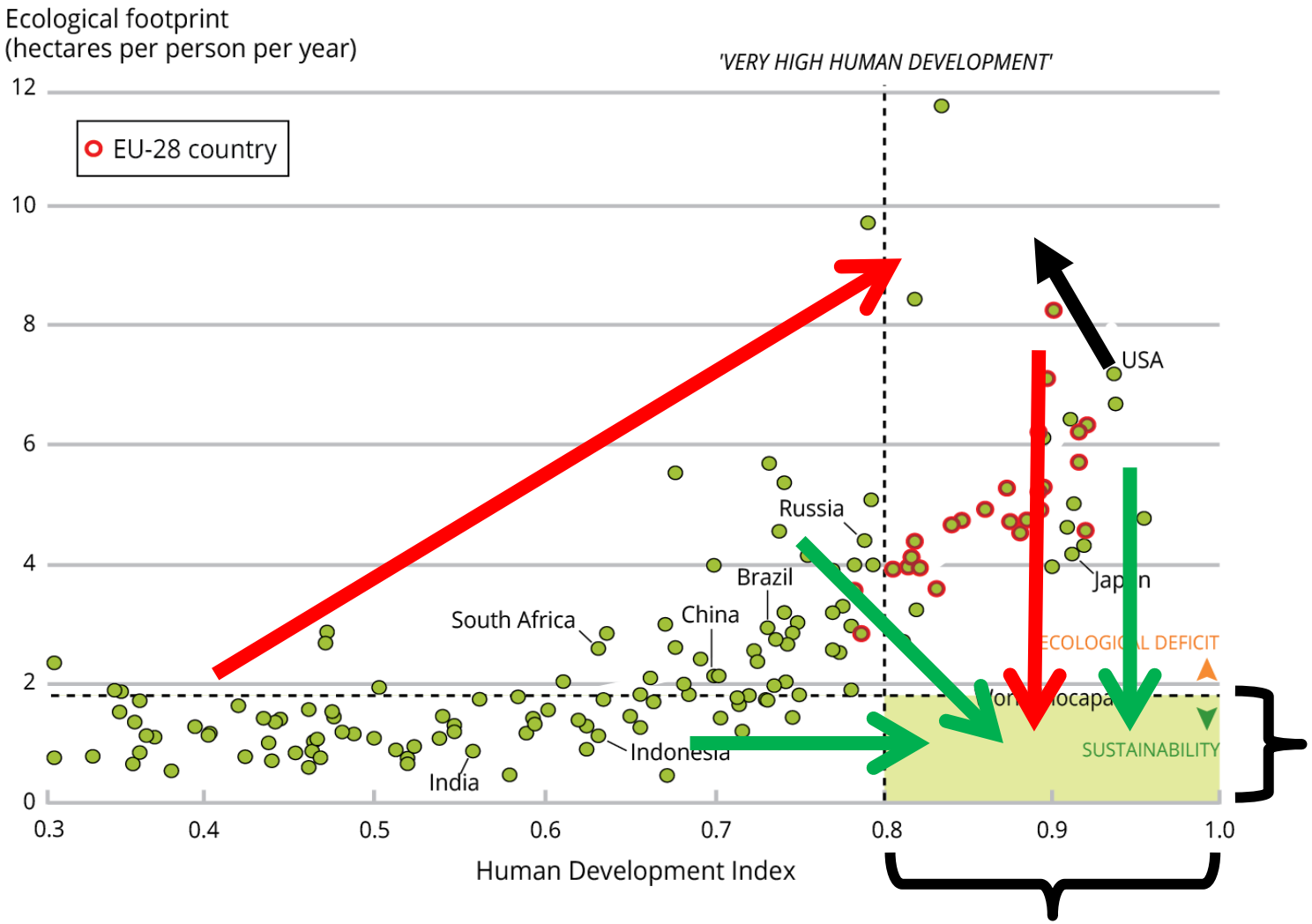
Circular economy – Developing the knowledge base

Mieke De Schoenmakere, Milan, 10 May 2019

The challenge of the 21st century



(Global Footprint Network, 2012; UNDP, 2014)

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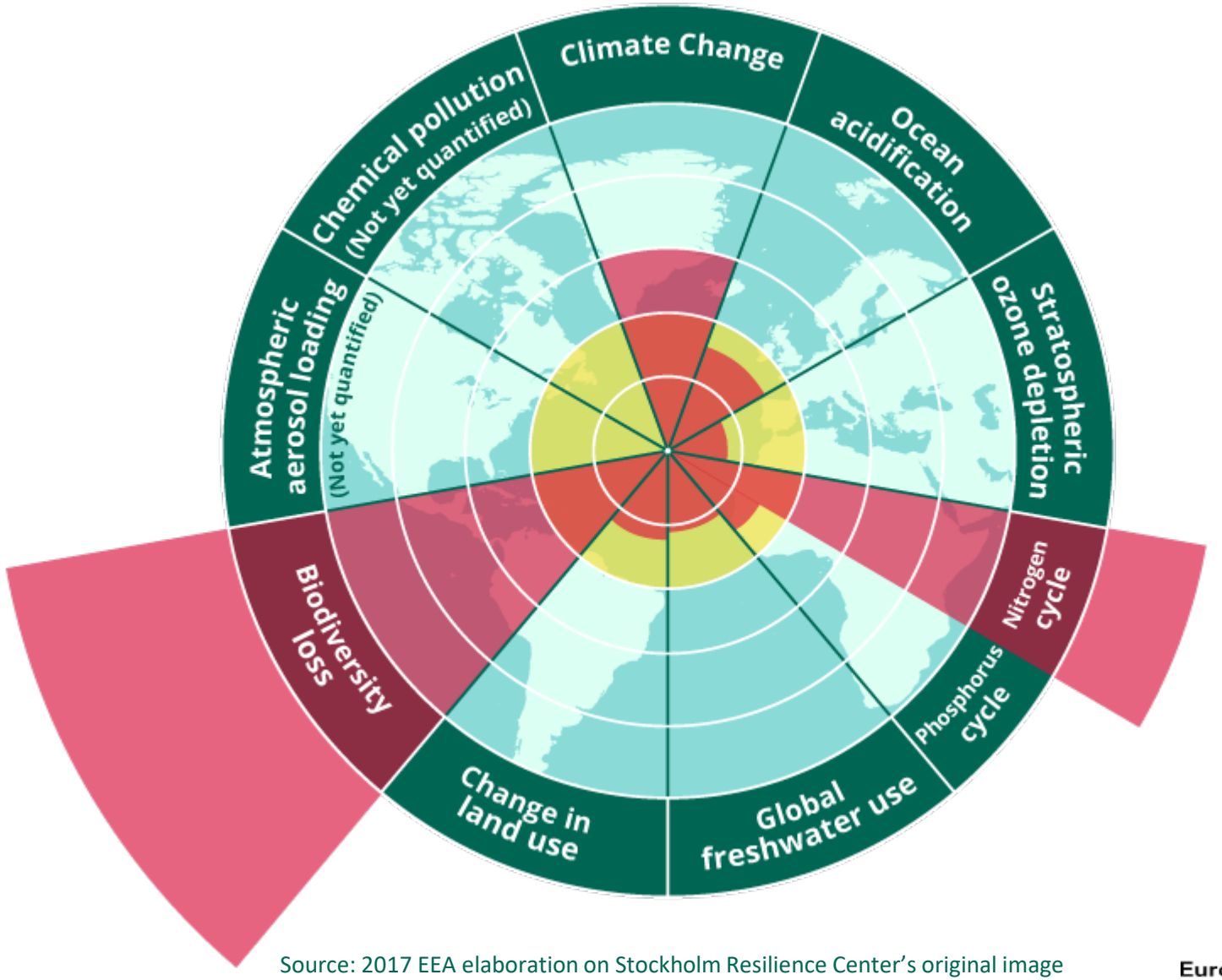
Planetary boundaries



Source: 2017 EEA elaboration on Stockholm Resilience Center's original image

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Vision of the 7th Environment Action Programme

‘**In 2050, we live well, within the planet's ecological limits.**

Our prosperity and healthy environment stem from an innovative, **circular economy** where nothing is wasted and where natural resources are managed sustainably, and **biodiversity is protected**, valued and restored in ways that enhance our society's resilience.

Our **low-carbon growth** has long been decoupled from resource use, setting the pace for a global safe and sustainable society.’

Source: 7th Environment Action Programme, European Commission, 2013

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Closing the loop

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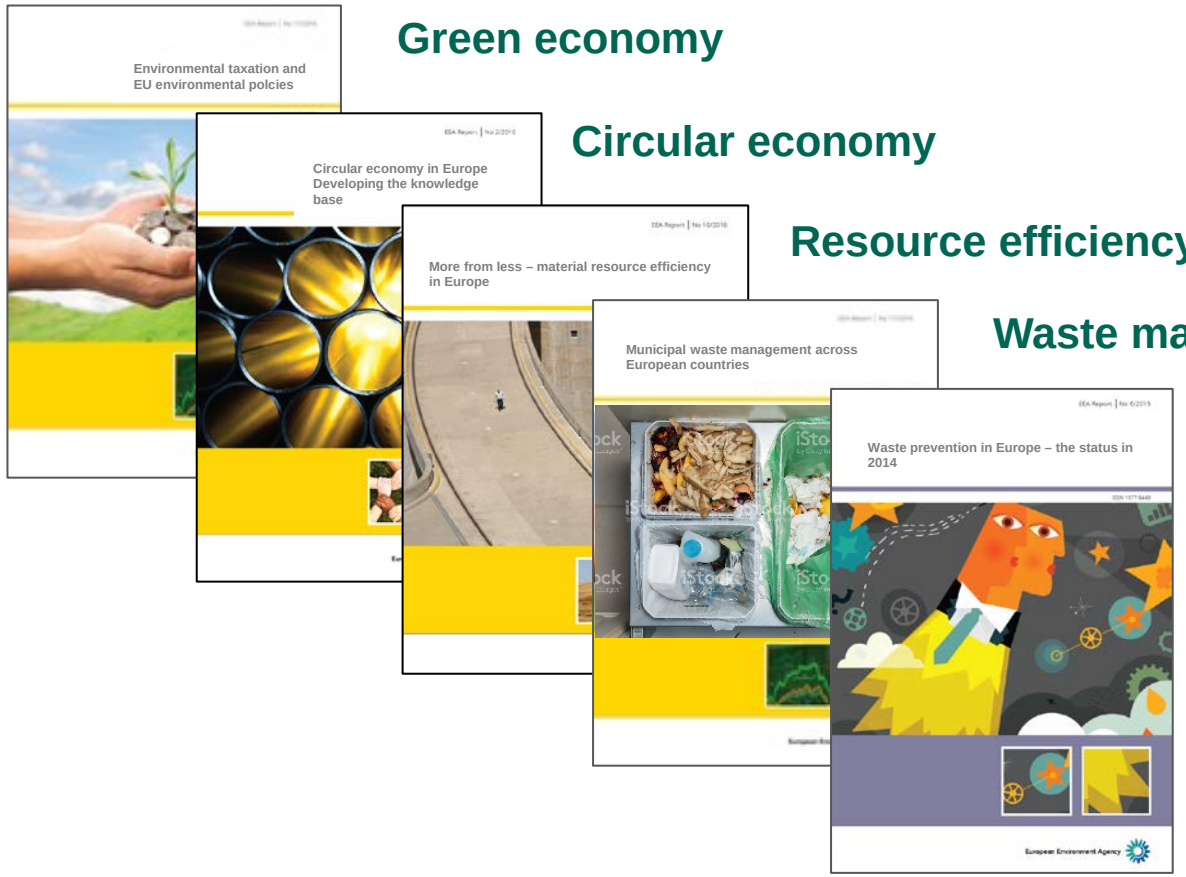
EEA reporting series



Green economy

Circular economy

Resource efficiency

Waste management

Waste prevention

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Circular economy - Developing the knowledge base

Published on **18 January 2016**

First of an **annual report series**

Conceptual **framing**, contribution to developing **knowledge base**
and **monitoring** framework,
in-depth **analysis** of aspects

Policy support (CE package)

Support to **stakeholder interaction**
(EIONET and beyond)

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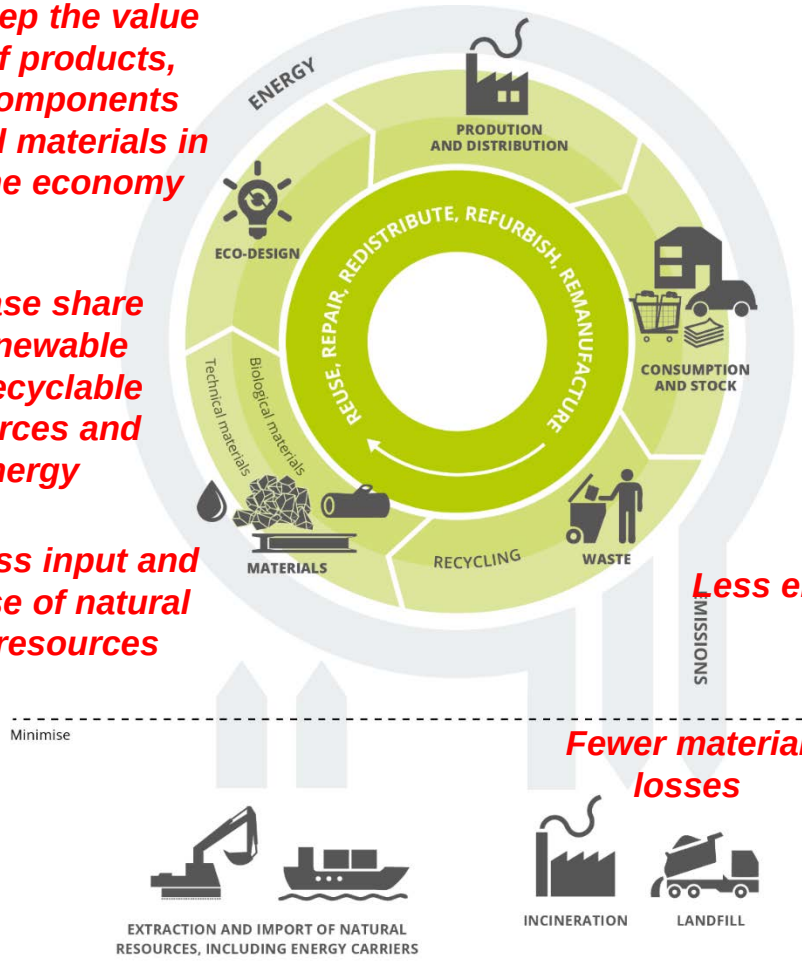
What is the circular economy?

Keep the value of products, components and materials in the economy

Increase share of renewable and recyclable resources and energy

Less input and use of natural resources



Less emissions

Fewer material losses

11.5 tonnes of materials extracted in 2014

3.0 tonnes of material per person imported in 2014

0.3 tonnes of waste per person incinerated in 2012

2.2 tonnes of waste per person sent to landfill in 2012

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Material input – possible indicators

Policy questions	Possible indicators	Data availability
Are Europe's primary material inputs decreasing?	DMC or RMC	++
Are material losses in Europe decreasing?	Proportion of material losses in key material cycles	+
	Diversion of waste from landfill	++
Is the share of recycled materials in material input increasing?	Share of secondary raw materials in material consumption	+
Are the materials used in Europe sustainably sourced?	Share of sustainability-certified materials in material use (by key materials)	+

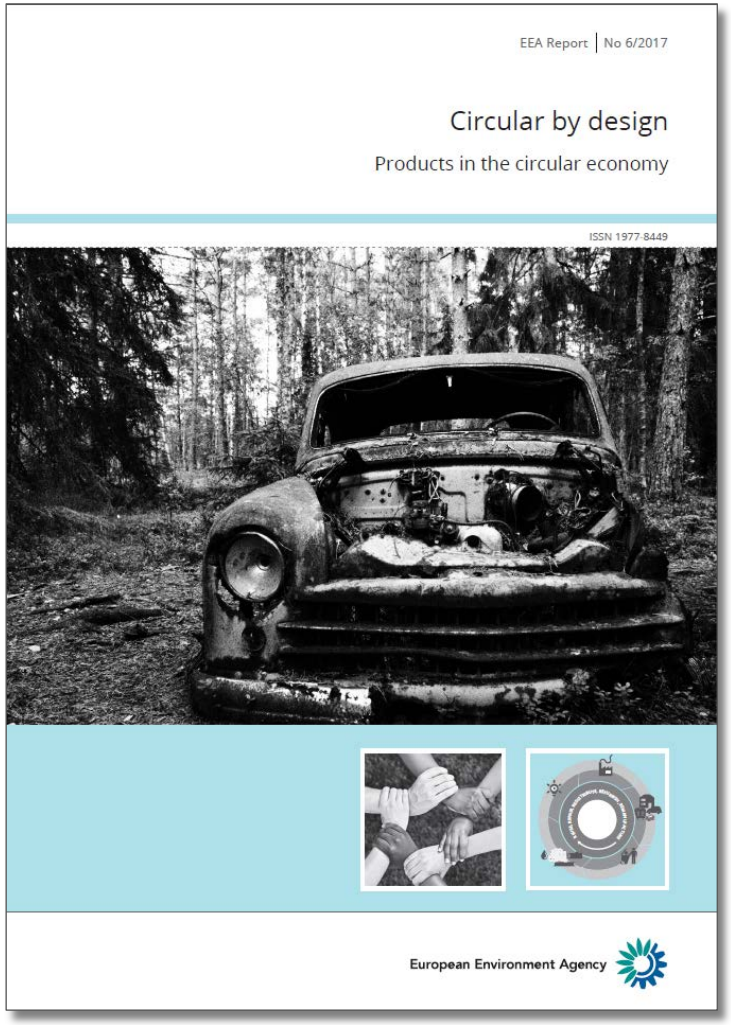
Note: ++, data readily available and/or indicator exists; +, limited data available that could be used to develop the indicator or experimental indicator; –, no data currently available to create the indicator.

Ecodesign – possible indicators

Policy questions	Possible indicators	Data availability
Are products designed to last longer?	Durability or lifetime compared with an industry average for a similar product	
Are products designed for disassembly?	Time and number of necessary tools for disassembly	
Are recycled materials included in product design?	Proportion of recycled material in new products	
Are materials designed to be recycled, avoiding pollution from recycling loops?	Share of materials where safe recycling options exist	

Note: ++, data readily available and/or indicator exists; +, limited data available that could be used to develop the indicator or experimental indicator; –, no data currently available to create the indicator.

Circular by design - Products in the circular economy



product trends
increasingly complex products
modular design
collaborative consumption
product services
home delivery systems
product lifespan
3D printing / additive manufacturing
markets for recycling
internet of things

Probably negative
Probably positive
Unclear

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increasingly complex products

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increasingly complex products

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modular design
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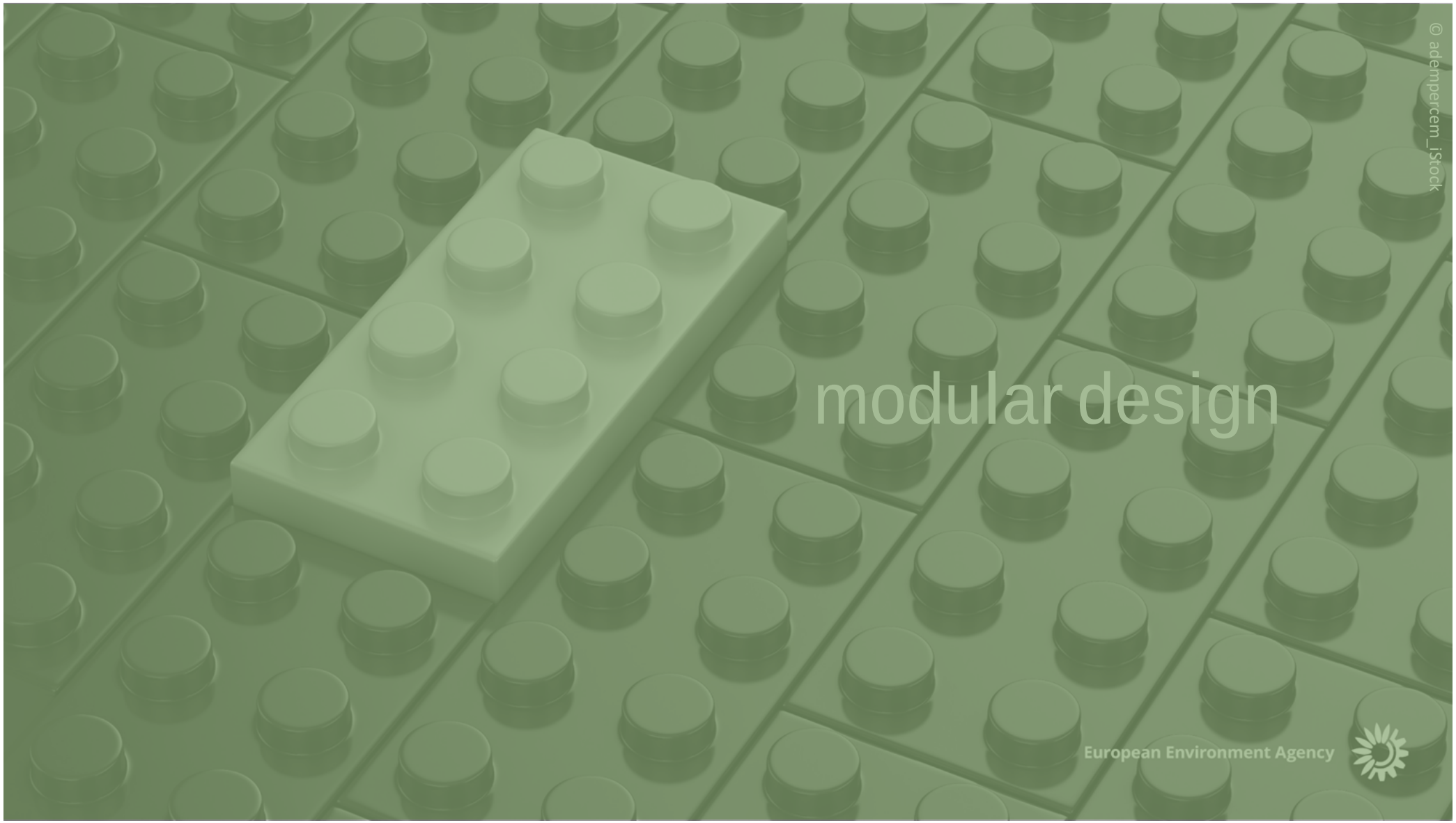
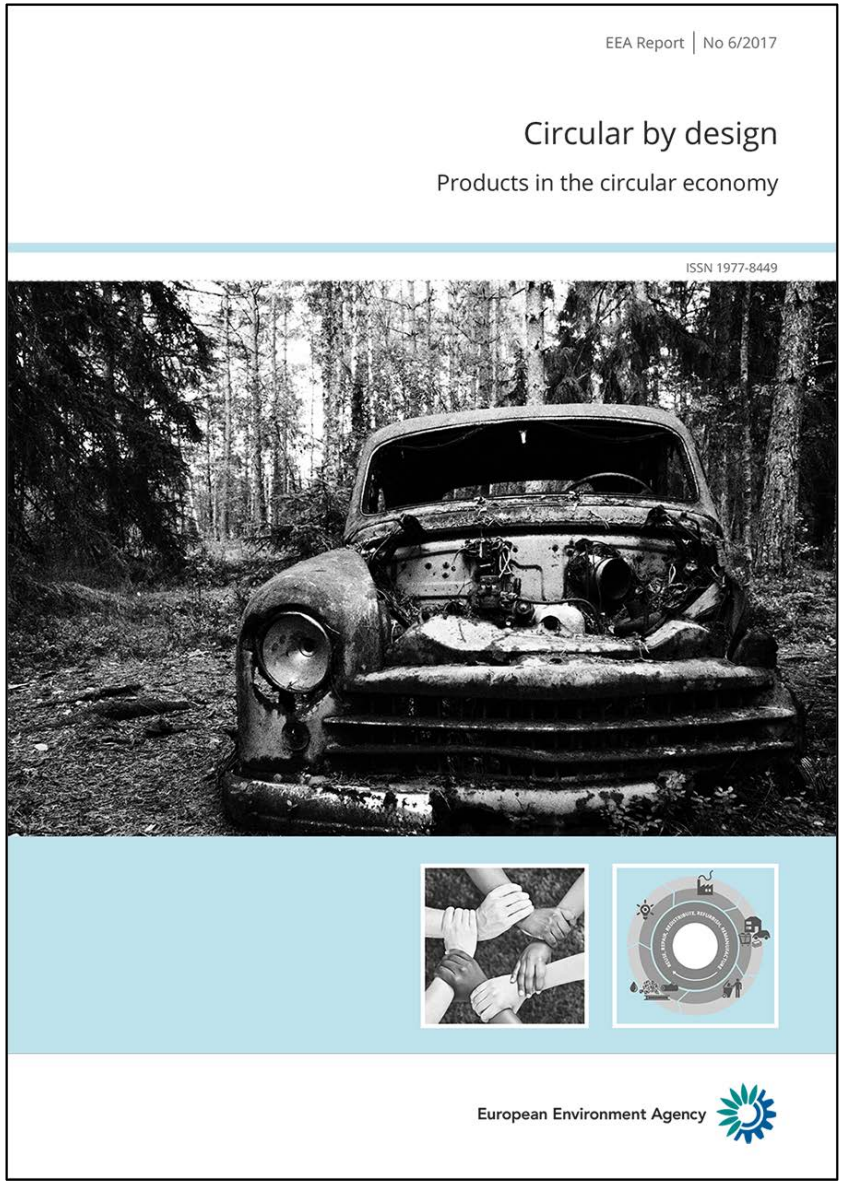


How to have chemicals and products which are ‘safe by design’?



Rethink how products are made:

- **Why**: Focus on the function needed.
- **How** to deliver function – via product?
- **What** materials to use.
- **Which** chemicals to use.

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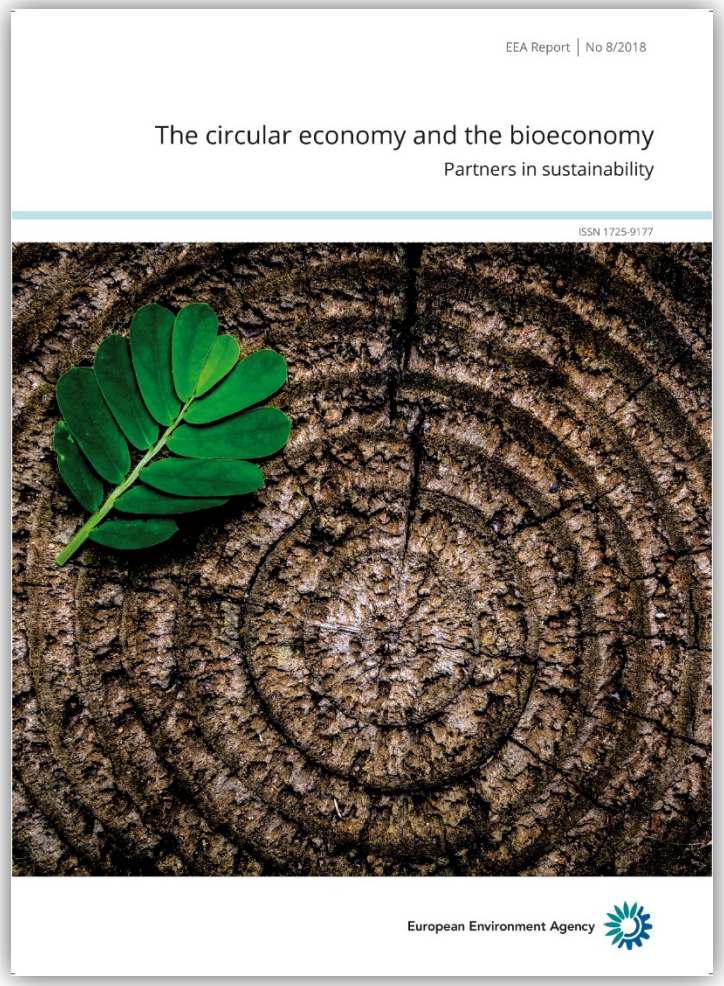
Governance

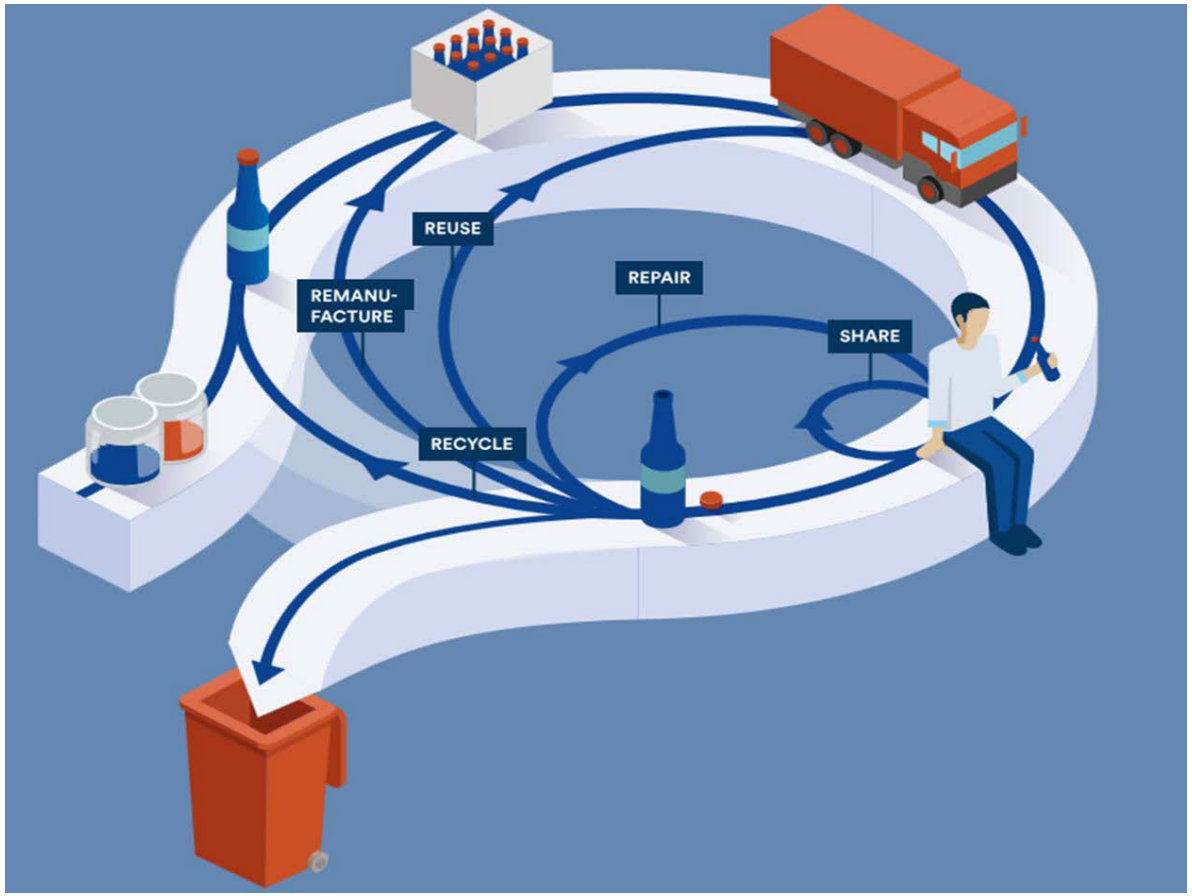
- Governance can support changes in producer behaviour and consumer behaviour.
- The policy focus needs to be widened because of the systemic nature of the transition to a circular economy.
- Should encompass more than waste management.
- Policy instruments need to be aligned to avoid negative side-effects and lock-in situations.

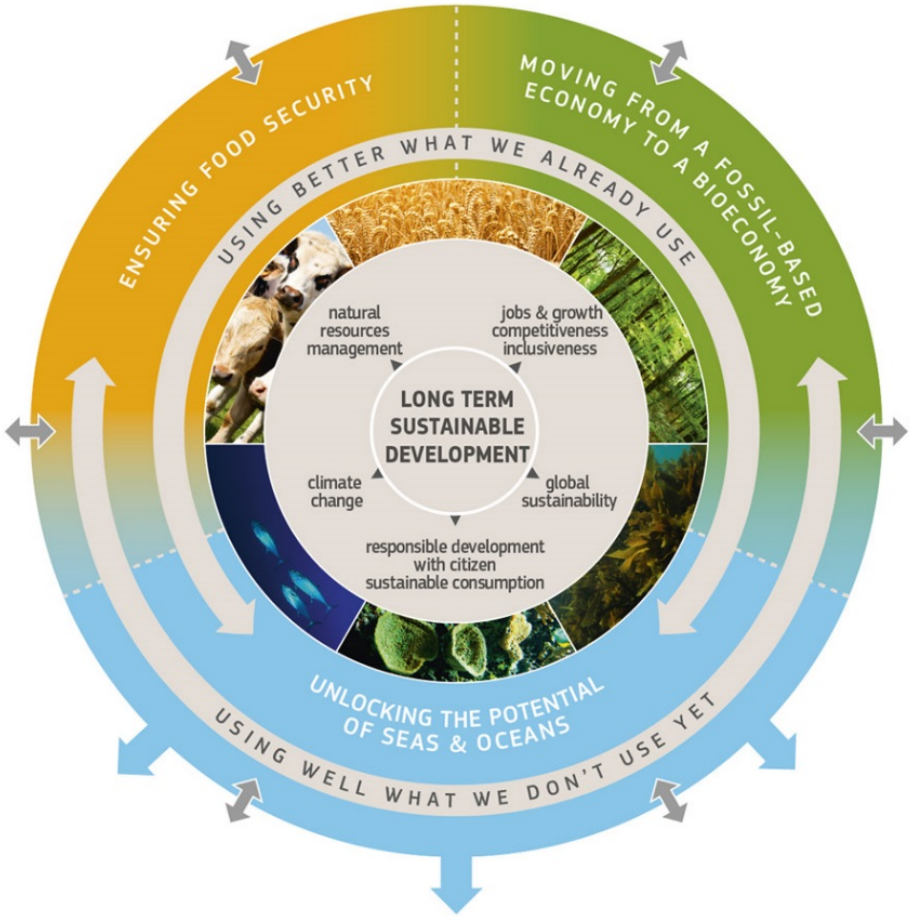
Partners in sustainability



- ✓ Synergies and trade-offs between circular economy and bioeconomy
- ✓ The sustainable use of renewable natural resources
- ✓ Circularity aspects of biobased products

Two complementary policy strategies





Source: Illustrations European Commission 2018 and 2012

Towards a circular bioeconomy

- **Challenging objectives**:
  - Keep the value of the products and materials - develop clean material cycles
  - From a fossil-based economy to a bioeconomy
  - Ensure food security
  - Within the limits of the planet
- Our current production and consumption patterns are not circular nor sustainable.
- The bioeconomy is not circular by definition.
- Potential to increase overexploitation of natural resources and depletion of natural capital.
- Processed biomaterials are not always biodegradable, and mixing them with technical materials can hamper recycling.
- Lack of systems perspective.

Supporting practices

throughout the different stages of the life-cycle:

- New material and production methods:
  - Biorefinery – producing more products from fewer resources
  - 3D printing with biomaterials
- Multipurpose crop and valorising residues
- Biowaste treatment:
  - Composting and anaerobic digestion
  - Reducing and valorising food waste
- Product and material lifespans:
  - Extending the lifetime of bio-based products
  - Cascading the use of biomass

The circular bioeconomy – a systems perspective

Balancing **sustainability** goals

Upscaling and **anticipating side effects**

Combining **technical** and **social innovation**

System-design principles

System design principles

- Prioritise innovation that **diminishes materials use** and keeps **products and materials in circulation**.
- Use **bio-based non-biodegradable materials** where their use provides a benefit over fossil alternatives, and where they can be **effectively recycled** and the end of their life.
- Use **bio-based biodegradable materials** where the risk of dispersion into the ecosystem is high, such as lubricants, materials subject to wear and tear and disposable products.
- Embed technological innovation in **wider system innovation** that also tackles consumer behavior, product use and waste management.
- Integrate these principles into **research and innovation**.

Thank you

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