Green Inland Ports

Good Practices

Funded by
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Circular economy projects

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1.1 Description – what is circular economy?

In a circular economy there is minimal waste. Raw materials are reused repeatedly, reducing the likelihood of waste generation. In contrast, the linear economy, which is still the dominant economy model, relies on the extraction of raw materials to produce goods that are eventually incinerated or landfilled after use.

The circular economy model lowers dependency on raw materials. Instead, the model prioritises products and materials that are already in use. If a product is broken, it is repaired. And if that is no longer possible, new products are made from it. If this is not possible, the raw material leaves the economy as waste. However, we must try to prevent that as much as possible.

A circular economy is therefore about preserving raw materials by protecting the value of materials, products, and components for as long as possible. This is done by applying circular strategies from the R-ladder. The R-ladder indicates the degree of circularity and consists of several steps that represent different strategies of circularity. Strategies higher up the ladder save more raw materials. The higher a strategy is on the R-ladder, the more circular the strategy is and the more raw materials it saves. Table 1 provides an example of the circular strategies (different steps) on the R-ladder.

Table 1 - Circular strategies on the R-ladder (source: What is a circular economy? - GroeneBrein)

Step on the R-ladder	Strategy	Description
R1.	Reuse and Rethink	Refrain from using products or using products more intensively.
R2.	Reduce	Manufacture products more efficiently or make them more efficient in use.
R3.	Re-use	Reuse a product.
R4.	Repair, Refurbish, Remanufacture and Repurpose	Repair and reuse product components.
R5.	Recycling	Process and reuse materials.
R6.	Recover	Incineration of materials with energy recovery.

1.1.1 The role of ports in a circular economy

Ports can play a dual role in the circular economy (Notteboom, T. et al., 2022)

- Internal circularity: Ports can make their own port's processes (more) circular. Port authorities can identify existing and/or potential circular processes within their ports, taking their inputs and outputs into account. Fundamental inputs to port operations include capital, land, equipment, labour and energy. At a minimum, circularity should result in similar output levels, even if some of the input levels are reduced. The strategy is to establish linkages between existing port users to find commonalities.
- Ports as enablers in the supply chain: Ports can also play a role in circular maritime supply chains. They can identify existing or potential options where a port can develop and expand circular processes within the supply chain it supports. Ports can act as sites, facilitators, or intermediaries in circular maritime supply chains.

1.1.2 Examples

- The Port of Rotterdam (The Netherlands):
  Known for its raw materials cluster. This means that the Port of Rotterdam can work with various partners to develop new and circular value chains, such as:
  - Recycling plastics and batteries, as well as the beneficial reuse of wind turbine blades (Port of Rotterdam, n.d.).
  - EMR Netherlands (headquartered in the Port of Rotterdam) is currently the only metal recycling company in the Netherlands with an End-of-Waste certificate, allowing EMR Netherlands to offer recycled material such as iron, steel and aluminium as pure raw materials to manufacturers. Using recycled materials instead of virgin materials saves energy, reduces GHG gas emissions and reduces other negative environmental impacts associated with extracting virgin materials from the earth (EMR Rotterdam & Port of Rotterdam, 2023).

- The port of Wittingen (Germany)
  Specialising in timber, the port generates wood residues that are unsuitable for reuse by wood processors but ideal for wood pellet production, reducing waste.

- Port of Strasbourg (France)
  With the support of the European Institute of Innovation and Technology (European Union, n.d.-b), 22 companies are currently working in the Strasbourg port area to optimise resource consumption and the industrial waste production. The aim of the approach is to create industrial synergies between different companies within the port area. Examples of industrial synergies established through this framework related to circular economy include: procurement of (raw) materials, minimisation of wood waste, smart use of electricity, (re)use of pallets, paper and cardboard, and (re)use of water from washing stations. With this approach, the European Institute of Innovation and Technology aims to:
  - Strengthen businesses' competitiveness
  - Optimise resource management
  - Develop contacts between companies working in similar areas

- Achieve energy efficiency

1.2 The aim of circular economy projects

The goal of creating a circular economy is to optimally use available resources, slow down the use of natural resources, and minimise or avoid all negative impacts related to the use of new materials. This can lead to optimal product life cycles and will reduce waste in the long-run.

1.3 Inland ports with circular economy projects

- Port of Strasbourg
- Compagnie Nationale du Rhône (Port of Lyon)
- Ports of Lille
- Port of Rotterdam
- Port of Zwolle
- Port of Wittingen

1.4 Stakeholders

The following stakeholders are involved in this good practice:

Port authorities play a crucial role in facilitating a circular economy, as they can both make their own processes circular and positively influence circular maritime supply chains.

Companies operating within the port area and companies that are part of the maritime supply chain: the transition to a circular economy is very complex. It involved scaling up circular initiatives and setting up circular partnerships, which often requires a lot of trust between companies instead of competition. This is currently not standard practice.

Governmental organisations: it is often difficult for companies to create a closed business model for circular economy projects. Government organisations can play a role in stimulating a circular economy.

1.5 Voluntary or mandatory

Contributing to a circular economy by setting up a circular economy business model or collaborating with other companies/organisations is currently voluntary.

However, the European Union announced a new Circular Economy Action Plan (CEAP) in 2020, which should serve as one of the main building blocks of the European Green Deal, Europe's new agenda for sustainable growth. The Circular Economy Action Plan announces initiatives across the entire life cycle of products, how products are designed, promoting circular economy processes and encouraging sustainable consumption. It aims to ensure that waste is prevented and resources are kept in the European economy for as long as possible (European Commission, n.d.).

The Circular Economy Network of Ports is an initiative from the European Union specifically targeting the ports sector. It is funded by the European Institute of Innovation & Technology (EIT) under its Climate-KIC programme, which aims to facilitate the transition to a more circular economy in the port sector providing an innovation ecosystem around port activities that promote circular economy initiatives (European Union, n.d.-a).

1.5 Realised/potential impact

According to the European Parliament, (2023), the transition to a more circular economy could increase competitiveness, stimulate innovation, boost economic growth and create jobs (estimates say around 700,000 jobs in the EU alone in 2030). According to European Union, (n.d.-b), synergies favouring a circular economy in the port of Strasbourg (France) have led to an annual reduction of 3,267 tonnes of GHG emissions in the wood waste sector, more than 3,500 tons of locally recovered cellulosic waste with an estimated savings of €16,000 per year, and more than 41,000 litres of water and €4,700 per year saved thanks to synergies between washing stations.

1.6 Possible obstacles

- According to Mankowska, M. et al., (2020) port authorities show a relatively linear mindset, in which circular supply chains are not strongly represented.
- Creating a circular economy requires adapting the supply chain infrastructure, which leads to high investment costs. It is often easier for industries to create new products than to recycle and reuse old products (Ideapoke, n.d.).
- Ports consist of multiple stakeholders, such as the port authority, terminal operators, companies, etcetera. It can be difficult to align all the stakeholders so that they are willing to create a circular economy. When data sharing comes into play, this becomes even more difficult.
- Most inland ports do not (yet) have a clear approach to becoming energy neutral. Reasons often mentioned include a lack of knowledge and regulation on the energy transition and circular economy (NVB, n.d.).

1.7 Key learnings

- (Inland) ports are very attractive locations for companies trying to promote circularity, because ports are often strategically well-positioned and include industries that use many raw materials and discharge many waste streams.

- Rules and regulations regarding circular economy in general and for inland ports in particular are scarce. For many inland ports (especially the smaller inland ports) this is insufficient to generate an approach for a more circular economy.

1.8 Sources

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