



SCOTLAND'S PORTS: A FUTURE VISION

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1 SCOTTISH PORTS

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Scottish ports are fundamental to the Scottish and UK economies, providing hubs for economic productivity and crucial social and spatial connectivity. They provide a vital source of high-quality employment, connecting trade, jobs, and communities with offshore and onshore industries that contributes approximately £1.9bn in gross value added to the economy (British Ports Association, 2018)¹.

The scale and functions of Scottish ports are diverse and geographically spread throughout Scotland. They handle ~15% of the UK's total cargo, over 32 million tons of oil and gas products, 10.5 million passengers, and 3 million passenger vehicles (UK Ports, 2018), as well as providing vital transport links for commercial and private vehicles and networks (British Ports Association, 2022). Scottish Ports also have a solid history of creating a sense of place, supporting offshore energy, fishing, cruise, and leisure markets and are essential locations for developing offshore energy facilities, vital to Scotland's energy, economic,

decarbonisation and Net Zero agendas that now face a period of significant change to current business as usual practices. Scottish ports have an opportunity to act as enablers of this change to meet emerging customer and supply chain needs by providing the resources and facilities the change requires.

This report sets out to understand why Scottish ports should look to adapt in the face of changing external pressures, define a set of principles that can be used to apply a circular economy approach to ports, and then tie it together into a vision for Scottish ports. In this context, a circular economy is an economic model that promotes creating value through the reuse of materials and resources, minimisation of waste, and regeneration of nature. A circular economy supports the Net Zero agenda by reducing the carbon emissions associated with the manufacture of new products and materials, shipment and goods logistics, and the decomposition of waste.

"Our people are the main thing but also long traditions and a vast historic knowledge. We are also all resourceful not afraid to try something new for the benefit of our harbour users."

- Anonymous survey response



2 THE NEED FOR ADAPTATION

Ports are now operating in a disrupted environment that faces many current and future uncertainties stemming from Covid-19, Brexit, energy, and digital transitions, changing trade patterns, climate change and environmental pressures.

Ports are now facing the need to adapt to these changes; a new circular approach looks to address the issues being faced and, at the same time, supports the industry's future growth. The Scottish Government recognises a circular economy approach as a significant economic opportunity to address the climate challenge, improve productivity by opening new markets, providing local employment opportunities and lower cost options to access goods and resources (Scottish Government, 2019). Concurrently, strong circular trends are evolving in European and worldwide ports that see circular activity as one solution to these pressures. For example, during Covid-19, many ports experienced a sizable drop in shipping trade from the Far East, resulting in slower movement of goods to Europe and elsewhere. At the same time, Port of Rotterdam, as an example, saw an increase in local business material reuse models through demand for remanufacturing space to support the local economy and communities to remanufacture their goods for internal markets.

While Scottish ports may not be directly comparable to overseas ports, there are shared external forces to address. Indeed, how the industry responds to these forces may be critical to its future success. Scottish ports can look to learn the lessons from early port adopters of circular approaches and adapt them to fit Scotland's unique and diverse ports characteristics. In doing so, Scottish ports can build on current circular practices to stay competitive and business resilient to changing climate and commercial pressures.

Through this approach, early adopter ports have successfully created innovation activity, industrial clusters, new business streams and localised markets for materials reuse. At the


same time, these ports have created high-value specialised jobs, such as in the Port of Nigg.

Embedding circular activity can soften the impacts of changing market trends, commodity prices and national policies, including energy, transport and bioeconomy policies. For example, policy supporting an increase in the offshore wind market sector (such as ScotWind Offshore Leasing Round) can stimulate the number of materials brought into ports creating opportunities for business development.

In turn, ports, local businesses, and communities are more likely to have the confidence to invest further resources and infrastructure, creating jobs, investment zones and capitalising on building on Scotland's circular material loops.

Future-proofing the industry by adopting circular activities supports sector resilience. It provides a method that addresses the sector's longer-term challenges and creates opportunities to build on and pivot how ports operate and adapt their activities for a decarbonised and globalised world. Mainstreaming circular activities reduces primary material consumption, shortens supply chains, and reduces fossil fuel extraction and consumption, benefiting ports in their function as transport nodes and as locations for logistics and manufacturing. Given that around four-fifths of Scotland's carbon footprint comes from the products and materials we manufacture, use, and throw away, ports can play a key role in supporting Net Zero carbon targets.

Moreover, a circular approach brings new business models and activities that decouple the sector's economic growth from material



"One of Scotland's most important energy industry facilities... supporting some of the largest construction and assembly shops in Europe... 36,000m2 of covered workspace it lends itself to ensuring long life vessels and equipment are kept at their highest value for as long as possible through major repair, maintenance, enhancement, or conversion projects..."

- Port of Nigg , 2022

consumption. It pivots the industry away from profit led by volumes of throughput (cargo, passengers, vehicles, goods) to embrace value creation from materials and interlinking with other peripheral circular models locally, nationally and internationally. It facilitates and enables sustainable supply chains, creating stronger sector resilience, community participation, innovation and new business opportunities and markets.

The following sections give a taste of the opportunities available to ports and illustrate the benefits these can bring to meet a changing market. At the same time, the publication seeks to offer a guiding approach for ports based on sustainable resource use and practices that will stimulate discussion and action within the sector in collaboration with organisations such as Zero Waste Scotland.



“Now we are actually looking at the value that is being created within the ports rather than just passing through...as companies make more money through increasing value then ports can charge more [and make] more profit...everyone’s a winner.”

- Port of Rotterdam

3 ADOPTING CIRCULARITY IN SCOTTISH PORTS

A circular economy is a sustainable economic model that is designed to reduce emissions, create jobs, new business models and pivot the way businesses, governments, and cities approach sustainability.

There are many definitions of a circular economy and useful guidelines targeted at how industry sectors adopt a circular approach. However, there is not a set of principles that are specifically tailored to the unique activities and geographic context of Scottish ports. The box below sets out key principles for broader sustainable aspirations for ports which will be positively impacted by circular activity.

A circular approach for Scottish ports will:

- Foster innovation and an entrepreneurial culture that aligns with Strategic Economic Transition Plans
- Be designed to act as hubs of excellence for materials value creation
- Support delivery of net zero outcomes
- Support delivery of a Just Transition and energy transformation
- Accelerate opportunities for Scotland's bioeconomy
- Embed collaboration between different ports and communities served to maximise materials and asset sharing and promote new market opportunities
- Support a wellbeing economy; fairer, wealthier and greener

Ports understand that effective transportation aids economic growth. They are also entrepreneurial and innovative by nature. Using this innovation with circular business models of sharing, leasing or value creation, the sector can play a significant role in economic transition within Scotland. Equally, ports adopting a circular economy approach makes them well placed to support the delivery of skills and education, leading to high-value jobs across many demographics.

This is a key area where ports contribute to a well-being economy and harness low or zero emission energy generation.

Ports handle a wide range of cargo with aggregates, timber, scrap metal and agricultural products (to name a few) entering and leaving Scotland through ports every day. Deploying existing handling skills and acting as hubs for numerous businesses ports can maximise material value through repair, reuse, and redistribution.

The ports sector already recognises the importance of Scotland’s commitments to net carbon zero. Many circular economy outcomes will deliver concurrent impact in terms of reduced carbon emissions and adopting circular approaches should look to calculate this impact every time.

Scottish ports are strategically located close to fishing, farming, distilling and other industries that are closely linked to the Scottish bioeconomy and circular economy innovation in this area. Take for example sustainable seaweed farming creating plant-based foods and sustainable packaging material or recovery of chitin from shellfish to create food preservers. Ports can facilitate storage of biological materials and enable transport of biomaterials to manufacturing sites located in larger cities. In doing so, they can play a key role in accelerating the Scottish bioeconomy.

The sector already benefits from strong links and working relationships with communities, whether this is remote rural ports or large ports located close to major population centres. Research suggests that

circular activities can create up to 43,000 new jobs in Scotland across multiple industries for a diverse range of opportunities at all skill levels (Coats, 2015). Given that 41 % of

Scottish population lives within 5 miles of the coast, this lends itself well to collaborative enterprise and training opportunities with communities.



“Looking specifically at offshore wind and decommissioning the major strength is proximity to offshore activity. However, all the ports are now too small or have insufficient space to be able to accommodate the next generation of equipment. A strength often overlooked is the skill set that is readily transferable from O & G.”

- Anonymous survey response

4 APPLYING CIRCULAR PRINCIPLES

A circular economy is a sustainable economic model that is designed to reduce emissions, create jobs, new business models and pivot the way businesses, governments, and cities approach sustainability.

Applying circular principles will involve the adoption of circular economy business models and approaches. Many existing models and services at ports can easily be adapted to embrace circular principles with small changes to existing skills, approaches, and capabilities. In each case, one approach can lead to another as demonstrated below:

APPLYING CIRCULAR PRINCIPLES TO PORTS



Off-site manufacture and assembly: Dock facilities offer space for orchestrating high-value manufacture. The capability is already developing in relation to offshore renewables, however it could be expanded in other industrial sectors, for example, linking in sustainable transportation to the manufacturing and assembly sites will also contribute to a Just Transition. **Space for assembly is flexible, modular, and able to pivot easily to disassembly.**



Disassembly and resupply: Many Scottish ports already demonstrate world class capability in onshoring and disassembly particularly in the oil and gas sector. As markets change, expanding this capability to manage, for example disassembly of first-generation onshore wind infrastructure will harness these **skills for new markets**, contributing to a Just Transition as well as economic and energy transition. **In turn, items from disassembly are often suited to refurbishment and reuse.**



Refurbishment and reuse: Many ports already effectively repair and refurbish ships in fishing, transport, and specialist niche markets and this could expand to disassembled items such as pumps or flow monitoring equipment. Equally expanding the expert skills to provide **refurbishment and maintenance** to wider marine, agricultural and energy industry businesses will open these skills to new markets and contribute to material value creation and delivery of net zero outcomes. **With expansion, these services create the business case for circular hubs.**



Circular logistic business hubs: Ports are strategically located typically with world-class logistics handling capability that regularly manages flows of material critical to the Scottish economy, for example, food, energy equipment, farming, and essential spares for assembly or repairs following disassembly. This presents an ideal opportunity for a working hub space explicitly designed for circular activity and combining these strengths with new opportunities to share materials at a high value between industries. In doing so, this will deliver excellence for value creation, foster **innovation and embed collaboration** between ports and industries. **With storage of critical equipment and spares this can lead to the creation of new business models in leasing and rental.**



Rental and leasing assets: Scottish ports exist at a strategic nexus between flows of materials and sectors of the Scottish economy. In numerous instances illustrated through the approaches above, they can also store or deploy high-value or critical equipment that could benefit a wide range of industries particularly in more remote locations, for example pumping equipment, generators, mobile lighting, and survey equipment. Pivoting current practice to **leasing models** will bring additional business activity to Ports and support strategic economic transitions and a fairer economy. **Linking back to the start, this can lead to renting and leasing assets that assist assembly.**

The case studies below illustrate how these business models and approaches are already being taken forward and demonstrate the potential that innovation will bring to develop new markets and activities.



Supporting Activities for Offsite Manufacture and Assembly

TimberLINK is run by ABP and ships up to 100,000 tonnes of timber a year from the ports of Ardrishaig, Campbeltown and Sandbank to wood processing plants in Ayrshire where new product is manufactured. It facilitates the sustainable transport of timber in rural areas of Scotland and delivers benefits for local communities and the environment for example the service removes around 8,000 lorry journeys or nearly 1 million lorry miles a year from roads between Argyll and Ayrshire. This includes the busy tourist routes on the Argyll peninsula and the A82 through Loch Lomond and the Trossachs National Park. (Scottish Forestry, 2022)

TimberLINK (Scottish Forestry, 2022)

Disassembly and Resupply

Ardersier is the largest brownfield port in the UK at more than 400 acres outlining potential re use of land and demonstrating significant growth in productivity. New owners (Regan and O'Sullivan) are aiming to transform Ardersier into Europe's first circular Energy Transition Facility through recycling the used oil rigs to make foundations for future fleets of floating offshore windfarms.

Ardersier Port has an exclusive agreement with floating wind firm BW Ideol, guaranteeing port access for the manufacture of concrete floating wind foundations. As well as circular economy benefits, it is anticipated thousands of long term jobs will follow.

Port of Ardersier (Walker, 2021)

Refurbishment and Reuse

The Port of Peterhead is well positioned to flourish in onsite remanufacture given its accessibility to the North Sea and numerous refurbishment companies have set themselves up in the region.

Peterhead, with its state of the art ship lift, can accommodate vessels weighing up to 2,000 tonnes for inspection, repair, maintenance, or survey. Vessels can be refurbished, and elements reused either using the outside berth or the covered repair hall allowing projects to be completed in a controlled environment whatever the weather conditions. This is a significant benefit, particularly for painting and welding.

Port of Peterhead (Peterhead Port Authority, 2022)



Circular Logistics Business Hubs

The Port of Nigg is the largest port facility in the Moray Firth and site of some of the largest construction and assembly shops in Europe. The Port also benefits from an unrivalled dry dock and over 1,135 metres of deep water quayside.

With direct access to the North Sea and combining storage, laydown, yard logistics support, and an established multi discipline workforce the Port of Nigg is fast becoming the main hub in the UK to support the renewables industry. Global Energy Group (owner) continues to develop its renewables sector fabrication and logistics offerings for both wind and tidal projects.

Port of Nigg (Port of Nigg, 2022)

Renting and Leasing Assets

Crown Estate Scotland lease the seabed for seaweed farming and look to combine this with co location of shellfish and offshore wind opportunities (Crown Estates Scotland, 2022). Whilst currently this development is still in its infancy, there are other leases for experimental developments in the pipeline. This is an area of significant potential investment and is linked to increased circularity activity in both the marine and port side for renting and leasing of related shoreside assets and it offers business diversification opportunity for fishermen and creates new green jobs.

Seaweed Asset Profile (Crown Estates Scotland, 2022)



'MANY EXISTING MODELS AND SERVICES AT PORTS CAN EASILY BE ADAPTED TO EMBRACE CIRCULAR PRINCIPLES WITH SMALL CHANGES TO EXISTING SKILLS, APPROACHES, AND CAPABILITIES'

5 CREATING THE VISION

The infographics below show examples of high-level circular activities for Scottish ports to consider.

They demonstrate a variety of circular activities ports can look to adopt regardless of location or port type. Ports can use the activities displayed below to reflect on their current and future business streams and identify areas where they see an alignment with circular activities that can build on their existing port models, as such, the

infographics shouldn't be considered in isolation, there may be relevant opportunities across the full suite of infographics depending on a ports ambition. Moreover, developing this approach will support ports to meet their current challenges and make them well placed for sustainable business growth in the future.

CITY PORT

1 GREEN JOBS AND SKILLS
City ports have created high-value green jobs and are collaborating closely with universities, colleges, and training institutes to maximise these opportunities. City ports have created high-value green jobs, generating transferable and diverse skills, and collaborating with universities, colleges and training institutes.

2 CIRCULAR LOGISTICS BUSINESS HUBS
Businesses at city ports are undertaking complex assembly and disassembly of assets and components to support recovery, refurbishment and reuse.

3 INNOVATIONS ON THE MARKET
City ports are acting as incubators for innovative start-ups and circular businesses, focussed on the sharing of feedstocks and wastes generated at the port.

4 REMANUFACTURE
City ports offer adaptable and modular off-site manufacturing facilities and logistics-handling capabilities to MANUFACTURE AND ASSEMBLY

5 REFURBISHMENT AND REUSE
City ports are facilitating material and asset sharing, storage of materials and spares, and leasing of high value, and in-demand equipment to key sectors of the Scottish economy.

6 DISASSEMBLY AND SUPPLY
City ports offer low carbon shipping and other transport exchange hubs for the movement and exchange of circular materials and products both nationally and internationally.

ZERO WASTE SCOTLAND

RURAL/SEMI-RURAL PORTS

1 REFURBISHMENT AND REUSE
Rural/Semi-Rural Ports offer space for repair and refurbishment services to support marine, agricultural and land management industries.

2 CIRCULAR LOGISTICS BUSINESS HUBS
Rural/Semi-Rural Ports provide a great network for storing materials for reuse and refurbishment.

3 INNOVATIONS ON THE MARKET
Rural/Semi-Rural Ports can encourage innovative start-ups and circular businesses to replicate models demonstrated at City Ports.

4 GREEN JOBS AND SKILLS
Rural/Semi-Rural Ports have strong community links and offer employment opportunities including future high-value green jobs.

5 LOW CARBON TRANSPORT
Rural/semi-rural ports will provide businesses low carbon shipping transport for local business to move goods to city ports and wider markets.

6 DISASSEMBLY AND RESUPPLY
Businesses and remote communities can store and share materials using space at Rural/Semi-Rural Ports.

ZERO WASTE SCOTLAND

ENERGY



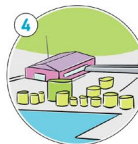
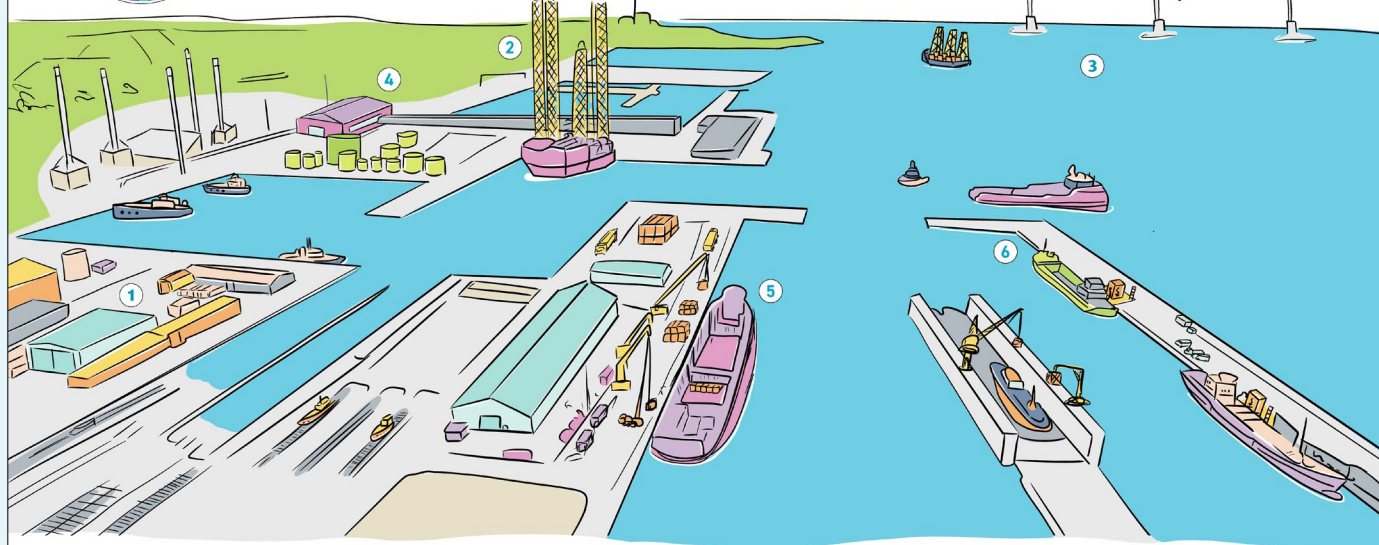
GREEN JOBS AND SKILLS
Circular projects at ports are providing the energy sector workforce with opportunities to transition or expand into high-value green energy jobs.



REUSE OF MATERIALS
Businesses at ports are undertaking decommissioning and deconstruction services for marine and oil and gas industries, and using these materials to feed into onward construction and renewables projects.



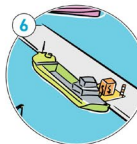
SUPPORTING ACTIVITIES FOR OFF-SITE MANUFACTURE AND ASSEMBLY
Ports act as hubs for renewables projects, optimising the use and reuse of materials in offshore renewables manufacturing and assembly, and onshore renewables decommissioning.



GREEN ENERGY
Ports are actively providing strategic locations for the development of green energy projects e.g., hydrogen generation and storage.



RENTING AND LEASING ASSETS
Ports are offering enterprises an opportunity to rent or lease critical spares and high-value equipment required to support energy projects.



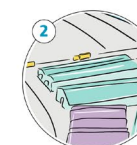
COLD IRONING
Ports enable cold ironing for docked vessels which will link to renewable energy generation made available at the site.



MATERIALS & ASSETS



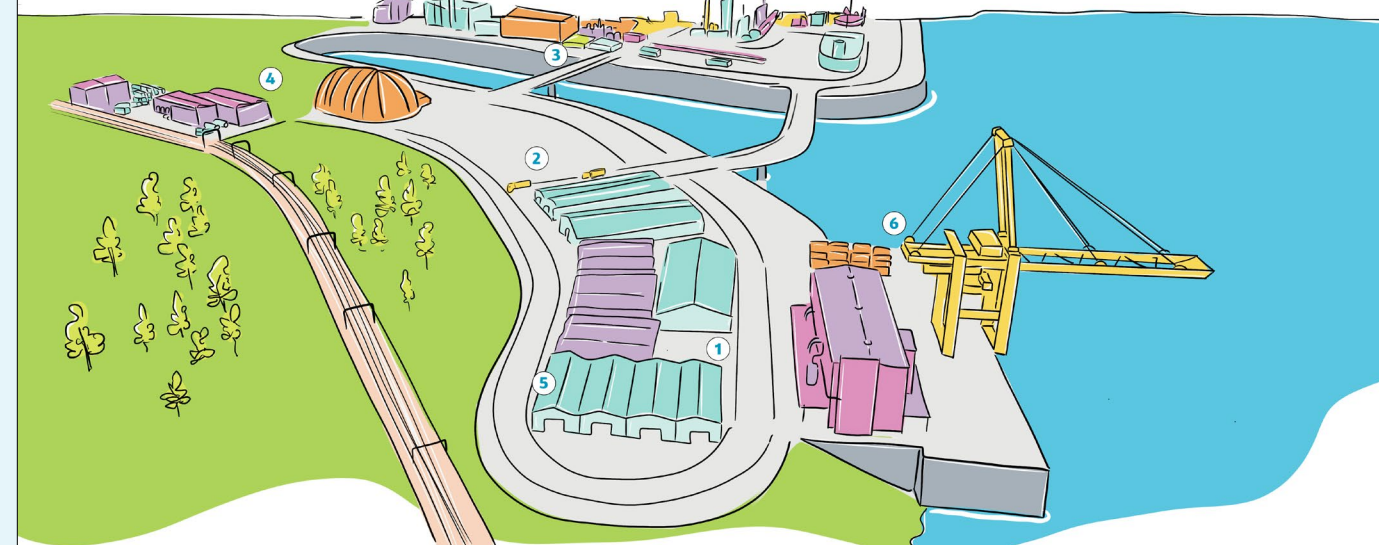
GREEN JOBS AND SKILLS
Ports continue to create new skills and employment related to sharing models for materials and equipment.



RESILIENCE
Ports are gaining additional income streams from asset sharing/leasing/rental which strengthens business opportunities as trade and travel patterns change.



NEW MARKETS
Ports enable digital start-ups and circular businesses to create opportunities for materials exchange platforms that can use space and shipping to facilitate transaction of equipment and materials.



MATERIAL FLOWS
Using digital technology ports are positioned to track material flows that support high value, closed-loop use of goods and materials within the port and with external markets.



CIRCULAR HUB
Ports offer space to develop circular hubs that can deliver off-site manufacture, disassembly, reuse and storage of critical spares and assets.



REFURBISHMENT AND REUSE
Ports are optimising the use of existing assets and infrastructure on-site through lifetime extension, repair, rental and sharing models.



COMMUNITY



DIGITAL
Ports are investing in digital infrastructure which can contribute more widely to local communities and are providing additional local digital coverage.



GREEN JOBS AND SKILLS
Communities and ports enjoy close employment links that offer High Value Green Jobs in energy, biotechnology, material handling and business innovation services



LOCAL COMMUNITY BENEFITS AND NET ZERO
Some ports are community-owned, and other ports are working closely with local communities and provide opportunities to implement climate adaptation measures and deliver net-zero progress at community levels.

Ports support improved integration of affordable and potentially low carbon transport links across Scotland. Local communities benefit from this to enable business trade.



MATERIALS AND ASSETS
Ports are providing access to new local, national and international business markets, innovation and collaboration opportunities improving resilience to changing trade patterns.

Ports are providing spaces for community businesses to set up operations that compliment circular activity.



BIOECONOMY



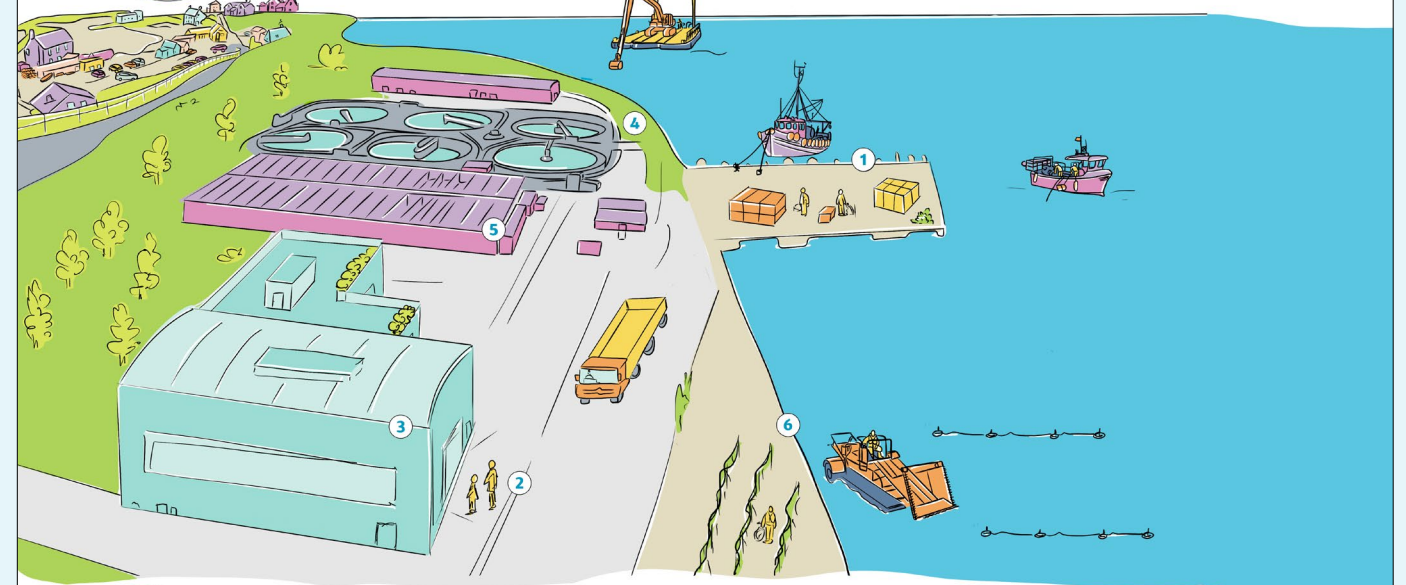
COMMUNITY
Ports maintain strong links with communities and will support innovation in fisheries, agriculture, brewing and distilling.



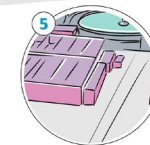
GREEN JOBS AND SKILLS
Ports are creating demand for new high-value bioeconomy related jobs and skills.



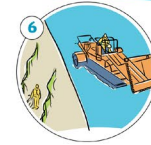
NEW MARKETS & INNOVATION
Ports are providing access to local, national and international business markets and are collaborating with businesses and universities to create new markets for bio-products.



ADAPTATION
Through circular approaches ports will support agricultural and marine services to address wider climate adaptation measures and net-zero objectives.



MATERIALS AND ASSETS
Ports are enabling asset sharing, leasing, and rental opportunities that benefit agricultural and marine service businesses.



RESILIENCE
Bioeconomy businesses are collaborating with ports to create new bio-product markets.



6 NEXT STEPS AND RECOMMENDATIONS

Harnessing circular opportunities needs to be led by Scottish ports who have the ingenuity, ambition and skills to deliver circular approaches and the Scottish Ports Group as the only national forum representing the interests of the port industry is in a unique position to facilitate collaboration in this ambition.

Collaboration, at the heart of successful circular outcomes must extend beyond the Port boundaries, and businesses, government and communities will have roles to play in delivering sustainable solutions that benefit ports and enrich coastal communities and deliver opportunities for Scotland's economy.

For ports across Scotland considering first steps towards approaches outlined in this publication, there is already practical guidance and support available through Zero Waste Scotland to encourage growth of the circular economy in Scotland.

For an example of practical experience that can provide further inspiration to ports, Zero Waste Scotland has supported Renewable Parts Ltd, a refurbishment specialist in the wind energy industry, to build workshop space that refurbishes and reuses components from wind turbines, preventing huge volumes of metals and specialist parts from being scrapped or sent to landfill.

The following next steps and recommendations are proposed to stimulate further discussion on this topic and action to adopt circular economy principles across Scottish ports:

- Opportunity for the creation of an inter-industry work group to facilitate learning and opportunities between ports and associated businesses
- Opportunity for relevant organisations to build knowledge and capacity on circular economy best practice – backed by evidence illustrating how circular economy activity can reduce carbon and increase revenue through value creation
- Consider how to incorporate circular economy action into ports efforts to contribute to net zero outcomes for Scotland – and drive wider recognition of the value ports can bring to this agenda
- Seek out funding that will support innovation and new circular business models at ports
- Consider the development of a net zero and circular road map for the ports industry – and at individual ports level – ensuring this is strongly aligned to the Just Transition and can enhance wider economic and community development initiatives

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