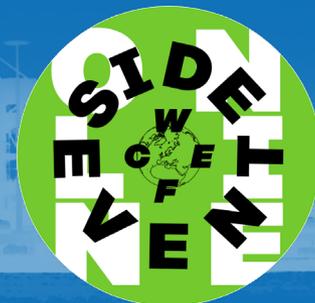




LOOP-Ports

Circular Economy Network of Ports



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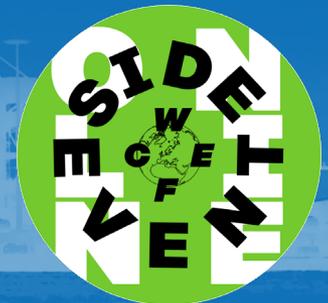
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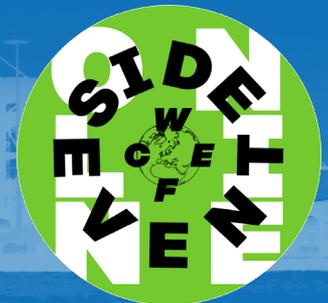
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Monika Elend – NTU International



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LOOP

Circular ca
Summary report of the

Prepared by NTU Institute for Maritime and Port Studies, Singapore

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LOOP-Ports
Circular Economy Network of Ports

A circular economy network of ports

The main goal of the circular economy in the port is to maintain the port activity and minimize the environmental impact.

The LOOP Ports Project: The purpose of the project is to assist in the transition within ports. Emphasis is placed on reducing CO2 emissions, minimizing waste, and expanding to other streams.

"LOOP-Ports aims to facilitate the creation of a Circular Economy that will provide an innovative port activity and stimulate the port industry."

Why ports and circularity?
Ports are considered a key element in the transition to a circular economy. In addition, most ports are hubs for various industries, making them a natural place for circular economy initiatives.

This makes them an ideal location for circular economy initiatives. The circular economy approach is a key element in the transition to a circular economy. It is a system of production and distribution that is designed to minimize waste and maximize the use of resources.

LOOP Ports is aimed at driving circular ports through the network of ports and drive ambitious circular economy initiatives.

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6 types of circular actions

To ensure a structured approach to the circular economy transition, several tools have been developed. The below rendition of different actions towards circularity can be addressed on both private company and state level. They are based on the waste hierarchy and constitute an overview for the cases which will be addressed.

Rethink
Making a difference, on a larger scale, requires conscious thought and reflection on what we are doing, and how we are doing it. Circular economy can be applied during designing, producing, consuming and disposing. Potential lies in sharing and having access to products without owning them, by designing them so that they can be repaired and maintained. Waste should no longer be the end of our consumption, but the start.

Reduce
The simple notion of this action is to consume less. Not to consume less than what you need, but to not overconsume and to consume products that reduce waste per item, such as refillables.

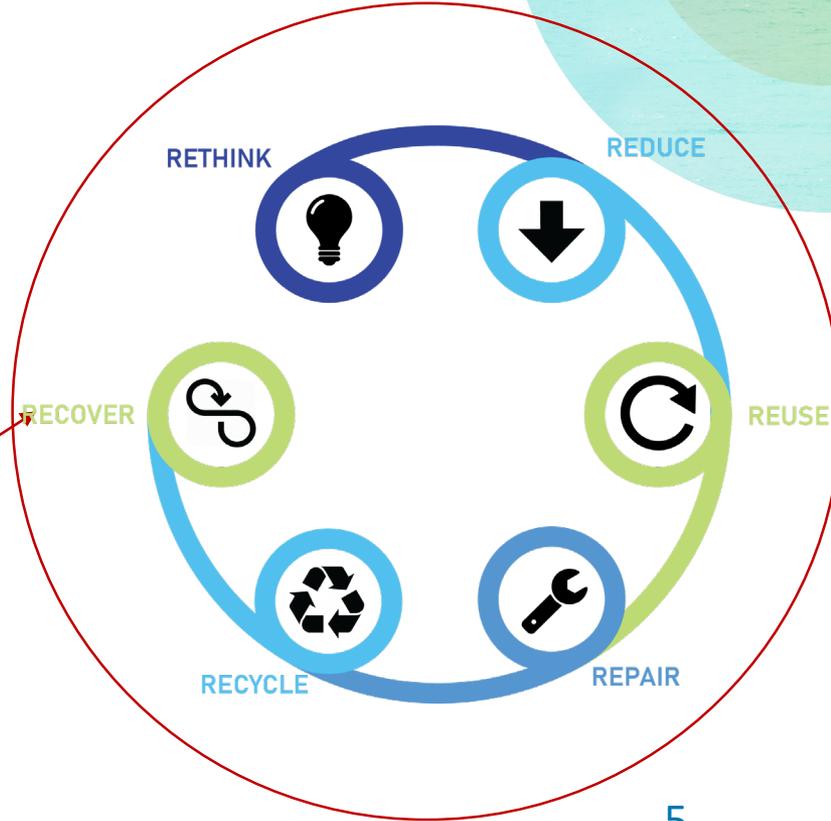
Reuse
Reuse of products can be done in many ways. It ties with reduction of single-use items from Reduce. Simultaneously, passing on items to other users once you are done using them, is an effective way of reusing them.

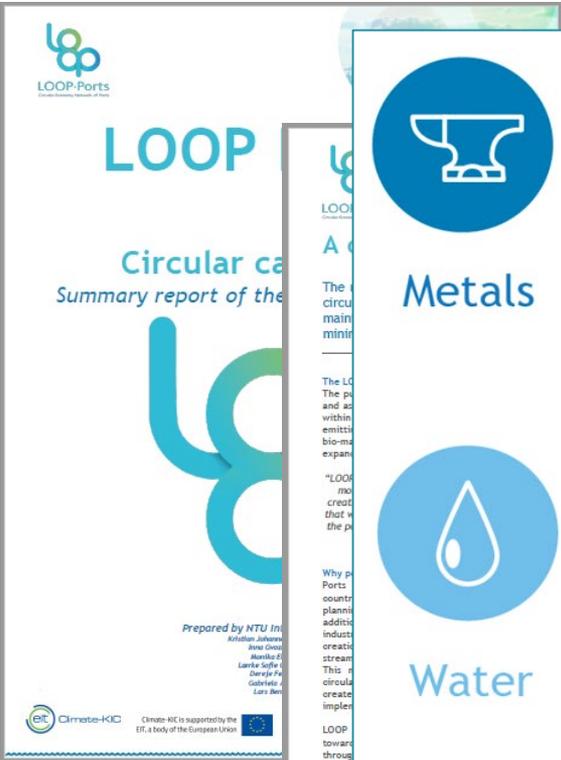
Repair
Repair is perhaps the simplest of the concepts. Extending the life of an existing product instead of discarding it, makes sure that the product is used to its full potential.

Recycle
Recycling can be done at all levels, and is, if targeted correctly, a highly valuable addition to consumption in households and companies alike. Several materials are, when recycled, able to be reused with the same properties they originally had, while others can be used for new purposes.

Recover
Recover embedded energy from non-recyclable waste material where feasible. Non-recyclable waste may at least be converted into energy through waste-to-energy processes such as combustion and gasification. Energy recovery may also be the capture and reuse of released heat from air and water systems. Energy recovery is a preferable waste handling process. However, recovery not always refers to energy. In some cases, the process can create a wide range of high-value products.

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LOOP
Circular economy
Summary report of the...

Prepared by NTU Institute for Maritime and Port Studies, Universiti Teknologi Malaysia, and other partners.



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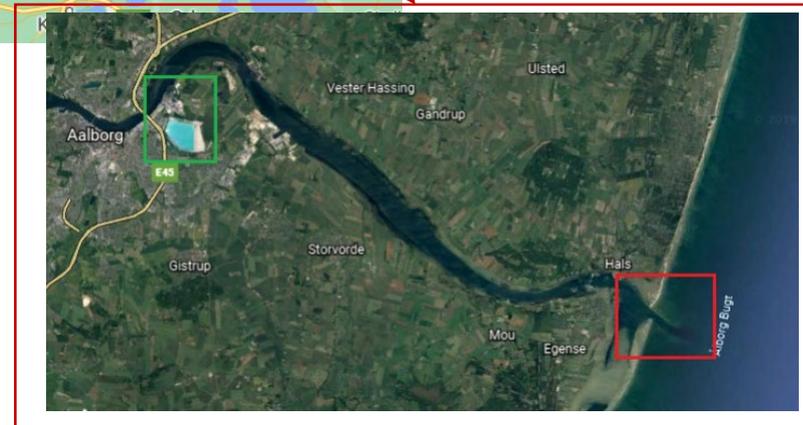
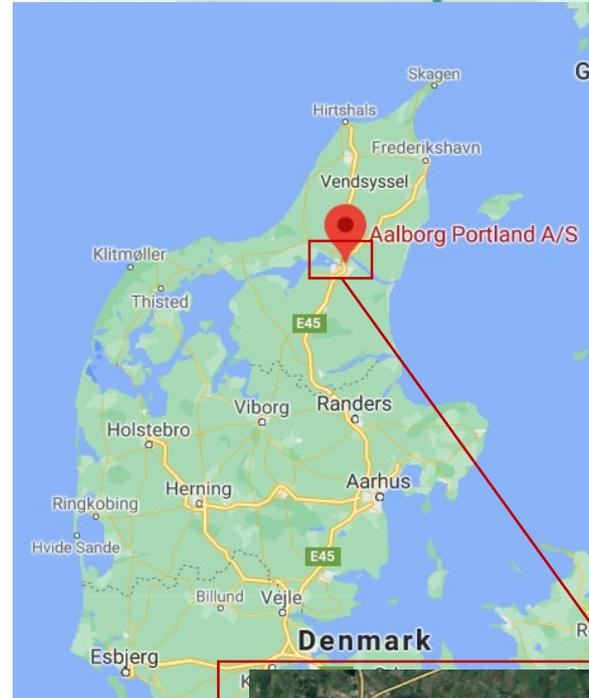
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Aalborg Portland, Denmark

Circular sourcing for cement production

Aalborg Portland carries out dredging on behalf of the municipality - in return the cement company gets access to sand for their cement production

The production of cement takes massive tolls on the environment, using both large amounts of materials and energy. Aalborg Portland have found a way to expand production, using alternative materials and waste-to-energy to eliminate the high climate impacts. This is obtained through strategic partnerships with local stakeholders, designing systems that utilize what was previously considered waste, as production inputs.



Using dredged material in cement production





Replicability in other ports

- Dredging operations are being carried out across Europe
- Different ways of valorization and use of the material are available
- The right Legislation needed

Key findings

- Use of alternative materials and waste-to-energy approach reduces climate impact.
- Regular dredging activities valorize dredged material in cement production.
- Symbiotic relations between Aalborg Portland, companies and the municipality lead to different waste-to-energy initiatives: from cooling local hospital to heating around 20,000 households.



RETHINK



REDUCE



REUSE



RECYCLE



RECOVER

Plastics from aquacultural farms

In Italy, local stakeholders are developing approaches to ensure a sustainable production of mussels in farms, while avoiding the contamination from plastics

In the North East of the Adriatic Sea, most of the marine litter found can be traced back to the practice of mussel farming. Nylon, Polyethylene and Polypropylene are all materials with a high potential for recycling, and efforts are being explored to create circular supply chains needed to ensure this approach. Simultaneously, the development of biodegradable nets are being pursued, rethinking the classic design.



In the last years, more than 600 tonnes of fishing nets per year have been treated and converted into plastic strings and then sold to secondary plastic producers





Replicability in other ports

- In Europe, shellfish farming represents around 60% of total aquaculture production
- Sustainable value chain development – involving key stakeholders
- Proper infrastructure for collection, reception and recycling

Key findings

- In the North East of the Adriatic Sea, most of the marine litter is linked to mussel farming.
- An initiative to create circular supply chains was launched that will reduce marine litter by collection and recycling of existing equipment.
- An initiative to develop bio-degradable or sustainably produced nets would provide a long-term solution.



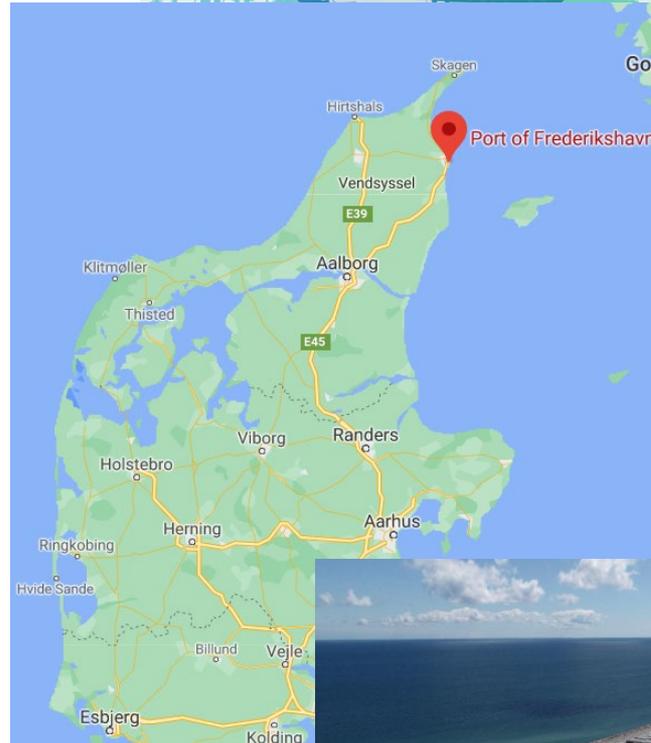
Port of Frederikshavn, Denmark
Circular Decommissioning of ships and rigs

M.A.R.S will, with the establishment of the first purpose-built decommissioning site in Europe, create new circular supply chains with local stakeholders

The ship decommissioning sector has been tarnished by stories of bad working environments on the beaches in Southeast Asia. With this increasing pressure on the global legislation has been rising. Couple this with a North Sea offshore sector in transition, and you get a rapidly growing decommissioning market in Europe. Enter Modern American Recycling Services, a highly specialized US company, who have their eyes set on circular decommissioning in Europe.



The facility will be able to process between 200.000 and 300.000 tonnes of materials each year, generating around 200.000 tonnes of secondary steel as a result.





Replicability in other ports

- Long term investment required
- Presence of highly specialized company
- The need for decommissioning is growing

Key findings

- Decommissioning is associated with harsh working environments mainly taking place in India, Bangladesh and Pakistan.
- New EU legislation provides new business opportunities for rapidly growing decommissioning market in Europe.
- Port's expansion plans provided the space for the new business opportunities to take place in the Port of Frederikshavn





Port of Marseille, France

Capture of greenhouse gases in microalgae

The VASCO project is using state-of-the-art green chemistry to transform industrial fumes such as CO₂ into a production microalgae

The project captures industrial fumes from large plants and use them to feed a production of microalgae. The algae, when harvested, is then used in the production of biofuels. As a result, the project turns CO₂ into sustainable fuel. The Vasco2 project has managed to successfully demonstrate the approach at pre-industrial levels, and through Vasco3, the partners are now targeting a full scale industrial demonstration.



Exploring ways of turning the algae into a range of different biofuels.

So far, the tests show that with a production of 1 hectare of algae pools, the approach is able to use 275t of CO₂ to produce 280t of algae paste





Replicability in other ports

- The ongoing research and project show promising results
- More research and testing required

Key findings

- The Port of Marseille is the largest freight port in France where one of the primary waste streams are GHG emissions
- The Vasco project focuses CO₂ valorization by capturing CO₂ in algae and turning it into biofuels
- The project engages different stakeholders interested in the development of new industry and addressing world's biggest waste problem, CO₂



RETHINK



REDUCE

Port of Boulogne-Sur-Mer, France
Valorisation of fish by-products

Former waste streams from the fishing industry are being used to manufacture a range of high-value products in the nutrition and beauty industry

Since the 1970's a highly specialized cluster has been under development in Boulogne, targeting fish processing at all its different levels. From this, a wide range of by-products are produced. There were previously discarded as waste, but with innovative product development, the company COPALIS have managed to create a wide range of high-value products, supplying both the nutrition and cosmetics industries.



Around 25,000-30,000 tonnes of byproducts is used to produce: 90% - animal nutrition, 7-8% - human nutrition, and 1-2% - cosmetics and dietetics





Replicability in other ports

- Fish by-products valorization provides broad range of possibilities
- Research has been focused on the use of innovative, economically and environmentally sustainable extraction methods to preserve the biological activity of the molecules
- The replicability of this case study relies on researchers, policymakers and economic agents to understand the trends and the tools available

Key findings

- Former waste streams from the fishing industry are used to manufacture a range of high-value products
- Fish by-products are used in production of animal nutrition, human nutrition and cosmetics
- Co-location of key stakeholders (suppliers of by-products and the processing site) provides additional advantage with lower prices and freshness of the products



RETHINK



REDUCE



REUSE

RETHINK



The circular economy has an important potential for ports

RECOVER



Port areas are attractive for the recycling industry



REUSE

The main reason for this is the proximity to cities, industries and the terminals



RECYCLE



REPAIR



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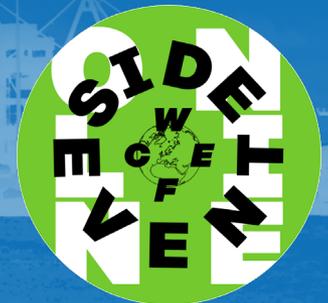
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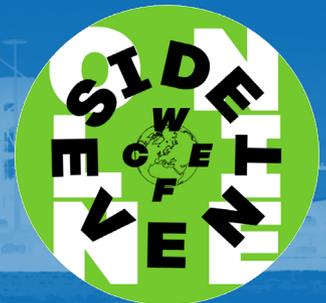


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