SCOTLAND BEYOND NET ZERO

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Seed Fund 2024-25 Impact Report

September 2025

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FOREWORD

As we navigate the journey towards sustainability, the Seed Fund has emerged as a beacon of innovation and collaboration for Scotland Beyond Net Zero (SBNZ). This flagship initiative, offering up to £15,000 for partnerships between SBNZ members and external partners like business, government and community groups, has proven instrumental in propelling Scotland towards its ambitious climate goals.

We would like to thank the participating SBNZ members for their contributions to the 2024 fund, which has awarded £161,119 across eight collaborative projects between academia and society, laying the groundwork for transformative change. We would also like to thank applicants from across our coalition – who submitted many more excellent proposals than could ultimately be funded - indicating the depth and breadth of research strengths across Scotland's Universities. Our thanks also extend to colleagues who reviewed the applications. This collaborative model has been a cornerstone of our success, fostering rich exchanges of knowledge and expertise.

Projects from the 2024 cohort, now reaching their conclusion, have delivered substantial impact. The projects have generated new scientific and social insights, influenced policy at multiple levels, and spurred interdisciplinary advancements. From pathways to commercialisation, providing innovative data to enhance policy-making, to rich knowledge on climate justice in Scotland, their contributions have been far-reaching. These projects have fortified SBNZ's mission, enhancing Scotland's research and innovation impact.

Thank you for taking the time to read about the projects the SBNZ seed fund has supported. The following sections offer a detailed summary of the eight seed fund projects from 2024, highlighting their impacts and showing their paths forward. Together, we advance towards a future beyond net zero—innovative, sustainable, and collaborative.

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PROJECTS FUNDED 2024-2025

Clean Energy from Non-Recyclable Plastic Waste

The challenge: This research addresses a dual challenge – the growing issue of non-recyclable plastic waste, and the need to increase clean energy sources such as hydrogen. Many plastic items produced cannot be recycled and so end up in landfill or discarded in the environment. Scotland has national strategies in place to reduce waste and promote a circular economy, as well as deploy hydrogen as a source of clean energy.

Image shows plastic waste – much of which cannot be recycled due to its chemical composition

The project: This collaboration between Dr Yeshui Zhang, a lecturer in the School of Engineering at the University of Aberdeen, Dr Oxana Magdysyuk, Scientific Officer (Powder X-ray Diffraction) at the University of St Andrews' School of Chemistry and Green H2 Energy has developed a way to optimise hydrogen production from non-recyclable plastic.

How the fund helped:

- *New scientific insights:* This project has generated new understanding of the catalytic process involved in converting non-recyclable plastic into hydrogen, drawing on the specialist strengths of each university. The project performed multi-functional analyses

using specialist equipment (fixed bed reactors) at the University of Aberdeen, then brought the chemical catalysts to St Andrews for specialist analysis.

- *Commercial application:* This has provided a route for the cost-effective and scalable upcycling of some plastics, with industrial and commercial applications. In turn, this could lead to further high-value jobs in the circular and net zero economy in Scotland.
- *Career development:* This project trained two PhD students in the experimental techniques used, equipping them with distinctive and high-value skills.

Next steps: This research has been submitted to two scientific journals and will be shared in stakeholder workshops. The collaboration will apply for further funding (RSE Research Collaboration Grant and Catalysis Hub Research Project 2025).

The UK Co-Benefits Atlas: Open, Interactive, and Visual Presentation of Co-Benefits Analysis for Achieving Net Zero

The challenge: Action and investment to address climate change brings additional social value, such as warm and dry homes, better heath from active travel, clean air from reduced air pollution, and cheaper energy bills. However, these co-benefits can be hard to quantify as the data that supports them is fragmented.

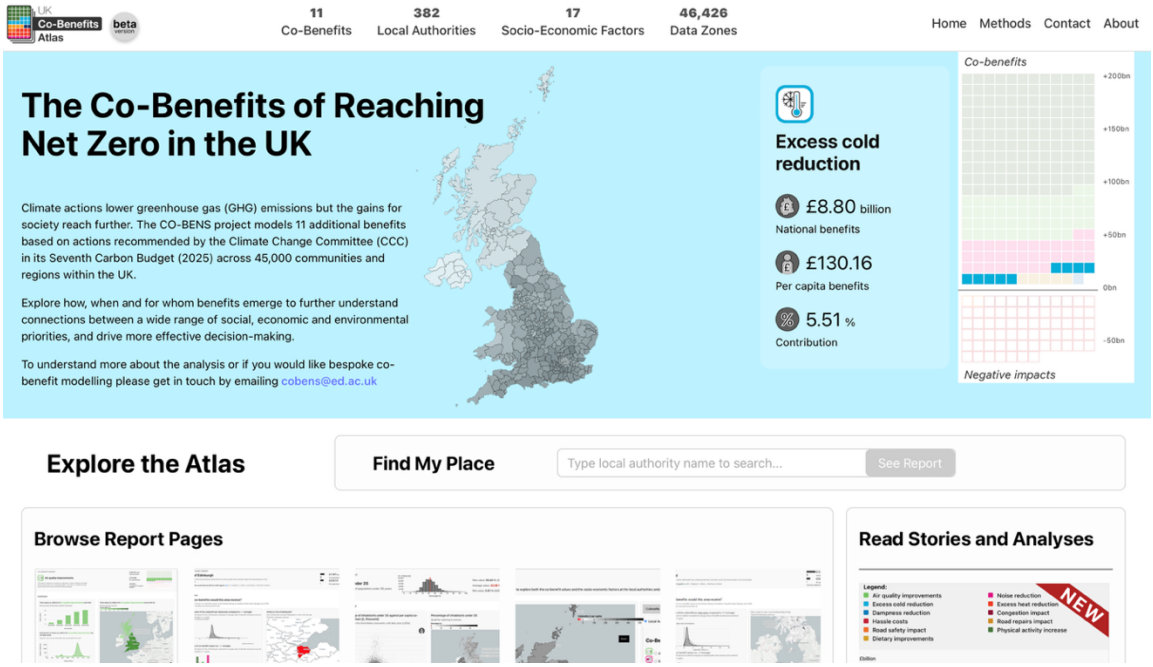

Image shows front page of UKCBA – an interactive website showing the social value of climate change investment by local authority area across the UK

The project: Dr Andrew Sudmant, Data Programme Manager, Climate Partnerships and Sarah Bisset, Projects Officer, Climate Partnerships, both from the Edinburgh Climate Change Institute partnered with Dr Benjamin Bach Lecturer in Design Informatics and Visualisation at the University of Edinburgh and Dr Sean Field, Director of Policy at the Centre for Energy Ethics at the University of St Andrews, in collaboration with data sources such as the UK's Climate Change Committee to create the UK Co-Benefits Atlas (UKCBA). UKCBA makes co-benefits data and analyses more accessible, understandable, and useful for businesses, investors, researchers, third sector organisations and policymakers across Scotland and the wider UK. The project involved developing the Atlas and working with potential users such as governments and local authorities to ensure the Atlas works for them.

How the fund helped:

- *Sharing knowledge:* The fund supported the team to share the Atlas with more than 150 local authorities since the launch of the Atlas through a launch event with Ashden and 6 public workshops.
- *Direct policy impact:* The numbers from the Atlas are being used by the Scottish government in its soon to be released climate action plan. The Atlas is also being built into the work of the Scottish Climate Intelligence Service and the work of Ashden UK, an environmental charity for local governments.
- *Highlighting best practice*: The Atlas was mentioned as best practice for social impact valuation by Manchester City Council in their recent tender, demonstrating the impact of Scottish innovation in climate data.
- *Advancing researchers' careers*: Ruaidhri Higgins-Lavery is submitting a proposal for a PhD based on the Atlas, Sian Philips PhD will draw on the Atlas, Jinrui Wang is pursuing a PhD in part around the work of the Atlas and lead designer Alexis Pister has realised a lecturer position in part built on his work with the Atlas.

Next steps: The team has submitted follow-on bids to Vattenfall UK (submitted), The Scottish Government through ClimateXChange (accepted), UKRI (submitted), Manchester City Council (submitted). It has also shared the work across Universities at conferences, and submitted two papers to high-ranking journals.

Beyond Net Zero: A Framework for Natural Capital Markets in the Marine Environment

The challenge: The Scottish Government wishes to protect marine environments from pressure from climate change, habitat degradation, and competing marine uses, while at the same time facilitating responsible private investment. We therefore need a framework to enable private finance to invest in marine resources while protecting ecologies and ensuring social benefits.

The project: Led by Dr Katherine Simpson, Lecturer in One Health and Environmental Economics at the University of Glasgow and Prof. David Paterson, Executive Director of the Marine Alliance for Science and Technology for Scotland (MASTS) at the University of St Andrews, this project partnered with NatureScot to explore the emerging topic of coastal and marine natural capital markets. The project also would like to thank collaborators David Bailey, Laurence De Clippele, Jason Matthiopoulos, Nicola McMeekin, Natasha Walker-Milne from the University of Glasgow, Emma Defew from the University of St Andrews and Chris Leakey from NatureScot. The project has laid the groundwork for longer-term structural change in Scotland's approach to nature finance.

Image shows participants at a workshop on marine natural capital in May 2025
Photo credit – Katherine SImpson

How the fund helped:

- *Policy and governance*: This project supported the Scottish Government's Private Investment in Natural Capital (PINC) programme to meaningfully consider the marine and coastal environment. It created marine investment principles which are a starting point for conversations of future codes, licensing conditions, and governance frameworks between —NatureScot, Scottish Government, and Crown Estate Scotland.
- *Longer term policy development*: The principles developed by the project could support the development of new codes and standards ensuring high-integrity, inclusive, and transparent marine markets that contribute to Scotland's biodiversity and climate goals.
- *New insights into knowledge frameworks*: The project has clarified the urgent need for marine-specific metrics, baselines, and benefit-sharing models.
- *Social insights*: The project demonstrated that marine nature finance is not only a technical challenge but also a deeply social one—raising issues of equity, access, and community benefit. It helped ensure these social dimensions were embedded in the draft principles, reducing the risk of repeating mistakes from land-based markets where communities were often sidelined.
- *New interdisciplinary conversations and networks* have emerged within the MASTS community, linking marine science with social science, law, and ethics. These groups are now exploring follow-on research on governance, benefit-sharing, and ethical safeguards.

Next steps: This project has substantial plans for next steps including sharing a policy brief with the Scottish Government, regulatory bodies, and stakeholder networks, as well as presentations at upcoming MASTS and SBNZ events. It has applied for two PhD projects (pending NETGAIN funding) focused on interdisciplinary research in marine nature finance. The team will continue collaborating with NatureScot, the PINC Programme, and the Marine Directorate to integrate coastal and marine principles into governance frameworks.

Rural District Heating Symposium

The challenge: Decarbonising home heating is a major challenge for Scotland's net zero strategy. Rural homes often rely on hard-to-decarbonise sources such as oil, and heat pumps often cannot be used in rural properties. Rural households also can suffer from energy poverty.

The project: This collaboration between Dr Keith Baker, Research Fellow in Fuel Poverty and Energy Policy at the Built Environment Asset Management (BEAM) Centre at Glasgow

Caledonian University, Ran Boydell, sustainable homes expert from Common Weal and Alex McLaren, Associate Professor in Architecture at Heriot-Watt University ran a one-day symposium on creating a rural district heat network in the Scottish Borders. The 100+ delegates heard speakers from government, industry, academia, the third sector, and communities.

4th generation district heating at Marstal, Denmark; Image credit: © Solar Energy Europe

How the fund helped:

- *Deeper understanding about specific challenges faced by rural communities:* The symposium demonstrated that rural communities are often left behind because of a lack of capacity rather than their abilities to understand technical projects.
- *Meaningful engagement between community, industry and policy:* It also showed a community willingness to engage in technical discussions and the importance of effective expert communication.
- *Policy development:* Findings have been submitted to the Scottish Government's proposed Home Energy Efficiency Technical Suitability Assessment (HEETSA) and to the short life Potential Improvement Measures Logic working group on Energy Performance Certificates. Evidence from the symposium will continue to feed into Common Weal's other policy papers and consultation response.

Next steps: The team are currently in confidential discussions about concrete ways forward such as policy changes, heat network trials in specific locations and developing Scotland-wide networks. The team is also preparing a policy paper.

Just transition through the lived experiences of women in Tayside deprived communities

The challenge: Marginalised communities can sometimes be overlooked when authorities design and implement green policies and infrastructure like housing, transport and energy, which can make systemic social injustice worse.

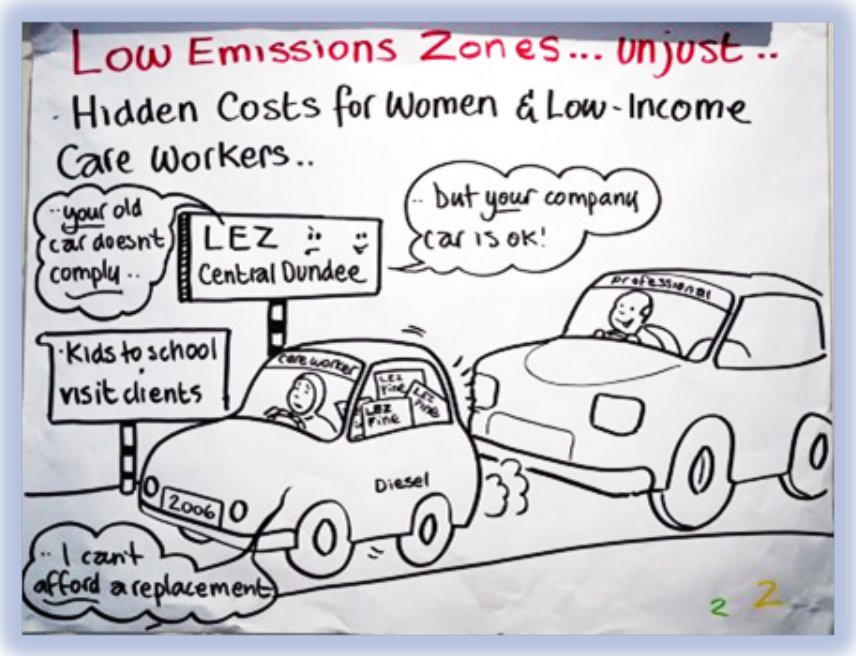

Image shows drawing from one of the project's sessions

The project: This collaboration between Dr Sufyan Droubi, Co-Director of the Just Transition Hub at University of Dundee, Dr Zoe Malcolm, Lecturer in Sociology (Sustainable Development) at the University of Edinburgh, Dundee City Council, the Dundee International Women's Centre and Wester Ross UNESCO Biosphere explored how climate policies can be made more just, how the council can support community-led climate initiatives, and how partnerships between stakeholders can be strengthened.

How the fund helped:

- *Social Insight:* The research uncovered injustices faced by low-income women, such as low emissions zones affecting care workers.
- *Policy recommendations:* The team developed meaningful and implementable policies including a Just Transition Network for Dundee with tools for communication and training, plus small grants for grassroots projects.

- *Impact on participants:* This project has had a substantial impact on research participants through creating new spaces for engagement between community members, community organisations, and local authorities.

Next Steps: This pilot has provided a route to scale up nationally and internationally, including Wales, Northern Ireland and Brazil (online workshop planned 2026). The collaboration will be seeking further funding, and submitting a publication the end of 2025 to an interdisciplinary journal of appropriate scope.

Using Green Bonds for Scotland's Sustainable Future: A Financial Strategy for Achieving Net Zero

The challenge: Green bonds can mobilise private investment into green projects, which is essential to pay for investments like renewable energy, clean transportation and climate-resilient utilities. Scotland required approximately £1.1 bn per year to meet its climate targets, making green bonds a key part of Scotland's green finance strategy. However, more knowledge is needed about their use in specific contexts.

Green bonds can provide financial backing for energy infrastructure like solar

The project: This collaboration between Mannheim Foundation, a Glasgow-based challenger foundation delivering public benefit through inclusive initiatives, Dr. Mehmet Sahiner, Lecturer

in Financial Economics at the University of Dundee and Professor Dimitris Andriosopoulos, Professor of Finance at the University of Strathclyde explored how Scotland can create supportive economic and governance frameworks for green bonds.

How the fund helped:

- *Policy Impact*: Directly informed the design of a Scottish Green Bond Framework, tailored to Scotland's institutional context (e.g. SNIB, Audit Scotland) for use by Scottish policymakers (e.g. Scottish Government, SNIB, public finance officers) (discussed with the Scottish Government climate finance team at a ClimateXChange workshop).
- *Technological Impact*: Introduced a novel, replicable metric for evaluating disclosure credibility, usable by regulators, investors, and rating agencies.
- *Economic Impact*: Showed that credible green bonds can mobilise capital at competitive rates, without higher borrowing costs for public issuers.
- *Social Impact*: Advanced the just transition narrative by embedding governance and transparency into green finance tools, ensuring public trust.

Next steps: The research will be presented to Scottish Government (SFC) in September 2025. There is a peer-reviewed publication under preparation. The team is designing follow-up research on nature-related financial risks in UK corporates. The research will be shared via an academic publication (under review) and a short-form policy brief and infographic to support awareness and stakeholder alignment.

Developing a Beyond Net Zero Performance Framework for Circular Economy Practice in Scotland; lessons from the Netherlands

The challenge: Like Scotland, the Netherlands has ambitious plans to implement a circular economy, reducing climate emissions and pollution. Both are facing challenges in implementing their ambitions, therefore comparing the two advances and shares knowledge on how to most effectively and fairly implement, measure and monitor a circular economy.

The project: Researchers from the University of Dundee (Professor Ian Robson and Dr Seemab Farooqi), the University of Aberdeen (Professor Audrey Paterson and Dr Wiliam Jackson) and Heriot Watt University (Dr Marques-McEwan) worked with external collaborators including the Dutch Government; Circular Economy Scotland; Pi Polymer Recycling; Robertson Group

Construction to gather comprehensive insights on current practices and identify key implementation challenges and opportunities.

Image shows Circular Economy Diagram. Source: EU Parliament

How the fund helped:

- *Collaboration and career development:* The project has led to expanded networks across Scotland and the Netherlands, advancing sustainability research with impactful data collection and new agendas, as well as a new collaboration between Heriot-Watt, Dundee and Aberdeen. Dr. Marques-McEwan in particular gained valuable networks and career development opportunities, with connections to practitioners and policy consultations enhancing professional growth.
- *New insights:* The research highlighted several insights regarding Scotland's Circular Economy (CE) transition, in particular the systemic policy shifts, infrastructure investment, and broad stakeholder engagement required to meet Scotland's targets.

Next steps: As Scotland prepares policy for the 2024 Circular Economy Act, this project is poised to significantly influence the upcoming strategy and monitoring framework. This project will respond to the upcoming consultation on the Circular Economy Monitoring Framework, and will feature the results in the Resources Management Association Scotland newsletter.

Electric Wallpaper for Clean Heating: A Pilot Study

The Challenge: In Scotland, occupied buildings account for 13% of the country's total greenhouse gas emissions and around 30% of its total energy consumption. The Scottish New Build Heat Standard (NBHS) requires new buildings applying for a building warrant from April 1, 2024, to use climate-friendly heating systems. New technology, such as the Electric Wallpaper (EWP), which uses infrared to heat from the ceiling, is a possible green heating solution.

The Project: The collaboration between the University of Glasgow (Dr Ahmad Taha), the University of Strathclyde (Dr Alejandro Moreno-Rangel), NexGen Carbon Zero Limited, West of Scotland Housing Association, and Glasgow City Council tested effectiveness of this innovative new clean heating product via a mix of desktop simulations and live data collection from properties that are using the technology, benchmarked against traditional gas central heating.

Image shows the technology being presented to Cabinet Secretary for Climate Action and Energy Gillian Martin and Professor Sir Anton Muscatelli, then-Principal and Vice-Chancellor, University of Glasgow

How the Fund Helped:

- *Technology Evaluation:* The funding has enabled an initial evaluation of a cutting-edge heating technology, contributing to the broader goal of achieving net-zero emissions in Scotland and the UK.

- Contributions to Policy: Findings from the study informed the Glasgow Retrofit Advisory Group's (RAG) position statement, supporting the development of a city-wide retrofit strategy.
- *Knowledge Exchange*: The fund supported a successful "Low-Carbon Living" workshop, fostering engagement from various sectors across academia, industry, and government.
- *Practice Enhancement*: The fund enabled meaningful engagement with stakeholders to identify best practices and co-design a robust methodology for conducting such studies. Valuable lessons were learned, actionable recommendations were made, and new areas for future exploration were identified.
- *Further Research:* Simulation models developed during the project are now supporting ongoing research into Digital Twinning for decarbonising the built environment.
- *Advancing a Researcher's Career*: The project provided valuable experience for research assistant Shilong Yan, laying the foundation for his PhD work on modelling of built environments.

Next Steps: The project team will share simulation outputs and insights with NexGen Carbon Zero Limited to support their application to the Department for Energy Security and Net Zero (DESNZ). A publicly accessible white paper will be released, summarising key takeaways from the "Low-Carbon Living" workshop.