



# Circular Economy in ports

Tim C. McAloone

# CIRCULAR ECONOMY

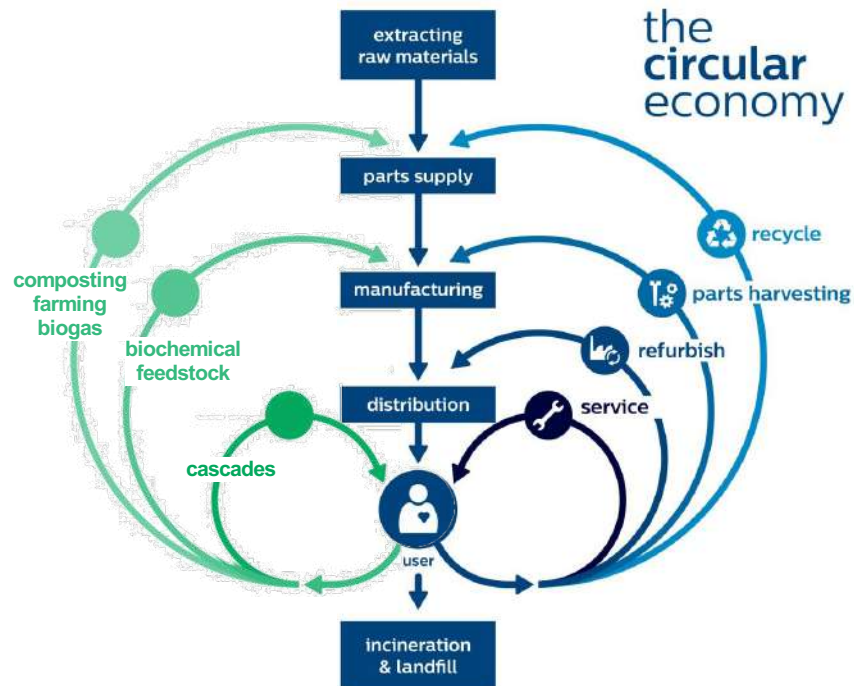
- Fastest growing business strategy area in Europe
- Closing the loops
- 1.8 trillion Euro per year in Europe
- Decoupling value creation from resource consumption
- Requires a systemic approach



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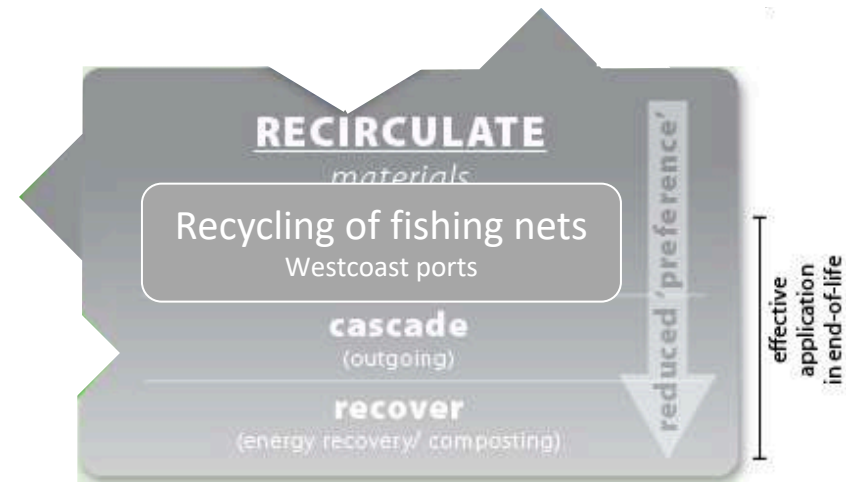
But, it's not just about recycling!

## Many different opportunities from CE



[The "Butterfly Diagram" of CE, adapted from Philips]

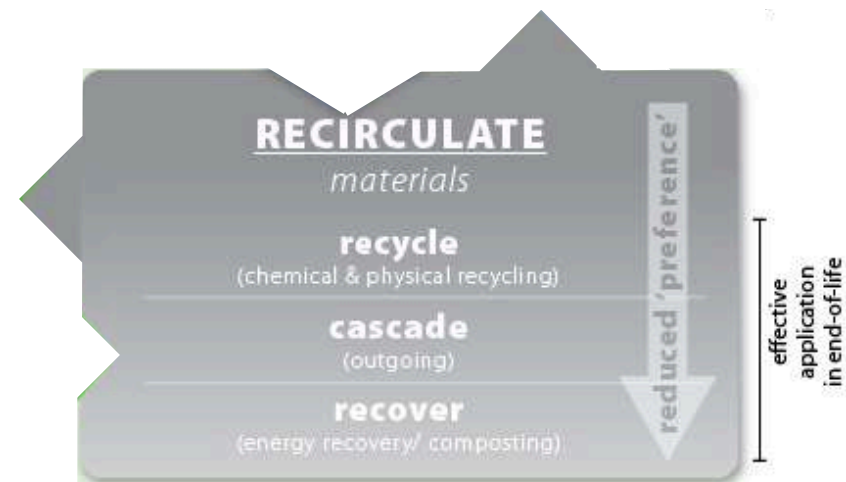




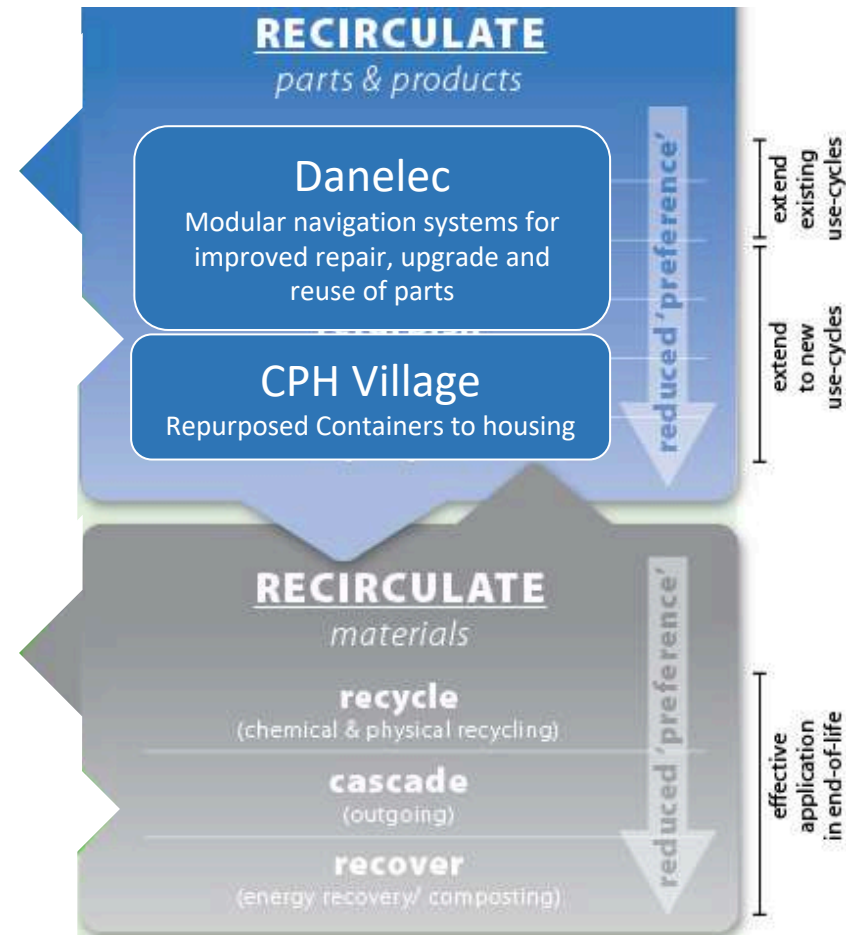


Abandoned, lost or disposed of **fishing** gear accounts for about a third of marine litter found in **European** seas, or over 11,000 tonnes per year. Almost half of the “great **garbage** patch” in the Pacific Ocean consists of such **fishing** gear. We estimate that in the **EU**, 20% of gear is lost at sea.









A close-up photograph of a hand inserting a green circuit board into a slot on the back of a black electronic device. The device has various ports and connectors on its rear panel, including a D-sub connector, a BNC connector, and several multi-pin connectors. The hand is holding the green board by its edges, and the board is being pushed into the slot. The background is white.

# Maximize uptime

*Rest assured your ship sails on schedule*

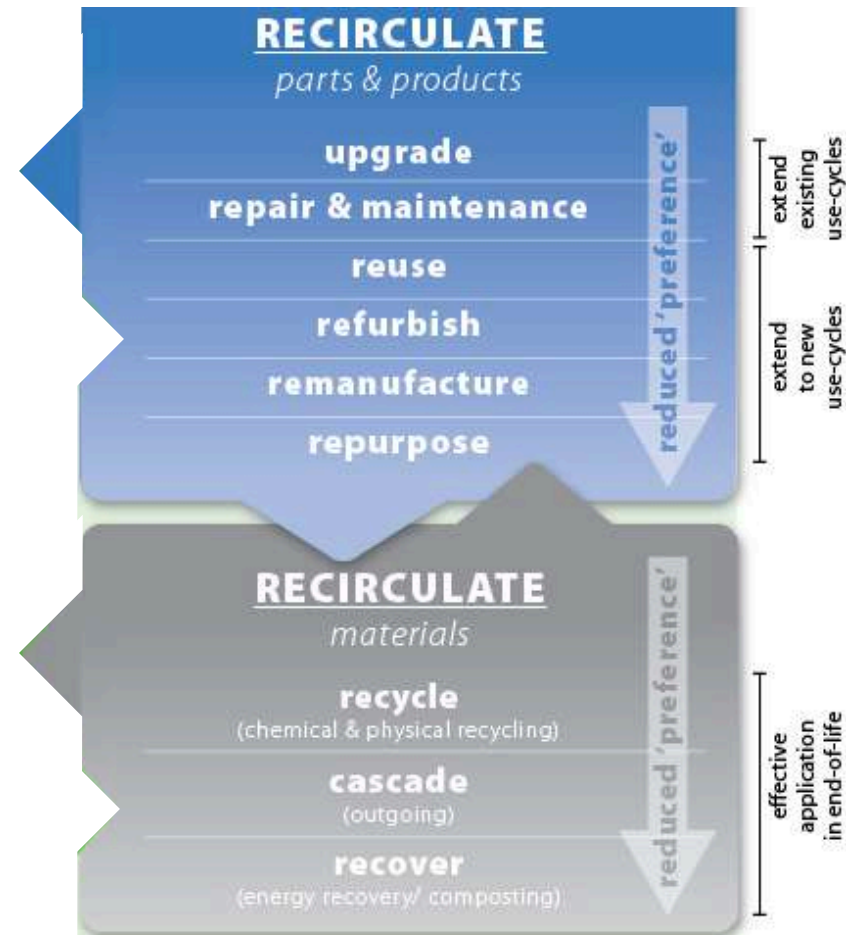
Our exclusive **SWAP technology™** enables fast and easy replacement of equipment in case of failure, without reinstalling software and reconfiguring the system

**danelec**  
MARINE

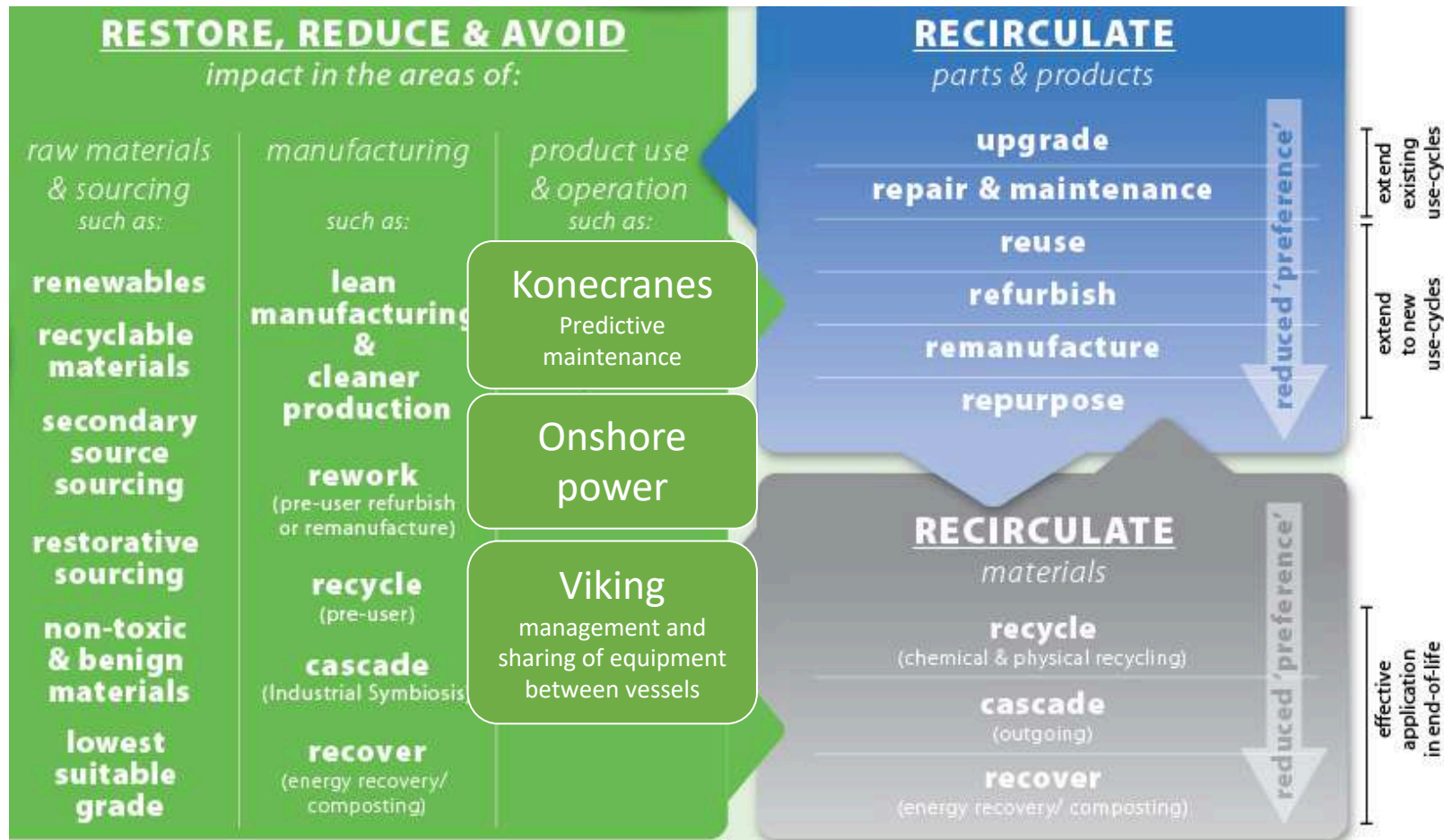


# CPH VILLAGE











# KONECRANES®

KONECRANES  
30 t

Predictive maintenance utilises condition monitoring, advanced inspections, and data analytics to predict component or equipment failure.

## RESTORE, REDUCE & AVOID

*impact in the areas of:*

*raw materials  
& sourcing  
such as:*

**renewables**

**recyclable  
materials**

**secondary  
source  
sourcing**

**restorative  
sourcing**

**non-toxic  
& benign  
materials**

**lowest  
suitable  
grade**

*manufacturing  
such as:*

**lean  
manufacturing  
&  
cleaner  
production**

**rework**  
(pre-user refurbish  
or remanufacture)

**recycle**

**Industrial  
symbiosis**  
eg. Kalundborg

(energy recovery/  
composting)

*product use  
& operation  
such as:*

**product  
longevity**

**low  
consumables**  
(energy, water,  
materials)

**use idle  
product  
capacity**

## RECIRCULATE

*parts & products*

**upgrade**

**repair & maintenance**

**reuse**

**refurbish**

**remanufacture**

**repurpose**

reduced 'preference'

extend  
existing  
use-cycles

extend  
to new  
use-cycles

## RECIRCULATE

*materials*

**recycle**

(chemical & physical recycling)

**cascade**

(outgoing)

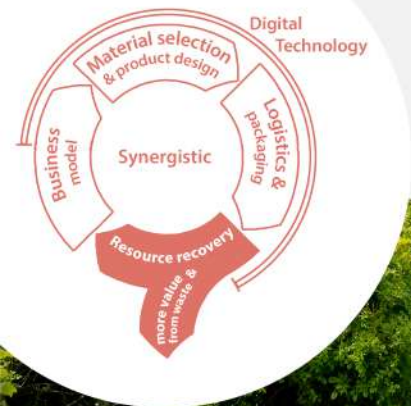
**recover**

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effective  
application  
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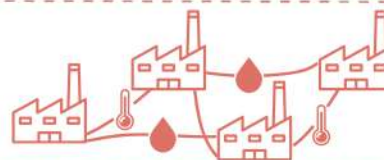





# #26 Kalundborg Symbiosis! Manufacturing by-products become resources



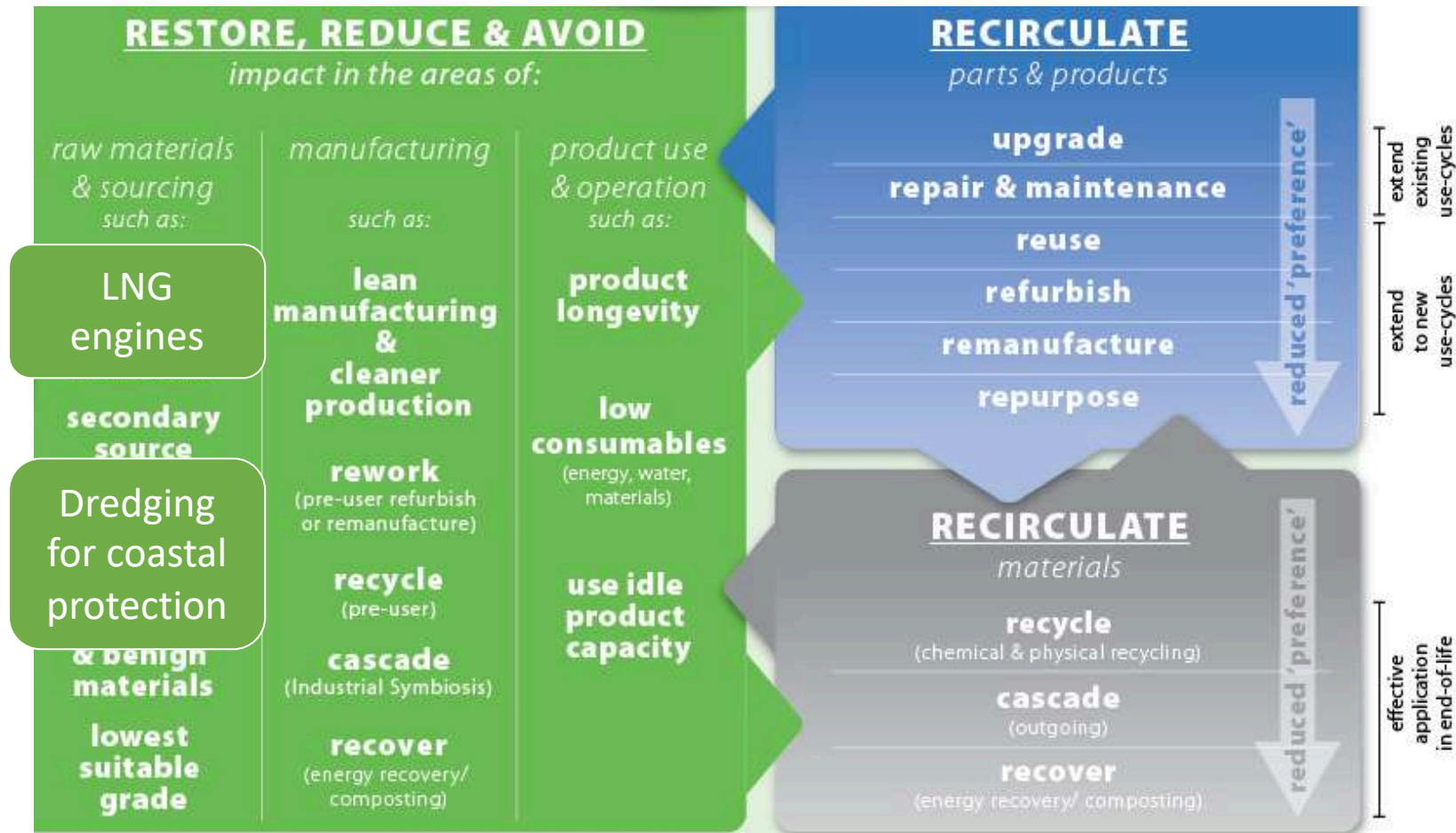
In the Danish town of Kalundborg, one can find **the world's first large-scale industrial symbiosis scheme**, where various manufacturing facilities **exchange by-products**.



 x 11  
— x 30

Read more about this and other Nordic cases of circular economy at **[circitnord.com](http://circitnord.com)**





**Rohde Nielsen A/S** applies three methods of protecting the coast in the most environmentally friendly way.

Either we pump sand on the beach using a floating or submerged pipeline, or we pump dredged material directly out over the bow of the ship to the fore shore, also referred to as The Rainbow Method. Thirdly, we can dump sand close to the shore using our state-of-the-art split hopper dredgers.



Rohde Nielsen A/S



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**Rolls Royce**

Power by the hour

**Hempel**

From selling coatings to selling  
reduced water resistance

aim for business  
innovation  
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Nor Lines and Rolls-Royce have signed a groundbreaking “Power-by-the-Hour” service agreement for the two vessels Kvitbjørn and Kvitnos. The new service offering harnesses the power of “Big Data” to monitor, plan and perform maintenance and repairs on all the equipment it has installed on the cargo vessels.

## RETHINK & RECONFIGURE

*value generation architecture*

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Autonomous  
or  
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vessels

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prevent excess, improve efficiency and aim for 'gentani', improve circularity potential

*logistics*

The vessel YARA Birkeland will be the world's first fully electric and autonomous container ship, with zero emissions. KONGSBERG is responsible for development and delivery of all key enabling technologies including the sensors and integration required for remote and autonomous ship operations, in addition to the electric drive, battery and propulsion control systems.



**REINVENT**

strive for full  
decoupling

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# CIRCULAR ECONOMY ... IN PORTS

- Fastest growing business strategy area in Europe ➡ • How does it look for Danish ports?
- Closing the loops ➡ • In which areas could we close loops?
- 1.8 trillion Euro per year in Europe ➡ • How much potential in ports?
- Decoupling value creation from resource consumption ➡ • As service-hubs, ports have a good start
- Requires a systemic approach ➡ • How to create the system & infrastructure?

