Image of Newtown Bay on the Isle of Cumbrae looking out towards the Isle of Arran
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Rural and Island Circular Economy Initiatives: International Learning and Local Case Studies

Task 1, Work Package 1: SRUC-C4-1 Building the circular economy: sustainable technologies, green skills and upscaling behaviours

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Table of Contents

Executive Summary

What were we trying to find out?

This report begins to explore the feasibility of circular economy initiatives in a rural and island context in Scotland, drawing on international case studies, work in Scotland to apply islands screening to recent circular economy consultation documents, and initial work to understand our first Scottish case study location (Arran and Cumbrae).

What did we do?

We completed a rapid evidence review of international circular economy examples beginning with an overview of what the circular economy is and why it is relevant to the policy context in Scotland. Alongside a small number of interviews with experts working locally on circular economy island initiatives, and in international circular economy-related organisations, the research team undertook desk-based research to identify and explore circular economy initiatives on Vlieland (Netherlands), Samsø (Denmark), Mallorca (Spain), and Norfolk Island (Australia).

What did we learn?

Circular economy initiatives are at times difficult to define but are essential to meeting national and international carbon neutrality goals. They also deliver to the UN Sustainable Development Goals, and to wider agendas such as community wealth-building and carbon neutrality.

Island communities can be valued as 'living labs' and 'lighthouse projects' – communities that can 'show the way' for circular economy initiatives on the mainland, providing that local people are fully engaged. Other success factors might include at least some degree of island community autonomy or agency to direct initiatives, positive mechanisms to encourage increased awareness and behaviour change by households and businesses, and an exploration of alternative ownership models. However, there may be challenges encountered, including an inability to take advantage of economies of scale, higher costs of delivery, challenges around local transport provision and accessing housing and land, and a lack of local data to measure flows, etc.

There are many international case studies and support organisations from which islands in Scotland can learn. Moreover the Scottish Government's recent island legislation, National Islands Plan and the introduction of Islands Community Impact Assessments all encourage greater recognition of the potential opportunities and challenges of Scotland's island communities.

In the specific case of Arran and Cumbrae, there is great interest on-island in circular economy initiatives and plenty of pilot projects underway with considerable scope for enhanced funding and support through a co-design process involving local island communities and wider regional, national and even international stakeholders.

What do we recommend?

From our evidence gathering we have distilled 10 key learning points for Scotland:

- The importance of local level data
- Exerting local 'control' over the products and services that come onto islands
- Islands as 'living labs'
- Rural and island skills-related issues
- A recognition of the long-standing structural challenges on islands is critical
- Promoting local understanding and awareness of what the term circular economy means and how it is relevant to everyday life
- Engaging local people in circular economy initiatives
- Joining up local, and local and extra-local, activities
- Aligning with the community wealth-building agenda
- Linking with global organisations and initiatives.

1. Introduction and approach

This report is the first from a new research project which started in April 2022, and is part of the Scottish Government's Environment, Natural Resources and Agriculture Strategic Research Programme 2022-2027. The project is entitled ***"Building the circular economy: sustainable technologies, green skills and upscaling behaviours"***.

This report outlines work that the research team has undertaken in Work Package 1 of the project, the aim of which was to review international examples of circular economy initiatives in rural and island locations. We situate this review of initiatives within debates about the definition of the term circular economy (Section 2) and the wider policy context with reference to the UN Sustainable Development Goals and recent policy developments in Europe and the UK (Section 3) and Scotland (Section 4) relating to the circular economy.

This report then reviews the islands screening (Island Community Impact Assessment) work undertaken by Scottish Government on the two recent circular economy consultation documents (Section 5). This screening work explores some of the factors which may mean that circular economy initiatives in island locations need to be designed and/or delivered differently from those in mainland locations to ensure positive outcomes – and no negative effects - for local communities.

Section 6 of the report provides information on selected international circular economy initiatives. We summarise the key information about these case studies, with direct reference to the approach to be taken, and key issues to be covered - relating to circular economy readiness in terms of technology, skills and behaviour change - in this project.

The final section of the report (Section 7) offers some reflections on the key learning from these existing initiatives which the team will explore further in our case study work in Scotland.

The team gathered information on the international initiatives initially through a desk-based review of evidence available online and in written reports and then through a small number of interviews. The interviews were undertaken with representatives of some of the specific initiatives we included, and with representatives of organisations working on circular economy issues internationally. These interviews were undertaken online using Microsoft Teams, with ethical approval obtained through SRUC's Social Science Ethics Committee and subsequently from Scottish Government. Interviewees completed participant consent forms in advance of the conversations and, where permission was given, the interviews were recorded for subsequent analysis.

The purpose of this international work was to inform the design and delivery of the case study-focused work in Scotland, which is also being undertaken in Work Package 1. We make brief reference to our first case study, the islands of Arran and Cumbrae in North Ayrshire, in the final section of this report.

2. What is a circular economy?

Recently the concept of the circular economy (CE) has gained popularity as a tool to help ensure sustainable development and protect natural resources. CE addresses issues like waste and pollution at the design level and aims to identify new ways to valorise and utilise existing materials to eliminate reliance on raw material extraction. The transition to a CE necessitates a systemic way of thinking and acting that interconnects people and communities, industries and infrastructure, and institutional and policy governance.

According to the Ellen MacArthur Foundation, the CE is one *"which is designed to eliminate waste and pollution, circulate products and materials (at their highest value), and regenerate nature"*[1]. Zero Waste Scotland states that the goal of the CE is to *"design out waste"* from products and to get the *"maximum life and value from the natural resources used to make them"*[2]. In simplistic terms, the aim is to move away from the current *"make, use, dispose"* model towards a *"make, use, remake"* model. Ellen MacArthur Foundation's butterfly diagram illustrates the technical and biological cycles involved in the CE, demonstrating the flow of materials back into the system for reuse (see Figure 1 on page 7).

The concept of the CE can be traced back to the 1860s (see Figure 2 on page 8) but was formally introduced in 1990 by Pearce and Turner (1990) (Tuladhar et al., 2022). Inspiration for the concept was drawn from the environmental movement in the 1960s. Researchers in subjects such as resource management and economic growth argued that we should consider the Earth's resources as precious and finite, and there were further discussions around the need for a shift away from a highly consumptive system towards one that uses resources wisely within natural limits. Between 1990 and 2010, the concept of a CE began taking shape. Researchers recognised the need for economic theories to address environmental issues, and concepts such as regenerative design and biomimicry[3] began gaining popularity (Tuladhar et al., 2022).

[1] https://ellenmacarthurfoundation.org/about-us/what-we-do
[2] https://www.zerowastescotland.org.uk/circular-economy/about
[3] Regenerative design employs systems thinking to reframe waste as a resource and can be applied to product or the built environment (Tuladhar et al., 2022). Biomimicry is a branch of regenerative design which mimics patterns and behaviours of a biological organisms or ecosystems (Tuladhar et al., 2022).

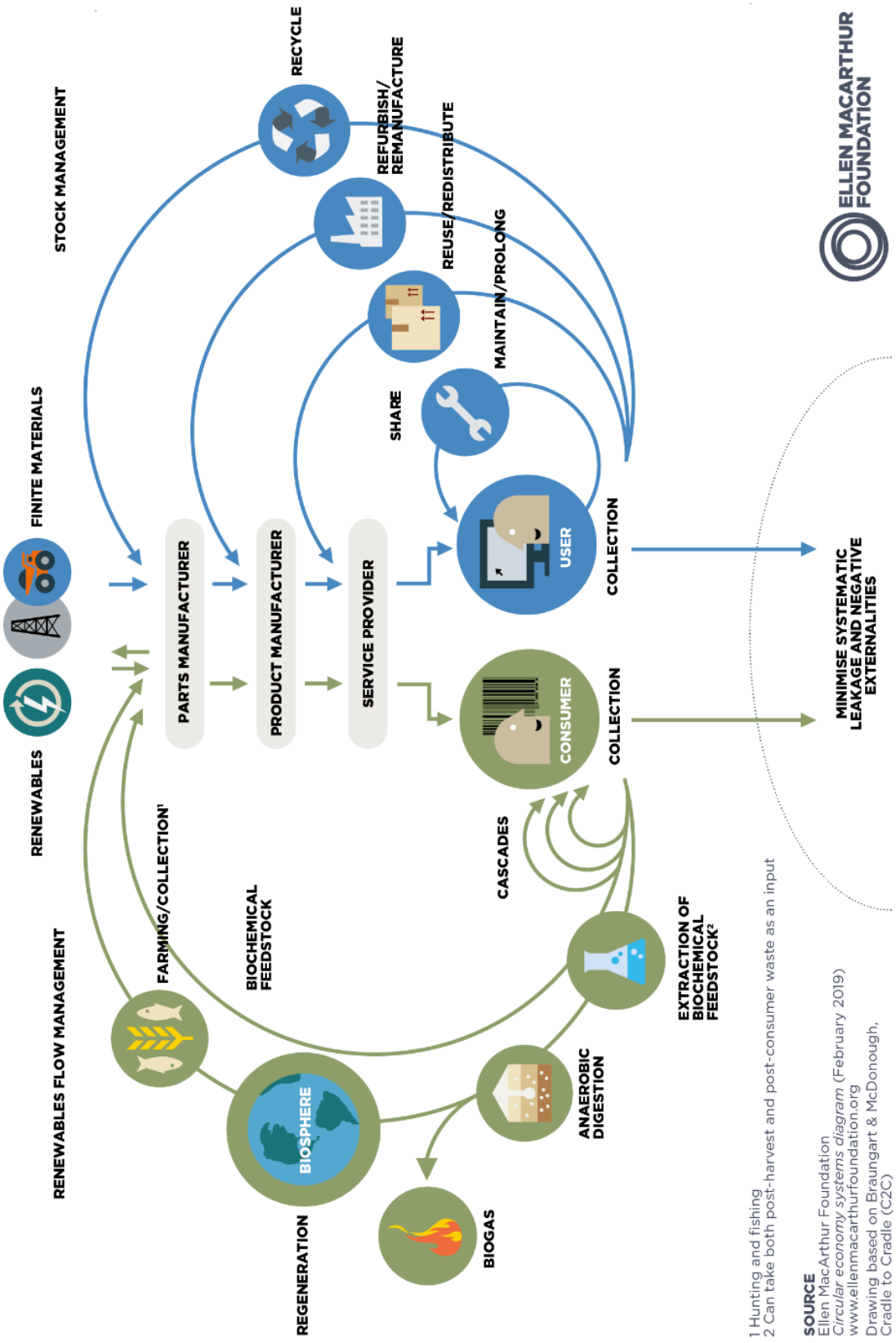

Figure 1: Circular economy systems diagram (Ellen MacArthur Foundation, 2019).

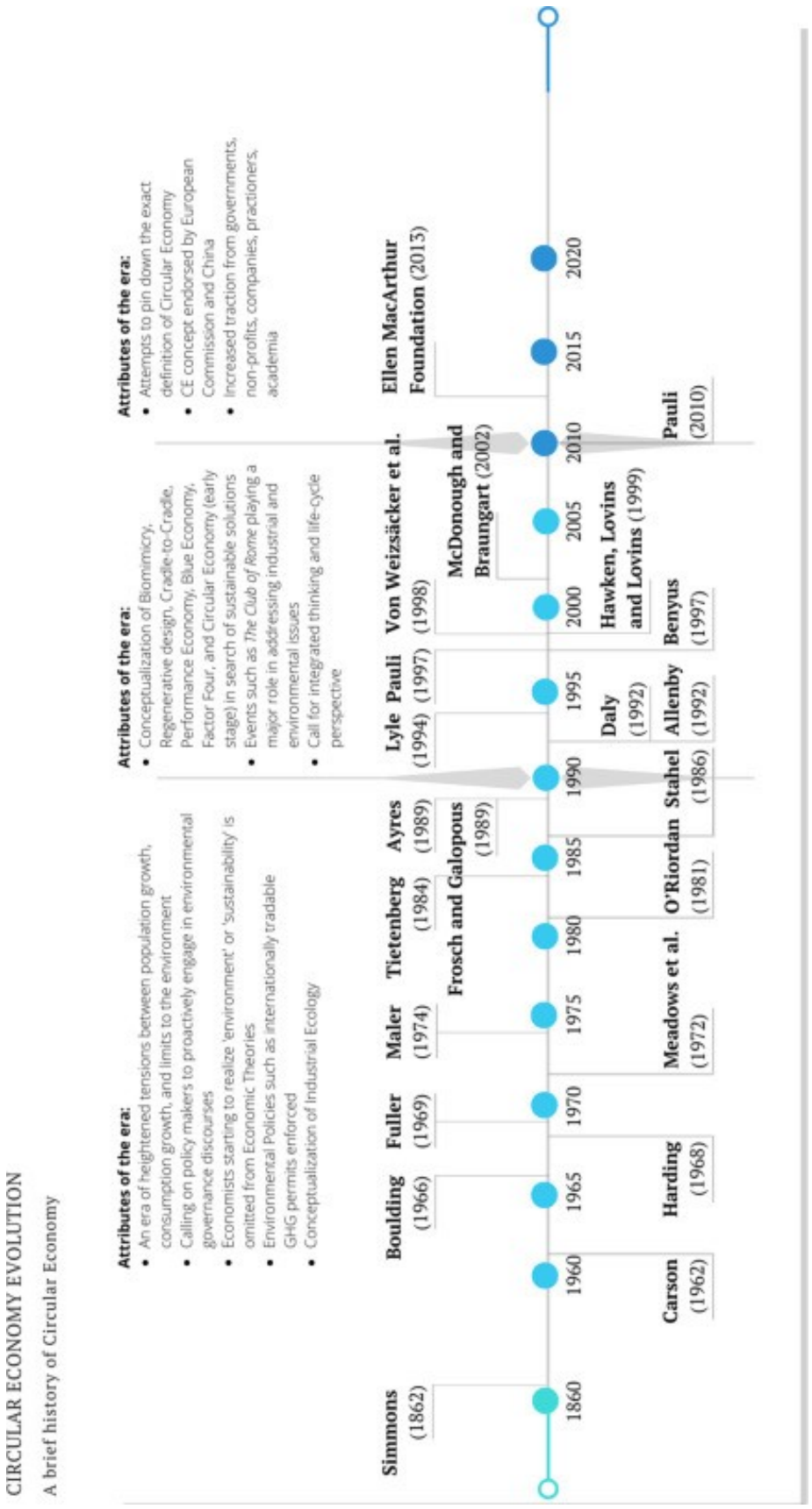

Figure 2: Timeline of the circular economy concept (Tuladhar et al., 2022).

Kirchherr and Hekkert (2017) observed that the CE concept was not well defined and argued that this has led to a misunderstanding of its aims and dilution of the term. They identified 114 different definitions of CE in academic literature. The most common definition used was the one provided by the Ellen McArthur Foundation as stated above. Based on an analysis of the 114 definitions found, these authors created a single, new, cumulative, definition of the CE to help create some clarity around what it is:

> *"[The circular economy is] an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations. It is enabled by novel business models and responsible consumers."* (Kirchherr et al. 2017, pp. 224-225)

Tuladhar et al (2022) identify Circular Business Models (CBMs) as instrumental in helping move the CE from theory to practice. According to Nußholz (2017), a circular business model is *"how a company creates, captures, and delivers value with the value creation logic designed to improve resource efficiency through contributing to extending useful life of products and parts (e.g., through long-life design, repair and remanufacturing) and closing material loops (p. 12)"*. For a circular business model to be successful, Tuladhar et al (2022) propose a holistic circular business model canvas which integrates micro and systems level business efforts with larger sustainability impacts (see Figure 3). According to Tuladhar et al, this figure points to all the factors affecting or ensuring a CE.

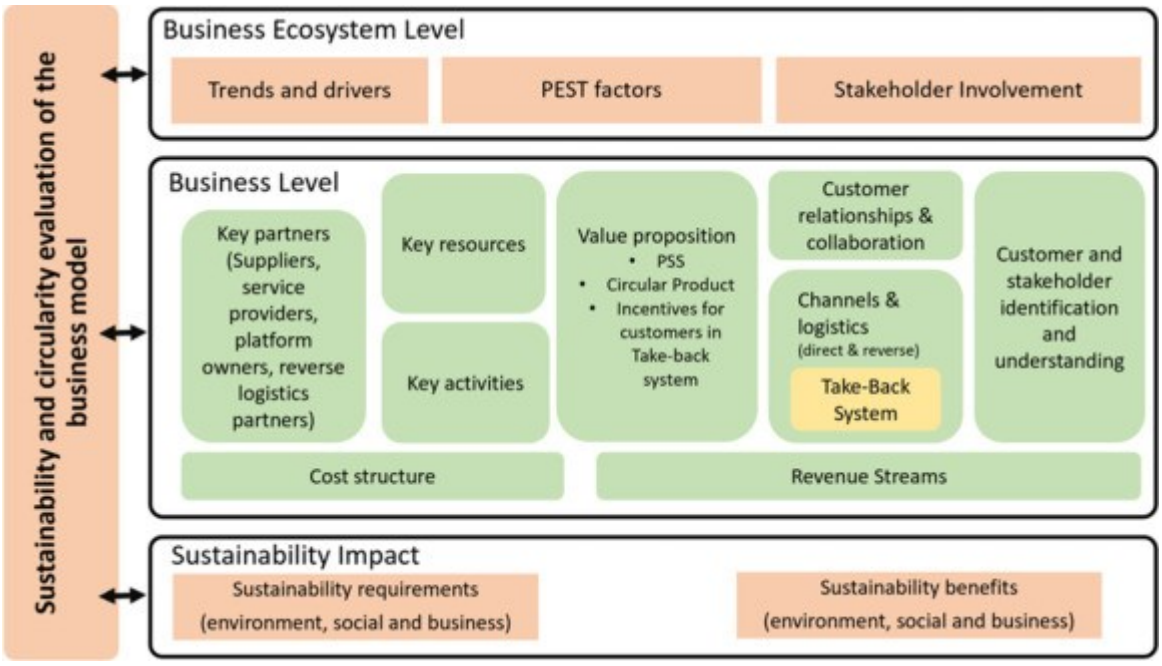

Figure 3: Holistic circular business model canvas taken directly from Tuladhar et al. (2022).

A shift towards CE practices for manufactured products is also found to reduce yearly CO_2 emissions (see Figure 4) (IPCC, 2022). This includes incorporating choice architecture by shifting demand for sustainable products and encouraging sustainable behaviours as well as enhancing capacity for material reuse and recycling.

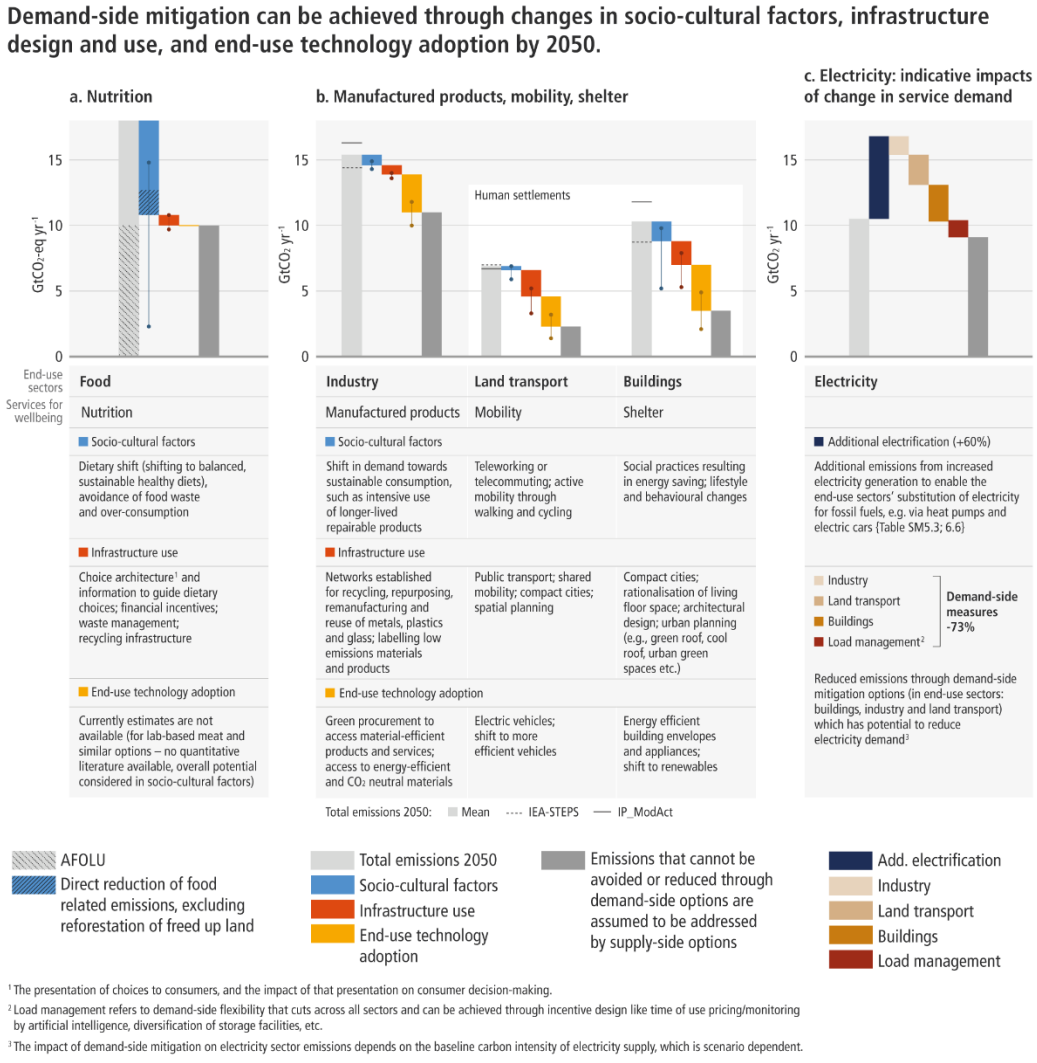

Figure 4: IPCC

To achieve a CE, entities must employ a systems thinking approach, establish reverse logistics and a closed-loop supply chain, and consider the 10Rs[4] (Tuladhar et al., 2022). According to the European Parliament implementing a CE is important to address the growing demand for and dwindling supply of raw materials[5]. However, according to the World Economic Forum currently only 8.6% of the world is circular[6]. To move along a CE

[4] The 10Rs taken from Reike et al. (2018):Refuse, Reduce, Re-sell, Re-use, Repair, Re-furbish, Re-manufacture, Re-purpose (ReThink), Recover (Energy), Re-mine (Landfill)
[5] https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits
[6] https://www.weforum.org/projects/circular-economy

path requires the capability of different actors and stakeholders to be understood – i.e. their willingness and readiness to adopt CE practices. And, to reiterate, advancing on a CE path requires the observation of systemic interconnectivity, going beyond the more traditional approach of recognising the combination of 'bottom-up' and 'top-down' processes and actions.

It is also important to explore the concept and implementation of a CE within the context of wider growth pathways, including the range of alternative growth pathways that have emerged in recent years, such as post-, de-, green-growth and doughnut economics. These all have slightly different meanings but can be defined as follows:

- Post-growth: The Post Growth Institute define post-growth as: *"a worldview that sees society operating better without the demand of constant economic growth. It proposes that widespread economic justice, social well-being and ecological regeneration are only possible when money inherently circulates through our economy"*.
- De-growth: De-growth is an idea that critiques the global capitalist system which pursues growth at all costs, causing human exploitation and environmental destruction. Instead, de-growth activists and researchers advocate for societies that prioritise social and ecological wellbeing to ensure environmental justice and a good life for all within planetary boundaries. To do this requires redistribution, reduction in the material size of the global economy and a shift in common values towards care, solidarity and autonomy.
- Green growth: According to the OECD, green growth is about fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our wellbeing relies. TO do this, it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities.
- Doughnut economics: This concept was put forward originally by the economist Kate Raworth. It is built on the doughnut of social planetary boundaries which frame the challenge of meeting everyones' needs within the means of the planet.

While these alternative pathways aim to represent a shift away from traditional linear growth, some researchers warn that these systems may not be radical enough to successfully decouple the concept of economic growth from resource consumption, pollution and social deprivation (Schulz & Bailey, 2014). In exploring alternative growth pathways, one issue is the concept of efficiency which is a hallmark for economically productive systems. Efficient capitalist economic systems are seen to compete with other public issues such as social justice, inclusivity, or environmental protection. As Bimpizas-Pinis et al. argue, the conceptualised efficiency of the CE is measured by how it "reflects or ignores public priorities and societal needs, such as environmental impact, or social equity" (p2, 2021). They argue that if the success of a CE society is measured by the same criteria as existing linear ones, it runs the risk of repeating the same failures.

3. The policy context for circular economy: looking beyond Scotland

The UN's Sustainable Development Goals (SDGs) focus on achieving a more sustainable future for all by 2030. While the 2030 Agenda for Sustainable Development, with its 17 goals and 169 targets, does not explicitly mention 'circular economy' there are clear links between many of the Goals and the CE principles; indeed CE approaches could be tools for delivering the SDGs in cross-cutting ways (Schröder et al, 2018). SDGs that are particularly closely linked with CE principles are: SDG12 which relates to responsible consumption and production, at the heart of the CE concept; SDG2 which relates to ending hunger which can be achieved through sustainable food production; SDG6 clean water; SDG7 affordable and clean energy; SDG13 climate action; and SDG15 life on land. Looking more deeply at sub-target level, there are goals where a CE approach can play an explicit role, including relating to the efficient use of resources, redesign and longer use of materials.

The Intergovernmental Panel on Climate Change's (IPCCs) 'Climate Change 2022' report reiterates the importance of CE principles to these SDGs. It notes that the CE concept is an increasingly important climate change mitigation approach that can help deliver human wellbeing by minimising the waste of energy and resources. The report includes specific examples of CE implementation, policies and mitigation potentials in chapters 5, 8, 9, 11 and 12. It argues that CE is shown to empower new social actors in mitigation actions, given that it relies on the synergistic actions of producers, sellers and consumers and that, as an energy and resource demand-reduction strategy, it is consistent with high levels of human wellbeing and ensures better environmental quality. It also creates jobs through increased sharing, reuse, refurbishment and recycling activities. The IPCC report notes that the transition towards a circular economy is one of a set of supply-side solutions aiming to meet growing demands for food, water and energy under a changing climate, which require both technical solutions and behavioural change, as well as greater coordination across multilateral institutions and governance. The report notes that circular economy approaches are commonly depicted by two cycles, where the biological cycle focuses on regeneration in the biosphere and the technical cycle focuses on reuse, refurbishment and recycling to maintain value and maximise material recovery.

At EU level, the European Commission issued a Circular Economy Action Plan in March 2020. The Plan is seen as one of the main building blocks of the European Green Deal, Europe's agenda for sustainable growth, alongside strategies and actions on supplying clean, affordable and secure energy, biodiversity, zero pollution and sustainable food production. The EU's transition to a CE is a prerequisite for achieving its 2050 climate neutrality target, for halting biodiversity loss, for reducing pressure on natural resources, and for creating sustainable growth and jobs. The Plan contains legislative and non-legislative measures in the form of 35 actions which apply along the entire life cycle of products, targeting how they are designed, processed, consumed and kept in use for as long as possible.

It is worth also mentioning the EU's Taxonomy, a tool to help, investors, companies, issuers and project promoters to navigate the transition to a low-carbon, resilient and resource-efficient economy. This was published by the Technical Expert Group on Sustainable Finance and includes a section on 'transition to a CE'. This report notes that progress towards a CE remains disjointed and inconsistent while environmental degradation continues on many fronts.

Turning to the UK, in July 2020, a joint statement was issued by the Department of the Environment, Food and Rural Affairs (Defra) in Westminster, the Department of Agriculture, Environment and Rural Affairs (DAERA) in Northern Ireland, the Welsh Government and the Scottish Government regarding the Circular Economy Package (CEP) which introduced a revised legislative framework, identifying steps for the reduction of waste and establishing an ambitious and credible long-term path for waste management and recycling. The Package acknowledges the different strategies and initiatives of individual countries within the UK and sets out the key changes made by the CEP and the approach of the UK to transposition of the 2020 CEP measures.

4. The policy context for circular economy: focusing on Scotland

The Scottish Government published its first CE strategy Making Things Last: a circular economy strategy for Scotland in 2016, and this emphasised the environmental, economic and community benefits from taking a CE approach. A CE approach was also referred to in other policy documents published at this time, including Scotland's Economic Strategy in 2015 and the strategy for manufacturing, A Manufacturing Future for Scotland (February 2016). Scotland has reached several CE targets since 2016, including: being the first UK nation to ban a range of priority single-use items, such as plastic cutlery and food containers (from 1st June 2022); banning biodegradable municipal waste from going to landfill by 2025 and a target of recycling 70% of all waste by 2025; and being the first to implement a Deposit Return Scheme for single-use drinks containers (currently scheduled for implementation in August 2023).

However, despite these achievements, the Scottish Government recognised in its background papers for the recent CE-related consultations (Scottish Government 2022a, b) that, without large-scale and rapid system change, Scotland will not meet its ambitious waste or recycling targets nor its climate change targets as set out in emission envelopes for different sectors in the Climate Change Plan Update in 2020. These envelopes reflect the pathway required to meet the statutory targets to reduce emissions by 75% by 2030 (compared with 1990) and to net zero by 2045. It is also recognised that there is a need to address Scotland's global carbon footprint from goods and services that are imported. Emissions from the consumption of goods and services account for 74% of Scotland's carbon footprint so there is a need to encourage more sustainable consumption to enable a more rapid move to a CE. It is recognised that 'making a sustainable choice' is still not 'the easy choice' for households, businesses or those working in the waste sector.

The Scottish Government's Programme for Government 2020-21 (Scottish Government 2021) and Scotland's Climate Change Plan Update in 2020 set out the Government's determination to accelerate progress to tackling the climate change and biodiversity emergencies, and its commitment to develop a route map to encourage radical and transformational change. The Plan recognised the need to reduce waste and meet the net zero targets in a way that maximises carbon saving potential, and the need to work with partners to identify how the waste and resources sector will contribute towards Scotland's journey towards net zero in the period to 2030 and beyond, and to become fully CE by 2045, the ambition set out in the Climate Change Plan Update 2020 (Scottish Government 2022a).

In line with its Programme for Government 2021-22 commitments, the Scottish Government published two consultations in May 2022 (2022a, b) as the start of a national conversation on delivering the Government's CE ambitions. The vision set out in these documents is focused on:

- **Responsible Consumption**, where people and businesses demand products and services in ways which respect the limits of our natural resources. Unnecessary waste, in particular food waste, will be unacceptable in Scotland.
- **Responsible Production**, where a CE is embraced by the businesses and organisations that supply products, ensuring the maximum life and value from the natural resources used to make them.
- **Maximising Value from Waste and Energy**, where the environmental and economic value of wasted resources and energy is harnessed efficiently.

The Scottish Government's consultation on the proposed priorities and actions for a Route Map to 2025 and beyond (2022a) includes a set of proposed priorities:

- Promote and support responsible production and consumption (including tackling consumption of single-use items and promoting reuse)
- Reduce food waste from households and businesses
- Significantly improve recycling from households and businesses
- Embed circular construction practices
- Minimise the impact of disposal of waste that cannot be reused or recycled
- Strengthen our data and evidence, sustainable procurement practices, and skills and training.

The overall aim of this Route Map is to reduce waste and meet waste and recycling targets for 2025 and to work with partners to identify how the waste and resources sector will contribute towards Scotland's journey towards net zero in the period to 2030 and beyond. The waste and recycling targets that form the key drivers of the Route Map, alongside the ambitious net zero targets, are:

- 15% reduction of all waste against a 2011 baseline by 2025
- 33% reduction of food waste, against a 2013 baseline by 2025
- Minimum of 60% recycling of all household waste by 2020

- Minimum of 70% recycling of all waste by 2025
- Maximum 5% of all waste to landfill and the ban on landfilling biodegradable municipal waste by 2025.

The detailed proposals are set out in the consultation background document (Scottish Government 2022a) in the form of seven change packages (one of which is cross-cutting – see Table 1):

Table 1: The seven change packages set out in the Scottish Government's consultation on a Route Map to 2025 and beyond (Scottish Government 2022a)

Promote responsible production, consumption and reuse (e.g. through banning the destruction of unsold goods to ensure they don't end up in landfill or incinerated when they could be reused or recycled)	Challenging and disrupting current approach to production and consumption by improving design, mainstreaming reuse and repair and incentivising sustainable choices.
Reduce food waste	Reducing food waste from all sources
Improve recycling from households (e.g. consulting on separate kerbside textiles collection by 2025)	Improving and optimising the performance of household recycling collection services to make the right choices easier for households.
Improve recycling from commercial businesses (e.g. through a mandatory requirement to report surplus and waste figures for goods such as food and textiles)	Businesses having the information and support they need to reduce waste and maximise recycling.
Embed circular construction practices	Embedding circular construction practices to reduce resource needs, reduce waste and carbon and encourage refurbishment and reuse.
Minimise the impact of disposal	Achieving the best environmental outcomes for materials that cannot be captured for reuse or recycling and ensure environmental and economic value of wasted resources and energy is harnessed efficiently.
Cross-cutting measures	To ensure the right structures and support are in place to enable action across the CE, including establishing powers to set local recycling targets, strategic measures and governance, research, data and evidence, sustainable procurement, and skills and training.

Alongside its consultation on the Route Map to 2025, the Scottish Government issued a parallel consultation on a Circular Economy Bill (2022b). This Bill will provide Scottish Government with the powers it requires to deliver the vision, priorities and change packages outlined in the Route Map. It includes a number of proposals, including a statutory duty on Scottish Government to publish or refresh a CE strategy according to a given timescale, and proposed powers for Scottish Government to take various actions, including introducing statutory targets on consumption reduction and reuse, establishing a dedicated CE body, introducing charging for single-use items and placing additional requirements on local authorities for household collection services and on households to improve recycling rates.

The CE-related ambitions set out in these two consultations are also reflected in wider current policy documents, including the Scottish Government's National Strategy for Economic Transformation published in March 2022 (2022c) which acknowledges the market, innovation and job opportunities from transitioning to a CE - and in the work of wider stakeholders. An example of the latter is the Scottish Vacant and Derelict Land Taskforce which put forward a recommendation on treating land as part of the CE, for example, by making it easier to buy land for reuse, with new laws for compulsory sales orders and reviewing the current ways that land is bought and sold by the public sector[7].

5. A circular economy in a rural and island context: islands screening work

5.1 Introduction

The Scottish Government's proposals for rapid and transformative change to transition more quickly towards a CE, as set out in the Route Map to 2025 consultation document (2022a), apply to communities, businesses and stakeholders across Scotland. However, all places are different, and it could be that the mandatory requirements on business recycling or more ambitious targets for household recycling for example, are more straightforward and quicker to achieve in some locations than others.

In our work on CEs in this project, we are particularly interested in exploring how this concept relates to rural and island locations. Acknowledging that everywhere is different, these communities tend to have some similar, shared, structural characteristics, including their dispersed populations, distance from centres of population, higher costs for service delivery, lower access to skilled populations and/or training opportunities, etc. which may mean that achieving recycling or waste management targets or behaviour change around the consumption and reuse of goods of different kinds is more challenging. For example, islands may have a lower capacity than non-island locations to process waste or collect and deal with recycling. This was a particular challenge raised in the Islands Community Impact Assessment undertaken for the Scottish Deposit Return Scheme, which noted the reliance on ferries for transport to

[7] For more information, see: Transforming vacant and derelict land - gov.scot (www.gov.scot)

and from islands and the need to take into account the capacity of those ferries and also the potential for weather-related disruption which will change that capacity, and potentially require interim storage facilities on-island. Similar issues related to higher costs and fewer or more challenging disposal routes for waste items were also raised in the Islands Community Impact Assessment for the National litter and flytipping consultation.

On the other hand, characteristics of these locations may mean that CE-related activities are more achievable and/or generate greater benefits than in more densely populated urban locations. For example, the circular agri-food system represents an opportunity for islands, many of which rely on tourism and agriculture, both activities that generate significant waste. The circular agri-food model gives islands the opportunity to turn waste from these activities into organic resources for crop production and energy generation purposes. In terms of island-based tourism, a growing visitor preference for eco- or sustainable-tourism experiences brings new opportunities for islands to reduce their environmental impact, make the most of local produce, and encourage visitors to engage in more sustainable practices, and for them to market themselves in this way[8].

Zero Waste Scotland's work with Highlands and Islands Enterprise in the Highlands and Islands region of Scotland[9] recognises the low population density in the region and its often dramatic and distinct geographies and topographical features, including mountains, lochs and (un)inhabited islands. These features bring certain challenges, namely access/distance to markets, access to skilled workforce, ageing population, etc. but also unique opportunities for implementing CE concepts across some of the region's key sectors, including food & drink, tourism, life sciences, energy, creative industries and technology and advance engineering.

In line with legislative commitments to undertake Islands Community Impact Assessments (ICIAs) which form part of the Islands (Scotland) Act 2018, the Scottish Government has carried out initial islands screening assessments on the proposals for the Route Map to 2025 and beyond (Scottish Government 2022a) and the Circular Economy Bill (Scottish Government 2022b). This screening work explored some of these challenges and opportunities and was undertaken through a variety of methods including a workshop, desk-based research and work undertaken for the previously planned Circular Economy Bill in 2019 (which was cancelled due to the Covid-19 pandemic) (Scottish Government 2022d). When undertaking this initial screening work, the Scottish Government acknowledged that full assessment of the impacts of the proposals on island communities will be undertaken through ICIAs, with opportunities for island local authorities, communities and businesses to engage as specific interventions

[8] For more information, see: Creating a circular economy for islands - Island Innovation
[9] For more information, see: Circular Highlands and Islands | Zero Waste Scotland, which includes case study information.

are designed and the secondary legislation is developed. This section of the report reviews the main issues raised in the islands screening work undertaken for both consultation documents.

5.2 Islands screening work for the proposed Circular Economy Bill

Three key issues were raised in the islands screening assessment for the proposed Circular Economy Bill (Scottish Government 2022d):

I. **Consumer choice**: Concerns were raised that the choice for consumers may be further reduced - island communities often face a lower choice already due to a smaller number of local shops and higher cost of deliveries[10] - because of retailers reducing their product range, either to avoid needing to charge for certain items or to help reduce reporting about and/or managing waste or surpluses. There may also be price and availability issues for reusable items. The screening assessment suggests that this concern could be mitigated for island communities by initially using these powers to target larger retailers.

II. **Transport**: There is a possibility that changes to delivery or collection systems may be more difficult to implement or more expensive for island authorities or affected organisations due to the greater distances involved and use of ferries and the associated time and availability constraints. Island communities already face challenges with the availability and affordability of transport, including higher costs of transporting goods and equipment onto island. Moreover, collection routes may already be less efficient due to the dispersal of businesses and households (indeed some of Scotland's islands lack kerbside recycling for this reason) so additional funding may be required if changes are mandated to the items that are collected. While many islands have landfill sites and/or other residual waste treatment facilities, other waste is usually required to be transported off island for processing, often by ferry. Increased recycling rates or greater segregation of waste may take up more space on ferries which again will result in higher costs particularly where multiple ferry journeys are required for waste to reach its end destination. Achieving this extra capacity may be particularly difficult during the busy tourist season or periods of bad weather, possibly requiring temporary local storage on-island requiring appropriate space and facilities. Finally, research undertaken for the screening assessment found that the smaller quantities of waste and recycling collected on islands meant that vehicles were often not full and therefore were operating more inefficiently.

[10] For more information, see: Fairer parcel deliveries: action plan - gov.scot (www.gov.scot). Research undertaken for this Action Plan found that some costs of delivery can be unfair for those living in rural and remote areas, such as the islands. This can prevent island communities from taking advantage of the digital economy and the products and services it provides. This can also be a barrier to small enterprises which further limits the availability for individuals as well as the economic potential for those locations.

III. **Storage**: The ability to store and segregate waste may be hindered by lack of facilities on-island and/or the increased amount of time it could take to remove items off island. It is worth noting, however, that rural areas and some islands may be in a favourable position in terms of having space for the required storage facilities.

5.3 Islands screening work for the proposed Route Map to 2025 and beyond

The initial islands screening for the Route Map identified four areas where there may be direct or indirect impacts for island communities when the proposals are developed: transport; availability of disposal options; availability of products and services; and employment and skills. The screening assessment goes on to discuss the relevance of these issues for six of the seven packages (see Table 1, not the seventh cross-cutting package) and the key points are summarised here:

1. Promote responsible production, consumption and reuse

There may be more limited options for increasing reuse on islands (as a solution to reducing consumption of goods and packaging) due to distance making collection inefficient or more expensive, infrastructure challenges, or a reduced market for reusable items. As raised in the previous screening, it is also important to recognise the more limited choice that already exists for island communities, particularly for products that have a direct charge attached to them, but alternatives may not be available. Benefits may be brought to island communities by measures that create employment and develop skills (e.g. in the repair or refurbishment of production), particularly where employment opportunities are limited[11]. The National Islands Plan Survey provides an understanding of availability of job and training opportunities across the different island sub-regions. Further knowledge would be needed to understand how this would relate to any opportunities and challenges resulting from measures that affect employment and skills, and how these would differ from those experienced by communities elsewhere in Scotland.

It is perhaps also worth reflecting on digital issues here too. In terms of banning the destruction of unsold durable goods, the Circular Economy Bill consultation notes that existing legislation in Scotland requires waste producers to take reasonable measures to apply the waste hierarchy when disposing of goods and to ensure that waste is managed in a manner that promotes high quality recycling. The consultation suggests that a phased approach may be best, with regulations focused on goods where there is most significant environmental impact, and informed by improved data collection that digital waste tracking will provide. The latter will require reliable and quick digital connectivity, excellent digital infrastructure, and good digital skills, not all of which are necessarily present amongst households and businesses in rural and island locations.

[11] For more information, see: Supporting documents - National Islands Plan Survey: final report - gov.scot (www.gov.scot)

The increased use of digital technology to support circular economy initiatives is also proposed in the EU's Circular Economy Action Plan, which has recently proposed a range of provisions including banning the destruction of unsold goods and the development of digital product passports which will include mandatory information on circularity and other environmental aspects.2. Reduction of food waste

There is potential for the redistribution of food to be more challenging in an island setting, though measures could also bring specific benefits. Evidence suggests that those living in more remote locations are more vulnerable to food poverty[12] and le higher costs of living[13] (most of Scotland's islands is classified as remote rural with remote small towns, according to the Scottish Government's urban-rural classification[14]). Remoteness may be a challenge for businesses with surplus food to redistribute and for community organisations trying to access surplus food[15], due to the distances involved, though a range of redistribution mechanisms are in place in island communities, ling for example FareShare (who distribute food to charitable organisations) as well as local community initiatives such as community fridges and food share schemes. Island businesses may also need to make more changes to their operations than those elsewhere to report on food waste, le they are currently exempt from segregated food waste collections under the rural exemption[16]. Businesses would need to introduce a system for measuring their food waste, for example by representative sampling, although this would bring them in line with the obligations on businesses elsewhere in Scotland that are not exempt from food waste separation requirements.

3. Improve recycling from households

It has already been identified that island authorities often face higher costs per capita in collecting, transporting and disposing of waste and recycling[17], due to the rural nature of collections making them less efficient. They also often incur additional costs as waste and recycling often needs to be transported off island for processing due to the limited landfill sites and other disposal facilities on islands. Island households may face barriers to responsible recycling or disposing of recycling due to the lack of facilities[18]; this applies to waste from several different sources, ling households, commercial properties and construction and demolition sites. It is harder for smaller local authorities with less

[12] For more information, see: The nature and extent of food poverty and insecurity in Scotland - Publications - Public Health Scotland
[13] For more information, see: A minimum income standard for remote and rural Scotland
[14] For more information, see: 2. Overview - Scottish Government Urban Rural Classification 2016 - gov.scot (www.gov.scot)
[15] Unpublished desk based Zero Waste Scotland research.
[16] For more information, see: The Waste (Scotland) Regulations 2012 (legislation.gov.uk)
[17] For more information, see: Reforming the UK packaging producer responsibility system - Partial island communities screening assessment (www.gov.scot)
[18] See also the Islands Community Impact Assessment undertaken for the National litter and flytipping consultation which describes some of these challenges.

waste to market to negotiate with private sector investors to establish new facilities and a reduced ability to work with neighbouring authorities to share the cost of developments through waste partnerships. Future measures designed to increase recycling levels from the Islands will need to take the specific and very diverse circumstances of different islands into account, for example, different transportation issues, lling cost and the potential for ferry disruption, due to either the weather or tourist levels.

4. Improve recycling from commercial businesses

There are unique challenges for island communities regarding the availability and affordability of transport. The higher costs might make it harder for island businesses to collect and distribute recycling, and to increase the market for recycled material, Ih might also be hampered by more limited local infrastructure.

5. Embed circular construction practices

The (more limited) availability and affordability of transport on, to and from islands may lead to higher costs of construction and there may be challenges regarding supply chains and skills with more limited access to sustainable construction products and services, reduced ability to follow demolition, screen, reprocessing and reuse of the resulting materials, and more limited availability and supply of workers[19]. However measures to create and develop skills In circular construction practices could also bring additional benefits to Island communities.

6. Minimise the impact of disposal

Impacts associated with the costs of disposal are likely to vary between islands. Some islands have access to a local landfill or other residual waste treatment facility, while others do not[20], and all other waste must be transported off island, often by ferry, for processing. If recycling rates increase and/or there are changes to obligations relating to the segregation of waste, this might result in a large space requirement on ferries with associated increased costs, especially if multiple ferry journeys are required for the waste to reach its destination. However, more limited options for disposal have led to innovative developments on islands, for example, developments on Shetland to create energy from waste facilities.

It may also be more difficult on islands to divert waste away from landfill due to higher transport costs and for some items there are limited times that they can travel on ferries, for example odour (or perceived odour) problems from difficult to recycle material such as end-of-life vehicles or construction materials. The significant cost of

[19] For more discussion of these issues, see: Heat in buildings strategy: island communities impact assessment - gov.scot (www.gov.scot)

[20] A map of the locations of operational landfill sites in Scotland is available in SEPA's Landfill Sector Plan: Landfill sector plan | Scottish Environment Protection Agency (SEPA)

transporting farm plastics for recycling, for example, also discourages recycling of this material on islands.

Work was also undertaken in the initial screening exercise for the Route Map to 2025 to assess existing data relating to waste and recycling for the islands. In relation to ferry transport, the National Islands Plan Survey highlighted that views on the reliability and availability of ferries varies between age groups and between island subregions[21].

Household waste and recycling (collection, treatment and disposal) data is available from island communities via their local authorities, and it is reported to SEPA on an annual basis using Waste Data Flow[22]. The data shows that most island communities have recycling rates that are below the Scottish average, in some cases substantially below[23], and that kerbside recycling collections are not universal across islands. Data on commercial and industrial waste is not available, but it is key to understanding waste, recycling and resource behaviours and flows and thereby to inform the design of measures to Increase these.

In the case of the North Ayrshire Council area, which includes the islands of Arran and Cumbrae (our first Scottish case study in this project) alongside the mainland, there may be challenges in disaggregating data for these island communities, but it is vitally important to be able to do this as highlighted by the National Islands Plan Survey which highlighted the variability of views between island subregions on access to recycling household waste and donating items for reuse (though the Survey did highlight that many islander do engage in pro-environmental behaviours, such as buying food locally and generating local renewable energy)[24].

Research[25] by Zero Waste Scotland indicated that for the rural inaccessible category (in which all the islands were classified, except Arran and Cumbrae as they are in North Ayrshire Council area which was classified as accessible rural), the annual cost per household of providing waste collections is substantially higher than the average cost in Scotland, i.e. there is an islands premium in the cost to local authorities of managing household waste.

The initial screening assessment also notes the Islands Green Recovery Programme Refill Fund which was part of the Scottish Government's £2 million programme to inspire locally led green projects on islands to recover from the Covid-19 pandemic. The Fund awarded over £250,000 to 20 organisations and businesses in island communities to develop packaging-free shopping opportunities in the grocery retail sector.

5.4 Concluding comments

[21] For more information, see: National Islands Plan Survey Final Report (www.gov.scot)
[22] For more information, see: Waste data | Scottish Environment Protection Agency (SEPA)
[23] For more information, see: 2019-household-waste-commentary.pdf (sepa.org.uk)
[24] For more information, see: National Islands Plan Survey Final Report (www.gov.scot)
[25] Unpublished desk based Zero Waste Scotland research.

The new legislative requirement to undertake initial islands screening assessments and then full ICIAs, offers a new opportunity in Scotland to undertake a detailed review of the potential island-specific implications of a new policy or piece of legislation. The work we are undertaking in this project will help to provide the necessary evidence to inform these assessments by generating a better understanding of the barriers, opportunities and impacts of implementing CE practices and models in an island location. A similar process does not currently exist formally for assessing potential impacts in rural areas, although this may be considered in time by the Scottish Government. The structural characteristics of islands – including their dispersed populations, more limited and expensive transport options, higher costs of service delivery, etc. – mean that CE-related interventions may need to be designed and delivered differently to mainland locations.

6. International examples of rural and island circular economy initiatives

6.1 Introduction

This section of the report provides background information on some of the organisations operating globally in support of the implementation of CE initiatives on islands. It highlights some specific island-based CE interventions that the team found through their desk-based research.

6.2 International organisations working to support island CE interventions

Greening the Islands is an international non-profit initiative that exists to support the self-sufficiency and sustainability of islands worldwide. The organisation has a number of activities, including: working in support of islands being a model for CEs in harmony with nature; promoting synergies in the nexus between the three pillars of the green economy – energy, water and mobility; developing a broad concept of CE that extends to waste, agriculture and eco-tourism; working to disseminate knowledge and best practice; stimulating collective work so as to accelerate the self-sufficiency and sustainability of islands and remote locations; and acting as a catalyst in relations between private and public stakeholders. The organisation argues that:

> *"Islands deserve particular attention within the policy and legal frameworks that look to establishing a circular economy in Europe: it's indispensable for islands as closed systems to exploit their natural resources effectively while at the same time they have limited local resources and little capacity for sustainable projects."*

At the Greening the Islands International Conference held in May 2018, delegates repeatedly invoked a CE as the best path towards the sustainable development of islands, including undertaking activities to increase resource and energy efficiency across diverse sectors such as energy and transport, water and tourism, and working to protect their land and marine environments, and incorporating them all into a single

vision. By following a CE model, the need for islands to 'import' energy and natural resources would be reduced and local resources would be used more efficiently to the benefit of the local environment as well as local job creation with associated economic and social benefits. Greening the Islands have set up a Greening the Islands Observatory to bring together businesses, citizens, communities, policymakers, etc. to match islands' needs and innovative solutions (including with regard to financing) in relation to the CE.

The Ellen MacArthur Foundation was mentioned at the start of this report and is active in terms of international CE initiatives, including through collating and sharing guidance and information on example projects across the world. The European Commission has supported several CE projects on European islands in recent years and has called for islands to collaborate and co-ordinate on their activities and organise common, standardised deployment to ensure that the solutions roll out to the market.

The CE concept was also the main focus of five events at Island Innovation's Virtual Island Summit held in September 2022. The main CE focused event, 'What Goes Around Comes Around: The Circular Economy' featured speakers from India, Kenya, and Iceland[26]. Akshay Gunteti from Green Worms Waste Management discussed solutions to plastic waste management for remote and rural communities in two islands off the coast of India. Their focus has been to put the community at the centre and work with them to manage their waste, but he also mentioned the importance of reducing this waste in the first instance. Alex Kubasu, programme manager for the CE initiative at WWF Kenya, discussed key findings from their roadmap to material circularity which include corporate and government accountability, materials elimination, environmental justice, and international leadership.

Keynote speaker Elva Rakel Jónsdóttir, head of the department for Climate and Circular Economy at the Environment Agency of Iceland gave examples of best practices from their perspective including the use of Hackathons to encourage innovation around CE pathways, a step-by-step approach to reducing specific material waste each year over a 10-year period, and a communication campaign which utilises images of wildlife to help the public make a connection between the effect waste has on other species. She also discussed Iceland's Green Step programme which was adapted from a Harvard University model and is used by all governmental bodies to decrease their environmental impact.

[26] A recording of this session is available to watch or download at: What Goes Around Comes Around: The Circular Economy | Island Innovation

6.3 International case study CE interventions

Only initiatives in OECD countries were explored in this work to make more directly relevant connections with the Scottish context. Case studies were chosen based on priorities for future CE activities in Scotland as set out in consultation documents (including promoting responsible production, consumption and re-use, reducing food waste, improving household and commercial business recycling, embedding circular construction practices, etc.) and also because they provided means for us to explore some of the issues that will form the focus of further work in this project, i.e. relating to the geographic location of the island (e.g. peripherality, distance from mainland, size of island, demographic and socio-economic information, etc.); CE readiness in terms of businesses, technologies, innovation and green skills (WP2 and 3); CE readiness in terms of mapping behaviours (WP 4); and differing system dynamics and growth pathways (WP5).

Case Study 1: Vlieland, Dutch Wadden Islands

Vlieland is the smallest inhabited island of the Dutch Wadden Islands and a UNESCO world heritage site. The island is 121.93 sq. mi and has a population of 1,138. Vlieland can be reached by ferry from the mainland which takes 45 minutes to 1.5 hours to cross the Wadden Sea and part of the North Sea. The site is a popular tourist destination, but tourists are not allowed to bring cars with them and there is a summer-only ferry service that runs to accommodate the influx of people. There is an intricate network of cycle routes and a bus service. The island has an ambition to become a sustainable and energy self-sufficient island and is well underway with its energy transition efforts. However, it is struggling to transition to a CE. For example, there have been a few successful examples of neighbourhoods with energy positive housing, but these efforts could be scaled up.

The Dutch government is taking a living lab approach with Vlieland and using it as a starting point for other closed loop island efforts. Essential products are typically shipped into the island and waste is shipped out back to the mainland. A material flow analysis was conducted by CE specialists Metabolic who have prepared recommendations for a CE which have been outlined in this report. The main recommendations highlighted in the report include adopting passive house standards to reduce energy and using wind to supply sustainable energy, using wastewater as an untapped resource, and reducing material use and encouraging local materials processing in the future. Additional studies have also been undertaken looking at reducing food waste on the island.

Two CE specialists at Metabolic made the case for why rural islands are particularly well-positioned for CE initiatives due to both their scale and tight knit community nature. In the Netherlands, the islands are seen as living labs where "lighthouse" projects

can be completed which will then "light the way" for transitions on the mainland. They noted it is easier to monitor the results from islands because they are closed systems.

They cautioned, however, that while islands can be great learning environments, it is not possible to use economies of scale and it is difficult to close every loop. Other disadvantages to working on an island setting include lack of density of populations that benefit from CE infrastructure and lack of expertise needed to help businesses become circular. It was also noted that topography can be a limitation and must be considered carefully. CE projects on islands should come equipped with funding and expertise rather than offloading the responsibility onto businesses who are juggling multiple priorities at once.

They noted that behaviour change may prove difficult based on the unique island contexts, but it is important to listen to and understand locals to see what the actual barriers are and how these can be overcome. In the Netherlands members of island communities value independence and will support CE initiatives which help support this. If there are clear benefits, then people will welcome the new models.

In terms of energy usage, the biggest by far is through ferries – a key mode of transportation for islanders. It is worth noting that the ferry company that services Vlieland has already put LNG (liquefied natural gas) ferries into service and Metabolic has argued that bio-LNG or the technology for electric ferries needs to be made more technically and economically favourable to reduce the environmental impact of Vlieland's ferries (Metabolic, 2017). In a Scottish context, in their June 2021 final report, Scotland's Climate Assembly included a recommendation in relation to ferry and vessel emissions (number 30) to *"Improve regulation about emissions from ferries (and other vessels used to transport goods around Scotland) so that high carbon emitting vessels are replaced with low carbon, modern alternatives, and ensure that the Scottish public sector fleet achieves a 50% cut in total carbon emissions by 2030."*

The Dutch government created a policy instrument called 'the Green Deals' in 2011 which serve to improve communications between firms and other stakeholders for sustainability projects - 22% of the Green Deal agreements are related to the CE (van Langen & Passaro, 2021). In 2012, the Dutch government made CE a key policy area and in 2016 pledged to reduce primary material consumption by 50% and transition to a CE by 2050 (van Langen & Passaro, 2021). The interviewees mentioned that although there is some policy support from Dutch government, there is more that can be done to enable CE initiatives on islands.

Case study 2: Island of Samsø, Denmark

Samsø is an island off the east coast of Denmark in the Kattegat Sea. It is also known as 'a piece of Denmark in miniature'. The island is 43 sq. mi and has a population of 3,726 people. It is seen as a CE success story after achieving a carbon footprint of negative 12 tonnes per person per year through the adoption of wind, solar and biogas which power

the island. The elements which made this transition to fully renewable energy a success included necessary technology, national funding, and a variety of incentive schemes which nudged household choices (de Jesus & Mendonça, 2018). They also had national level policies which served as an institutional driver which, combined with effective communication and a vibrant cultural context, became strong social drivers for a CE (de Jesus & Mendonça, 2018).

In 2015 Samsø launched the "Full Circle Island" project which was an initiative intended to make the island the first CE. Samsø has an Energy Academy which generates knowledge and solutions towards Samsø's CE goals. Their focus is on enhancing locals' knowledge of a circular bioeconomy which focuses on sustainable agricultural production, clean water, and recycled waste. The goal was to build up a story about Samsø so that the Danish and European Parliaments would pay attention. As their success grew, more policy tools became available including the important price support system. Søren says this has been ground-breaking for Danish industry and green technology innovation.

According to a New York magazine interview with Søren Hermansen, Director of the Energy Academy, much of Samsø's success is due to the support from Danish politicians and government leadership. Green innovation in Denmark started with a political vision at the second Convention of the Parties (COP) in Kyoto on the heels of the 2007 energy crisis. Samsø then won a competition to explore renewable energy options on the island. The Danish government gave state guarantee rates to produce offshore wind energy which made it affordable for individuals to buy shares. Denmark wanted to move away from coal and gas-powered systems towards green energy and a decentralised energy structure was promoted.

The research team heard a little more about the process of turning Samsø into a CE island through a further interview. The cooperative structure that was developed for the renewable energy production was important. This means that residents of Samsø are owners and beneficiaries of the renewable energy projects. Cooperative ownership models for wind turbines and district heating were explored and became popular as individuals realised these were safe and cheap alternatives to international fuel imports. The model of shared responsibility and democratic decision-making felt good to citizens. However this model is being challenged by changing EU standards in bidding and by the increasing size of renewable energy farms needed to meet ambitious GHG reduction goals.

Citizens of Denmark tend to see themselves as innovative individuals particularly because they are made up of multiple small islands. In this case, any initiatives which increase the agency of individuals and communities are welcomed more easily. It is important that the concerns of the people are listened to. Most of Denmark's 27 inhabited islands have their own administration, economies, and political influence. This process of Danish islands gaining more autonomy and power has been a hard fight which has taken place over many years. Independent political structure is a big part of

Samsø's CE success. It is worth reflecting that, in Scotland, the Islands (Scotland) Act 2018 and its associated provisions (such as the creation of a National Islands Plan and the introduction of Island Community Impact Assessments), has raised the policy and political profile of Scotland's islands, at the same time as an ever-increasing proportion of Scotland's land, particularly in its island communities, is now owned, governed and/or managed by communities. However, in a situation different to that in Scotland,

Another key 'success factor' in Samsø has been the breaking down of big goals to smaller projects, which makes it easier for people to see how they fit in. It is also important to be aware of the mixed fuel options available to ensure there is balance in the energy delivery system. Alongside this, although islands can serve as useful 'living labs' for innovation, there should be caution taken in terms of undertaking too many experiments, and often it's the case that existing methods of doing things need to be replaced with better investments. CE initiatives on islands must also not only speak to locals' needs, but should also tie in with wider national and international goals.

The final point raised in the interview related back to the power held by islands. It is important not to understate the importance of island autonomy both in governance and economic sustainability. For these islands, "it means a lot to be independent, not disconnected, that's not the same thing.... If we give them the administrative power, it is amazing to see what can be accomplished."

Case study 3: Mallorca, Spain

Mallorca Council has launched a Mallorca Circular Plan which includes 24 projects funded by 800 million euros from the EU Next Generation Fund. The council of Mallorca is using the technological platform Finhava to promote the CE in the fields of local agriculture and sustainable tourism. The platform traces and calculates the carbon footprint of food consumed in hotels and evaluates the volume of food waste produced and transforms this into an ecological compound for farmers to use as fertiliser for crops. Farmer's products are then reintroduced to the cycle and the cycle is closed. The software offers an opportunity to track consumption and minimise waste.

In addition to the software, the Balearic region has a new law regarding sustainable tourism which introduces a circularity strategy. The new law:

- obliges hotel establishments to eliminate fuel oil or diesel boilers and to replace them with thermal systems that reduce CO2 emissions; and control temperatures to avoid excessive use, and to install water-saving devices in bathrooms; they are also prohibited from offering amenities with single-use plastics to their clients
- requires that tourist establishments offer at least 3% of local produce, livestock, or fishing products; in the case of 4- and 5-star hotels, the percentage rises to 4% and in rural agrotourism establishments they must offer at least 5% local produce.

- includes a moratorium on any new tourist accommodation for the next four years (currently the Balearic Islands has more than 600,000 tourist beds).
- permits hotels to grow by 15% in volume in exchange for a 5% reduction in the number of beds.
- authorises a change of use for obsolete hotels, which can be converted into housing.
- draws up a strategic circular plan for energy, waste, water, land use, food, and mobility, with the support of competent administrations in these areas and with the aim of promoting the primary sector in the region.

As part of the CE strategy, the plans should have a planning stage where necessary actions are defined and an evaluation stage where the circular process is evaluated, and the lines of action are reviewed.

Case study 4: Norfolk Island, Australia

Between the coasts of Australia and New Zealand there is a very small external territory island, Norfolk Island, with a total area of 13.4 sq. mi and 2,188 residents. Anything that is not produced on the island arrives via air freight or sea. The island is a 2.5-hour flight from mainland Australia. The Norfolk Wave Campaign aims to provide an educational platform for residents and visitors to make better use of their waste and resources. Their campaign has a take on the reduce, reuse recycle slogan which encourages people to be resourceful, be mindful, and act now to reduce waste and impact on the island. The island experiences issues with resource reuse and while glass is easily reused, building waste and hard plastics are hard to process and are sometimes burnt and the ash-product is thrown into the sea. Proper waste management is expensive and difficult. However, the locals have created a culture of reuse and repurposing and most residents are keenly aware of the importance of a sustainable island. There are also developments on the island in relation to eco-friendly tourism[27].

Further CE initiative case study information

In addition to these four case studies, the research team located information on many other CE initiatives from around the world. The Ellen MacArthur Foundation website has a large quantity of examples and case study information, from the global north and south. The organisation works to accelerate the transition to a CE, encouraging action, providing thought leadership and inspiration, and sharing information. For example, the island of Porto Santo in Portugal is reusing old car batteries and generating renewable energy. There are several food- and food waste-related examples from Italy, and in

[27] For more information, please see: Eco-friendly Holiday Destination - Norfolk Island Stories

particular from Sicily, including one example where a network of small towns is focusing on creating an organic waste management system.

Work is also underway in the Greek islands where visitors are not allowed to bring plastics onto the island, their bags are checked, and people are asked to only use reusable containers. There are examples from Africa focusing on insect farming, and one example where insect protein is being added to infant powder milk with the aim of improving the health of children. There are also regenerative farming examples from Brazil and Kenya, and a regenerative ocean farming example from Connecticut in the USA. All these examples are in different geographical contexts to Scotland, with different climates, cultures, etc. but there may still be interesting learning for here.

The Greening the Islands website contains lots of 'best practice' case studies of island-based circular economy initiatives, which are organised by theme: Best practices - Greening The Islands, and there is also the circular economy club website which serves as a networking opportunity for professionals and organisations interested in the circular economy. The Islands Innovation website also contains a large quantity of information relating to different kinds of island case studies, including relating to CE interventions, and the Orkney Islands feature here, mainly due to their work relating to renewable energy[28].

The Sustainable Islands Platform website contains information on sustainability and CE-related interventions in island location, and there is also work going on in the Nordic countries to set up a network of carbon neutral islands. The website of Nordregio (a research organisation based in Stockholm) contains a large amount of Nordic case study information (e.g. in Bornholm), though there is limited explicit mention of the CE concept. One final example worth mentioning is from Croatia, where an article notes the challenges of implementing CE initiatives on the islands of Hvar and Cres due to low environmental awareness.

1. Key Learning for the Scottish context

7.1 Early learning from Scotland: the islands of Arran and Cumbrae

[28] For more information, see: https://islandinnovation.co/webinar/orkneys-energy-revolution-leading-the-way-to-a-low-carbon-future/; https://islandinnovation.co/webinar/energy-at-the-end-of-the-world-an-orkney-islands-saga/; https://islandinnovation.co/webinar/shining-to-the-future/. See also: Some Islands in Northern Scotland Have Too Much Clean Energy, so They Are Producing Hydrogen Power (interestingengineering.com) and The tiny archipelago blazing a trail towards sustainability (planetark.org)

Alongside the review of international examples and the intelligence gained from the islands screening work on the Scottish Government's two recent consultation background documents, the research team has also undertaken work in Work Package 1 to begin to gather information on and understand our first case study for this project, the islands of Arran and Cumbrae, off the coast of North Ayrshire.

This work has involved desk-based information gathering, including through the review of local authority and community plans for example, developing relationships with staff at North Ayrshire Council (in particular Sarah Baird, Senior Islands Officer), and a visit to both islands conducted by two members of the research team in late August-early September 2022. Based on this evidence, the research team has identified some early learning to support and inform our more in-depth work to understand CE readiness on the two islands in the Work Packages of this project. This learning is summarised in Box 1.

Box 1: Learnings from the Case Study Islands: Arran and Cumbrae

Isle of Arran

- Access to housing and a reliable ferry transportation system are key priorities to a functioning island.
- Access to land on Arran is challenging. For example, those looking to purchase additional land for regenerative agriculture or community farming are finding it difficult to convince landowners to sell parts of their land and have trouble obtaining funding for the purchase of the land.
- Individuals are still experiencing trauma and conflict from the legacy of the Highland Clearances which must be acknowledged.
- Local and indigenous knowledge and traditional practices and culture are being lost, but instead must be valued and expanded.
- Improved digital and social connectivity could enhance the wide range of existing activities and empower voices across island.
- There are good interrelations between sustainability groups on the island, but some are recognised as more 'dominant' and can tend to receive more funding. A more joined-up and strategic approach amongst sustainability groups and initiatives is welcomed.

Isle of Cumbrae

- Residents of Millport have much pride over the beauty of Cumbrae.
- They are interested in further developing the 'shared goals' for the island, combining interests for both nation-wide initiatives and local development and sustainability.
- Residents experience a struggle for ownership and voice. This has been especially noticeable after several failed consultation and engagement attempts have led to anger and distrust amongst residents.

7.2 Key learnings for the Scottish context

Based on this evidence from Arran and Cumbrae and from the international examples the research team has identified, explored and reported here, an emerging list of key issues to consider has been distilled. Some of these may be challenges to CE implementation while some are opportunities. The remainder of this final section of the report briefly summarises these issues:

- **The importance of local level data:** Local level data is vital to understand flows of people, resources, etc. on and off/to and from island (and rural) locations. However this data can be hard to collect and to make available due to small sample sizes and challenges with maintaining anonymity and confidentiality. Lack of local level data is an issue for Arran and Cumbrae as their data tends to be amalgamated with the data collected for the whole of North Ayrshire Council, or at least combined with data for some mainland locations. There may be opportunities to think creatively about the kinds of data that would be useful and how it might be collected, with a recognition that more qualitative data may be as useful as quantitative, statistical data. For example, in one food waste related project in Africa about which the research team heard, photography is used to document material flows that come into a city. The quantities of food waste brought by local people to a waste centre are weighed and both types of evidence are combined to accurately document and measure the flows of waste. Given the reliance of many islands on ferry or air transport, it may be possible to adopt a similar approach to monitoring and calculating resource and waste flows. Digital technology and new software may be important here too (as in the case of Mallorca where software is used to track flows), although the reality of unreliable and slow digital connections for many rural and island residents in Scotland is an important limitation to acknowledge.
- **Exerting 'control' over the products and services that come onto islands:** Islands and indeed rural locations may be better placed and more able to place limitations on numbers of people or types of products (e.g. single-use plastic bags) that they do not wish to see on their islands, than urban locations for example. On Arran and Cumbrae, information about how visitors are expected to assist in helping keep the island plastic free, zero waste, or carbon neutral could be communicated at multiple points of contact - something that Jack's Alternative stays in Cumbrae have begun doing. Such 'power' may be especially critical when islands are important tourism destinations but where the benefits that are brought to the location are outweighed by the disadvantages (e.g. in terms of additional quantities of waste generated during peak tourist season). At the same time, these rural and island locations are microcosms of the whole economy e.g. of Scotland or of the UK and so the challenges and opportunities faced have much wider relevance.
- **Islands as 'living labs':** Islands and some remote rural locations may be effective locations to establish 'living labs' through which new approaches and techniques can be tested, such as new tools for separating recycling, or for weighing and paying for rubbish, etc. as such these locations lead the way in terms of advancing CE initiatives ('lighthouses'). This has been a positive element of the island of Samsø's experience, for example. However, such testing must be appropriate to the local circumstances and must be designed with the engagement of local people – not just through a 'tick box' consultation exercise - and undertaken with their involvement. On the Isle of Arran, for example, there

were plans to build a composting facility, but residents argued that this would not be fit for purpose and it was argued that the plans did not fully consult residents at the outset.

- **Rural and island skills-related issues:** It is often the case that rural and island locations lack people with the range of skills that may be required for new CE-related initiatives (which might include technical and engineering skills as well as an ability to think in a systems-focused way and an understanding of behaviour change and the factors influencing it) and also have few local opportunities for providing such skills training. However, the research team found that there is both a desire and willingness within the two islands to improve skills and train locals. Particularly on the Isle of Arran, there are already skills training initiatives underway for sustainable agriculture practices and home repairs through the Pioneer Project, Woodside Arran, and the Arran Repair Café. In Scotland, there is an imperative for local FE and HE colleges to work with industry, researchers, etc. locally to better understand future skills gaps and work to develop their offering to address them.
- **A recognition of the long-standing structural challenges on islands is critical:** In some instances islanders may wish to promote behaviour change on their island to become more sustainable and develop a CE but structural challenges may hold them back (e.g. relating to the ability to access land for local growing, to access affordable housing, reliable ferry transport or to achieve economies of scale and reduce costs). In this sense, targets might be ambitious but the reality of being able to achieve them may be very different, due to higher costs and other resource constraints. On the other hand, rural and island areas tend to have access to larger areas of land, for example for the construction of storage facilities, or indeed at household level in terms of more outside spaces than is the norm in urban houses (where recycling and waste can be sorted and stored if required).
- **Promoting local understanding and awareness of what the term CE means and how its relevant to their everyday life:** The Ellen MacArthur Foundation places emphasis on ensuring that the CE concept stays 'big and inspiring enough' so that people see it as a term that goes beyond recycling and waste management to refer to an entire system-change approach. Circularity rather than linearity of thinking is key, hence the need for accurate and up-to-date information on material flows. At the same time, it is important to ensure that the 'big' term can be made meaningful to individuals and their everyday lives, whether that be in rural, urban or island locations. Clarity over how all these relevant terms – CE, net zero, carbon neutral, sustainability, etc. – link and work together (or not) and what they mean for individual, family, household and business behaviour, is also important.
- **Engaging local people:** This engagement – going beyond consultation – is vital (this was particularly evident in Samsø, for example). This helps to ensure that any interventions are appropriate for the geographical, cultural, economic, social,

etc. contexts in which they are being introduced, and that local people buy-in to the aims, methods etc. of what is being implemented, and its evaluation.

- **Joining up local, and local and extra-local, activities:** Ensuring that local initiatives work together towards the same goals is important, as is ensuring that these local initiatives work within the framework set by national or regional level interventions or designations (such as Cumbrae's designation as one of Scottish Government's carbon neutral islands by 2040), or even global ambitions, such as the UN'sSDGs. This framework needs to be flexible enough to facilitate and enable locally tailored interventions which will vary between places (even places which are geographically close, such as Arran and Cumbrae, but which are very different). Work to facilitate and encourage local initiatives to work together might be most appropriately done by those organisations themselves assuming they have good collaborative relationships between them, or perhaps by an 'external' body such as the local authority or other anchor organisation.
- **Aligning with the community wealth-building agenda**: Community wealth-building is an important current policy driver in Scotland and the CE concept can be aligned with this agenda. This also provides a means for local CE-related initiatives to be linked to wider community-led local development activity, and for it all to be brought under the community wealth-building banner, in both rural and island locations. Underlying both principles is an approach based on making the most of community assets (whether they be land, materials to recycle and reuse, etc.) in appropriate and positive ways.
- **Linking with global organisations and initiatives:** Our review of evidence for this report has shown that there are several international organisations working on the CE, many of which are keen to share information on 'best practice' interventions in different locations. It is important for Scotland's islands to link into these global networks to learn from, and share knowledge and experiences with, elsewhere.

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