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LOOP·Ports
Circular Economy Network of Ports

CIRCULAR ECONOMY INSTITUTIONAL Online Workshop

Italian session

26th November 2020

LOOP·Ports
Circular Economy Network of Ports

Workshop
AGENDA

The LOOP-Ports project
how a network of ports can contribute to circular economy transition

Introduction and overview (5')
The Loop-Ports project experience about circular economy and European ports (5')
The Loop-Ports case studies and results (10')
Circular economy: opportunities and barriers (10')
Ports green development (10')
Q&A and discussion (10')

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LOOP·Ports
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The LOOP-Ports project: how a network of ports can contribute to circular economy transition

Ing. Silvia Grandi, PhD - Ministero dello Sviluppo Economico
Italian Ministry of Economic Development

INTRODUCTION

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Dott. Nicolas Greggio – University of Bologna
CIRSA EMRG LAB, CIRI EA

RETE ALTA TECNOLOGIA EMILIA-ROMAGNA HIGH TECHNOLOGY NETWORK
TECNOPOLO RAVENNA

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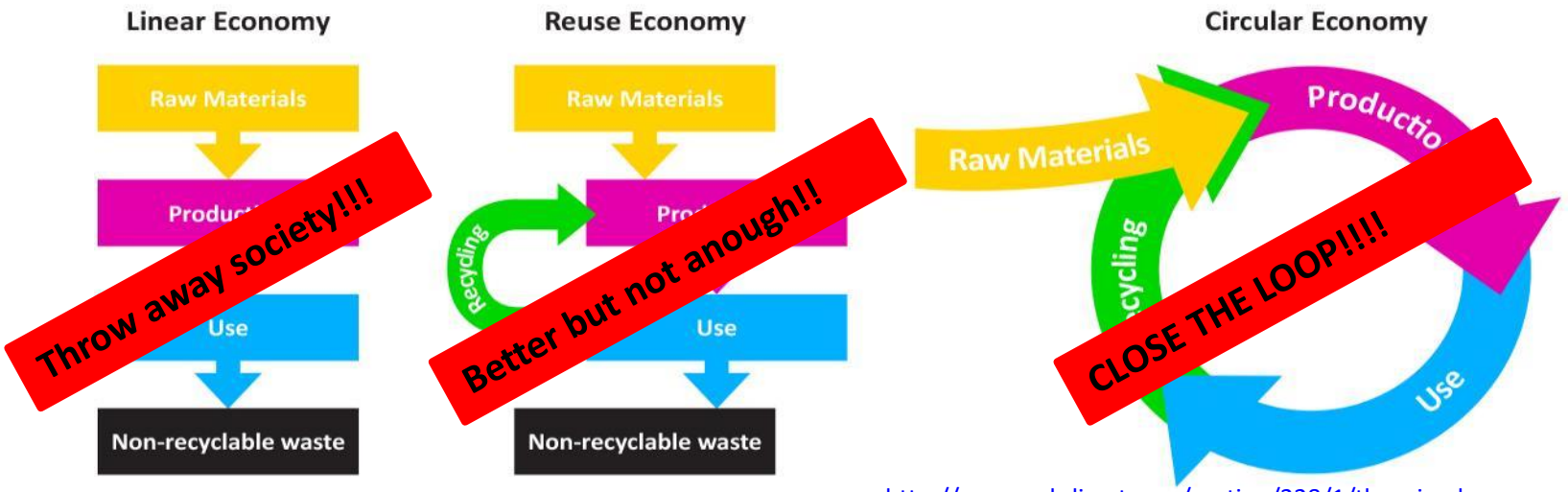
The LOOP-Ports project: how a network of ports can contribute to circular economy transition

INTRODUCTION



http://www.pcl-direct.com/section/228/1/the_circular_economy

What is the definition of a circular economy?

Is an economic system where products and services are traded in closed loops or 'cycles. It is a regenerative by design economy, with the aim to **retain as much value as possible of products, parts and materials**. It is a system that allows for the **long life, optimal reuse, refurbishment, remanufacturing and recycling of products and materials**.

(Kraaijenhagen, Van Oppen & Bocken. 2016, Ellen MacArthur Foundation, 2016)

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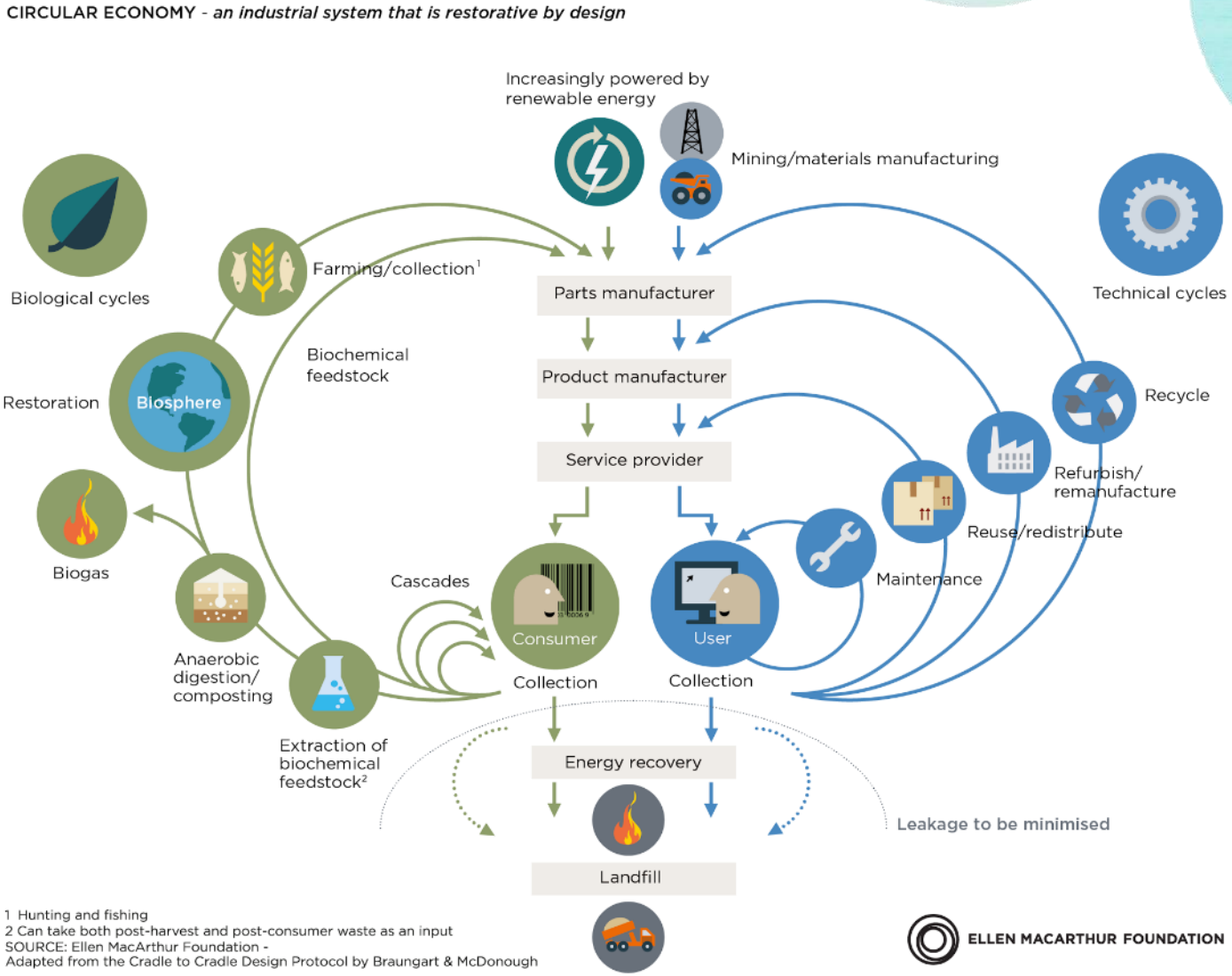
Workshop

The LOOP-Ports project: how a network of ports can contribute to circular economy transition

INTRODUCTION



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Why Circular Economy in Ports?

Definitions of Ports?

Ports constitute logistic nodes playing an important role in the management and co-ordination of material and information flows, at the interface between land and water transport, within a global supply chain network (Carbone and De Martino, 2003).

H.A. van Klink Strategic partnering among logistic nodes: Rotterdam and Eastern Europe J. Transp. Geogr., 2 (3) (1994), pp. 169-177

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Ports matter

Ports are crucial for the European transport business, competitiveness, job creation and investment.

Europe's ports are the gateways to the EU.

- 74% of extra-EU goods are shipped through ports.
- 37% of the intra-EU trade
- 385 million passengers.
- Over 1200 commercial operating seaports
- in 70.000 km of coasts.
- In 2018, around 5 billion tonnes of cargo transited through European ports.

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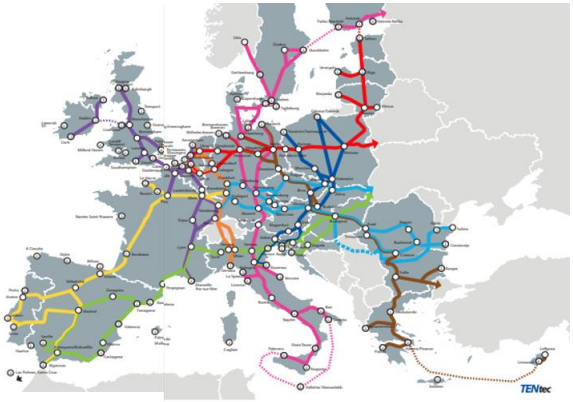
Why CE in Ports?

Ports are places where **multiple systems collide** – shipping, energy, waste, tourism and other transport for example. They are emissions hotspots, but also hubs with the potential to effect enormous change.

This maritime hubs can be **catalysts for reversing the fast-growing emissions** from international shipping and trade hotspots.

As hubs of global resource flows, hosts to **large industrial complexes**, and inter-modal platforms with **strong connections with their hinterland** and urban areas, ports can be ascribed a unique and **highly important role in stimulating circular economy practice**, with their influence transcending far beyond their own industrial complexes (Kuipers, 2015).



Kuipers, B. (2015). Ports as catalysts for change towards a circular economy. Persentation at the ESPO Conference, Athens, May 22, 2015. Available at: https://www.espo.be/media/ESPO%20Bart%20Kuipers%20Circular%20Economy%20final%202105.pdf

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The LOOP-Ports project: how a network of ports can contribute to circular economy transition

INTRODUCTION

Why is the circular economy important for ports?

- Ports act as 'matches' to **activate relations** between the production and recycling industries in order to reuse energy in the chain.
- Ports **are home to industries** active in the treatment, collection and shipment of waste and stimulate the emergence of innovative circular cycles.
- Ports **are important points of passage for all types of waste and industrial flows** and act as logistics hubs for the import/export of waste materials. Therefore, they are ideal places to further develop the circular economy.
- The presence of **industrial districts** in ports helps to facilitate the circular and more sustainable use of waste and resources because they offer the advantage of synergies between industries.

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Port of Rotterdam

Next session

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The LOOP-Ports project

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The Loop-Ports project experience about circular economy and European ports

RATIONALE

At present, CE initiatives related to the port sector are being developed in an isolated way.

NEED: To actively involve the port sector in this new model of production and consumption

- Crossing-points for all kinds of waste and industrial flows.
- Logistical hubs for the import and export of waste materials.
- Setting-up location of industries that are active in the treatment, collection and shipment of waste
- Innovation circles active promoters.

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The Loop-Ports project experience about circular economy and European ports

LOOP-Ports project is funded by the EIT Climate-KIC initiative in the framework of the "SUSTAINABLE PRODUCTION SYSTEMS"

LOOP-Ports aims to facilitate the transition to a more circular economy in ports through the creation of a Circular Economy Network in ports that will provide an innovation ecosystem around the port activity and stimulate circular economy initiatives in European ports

ENGAGED

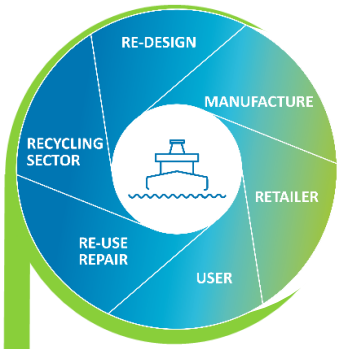
- 32 Port Authorities
- 4 Public Authorities
- 4 Port Associations
- 1 Environmental Management Organization
- 4 Industry Associations

13 partners from 6 European Countries

France
Italy
Germany
Netherlands
Denmark
Spain

+450 ports analysed
7 business models
3 training pilots
1 web tool
30 workshops

(All the port stakeholders are invited to participate in the network)



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LOOP·Ports
Circular Economy Network of Ports

Session

The Loop-Ports project experience about circular economy and European ports

WP1
CE mapping in EU ports

The aim is to find out in which European ports the environment is most favourable for the launch of circular economy initiatives

WP2
Looking to the future

The goal is to verify and define the drivers of change for the launch of initiatives related to the circular economy

WP3
Trainings IT, ES, DK

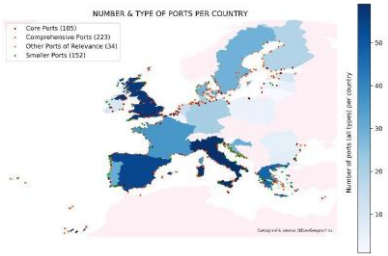
The aim is to increase knowledge in the field of circular economy

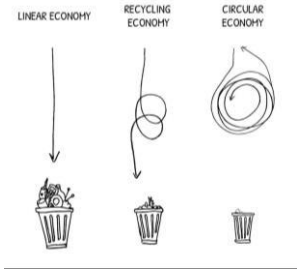
WP4
Network and workshops

The goal is to create a network of ports for the circular economy

WP5
Business models & dissemination

The goal is to provide the tools to support the network of ports for the circular economy





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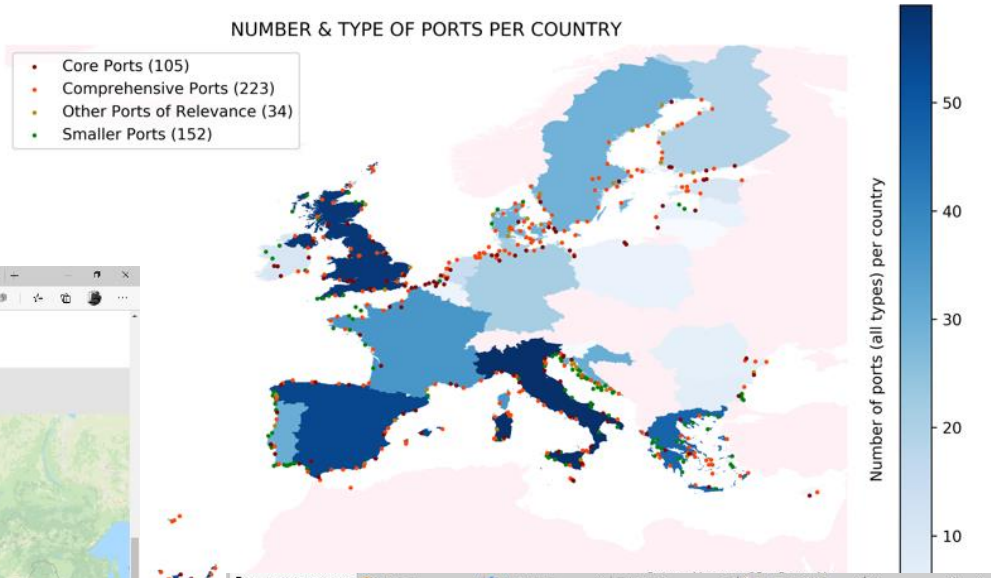
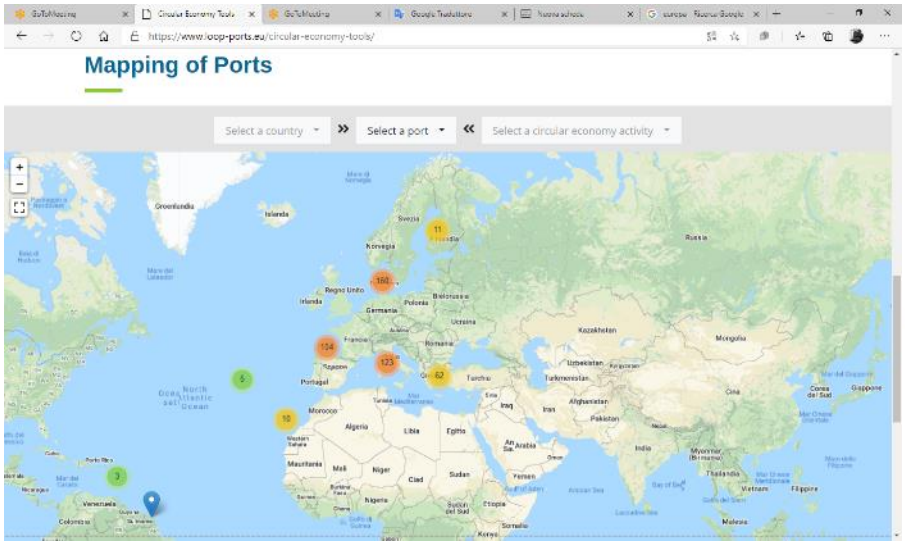
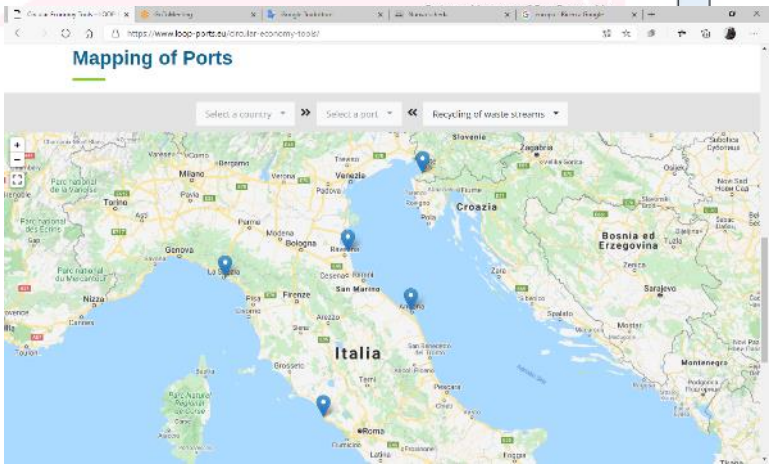
The Loop-Ports project experience about circular economy and European ports

WP1
CE mapping
in EU ports







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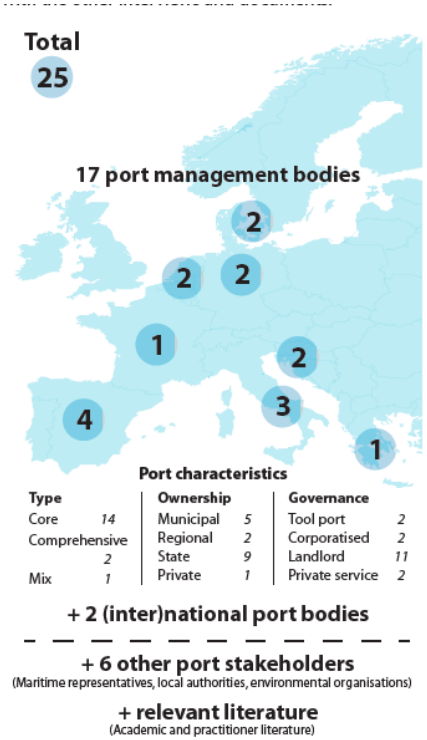
The Loop-Ports project experience about circular economy and European ports

WP2
Looking to the future



Port characteristics

Type		Ownership		Governance	
Core	14	Municipal	5	Tool port	2
Comprehensive	2	Regional	2	Corporatised	2
		State	9	Landlord	11
Mix	1	Private	1	Private service	2

+ 2 (inter)national port bodies

+ 6 other port stakeholders
(Maritime representatives, local authorities, environmental organisations)

+ relevant literature
(Academic and practitioner literature)

7 levers of change

1 Lever #1
Awareness and information regarding CE potential
The first condition for change is awareness of the problems that CE can help address and areas where CE can create new opportunities (conceptual understanding of the CE concept). To make a clear link with the local situation in the port, insight into current resource streams and other improvement opportunities are needed. Next, technical and non-technical knowledge is necessary to effectively leverage CE to capture the associated business and environmental benefits.

2 Lever #2
Business models & market structure
The second lever focuses on the formal and informal relationships between actors in the port sector. It can be split into two strongly related aspects: the way business is conducted (how ports create, deliver, and capture value, in economic, social, cultural or other contexts to other stakeholders) and market structure (competition and collaboration, information sharing, economies of scale, transparency, stability, and market shaping instruments such as fines, fees, contracting practices, rebates, etc).

3 Lever #3
Rules, policies, and regulatory instruments
This lever covers the legal, policy and regulatory instruments deployed by local, national or supranational governments, business and other organisations to influence decision making linked to the port sector that direct or determine what circular economy initiatives are viable. Think of strategies, targets, performance and technology standards; labelling and bans; spatial planning; monitoring and enforcement; and assessments and permits.

4 Lever #4
Fiscal instruments, investment and funding
Lever four examines the current situation and developments related to fiscal instruments and incentives. It asks what financial tools (fines, rebates, bonuses, procurement) are currently available to ports to stimulate CE initiatives. This lever furthermore explores the status of the investment climate, and the role of funding instruments such as grants and subsidies.

5 Lever #5
Technology, processes, design, standards and infrastructure
This lever revolves around the physical conditions that can help or hinder circular economy practices. It explores the current status of technology, designs and processes, and how new developments in these areas create new possibilities. In addition to this, this lever examines what standards or certification schemes are needed to capture these opportunities., as well as the enabling role infrastructure plays.

6 Lever #6
Collaboration inside the port and with other port stakeholders
This lever examines the status as well as the need for collaboration and co-creation processes between stakeholders. It focuses on both the engagement of the ports with its environment such as businesses based in the ports, solutions providers, legislators, etc. In addition to this, a spotlight is put on the relationship with the cities ports are often based in or near, and the need for a positive engagement with citizens that stems from this.

7 Lever #7
Technical and non-technical knowledge, skills and capabilities
This lever reviews the previous levers and looks at what knowledge, skills and capabilities are needed for ports to make the next step with circular economy. A distinction is made between newcomer ports - ports new to circular economy, and forerunner ports - ports who are experienced with applying CE thinking.

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The Loop-Ports project experience about circular economy and European ports

WP3
Trainings
IT, ES, DK

22 Participants:
6 Italian Port Authorities

When:
19-20 November 2020

Participants :
Port community
of Port of Valencia

When :
26 November 2020

Participants :
Port of Frederikshavn

When :
16-18 November 2020

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WP4
Network and workshops

UNIHAMB

DTU

VEOLIA

TNO

Just happened!!!!

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The Loop-Ports project experience about circular economy and European ports

WP5
Business models & dissemination

It is all about circular economy!

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The LOOP-Ports project: how a network of ports can contribute to circular economy transition

The Loop-Ports case studies and results

TIZIANA CAMPISI - CIFLA Fondazione Flaminia

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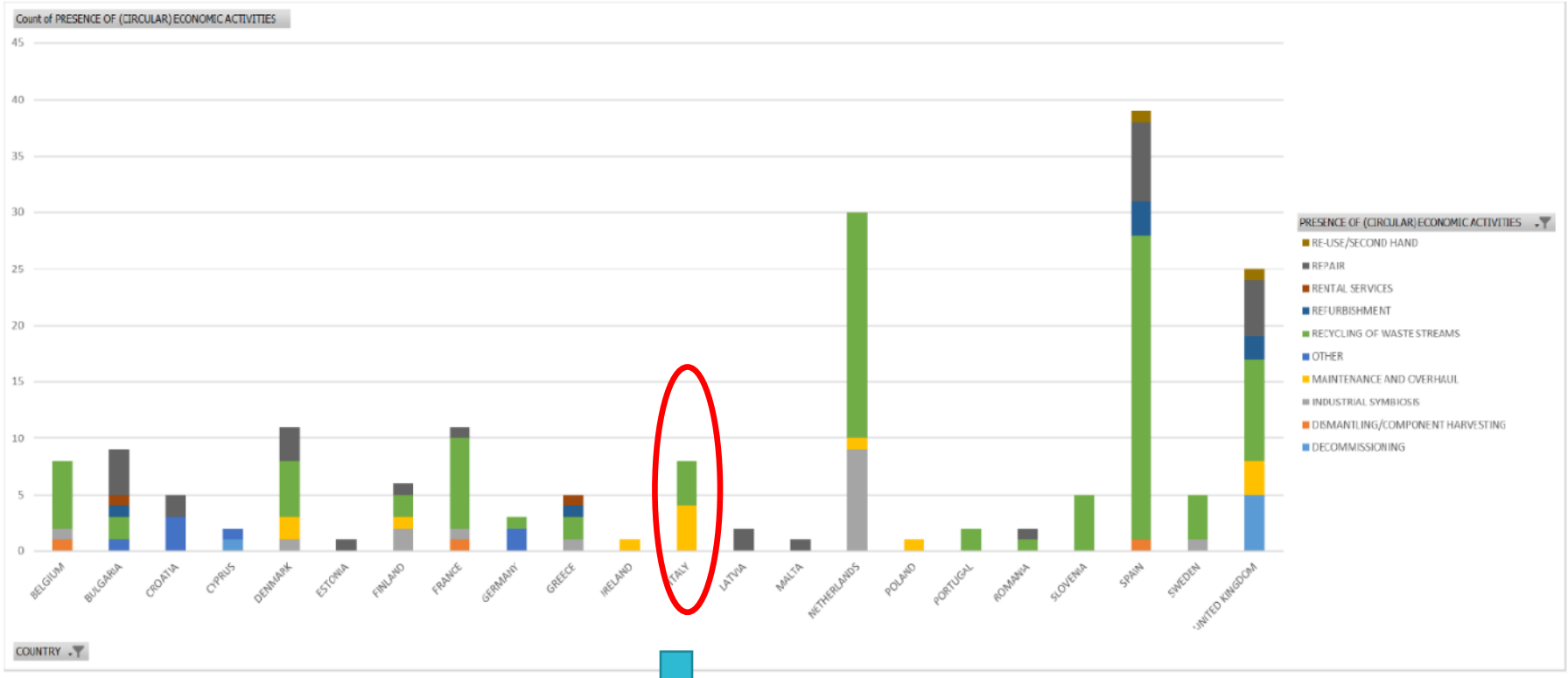
The Loop-Ports case studies and results

Mapping Circular Economy Practices



Low visibility
Low awarness
Need of «real» mapping

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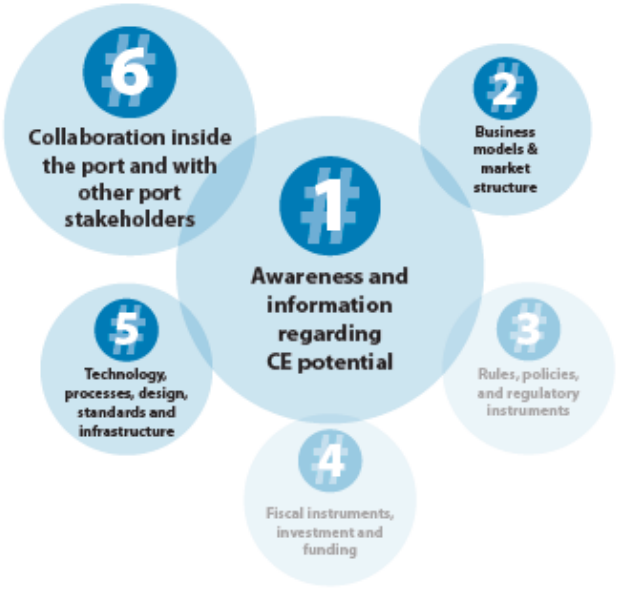
The Loop-Ports case studies and results

Interview to EU Ports

Focus for knowledge, skills and capabilities for developmental stages

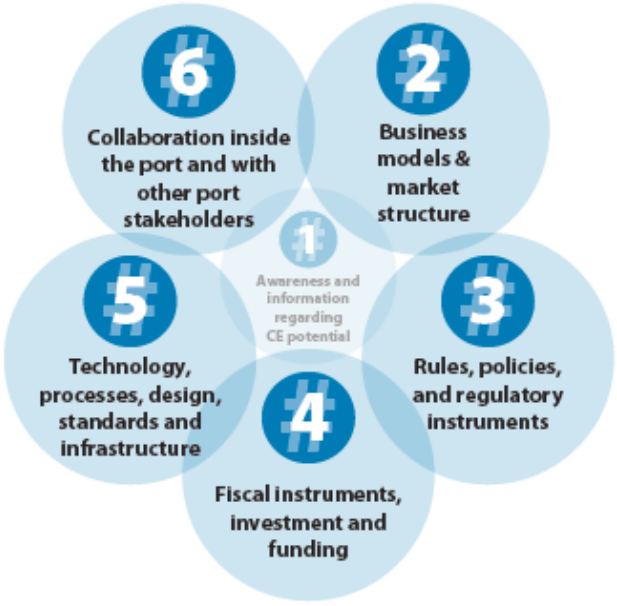
Newcomer ports

Ports that are exploring CE potential



Forerunner ports

Ports that are advanced in their application of CE



Need of training on the topic

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The Loop-Ports case studies and results

3 themes

1

Circular port assets & equipment

Optimisation of capacity and life-time extension of port assets, such as buildings, cranes, quays, buoys and other equipment through smarter use (e.g. renting, sharing) and smarter maintenance.

2

Circular flows within ports

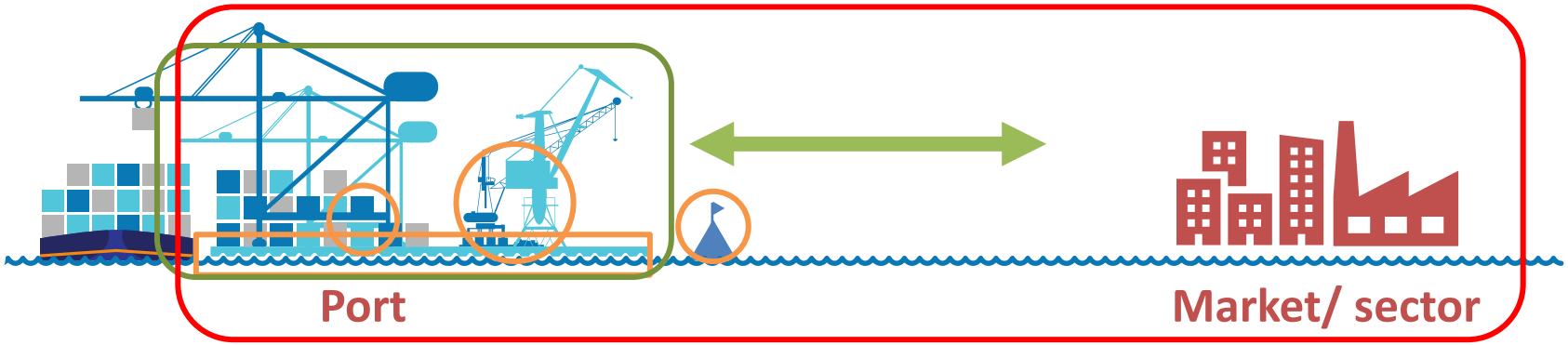
(and between ports & surrounding area)

New uses for would-be wastes generated by port activities, such as ship waste and by-products of industries within ports and port activities.

3

Ports & circular markets

Ports enabling other industries – both on and offshore – to become more circular by developing new activities that connect supply and demand for circular resources (targeted at resource flows trough ports).



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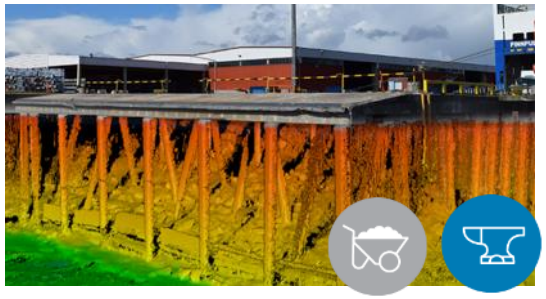
The Loop-Ports case studies and results



HAMINAKOTHA, FI
Digitalisation for better use of port assets

Digitalisation through 3D operating system - this allows intensification of daily port operations, as well as effective maintenance and repair of port facilities.

RAMSGATE, UK
Efficient maintenance through modular design

A new light-weight and modular design enables quicker buoy maintenance, with less stock in reserve, and executed by smaller ships enables more cost-effective maintenance.

Port of Kristiansand
PSS for reducing in-harbour emissions

Product/service system for reducing in-harbour emissions through onshore power supply.

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The Loop-Ports case studies and results

COPENHAGEN/MALMÖ,
Industrial symbiosis

Development of a port-based industrial symbiosis network, where one facilities' waste is used as the input by another.

Port of Ravenna, Italy
Repair and regeneration of the shipping containers

Containers' end of life and end-of-use is valorizing internally in the port, with a dedicated service for repairing and regenerating the shipping containers.

AALBORG, DK
Circular sourcing for cement production

Dredging has become a value adding activity - the sands are used as a raw material in the production of grey cement in the co-located cement plant.

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The Loop-Ports case studies and results

FREDERIKSHAVN, DK
Circular Decommissioning of ships and rigs

The port of Frederikshavn have established a dedicated infra-structure for decommissioning of offshore structures enabling reuse and refurbishment of machinery and equipment.

MOERDIJK, NL
Valorisation of waste tires through pyrolysis

Piloting return logistics to valorize waste tires through pyrolysis - replacing incineration to obtain gas, oil and biochar for producing new goods and generation of energy.

ANTWERP, BE
Linking Circular Markets in the Carloop Project

Antwerp Port Authority has set up a pilot project to bring back used car parts. The usable parts are sorted at local partners in West Africa and sent back to Antwerp for recycling or refurbishment.

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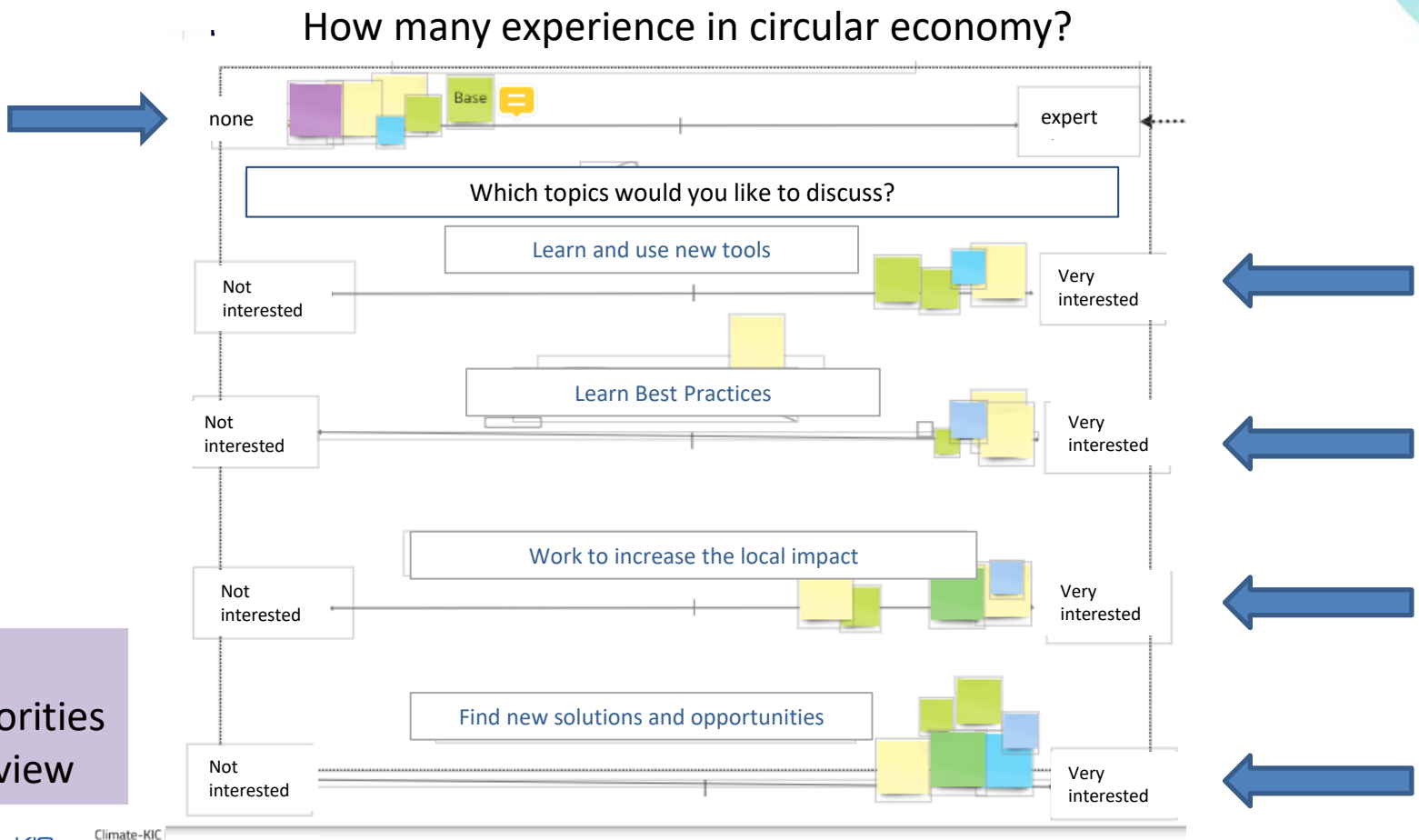
The Loop-Ports case studies and results

Case study: ITALY



Port Authorities interview

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Circular Economy Network of Ports

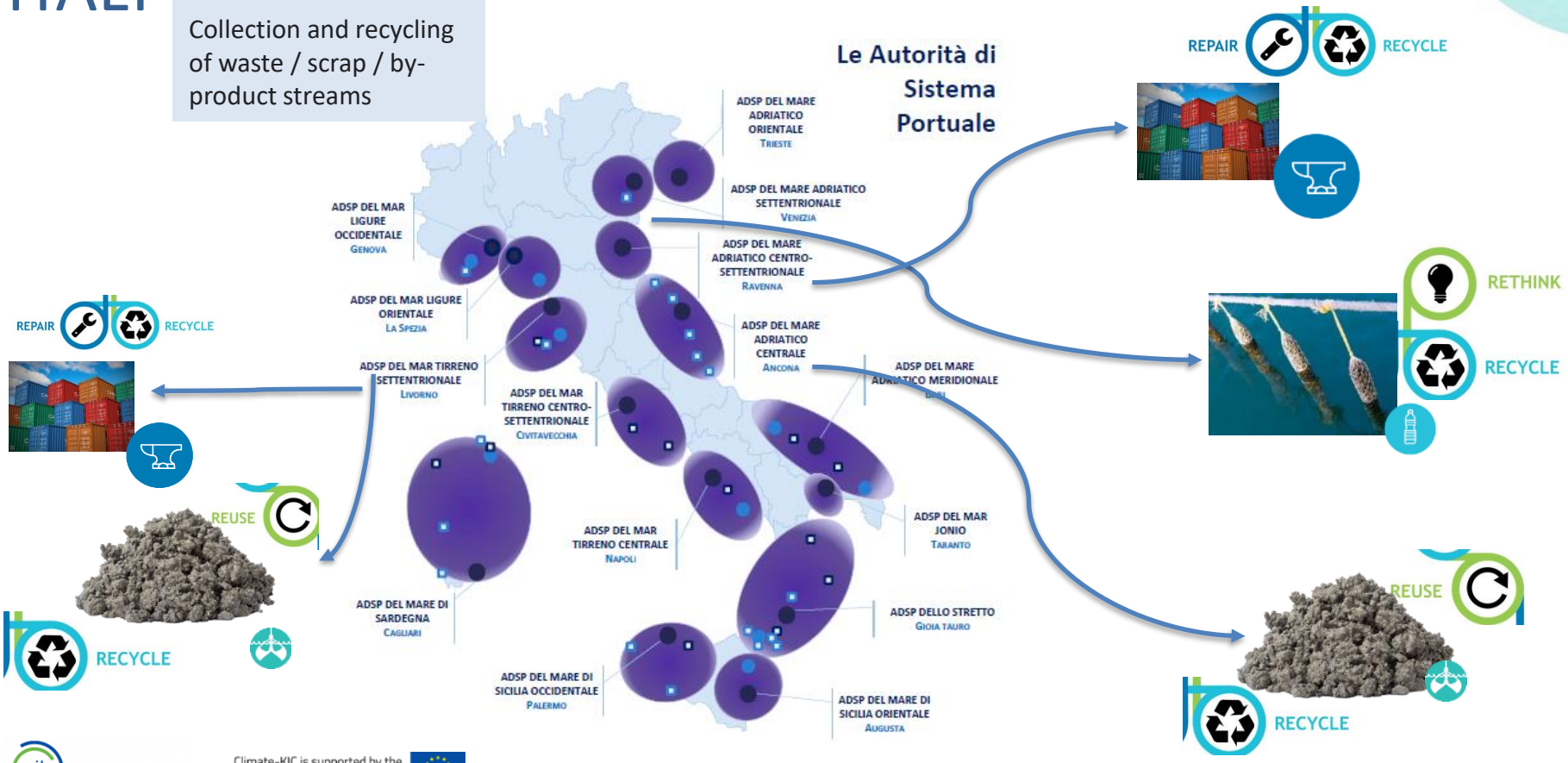
Session
The Loop-Ports case studies and results

Case study: ITALY

At the end of the project:
How many best practices of circular economy in your port?

ALL

Collection and recycling of waste / scrap / by-product streams



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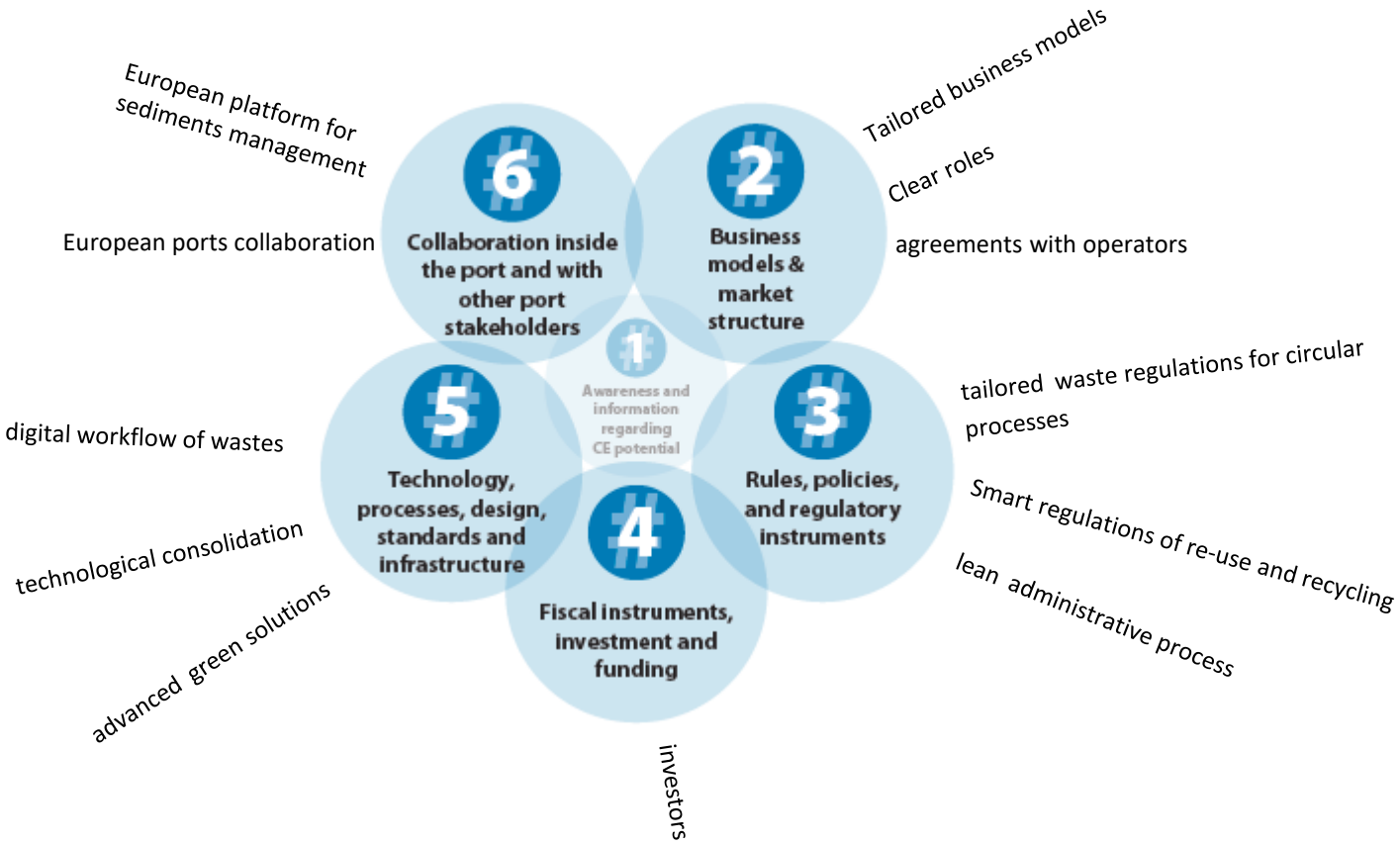

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The LOOP-Ports project: how a network of ports can contribute to circular economy transition

Circular economy: opportunities and barriers

Prof. Fabrizio Passarini – University of Bologna
CIRI FRAME

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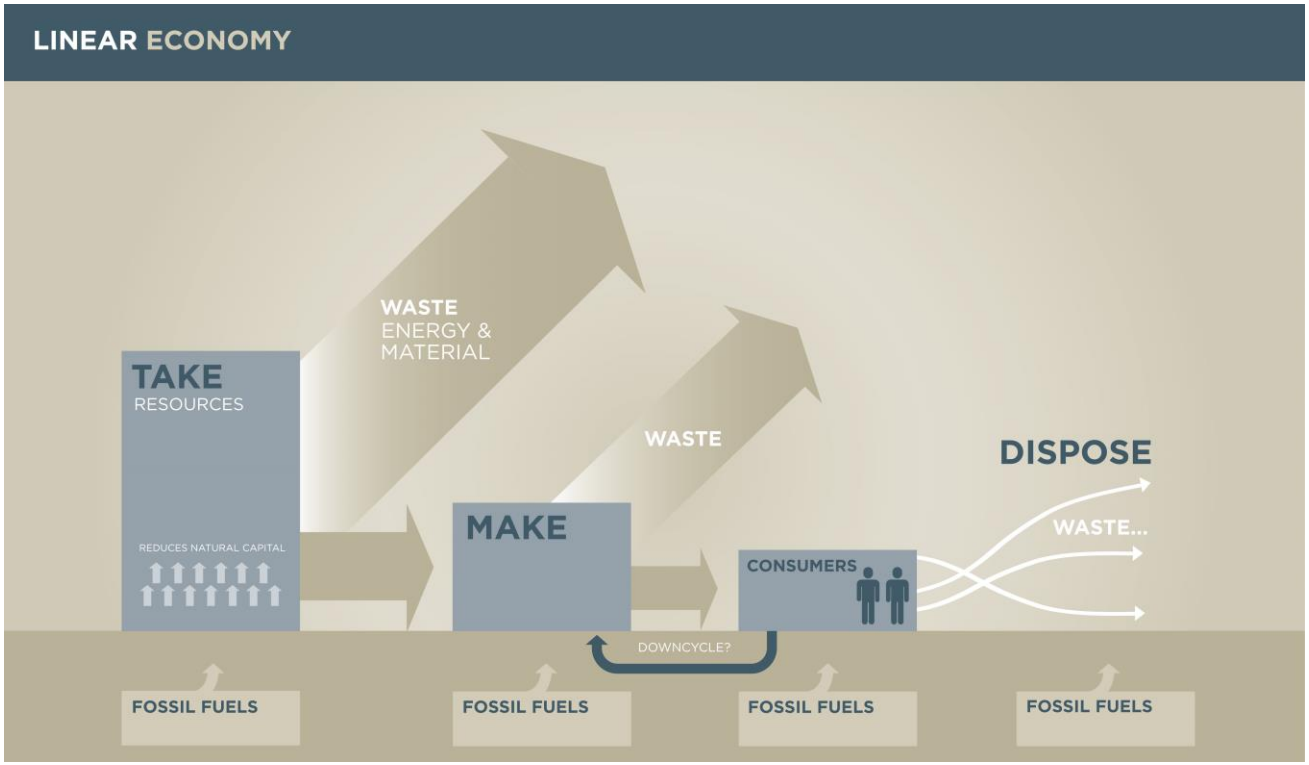
Session
Circular economy: opportunities and barriers

The starting point: a linear model



Source: “Linear Economy”, Ellen MacArthur Foundation, 2014

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LOOP·Ports
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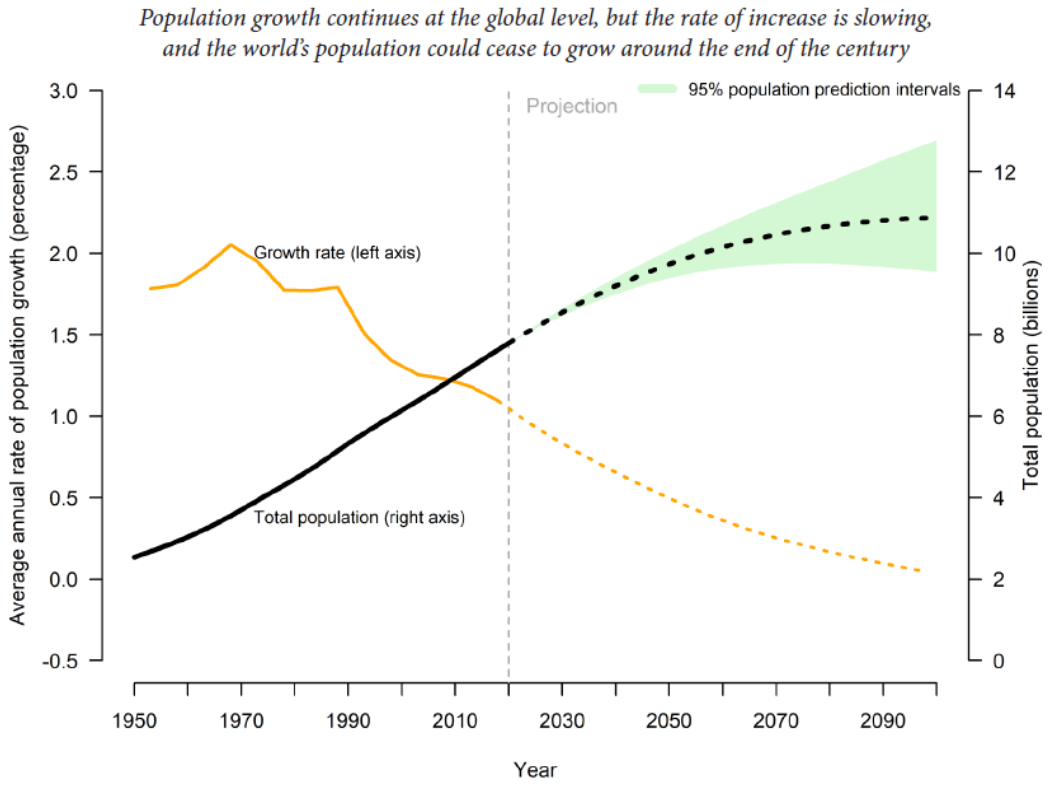
Session
Circular economy: opportunities and barriers

Reasons of unsustainability: competition for finite natural resources

Expansion of global population and of its standard of living never seen before on Earth (> 9 billion people estimated in 2050)
The growth in the demand of food, feed and fibres could be of 70% within 2050, the global energy and water consumption of 40% already within 2030.



Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019.

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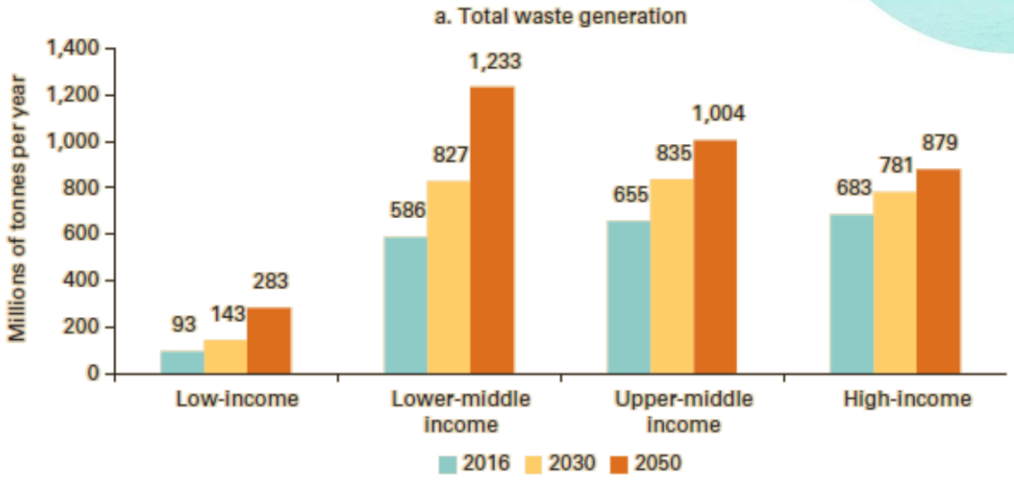
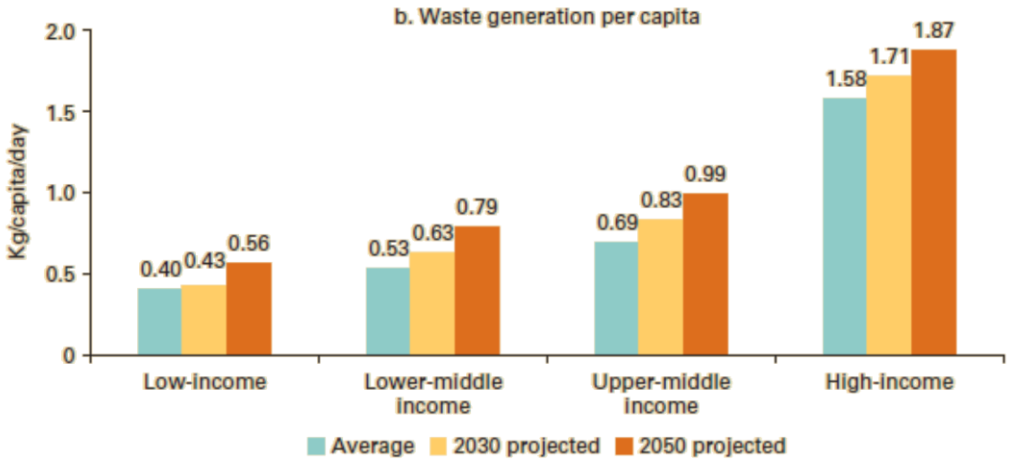
LOOP·Ports
Circular Economy Network of Ports

Session
Circular economy: opportunities and barriers

Reasons of unsustainability: impacts on the environment (1)

Unsustainable pace of waste generation : from 3.5 million t/d in 2010, to expected 6 million t/d in 2025. **One third of the world food production becomes waste**. Recovering **one forth** of these resources could **nourish 870 million people**.





Source: "What a Waste 2.0", World Bank, 2018, https://openknowledge.worldbank.org/bitstream/handle/10986/30317/9781464813290.pdf

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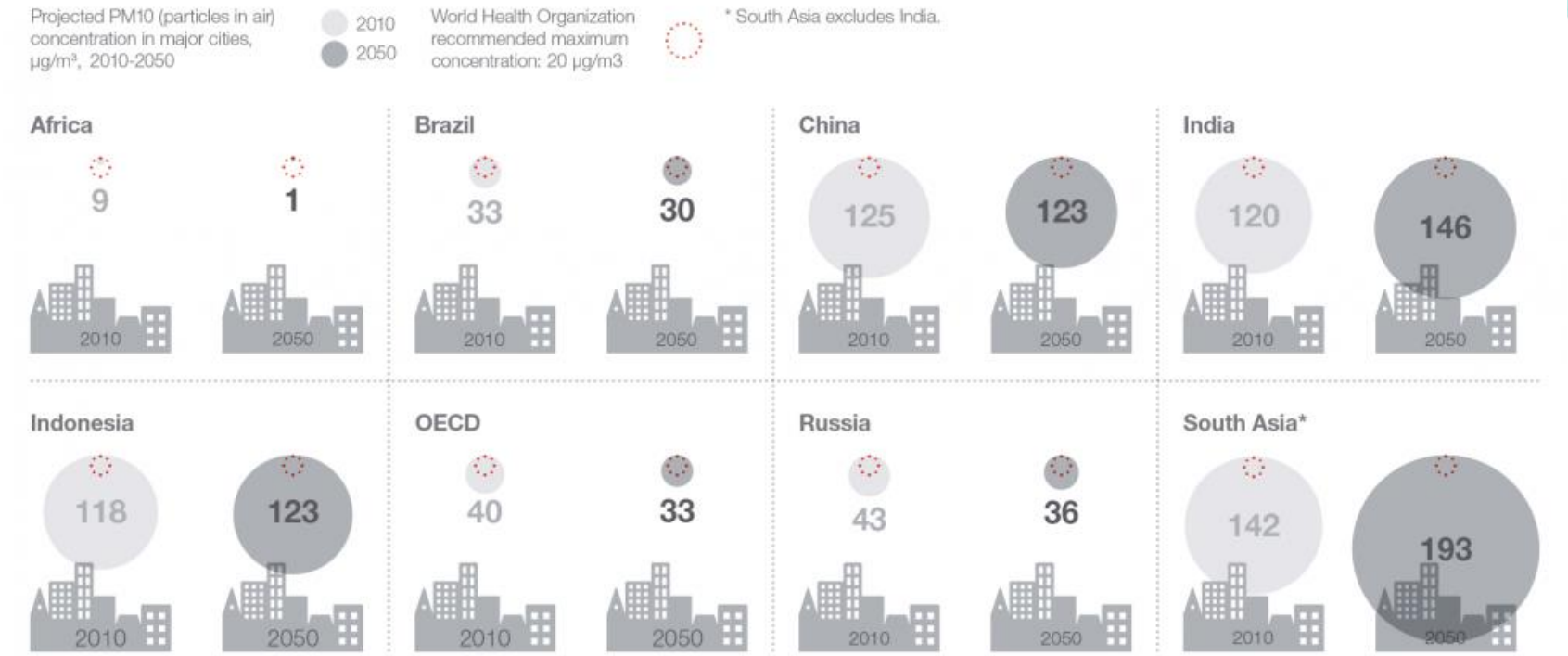
Circular economy: opportunities and barriers

Reasons of unsustainability: impacts on the environment (2)



3.5 billion people (about half of the world population) live in nations in which air quality is considered **UNHEALTHY**.
Source: http://www3.weforum.org/docs/GAC14/WEF_GAC14_OutlookGlobalAgenda_Report.pdf

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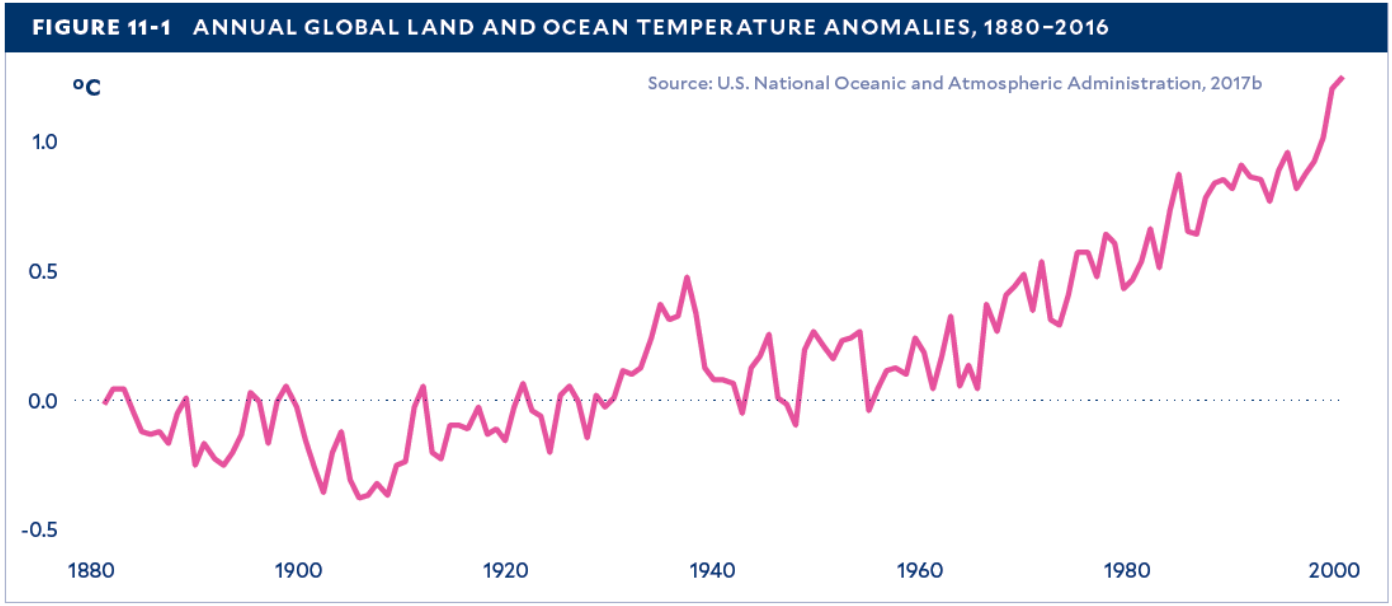
Reasons of unsustainability: impacts on the environment (3)



Source: "2018 Environmental Performance Index", Yale University, 2019, https://epi.envirocenter.yale.edu

Climate anomalies: 143 million people within 2050 are estimated to become "internal climate migrants" (https://openknowledge.worldbank.org/handle/10986/29461); in 2019 already 24.9 million people have been pushed to migrate within their Countries (https://www.internal-displacement.org/global-report/grid2020/).

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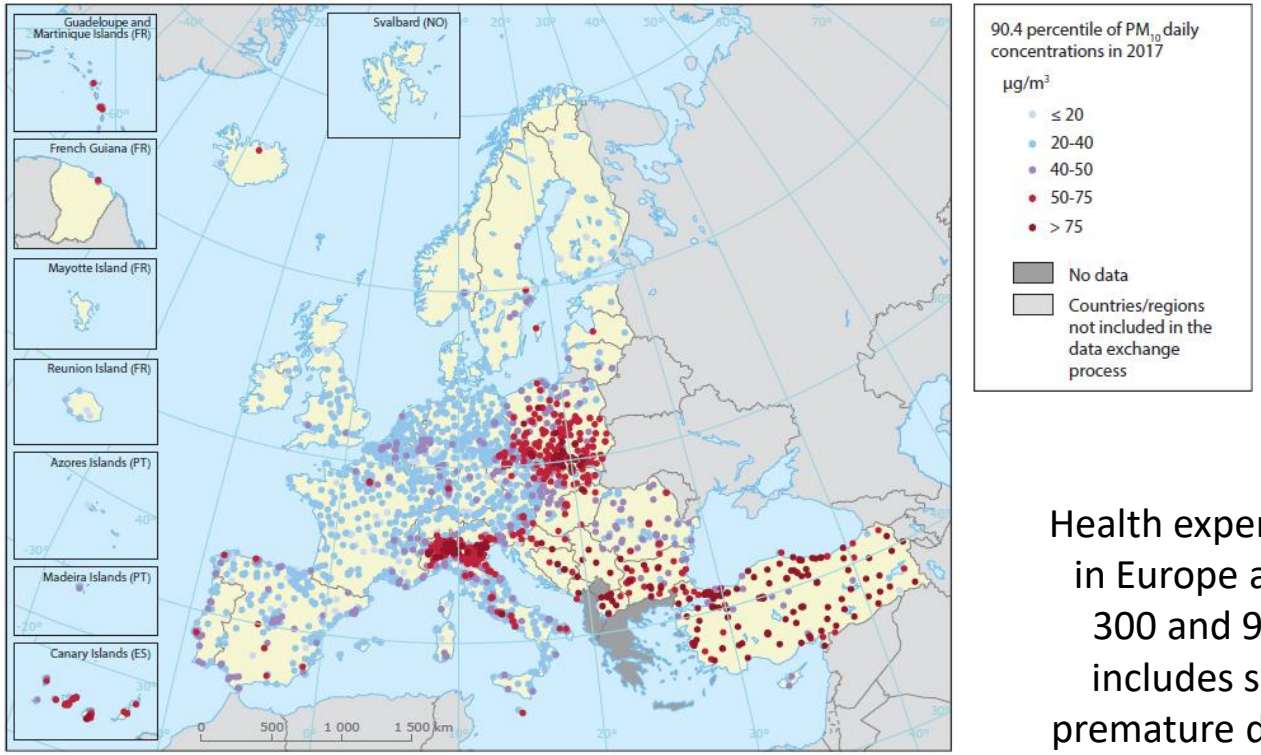
Reasons of unsustainability: impacts on human health



"Air quality in Europe — 2019 report". EEA Report No 10/2019, https://www.eea.europa.eu/publications/air-quality-in-europe-2019

Health expenses due to air pollution in Europe are estimated between 300 and 900 billion €/year. This includes social costs of 470,000 premature deaths/year (only due to fine particles) and the loss of 150 million working days/year.

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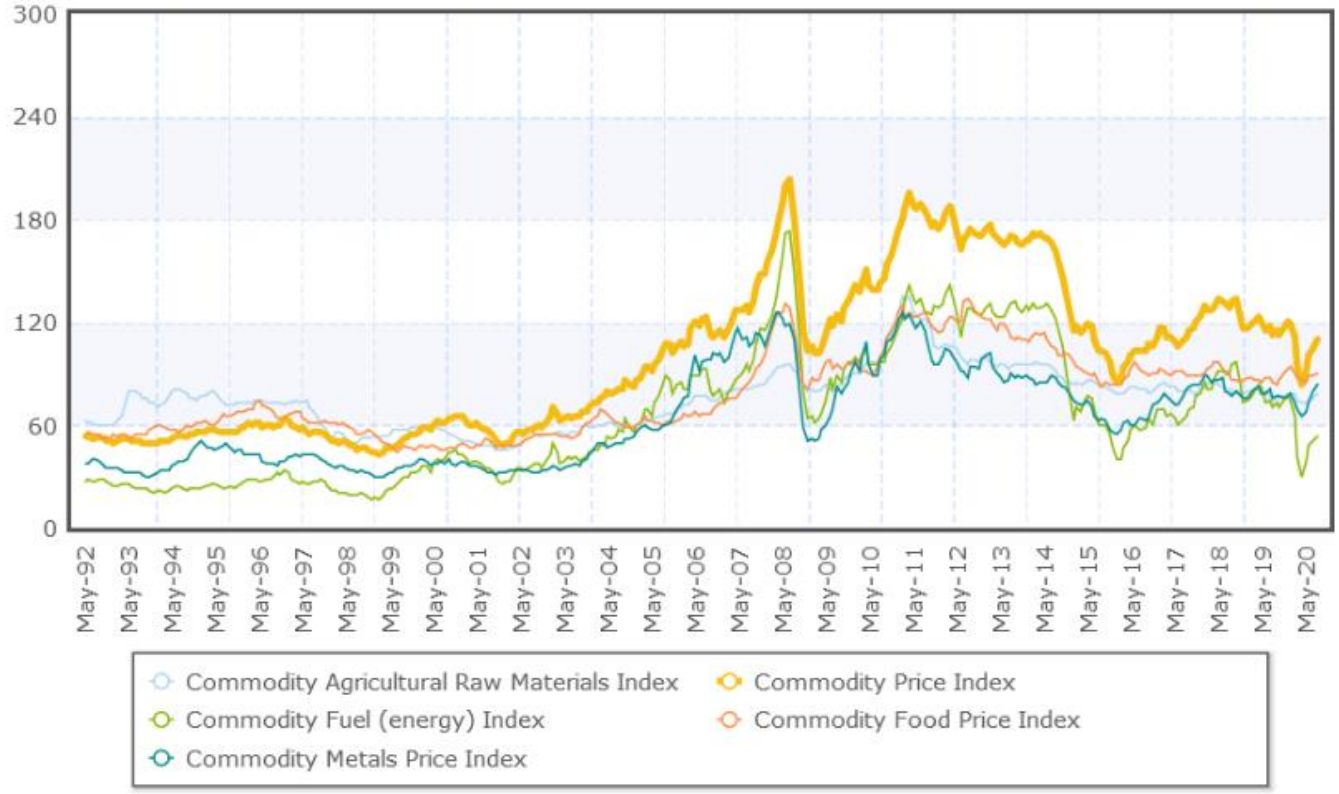
Reasons of unsustainability: impacts on the economy



Source: https://www.indexmundi.com/commodities/

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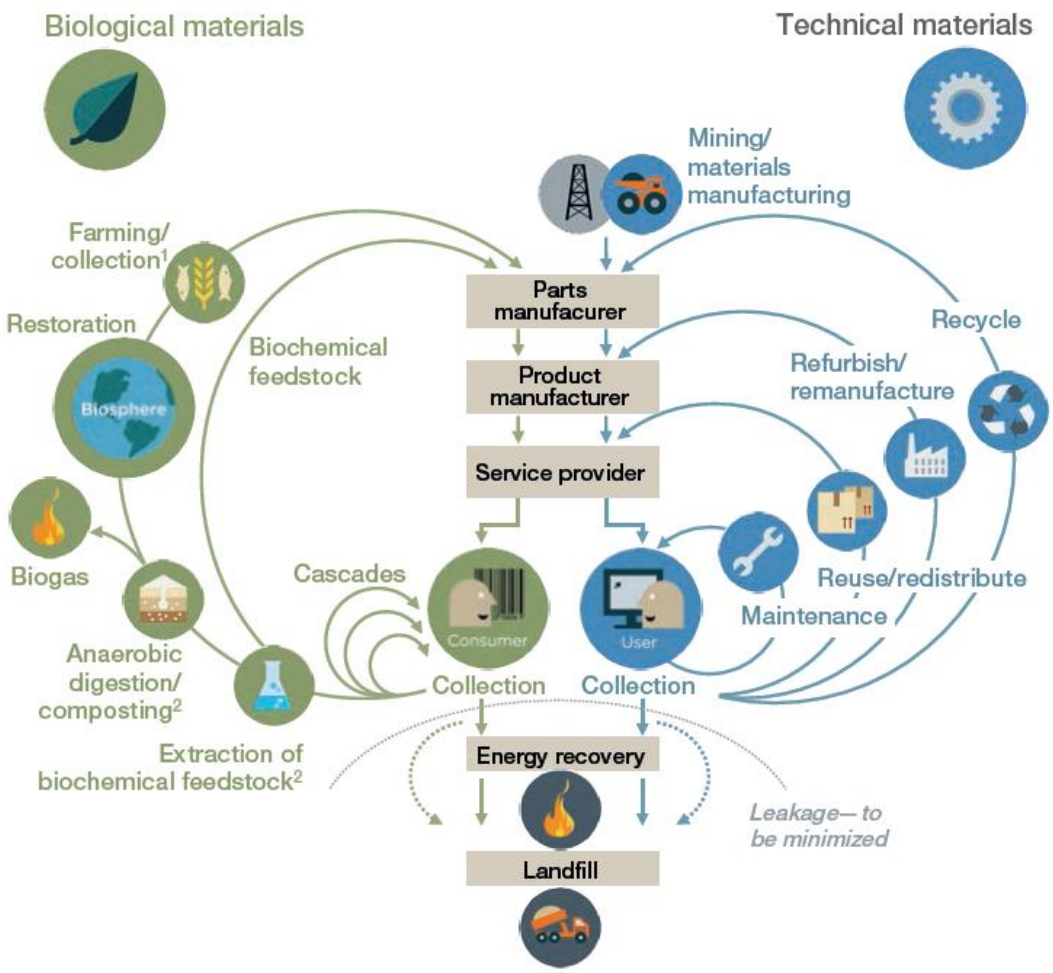
What is Circular Economy

A circular economy is a **systemic approach** to economic development, regenerative by design that aims to gradually **decouple growth from the consumption of finite resources** (https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail)

Source: Ellen MacArthur Foundation, "Towards the Circular Economy: Economic and business rationale for an accelerated transition", 2013

It is built on three principles:

- **Design out waste and pollution**
- **Keep products and materials in use**
- **Regenerate natural systems**



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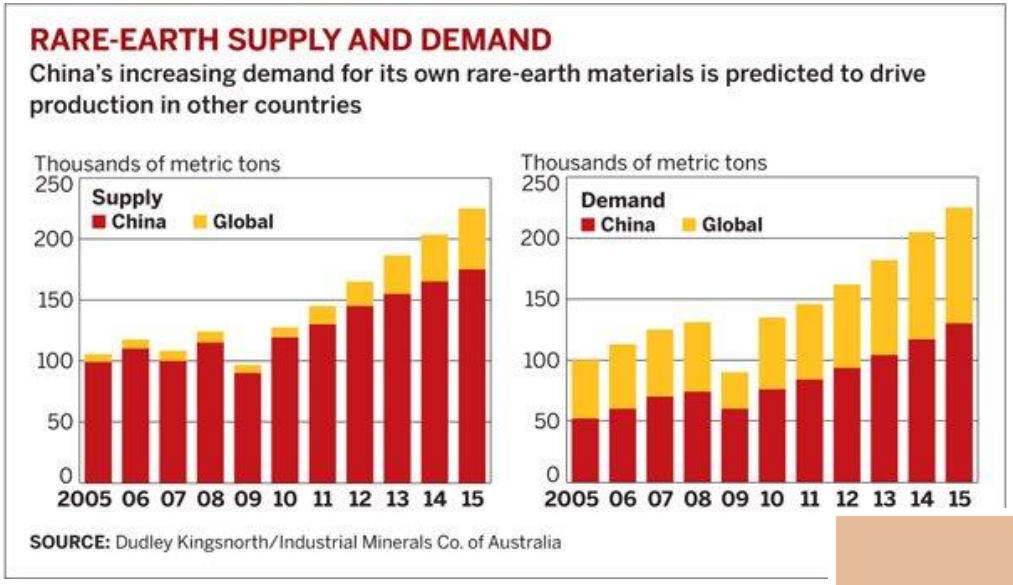
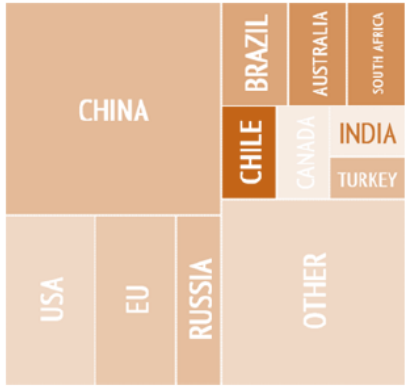
Circular Economy as a European necessity

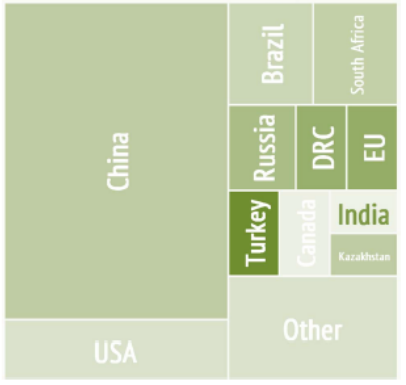


Source: "The European Critical Raw Materials review", MEMO/14/377, European Commission, 2014, https://ec.europa.eu/commission/presscorner/api/files/document/print/en/memo_14_377/MEMO_14_377_EN.pdf

Fonte: "Report on critical raw materials for the EU", European Commission, May 2014, https://ec.europa.eu/docsroom/documents/10010/attachments/1/translations/en/renditions/



World primary supply of the 54 candidate raw materials



World primary supply of the 20 critical raw materials

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Circular Economy as a European necessity

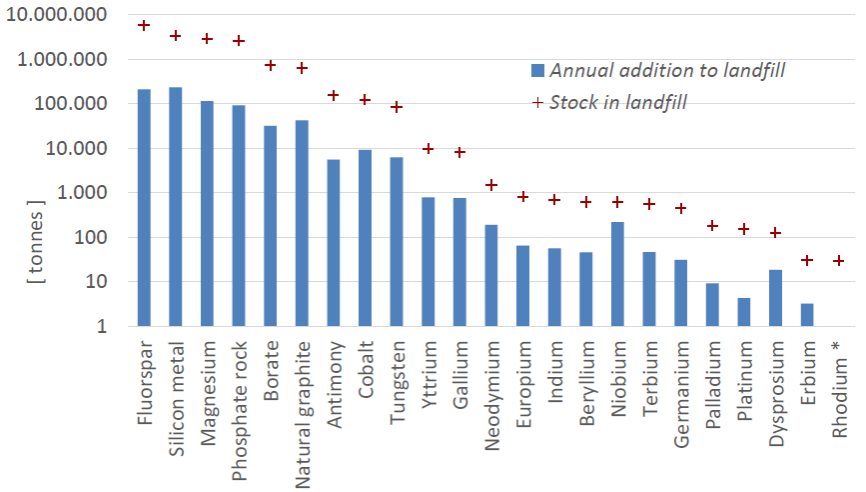
End-of-life recycling input rate (EOL-RIR) [%]

H																	He 1%
Li 0%	Be 0%											B* 0.6%	C	N	O	F* 1%	Ne
Na	Mg 13%											Al 12%	Si 0%	P* 17%	S 5%	Cl	Ar
K* 0%	Ca	Sc 0%	Ti 19%	V 44%	Cr 21%	Mn 12%	Fe 31%	Co 35%	Ni 34%	Cu 17%	Zn 31%	Ga 0%	Ge 2%	As	Se 1%	Br	Kr
Rb	Sr	Y 31%	Zr	Nb 0%	Mo 30%	Tc	Ru 11%	Rh 9%	Pd 9%	Ag 55%	Cd	In 0%	Sn 32%	Sb 28%	Te 1%	I	Xe
Cs	Ba 1%	La-Lu[1]	Hf 1%	Ta 1%	W 42%	Re 50%	Os	Ir 14%	Pt 11%	Au 20%	Hg	Tl	Pb 75%	Bi 1%	Po	At	Rn
Fr	Ra	Ac-Lr[2]	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Uut	Fl	Uup	Lv	Uus	Uuo

[1]Group of Lanthanide	La 1%	Ce 1%	Pr 10%	Nd 1%	Pm	Sm 1%	Eu 38%	Gd 1%	Tb 22%	Dy 0%	Ho 1%	Er 0%	Tm 1%	Yb 1%	Lu 1%
[2]Group of Actinide	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Aggre-gates	Bento-nite	Coaking Coal	Diato-mite	Feldspar	Gypsum	Kaolin Clay	Lime-stone	Magne-site	Natural Cork	Natural Graphite	Natural Rubber	Natural Teak Wood	Perlite	Sapele wood	Silica Sand	Talc
7%	50%	0%	0%	10%	1%	0%	58%	2%	8%	3%	1%	0%	42%	15%	0%	5%

* F = Fluorspar; P = Phosphate rock; K = Potash, Si = Silicon metal, B = Borates.



* Rhodium annual addition to landfill = 0.7 tonnes

Source: "Report on Critical Raw Materials and the Circular Economy", 2018 (https://ec.europa.eu/commission/publications/report-critical-raw-materials-and-circular-economy_en)

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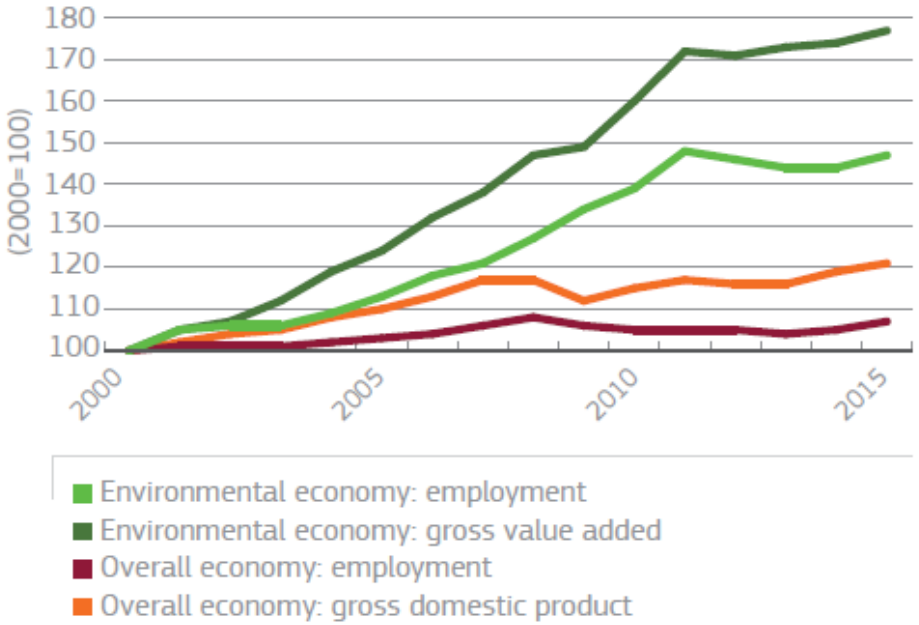
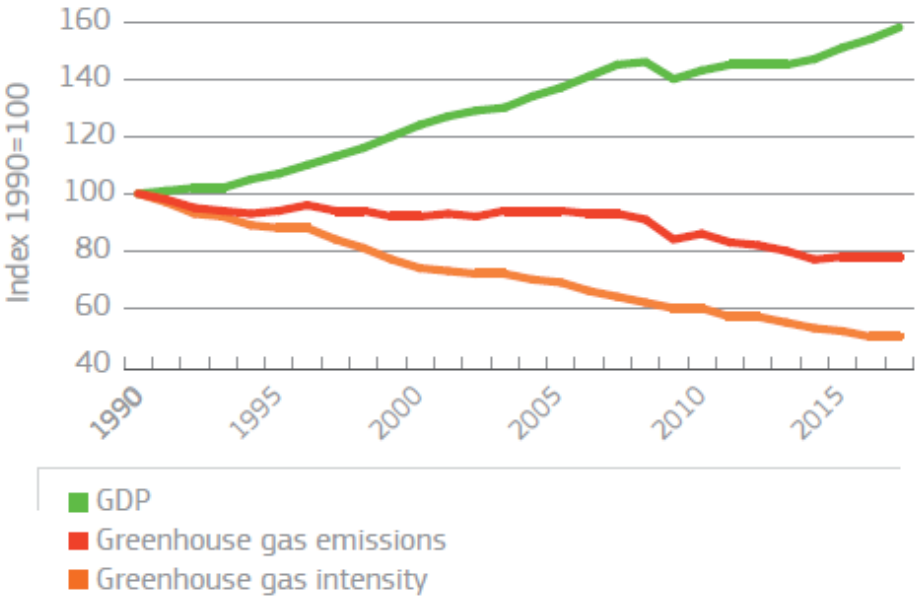
Circular Economy as a potential of sustainable development in Europe

In the EU environmental economic sectors are growing faster than the overall economy



EU demonstrates that economic growth and low-carbon transition are compatible



Source: Reflection Paper: "Towards a sustainable Europe by 2030", EC, 2019-01-30 (https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf)

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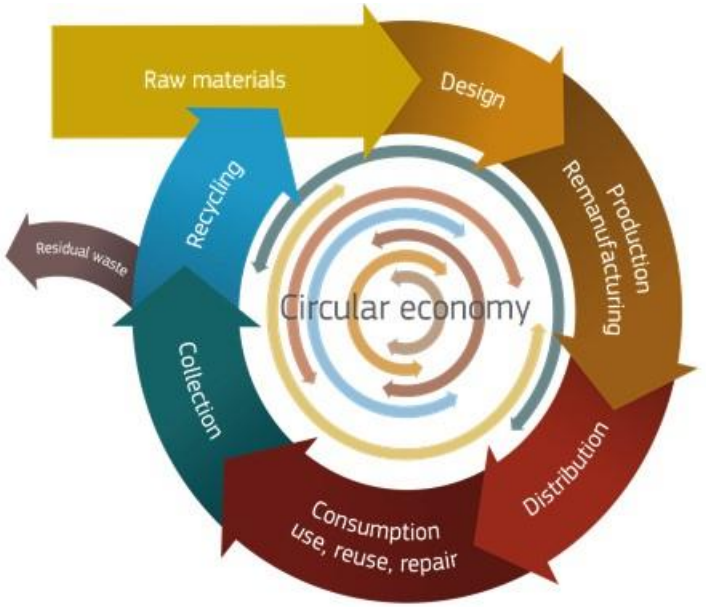
"Closing the loop": An EU action plan for the Circular Economy

This is a part of the Circular Economy package, containing also a list of measures and four legislative proposals on EU waste policy. It considers all phases of the value-chain: production, consumption, repair and regeneration, waste management and recovery of secondary raw materials.
Finally approved on **18 April 2018** by European Parliament.

- Target of recycling for MSW: **65% by 2035**.
- Different targets for packaging materials: in general, **70% by 2030**, but with sub-targets for plastic packaging.
- **Max 10% landfill disposal** by 2035.
- From **2023** the **separate collection of biowaste** will be mandatory.
- Mandatory selective collection is required also for **textiles** and for **hazardous materials in household waste** (as paints, pesticides, oils and solvents).



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"Closing the loop": An EU action plan for the Circular Economy

GLOBAL CIRCULARITY METRIC [%]

When we consider the four fundamentals above it becomes apparent that the last one, the cycling of materials is a key factor. For a metric that captures this essential dynamic we therefore suggest the circularity metric to be the share of cycled materials as part of the total material inputs into the global economy every year. Applying this definition to the numbers in the diagram results in a **GLOBAL CIRCULARITY METRIC of 9.1%** for 2015.

Cycled materials / Material inputs

=

8.4 billion tonnes / 92.8 billion tonnes

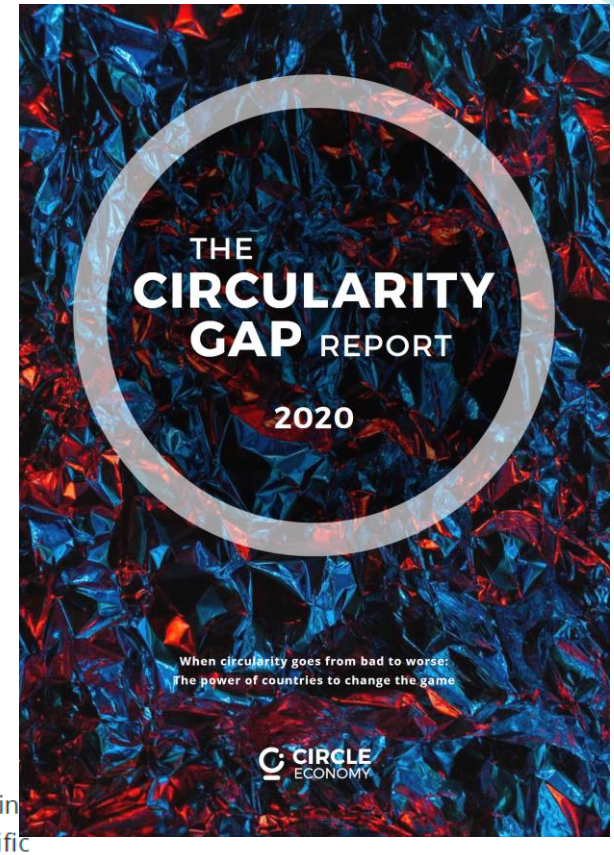
=

9.1%

GLOBAL CIRCULARITY FALLS FROM 9.1% TO 8.6%

Since the launch of the Circularity Gap Report back in 2018, we have seen a significant body of new scientific publications and data sources updated. This allows for the use of more accurate data, in some cases.

https://www.circularity-gap.world/



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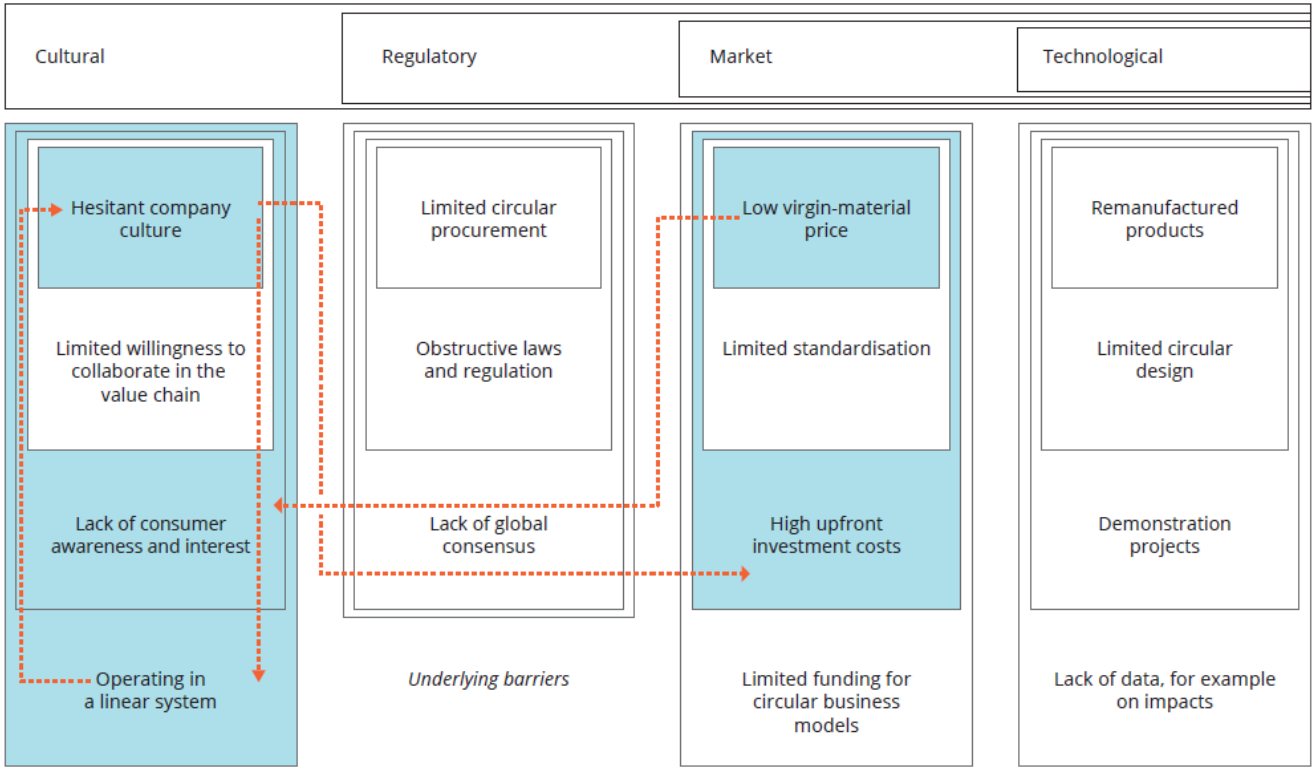
Barriers to the development of a Circular Economy

Key circular economy barriers and their interactions
https://www.eea.europa.eu/publications/circular-economy-in-europe-insights



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How the Circular Economy tackles climate change

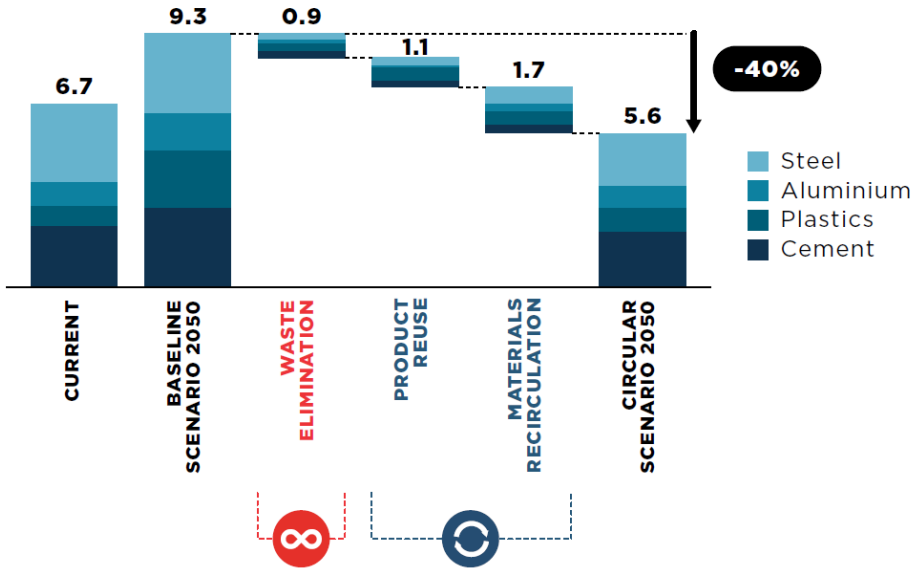
Design out waste and pollution **to reduce GHG emissions** across the value chain

Keep products and materials in use **to retain the embodied energy** in products and materials

Regenerate natural systems **to sequester carbon** in soil and products

FIGURE 4: A CIRCULAR ECONOMY COULD REDUCE ANNUAL GLOBAL CO_2 EMISSIONS FROM KEY INDUSTRY MATERIALS BY 40% OR 3.7 BILLION TONNES IN 2050

Global CO_2 emissions from four key materials production
Billion tonnes of CO_2 per year



Ellen MacArthur Foundation, Completing the Picture: How the Circular Economy Tackles Climate Change (26th September 2019)
www.ellenmacarthurfoundation.org/publications

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Conclusions

- The present model of production and consumption, based on a linear economy, is unsustainable, in many respects.
- The implementation of a circular economy makes it possible to optimise energy and material sources, leading Europe to a lower dependence on other Countries and a general limitation of climate changing gas emissions.
- Not only technical and economical barriers are present, but also some cultural resistance and often laws that are not suited to the new requirements.
- An efficient application of the principle of circular economy would be based not only on higher recycling rates (discouraging disposal and promoting technical innovations and more treatment plants), but also on different actions focused on waste prevention, eco-design, energy efficiency, water savings, carbon capture and utilisation.

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Workshop

The LOOP-Ports project: how a network of ports can contribute to circular economy transition

Ports green development

Policies for eco-sustainable development

Dr Francesco Matteucci -
European Innovation Council
(EIC)

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Workshop

The LOOP-Ports project: how a network of ports can contribute to circular economy transition

Q&A
SESSION

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NEXT STEPS IN THE PROJECT

Open for registration. Link: https://www.loop-ports.eu/2020/09/loop-ports-final-conference

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