SCOTLAND BEYOND NET ZERO

Seed Fund Projects

2025

The UK Co-Benefits Atlas:
An Interactive Visualisation Atlas to Understand the Impacts of Achieving Climate Action Targets

The UK Co-Benefits Atlas is an interactive online visualisation atlas [1] presenting and explaining data on the potential socio-economic impacts of achieving climate action targets in the UK.

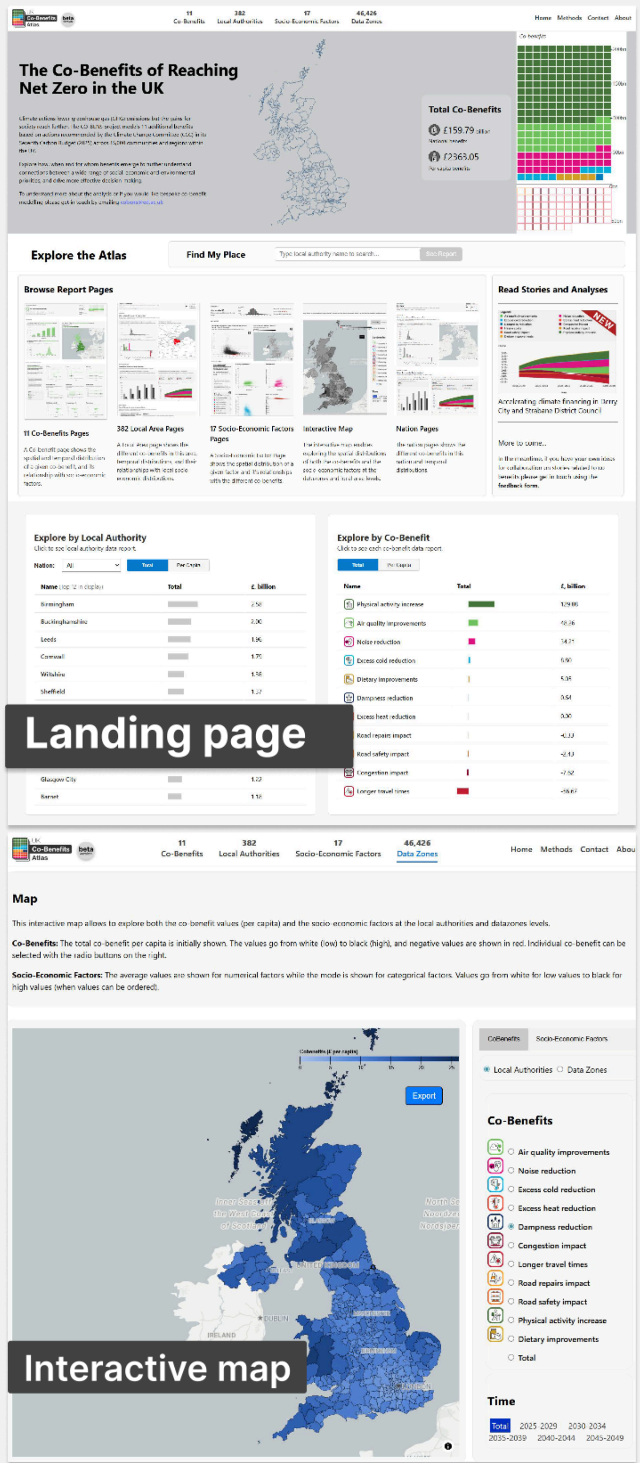
What Are Co-Benefits?

For every £1 spent on climate change mitigation in the UK, there are as much as £14 of social benefits in the form of improved public health, better urban connectivity, and increased productivity [2].

What is in the Co-benefits Atlas?

The Atlas integrates 410 report pages spanning 11 co-benefit categories, 17 socio-economic factors, 382 geographic reports at both national and local authority levels, and an interactive map displaying co-benefit data across 46,000 data zones.

Atlas Pages



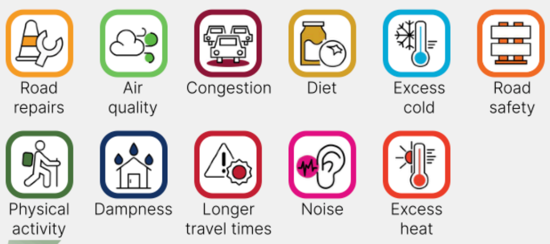
Design Challenges and Solutions

The Atlas is designed through domain expert collaboration and stakeholder participation over a 10-month period.

The Atlas uses a ***bottom-up, data-driven*** approach to provide balanced access to the full range of co-benefits data.

Transparency is maximised by giving users options to explore different data representation, e.g., toggling between per capita values and total values.

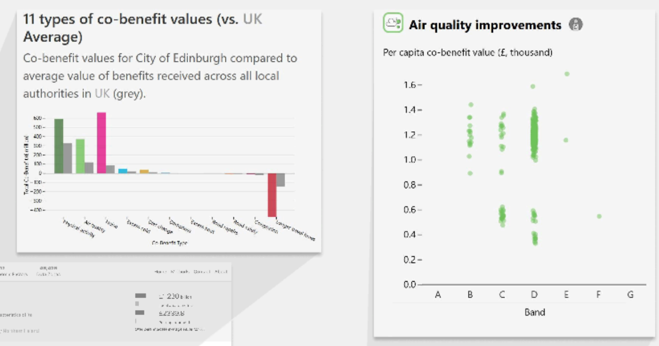
Strong ***visual Identities*** ensure easy orientation by assigning every co-benefit a unique colour and icon.

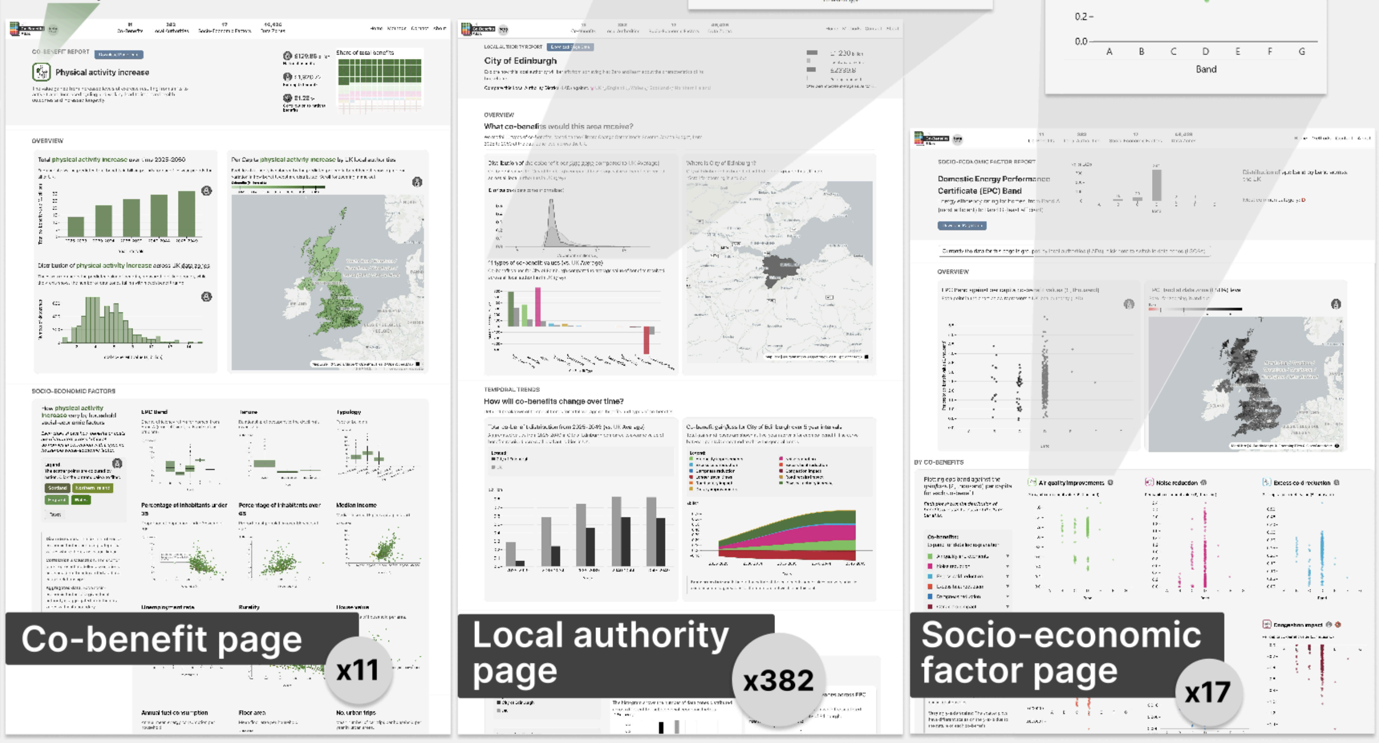


Navigation is ***coherent and intuitive***, with visual marks linking pages to foster free exploration.

Every visualisation is designed to ***stand alone*** with a brief explanation of its visual encoding, measurement units and label descriptions for comprehensive exports.

The use of ***standard visualisations*** allows exploration of the expressive limits of traditional charts while drawing on widely familiar forms.





Potential Use Cases

Support learning, community engagement, and decision-making by providing evidence of co-benefits that help motivate action, raise awareness, and strategically guide future climate initiatives.

Wide Audience

Aimed at policy experts and decision makers, businesses, climate activists and advocates, local communities, and the general public to explore and build their case for specific local entity.

References

[1] J. Wang, X. Shu, B. Bach, and U. Hinrichs. Visualization atlases: Explaining and exploring complex topics through data, visualization, and narration. IEEE TVCG, 2024. 1, 2

[2] A. Sudmant, D. Boyle, R. Higgins-Lavery, A. Goulson, A. Boyle, J. Fulker, and J. Brogan. Climate policy as social policy? a comprehensive assessment of the economic impact of climate action in the uk. Journal of Environmental Studies and Sciences, 2024.

https://ukcobenefitsatlas.net/

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SCOTLAND BEYOND NET ZERO

Just transitions for women in marginalised communities

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Introduction

Our research explores what "just transition" means for women in marginalised communities.

These communities are among the most vulnerable to climate change yet contribute the least to emissions. Within them, some groups face even greater risks, and our focus is on women.

Despite many challenges, these communities show remarkable resilience and innovation, which must be recognised.

Yet the injustices they face undermine their adaptive capacity, worsening their vulnerability.

Transitions to net zero involve complex social, economic, and political shifts—across energy, farming, transport, construction, and lifestyles.

If poorly designed, transition policies risk deepening injustices, further marginalising communities and jeopardising the transition itself.

Our work highlights a critical gap: the lack of community-led approaches and the absence of marginalised women's voices in shaping just transitions.

Analytical framework

Just transitions are transitions from today's world of high levels of greenhouse gases emissions and injustices to a future of net-zero emissions and fewer injustices for marginalised communities.

Just transitions require

(1)Prevention of new injustices and tackling of historical injustices affecting marginalised communities;

(2)Support for the organic responses that the communities and the civil society organisations develop to address such injustices (actions of socioenvironmental care); and

(3)People living in marginalised communities to participate in policymaking; transition policies to be continuously monitored so that transition processes can be corrected and enhanced.

The concept is open and allows for the people in marginalised communities to identify which injustices and actions of care require attention and support, and to define how policies and policymaking could be improved.

The analytical framework and the methodology employed drew from our prior research with communities in Brazil and across Scotland.

Key findings

Tackling injustices	**Women face interconnected injustices (unsafe and polluted neighbourhoods, discrimination, unaffordable housing) that reinforce each other.**
Actions of care	**Despite pressures, women show resilience through grassroots projects (food support, sustainability, cooking, healthy living).**
Policies	**Many feel excluded from decisions, unaware of key policies or consultations, leading to distrust and disempowerment.**

Key recommendations

Support	**Fund and sustain grassroots initiatives of care that already deliver resilience.**
Include	**Ensure women and marginalised groups are directly involved in climate policymaking.**
Targets	**Go beyond carbon targets: track safety, belonging, and affordability.**

Methodology

Illustration: Graham Ogilvie

We collaborated to co-design and implement three days of workshops.

Participants were women living in socio-economically deprived areas within Dundee. They were of diverse ages, employment status, housing ownership and income.

The workshops allowed women to share their experiences in an informal discussion setting in small groups and altogether.

They were independently facilitated by community development experts and a professional illustrator.

We also created bespoke cards to prompt women to think about issues important to them –from housing conditions to energy costs and food.

After the workshops with women, we met with representatives of organisationsand the Dundee City Council to discuss the findings.

Just Transitions Monitoring Framework

- **Tackle Injustices**

Identify local injustices across social, economic, environmental and climate dimensions.

Example: housing quality, food insecurity, cost of living, transport, trust in authorities

- **Support Actions of Care**

Map grassroots responses that that tackle injustices, support wellbeing, promote adaptation and mitigation.

Example: community centres, warm hubs, women-led mutual support groups, communiy gardens and kitchens

- **Participate in policymaking**

Assess policymaking and policies, co-design fair policies, track progress with indicators that communities recognise, and embed accountability.

Example: review of net-zero transition plans adopted locally or nationally

Acknowledgements

Funding: Scotland Beyond Net Zero and University of Dundee Collaborate for Impact. Supporters: Wester Ross Biosphere, Boomerang, Dundee Volunteer and Voluntary Action, Dundee International Women's Centre, Dundee City Council. September 2025.

MycoPack: Mycelium-Based Composites from Distillery Byproducts for Sustainable Packaging

Introduction

The MycoPackproject, titled "Mycelium Composites from Distillery By-products for Sustainable Packaging," addresses the challenge of single-use plastics and energy-intensive packaging in Scotland's premium food and drink sector. The project aims to develop a regenerative and fully compostable packaging material by transforming organic residues from whisky production into protective packaging using mycelium, the root-like structure of fungi. The resulting composite is a lightweight, durable, naturally impact-resistant, and fire-retardant alternative to traditional materials. The project will produce a prototype that demonstrates technical functionality, environmental benefits, and potential market value.

Organizational Bodies

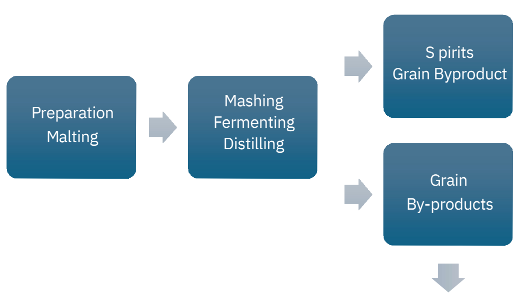
This collaboration involves three key partners:

Edinburgh Napier University (ENU):Led by Dr. Dongyang Sun with RA Christian Longo, the lead applicant, ENU will lead the project and be responsible for materials processing and composite testing.

University of Dundee (UoD):Dr. Wenbin Zhou, the co-investigator, complements the team with expertise in mechanical and manufacturing engineering. UoD will lead the project on mold design and prototyping using additive manufacturing.

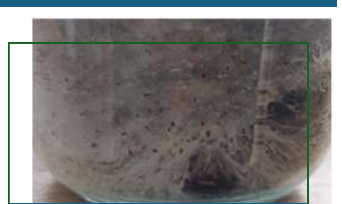
Arbikie Highland Estate Distillery:This industrial partner will supply raw feedstocks, enable stakeholder engagement, and support product trials. Their involvement ensures the project is grounded in real industry needs and conditions.

Implementation



Mycoproduction

1 -Inoculation



2 -Colonization

3 -Forming

4 -Deactivation

5 -Utilization

6 -Disposal & Decomposition

Project Phases

The 10-month project, running from August 1, 2025, to May 31, 2026, is structured around five work packages with clear milestones. The phases include:

Phase 1 & 2:Spent grain stabilizationto ensure a consistent feedstock and feedstock characterizationto optimize nutrient and physical profiles for reliable mycelium growth.

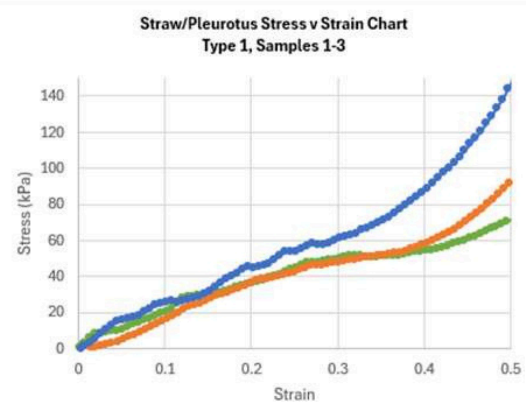
Phase 3:Mycelium composite formationby exploring molding and extrusion-based approaches using low-energy processes.

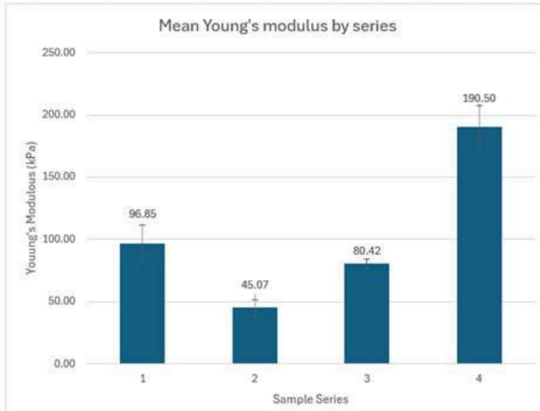
Phase 4:Prototype developmentinvolving the design and 3D printing of custom molds for whisky bottle packaging.

Phase 5:Pilot testing and feedbackto assess the mechanical performance of the prototype and gather input from industry stakeholders.

Desired Characteristics

The final MycoPackproduct is intended to serve as a high-end packaging and product display solution, particularly for premium goods like whisky. To achieve this, it is expected to have strength and resilience that meet or exceed current market options. The material's natural properties will be leveraged to provide impact resistance and fire-retardance. The project will focus on tailoring the material to reflect a high-end aesthetic, with the goal of creating a solution that is not only environmentally responsible but also visually appealing and aligned with the brand.





Project Results and SBNZ Support

The project's key outputs will include a physical demonstrator, a stakeholder-focused impact summary, and the identification of pathways for scale-up. The findings will be communicated to different audiences through accessible blog posts and short videos, and academically through at least one peer-reviewed paper. This seed-funded project sets the stage for longer-term impact, with the potential to scale the technology to other high-value sectors, such as cosmetics and electronics, and attract future funding.

MycoPackdirectly supports the Scotland Beyond Net Zero (SBNZ)themes by:

Circular Economy:Creating value from waste through material innovation.

Nature-BasedSolutions:Utilizing biological systems for sustainable product development.

Place-BasedTransitions:Rooting innovation in rural industry and regional supply chains.

Edinburgh Napier UNIVERSITY

University of Dundee

SCOTLAND BEYOND NET ZERO

ARBIKIE HIGHLAND ESTATE

Dongyang Sun ENU
Christian Longo ENU
Wenbin Zhou UoD
Kirstie Black, Arbikie Highland Estate Distillery

Social Housing Beyond Net Zero

Digital Product Passports(DPP)-Enabled Circular Supply Chain for Social Housing in Scotland's Cities

SCOTLAND BEYOND NET ZERO
Wheatley Group
University of Glasgow
GCU Glasgow Caledonian University
University for the Common Good

1 Construction Waste & Recycling

Material supplier → Building material → Building manufacturer → Contractor

Social housing operator

Social housing

Direct reuse, remanufacturing, harmless treatment, etc.

"The built environment accounts for 40% of the overall carbon footprint."

Construction waste mismanagement

Various types of pollution and impacts

2 Digital Product Passport as a Circular Enabler

"The Digital Product Passport (DPP) is a digital-based information carrier that spans the entire product lifecycle."

Obstacles:
- Lack of transparency
- High recycling complexity
- Circular supply chain decentralization
- Policy inadequacy

DPP

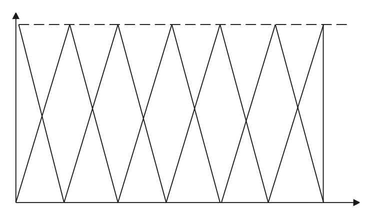
- General Data → Unique ID & model, Production & installation dates, ...
- Materials → Bio-based content, Hazardous substances, ...
- Disposal Guidelines → Step-by-step disassembly, reverse logistics, ...
- Circularity Information → Reuse options, Recyclability rate, ...
- Compliance Documentation → CE/UKCA compliance, Fire & structural performance, ...
- Environmental Impact → Embodied carbon, Energy & water use, ...

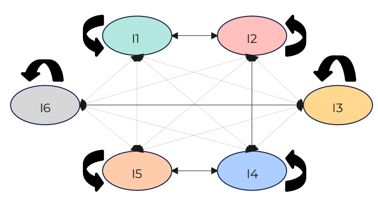
3 Research Objectives

RO1	To conduct a systematic literature review on DPP-enabled Circular Supply Chain Management by focusing on the built environment.
RO2	To identify key circular drivers and barriers that impact social housing.
RO3	To establish the benefits and challenges of a circular approach.
RO4	To ascertain DPP-enabled solutions that are suitable for social housing.
RO5	To provide recommendations for transitioning towards DPP-enabled circular supply chains.

4 Methodology: Fuzzy-DEMATEL

1. Problem Identification and Decision-Making Team
2. Expert Evaluation and Fuzzy Scale Setting
3. Construct and Standardize Fuzzy Direct Relationship Matrices
4. Calculating the Total Relationship Matrix and Model Analysis
5. Defuzzification and Causal Graph Construction





5 Project Expected Outcomes

01 Best-Practice Framework: Establishing a circular supply chain best practice solution for the construction industry centered around the DPP.

02 Comprehensive Review: A thorough examination of cutting-edge research, industry practices, and policy landscapes concerning circular supply chains in the construction sector.

03 Drivers and Barriers Matrix: Quantify the causal relationships between technological capabilities, stakeholder roles, economic and regulatory factors, and DPP adoption, then prioritize them.

04 Communication and Academic Output: Produce high-quality academic papers and industry reports, disseminating research findings through seminars, websites, newsletters, and university channels.

6 Significant Contributions

Contributions

- *Practice*: Enable social housing providers and construction firms to adopt circular supply chains through energy efficiency, smart material use, and recycling.
- *Policy*: Provide evidence to shape targeted regulations, incentives, and future DPP standards in the UK and beyond.
- *Theory*: Introduce a unified approach combining Design for Sustainability (DPP) with circular supply chain management.
- *Society*: Promote sustainable, affordable social housing and extend impact across the national construction network via Wheatley Group.

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Heritage Meets Innovation: Smart PV for Cities Overcoming Tomorrow's Climate

Edinburgh Napier UNIVERSITY | ROBERT GORDON UNIVERSITY ABERDEEN | SCOTLAND BEYOND NET ZERO

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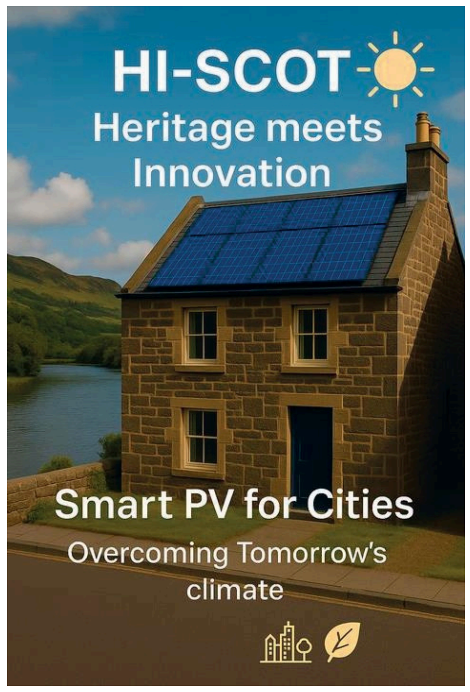
Objectives

- HI-Scot focuses on integrating photovoltaic (PV) technology into Scotland's historic buildings, addressing challenges with aesthetics, regulations, and public acceptance.
- The initiative will include a pilot installation or visual materials to show how PV systems can blend with historic architecture.
- Research will explore mimicking traditional materials and using coatings to minimise visual impact, creating guidelines for Scotland's architecture.



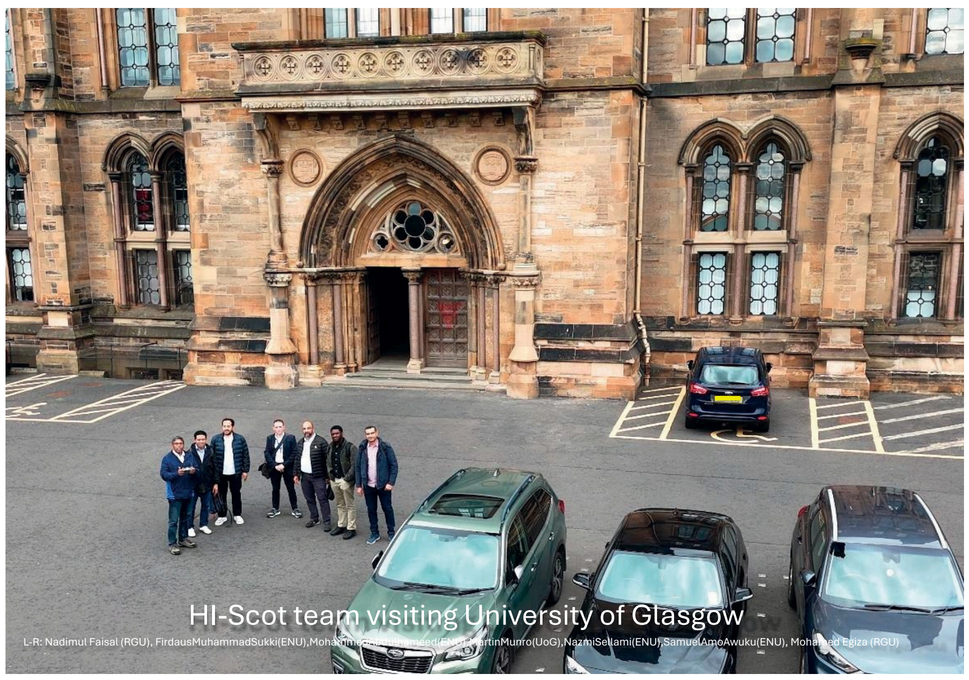
Expected outcomes/impacts

- The project will involve businesses, academics, local councils and other stakeholders to overcome planning and policy barriers.
- The goal is to support energy upgrades in heritage contexts and align Scotland's heritage with climate targets, balancing preservation with innovation.


East Quadrangle of the Gilbert Scott Building, University of Glasgow


Front of the Gilbert Scott Building, University of Glasgow


Dar Al-Arqam (Lauriston Church), Edinburgh


HI-Scot team visiting University of Glasgow
L-R: Nadimul Faisal (RGU), FirdausMuhammadSukki(ENU),MohammedAbdulhameed(ENU),MartinMunro(UoG),NazmiSellami(ENU),SamuelAmoAwuku(ENU), Mohamed Egiza (RGU)

BEFS BUILT ENVIRONMENT FORUM SCOTLAND | مركز دار الأرقم الإسلامي Dar Al-Arqam Islamic Centre

Investigators & Researchers

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Current Project Partners

BuiltEnvironmentForum Scotland(BEFS)
Dar Al-Arqam, CeeD

CeeD Centre for Engineering Education & Development

Unveiling Structural Evolution and Performance of Hybrid-functional Catalyst in Plastic Pyrolysis-catalytic Gasification Process

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BACKGROUND & MOTIVATION

- Fossil-based **plastic** still account > 90% global plastic production (Fig.1)[1].
- Recycling: post-consumer mechanically recycling predominate circular plastic.
- The demand for **H2** reached 94 million tons (Mt) in 2021, contributing around 2.5 % of global energy consumption (Fig. 2) [2].
- Pyrolysis-catalytic gasification of plastic waste to produce H2: solve two problems together.

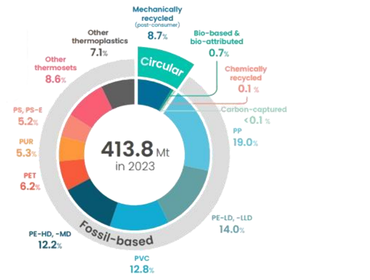


Figure 1. World plastics production in 2023

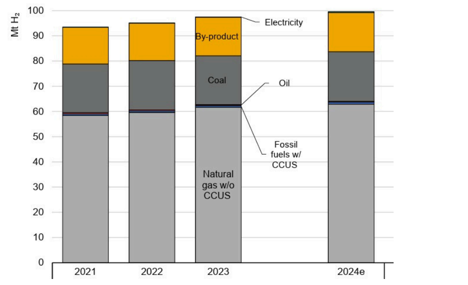


Figure 2. Global H2 production 2021 - 2023

MATERIALS & METHODS

Reactor design: two-staged fixed bed reactor(Fig. 3)

- Plastic waste was pyrolyzed and fully decomposed under 600 °C in 1st-stage and became short-chain hydrocarbons.
- The hydrocarbons were then catalytically gasified in second-stage under 900 °C, yielding H_2rich syngas.

Hybrid-functional catalyst: Ni-CaO-Ca2SiO4(Fig. 4) [3]

- **Ni**: activation site, efficiently cracking C-C, C-H and C-O bonds, relatively cheap.
- **CaO**: CO_2 sorbent, high sorption capacity and low cost.
- **Ca2SiO4**: structural stabiliser, forming sintering-resistant and anti-agglomeration sea tentacle-like morphologies.

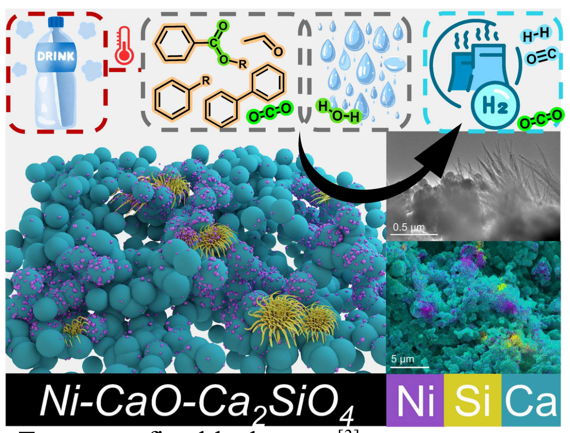


Figure 3. Two-stage fixed-bed reactor[3].
Figure 4. Predicted catalyst morphology and catalytic processes.

RESULTS

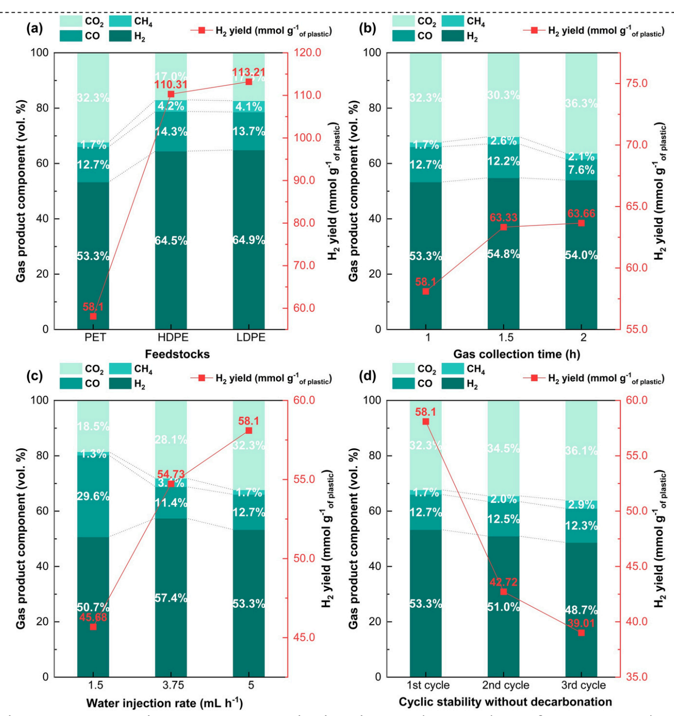


Figure 5. Reaction process optimization column chart for gas product yield with different parameters. (a) feedstocks, (b) gas collection time, (c) water injection rate and (d) cyclicstability.

Process optimization for **maximum H2 products yields** with 4 parameters:

- Feedstocks
- Gas collection time
- Water injection rate
- Cyclic stability (without catalyst regeneration)

❖ The highest H2yield was **113.21** mmol g-1 of plastic.
❖ The highest syngas yield was **137.19** mmol g^{-1} of plastic.

DISCUSSION

***Ex-situ* Powder X-ray Diffraction (PXRD)** pattern for fresh and spent catalyst (Fig.6)

•No metallic Ni in fresh catalyst
•Sharpening of the Ni diffraction peaks are observed:
and further growth of the NiO phase
slightly sintering of Ni after 3 cycles.

***In-situ* PXRD** analysed the structural evolution of catalyst by heating RT to a catalytic temperature of 900 °C with the existence of feedstock. (Fig.7):

•PET pyrolyzes between 400–500°C, the appearance of metallic Ni and the concurrent attenuation of NiOreflections at 500°C.
•Eventually, NiOand $CaCO_3$ were no longer detectable, the catalyst remained stable thereafter.

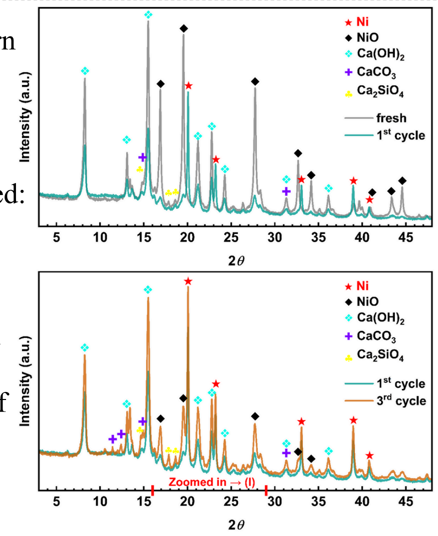


Figure.6 *Ex-situ* XRD patterns of fresh Ni-CaO-Ca2SiO4 and spent catalyst after the 1st and 3rd cycle.

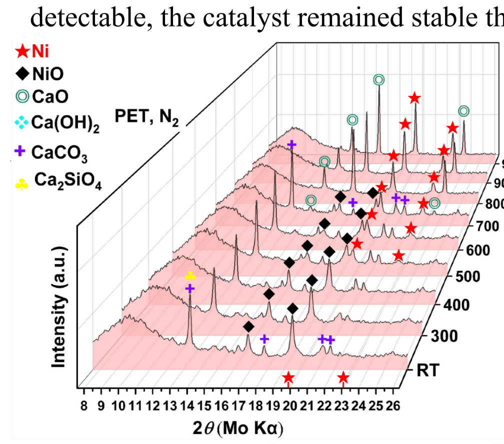


Figure 7. Ni-CaO-Ca2SiO4 catalyst, PET loaded, N2 gas flow, **50°C min-1** ramping rate. Scan at RT, 300, 400, 500, 600, 700, 800 and 900 °C and 900* (30 mins after catalyst reached 900°C).

***In-situ* PXRD pattern** demonstrated the evolution of catalyst under **slow heating rate** (Figure.8 and Figure.9):

- No coexistence of Ni and CaO is observed until all available CaO has been consumed

•Sharp decline in the wt% of Ni is observed between 640 and 680°C: decomposition of $CaCO_3$, release a significant amount of CO_2, thereby oxidising Ni to NiO.

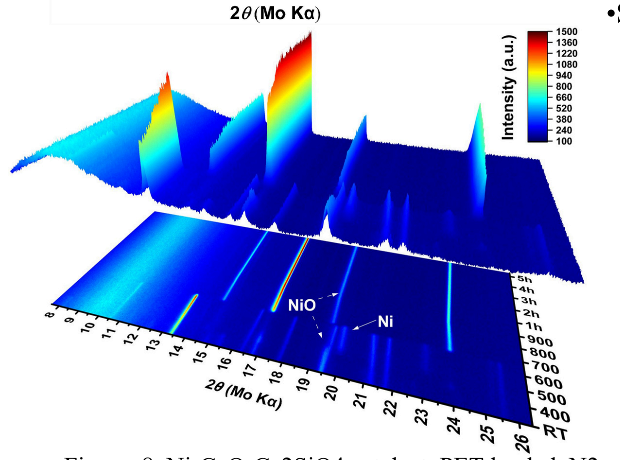


Figure. 8. Ni-CaO-Ca2SiO4 catalyst, PET loaded, N2 gas flow, **20°Cmin-1**ramping rate,with **scansevery 5 °C**, scans every 3 mins after 900 °C.

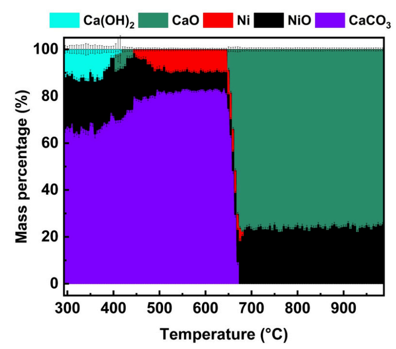
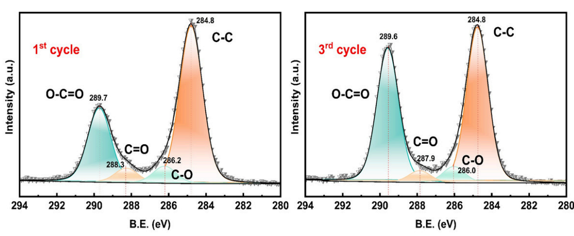


Figure.9 Calculated mass evolution of catalyst in Fig. 8.

•X-ray photoelectron spectroscopy (XPS)

Carbon 1s: IncreaseintheO–C=Opeak:calcium carbonate or oxidised graphitic carbon.

Nickel 2p: XPS reveals that almost **no** metallic Ni^0 (Ni $2p_{3/2}$ = 852.6 eV) **at the sample surface,** which likely be covered & pore obstructed by carbon deposits.



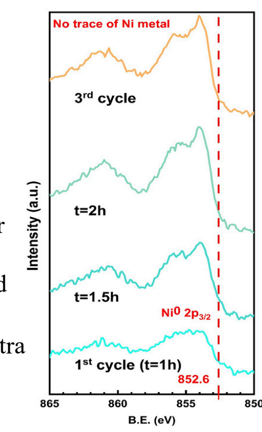


Figure 10. C1s XPS spectra for spent catalysts after the 1st and 3rd cycle. Ni2p XPS spectra for spent c ata ly st s.

CONCLUSION

❖ Achieved a maximum H_2 yield of**113.21 mmol g^{-1}** of plastic.
❖ **NiO** was the only Ni species detected on the catalyst surface, indicating that deactivation initiates at the outer regions.
❖ A **slow heating rate** may promote CO_2 release from PET pyrolysis, potentially oxidising Ni to NiO and accelerating deactivation.

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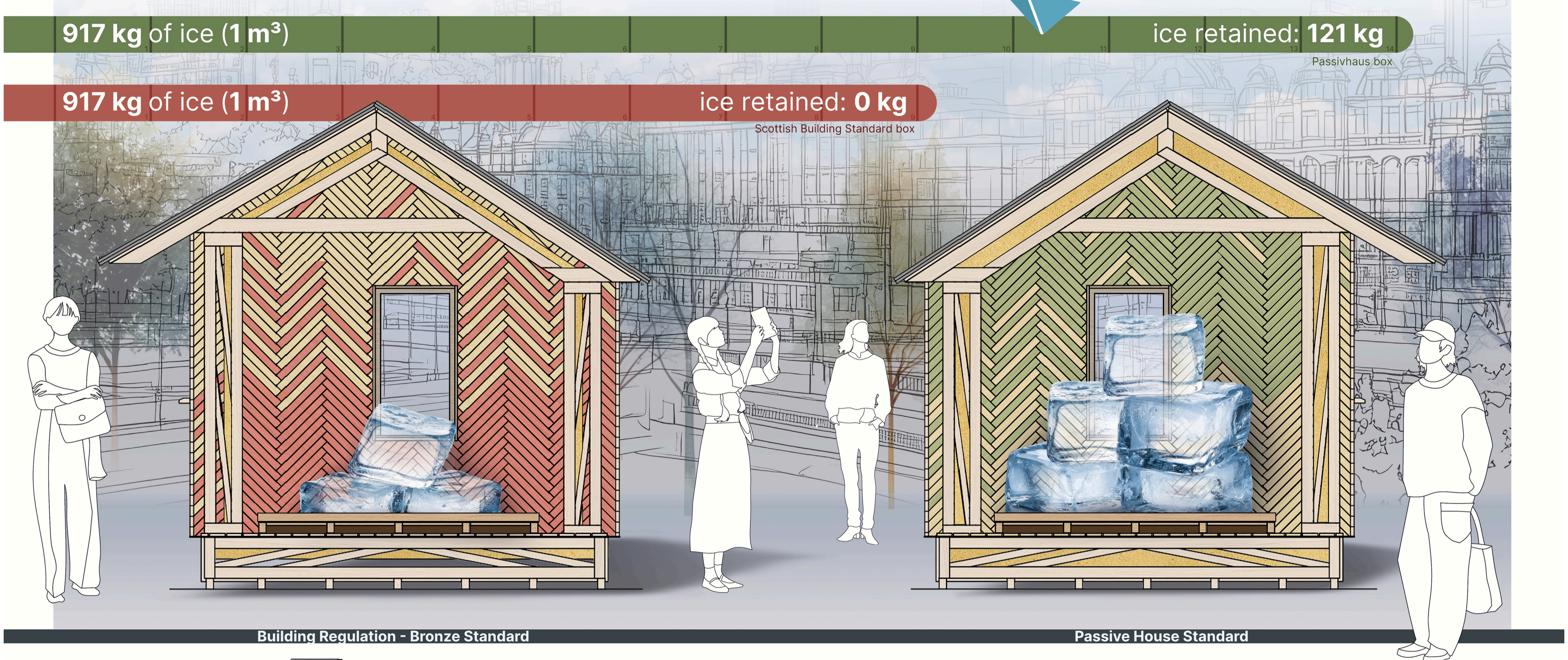
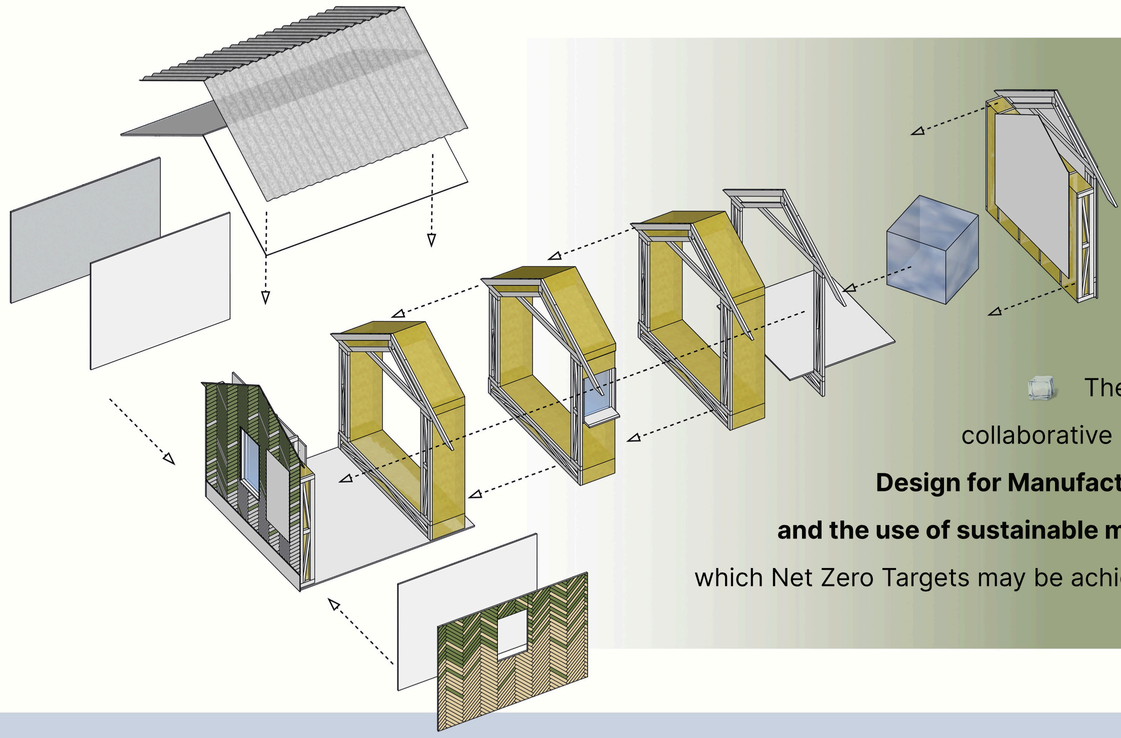
3. Qin, Tian Heng, et al. "Pyrolysis-catalytic gasification of plastic waste for hydrogen-rich syngas production with hybrid-functional Ni-CaOCa2SiO4 catalyst."*Carbon Capture Science & Technology*14 (2025): 100382.

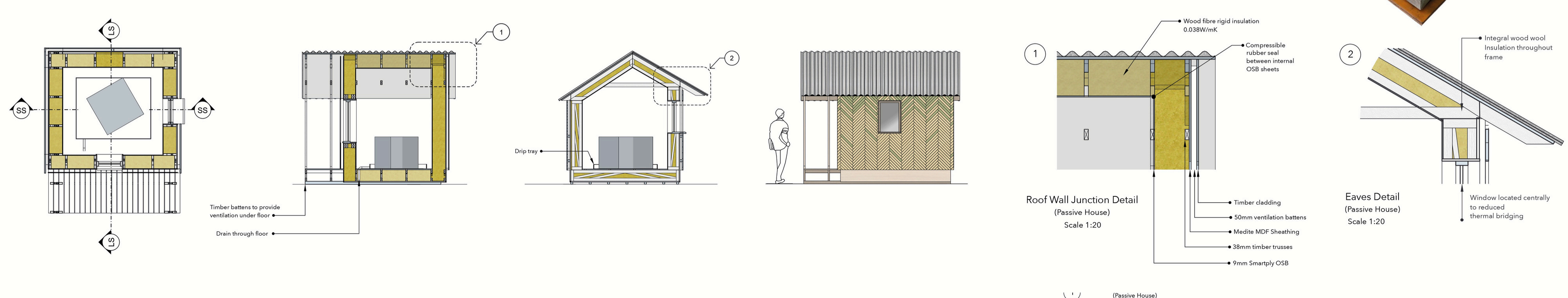
IceBox Challenge





- In the UK, buildings account for approximately **27% of CO_2 emissions** with approximately 18% coming from residential buildings.
- To meet 2050 Net Zero Targets, **1.5 million new homes** and an estimated **27 million existing homes** will require to be built or retrofitted to energy efficient standards.
- The proposed project will catalyse high impact research, partnerships and collaborative activities in the areas of **building performance, Life Cycle Analysis (LFA), Design for Manufacture and Assembly/Disassembly (DFMA/D), cost, embodied carbon and the use of sustainable materials** to provide methodologies through which Net Zero Targets may be achieved.

- Central to this will be the creation of **digital twin models** which mirror existing building archetypes, underpinned by the provision of training in the use of **state-of-the-art design software and experiential learning approaches** to upskill learners in the design of energy efficient buildings.
- Two small scale buildings used as part of the International Passivhaus Associations (iPHA) Icebox Challenge will be created through a **working partnership with Trimble Inc**.
- The models, one built to **existing Scottish building regulations**, the other to the **international Passivhaus standard** will be used to study comparative performance.
- The accuracy of these twins will be **validated and refined through testing relative to the physical assets**, creating verified models which can then be **scaled and related to other housing archetypes** as an aid to design and retrofit activities.
- The Icebox structures will feature as part of a **Channel 4** programme hosted by **Guy Martin** who will demonstrate the advantages of the Passivhaus approach to an estimated 2 million viewers.



Unpacking the tourism-transport nexus in sustainability transitions

Project description

While it is commonly recognised that the interrelationships between tourism and transport are of key importance to the wider tourism system, little is known about the nature of these relationships and how they influence each sector's journey to Net Zero. Given the strategic significance of transport to the Net Zero ambitions on the one hand, and the economic importance of tourism to the Scottish economy on the other, this dearth in knowledge is surprising. The aim of this project is to address this lacuna and lay foundations for more nuanced interdisciplinary research that will lead to concrete solutions and policy implications in support of Net Zero.

Research questions

1. What potential does the tourism sector have to reduce its reliance on unsustainable transport?
2. How can the transport sector help foster sustainable tourism development?

Methods

Stage 1:
- Grey literature review
- Stakeholder mapping

Stage 2:
- Two one-day workshops with tourism and transport stakeholders across Scotland (up to 50 participants at each workshop)

Stage 3:
- 20 semi-structured interviews with key stakeholders
- An online dissemination event
- Writing-up

Impact and relevance

Academic impact
- Empirical findings on nexus interactions between transport and tourism
- Possible theoretical implications
- Future research agenda

Non-academic impact
- Identification of key areas of interdependence and key challenges across Scotland's regions
- Development of a stakeholder network
- Policy recommendations

The team

HEI / ORGANISATION	TOURISM	TRANSPORT
University of Aberdeen	**Dr Piotr Niewiadomski** (Dept. of Geography & Environment)	**Dr Mark Beecroft** (School of Engineering)
University of Strathclyde Glasgow	**Dr Irma Booyens** (Strathclyde Business School)	**Dr Neil Ferguson** (Dept. of Civil and Environmental Engineering)
Partners	support offered by **VISIT SCOTLAND**	**NESTRANS** (official partner)

Sustainability transitions

Sustainability transitions are complex shifts from the current, carbon-intensive socio-technical system to one based on more sustainable modes of production and consumption that are necessary to address the grand challenge of climate change. *(Hansen and Coenen, 2015; Smith et al., 2010)*

Sustainability transitions (ST) is also a complex interdisciplinary research field. Two main shortcomings in the field can be identified:
- Focus on selected strategic sectors: energy, transport and food,
- Limited attention to horizontal connections between systems.

(Geels et al., 2023a, 2023b)

References

Geels, F.W., Kern, F., Clark, W. (2023a) Sustainability transitions in consumption-production systems, *The Proceedings of the National Academy of Sciences*, 120(47), pp. 1-10

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Smith, A., Voß, J.-P., Grin, J. (2010) Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges, *Research Policy*, 39(4), pp. 435-448

From philosophical foundations to practical land-use decisions:

a case study on carbon accounting in peatland restoration

THE UNIVERSITY of EDINBURGH

University of St Andrews

SCOTLAND BEYOND NET ZERO

Philosophical foundations

How should we compare different greenhouse gases? Current methods focus on physical properties like global warming potential. Our approach instead starts from the philosophical foundations: what do we owe to future generations?

Preservation obligations

We suggest that the current generation has an obligation to preserve certain things for the future: a stable climate, healthy ecosystems, social institutions that serve everyone, etc. When we cannot fully preserve these things, we have an obligation to minimize the losses. This principle drives our new approach to greenhouse gas accounting: comparing emissions by how much they damage what we ought to preserve.

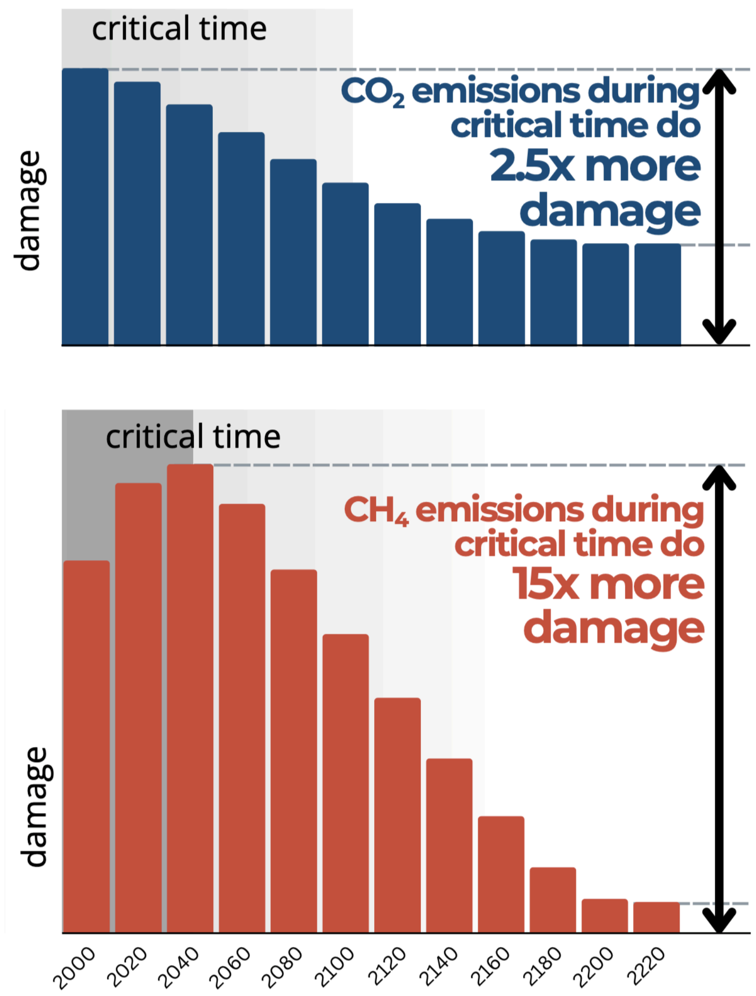
Adaptation and damage

Both natural and human systems need time to adapt to climate change. Damage multiplies when change happens faster than the systems can adapt. For this reason, the timing of emissions is crucial: emissions at critical times cause far more damage.

Same emission, different damage: timing is critical

Our preliminary results suggest that, because systems need time to adapt, timing plays a critical role in determining how much damage an emission does.

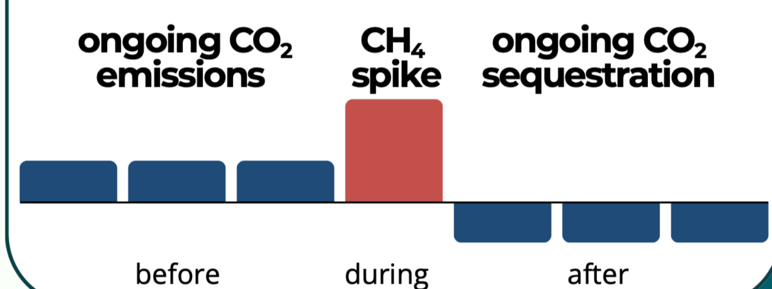
Initial results based on a simplified model:



Results shown for a rapid decarbonization scenario (RCP2.6). Under optimistic emission scenarios, timing effects become MORE significant – making timing-sensitive strategies an essential part of ambitious climate policy.

Peatland restoration

Degraded peatland is a source of CO_2 emissions. Successful restoration usually involves a spike in CH_4 emissions, followed by net CO_2 sequestration.



Research questions

Around 20% of Scotland's land area is peatland and around 80% of this peatland is degraded. Peatland restoration has the potential to play an important role in Scotland's transition to net zero. Can paying attention to timing help to improve decisions about peatland restoration?

Corrour partnership

Corrour Estate in the Scottish Highlands is actively working to restore their degraded peatlands. We will co-develop our timing framework using real restoration data and aim to create practical tools for land managers.

Interdisciplinary team


Derek Ball, philosophy, University of St Andrews


Matthew Brander, carbon accounting, University of Edinburgh

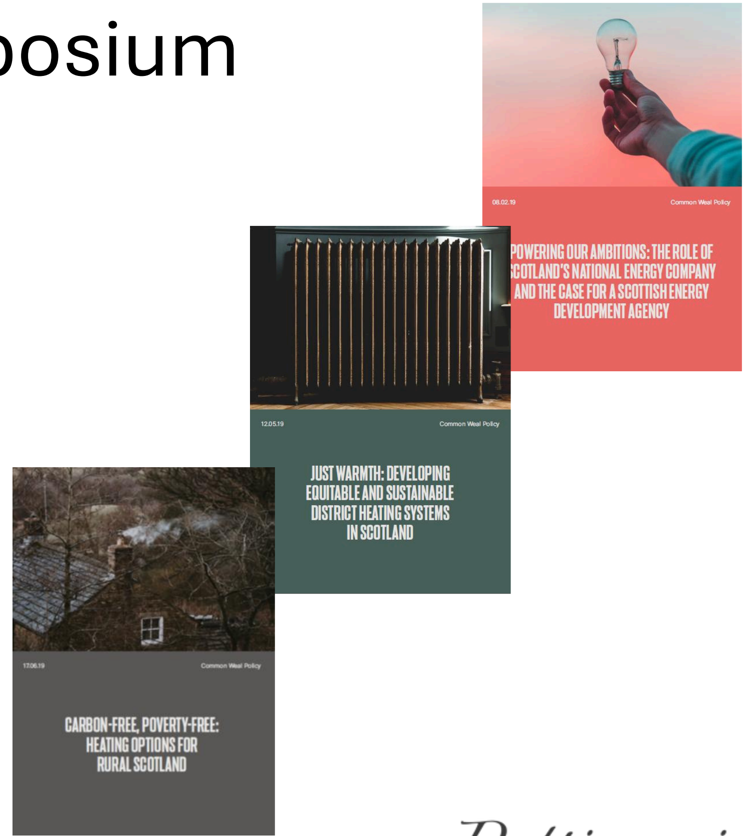

Lydia Cole, conservation ecology, University of St Andrews


Tim Mulgan, philosophy, University of Auckland


Caroline Touborg, philosophy, independent researcher

SBNZRuralDistrict Heating Symposium

2nd April 2025
Galashiels and Online



Background

In2019 Common Weal & GCU published 'Just Warmth', the second inour 'energy trilogy' of policy papers that set out our vision of how public ownership of energy can tackle climate change and fuel poverty without leaving anyone behind. Drawing on evidence from Denmark and other comparable countries as well as research at GCU, the papers pay particular attention to the development of sustainable '4th generation' district heating and decarbonising rural and off gas grid properties.

Whilst this remains a work in progress in Scotland, the Welsh Government's development of Ynni Cymru is based on our model.

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

The Opportunity

Many Scottish communities are keen to realise the benefits of DHS and engage with other stakeholders to develop projects, but capacity and access expert input is often lacking in the rural areas that could benefit most from them. SBNZ funding enabled us to bring them together. The model for the symposium was adapted from one originally developed by Pattiesmuir Ltd, Douglas Chapman MP, and The Herald, but reworked to focus specifically on developing DHS. We were particularly lucky to hear from Morten Duedahl, a world leading expert at the Danish Board of District Heating.

What Next?

The symposium was attended by over 50 people in person and over 50 online, representing communities, industry, government, the public and third sectors, and academia.

It gave us a mandate to establish a 'DHS coalition'. For this to work we'll need a business model that will provide long term financial sustainability without relying on donations. We've worked out how we think this can be done and are in discussions with others as to how to make it happen, and would love to hear from anyone interested in joining us on this journey.

Many thanks to all our speakers from:

DBDH, SAV, Kensa, SWEP, Alfa Laval, sfha Scottish Federation of Housing Associations, Scottish Islands Federation, Star Refrigeration, South of Scotland Enterprise, Consumer Scotland Luchd-Cleachdaidh Alba, Scottish Government Riaghaltas na h-Alba gov.scot

For more information email: keith.baker@gcu.ac.uk & visit www.commonweal.scot

HEATING FROM THE CEILING

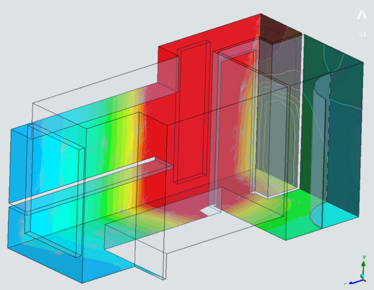
Evaluating ElectricWallpaper in ScottishHousing Association Tenements via a Sensor-based System

SCOTLAND BEYOND NET ZERO

Dr.Ahmad Taha,Dr.Alejandro Moreno-Rangel,Mr.Shilong Yan

PROBLEM STATEMENT

Oldestand leakiest homes in Europe; lose heat **3x** faster; **37%** of carbon emissions; **80%** of buildings in use today will still be inhabited by 2050



Radiator Simulation for Room:
- Unevenheating
- Fuel dependency
- Heatingfrom outside ofobjects

Problems:
- Less comfort
- High energycost

SCOTLAND

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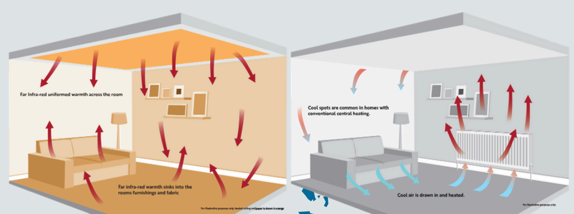
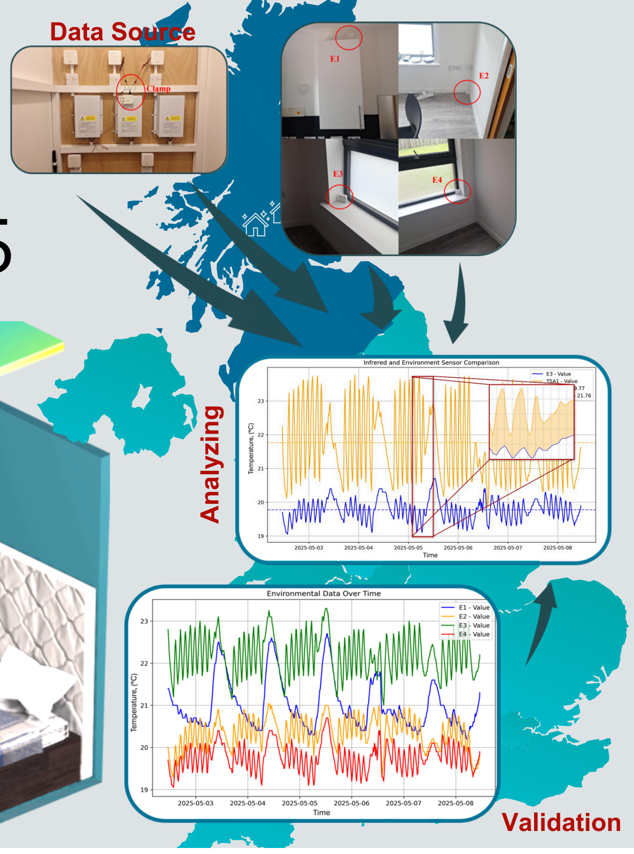
BEYOND NETZERO

EDINBURGH - 2025

METHODOLOGY

Compare conditions with and without EWP technology; Monitor temperature, humidity, heat retention, and energy consumption; Gather insights on comfort and satisfaction; Identify performance impacts; Publish findings and inform policy.



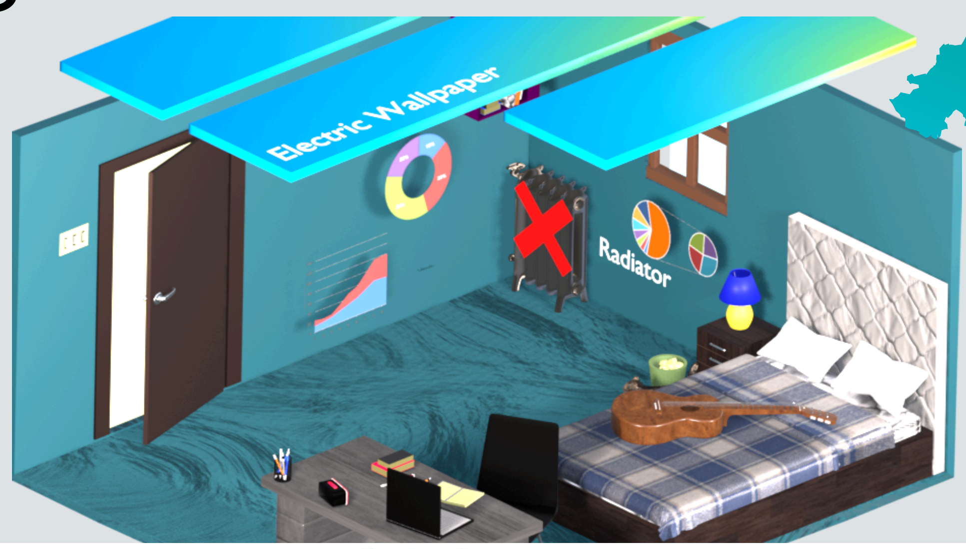


OUTCOMES

Modelling Outcomes:

EWPvsRadiator–Whole Flat
- EWPconsumption: **11.75** kWh~ £**2.88**
- Radiator consumption: **21.92** kWh~ £**1.62**
- Electric heating uses **less energy** but **costs more**

Spatial & Behavioral Impact:
- Significant variations observedacross roomswith EWP systems
- Behavior-Adjusted Power Model consume less



University of Glasgow · University of Strathclyde Glasgow · Glasgow City Council · West of Scotland Housing Association · NEXGEN THE FUTURE OF HEATING · SCOTLAND BEYOND NET ZERO