Imperial Network of Excellence in Sustainability through Life Cycle Approaches

'Imperial Life Cycle Network'

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🌐 www.imperial.ac.uk/life-cycle-network

🐦 @ICL_LifeCycle

in Group: 'Life Cycle Community UK'

Imperial College London

Seminar Series

13th October 2020, 17.30-18.30 (GMT)
Dr. Carly Whittaker (UK Department for Transport)
'Life Cycle Assessment, counterfactuals and policy making'

10th November 2020, 17.30-18.30 (GMT)
Dr. Serenella Sala (European Commission, Joint Research Centre)
'Life Cycle Assessment in EU policies: past, present and future'

8th December 2020, 17.30-18.30 (GMT)
Dr. Llorenç Milà I Canals (UN Environment Programme, Life Cycle Initiative)
'UNEP Life Cycle Initiative's work to support progress towards the SDGs with life cycle approaches'

➔ **To register please visit: www.imperial.ac.uk/life-cycle-network/events/**

SUSTAINABILITY
THROUGH LIFE CYCLE APPROACHES

Life cycle assessment in EU policies
past, present and future

Serenella Sala

European Commission – Joint Research Centre

10th November 2020,
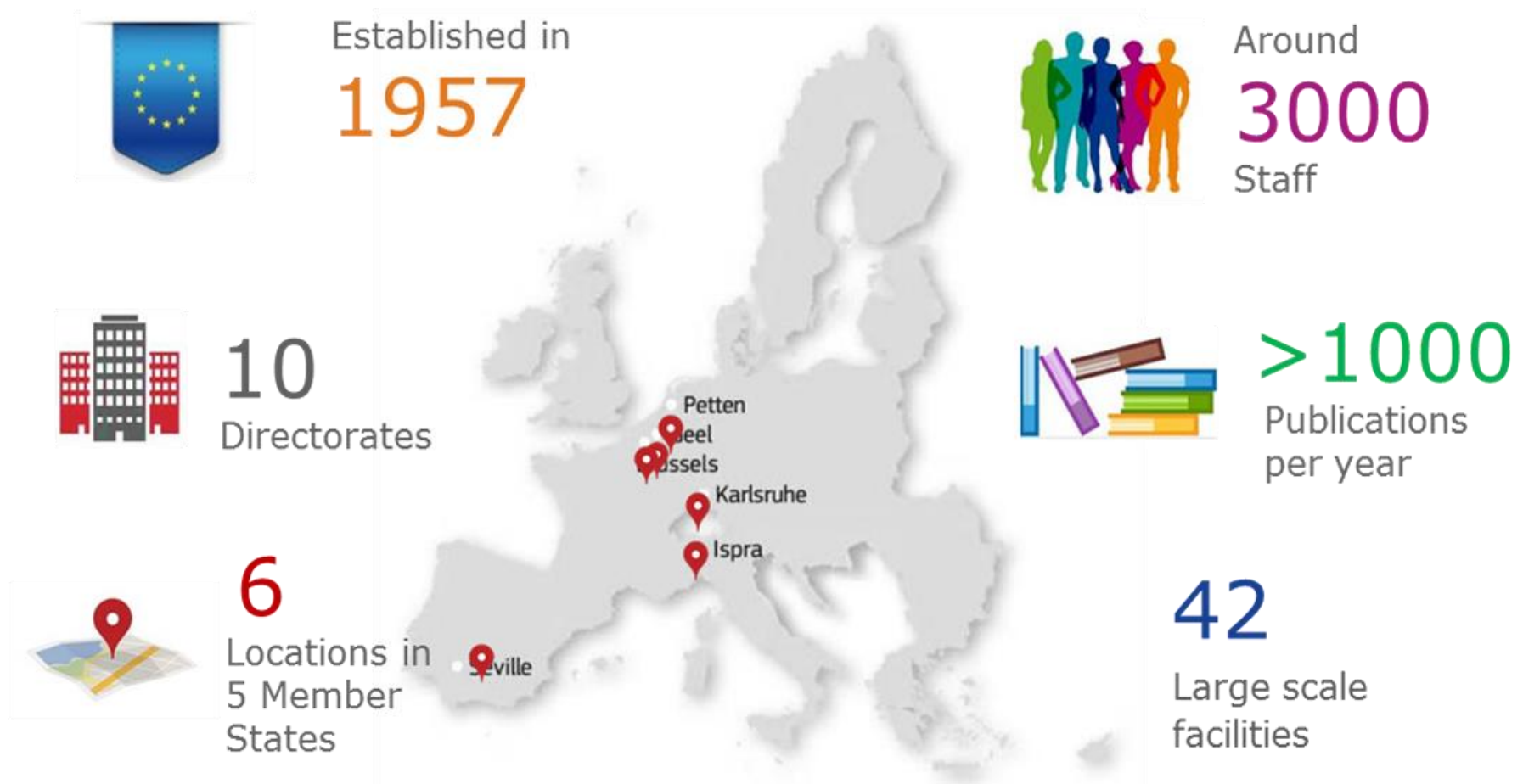
Imperial College London, virtual seminar

Joint Research Centre – European Commission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.

As a Commission service independent from national or corporate interests, the JRC builds trust by providing evidence to support the definition of policies - from their design to implementation, monitoring and evaluation.

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Joint Research Centre – European Commission


Established in **1957**

Around **3000** Staff

10 Directorates

>1000 Publications per year

6 Locations in 5 Member States

42 Large scale facilities

Petten
Geel
Brussels
Karlsruhe
Ispra
Seville

European Commission

EC-JRC
Scientific knowledge for policy support

The Joint Research Centre (JRC) is the European Commission's science and knowledge service which employs scientists to carry out research in order to provide independent scientific advice and support to EU policy.

DATA **MODELING** **MAPPING** **KNOWLEDGE** **POLICY SUPPORT**

https://ec.europa.eu/jrc/

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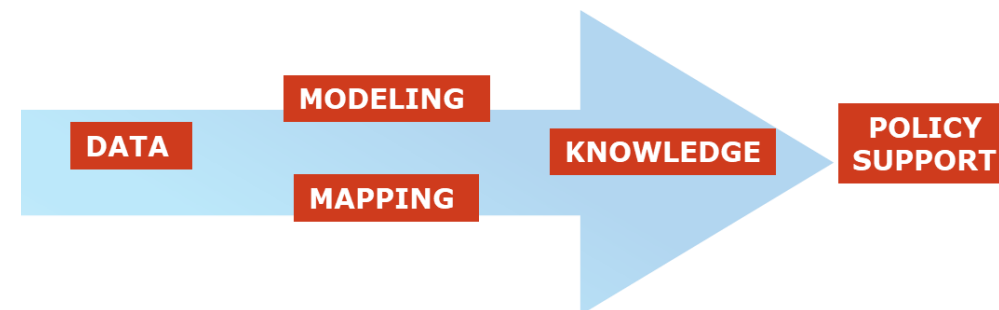
Sustainable Resources Directorate - Policy Context

Contents

- Key role of life cycle thinking in support to policies

- Evolution of the role of LCA in policies, an EU perspective

- Green Deal: zooming into its key components

JRC TECHNICAL REPORTS

Life cycle assessment for the impact assessment of policies

Life thinking and assessment in the European policies and for evaluating policy options

Sala, S., Reale, F., Cristobal-Garcia J., Marelli, L., Pant R.
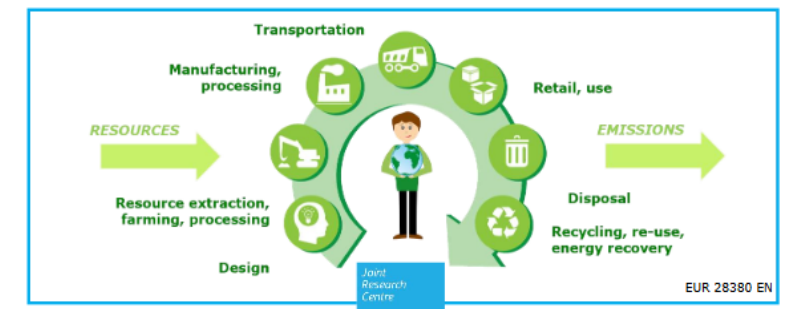
2016

EUR 28380 EN

European Platform on LCA
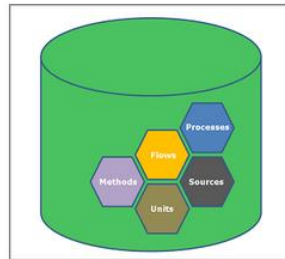
Supporting EU policies and developing methods and approaches to improve robustness and wide applicability of LCA

https://eplca.jrc.ec.europa.eu/

Life Cycle Thinking
Core concept for Sustainability Assessment of Goods, Services, Organisations and Regions
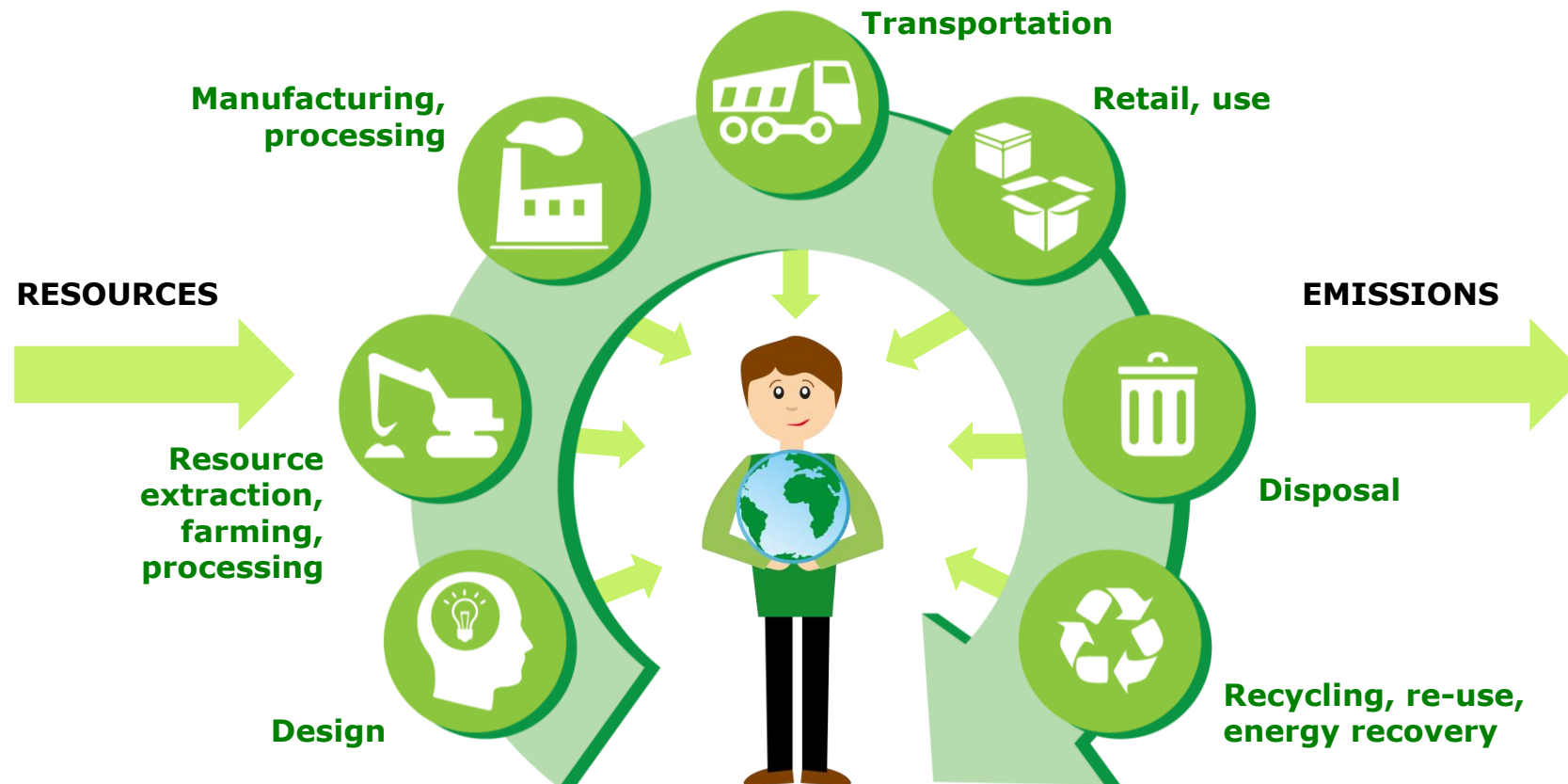
How may we manage a transition towards better production and consumption systems, within limits of our planet?

Climate crisis

Ocean adidification

Chemical pollution (not yet sufficiently quantified)

Ozone depletion

Particle pollution of the atmosphere (not yet sufficiently quantified)

Nitrogen cycle

Biodiversity loss

Phosphorus cycle

Deforestation and other land use changes

Freshwater use

Safe planetary boundary / guide rail according to the authors

Scientific observation until 2009

Illustration: Felix Müller (www.zukunft-selbermachen.de)   Licence: CC-BY-SA 4.0

- Integrated assessment
- Avoiding burden shifting along supply chains
  - Life cycle stages
  - Impact categories
  - Geographical boundaries
  - Temporally

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LCT and LCA supporting integrated assessment - 1

- Assess the performance of **good, services, systems, technologies, innovations, infrastructures, waste management options, regions**

- Help identifying the **most important burdens and the most relevant life cycle stages** contributing to environmental impacts (material extraction, manufacturing, use phase etc.)

European Commission
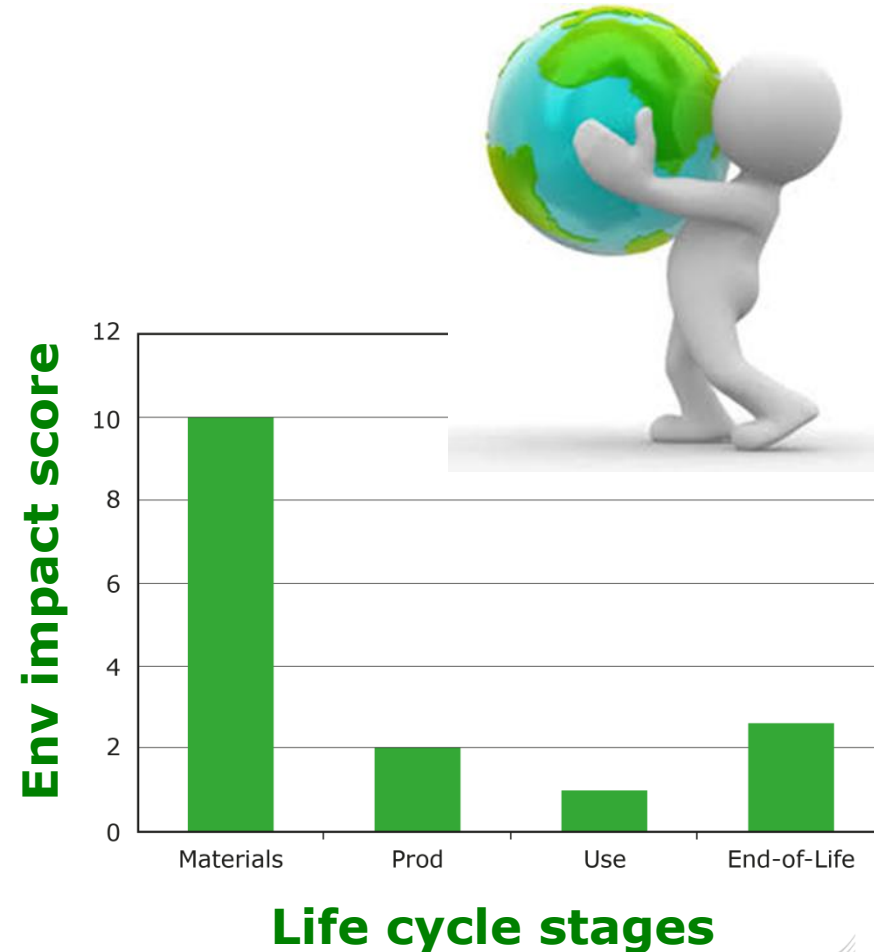
LCT and LCA supporting integrated assessment - 2

Avoiding burden shifting

- **over impact categories** (increasing impact in an impact category while reducing the impact on another) and…

- **over life cycles stages** (e.g. increasing impact in the end of life while reducing the impact in the use phase)

Reducing energy consumption

Increasing ecotoxicity and euthrophication

European Commission
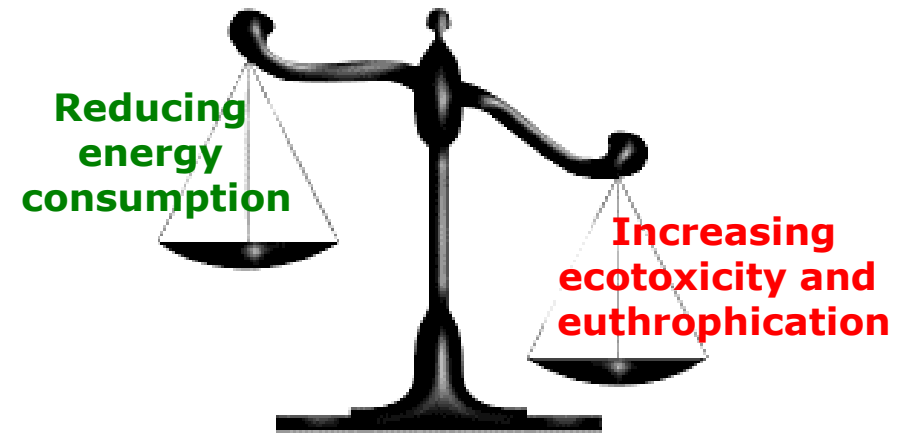
LCT and LCA supporting integrated assessment - 3

- covering the **entire supply chain**, either European and extra European

- Allowing **assessing options along the life cycle**, having policy implications. E.g. improvement of recovery/recycling of precious / critical raw materials at the end-of-life can reduce the dependence of EU on imports'

Link with international targets (and planetary boundaries)

Link with domestic/ EU targets
e.g. target of resource efficiency for water consumption. Reduction of water consumption in use phase will affect local water availability

Extraction of raw material

Manufacturing 1

Manufacturing 2

Use phase

End of life

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LCT and LCA supporting integrated assessment - 4

Ensure consistency and a **systematic approach** in the evaluation of impacts
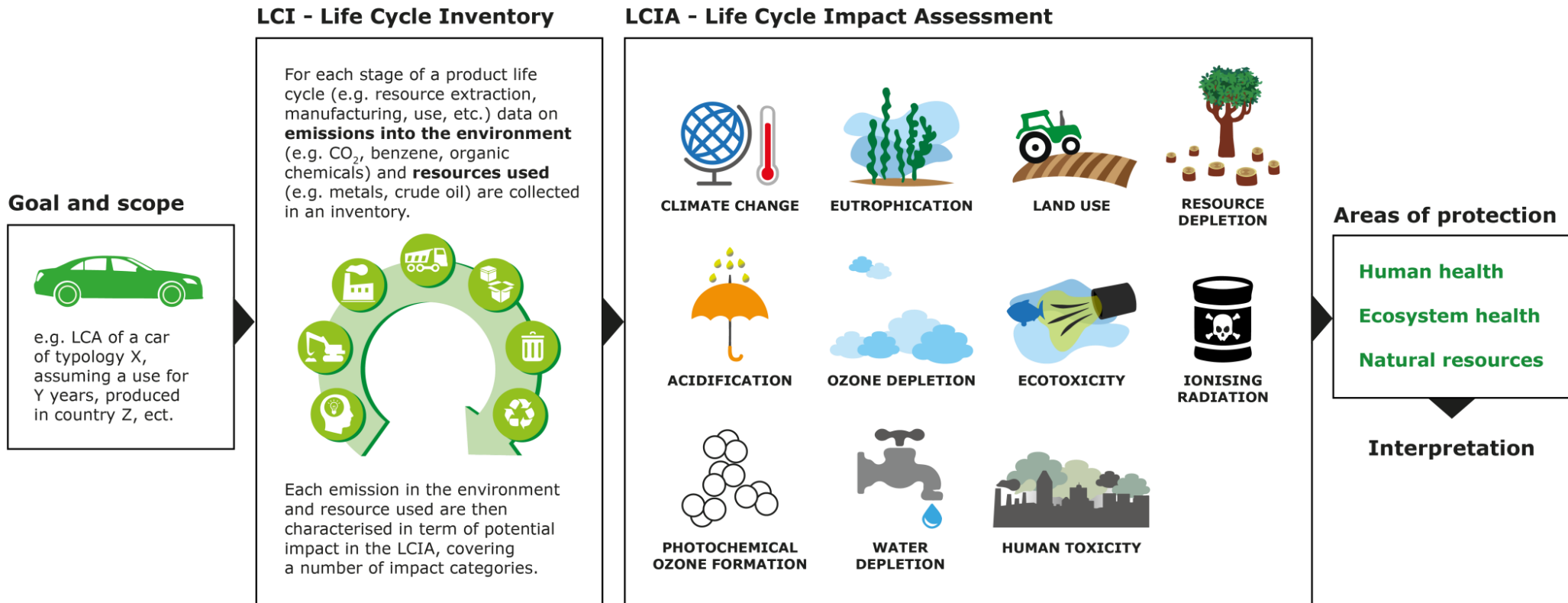
LCT and LCA supporting integrated assessment - 5
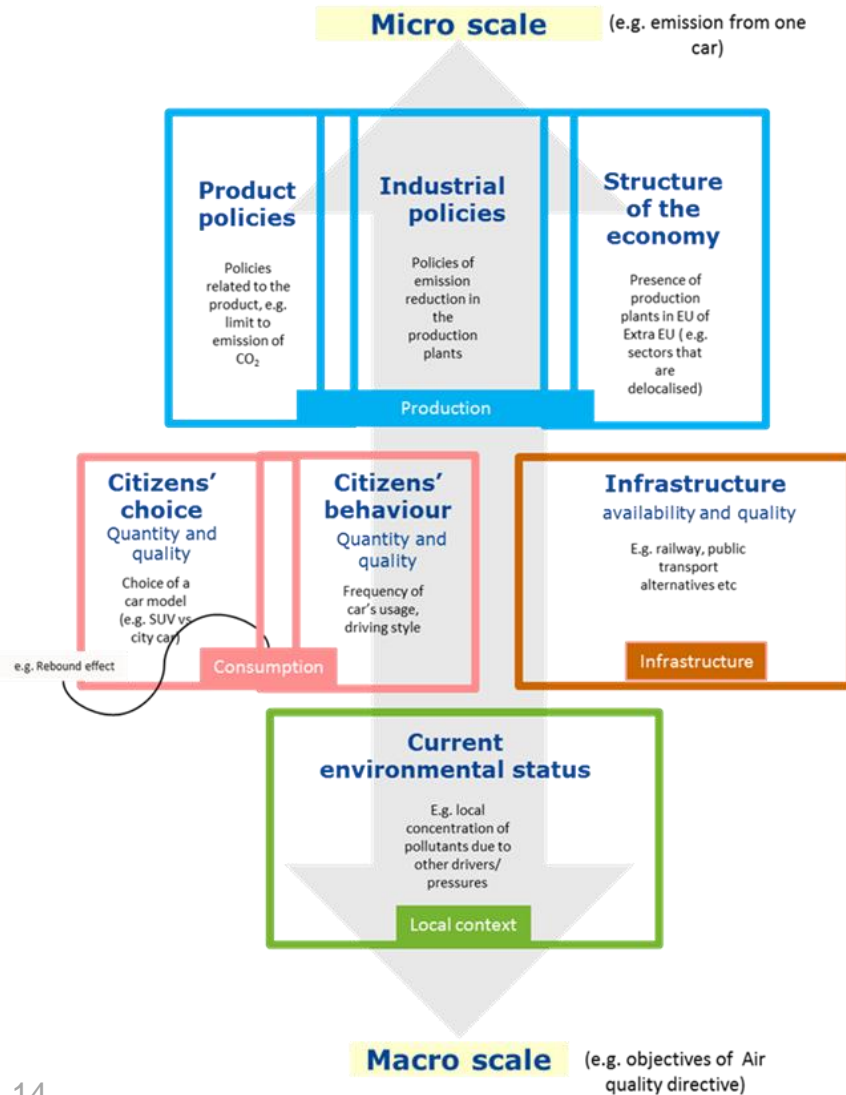
Supporting the assessment of the **relationship between micro and macro scale** (e.g. product and territorial policies)

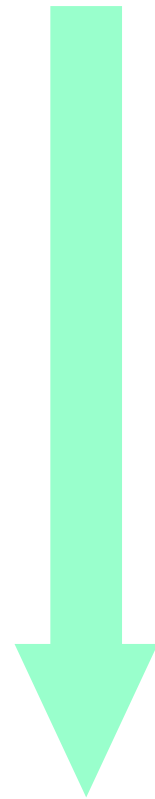Emissions from one car, *product policies*

PRODUCT LEVEL

Mobility system, infrastructure

MESO LEVEL

Air quality – *territorial policies*

MACRO LEVEL

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LCT and LCA supporting integrated assessment - 6

EASY CONSUMER
WELLNESS CONSUMER
GREEN & ETHIC CONSUMER
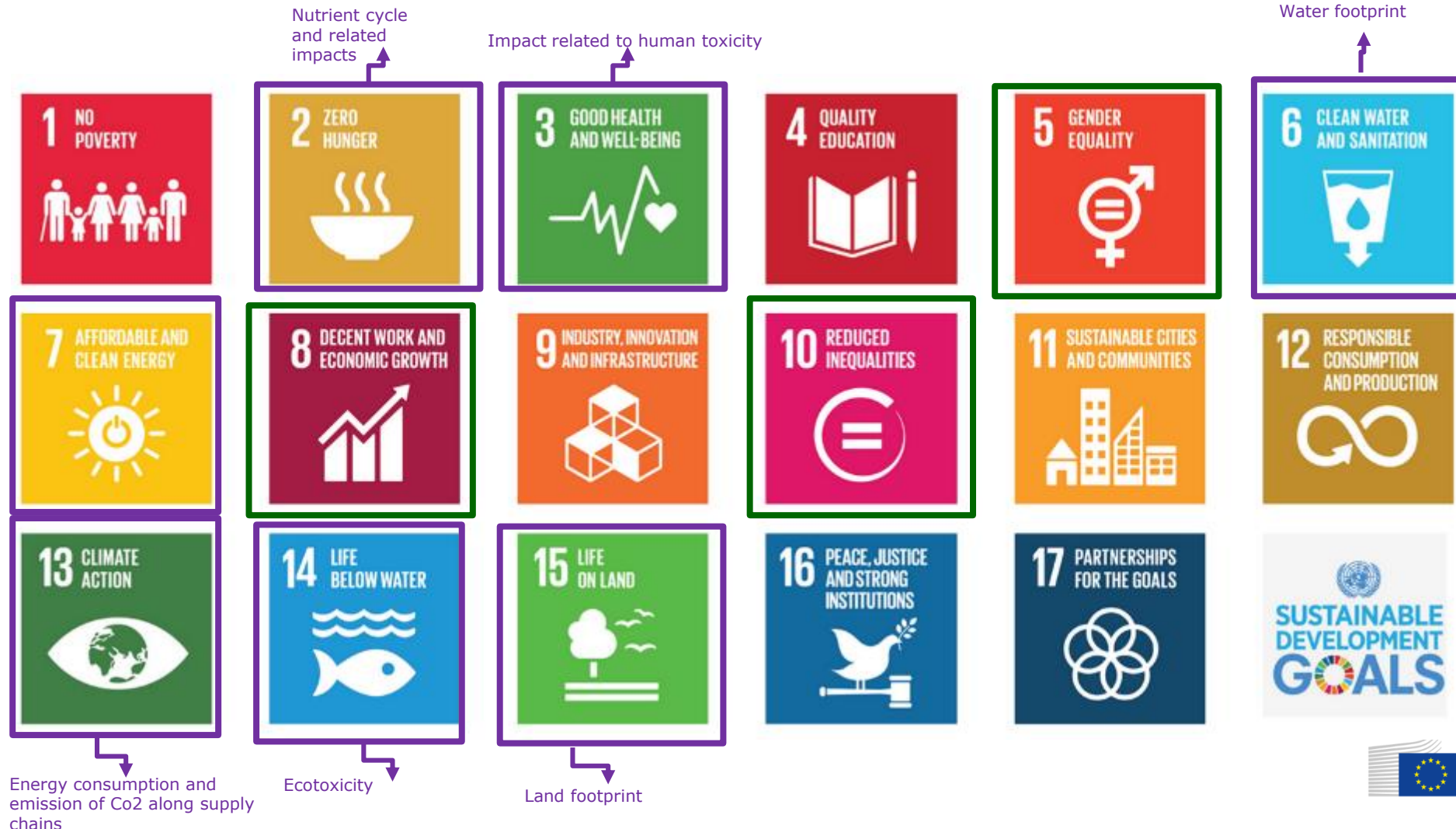VEGGIE CONSUMER

- Run **scenarios under specific assumptions** in terms of production and consumption patterns to estimate impacts associated with possible future interventions and consumers choices and behaviours.
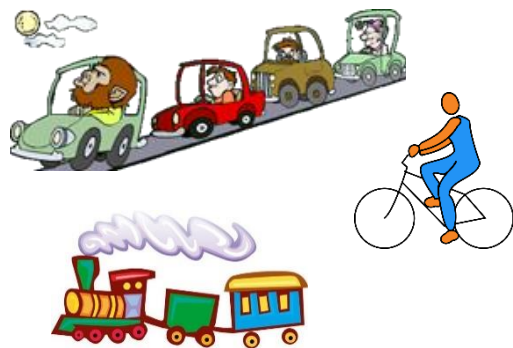
- **Assess options and burdens** and benefits associated to the implementation of policy options (and associated targets), enlightening the decision-making process

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LCT and LCA supporting integrated assessment for Sustainable Development Goals

Several impacts are covered by the LCA impact categories (some examples, in purple covered by environmental LCA, in green by Social LCA)

Nutrient cycle and related impacts

Impact related to human toxicity

Water footprint

Energy consumption and emission of Co2 along supply chains

Ecotoxicity

Land footprint

16

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LCT and LCA supporting integrated assessment for Sustainable Development Goals

Sala S. (2019) Life cycle assessment and evaluation of solutions towards sustainable development goals. In: Filho W. L. (Eds). Encyclopedia of the UN Sustainable Development Goals, Springer
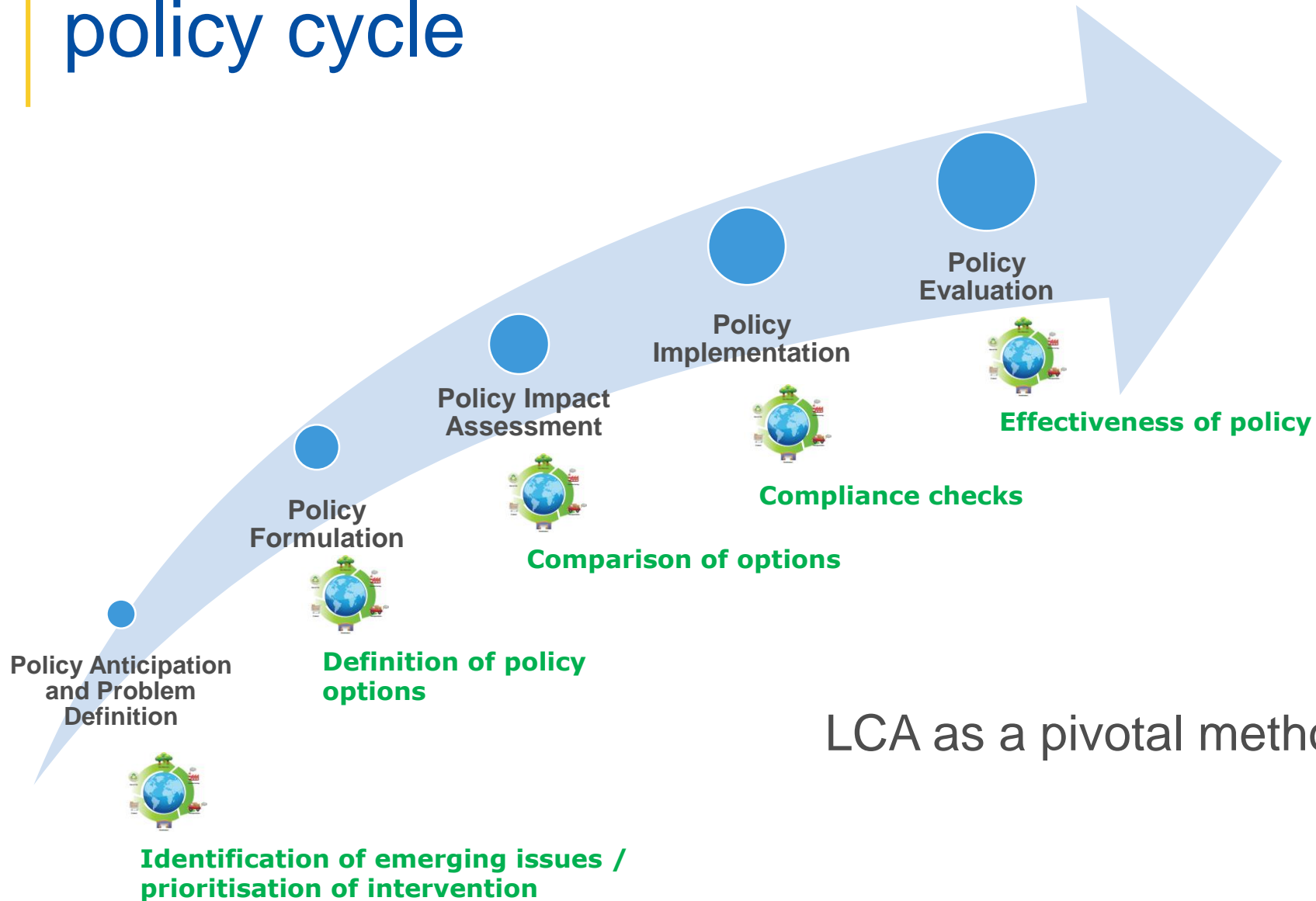
European Commission
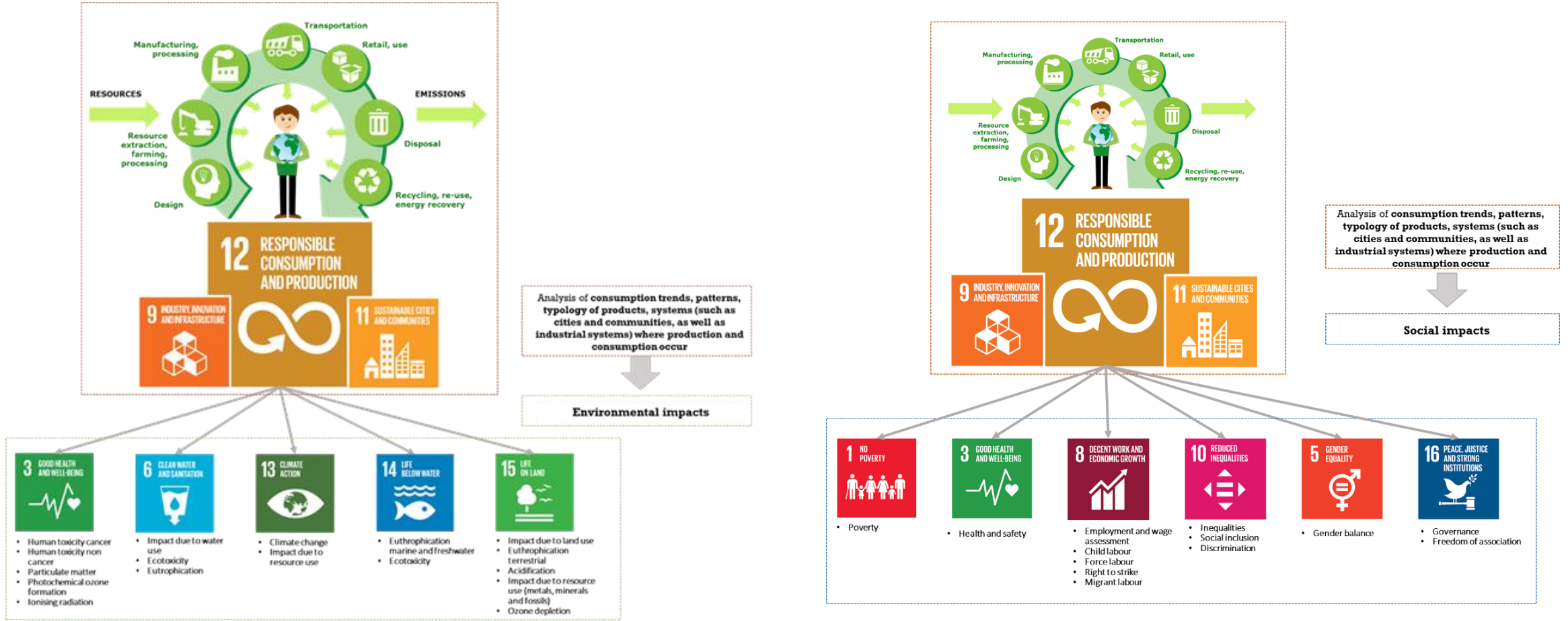
LCT and LCA supporting integrated assessment beyond relative assessment

- Linking LCA impact categories with planetary boundaries

Sala, S., Crenna, E., Secchi, M., & Sanyé-Mengual, E. (2020). Environmental sustainability of European production and consumption assessed against planetary boundaries. *Journal of Environmental Management*, *269*, 110686.
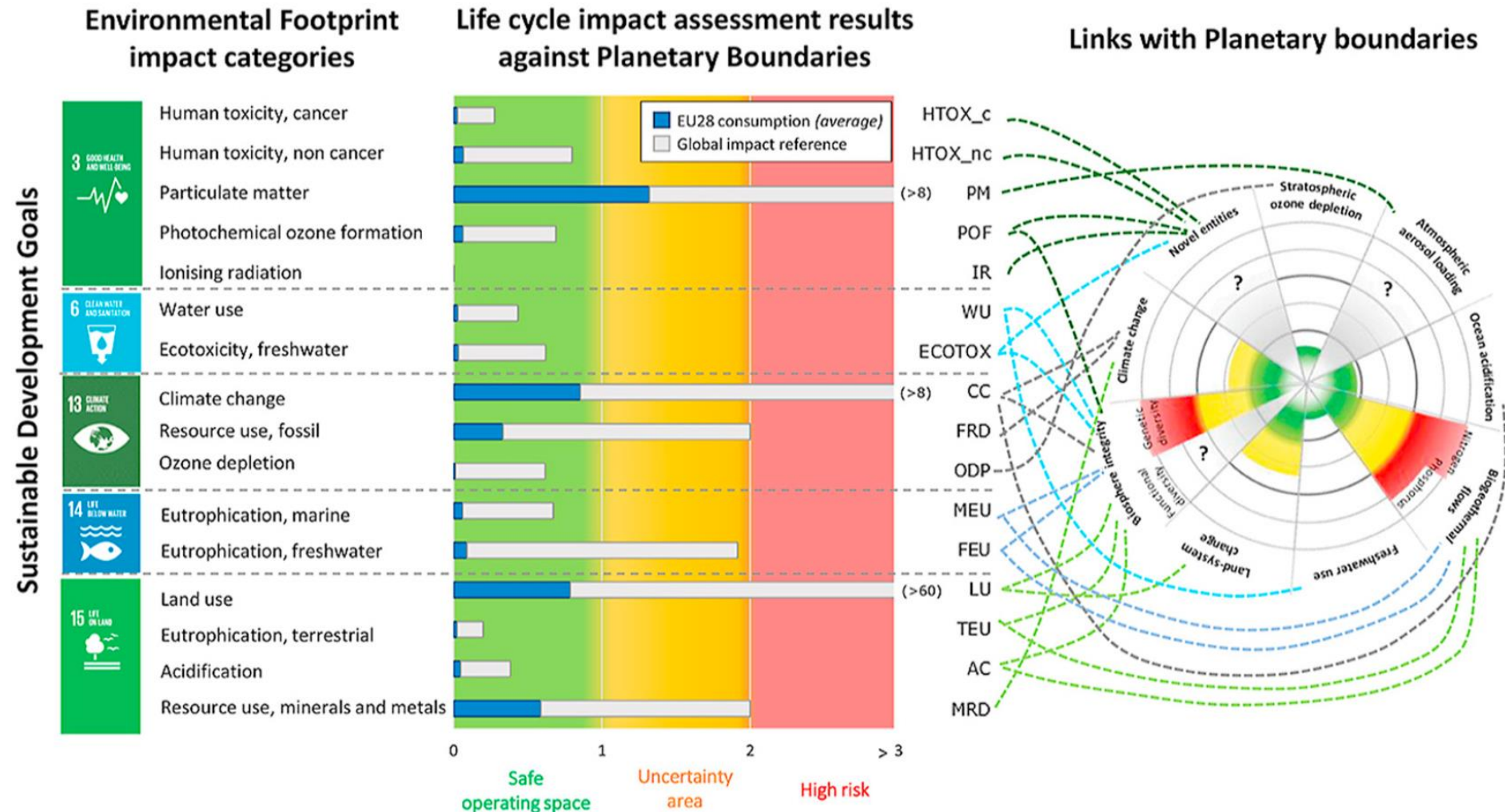
Life Cycle Thinking and assessment in the policy cycle

Policy Evaluation

Effectiveness of policy

Policy Implementation

Compliance checks

Policy Impact Assessment

Comparison of options

Policy Formulation

Definition of policy options

Policy Anticipation and Problem Definition

Identification of emerging issues / prioritisation of intervention

LCA as a pivotal method for policy support

European Commission

Policy anticipation and problem definition

LCA studies reporting "insight/warnings" related to environmental issues to be taken into account

Examples:

- the problem definition of the impact assessment of the communication **Building single market for green product** COM(2013)196;
- communication on **Resource Efficiency Opportunities** in the Building sector COM(2014) 445

European Commission

Policy formulation - 1

Typologies of policy options requiring:

- **assessment** (e.g. REACh, requiring risk assessment of substances for human health and ecosystems; EIA directive, setting a procedure for authorization of certain plants);
- **management scheme** (e.g. SEA directive, assessing and monitoring plans)
- **specific requirements** (e.g. ecodesign directive; ecolabel; air quality directive; emission trading directive).

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Policy formulation - 2

Policy options may:

- be **based on LCT /LCA results** (e.g. addressing a specific relevant life cycle stage or relevant environmental impact)
- include **some requirements based on LCA indicators** (e.g. a life cycle assessment based calculation)

ROLE OF LCA

- e.g. a full LCA may be request before **putting a certain product on the market**;
- LCA for **monitoring performance of products**;
- LCA may be used to **set the requirements to be respected.**

European Commission

Policy formulation - 3

Examples:

- in the **Waste framework directive** (2008/98/EC) where LCT is cited for justifying possible changes in the waste hierarchy, due to environmental concerns assessing waste management options;

- in the communication "**Building single market for green product**" COM(2013)196 where LCA is the reference methodology for product and organisation environmental assessment and in the **green claims initiative of 2020**

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Policy impact assessment

- Supporting the **comprehensive and systematic assessment of environmental aspects**, and even beyond environmental aspects if including Life Cycle Costing and Social LCA.
- LCA may **spot impacts** related to a number of different impact categories and may help avoiding shifting burden from one stage in the life cycle to another.
- Complementary to **risk assessment.**
- Assessing **future scenarios.**

Example:

- in the impact assessment of **plastic bags directive** (SWD/2013/0444) where policy options has been based on tackling issue coming from a convergence of different LCA which were supporting prevention policy options.

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Better Regulation COM(2015) 215

Life cycle analysis is listed in the Better regulation toolbox (tool 64) among the methodology which may support policy impact assessment.

COM(2015) 215 and the 2020 update

European Commission

EN English

Search

Better regulation toolbox

PAGE CONTENTS

I. General principles of better regulation

II. How to carry out an impact assessment

III. Identify impacts in impact assessments, evaluations and fitness checks

IV. Implementation, transposition and preparing proposals

V. Monitoring the application of an intervention

VI. Evaluations and fitness checks

VII. Stakeholder consultation

I. General principles of better regulation

- TOOL #1.Principles, procedures & exceptions
- TOOL #2.The Regulatory Fitness Programme and the REFIT Platform
- TOOL #3.Role of the Regulatory Scrutiny Board
- TOOL #4.Evidence-based better regulation
- TOOL #5.Legal basis, subsidiarity and proportionality
- TOOL #6.Planning and validation of initiatives
- TOOL #7.Drafting roadmaps, evaluation roadmaps and inception Impact assessments

II. How to carry out an impact assessment

- Introduction
- TOOL #8.What steps should I follow for an impact assessment?
- TOOL #9.When is an impact assessment necessary?
- TOOL #10.Financial programmes and instruments
- TOOL #11.Social partner initiatives
- TOOL #12.Format of the impact assessment report

https://ec.europa.eu/info/files/better-regulation-toolbox-64_en

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Policy implementation

If LC- based indicators are used as requirements of the policy option, LCA studies will be needed

Example:

- **Directive on renewable resources** (2009/28/EC) where there is an LCT based requirement on GHG reduction for Biofuels;
- "**Ecodesign Directive**" (2005, then 2009/125/EC) Definition in Annex I of the (Method for setting generic ecodesign requirements) of the life cycle stages and the environmental aspects that should be tackled by implementing measures.

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Policy evaluation

- Use of LCA for assessing the benefit of the policy (at macro scale) including systemic aspects.
- Need of modifying/ repealing a legislation.

Example:

- the **repeal of waste oil directive** based also on a study reporting LCA evidences.

European Commission

Single use plastic (LCT,LCA)
EU Green Deal (LCT,LCA)

Public procur. (LCT,LCC)

Resource energy flagship (LCT,LCA,LCC)

Bioeconomy (LCA,PEF)
REDII (LCA,LCT)
Packaging waste (LCT,LCA)
Sust. Invest. (LCT,PEF)

Ecolabel (amendment) (LCT,PEF)
Energy Labelling (LCT,LCC)

Single market green products (PEF,LCT,LCC)

Sustainable investments (LCT,LCA,PEF)
Circular Economy Action plan (LCT,LCA,PEF)
Biodiversity strategy (LCT,LCA,PEF)
Farm to fork strategy (LCT,LCA,PEF)

Ecodesign (All)

WasteFD (LCT,LCA)
GPP (LCT,LCC)

Waste prevention strategy (LCT,LCA,LCC)
Sustain. Use resources (LCT)

Biofuel (LCT)
Better Reg. (LCA,LCT)

REACh (LCT)

EOL Vehicles (LCT)

Integrated Product Policy (LCT,LCA)

Packaging (LCA)

Ecolabel (LCT,LCA)

Legend: LCT | LCA | LCC | PEF/OEF

Years: 1991 1992 1993 1994 1996 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

European Commission

Evolution of LCT/LCA/LCC/PEF in the EU policies
By type of policy

Types of policies

RECOMMENDATIONS; 3

DECISIONS; 81
(of which 57 are linked to the Ecolabel Regulation)

REGULATIONS; 41
(of which 24 are linked to the Ecodesign Directive)

DIRECTIVES; 28

COMMUNICATIONS; 167
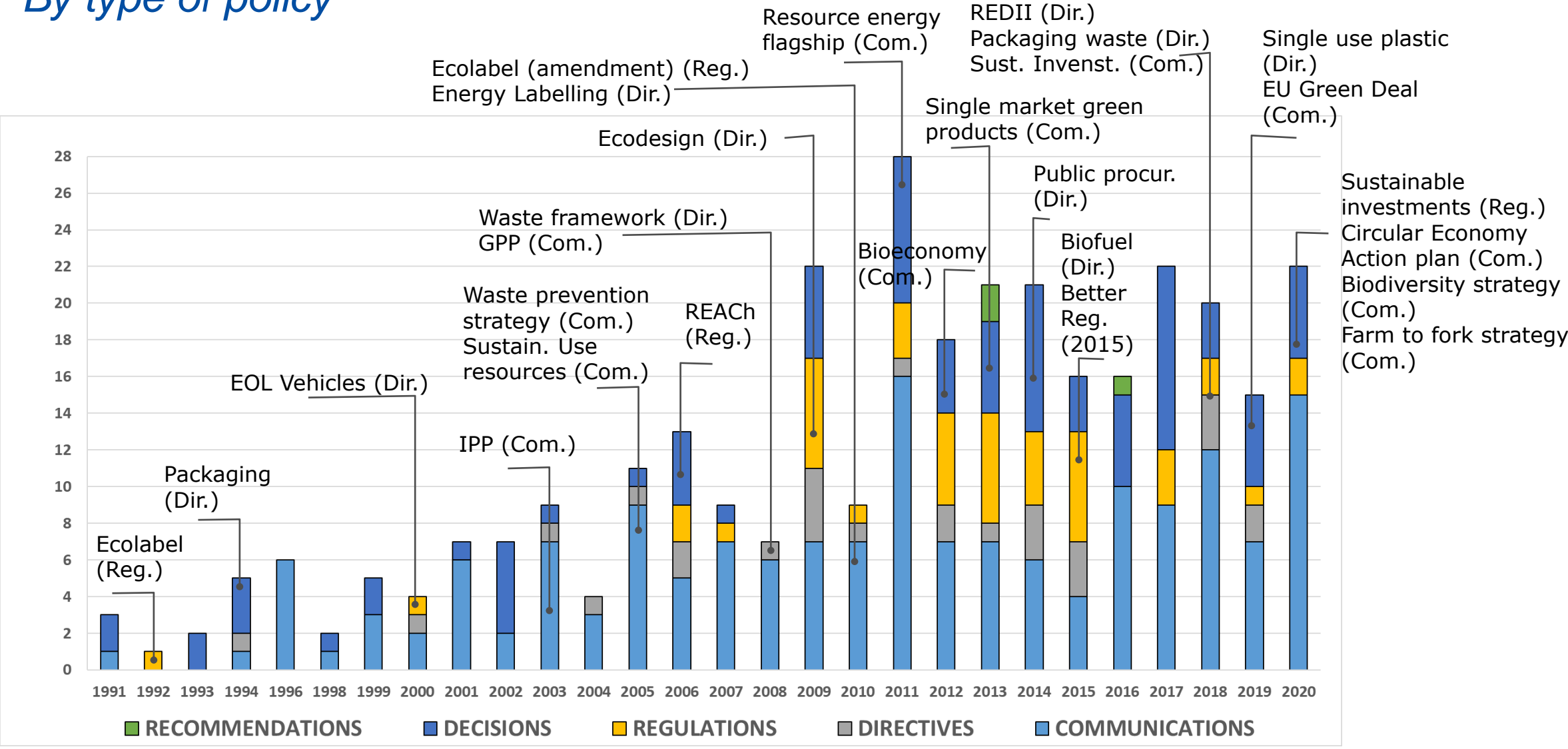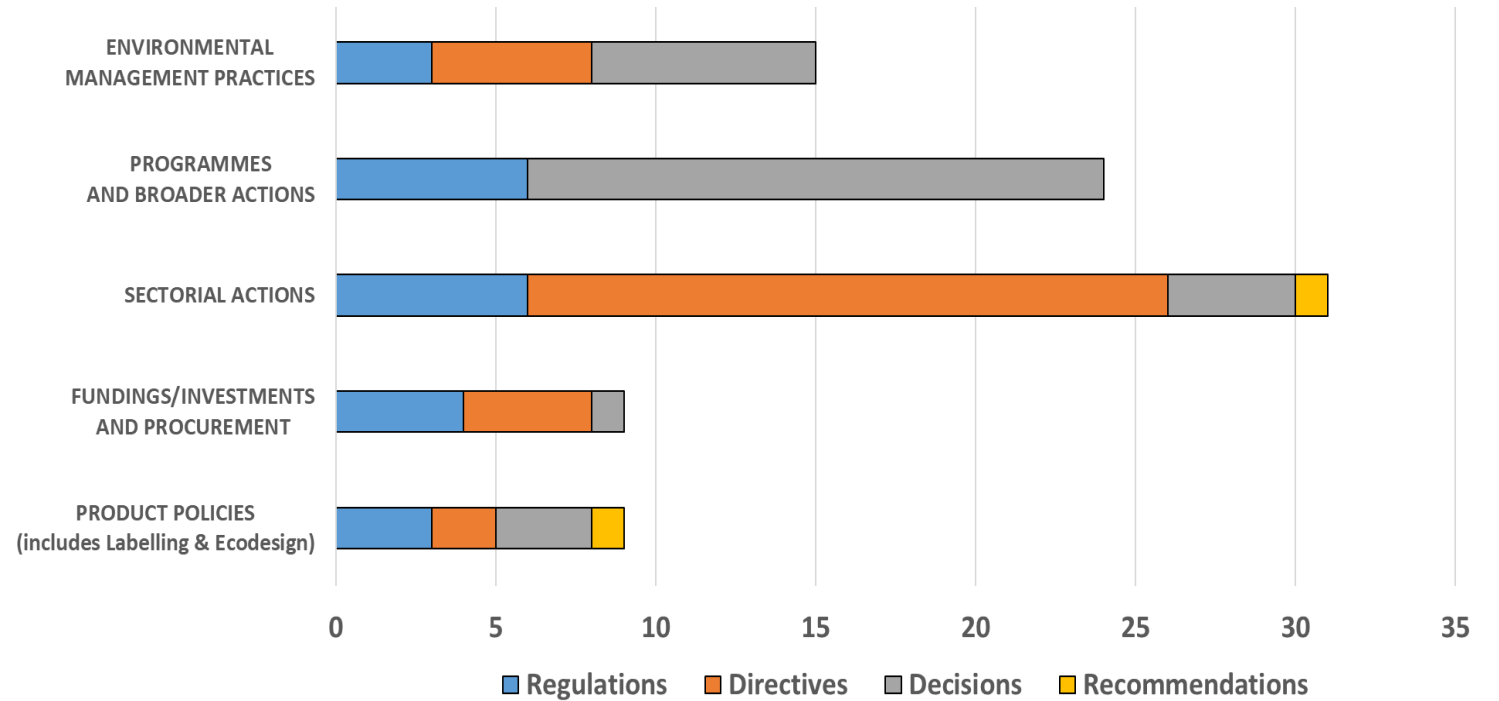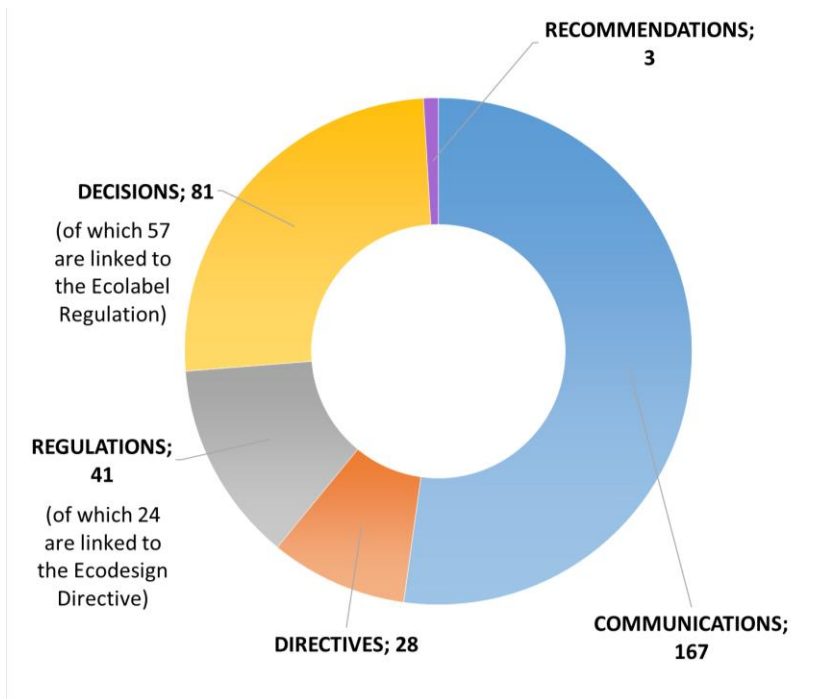
The figure is excluding specific implementations, such as the 57 Decisions linked to the Ecolabel Regulation and the 24 Regulations linked to the Ecodesign Directive

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Overview of the main sectors addressed in Policies and Communications
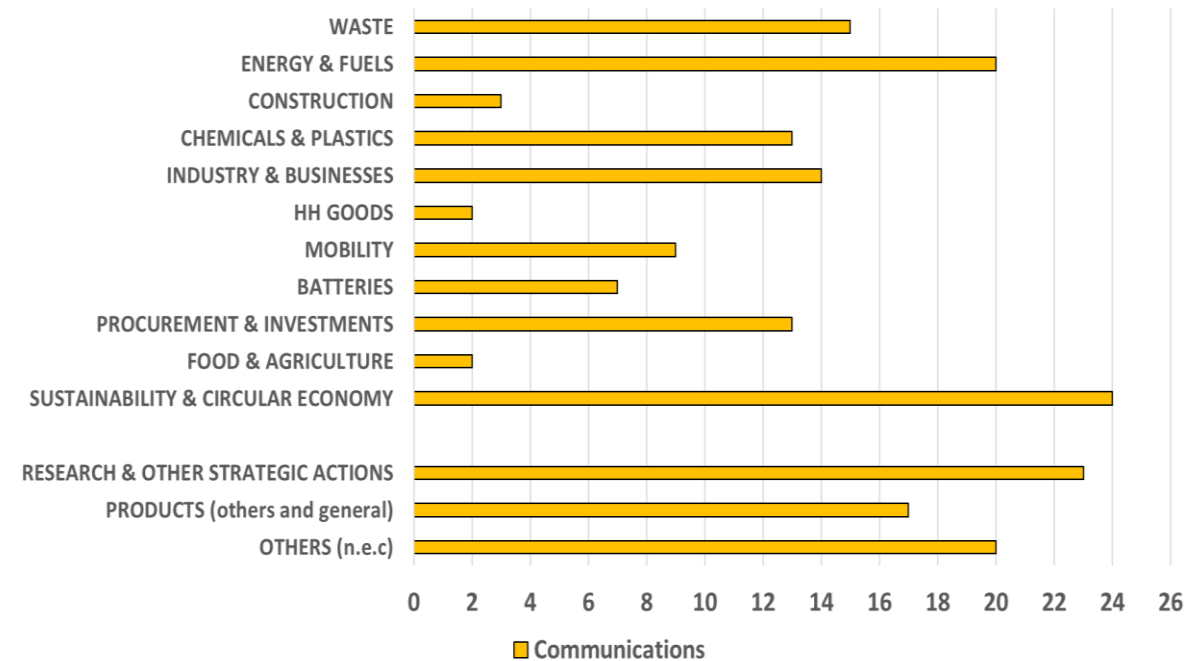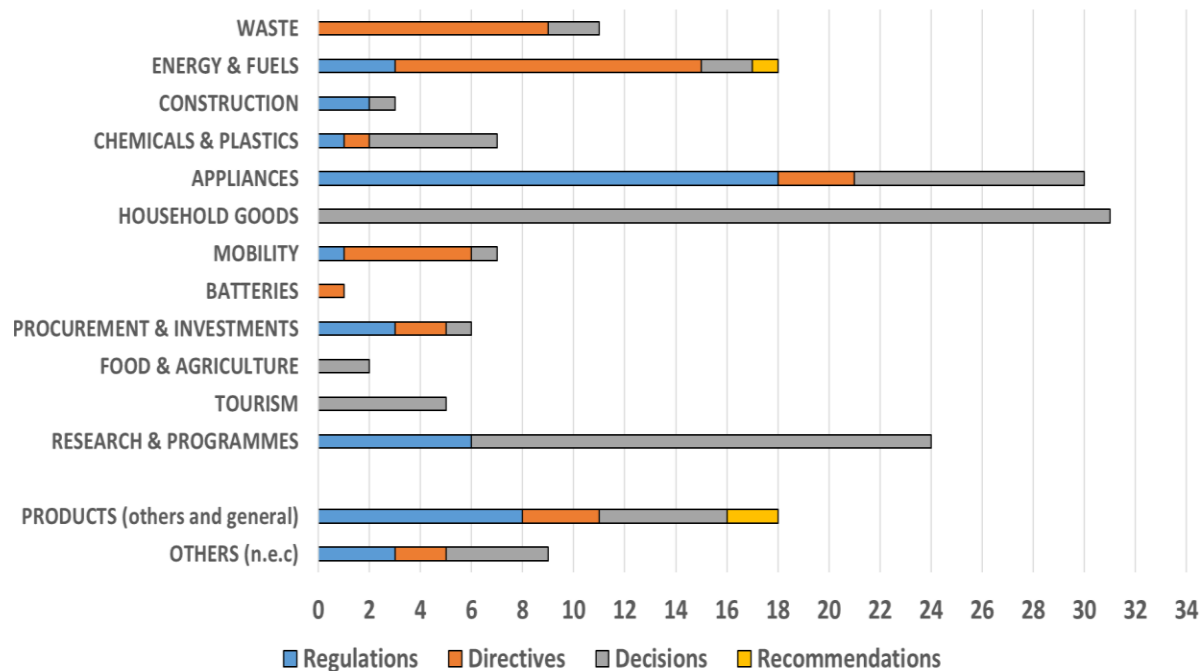
LCT in EU policies developments

EU COMMUNICATIONS

- **LCT is at the heart**
  - "**Integrated Product Policy (IPP)**" (2003)

  IPP seeks to minimize environmental impacts by looking at all phases of a products' life-cycle and taking action where it is most effective

  - "**Building the Single Market for Green Products**" (2013)

  the initiative proposes a set of actions, establishing two methods to measure the environmental performance throughout the life cycle of products and organizations, the PEF and the OEF

- **LCT is also addressed in other COM**, including:
  - "Better regulation" (2015, 2020)
  - "Circular economy" (2015, 2020)
  - "Bioeconomy " (2012, 2018)
  - "Resource Efficient Europe' (2011)
  - "Challenges in Commodity Markets and on Raw Materials" (2011)

European Commission

LCT in EU policies developments

- **LCT is at the heart**   **DIRECTIVES**

  - "**Ecodesign Directive**" (2005, then 2009)
  Article 1: "It contributes to sustainable development by increasing energy efficiency and the level of protection of the environment"; Definition in Annex I of the Directive (Method for setting generic ecodesign requirements) referring to of the life cycle stages and the environmental aspects that should be tackled by implementing measures

- **LCT is also addressed**

  - "**Waste Framework Directive**" (2008)
  introduces the waste hierarchy; possible deviation from the waste hierarchy can be justified through LCT

  - "**Energy labelling Directive**" (1992 then 2010)
  provide to consumers with information on the energy consumption, and other environmental aspects   (e.g. water consumption, noise) during the use phase of the product

  - "**Public procurement Directives**" (2004 then 2014)
  allow public procurement …..to achieve objectives of sustainability….submitting tenders that reflect the diversity of technical solutions standards and technical specifications including those drawn up on the basis of performance criteria linked to the life cycle (Directives 23, 24, 25 of 2014)

LCT in EU policies developments

REGULATIONS

- **LCT is at the heart**

  - "**Ecolabel regulation**" (2000, then 2010):
  Ecolabel is a "voluntary (…) award scheme intended to promote products with a reduced environmental impact during their entire life cycle and to provide consumers with (…) information on the environmental impact of products". Ecolabel criteria are often developed following a thorough LCA analysis to identify hot-spots

- **LCT is also addressed**

  - "**REACh Regulation on Chemicals**" (2006)
  Risk assessment and management of chemicals shall consider all stages of the life-cycle of the substance resulting from the manufacture and identified uses;

  - "**Construction Products Regulation**" (2011)
  It defines basic requirements for construction works (in terms of health, safety of persons, environmental impacts along the life cycle)

Bioeconomy Strategy

- Assessing benefits and trade-offs of a transition towards a circular bioeconomy at the level of products and systems

- Supporting innovation with prospective LCA of green chemistry solutions at low technological readiness level

- Leverage environmental performance information to boost the market of bio-based products by potentially integrating the Environmental Footprint methods into a wide range of relevant tools

https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf

A Clean Planet for All: the 2050 Long-term Strategy that asked for paradigm shifts
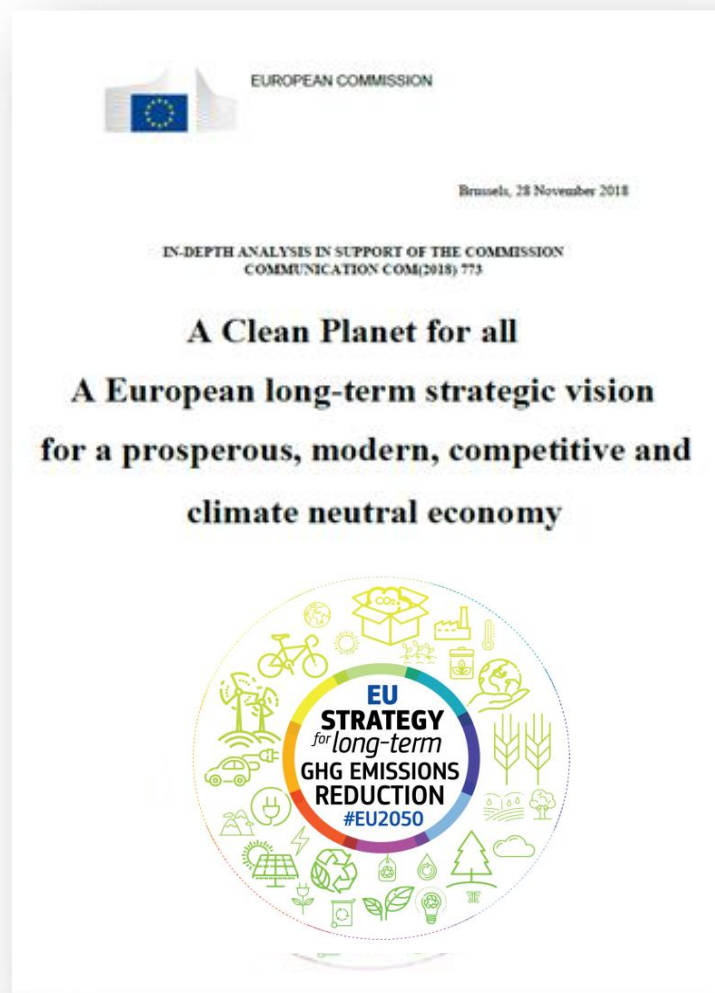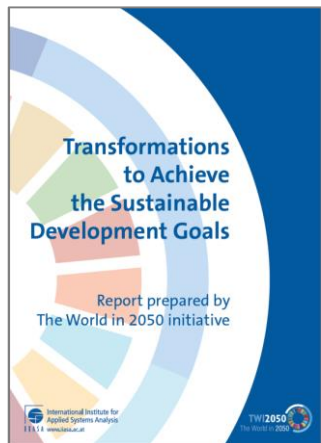
Addressing global challenges, spillover, and transboundary effects

Stressing the need of system thinking in policies

On the European Green Deal:

"

All unforeseen challenges have not derailed our efforts to deliver on our long-term agenda for the EU.

I remember our first days in office. At that time there was still a lot of skepticism about the Green Deal and the goal to be climate-neutral in 2050.

Today, it is no longer the question if there will be a Green Deal, but: How far-reaching will the transition be?

European Commission

UN Agenda 2030 for Sustainable Development

17 Goals
169 Targets
232 Indicators

Sustainability at the core of the six political ambitions of the new Commission

Life cycle thinking especially relevant in three key pillars of the current EU Commission

A Green Deal for Europe
- Pillar dedicated to sustainable production and consumption
- A new Circular Economy Action Plan
- Mobilising research and fostering innovation

A stronger Europe in the World
Secure and sustainable value chains
Fair trade and responsible sourcing

A Europe fit for the Digital Age
- Competitive industry
- Industrial Strategy Package

European Commission

The EU green deal, LCA and PEF/OEF

https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
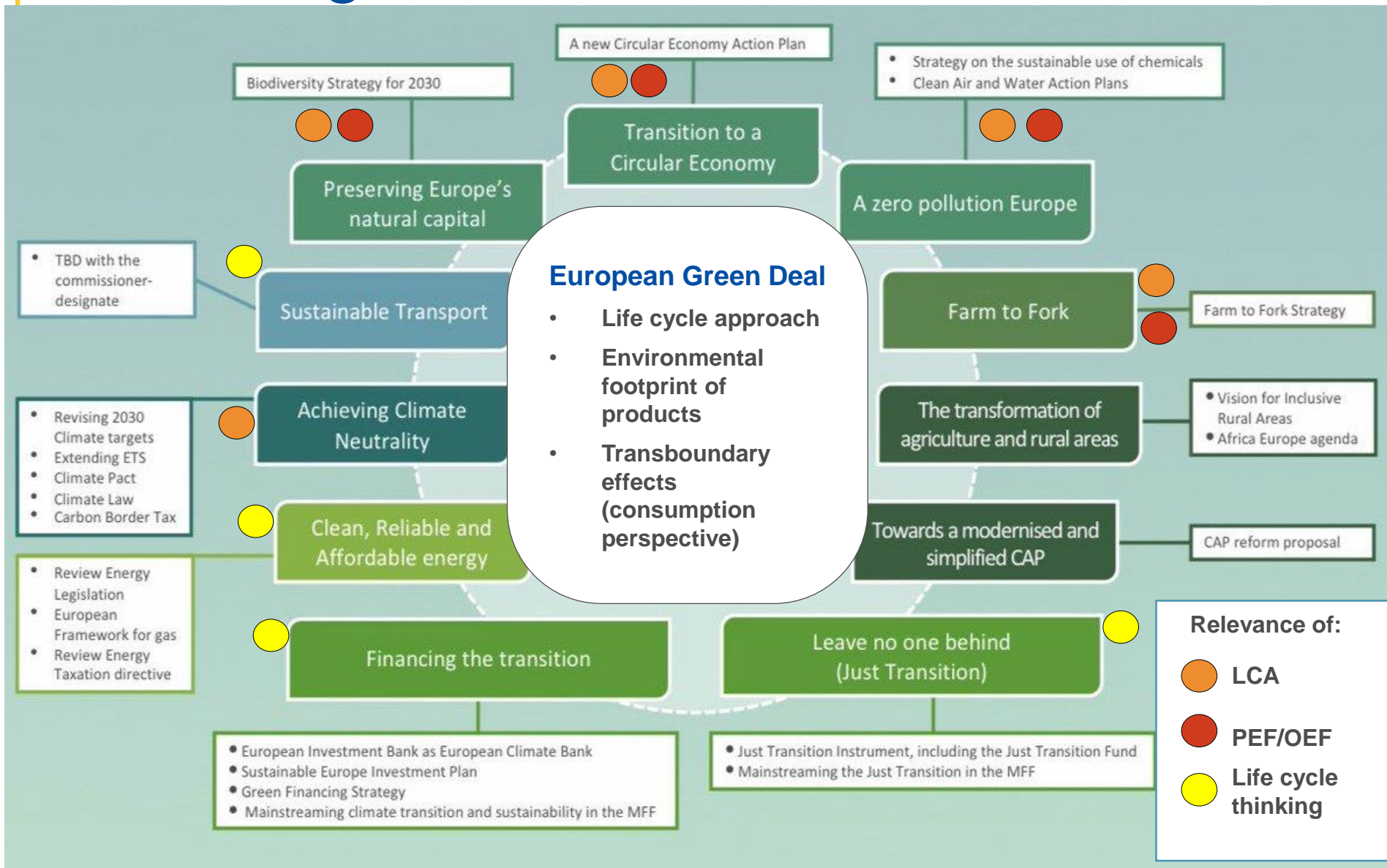
Circular Economy Action Plan (CEAP)
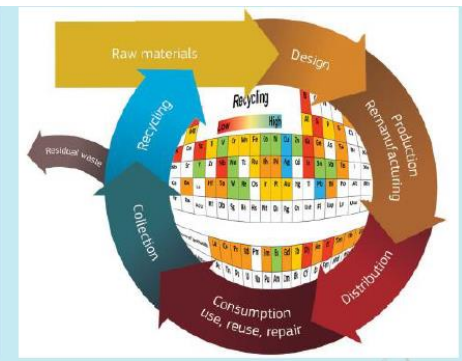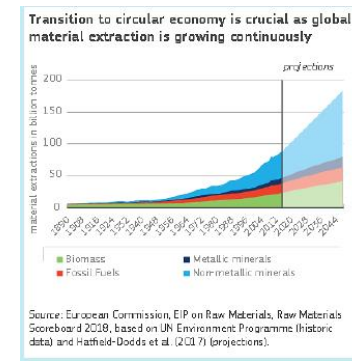
- The CEAP is a building block of the **European Green Deal**, Europe's new agenda for sustainable growth.

- With initiatives along the **entire life cycle of products**, it aims to make our economy competitive and fit for a green future, while protecting the environment and giving new rights to consumers.

- **Sustainable products**. It focuses on the design and production for a circular economy, to ensure that the resources used are kept in the EU economy for as long as possible.

- **Focus areas**: electronics and ICT, batteries, textiles, plastics incl. microplastics, construction and buildings, food and packaging, waste.

European Commission

CEAP and LCA

Circular economy
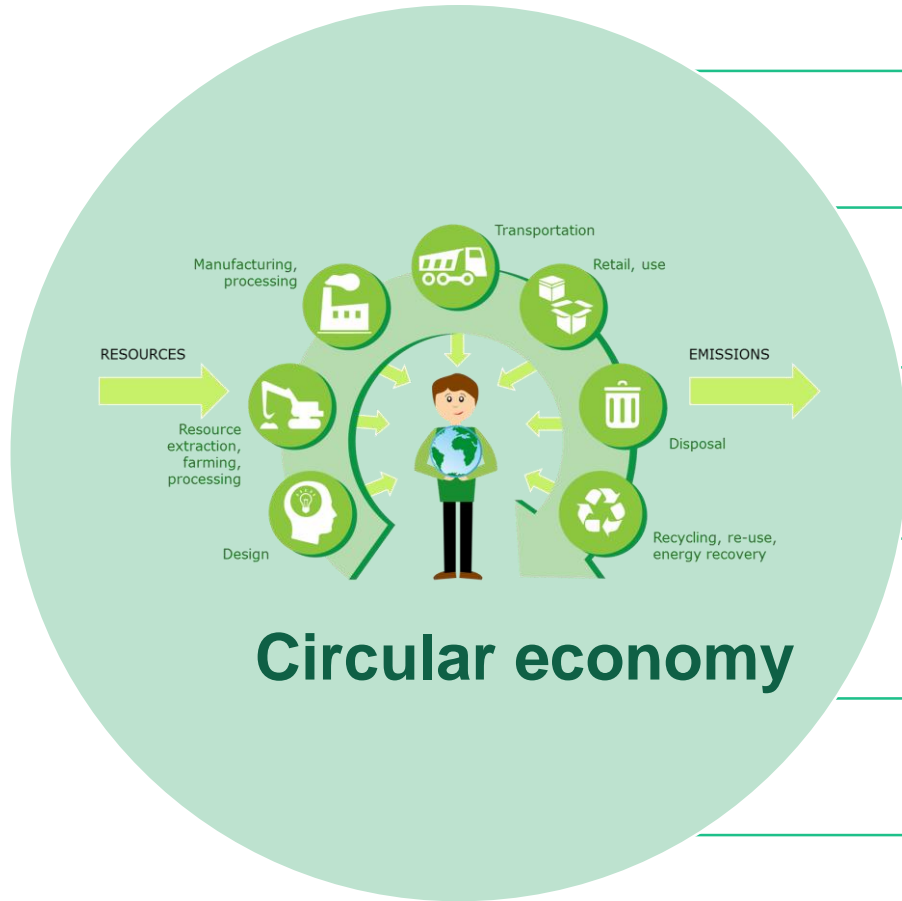
Harmonisation of product policies

Green claims based on Product Environmental Footprint

Improving efficiency of nutrients flows with a system perspective

Improving waste collection and management systems as well as use of secondary raw materials

Analysis of supply chains of key sectors: appliances, textile, plastics etc

Consumer behaviors towards a green transition

European Commission

Raw materials information System

https://rmis.jrc.ec.europa.eu/

Single Market for Green Products Initiative

https://ec.europa.eu/environment/eussd/smgp/index.htm

Product/Organisation Environmental Footprint (PEF/OEF)

The PEF/OEF methods have been developed since 2013 within the **Single Market for Green Products Initiative**

The aim is to provide companies with **standard methods to substantiate claims they make about the environmental footprint** of their products / services

Based on **ISO 14040 series standards**, PEF/OEF further specify key methodological options and quality requirements for data (and potentially including sectorial rules, named Product Environmental Footprint Category Rule PEFCR/ Organisation Environmental Footprint Sectorial Rules OEFSR)

Methods developed through **consensus building and industry driven** (for the development of PEFCR/OEFSR)

The overall objective is to grant a **level playing field for environmental claims**

EPLCA (European Platform LCA) https://eplca.jrc.ec.europa.eu/EnviromentalFootprint.html

DG-ENV Website Building the single market for green products http://ec.europa.eu/environment/eussd/smgp/index.htm

Green claims initiative

https://ec.europa.eu/environment/eussd/smgp/initiative_on_green_claims.htm

"Farm to Fork" Strategy and CAP beyond 2020

- Adopting a system perspective
- Reducing the overall environmental footprint of the EU food system
- Supporting sustainability labelling of food products
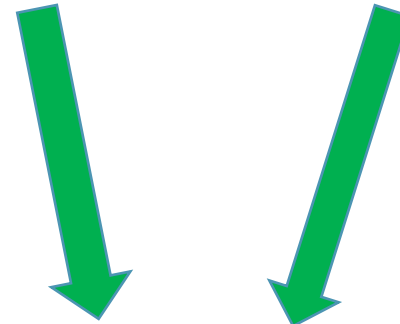
European Commission

Biodiversity Strategy 2030

Towards reverted biodiversity loss & healthy ecosystems

- Biodiversity and Healthy Ecosystems
- Natural Capital Accounting and Monitoring Indicators
- Soils as key component across many policies
- Safeguarding European wild pollinators
- Monitoring alien invasive species to protect nature

Biodiversity Knowledge Centre

EU Observatory on Deforestation & Forest Degradation

Forestry

- Advanced monitoring of global forest resources
- Monitoring EU forest status & threats for adaptation

Biodiversity footprint

measuring the environmental footprint of products and organisations on the environment, including through life-cycle approaches and natural capital accounting

Role of footprints

Deforestation footprint

European Commission

The way forward…

- Complementarity with other methodologies

- Coherence and consistency in the use of LCA in different product policies (e.g. PEF, Ecolabel, Ecodesign, GPP)

- Coherence, consistency, synergies and win-win between policies dedicated to single elements and those looking at the entire supply chain (e.g. Reach, Waste Policies, etc)

- Supporting Sustainable Development Goals's

- Interpretation of results

- Communication of results

European Commission

Conclusion

- The European **Commission** has put the delivery of the 2030 Agenda and its **SDGs on top of its political agenda** for **Green Deal**, shaping a sustainable Europe for future generations and striving for competitive sustainability.

- To fully implement SDGs across geographical and policy areas, a **multi- and interdisciplinary approach** is needed with solid evidence base.

- **Integrated modelling is key to identify synergies and unveil trade-offs** among SGDs, to anticipate direct and indirect effects, to assess sustainability of policies and define solutions to reach the SDG targets.

- Life cycle thinking and assessment are present into EU policies since the early 90's. Policies evolved over time and **now life cycle thinking and assessment are central in the Green Deal** as approaches to deliver on the ambitious targets

- **Improving the link between product and territorial policies** is an essential step towards more effective environmental policies

European Commission

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Thank you

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Thank you all for your attention and participation!

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