Orkney Islands Council

Net Zero Transition

Executive Summary

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Overview

Aether has been commissioned to provide Orkney Islands Council (OIC) with independent advice on the actions it can take to reduce its impact on climate change and identify indicative organisational pathways towards net zero. This report presents information on the current scale of annual greenhouse gas (GHG) emissions arising from the operations carried out by OIC. It then describes potential future scenarios that account for a range of interventions and GHG reduction measures. This report is not intended to represent a final position or Climate Strategy for the Council at this stage. Rather it is intended to present evidence on priority actions that OIC can take to meet national and local climate change targets while supporting a wider shift to a low carbon economy. Further work, including cost-benefit analysis and financial appraisal of specific projects and programme actions, will need to be undertaken by the Council as a next step.

The study included a range of research tasks, the findings of which have been provided to OIC in the form of separate interim reports.[1] This document consolidates key findings from the entire project, with information presented in the following order.

- **Section 1**, the introduction, addresses questions such as 'Why it is important to take action on climate change?' and 'What is the policy context?', and defines key terms used in GHG accounting.
- **Section 2** describes OIC's current GHG emissions baseline and data sources.
- **Section 3** models future greenhouse gas emissions and presents the Business As Usual (BAU) and potential emissions reduction scenarios.
- **Section 4** presents priority interventions for Net Zero and outlines measures for consideration by OIC.
- **Section 5** describes opportunities for OIC to compensate for any remaining emissions, sometimes called 'offsetting' or 'insetting'.
- **Section 6** provides a summary and conclusions.
- The **Appendices** provide further detail on the modelling assumptions and methodology used as part of this project.

Please refer to the main report, ***'Orkney Islands Council: Net Zero Transition'*** (Aether, 2026), for additional information.

[1] In this document, section headings also indicate (in brackets) the task number as defined in the original Invitation to Tender (ITT).

1 Introduction

There is an overwhelming scientific consensus that human activities are causing global temperatures to increase, with serious knock-on effects for our atmosphere, land and oceans. The UK Climate Change Risk Assessment (2022) identified 61 risks and opportunities for Scotland[2] including:

More severe and frequent storms and flooding

A greater risk of wildfires and heatwaves

Rising sea levels and coastal erosion

Food safety and food security issues

Other changes in the ecosystem that pose a risk to agriculture and fishing

Cascading failures for infrastructure networks (water, energy, transport, ICT)

Governments around the world have acknowledged the urgency of this problem and are now seeking to limit the damage. This can be done both by (a) reducing greenhouse gas (GHG) emissions, to limit the overall temperature rise and therefore limit even more extreme climate change, and (b) making sure that our communities, economy, and infrastructure are resilient to the changes that are already underway. This study focuses on point (a), which is referred to as GHG mitigation.

In July 2019, OIC declared a climate emergency, and reaffirmed the priority to work towards a carbon neutral economy. OIC's climate change ambitions sit within the context of a variety of national and international treaties and legislation, such as:

- The 2016 Paris Agreement, which commits signatories to pursue action to limit global warming to 2°C, with an ambition of keeping it below 1.5°C.
- The Climate Change (Scotland) Act 2009, as amended in 2019, which sets a legally-binding GHG reduction target for the whole country to reach net zero emissions by 2045 at the latest.

All Scottish Local Authorities have a duty[3] to take action on climate change in support of this national target and report[4] their progress under the Climate Change (Duties of Public Bodies: Reporting Requirements) Amendment Order 2020. Orkney Islands Council reports to the Scottish Government each year in accordance with these requirements, with the latest submission reported in November 2025.

[2] https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Scotland-Summary-Final-1.pdf
[3] https://www.legislation.gov.uk/ssi/2020/281/made
[4] https://sustainablescotlandnetwork.org/ssn-manual/reporting

The services that OIC provides, and the potential solutions that it could adopt to mitigate GHG emissions, are almost unique among UK Local Authorities due to the islands' remote nature which often demands additional infrastructure, resilience and forward-planning. Although OIC is embracing this challenge, the Council has acknowledged that they are currently "below the pace required within recognised net zero aligned approaches."[5] There is therefore a need for further, accelerated action.

Note: GHG accounting terminology

In GHG accounting, it is standard practice to group emissions into different categories or 'scopes'. This is done in order to clarify which sources of emissions arise directly or indirectly from an organisation's activities, and which ones they have the most control over. The table below provides definitions of scopes, with relevant examples for OIC.

Scope	Definition	Examples
Scope 1	Direct GHG emissions from sources owned or controlled by OIC	Burning fossil fuels within Council buildings e.g. oil boilers or petrol and diesel in fleet vehicles
Scope 2	Indirect GHG emissions from the consumption of purchased electricity, steam or other sources of grid-distributed energy	Electricity used across the Council estate – council offices, EV charging points and street lighting
Scope 3	Other GHG emissions that occur indirectly from OIC's activities	Emissions from staff working from home and commuting, or from operations which are run by a third party (e.g. Pickaquoy Leisure Centre or from waste disposal).

2 OIC's GHG Emissions Baseline (Tasks 1 and 2)

At the start of the project, the Aether team conducted an independent review of OIC's current GHG accounting approach and an officer-led re-scoping exercise. Aether's review was conducted with reference to core principles of GHG accounting: transparency, relevance, accuracy, consistency and completeness.

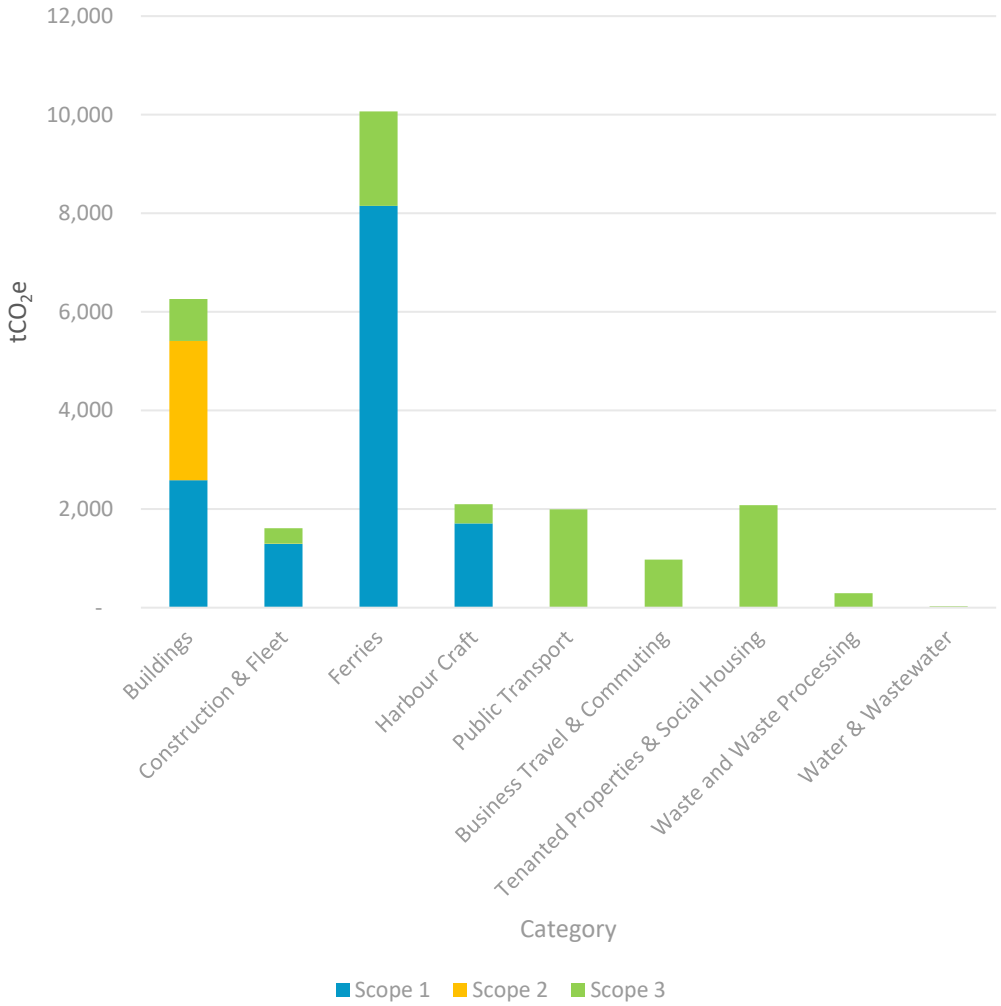
Through this process, it was evident that OIC has relatively advanced in-house procedures for GHG accounting, and that a considerable amount of detailed consideration had been given to the GHG inventory re-scoping. That puts the Council in a very good position to undertake more detailed climate action planning going forward. The review identified some areas for improvement, primarily in relation to the need for further documentation, which would improve transparency and ensure that the inventory can be maintained in the event of staff changes etc.

Based on those recommendations, a GHG emissions baseline for 2023-24 was then calculated by OIC and supplemented with information from Aether.[6] The results indicate that OIC's annual emissions are approximately 25,411 tCO_2e. The bar chart below shows emissions grouped by category and scope.

[5] https://www.orkney.gov.uk/media/akqorobh/item-24-climate-change-strategy.pdf

[6] 2023-24 was the most recent year for which data were available at the time the analysis was prepared. The time lag is not considered to have any material impact on the recommendations in this study as the strategic interventions still apply.

Figure 1. OIC 2023-24 baseline emissions sources by scope



Note that, although the scope of the baseline presented in this study is broadly similar to recent annual GHG reports published by OIC, there are some differences. The main ones are:

- The inclusion in this study of emissions from Orkney College, which are grouped within the 'Buildings' category in the above chart but do not significantly impact the results;
- A change to the emission factor for waste sent to landfill (i.e. a correction to better account for waste streams in Orkney compared with other Scottish Authorities), which results in emissions per tonne of waste sent to landfill; and
- The inclusion of additional well-to-tank emissions for fuel use, which results in emissions from buildings, vehicles, ferries and harbour craft appearing higher in this study.

3 Modelling future GHG emissions (Tasks 3 and 4)

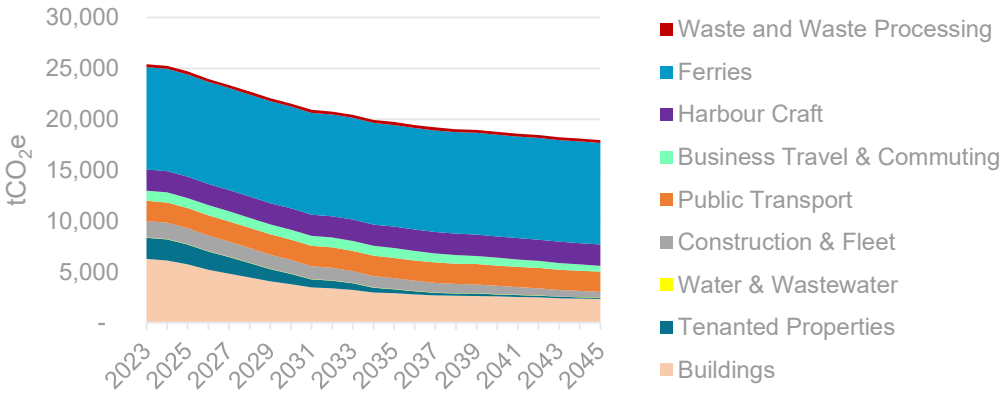
3.1 Future emissions in a 'Business as Usual' scenario (Task 3)

Future GHG emissions have been estimated under a 'business as usual' (BAU) scenario. BAU measures include planned and committed projects that are definitely or highly likely to occur. They were identified through a process that included a policy review and workshops with OIC officers. The BAU acts as a counterfactual against which the GHG impacts of alternative, more ambitious net zero scenarios can be compared.

The BAU measures that have been modelled include, but are not limited to: capital works to buildings and LED lighting upgrades described within OIC's existing Carbon Management Plan (CMP), substituting combustion engine vehicles with electrically powered alternatives as part of the natural fleet replacement cycle, reductions in waste arising, upgrades to existing housing and construction of new housing, and decarbonisation of the national electricity grid.

Results of the BAU analysis indicate that emissions would drop by up 15% by 2030 and 29% by 2045, as illustrated in the graph below. The majority of this change is due to decarbonisation of the national electricity grid, which would reduce emissions by 20% by 2045 with no further intervention by OIC (beyond the above BAU actions). The remaining 7% reduction is attributed to the impacts of other planned and committed BAU measures, including but not limited to building refurbishments, heating system upgrades, estate rationalisation, and replacing some vans with electric vehicles (EVs).

Figure 2. Business as usual emissions to 2045



The BAU analysis highlights that, although OIC has committed to many beneficial GHG reduction measures, reaching net zero will require a significant increase in ambition and an accelerated pace of action, which will require greater levels of investment.

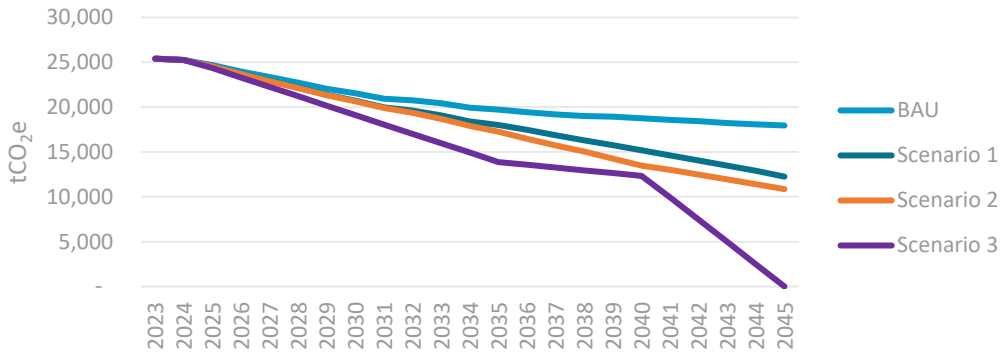
3.2 Decarbonisation scenarios

OIC has already explored a wide range of additional GHG mitigation measures, set out in documents such as the Carbon Management Plan. Those options were reviewed and supplemented with additional suggestions from independent experts within Aether. The impacts of those measures were modelled to evaluate three potential decarbonisation pathways for OIC, representing different levels of ambition on climate change.

The modelling results show that there are opportunities to significantly reduce emissions in the short to medium term. The overall GHG reduction that can be achieved, based on currently available solutions and mature technologies, is estimated to be approximately 50-60%. This assumes full decarbonisation of buildings, buses, vans and staff commuting or business travel by car. With partial electrification or hybridisation of ferries and aviation, the reduction could be higher, around 65%.

Mitigating the remaining emissions will rely on technological advances in sectors such as marine transport, aviation, and waste, along with carbon capture and storage (CCS). In these cases, the timescales are uncertain and outside OIC's ability to control, but OIC can play an influential role by continuing to show leadership and a willingness to explore and test new technologies.

Figure 3. Comparison of total GHG emissions in each scenario modelled



Given its operational emissions profile, a key risk for OIC is technological 'lock in' across ongoing procurement and replacement/upgrade work. This includes purchasing new fossil fuel-based heating, vehicles and marine vessels along with public transport contracts. Unless OIC intends to replace or retrofit these again before 2045 (or an alternative net zero target date), the council will not be able to decarbonise those sources of emissions by then.

In the Invitation to Tender (ITT), OIC requested that one of the decarbonisation pathways 'must be aligned to a 1.5 degrees Science-Based Targets approach.' This analysis suggests that OIC would not be able to achieve the scale of near-term GHG reductions needed to comply with such an approach. This is primarily due to the challenge of decarbonising the ferry fleet which has a large impact on the calculations. However, near-term reductions are possible for other sources of emissions, such as buildings and road vehicles. OIC can still demonstrate a high level of ambition by bringing forward those mitigation measures.

Note: The importance of net zero targets vs. actions taken in the meantime

From an environmental perspective, it is not just the emissions in a given target year, but the pace of change that is also important. This is because climate change is driven by cumulative emissions rather than emissions at a single point in time.[7] A slower pace of decarbonisation allows more carbon to build up, making it harder to stay within safe temperature limits. Therefore, rapid and sustained emissions reductions are essential to limit total atmospheric GHG concentrations and avoid breaching critical climate thresholds.

For these reasons it is recommended that OIC should:

- Seek to accelerate GHG reductions for sources of emissions that *can* be addressed using existing solutions, i.e. aim for the highest ambition scenario;
- Review its existing capital, operational and maintenance plans to identify and avoid the highest risks of technological lock-in;
- Horizon scan forthcoming and emergent solutions likely to be available in the coming decade and continue to trial/seek innovation funding; and
- In addition to a headline 'net zero by X year' target, consider adopting GHG decarbonisation targets that focus less on headline GHG reductions and more on the question, 'Is the Council doing the very best it practically can to address each source of emissions?'

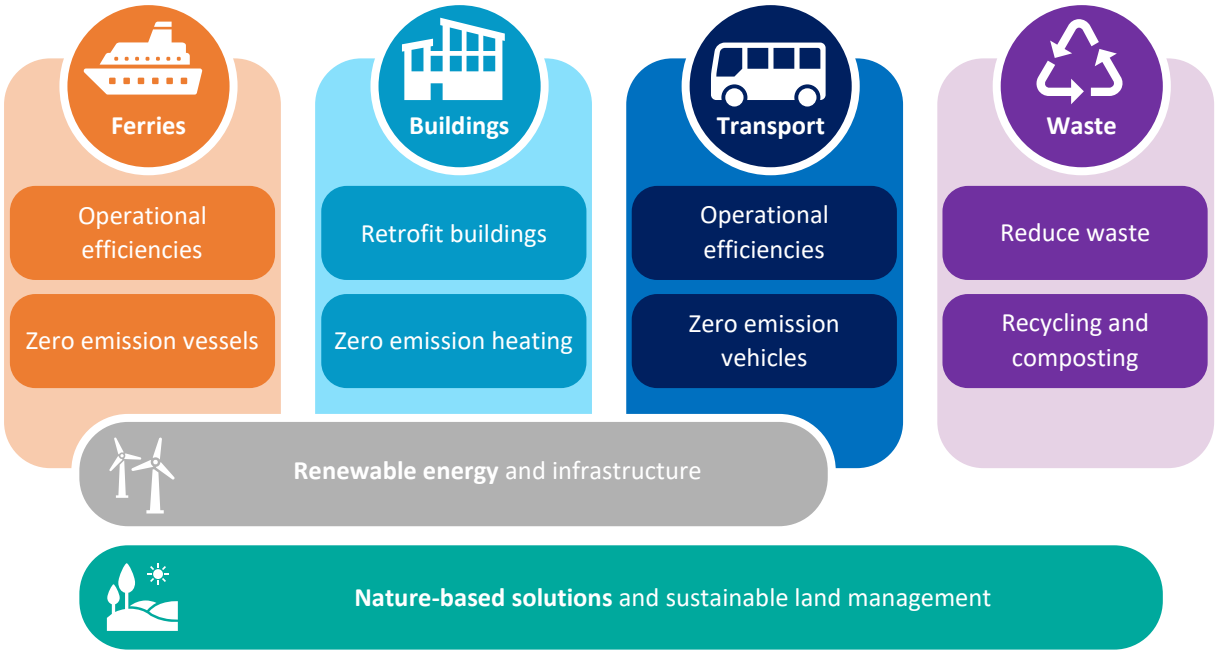
[7] https://www.theccc.org.uk/wp-content/uploads/2025/02/The-Seventh-Carbon-Budget.pdf

4 Priority interventions for net zero

Based on this analysis, the top 3 GHG mitigation priorities for OIC can be summarised as:

1. Decarbonising marine services, including ferries, harbour craft and tugs
2. Decarbonising buildings, including OIC-operated and tenanted properties
3. Switching to an electric vehicle OIC fleet and for contracted bus fleet / public transportation services

These are all part of a wider theme, which is phasing out the use of fossil fuels – a transition that will require a combination of energy demand reduction, renewable energy supply, and supporting infrastructure in order to be successful.



A more detailed description of the priority measures, including (where possible) estimated capital costs and operational costs/savings, is provided in **Sections 3 and 4** of the main body report and supported by further information in the technical **Appendices**. Although the gross costs are high, it is important to note that the net costs are expected to be significantly lower. Evidence from organisations such as the UK Climate Change Committee indicates that the transition to a net zero economy will provide substantial direct, financial benefits and cost savings, particularly for households who will see significant long-term savings. There is also a cost of inaction; for example, damage to property, infrastructure, and human wellbeing associated with extreme weather events. Near-term action is essential to mitigate these risks.

Section 6 (the conclusion) of the report summarises key recommendations in tabular form.

Achieving these outcomes will require changes in OIC's organisational ways of working, with consideration given to the council's legal obligations, public commitments, and the wider cost of societal inaction. For example:

- Ensuring that the climate change agenda which has been established in the Council's Corporale Plan as a priority, is championed by the Council's Corporate Leadership Team, with relevant net zero transition measures being integrated into service area delivery plans

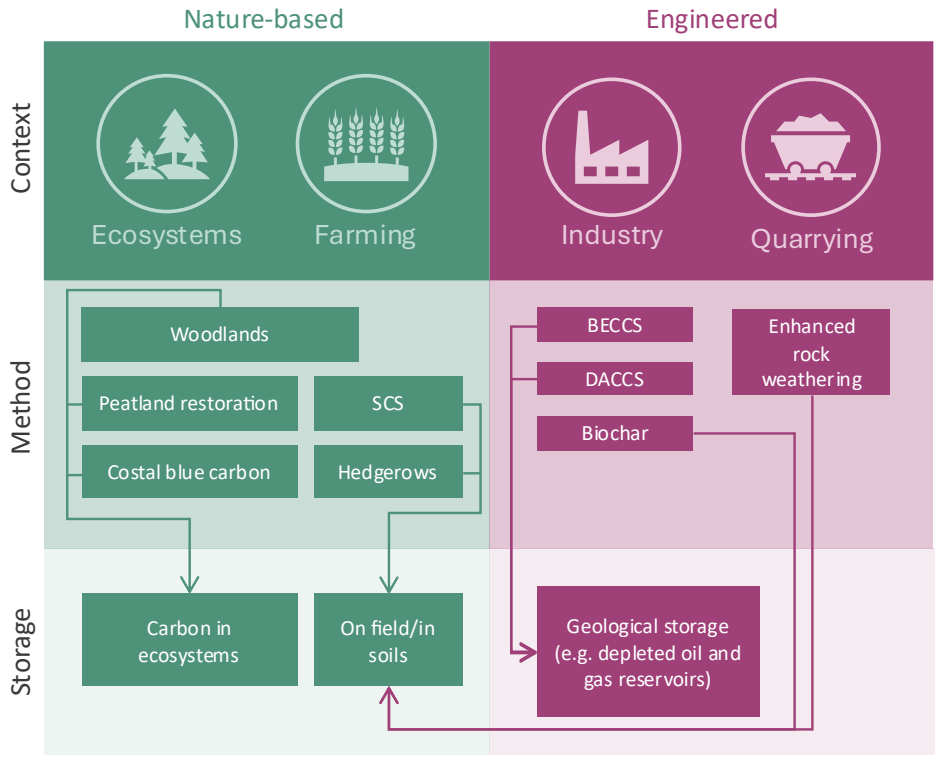
to ensure that it is considered a day-to-day priority rather than an intangible, longer-term ambition that can be postponed.

- Re-assessing the way funding is allocated and budgets are set, ensuring these can accommodate the expected near-term cost uplifts associated with some decarbonisation measures and recognising that these may reduce operational costs or avoid the financial burden of offsetting in future.

The push for net zero should also be considered as part of a wider response to climate change that needs to incorporate adaptation and resilience alongside GHG mitigation. This is particularly important given Orkney's island context and vulnerability to climate change. When implemented correctly, there are important societal, economic and environmental co-benefits that can be realised through this approach, such as: providing skills and green jobs, improving health and wellbeing, biodiversity, sustainable resource use, climate resilience, air quality, and potential to support wider research. A summary of key co-benefits for different types of mitigation measures is presented in **Section 4**.

5 Neutralising and compensating for residual emissions

The modelling presented in this report shows that, even after accounting for a range of mitigation measures, reaching net zero GHG emissions will remain challenging for OIC. In 2045, there are likely to be substantial residual emissions, potentially in the order of 11-12 $KtCO_2e$, which provides important context when considering the scale of GHG reduction from offsetting/insetting projects. This study has therefore examined different ways that the council could compensate for ('offset' or 'inset') any remaining GHG emissions, primarily focusing on project types that could be undertaken within the locale of Orkney. It explores a variety of Nature-Based Solutions (NbS) and engineered carbon dioxide removal (CDR) methods, which are illustrated in the diagram below.



The main opportunities across Orkney as a whole are likely to involve peatland restoration, with secondary opportunities in tree planting (either as individual trees/small groups, woodland creation,

or hedgerows), and implementing sustainable agricultural practices. Mapping provided by OIC indicates that tree planting could potentially be the main form of project opportunity on council-owned land. In terms of engineered carbon dioxide removal (CDR) project opportunities, this report has also identified that there is theoretically potential for direct air carbon capture and storage (DACCS) on Orkney in future once the technology is more mature.

The GHG reduction impact of NbS projects, in terms of tCO_2e saving per hectare (ha) of land, will likely be small compared to the scale of residual emissions from the council. If implemented correctly, NbS can provide wider environmental benefits in terms of biodiversity, habitat creation, and climate resilience. Therefore projects should be seen as complementary to direct GHG mitigation.

Offsetting/insetting is often described as a 'last resort' which should only be pursued after all other options for direct GHG removals have been exhausted. They are not a substitute for direct GHG reductions. However, NbS take time to plan and implement, and the habitats take time to mature. Therefore, OIC will need to start planning for NbS now – in parallel with its other mainstream decarbonisation initiatives – if it wishes to realise the GHG benefits in future years.

6 Conclusion

OIC has a very good foundational understanding of GHG mitigation and has already implemented a number of GHG reduction projects. The Council Plan and Delivery Plan establish climate change as a high strategic priority, but the key next step is to ensure that it is fully embedded in both day-to-day operational decision making and longer-term planning and budgeting.

This report provides a baseline appraisal of the challenges and opportunities available to the Council to achieving net zero. The analysis is informed by industry standard methodologies which have been applied to the Islands context and take into consideration the specific operational realities that the Council will face. It presents a strong evidence base and recommendations, from which the Council can now undertake further more detailed work, including cost-benefit and financial appraisal of project and programme actions.

Reaching net zero will require a high level of ambition and significant changes in the way that the council makes strategic decisions and operates day-to-day. This presents a uniquely complex challenge for the Council, shaped by the realities of island life, such as in-built higher energy and logistics costs and the need to maintain resilient connectivity across land and sea to provide lifeline services to dispersed communities. On the positive side, Orkney has a strong heritage in low carbon innovation and there are economic opportunities for communities and organisations taking a lead. The council is in a good position to continue to collaborate with decarbonisation partners and to engage with innovative solutions ahead of the curve. This report presents a high ambition GHG reduction scenario that OIC can aim towards, alongside recommendations on strategic leadership and management actions.

At the same time, there is a broader picture to consider: Climate change itself, along with the transition to net zero, will not only affect OIC's services, but have wider social and economic impacts on Orkney as a whole. Going forward, it is important for OIC to continue to pursue a twin track of GHG mitigation and adaptation planning. This will give the best chance of minimising the impacts of climate change and delivering the greatest benefits for the community.

A full list of recommendations for OIC is provided in **Section 6** of the full report.