The circular economy and the bioeconomy

Partners in sustainability

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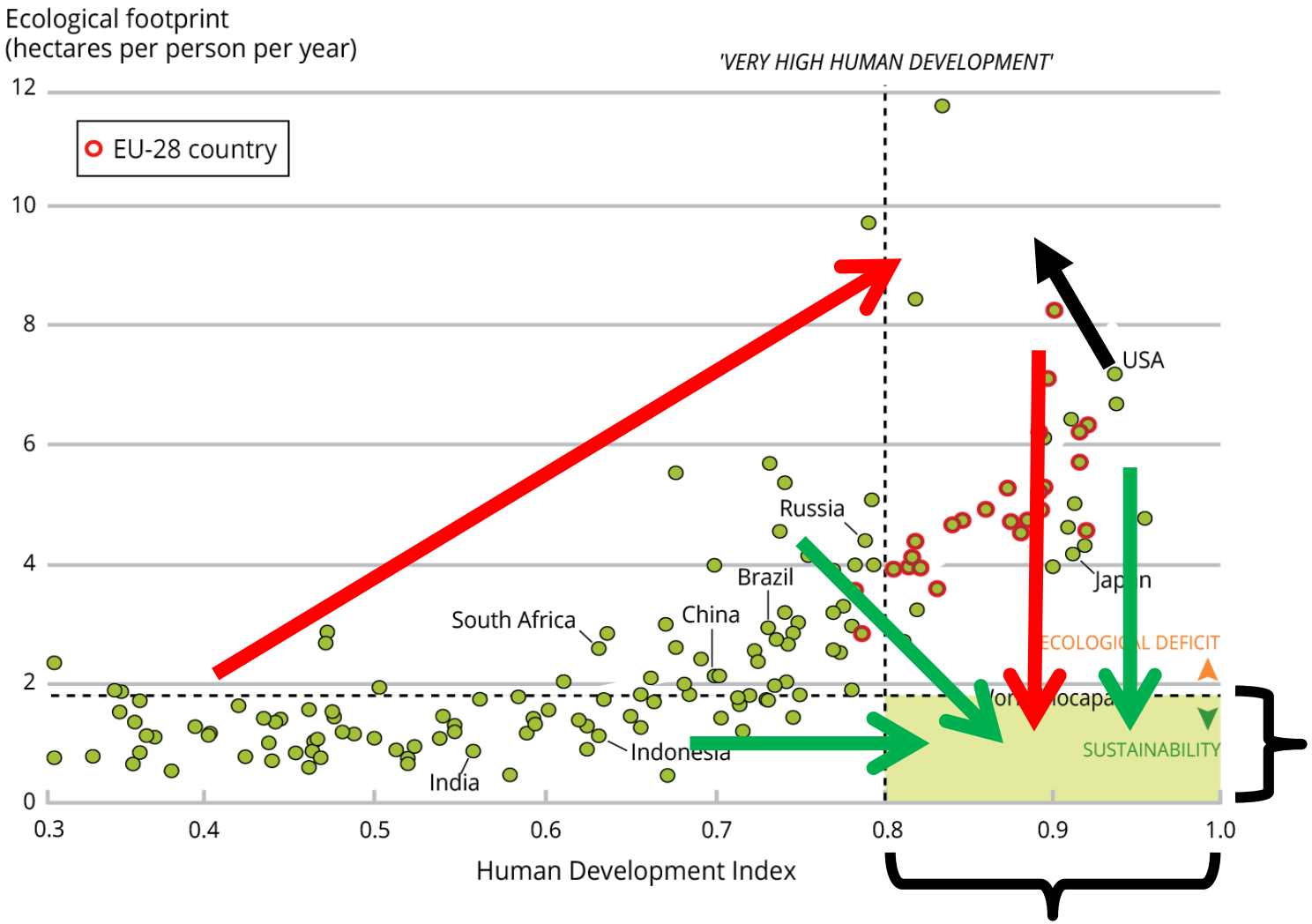
Nordic-Baltic Energy and Climate Challenge- Mobility and Circularity, Riga
Mieke De Schoenmakere, 18 October 2018

European Environment Agency

The challenge of the 21st century



(Global Footprint Network, 2012; UNDP, 2014)

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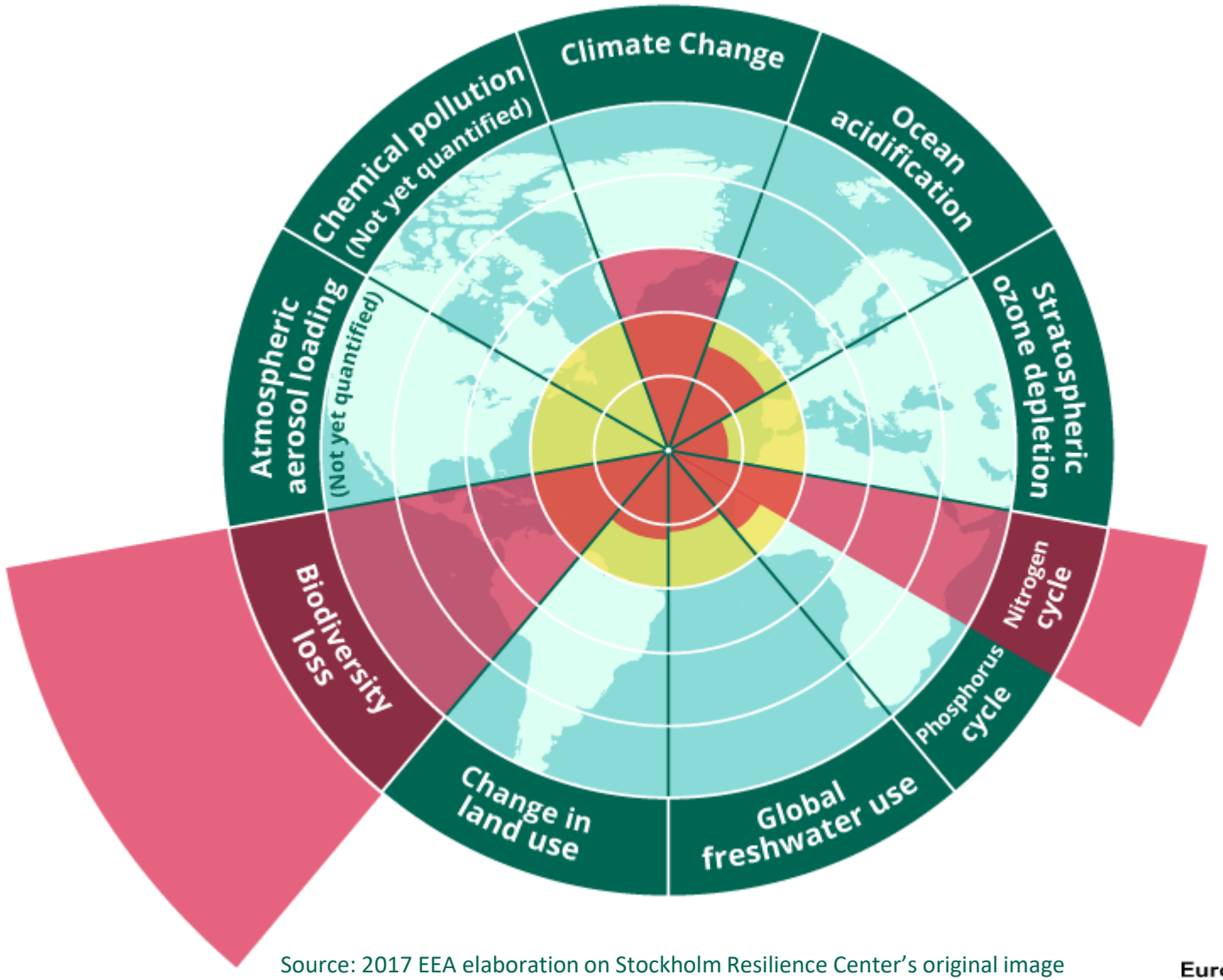
Planetary boundaries



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.**

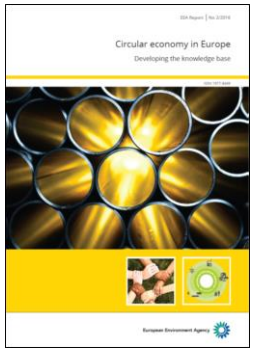
Our prosperity and healthy environment stem from an innovative, **circular economy** where nothing is wasted and where natural resources are managed sustainably, and **biodiversity is protected**, valued and restored in ways that enhance our society's resilience.

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

Closing the loop

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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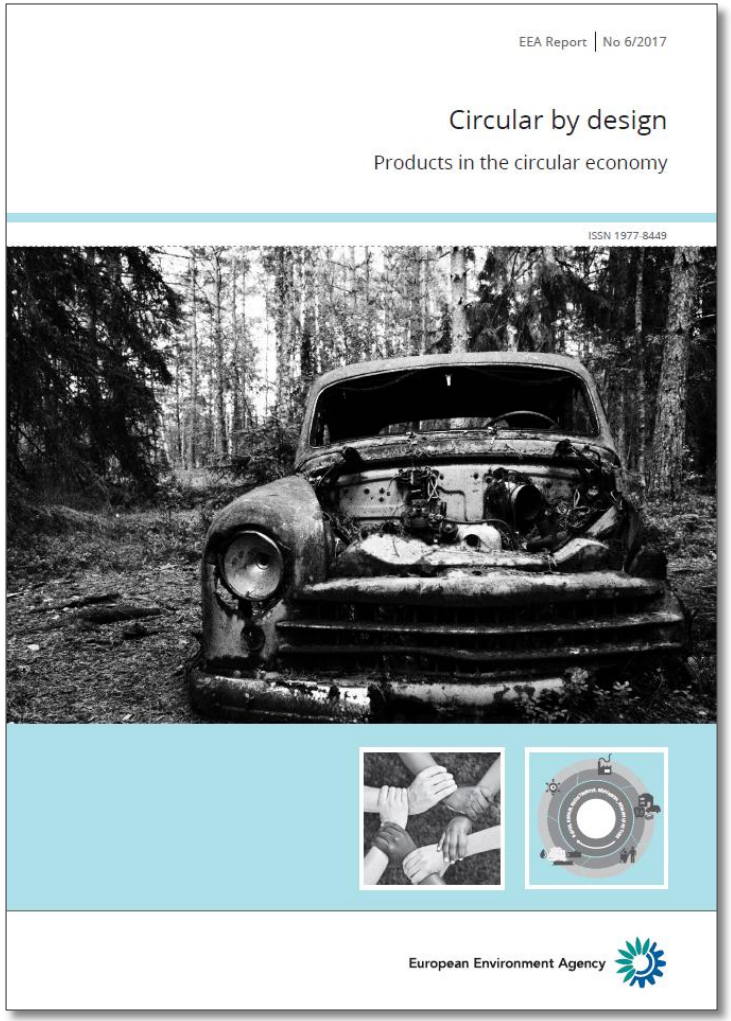
Circular by design - Products in the circular economy



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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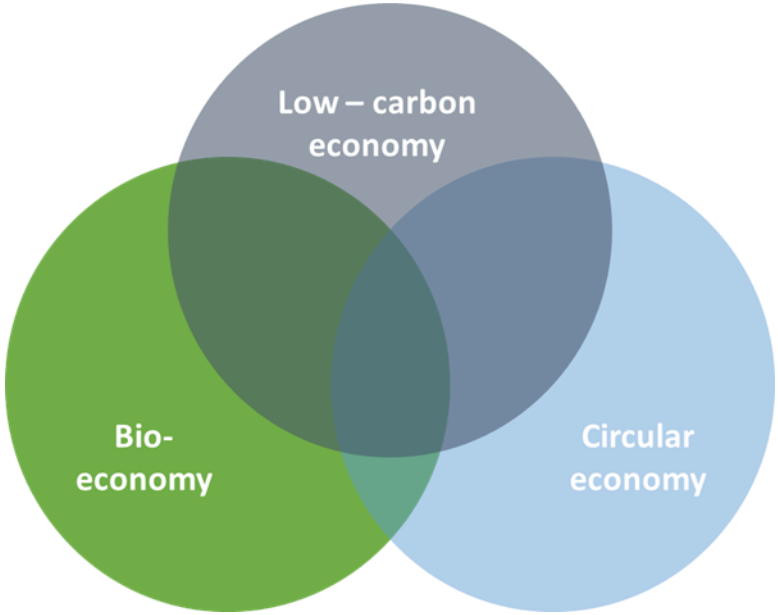
Opportunity for integration and synergies

Energy flows	Energy efficiency, share of renewables
Material flows	Reduced material demand Biological vs technical materials Bioeconomy impact
Natural capital	Effects of land use, limits to potential of bio-material / bio-energy



The establishment of a circular economy can **support** the transition to a decarbonisation of Europe by 2050 and allows to bridge the gap between national climate mitigation measures on paper and climate action by citizens and companies.

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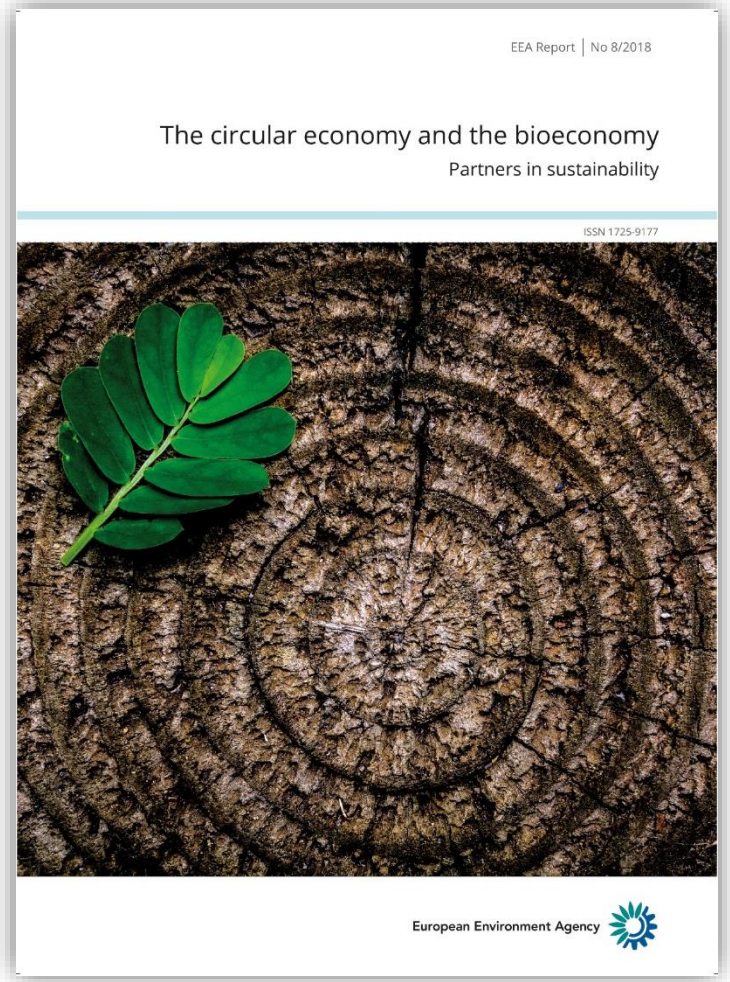

- ✓ Synergies and trade-offs between circular economy and bioeconomy
- ✓ The sustainable use of renewable natural resources
- ✓ Circularity aspects of biobased products

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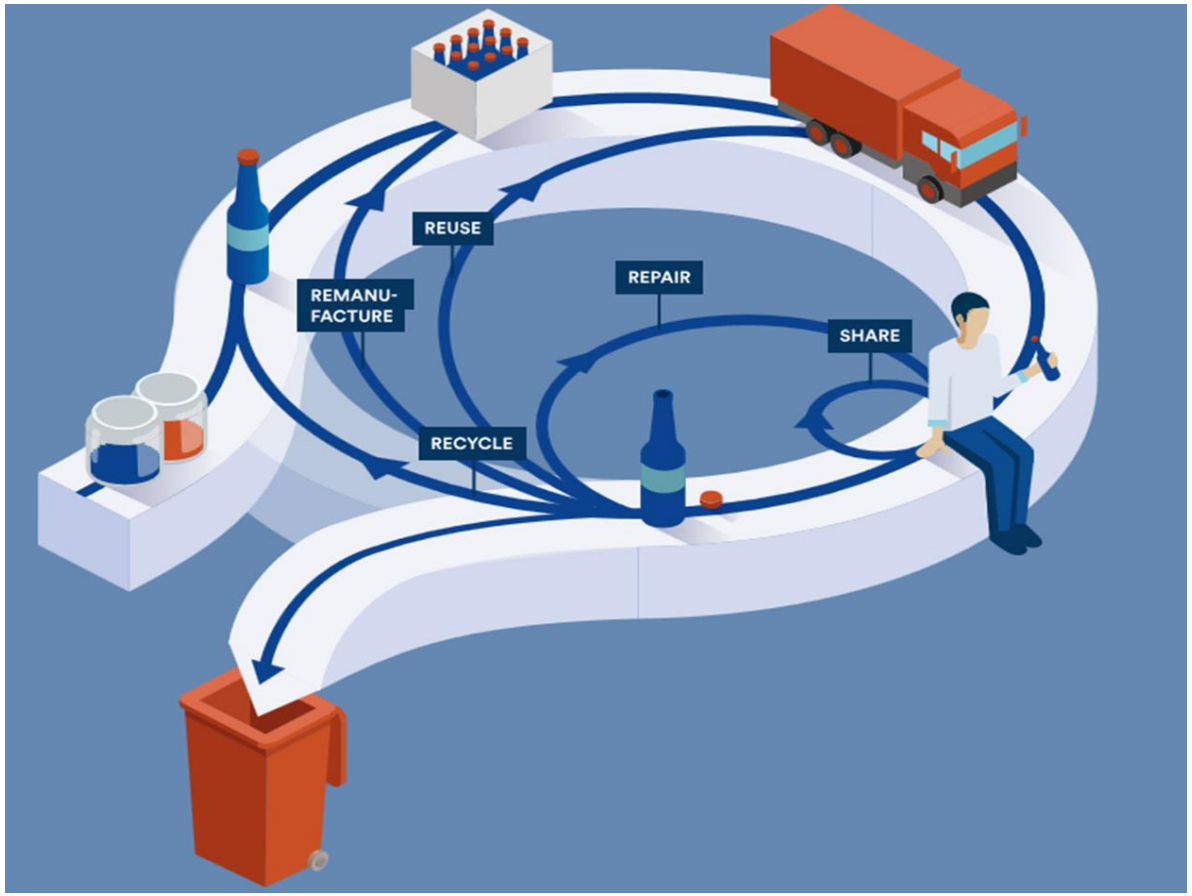
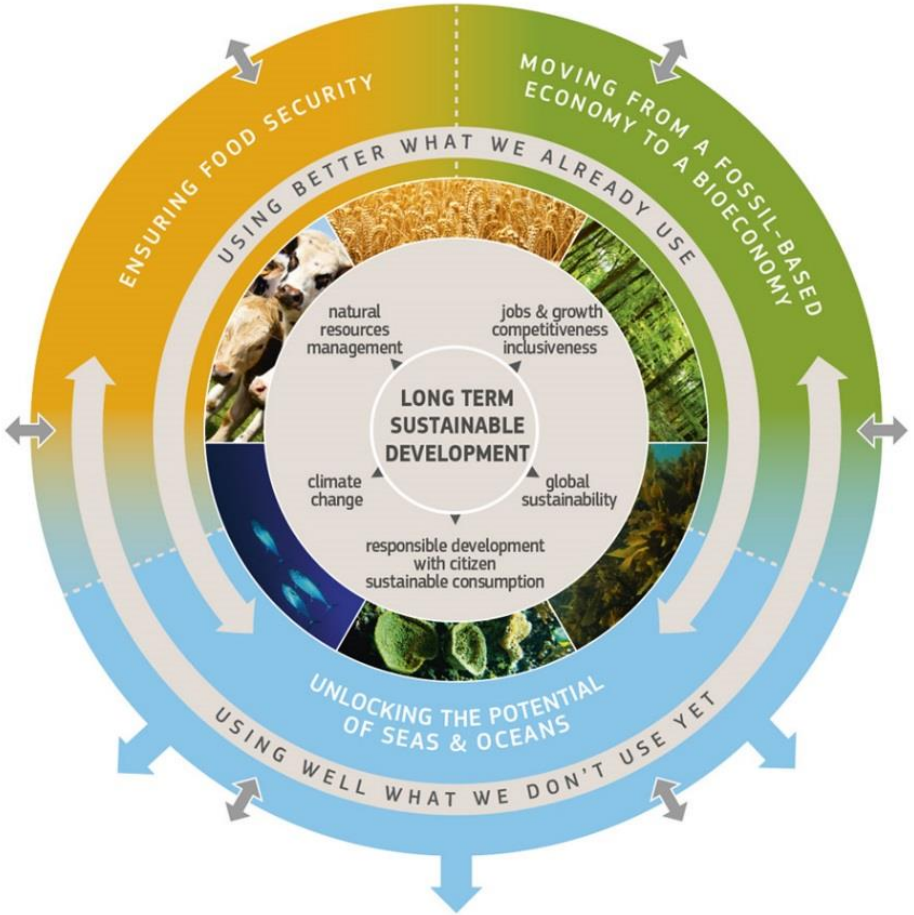
Two complementary policy strategies





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

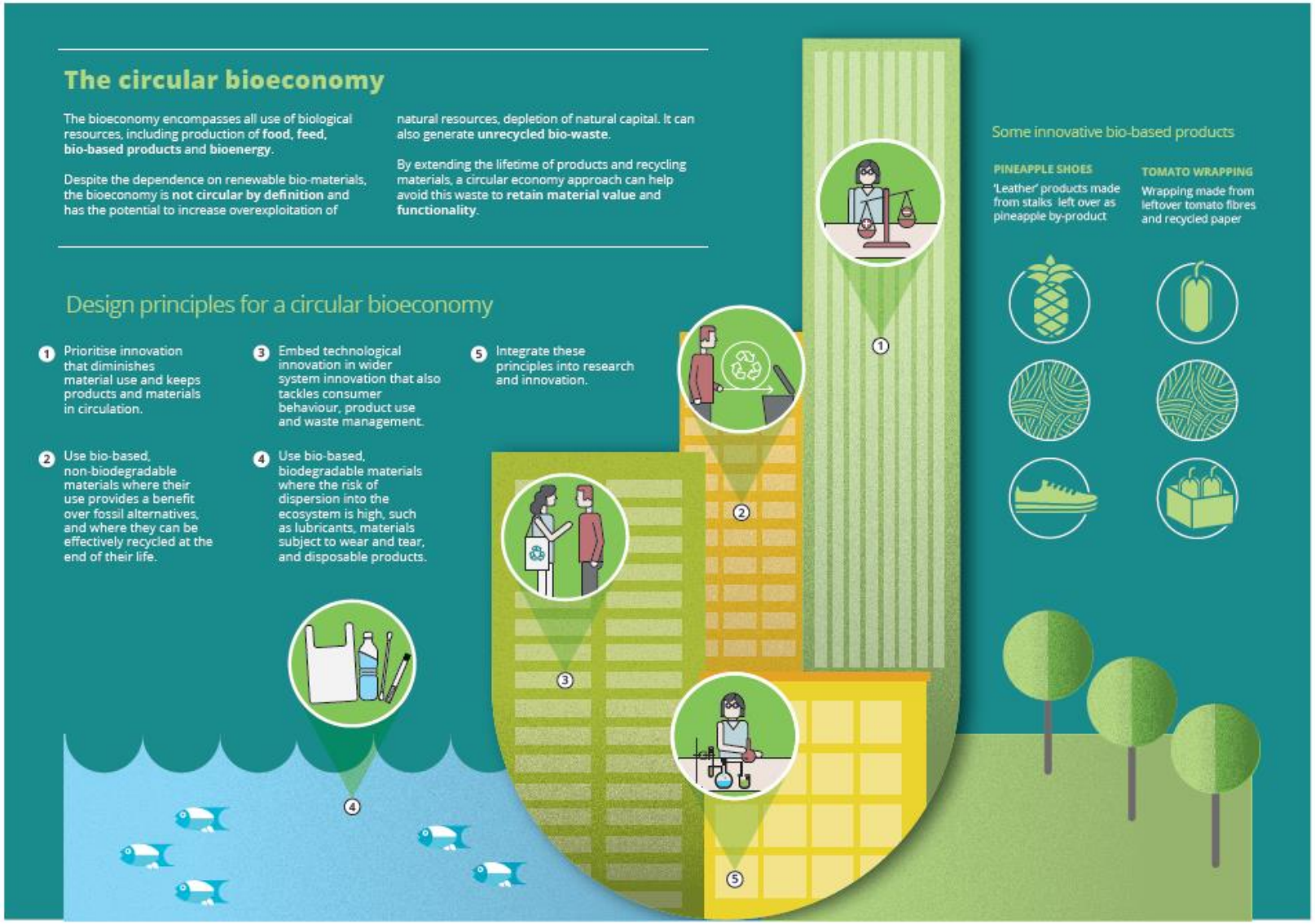
Balancing **sustainability** goals

Upscaling and **anticipating side effects**

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

System-design principles

System design principles



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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**.

The bottom line

A key challenge....

... to keep the right balance, produce and use products within the limits of planet.

And a lot of unknowns...

... to develop the right solutions for a huge variety of applications.

But a major opportunity...

... to apply a more integrated and systemic perspective to optimise the use of biomaterials and to create a sustainable circular bioeconomy

Thank you

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