequestration. Highlands and Islands Enterprise (HIE) has co-ordinated the multi-faceted project for Argyll and Bute Council, funded by the UK Government through the UK Community Renewal Fund.

The objective is to provide a baseline and information which:

- assesses what natural capital the area has to offer and any current sequestration activity;
- provides an expert evaluation of opportunities;
- examines the potential of carbon markets for the area, assessing costs and future value to the economy;
- develops a proof of concept business model with example opportunities; and
- delivers suggested implementation plans and recommendations.

This prospectus provides an overview of the findings and there's also some brief introductory information on types of carbon sequestration and carbon codes for context. The reports have been delivered by the Scottish Association for Marine Science (SAMS) Enterprise, Imani Enterprise Ltd, ekosgen, Azets, Caledonian Climate Ltd, and Galbraith. The reports are available in full at www.hie.co.uk/carbonsequestration

HEADLINE FINDINGS FOR ARGYLL AND BUTE

The opportunities

- Argyll and Bute's unique natural carbon assets and rare ecosystems present a significant opportunity for the area to benefit from carbon sequestration activity.
- Carbon sequestration activity, supported correctly, offers not only an opportunity to stimulate the economy, but also an opportunity to secure wider [community wealth building](#), community benefits and environmental benefits.
- There are different kinds of carbon sequestration, and the research found the best opportunities in the immediate future are 'terrestrial biological' – focusing on woodland and peatland action.
- Researchers worked up various scenarios and early results suggest the economic potential from carbon credits ranges from £8.7m – based on restoring 10% of the area's degraded peatland - to more than £3bn when looking at high value integrated models.
- Additional benefits include: 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; creation of skilled jobs; physical and mental health improvements; social well-being; increased community engagement; and increased support for community-led development.
- With around 49,500ha of the area's peatland degraded, restoring it all has a potential carbon benefit of 164 kilotonnes of CO₂ equivalent per year.
- Carbon trading is happening now in Argyll and Bute, with initial innovative peatland and woodland projects underway. There are 855ha of woodland dedicated to carbon sequestration, and more in planning stages.

Making it happen

- Argyll and Bute has significant natural assets and unique supporting scientific expertise in the marine environment. The carbon benefits of seagrass, seaweed and shellfish offer major opportunities. However, more research and development is required before carbon trading can be developed.
- Hedgerow, soil, and saltmarsh carbon codes are in development which may provide additional opportunities in future.
- The research highlights that adopting an aggregated approach to carbon projects, rather than individual small-scale projects, could maximise returns, minimise risk and retain control/balance in land use and community. This strategy could positively impact on buying power and realising community wealth benefits.
- Bringing the private, public and community sector together is vital to unlocking the opportunities.

Recommended actions include:

- Exploring potential approaches for a carbon market facilitation agency to stimulate the market;
- More communication – including a package of information for land managers to raise awareness, stimulate supply, and support decision making;
- Creation of a supportive environment – both influencing national strategy and at local level;
- Development of a challenge fund opportunity, or other support mechanisms.



Photo credit ACT



Photo credit Jenny Love



SCALE OF THE OPPORTUNITY IN ARGYLL AND BUTE

Argyll and Bute has a lot to offer

Argyll and Bute is Scotland's second largest local authority area. It has a rich geography, is already embracing carbon market projects, and offers the advantage of a skilled rural and specialist marine workforce. More than 3,500 people are working in agriculture, forestry, and fishing – three times the national rate. It provides the perfect location to explore how to realise the wider benefits of carbon sequestration.

7,000 km² of land

50% of land area is heather, moorland, peatland, and rough grassland

15% of Scotland's total woodland

5,000 km² of agricultural land

3,700km² of coastline

What impacts could a successful carbon market offer?

The Economic Impact Report has modelled a series of scenarios, with a range of take-up rates and carbon prices considered. Each demonstrates the potential revenue, job creation and environmental impacts.

Base scenarios at current carbon market prices		Carbon Revenue	Jobs - full time equivalent (FTE)
Peatland	Restoring 10% of degraded peatland.	£8.7m	10
Forestation	Setting aside 15% of agricultural land and planting native woodland at 1,600 trees per hectare.	£312m	2,320
Silvopasture (a blend of tree growing, foraging and grazing on the same land)	Setting aside 10% of agricultural land, planting native woodland at 400 trees per hectare.	£16m	1,820
Enhanced scenarios at greater levels of uptake and higher carbon prices			
Forestation	Setting aside 20% of agricultural land, planting native woodland 1,600 trees per hectare.	£831m	3,060
Silvopasture and forestation	Setting aside 25% agricultural land, planting native woodland 1,600 trees per hectare; 20% grassland converted to silvopasture.	£1.6 billion	7,550
High carbon value integrated	Setting aside 30% agricultural land, planting native woodland at 1,600 trees per hectare, converting 25% of grassland to silvopasture.	£3.2 billion	9,320

The valuation of the carbon market in Argyll and Bute may range from tens of millions, to billions of pounds in the long run. The market is currently undergoing transformation and so uncertainties around value must be mitigated with informed decision-making. This depends on a number of key factors:

- Degree of uptake/transformation – to what extent is every piece of our environment going to be improved by carbon financing, from restoring degraded peatland, to regenerative farming, to natural woodland (and in the marine space, seagrasses and in future seaweed, phytoplankton)?
- Carbon price – the price has the potential to go magnitudes higher, or stay relatively low. One option to mitigate this is to integrate carbon prices into wider natural capital initiatives that seek out ‘charismatic carbon’, that is, carbon sequestration integrated with a suite of other social, economic and environmental actions. This could be included in a product from that land (e.g. a premium on dairy produced in a better manner) or through payments to communities or landowners.
- Choice of sequestration activity – some activities might have a profound effect on other economic activities that currently exist. For example, if a farm was planted up with carbon sequestering forest then it would have a knock-on effect on the types and number of jobs in a local economy or food security.
- Degree of local demand – industry needs for net zero, such as distilleries who have energy demands, may drive demand for such local carbon management, at a price that is not absolutely linked to global prices. It remains to be seen how strong these local economic ties will be.

Photo credit: SAMS



Costs

Each of the methods of carbon sequestration available have their own variations in terms of effectiveness and price. Argyll and Bute has the advantage of assets that offer some of the lowest cost mechanisms to sequester carbon.

Who can benefit and how?

The modelled scenarios demonstrate the carbon revenue generation potential for Argyll and Bute. So who can benefit? There are opportunities for all landowners and managers, farmers, crofters, and asset owning community organisations who are open to exploring new land management models for cropland, peatlands, grasslands, and ecosystems along our coastlines.



Photo credit: ACT



Photo credit: SAMS



Photo credit: ACT

An analysis of agricultural land shows there are almost 2,000 farms in Argyll and Bute, with a total agricultural area of 509,100ha. Half of farms are cattle and sheep with grass and grazing in Less Favoured Areas (LFAs). Carbon sequestration projects offer farmers the potential to reshape land use and potentially increase value without losing productivity.

SILVOPASTURE AND HILL FARMING

SAC Agricultural Consultant Jenny Love has a 1,000ha hill farm near Dalavich on the western bank of Loch Awe. Also an advisor with SAC Consulting, she regularly visits farmers to carry out carbon audits and advise on carbon mitigation options, as well as Scottish Government grants and schemes.

Passionate about climate and the environment, Jenny runs a local net zero group. This has brought together dedicated local extensive hill farmers to discuss common areas of concern and work on solutions. Recently the group sampled the soil on the hills of each farm to investigate soil carbon, highlighting that well managed grassland, especially on lightly stocked hill farms which are managed for high plant diversity, can enhance soil organic carbon.

She has also been working with local farms recently, including her own, investigating how planting and stock can be blended together, without fencing off large areas of land – a system known as silvopasture. For Argyll hill farms, rather than taking any of the limited production ground out of action, planting can occur as a riparian buffer, along riverbanks.

She highlights that benefits include protecting rivers from runoff and erosion, as well as stabilising river banks and providing good habitat for aquatic life. In Argyll, an important benefit of stabilising hill streams is to the peat, reducing the risk of peaty riverbanks being eroded and reducing the risk of peat runoff to the sea. A further local advantage of tree planting for sheep farmers in Argyll and Bute is reducing sea eagle predation by providing shelter.

Jenny commented: “Argyll farms can act as a ‘sink’ to reduce the levels of carbon dioxide in the atmosphere by sequestering carbon in our soils and vegetation. There is a real opportunity for our farmers to lead the way in helping to combat climate change and reach our net zero targets.”

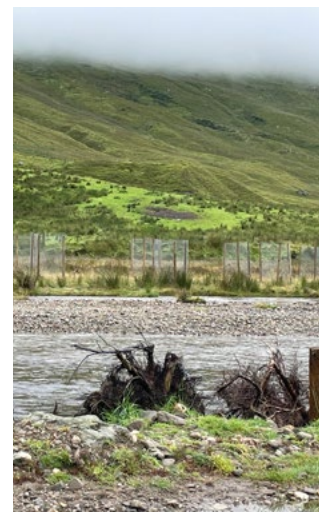
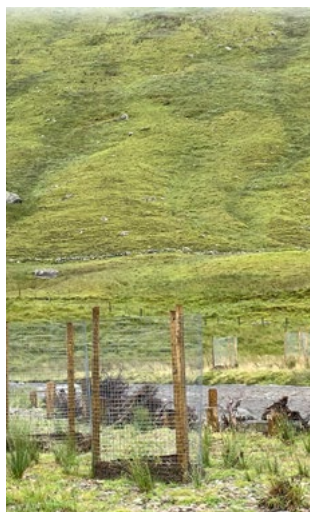


Photo credits Jenny Love

There are currently several **Peatland ACTION** projects completed or underway in Argyll and Bute. Most involve restoration, with others focused on rhododendron control and monitoring flux (carbon exchange). Islay also ran volunteer projects through the **Bog Squad** with Butterfly Conservation Scotland.

PEATLAND RESTORATION ON ISLAY

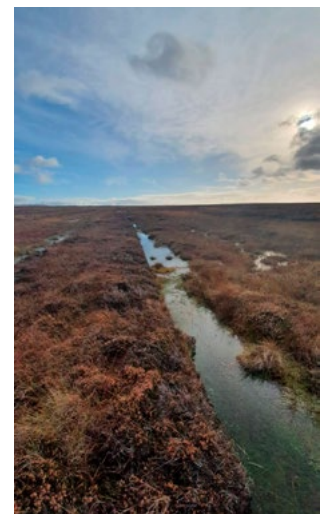
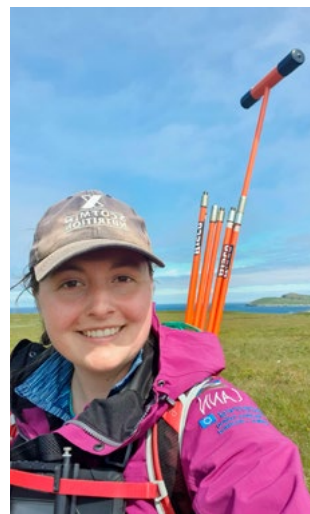
Around 60% of Islay, the southernmost of the Inner Hebrides islands, is covered in peat.

[Argyll and the Isles Coast and Countryside Trust \(ACT\)](#) has for the last five years been one of 11 cross border partners working with the [Collaborative Action for the Natura Network \(CANN\) Project](#). EU Funded by INTERREG VA Programme and managed by the Special EU Programmes Body (SEUPB), the projects have been working to save peatlands and wetlands across Ireland, Northern Ireland, and Scotland.

The Islay project has carried out extensive work at Eilean na Muice Duibhe (Duich Moss) and Rinns of Islay, both Special Areas of Conservation. This has involved monitoring the sites, collecting environmental data, controlling invasive species, particularly Rhododendron Ponticum, developing deer management plans, and developing conservation action plans for the sites.

ACT has now been successful in securing funding from Esmée Fairbairn Foundation to try to expand the range of landowners engaging in Peatland Action and the Peatland Code. The project hopes to engage with the wider community, draw in Islay's main industry - whisky distilleries, and share the project model and lessons learned as they go along.

Photo credits ACT



In forestry, woodland carbon projects are popping up across the area, with almost 40 in development including at Campbeltown, Luing, Islay, Inveraray, and Kames. More than 850ha are currently dedicated to carbon sequestration for future carbon units. This equates to around 0.5% of the total forested area in Argyll and Bute. There are many more opportunities to tap into. Modelling indicates 76,600 ha of existing foresty land could accommodate expansion.

NATIVE SPECIES REPLANTING IN BUTE

[Bute Community Land Company](#) owns and manages Bute Forest in the north of the island. The Trustees' goals are to manage the Forest in a responsible and environmentally sensitive way, to increase environmental education and to enable greater access for residents and visitors to the 160ha forest.

Recent community-led developments include investment in pathways and the creation of two minimal impact off-grid 'Charcoal Huts', inspired by early settlements found in the wood.

Following a recent small harvesting of mature larch and spruce, the team is planning to replant with more native species, with up to 100% native broadleaves, including aspen, juniper and Scots Pine. While replanting is not currently eligible for the Woodland Code, they are for the first time investigating the potential of carbon credits for future plans.

IN MARINE

Whilst there is ongoing research to identify the extent of carbon stores in the marine environment in Argyll and Bute, it is accepted that there is a high sequestration capacity within the area. As yet there are not the same management and ownership models to support marine sequestration as there are on the land sequestration side. This is a barrier to market development. However, as the mechanisms develop, Argyll and Bute can be a valuable innovation and test area for developing marine biotechnology applications of carbon sequestration through seaweed, seagrass, or shellfish.



THE WAY FORWARD

The research recommends a range of practical actions to support the development of a local carbon sequestration market, including developing local support platforms, and connecting with agricultural partners to navigate impacts of change on existing land use.

- Argyll and Bute has high integrity land which must be used wisely and to optimal value.
- 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.
- Apportioning what is best for different types of use requires support.
- There is an opportunity for smart insetting vs offsetting, and stakeholders believe there is a premium for quality and provenance that Argyll and Bute can capitalise on. Insetting may come to include 'local or community offsetting'. Carbon sequestration must be integrated with carbon reduction.
- 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.

HOT TOPICS

Sequestration and farming balance

Wider impacts of adoption on farming clusters

Pricing and processes for carbon units

Requirements on landowners for in-setting

Local timber construction opportunities

The offset market

Public sector support

Recommendations

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

Recommendation 2: Strategic partners to consider outcomes and findings from the Implementation Plans and 'Requirements for Highlands and Islands carbon market turn-key funding platform' in exploring options for a local or regional carbon market facilitation agency, in line with Recommendation 1.

Recommendation 3: Strategic partners, in conjunction with project External Stakeholder Group 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.

Recommendation 4: Strategic partners 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 research business modelling.



BACKGROUND: WHAT IS CARBON SEQUESTRATION?

An increase of CO₂ in our atmosphere is causing global temperatures to rise. Carbon sequestration is the process of capturing, removing and storing the excess CO₂. There are three main types of carbon sequestration: **biological, geological and technological**.

The first – biological – is considered the most valuable to Argyll and Bute in the immediate term.

BIOLOGICAL CARBON SEQUESTRATION

This is the capture of CO₂ and storage in vegetation such as grasslands or forests, in soils and oceans. Biological sequestration can involve the restoration of damaged natural environments to either capture carbon as plants grow, for instance when creating woodland, or to reduce emissions from a degraded environment, such as repairing a damaged peatland that already has a large store of carbon. Habitats that naturally store more carbon than they release are known as carbon sinks.

SOIL CARBON SEQUESTRATION

This is when carbon is stored in soil by decomposing plant material. CO₂ is captured through photosynthesis and stores it as Soil Organic Carbon (SOC). Agricultural activities can degrade and deplete SOC levels. New land management practices offer the opportunity to reduce emissions, improve soil quality and enhance agricultural yields.

FORESTRY CARBON SEQUESTRATION

Roughly 25 per cent of global carbon emissions are captured by plant-rich landscapes such as forests, grasslands, peatlands and moorlands, and stored as biomass or living material such as leaves, branches, roots and tree trunks.

GRASSLAND CARBON SEQUESTRATION

Unlike trees, grasslands store most of their carbon in the soil. They are a reliable carbon sink in areas that are hit hard by droughts and wildfires. When grasslands are burned most of the carbon stays fixed in the roots and soil. Intact forests can store more carbon but in unstable conditions grasslands may be arguably more resilient.

PEATLAND CARBON SEQUESTRATION

Peatlands are by far the world's most efficient carbon store. Scotland is home to 13% of the world's blanket bog. Peatlands also capture carbon dioxide from the atmosphere through photosynthesis. When healthy their wet conditions mean the vegetation doesn't decompose so they don't release CO₂. However, more than three quarters of UK peatland is no longer in its pristine state, often as a result of drainage to make the land more suitable for crops and tree growth. Drainage releases carbon stored within the peatlands into the air. Flooding of these peatlands is therefore required in order to return the habitats to carbon sinks.

OCEANIC CARBON SEQUESTRATION

Our oceans cover 70% of the Earth's surface and they currently absorb around a quarter of the CO₂ that human activities generate annually.

Additional forms of carbon sequestration include:

GEOLOGICAL CARBON SEQUESTRATION

Geological carbon sequestration is the process of storing carbon dioxide in underground geologic formations, or rocks. Typically, carbon dioxide is captured from an industrial source, such as steel or cement production, or an energy-related source, such as a power plant or natural gas processing facility and injected into porous rocks for long-term storage. There is an example of geological sequestration in Scotland called the [Acorn Project](#), which is repurposing existing gas pipelines in the north-east to take CO₂ to an offshore storage site.

TECHNOLOGICAL CARBON SEQUESTRATION

Scientists are exploring new ways to remove and store carbon from the atmosphere using innovative technologies. Researchers are also starting to look beyond removal of carbon dioxide and at more ways it can be used as a resource. Examples include graphene production, direct air capture and engineered molecules.

WHAT'S INSETTING AND OFFSETTING?

Basically, inseting is about using nature to mitigate your own net emissions. Offsetting is when you use your carbon reducing activities to mitigate the emissions of others. See this handy explainer from the [World Economic Forum](#).



THE FINANCES OF CARBON SEQUESTRATION

Carbon benefit can be delivered either by switching from one habitat type to another - for example from grassland to woodland, or by restoring the condition of habitats - for example peatland. As our knowledge of carbon management in natural habitats grows, it is likely that more diverse opportunities will arise for monetising carbon benefit.

Carbon codes and credits enable buyers to invest in carbon sequestration schemes, to compensate for their unavoidable carbon emissions. Carbon Code schemes guarantee transparency and accountability in the carbon sequestration process, while providing benefits for water, biodiversity, communities and the economy. The carbon codes of interest for the Argyll and Bute region are: the [Woodland Carbon Code](#) and the [Peatland Code](#).

WOODLAND CARBON CODE

This is a government-led scheme that regulates, verifies, and validates how landowners can participate in projects that use woodland for carbon sequestration and credit trading. The carbon sequestration from these projects is translated into carbon units which can be used only once. The carbon units can be either be used against the landowner's own emissions, or can be sold to a third party to compensate for their emissions.

Projects produce verified and validated units. Verified carbon units can be used against current year's emissions, while validated ones are available for sale for future vintages and can be used for future Net Zero plans. In both cases one unit corresponds to one tonne of carbon dioxide sequestered, either currently or in the future. One tonne of carbon is equivalent to 3.67 tonnes of CO₂x, that is – for every tonne of carbon sequestered 3.67 credits are generated.

These projects give Argyll and Bute a total area of 854.6ha dedicated to carbon sequestration for future carbon units, for a collective predictable claimable 264,283 tCO₂e. This equates to around 0.5% of the total forested area in Argyll and Bute.

PEATLAND CODE

The Peatland Code was set-up to help facilitate restoration of the UK's extensive peatlands, 80% of which are estimated to be in a degraded state. Degraded peatlands are a significant source of greenhouse gas emissions, and in the UK alone are contributing 23 million tonnes of CO₂e emissions each year, almost 3.5% of the country's total carbon footprint.

The Peatland Code is the certification standard for peatland restoration in the UK, offering the assurance that greenhouse gas mitigation claims are validated and verified by an independent body. The code safeguards the integrity of its project's carbon credits and, through the generation and sale of these units, provides land managers undertaking peatland restoration with a source of revenue.



WHAT IS COMMUNITY WEALTH BUILDING

- Developing local supply chains of businesses likely to support local employment and keep wealth within communities - creating local employment opportunities.
- Fair employment and just labour markets – for example, paying the living wage.
- Shared ownership of the local economy – increasing social enterprises as part of the business base; tenant farmers can benefit and innovate.
- Subscribing to the interim principles for responsible investment in natural capital - promoting the idea of community benefits and mutual benefits from a shared approach.
- Making financial power work for local places – increase flows of investment within local economies by harnessing and recirculating the wealth that exists. Harnessing new income streams drawing in money from outside the region.

FOR MORE INFORMATION VISIT

hie.co.uk/carbonsequestration

