Cumbrae

Community Climate Action Plan

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CARBON NEUTRAL ISLANDS

CARBON NEUTRAL ISLANDS CUMBRAE

CUMBRAE COMMUNITY DEVELOPMENT COMPANY

THE ISLANDS SCOTLAND ACT 2018 ACHD NAN EILEAN ALBA 2018

Community Energy Scotland Cumhachd Coimhearsnachd na h-Alba

Empowering Communities

Scottish Government Riaghaltas na h-Alba

About the Plan

The Carbon Neutral Islands (CNI) project is a Scottish Government Programme for Government commitment that aims to demonstrate the climate-resilience and low carbon potential of islands. This Community Climate Action Plan (CCAP) is a community record of existing knowledge and data, and prioritises key actions towards achieving a carbon neutral and sustainable future. This action plan is intended to be a 'living document' owned by the Cumbrae community, which can be reviewed and amended to reflect the progress made on our decarbonisation journey.

Cumbrae Community Development Company (CCDC), the local community anchor organisation for the Carbon Neutral Islands Project on Cumbrae, employs a Community Development Officer (CDO) who alongside the local community has developed this plan.

CCDC is a community-based development trust with charitable status located in Garrison House in Millport on the Isle of Cumbrae.

The Scottish Government commissioned Community Energy Scotland to act as the key delivery partner for the initial phase of the project. A key aim from government is to ensure the community is at the heart of the project. Community Energy Scotland was chosen given their previous experience of engaging with communities and delivering community-led projects.

Acknowledgements

This plan would not have been possible without the support of key project partners:

Community Energy Scotland (CES) is Scotland's only national charity dedicated to supporting communities across Scotland to develop theirown decarbonisation & renewable energy projects. They have supported us by carrying out our energy and transport carbon audit, providing community outreach expertise, networking opportunities, shared learning and facilitation of training opportunities, as wellas support in the production of this action plan.

Scottish Communities Climate Action Network (SCCAN) provided a range of training to CNI Community Development Officers (CDOs) and representatives from steering groups and anchor organisations to equip the project members with the skills and confidence to deliver effective engagement events in the island communities.

Sniffer via the Scottish Government funded Adaptation Scotland programme led on the components of the work on climate resilience and adaptation, including support to prepare climate and coastal change assessments and working with live scribes to create visualisations of island specific issues.

CNI Community Development Officer (Cumbrae), Scott Watson, would also like to thank the following for their contribution to the development of this Community Climate Action Plan:

- **The Cumbrae community**
- **Cumbrae Community Development Company (Anchor Organisation)**
- **Cumbrae Local Island Plan Delivery Group (Steering Group)**
- **Alan Cawley Photography**
- **Cumbrae Primary School**
- **North Ayrshire Council**
- **NatureScot**
- **Other Carbon Neutral Island communities and CDOs from Barra, Hoy, Islay, Raasay and Yell**

Contents

1. Executive Summary

The Carbon Neutral Island (CNI) project is a Scottish Government Programme for Government commitment focusing on the islands of Great Cumbrae, Barra, Hoy, Islay, Raasay and Yell to support them to become carbon neutral by 2040.

The Cumbrae Community Climate Action Plan (CCAP) represents the first steps of a path towards a low carbon future for Cumbrae. One in which both residents and visitors thrive in a connected, healthy, and prosperous community, acting collaboratively and individually to address the challenges of climate change.

1.1 Carbon Audit Overview:

To inform discussions regarding Cumbrae's current decarbonisation status, identify community priorities, and later track progress to these goals, carbon audits have been completed to establish a representative baseline carbon footprint for Cumbrae. The audits quantify greenhouse gas (GHG) emissions sources and sinks for five key sectors – Energy; Transport; Waste; Agriculture; and Land-Use, Land-Use Change and Forestry (LULUCF).

A Blue Carbon "Habitat Suitability Study" was also conducted (see note opposite)

The largest source of emissions attributable to Cumbrae come from the energy sector, followed closely by Transportation, Land Use, Land Use Change and Forestry (LULUCF) is considered to act as a sink overall, though uncertainties in this sector are significantly higher than for other sectors. Further details on each of these audits are included later in the action plan.

The development of the Great Cumbrae CCAP has included extensive research, analysis, modelling and engagement with the island community It identifies priority areas for actions to reduce community wide Greenhouse Gas (GHG) emissions.

The CCAP focuses on lowering emissions created from the energy, transport, agriculture, land use & land use change and waste sectors.

Note: Blue carbon habitats are increasingly recognised for their potential to sequester and store carbon and provide a marine nature-based solution for climate change mitigation, adaptation and resilience. These habitats (saltmarsh and seagrass in Scotland) are eligible for inclusion in the UK Greenhouse Gas inventory, however significant evidence gaps currently prevent this.

The Scottish Government is working with the UK Blue Carbon Evidence Partnership to develop a roadmap for inclusion. The wide consideration of blue carbon habitats in this report - beyond just saltmarsh and seagrass - recognises the important ecosystem benefits these habitats provide including as important long-term stores of carbon. The report highlights the importance of protecting and restoring blue carbon habitats to maximise their potential as a marine nature-based solution.

Figure 1. Bar chart showing an overview of the CO2e emissions per sector covered by the carbon audit process[2].

1.2 Community Priorities

Community engagement throughout the development of the Community Climate Action Plan has identified the following key priorities of the local community:

- **Warmer homes, lower energy bills and reduction of fuel poverty**
- **More sustainable transport, particularly the ferry route and a reduction in the number of private vehicles**
- **Nature based solutions and habitat restoration**
- **Feasibility of community owned energy generation on Cumbrae**

1.3 Next Steps

This plan represents the Cumbrae community's first steps towards detailed understanding of and lowering of carbon emissions from the island in order to benefit the quality of life and resilience of our community, whilst contributing to the global effort to combat climate change.

It is important that the plan and its actions continue to be reviewed by the community to ensure they reflect and respond to changing circumstances. This CCAP is a tool for the whole community to use in order to ensure the long-term sustainability of the island, its people, ecosystems and future.

Immediate actions which are noted as important for the community following this plan include:

- Allocating lead roles and responsibility for each action in orderto start pursuing them.
- Ground-truthing of the land audits and blue carbon habitat suitability study to fill data gaps where identified.
- Establish potential carbon reduction figures and costings.
- Complete Community Investment Strategies to help fund the actionswhere necessary.
- Ensuring that the implementation of the actions plan is driven by the island community and it's success does not rely on volunteer action.

Success of the Carbon Neutral Islands project on Cumbrae will rely on the community working together with local, regional and national partners as well as on-going support from the local authority and Scottish Government.

However, it will be the Cumbrae community's own drive, local expertise and passion for a greener and more sustainable island that will make it happen.

2. Cumbrae and The Climate Emergency

2.1 Climate Change

Climate change and nature loss are amongst the greatest threats facing our planet. Small, low-lying islands are under threat from climate change and predicted rising sea-levels. Climate change is expected to increase instances of flooding and coastal erosion, whilst simultaneously negatively affecting water supply, food production, health, tourism and accelerating habitat depletion.

Scotland has declared a climate emergency and stepped up its climate action and commitments through Scotland's 2019 Climate Change Act – calling for net zero greenhouse gas emissions by 2045. Scotland's climate change legislation also ensures we prepare and adapt to the impacts which are already locked in, including rising sea levels and more extreme weather.

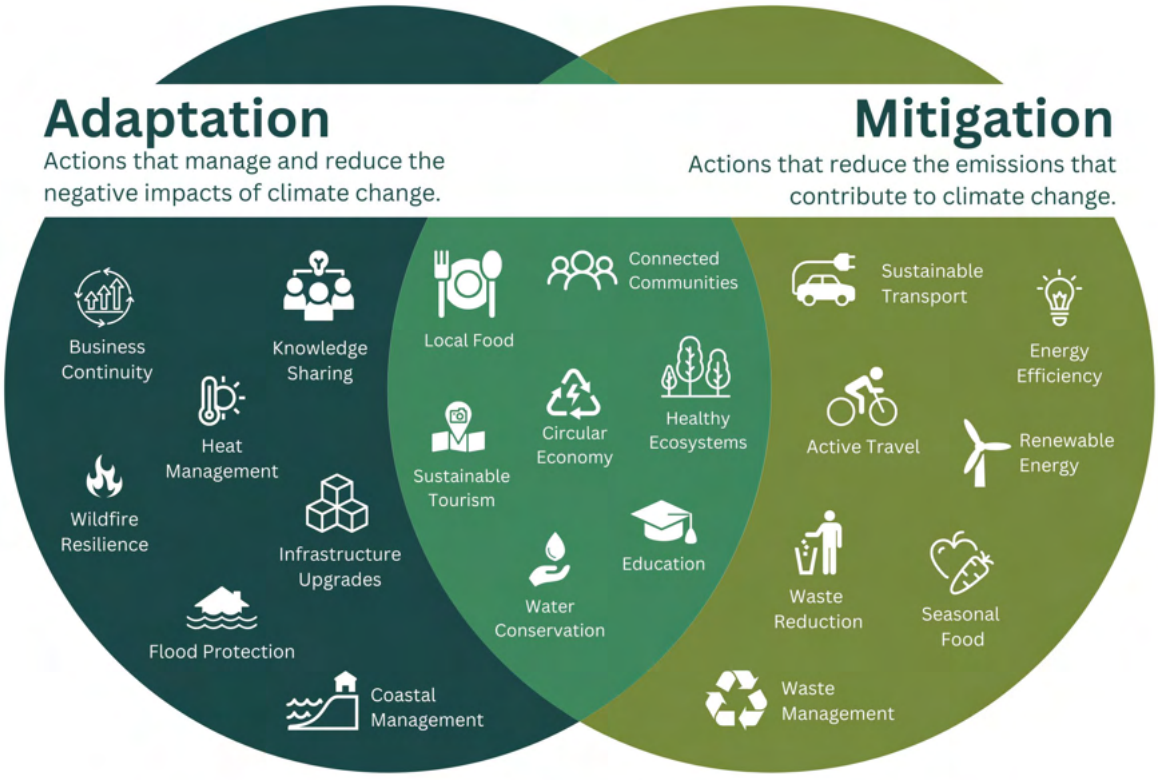


Figure 2. Venn Diagram illustrating the overlaps between climate change adaptation and mitigation actions.

2.2 Benefits of Decarbonisation

While the overall aim of decarbonisation is to address global climate change, at a local level there are direct benefits from community climate actions. Benefits can include reducing costs for households and businesses, healthier people and places and new opportunities for employment and skills development. This plan aims to address the need for both **adaptation** actions that manage and reduce the negative impacts of climate change, and **mitigation** actions that reduce emissions that contribute to climate change. Figure 2 (above) illustrates that adaptation and mitigation often overlap, and both are needed to help reduce risks from changes in climate and weather and increase community resilience.

2.3 Island Environment

Great Cumbrae, more commonly referred to simply as Cumbrae, is located on the Firth of Clyde approximately 28 miles South West of Glasgow, between the Isle of Bute to the West and the mainland towns of Largs, Fairlie, and West Kilbride.

The larger of a group of islands, Cumbrae is accessed via the Largs-Cumbrae ferry route operated by Caledonian MacBrayne and a 10.2 mile flat circular road that surrounds the island itself.

Geographically and historically the island sits within the area of Argyll, however, is within North Ayrshire Council for modern administrative purposes and looks towards Largs for a large range of everyday services such as education, healthcare and shopping.

Cumbrae's population is centred predominantly within the town of Millport situated at the Southern bay of the island. A largely untouched Victorian seaside town with a strong atmosphere and nostalgia of a by-gone era of paddle steamers and seaside holidays. There is also historic evidence of stone-age and Obanic culture on the island, bronze-age settlement and use as a staging post on the lead up to and during the Battle of Largs in 1263.

The Arran & Cumbrae Landscape Character Assessment from North Ayrshire Council 2008, categorises Cumbrae as "Coastal Fringe with Agriculture" with areas outside of the town of Millport designates as "sensitive landscape" noting:

"Although there are strong local variations in the landscape character of the Cumbraes, it is not appropriate to identify detailed landscape types at the level of a regional assessment. Great Cumbrae, as the name suggests, is larger, and more settled with much of the island given over to improved pasture and smaller areas (mainly steeper slopes) under deciduous woodland or heather moorland. The settlement of Millport is strung along a bay along the south of the island.[3]"

Cumbrae is a popular visitor destination for day trippers, walkers, cyclists and young families. Nature lovers and wildlife watchers enjoy the island due to its accessibilityand stunning land and coastline which is home to over 125 species of birds, seal colonies, porpoises, and basking sharks and more.

Figure 3. Area map of Great Cumbrae. © OpenStreetMap

Figure 4. Detail map of Great Cumbrae. © OpenStreetMap

2.4 Demographics of Cumbrae

The area of Great Cumbrae and its town of Millport are covered in their entirety by two datazones as defined by the Scottish Census. Largs Central and Cumbrae 06 (datazone ID: S01011327) and Largs Central and Cumbrae 07 (Datazone ID: S01011328).

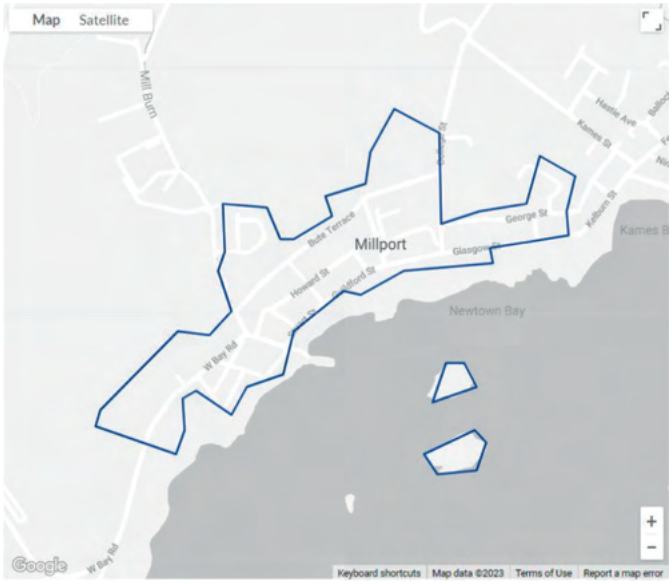


Figure 5. Datazone Central Largs and Cumbrae 06

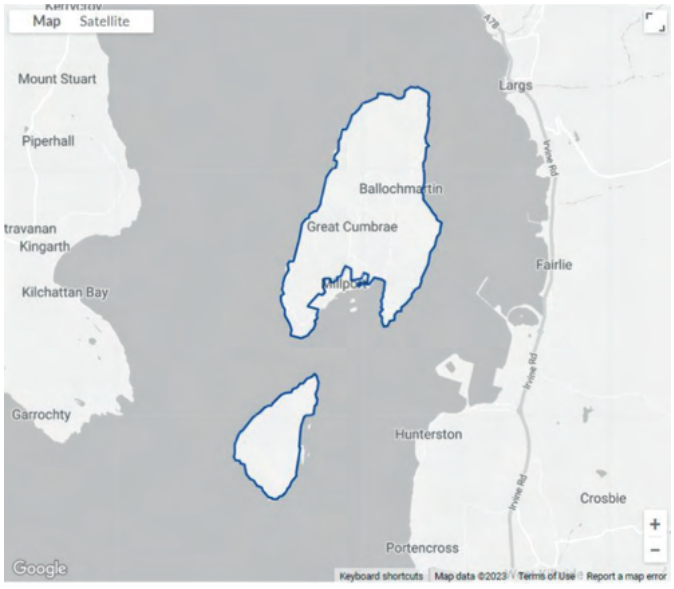


Figure 6. Datazone Central Largs and Cumbrae 07

According to official statistics of the Scottish Government from 2021, the population of Great Cumbrae is 1,274[4]. The age demographics of the population are known to be relatively higher than seen at local authority level in North Ayrshire or across Scotland with the 60-74 and 75+ age brackets particularly high on Cumbrae.

Cumbrae Age Profile

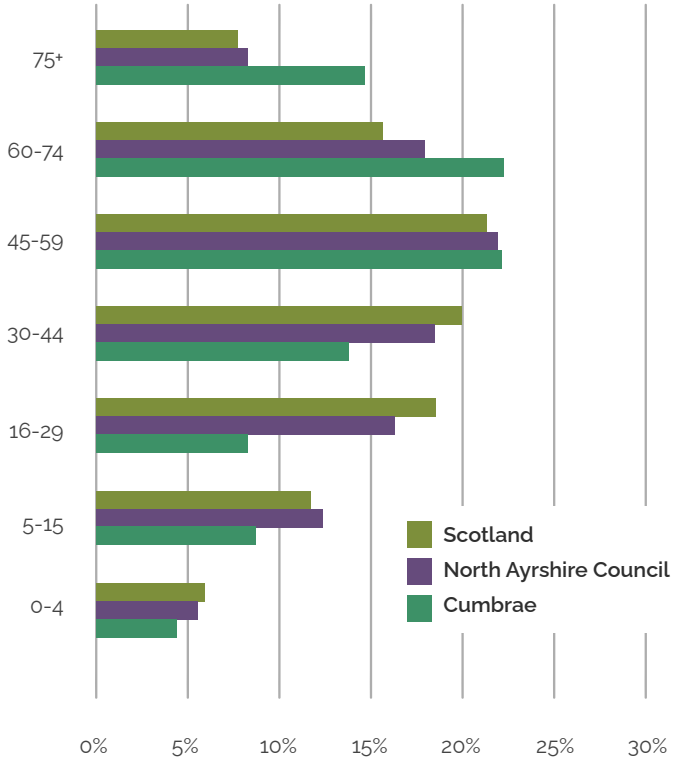


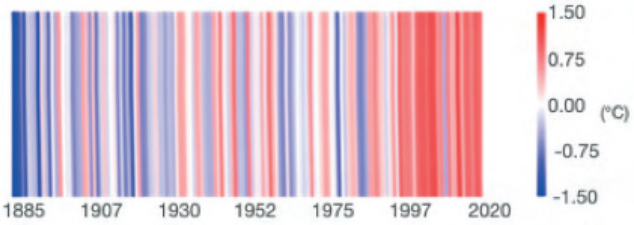
Figure 7. Bar chart showing a comparison of age groups on Cumbrae from Scottish Census data.

According to Scottish Index of Multiple Deprivation 2020 (SIMD) over 50% of properties on Cumbrae are deemed to be in an area within the top 20% most deprived in Scotland overall and in the top 10% most deprived for the Housing and Employment sectors.The remainder of properties on Cumbrae are deemed to be in an area within the top 50% most deprived in Scotland overall [5]

2.5 Climate Predictions

Climate and coastal change predictions specific to Cumbrae were requested from the Scottish sustainability charity Sniffer and completed by JBA Consulting.

Predictions suggest that the annual average temperature on Cumbrae could have risen 7 degrees Celsius by the end of the century. That the sea level could increase by up to 1 metre and that on average the Cumbrae coastline would be expected to retreat up to 21 metres.[6]



Blue indicates years with average temperature below historic average

Red indicates years with average temperature above historic average

Figure 8. Overview of Climate and coastal change predictions provided by JBA Consulting

Historic: Annual average rainfall for the past decade has been above the historic average.

Future changes: Winters may become wetter, and summers only slightly wetter by 2100.

Historic: Annual average temperatures for the past 20 years have been above the historic average.

Future changes: Mean air temperatures will increase across all seasons. By 2100 there could be an increase of up to almost 7 °C in the summer.

Historic: Historically, erosion and accretion have occured around the coast of Great Cumbrae.

Future changes: The data projects the shoreline could retreat on average -21m by 2100.

Historic: The number of storms, wave heights and intensity has been relatively consistent in the past.

Future changes: Peak wave height is expected to increase. Intensity may increase as these are sustained over longer durations.

Historic: 80% of records of annual average mean sea level between 2010 and 2015 were above the historic annual average.

Future changes: Sea levels will rise. This could be up to 1m by 2100.

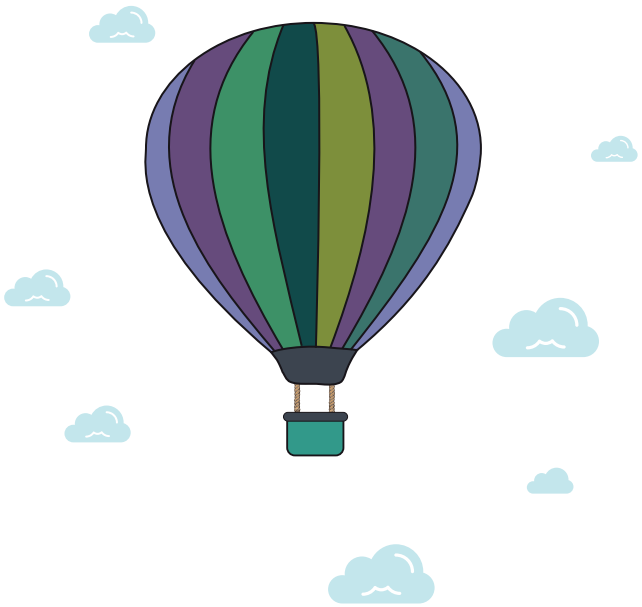
3. The Carbon Neutral Islands Project

3.1 Introduction to the Project

In May 2022 the Cabinet Secretary for Rural Affairs and Islands announced the six Scottish islands to be supported by the Carbon Neutral Islands project: Barra, Great Cumbrae, Hoy, Islay, Raasay, and Yell. The CNI project includes one island from each of the local authority areas with responsibility for islands in Scotland.

More widely, the CNI project will help to deliver key commitments in the National Islands Plan[7] and the National Performance Framework[8], create island-based jobs, and support islands to adapt to the negative effects of climate change.

The project aims to align with wider net-zero and decarbonisation efforts and will contribute to the Scottish Government's statutory target to reach net zero by 2045.



A tonne of CO_2 would look like a filled hot air balloon

3.2 Definition of Carbon Neutral

The Project considers carbon neutrality akin to net zero. Accordingly, a carbon neutral island is an 'island where the greenhouse gas (GHG) emissions (captured as CO_2 equivalent) are in balance with the sinks'. Sinks can be natural resources capable of absorbing CO_2 (trees) or technological solutions that do the same thing (carbon capture and storage). Carbon neutrality is to be achieved by 2040, five years prior to Scotland as a whole.

The Project will look at carbon neutrality as broadly as possible in line with the Scottish Government's updated Climate Change Plan list of sectors:

- Electricity
- Buildings
- Transport
- Industry
- Waste and the Circular Economy
- Land Use, Land Use Change and Forestry
- Agriculture
- Negative Emissions Technologies

In addition, the project will also include a blue carbon component which will support Scotland to refine its nationwide methodologies in this field.

3.3 Drivers Underpinning the CNI Project

The CNI project is underpinned by the following key drivers: alignment, justice and inclusion, and replicability.

Alignment: The project aims to align with existing island-based climate change efforts and to avoid duplication. The first step towards this was a study which mapped existing island-based climate accounting exercises, projects and funding sources.

Justice and inclusion: The project will support islands to become carbon neutral in a just and fair way. To ensure this, the project will consider the recommendations of the Just Transition Commission[9]. Fairness will be promoted through an effective bottom-up participatory process driven by the six island communities.

Replicability: The work is being completed to standardised and agreed methodologies wherever possible in order to allow replication and direct comparison. All Scottish islands will benefit from the project through knowledge sharing of good practice from the implementation of the project. The six islands will act as 'Lighthouse Communities' for other Scottish islands and as catalysts for net zero action across Scotland.

3.4 Aims for the CNI Islands

By 2040 the goals for each of the six islands are:

- **The island community has achieved carbon neutrality.**
- **The net zero journey has been driven by the island community itself.**
- **Learnings from the six CNI islands are shared with the Scottish Government Islands Team, Local Authorities, Climate Regional Hubs and the Islands Centre for Net Zero and help to develop resources to support other Scottish islands on their de-carbonisation journeys.**

Whilst the overarching theme of the project is climate resilience the project aims to improve quality of life, create employment and improve the sustainability of the community.

3.5 An Island Led Approach

On Cumbrae the CNI project is led by an island steering group of community representatives who identified Cumbrae Community Development Company (CCDC) as the anchor organisation. CCDC is funded by the project to employ a local CNI Community Development Officer (CDO) – Scott Watson. The CDO is the link between the Steering Group, the Community, and the external agencies involved in the project, supported by Community Energy Scotland (CES).

The CDO has worked closely with the technical team at CES to ensure local data informs the initial carbon audit, detailed from Section 4-11, which includes work by the external consultants, Aether and Adler & Allan. The carbon audits, along with climate and coastal change assessments by Adaptation Scotland and JBA Consulting, are tools to help identify and highlight potential key areas for decarbonisation, mitigation and adaptation actions. However, the actions within the Community Climate Action Plan look beyond the data to reflect the island community's priorities for a flourishing carbon neutral future.

The Community Climate Action Plan (CCAP) helps the community record existing knowledge and data, prioritise key projects and schedule actions towards a carbon neutral and sustainable future. The CCAP is a 'living document' owned by the Cumbrae community, which can be reviewed and amended to reflect the progress made on the island's decarbonisation journey.

4. Carbon Audit Overview

To inform discussions regarding Cumbrae's current decarbonisation status, identify community priorities, and later track progress to these goals, carbon audits have been completed to establish a representative baseline carbon footprint for Cumbrae. The audits quantify greenhouse gas (GHG) emissions sources and sinks for five key sectors – Energy; Transport; Waste; Agriculture; and Land-Use, Land-Use Change and Forestry (LULUCF).

A Blue Carbon "Habitat Suitability Study" was also conducted.

It is, however, thanks to the cooperation of local residents and businesses that this exercise has been possible.

1 tonne CO_2

=

5,737 miles (small car)

or

121,643 charges

or

500 x CO_2 fire extinguishers

4.1 Methodology Overview

The audits for energy, transport, waste, agriculture and LULUCF follow the Greenhouse Gas Protocol (2021) Global Protocol for Community-Scale Greenhouse gas inventories[1], which is itself aligned with IPCC (2019) guidelines[10]. A methodology for blue carbon is being developed that will be used to calculate habitat extent and estimate carbon stores and annual sequestration rates. Detailed methodologies for each sector are provided in the respective carbon audit reports.

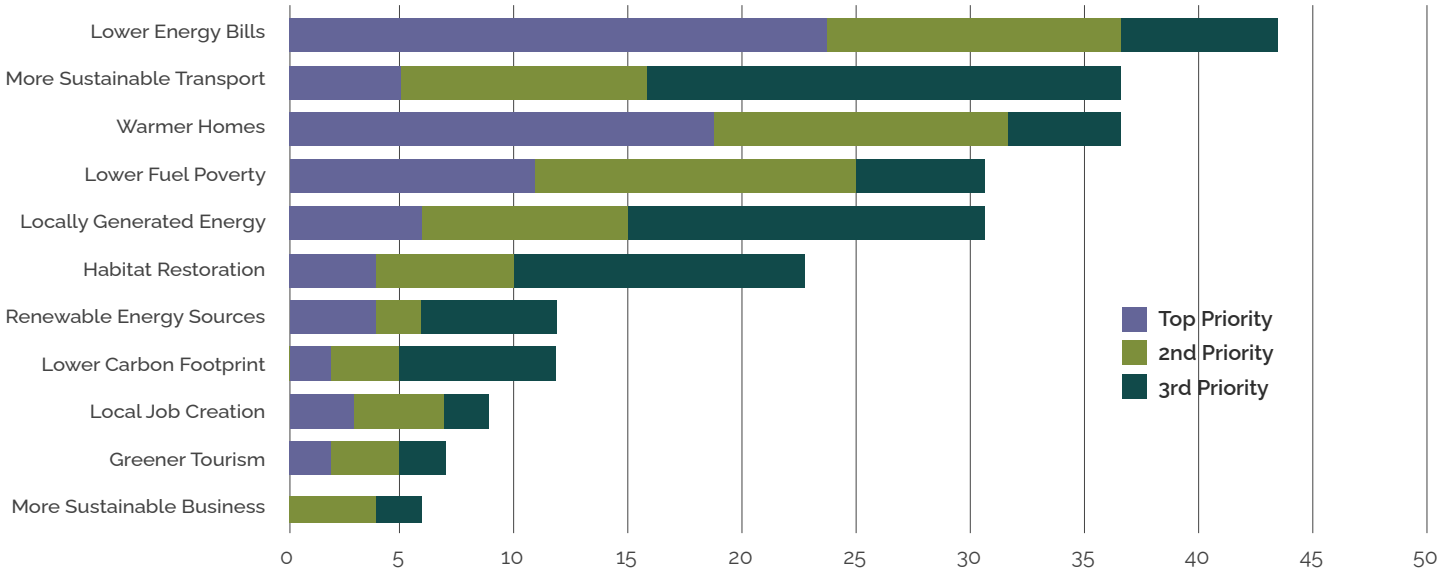
4.2 Key Findings

The largest source of emissions attributable to Cumbrae come from the energy sector, followed closely by transportation. Land Use, Land Use Change and Forestry (LULUCF) is considered to act as a sink overall, though uncertainties in this sector are significantly higher than for other sectors.

Figure 9. Bar chart showing an overview of the CO2e emissions per sector covered by the carbon audit process[2].

5. Community Engagement

Figure 10. Community priorities as identified during engagement sessions.



A total of 4 public drop-in sessions were held within Garrison House between February and March 2023. Information from the carbon audits along with updates on the project were shared with over 150 individuals from the local community. These events were also attended by representatives from Community Energy Scotland, Home Energy Scotland, The Wise Group and North Ayrshire Council to offer advice on home energy efficiency, funding and other areas of interest.

During the events, attendees were invited to prioritise some of the benefits the Carbon Neutral Islands project could have for Cumbrae and complete an anonymous survey of which 63 responses were received. Results from both of which have helped to shape this Community Climate Action Plan.

In addition to the public drop-in sessions, presentations and discussions took place with several community groups and organisations including with 50 children from Cumbrae Primary School who were keen to share their thoughts on climate change, how Cumbrae could become carbon neutral and created a Carbon Reduction Agreement for themselves.

One-to-one engagement has occurred regularly where members of the community have been looking for more information about the project or advice relating to their own circumstances and home energy efficiency.

Timescales have meant engagement with some groups has been limited. Secondary School aged youths have been identified as a group that will need future engagement.

5.1 Community Priorities

Some of the key priorities that were identified as part of the community engagement process were:

- Warmer homes, lower energy bills and reduction of fuel poverty.
- More sustainable transport, particularly the ferry route and a reduction in the number of private vehicles.
- Feasibility of community owned renewable energy generation on Cumbrae.
- Nature based solutions and habitat restoration.

6. Energy

Community Energy Scotland conducted an audit of Energy sectors on Cumbrae to develop a baseline greenhouse gas emissions study as part of the Carbon Neutral Island Project. The report dated March 2023 looks at both domestic and non-domestic energy use on the Island.

6.1 Carbon Audit

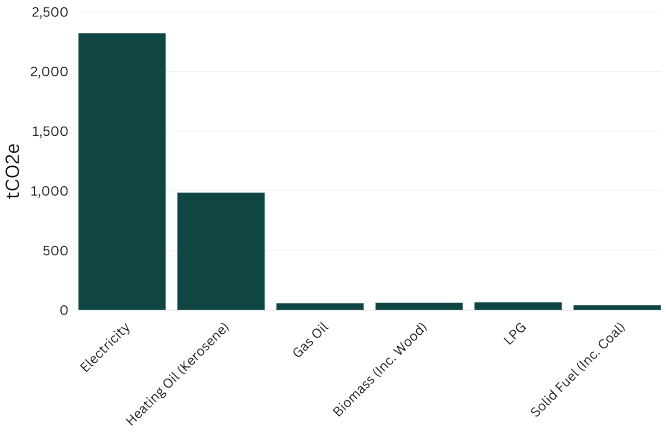


Figure 11. Bar chart detailing sources of emissions for the Cumbrae Energy sector as identified during the audit process.

The CES audit shows that electricitygeneration is the largest source of emissions attributable to Cumbrae in the energy sector. It accounts for 65.8% of the total 3,523 tCO_2e from this sector and up to 70% of which is believed to be from the domestic setting.

It should be noted however that domestic consumption estimates are assumed to include consumption from self-catering accommodation, which should be accounted under commercial and institutional energy. However, due to uncertainty as to the share of non-domestic housing, these are accounted for under residential energy until this information has been clarified.

6.2 Domestic Properties

It is estimated that more than 27% of households in Cumbrae are likely to be in fuel poverty, compared to 24% of Scotland as a whole[11]. The Home Analytics database combined with discussion with the local community, shows that older, traditional build housing stock, with dated heating systems that are costly and inefficient to run and poor levels of insulation are the reasons for this. It should be noted that these figures pre-date the recent energy price rises which is likely to have exacerbated the situation.

EPC Band	% Properties
A	<1%
B	1%
C	9%
D	19%
E	33%
F	27%
G	11%

Main Fuel Type		Percentage
Electricity	Heat Pumps	2%
	Storage Heaters	54%
	Room Heaters	16%
	Boiler	8%
Oil		16%
Solid/Biomass		1%
Other/Unknown		3%

Figure 12. Overview of the EPC Band ratings and heating system types in Cumbrae.

6.2.1 Existing Renewable Electricity Generation

As of 2019 Cumbrae had approximately 71kw of installed renewable capacity provided entirely by Solar PV installed on individual's homes. This is known to have increased recently, however, data is not yet available on new properties.

6.2.2 Proposed Photovoltaic Solar Farm at Wee Minnemoer Site

A planning application for a proposed photovoltaic solar farm with associated battery storage infrastructure was submitted by Comsol Energy Ltd. on Friday 10th February 2023.
Ref: 23/00114/PP.

At the time of writing, North Ayrshire Council planning have received a total of 290 public responses for the application, 5 of which support the application and 285 object to the application. Common themes of objections to the proposed Solar Farm are location, size, potential destruction of habitat and lack of community benefit.

Community engagement as part of the CNI project has shown that locals are keen to explore the feasibility of community owned energy generation at suitable locations on Cumbrae.

6.2.3 Community Engagement

During engagement sessions, members of the community were asked to prioritise some of the benefits that could come from a Carbon Neutral Cumbrae, identifying their first, second and third priorities. Over 45% of priorities identified fell into the categories of Lower energy Bills, Warmer homes or Lower Fuel poverty and over 22% as a top priority

Survey responses showed 48% of respondents felt they were unable to adequately heat their home with all but three of those respondents stating that they used either storage heaters or wet electric. Electricity costs were stated as the most common reasoning for this, however most respondents also quoted dated or inefficient heating systems and lack of or poor insulation. These figures along with the context of the cost of fuel crisis, suggest fuel poverty is significantly higher on Cumbrae than previous figures show

Responses to the survey also showed 32% of respondents, a much higher percentage of houses with wood burning stoves and open fires as a secondary source of heating than has likely been considered in the audit process. Further work is required to understand the full extent of this on Cumbrae.

6.3 Commercial and Institutional Properties

Whilst the carbon audit identified that over 16.6% of energy sector emissions (592 tCO_2e) were attributable to non-domestic properties in Cumbrae, it is almost certain that this figure is lower than actual levels, lack of data, along with self-catering accommodation assumed to be included within domestic energy figures and the likelihood of some smaller businesses on the island being miscategorised means that further work will be required to understand the full extent of non-domestic emissions on Cumbrae.

More Sustainable Business was not seen to be a priority by the local community during engagement sessions, however, this could be due to a smaller number of businesses represented at the sessions.

6.4 Community Climate Actions

Project	Priority	Timescale
Improve insulation in homes primarily within conservation area	High	Short (1 year)
Individual business carbon audits	High	Short (1 year)
Conduct feasibility of various local energy generation solutions	High	Short (1 year)
Better understand the full extent of wood burning stoves and open fires in use on Cumbrae and the types of fuel in use	Low	Short (1 year)
Upgrade to more energy efficient & cost-effective heating systems	High	Long (5+ years)
Community owned renewable energy generation	High	Long (5+ years)

7. Transport

Community Energy Scotland conducted an audit of the Transport sector on Cumbrae to develop a baseline greenhouse gas emissions study as part of the Carbon Neutral Island Project. Report dated March 2023.

7.1 Carbon Audit

The transport sector includes emissions from on-road traffic as well as ferries departing the island. Waterborne transport accounts for around 33% of emissions in this sector predominately due to the fuel powering the ferry, while around 66% of emissions come from on-road vehicles. The other 1% comes from other transport such as off-road vehicles and private boats shown in the graph below.

Other vessels include PS Waverley and smaller leisure craft; however, they make up only a very small percentage of the transport to and from the island.

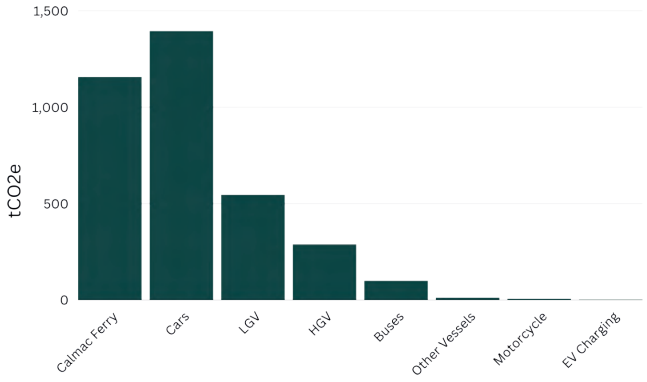


Figure 13. Bar chart showing a breakdown of CO2e emissions from the Transport sector.



18,393 nm	678,298 L (Marine Gas Oil)	1,156 tCO_2e

7.1.1 Largs - Cumbrae Ferry Route

The Cumbrae ferry service is provided by Caledonian MacBrayne (Calmac) operating the Largs – Cumbrae route. This is a direct route one nautical mile in distance that takes approximately 10 minutes each way.

Pre-COVID lockdown data from 2019 was deemed to be the most complete dataset for a typical year available at the time of the audit and has been used for this reason. During this timescale, Calmac operated 22,900 sailings on the route, consuming a total of 678,298 litres of marine gas oil and resulting in the emission of 1,156 metric tonnes of CO_2e attributable to Cumbrae. This accounts for approximately 33% of the total emissions from the transport sector, making this ferry the biggest single emitter on Cumbrae.

By its nature, waterborne travel includes journeys which occur entirely out with the island boundary of Cumbrae. GPC guidance requires that, for transboundary journeys, emissions associated with departing journeys only are attributed to the island. In the case of Cumbrae, which is the only island serviced by this route, there is an argument that all emissions from the ferry should be attributed to the island in future.

A request for a Strategic Transport Review for the ferry service on Cumbrae has been submitted to Transport Scotland by Cumbrae Ferry Users Group. Should this happen CNI Cumbrae would look to contribute to this.

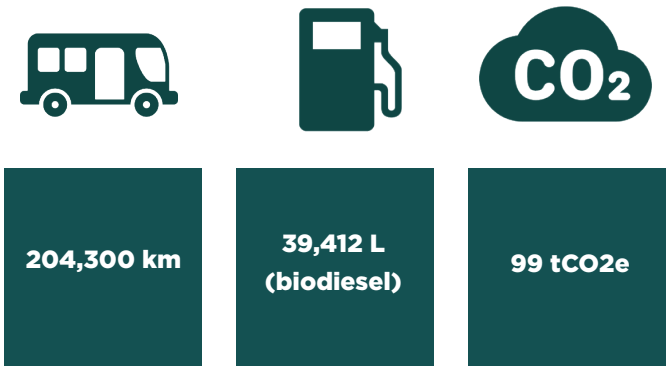
7.1.2 Local Bus Service

On Cumbrae, there is a single bus operator that provides services along a single route, roughly 14 kilometres from Quayhead at Millport Pier to Cumbrae Slip.

Millport Motors Ltd. underwent a detailed carbon audit of their business as part of the North Ayrshire Council "Green Islands Net-Zero Project" in 2022, and accounts for 99 tonnes of CO_2e annually[12] which is less than 3% of the total transport related emissions of Cumbrae.

Millport Motors are actively engaged in further improvements to the sustainability of their fleet and are likely to play a significant role in some of the priorities identified during community engagement such as the reduction of vehicle use on Cumbrae.

Survey responses from individuals during community engagement session indicate the most common reasons that someone is more likely to use a car when traveling to the ferry slip rather than the bus are cost, convenience, no nearby bus stop on the route and carrying shopping.



7.1.3 Electric Vehicles and EV Charging Points

Electric vehicles are well suited to island locations in many ways. Journey distances are usually short which means that the vehicle range is less of an issue. In addition, the absence of public petrol or diesel supply on Cumbrae means that vehicles must leave the island in order to fuel up, adding to the already extensive ferry traffic to and from Cumbrae and adding to vehicle running costs.

At present, however, the number of EVs on Cumbrae is limited to less than 3% of the total number of licenced vehicles. This is highly likely due to higher up-front costs and lack of local infrastructure.

Survey responses during community engagement sessions identified "Support for Electric Vehicles" as a priority for 58% of respondents.

7.2 Improved Walking and Cycling Routes

Community engagement sessions and survey responses have identified "improved walking and cycling routes" as a medium priority of the local community with 40% of respondents mentioning it in survey responses.

Sweco were previously appointed by North Ayrshire Council to look at options for an off-road cycle route between the Quayhead near Millport Pier and the Cumbrae ferry slip.

Phase 4 of the proposal from Sweco[13], recommended that an off-road cycle route between Field Studies Council Centre (previously Marine Biological Station) and Cumbrae Slip was prioritised, however,funding has yet to be secured for the project with an unsuccessful bid for SustransFunding as recently as February 2023

7.3 Community Climate Actions

Project	Priority	Timescale
Better understand the number of visitor cars being brought onto the island	High	Short (1 year)
Increase support for EVs on Cumbrae	Low	Short (1 year)
Reduction of vehicle use on Cumbrae	High	Long (5+ years)
More sustainable ferry travel to and from Cumbrae	High	Long (5+ years)
Improvement of walking and cycling routes on Cumbrae	Medium	Long (5+ years)

8. Agriculture

Aether were requested by Community Energy Scotland to develop a baseline study of the Agriculture sector of Cumbrae as part of the Carbon Neutral Island Project.

The report dated March 2023 details emission estimates calculated from national level data in addition to island specific data such as livestock numbers.

8.1 Carbon Audit

Within the agriculture sector, the main source of emissions arises from enteric fermentation, which are those deriving from the digestive systems of ruminant livestock. Other land management practices such as applying inorganic fertiliser, liming, and the decomposition of manure under anaerobic conditions also have an impact. These figures reflect the best available data and use local livestock numbers, but more work is required to verify findings.

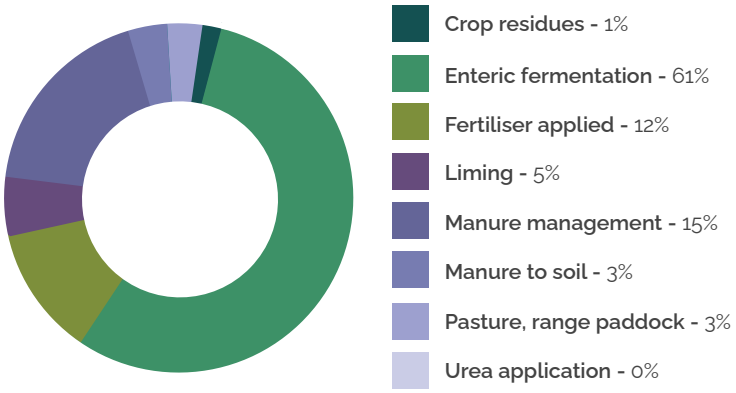


Figure 14. Pie chart showing the emissions related to the agriculture sector of Cumbrae[14].

8.2 Community Engagement

Community engagement on Cumbrae established no priorities specific to agriculture. However, it should be noted, that as major landowners on the island local farmers will play an integral role in any land based solutions. Further engagement with the agriculture sector on the island will be necessary to help identify any opportunities and challenges going forward.

9. Land Use, Land Use Change and Forestry

Aether were requested by Community Energy Scotland to develop a baseline study of Land Use, Land Use Change and Forestry (LULUCF) for Cumbrae as part of the Carbon Neutral Island Project.

The report dated March 2023 details emission estimates calculated using island specific data as far as possible, gap filling with local authority or national datasets where needed. Assessment of this area has to date been mostly desk based and it is important that this information is ground-truthed to provide additional certainty.

9.1 Carbon Audit

Overall, the LULUCF sector was found to be a carbon sink for Cumbrae with the majority of removals attributed to forest land, in particular living biomass present in forest land.

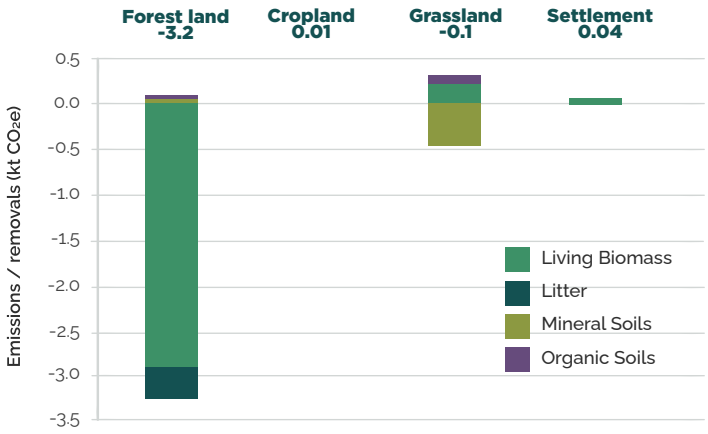


Figure 15. Emissions/removals from the LULUCF sector[14]

Uncertainties in the LULUCF sector are significantly higher than other sectors, which is the case at both national and local level. It is evident however that protecting woods on Cumbrae and encouraging new growth could be an important carbon sink in its journey to carbon neutrality.

9.1.1 Peatland

Three small areas of possible peatland have been identified on Cumbrae and categorised as "intensive grassland". The full extent of this peatland and its state of decay is currently unknown and requires further investigation.

9.2 Community Engagement

During community engagement sessions, "Habitat Restoration" was identified as a medium priority by those that attended. Discussions with NatureScot suggest that the potential for land-based nature-based solutions on Cumbrae is high.

9.3 Community Climate Actions

Action	Priority	Timescale
Ground truthing of land use data	High	Short (1 year)
Confirm full extent and condition of peatland on Cumbrae	Medium	Medium (2-4 years)
Protection of sensitive landscapes	High	Long (5+ years)
Restoration and growth of woodland areas & living biomass	Medium	Long (5+ years)

10. Blue Carbon (Marine)

Adler & Allan were requested by Community Energy Scotland to develop a 'Habitat Suitability Study' to derive models of potential Blue Carbon sites as part of the Carbon Neutral Islands Project.

The report dated March 2023 provides distribution maps of potential locations of existing blue carbon habitats on and around Cumbrae. The results are only an indication of potential habitats and need to be validated before an assessment of carbon stocks and the potential for sequestration in waters surrounding Cumbrae can be estimated. Further work will be necessary in this area.

10.1 What is Blue Carbon?

Several definitions of blue carbon exist. The Scottish Blue Carbon Forum defines blue carbon as the carbon captured and stored in marine and coastal ecosystems that accumulates over long timescales through natural processes (e.g. photosynthesis). Carbon is present in both inorganic and organic forms.

Blue carbon habitats are increasingly recognised for their potential as a marine nature-based solution, offering multiple co-benefits for climate mitigation, adaptation, and biodiversity. As a nature-based solution, blue carbon habitats are important in tackling climate change and, in conjunction with some terrestrial habitats, can help to reduce atmospheric carbon dioxide via natural sequestration/carbon capture.

In Scotland, blue carbon habitats include saltmarshes, seagrasses, kelp beds, biogenic reefs, and geological sedimentary stores, such as seafloor and sea loch sediments, and many of these are present in the coasts and seas around Cumbrae.

Blue carbon habitats are vulnerable to the impacts of climate change and human pressures and in a degraded state could in fact contribute to emissions. Therefore, actions in this area should focus on protection, restoration and enhancement of existing blue carbon habitats and should consider the potential to restore or create new habitats where appropriate.

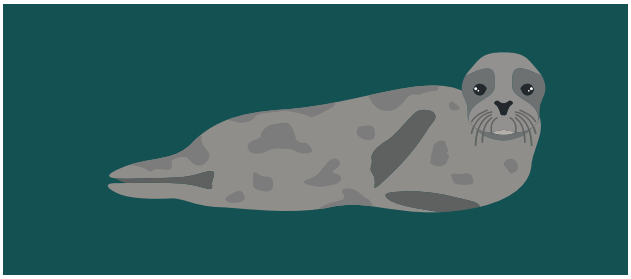
10.2 Blue Carbon Potential

To understand the potential of blue carbon habitats for climate change mitigation on Cumbrae, we need to calculate the contribution from Cumbrae's existing blue carbon habitats.

The focus of future work should be on the organic carbon stored in these habitats. This is because the formation of organic carbon leads to sequestration of CO_2 and the carbon stored remains vulnerable to human pressures. It is hugely challenging to calculate the impact of disturbance of organic carbon stores as the ocean carbon cycle is complex and many evidence gaps remain.

In contrast, the formation of inorganic carbon (calcium carbonate) in the marine environment does not reduce the amount of atmospheric carbon dioxide and physical disturbance of some inorganic carbon, for instance shell material, is not known to cause emissions. However, calcifying reef structures, such as maerl beds, are essential for biodiversity and can help to trap and protect organic carbon that may come from other sources. The role calcifying habitats play in climate mitigation is not currently well understood.

Due to current data gaps, including on the extent and condition of blue carbon habitats around Cumbrae's shores, the Adler & Allan baseline study is heavily based on 'predicted' blue carbon stores from habitat suitability modelling, a process that maps areas with the correct conditions for a habitat or species to exist. Ground-truthing of these habitat models will help to validate the predictions and improve the evidence base of habitat distribution and extent. This information can then inform a more accurate scoping of the potential contribution of blue carbon habitats to carbon sequestration and storage for the island.



10.3 Millport Coastal Flood Protection Scheme

Van Oord Dredging and Marine Contractors provided a breakdown of the potential carbon footprint for the Millport Coastal Flood Prevention Scheme at the request of Carbon Neutral Islands (Cumbrae) in a memo dated 20 February 2023.

The total estimated emissions from the project are 8,822 tCO_2e[16] however this does not include any resulting sediment displacement.

10.4 Community Climate Actions

Project	Priority	Timescale
Validation of modelling outputs for Blue Carbon habitats	Medium	Short (1 year)
Completion of Millport Coastal Flood Protection Scheme	High	Medium (2-4 years)
Protection of sensitive marine areas	Medium	Long (5+ years)
Restoration or Creation of key sequestrating habitats	Medium	Long (5+ years)

11. Waste and Wastewater Treatment

Aether were requested by Community Energy Scotland to develop a baseline study of the Waste sector for Cumbrae as part of the Carbon Neutral Island Project.

The report dated March 2023 details emission estimates calculated using island specific data as far as possible, gap filling with local authority or national datasets where needed.

11.1 Carbon Audit

The waste sector on Cumbrae is responsible for approximately 440 tCO_2e annually[14]. The majority of emissions calculated for this sector are due to landfill, equating to approximately 72% of emissions annually.

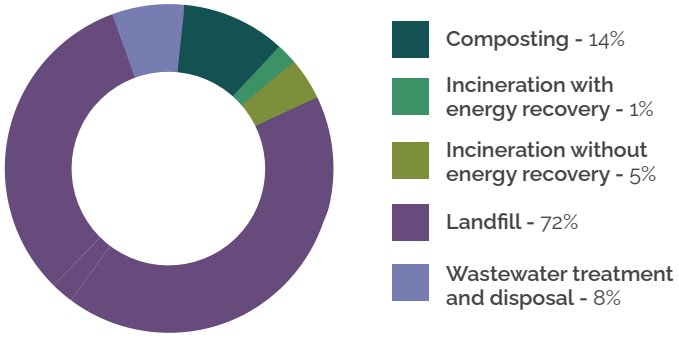


Figure 16. Emissions from the Waste Sector

11.2 Community climate actions

Survey responses from community engagement sessions indicate that 100% of respondents recycle household waste where possible, including food, paper, cardboard, glass & plastic with 62% indicating that they recycle batteries. Whilst it is acknowledged that North Ayrshire Council has an extensive household waste and recycling scheme on Cumbrae, feedback from the local community during the engagement process is that improvement is required in the recycling of larger items, particularly electrical appliances with many highlighting the difficulty of arranging and length of time to arrange disposal on the island with 7.5% of respondents to the survey stating this as a challenge Cumbrae would face on reaching Net-Zero.

Action	Priority	Timescale
Enhance zero-waste / closed loop recycling messaging on Cumbrae	Medium	Short (1 year)
Work with NAC to improve uplift and recycling of larger items, particularly electrical / white goods	High	Medium (2-4 years)

12. Cumbrae Youth

Cumbrae Primary School played an active role with the Carbon Neutral Islands project on Cumbrae throughout the carbon audit process and drafting of the CCAP. The children have shown great passion and knowledge on the subject of Climate Change, how it may affect Cumbrae and ways that Cumbrae could become carbon neutral by 2040.

Approximately 50 children from Cumbrae Primary met with the Cumbrae CDO to discuss climate change on Cumbrae, sources of carbon emissions and ways that we can all reduce and mitigate these greenhouse gasses.

As part of this Cumbrae Primary School came up with their own action plan.

Cumbrae Primary School Climate Action Plan
Reduce food waste by eating our meals
Walk or cycle to school (making use of newly installed bike shed at school)
Reduce and pick up litter, recycling where possible
Play outside more, rather than watching TV or playing with iPads
Use a blanket or jumper first if it gets cold
Turn off the lights when we are not in a room

Action	Priority	Timescale
Installation of weather monitoring station and ongoing engagement of Cumbrae Primary School	High	Short (1 year)
Shared knowledge and learning network for Cumbrae Primary School with other CNI project schools	Low	Short (1 year)
Engagement with secondary school aged children	Medium	Short (1 year)
Further engagement with Cumbrae Primary School within Science Technology Engineering Arts Maths (STEAM) framework	High	Medium (2-4 years)

13. Overview of Community Climate Actions

Sector	Action	Priority	Timescale
Energy	Improve insulation in homes primarily within conservation area	High	Short (1 year)
Energy	Individual business level carbon audits	High	Short (1 year)
Energy	Conduct feasibility of various local energy generation solutions	High	Short (1 year)
Energy	Upgrade to more energy efficient & cost-effective heating systems	High	Long (5+ years)
Energy	Community owned renewable energy generation	High	Long (5+ years)
Transport	Establish the number of visitor cars being brought onto the island and reasoning	High	Short (1 year)
Transport	Increase support and infrastructure available for EVs on Cumbrae	Low	Short (1 year)
Transport	Reduction of vehicle use on Cumbrae	High	Long (5+ years)
Transport	More sustainable ferry travel to and from Cumbrae	High	Long (5+ years)
Transport	Improvement of walking and cycling routes on Cumbrae, ensuring paths and roads are resilient.	Med	Long (5+ years)
LULUCF	Ground truthing of land use data	High	Short (1 year)
LULUCF	Confirm full extent and condition of peatland on Cumbrae	Med	Med (2-4 years)
LULUCF	Protection of sensitive landscapes	High	Long (5+ years)
LULUCF	Restoration and growth of woodland areas and living biomass	Med	Long (5+ years)
Waste	Improve zero-waste / closed loop recycling messaging on Cumbrae	Low	Short (1 year)
Waste	Improve uplift and recycling of larger items, particularly electrical / white goods	Med	Med (2-4 years)
Marine/ Blue Carbon	Validation of modelling outputs for Blue Carbon habitats	Med	Short (1 year)
Marine/ Blue Carbon	Completion of Millport Coastal Flood Protection Scheme	High	Med (2-4 years)
Marine/ Blue Carbon	Protection of sensitive marine areas	Med	Long (5+ years)
Marine/ Blue Carbon	Restoration or Creation of key sequestrating habitats	Med	Long (5+ years)
Cumbrae Youth	Installation of weather monitoring station and ongoing engagement of Cumbrae Primary School	High	Short (1 year)
Cumbrae Youth	Shared knowledge and learning network for Cumbrae Primary School with other CNI project schools	Low	Short (1 year)
Cumbrae Youth	Engagement with secondary aged children	Med	Short (1 year)
Cumbrae Youth	Further engagement with Cumbrae Primary School within Science Technology Engineering Arts Maths (STEAM) framework	High	Med (2-4 years)

14. Next Steps

The CNI project will proceed to cost the implementation of the Community Climate Action Plan and will develop a community investment strategy to help fund the actions where necessary.

What: While some of the actions are already clearly defined others may need further discussion to understand what is needed to achieve the desired outcome.

Who: While the CCAP is intended to benefit the whole community, specific actions will require a range of different actors. These include:

- Individuals within the community
- Community organisations
- Private businesses
- Local Authorities
- Statutory Bodies
- Scottish (and wider) Government
- Other networks of interested parties and communities

Most actions will require the different actors to collaborate, and building partnerships will be an important part of the process, along with a potential need to influence others.

How: It is important that actionsare led by and for the community. This will likelyinvolve leading on immediate actions, taking advantageof any potential "quick wins" available, workingon longer plans and investment strategies and exploring opportunities for collaborations which will allow the Cumbrae community to lead, and work with others, to begin making tangible progress towards their own local vision of a decarbonised future. The CDOs have been an integral part of this projectand its progress.

The resources required to deliveron this vision are likely to be substantial, andthe Investment Strategies will consider anddescribe in detail how best to utilise funding from differentsources including:

- Local and external sources
- Existing public funding
- Public-private partnership
- Private investment

When: Having identified the timescale for each action it will be important to map out a timeline for implementation. Some actions may be achieved quickly while others may take longer and require different stages of activity

15. Review of Actions

The Community Climate Action Plan is intended to be a living document reviewed and updated locally by the Cumbrae Community Development Officer as the project progresses.

It is suggested that a review of the plan is conducted by the CNI steering group on Cumbrae regularly to reflect on progress and update or amend identified actions in line with any changes to the island's circumstances. Engagement with the wider Cumbrae community on changes may be necessary as deemed appropriate by the CDO and steering group.

CNI Community Development Officer (Cumbrae) Contact details	
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11. North Ayrshire Fuel Poverty Statistics 2019
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15. Blue Carbon Baseline Study – Cumbrae (Adler & Allan) - March 2023
16. Carbon footprint of Millport Coastal Flood Prevention Scheme (Van Oord) Memo dated 20 February 2023

Carbon Neutral Islands 2023

Cumbrae