

Progress towards a circular economy in Europe



Hans Bruyninckx | Steunpunt Circulaire Economie | 22 November 2021

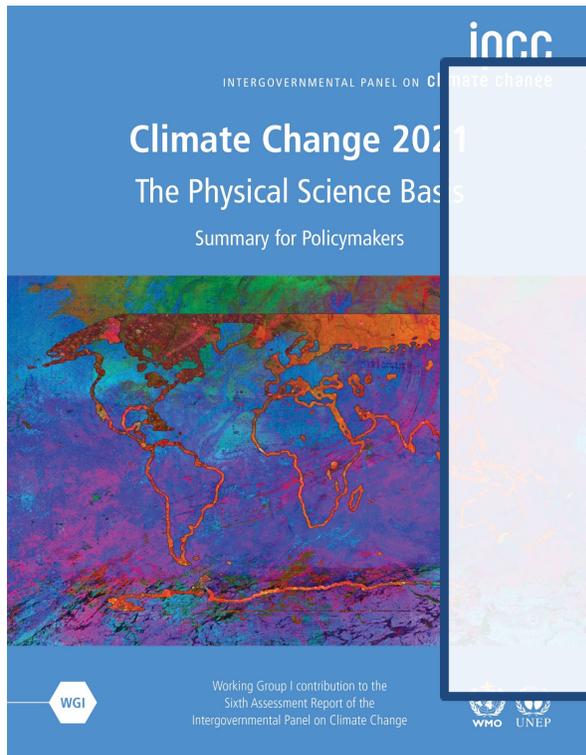
Global context: unprecedented challenges, improved knowledge, current bending the trends too slow

1. IPCC: **climate change**

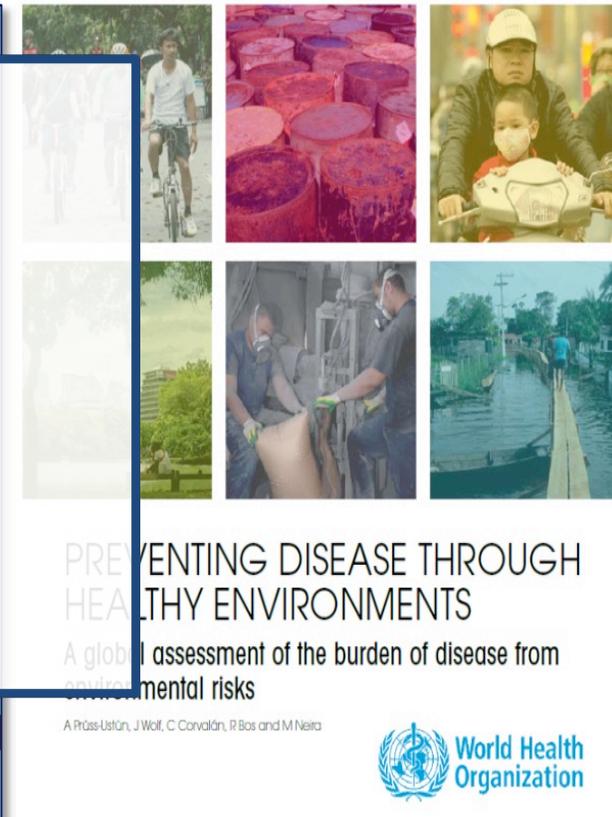
2. IPBES: **biodiversity loss** and ecosystem services

3. IRP: unsustainable **resource use**

4. WHO: environment and **health**



- **Urgency; pivotal decade**
- **Irreversibilities**
- **Tipping points**
- **Interconnected**



Global response: sustainable development goals (again!)



European Green Deal: a paradigm shift in politics/policy?

- First climate-neutral continent
 - Biodiversity Strategy 2030
 - New Circular Economy Action Plan
 - Zero Pollution Ambitions
 - Future-Fit Digital Economy
 - Just Transition Mechanism
 - Sustainable Finance
 - Future Economy Strategy - new industrial strategy
- The political, economic, investment, ... priority for Europe**
- Strong systemic transitions logic**
- Link with sectoral policies
 - Interconnected
 - Longer time horizon
 - Social dimension
 - Innovation, digitalization
- Governance agenda**

“Our *most pressing* challenge is keeping our planet healthy. This is the *greatest responsibility* and opportunity of our times.”

“Europe must *lead the* transition to a healthy planet and a new digital world.”

Ambitious, innovative, interconnected, systemic



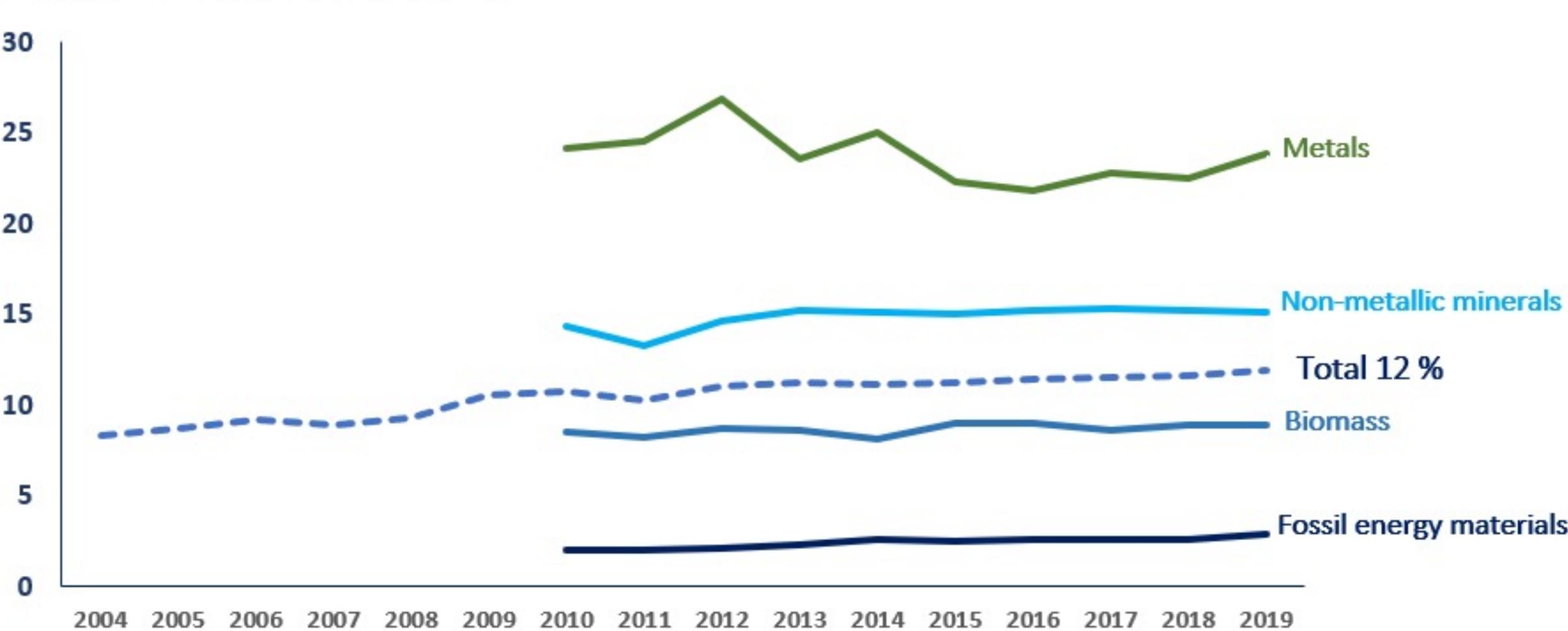
First (EU) steps in Circular Economy: 2010-2015-2019



- From concept to policy objective
- Building mostly on waste legislation
- Research and development
- Intellectual/network expansion
- Global scope
- Slow uptake in the physical economy

Circular use of materials is still low

Trends in the circular material use rate, % in EU-28

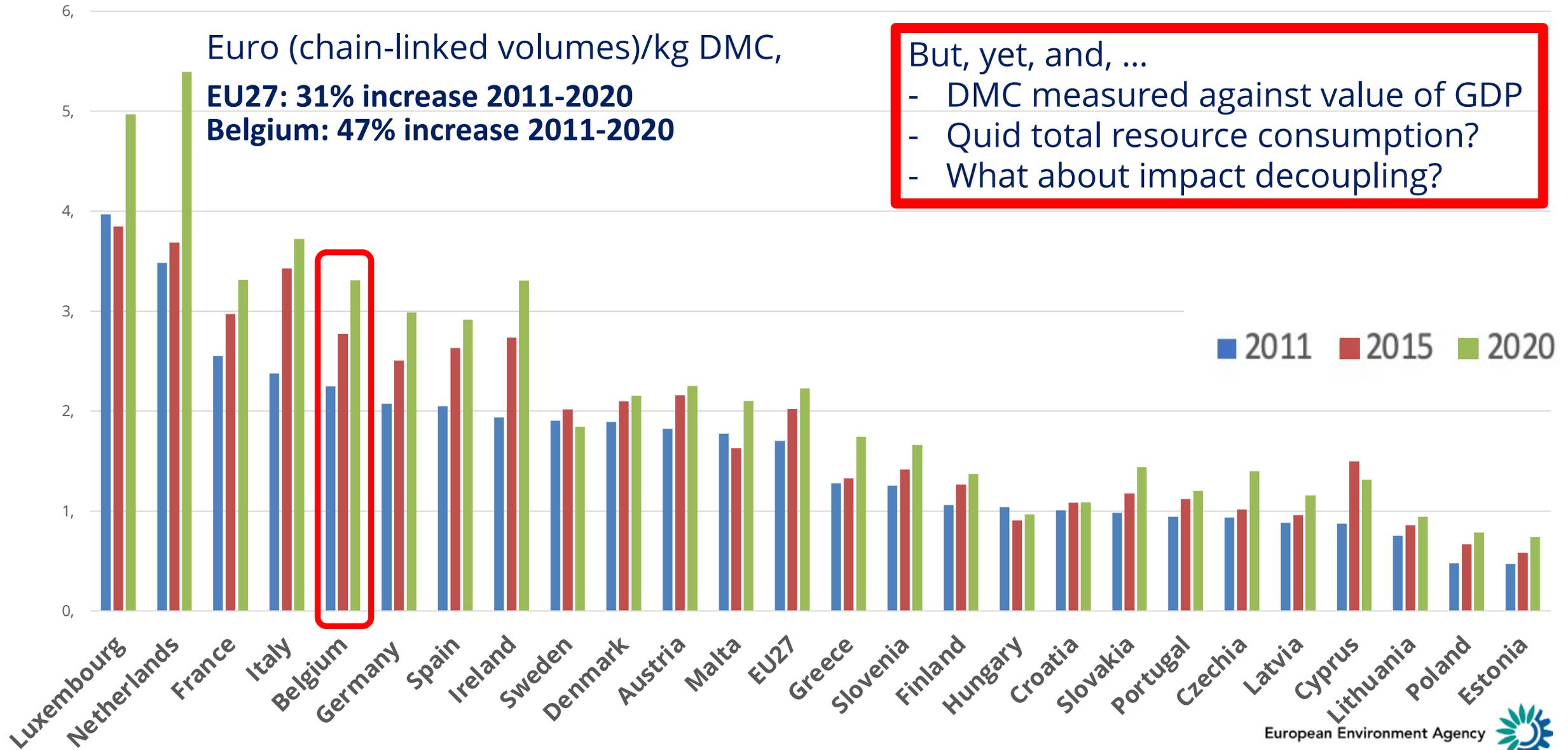


Resource efficiency is improving in Europe

Euro (chain-linked volumes)/kg DMC,
EU27: 31% increase 2011-2020
Belgium: 47% increase 2011-2020

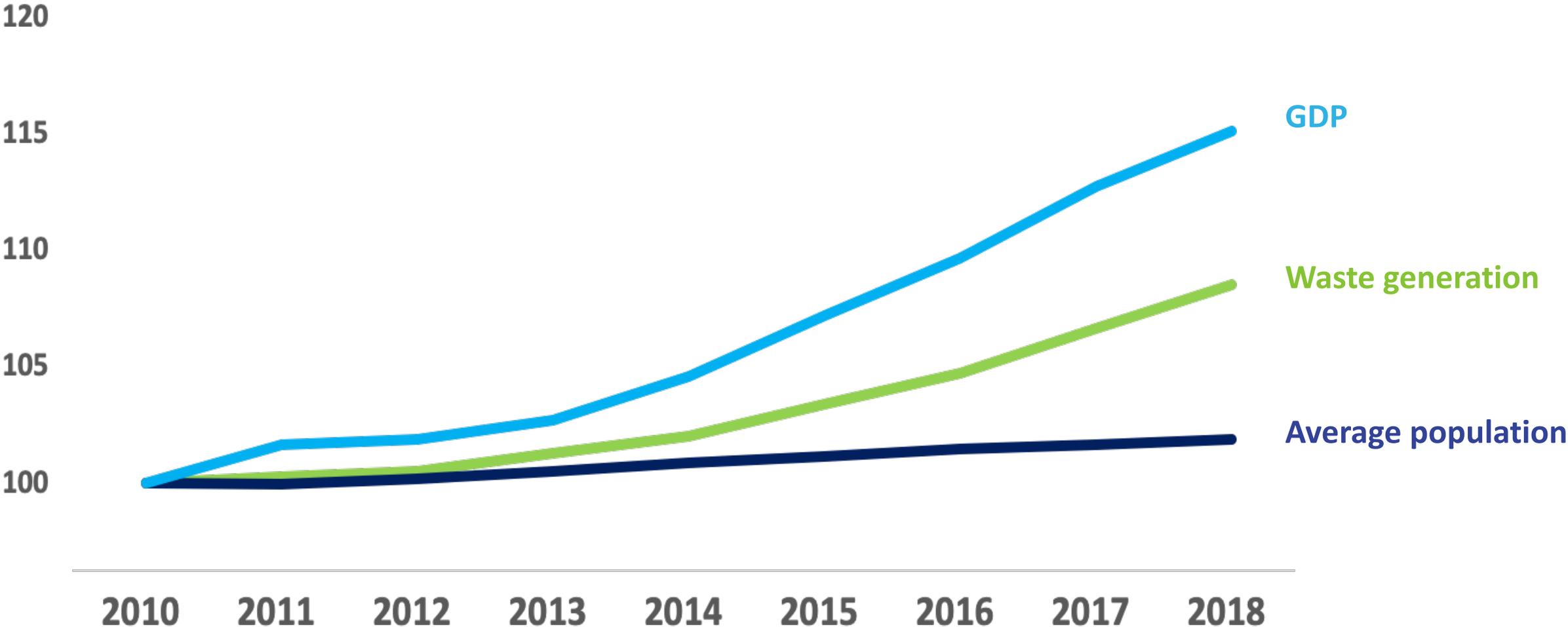
But, yet, and, ...

- DMC measured against value of GDP
- Quid total resource consumption?
- What about impact decoupling?



Waste generation is still increasing

Trends in waste generation, economic development and population, EEA-33



Circular economy as part of the European Green Deal

Circular Economy Action Plan

For a cleaner and
more competitive
Europe

- concrete actions
- strong sectoral focus
- tackling the hard issues (governance, design, EPR, external footprint, obsolescence, ...)
- systemic vision
- focus on transparency

Emphasis on the upstream aspects

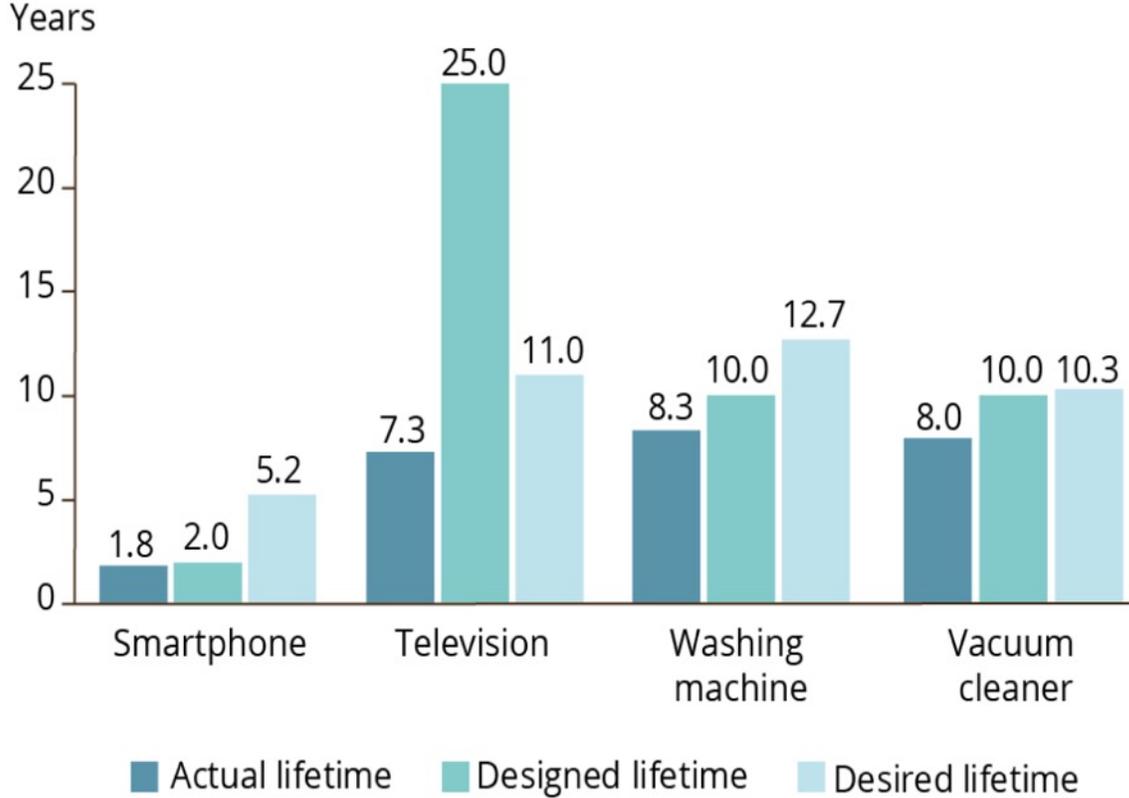


The core of this legislative initiative will be to widen the Ecodesign Directive beyond energy-related products so as to make the Ecodesign framework applicable to the broadest possible range of products and make it deliver on circularity.

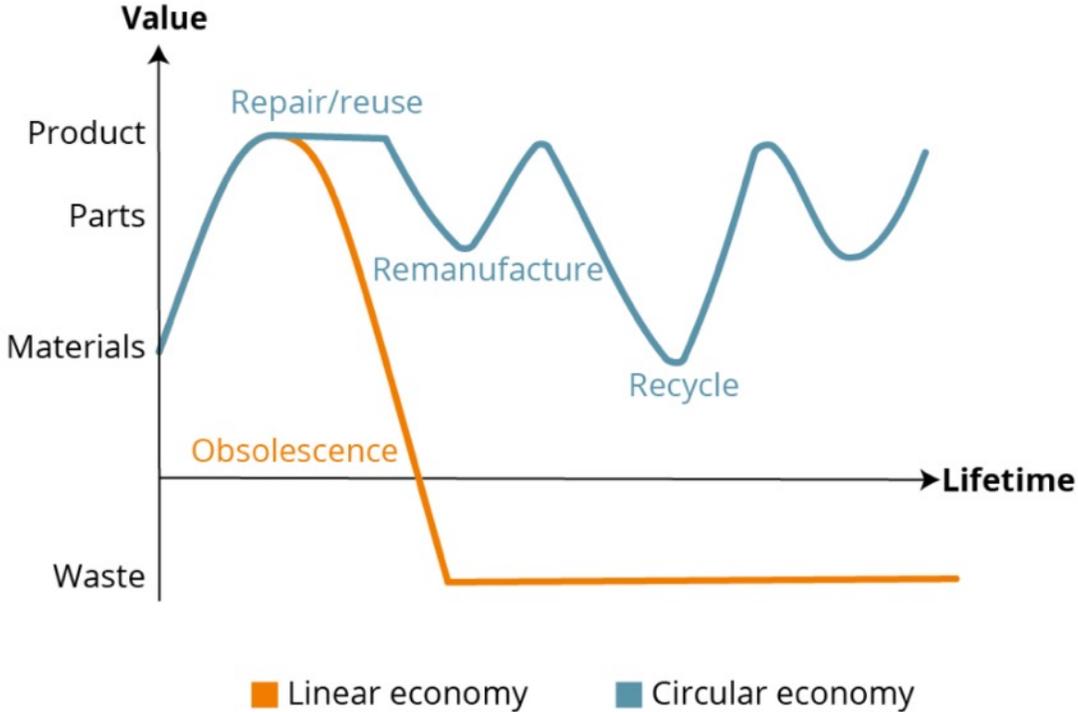
- Product durability, reusability, upgradability, reparability, remanufacturing
- Increased recycled content in products/high quality recycling
- Banning the destruction of unsold goods
- Avoid hazardous chemicals
- Reduce carbon footprint
- Product-as-a-service;
- Producers keep the ownership

Too young to die: extending product lifespans

Lifetime for smartphones and home appliances



Representation of circular vs linear economy for electronics

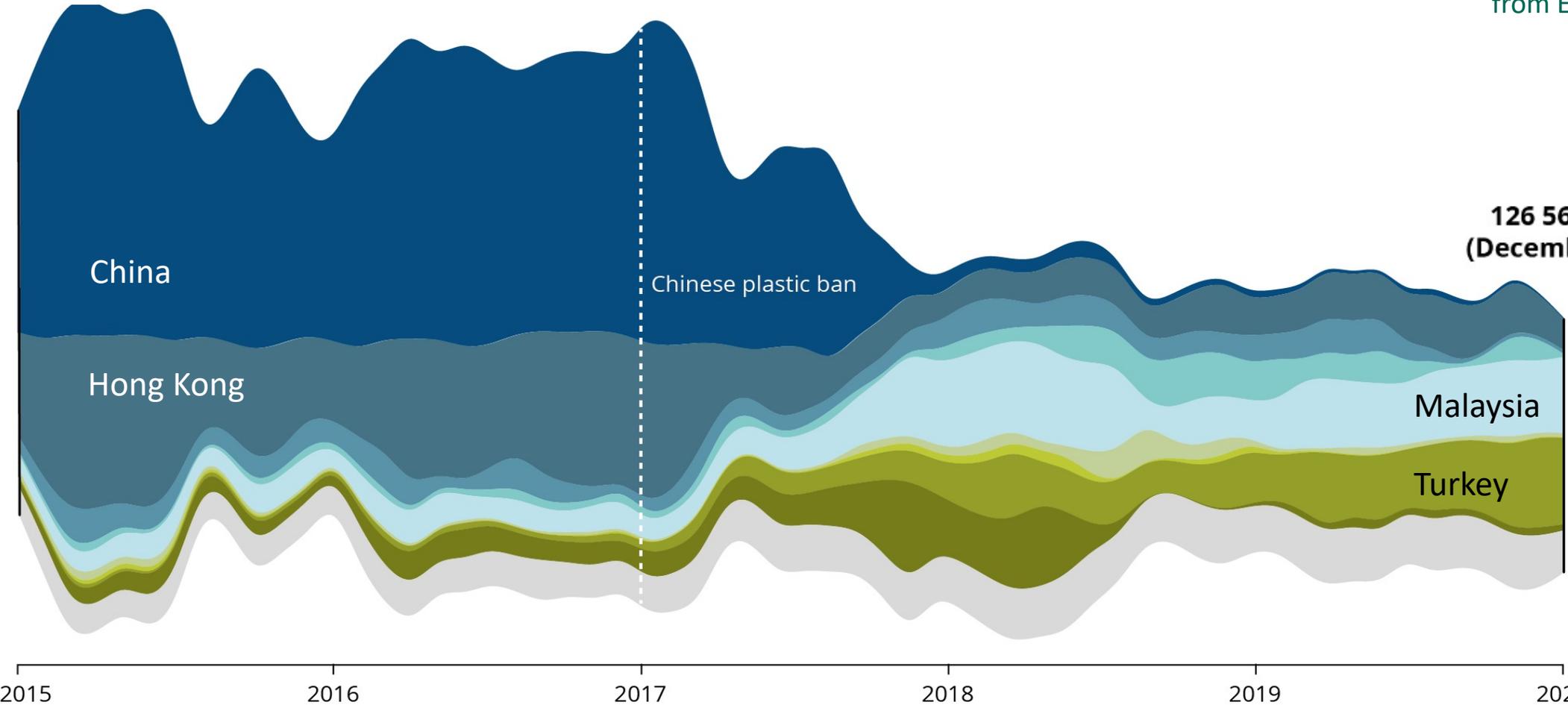


Source: ETC/WMGE

Europe's trade in plastic waste: where does it all go?

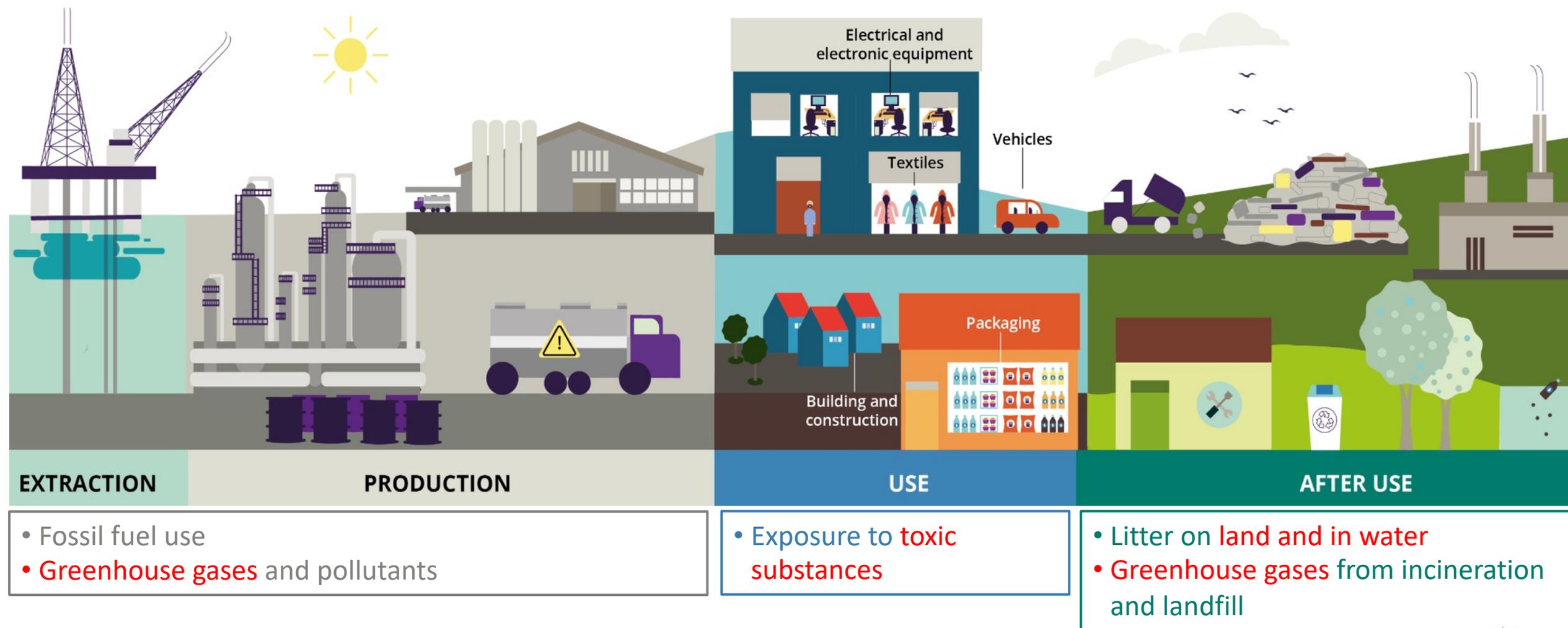
Total
201 911 tonnes
(January 2015)

Source: Reproduced
from EEA (2019).



- China
- Hong Kong
- India
- Indonesia
- Malaysia
- Taiwan
- Thailand
- Turkey
- Vietnam
- Other

Plastics: a triple-whammy



Source: EEA (2021).

Safe-by-design chemicals: reduce hazard and complexity!

'Safe and sustainable by design' Questioning the fundamentals?

Humanitarian
Elements

Enabling System Conditions
Elements

Noble
Elements

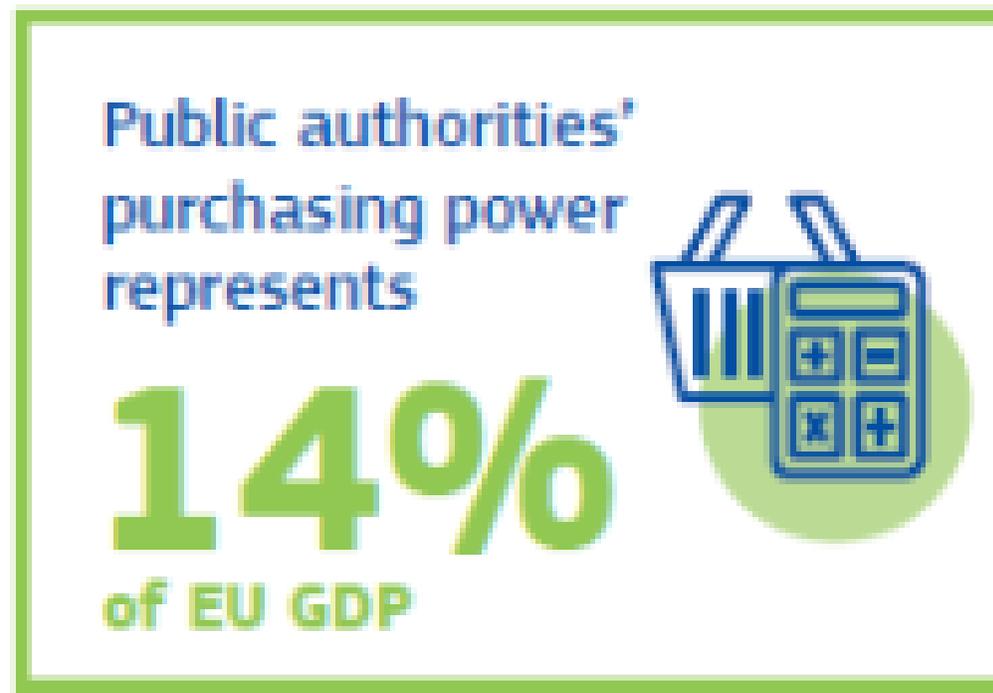
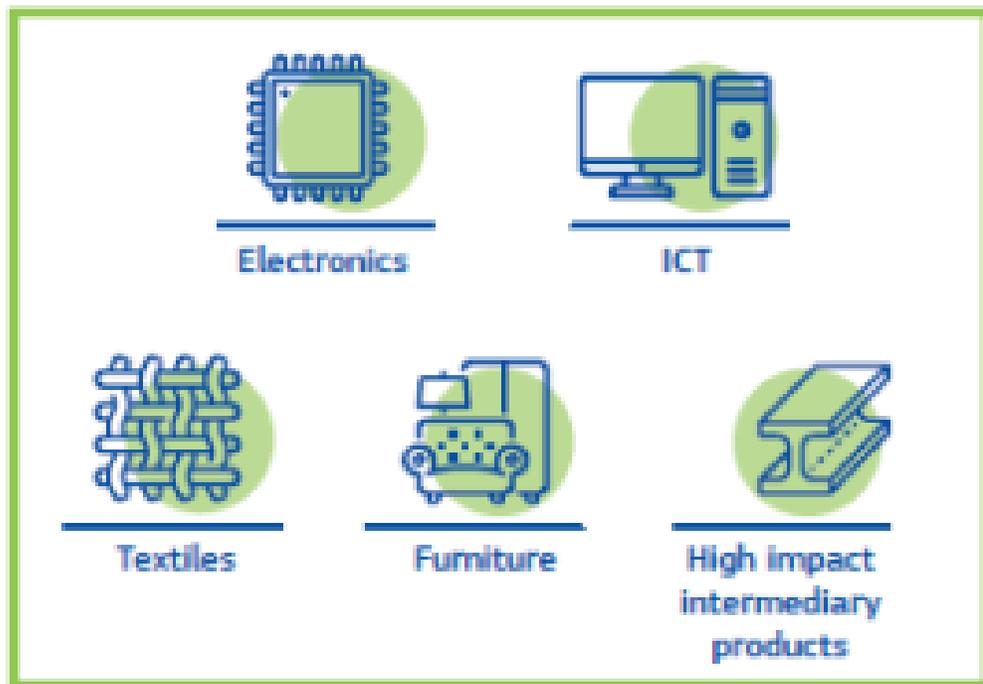
- Conceptual Frameworks
- Policies and Regulations
- Economics and Market Forces
- Tools
- Metrics

- Prevent Waste
- Atom Economy
- Less Hazardous Synthesis
- Molecular Design
- Solvents/Aux
- Energy
- Renewable Feedstocks
- Catalysis
- Degradation
- Measurement and Awareness

5 B Biomimicry	6 Cb Life Cycle Cost-Benefit Analysis	7 Ae Atom Economy	8 Pr Extended Producer Responsibility	9 Ea Epidemiological Analysis and Ecosystem Health	10 P Design for Posterity
13 Ce Circular Economy	14 Fc Full Cost Accounting	15 Ef E-Factor	16 Pb Property Based Regulation	17 Aa Alternatives Assessment	18 Lp Life-Compatible Products & Processes
31 Bd Benign by Design	32 Hc Harm Charge / Carbon Tax	33 Ff F-Factor	34 Ct Chemical Transparency	35 Lc Life Cycle Assessment	36 Z Zero Waste
49 Ie Industrial Ecology	50 Dc Depletion Charge	51 Ql Qualitative Metrics	52 Cl Chemical Leasing	53 So Solvent Selection Screens	54 Fi Chemistry is Equitable and Fully Inclusive
67 Tg Trans-Generational Design	68 Rf Sustained Research Funding	69 Qn Quantitative Metrics	70 Se Self-Enforcing Regulations	71 Cf Chemical Footprinting	72 De Benefits Distributed Equitably
85 Be Bio-Based Economy	86 Ci Capital Investment	87 Bb Chemical Body Burden	88 I Innovation Ecosystem Translation from Lab to Commerce	89 Et Education in Toxicology and Systems Thinking	90 K Extraordinary Chemical Knowledge Comes with Extraordinary Responsibility

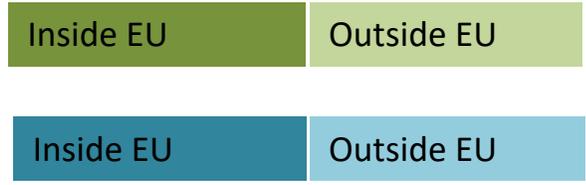
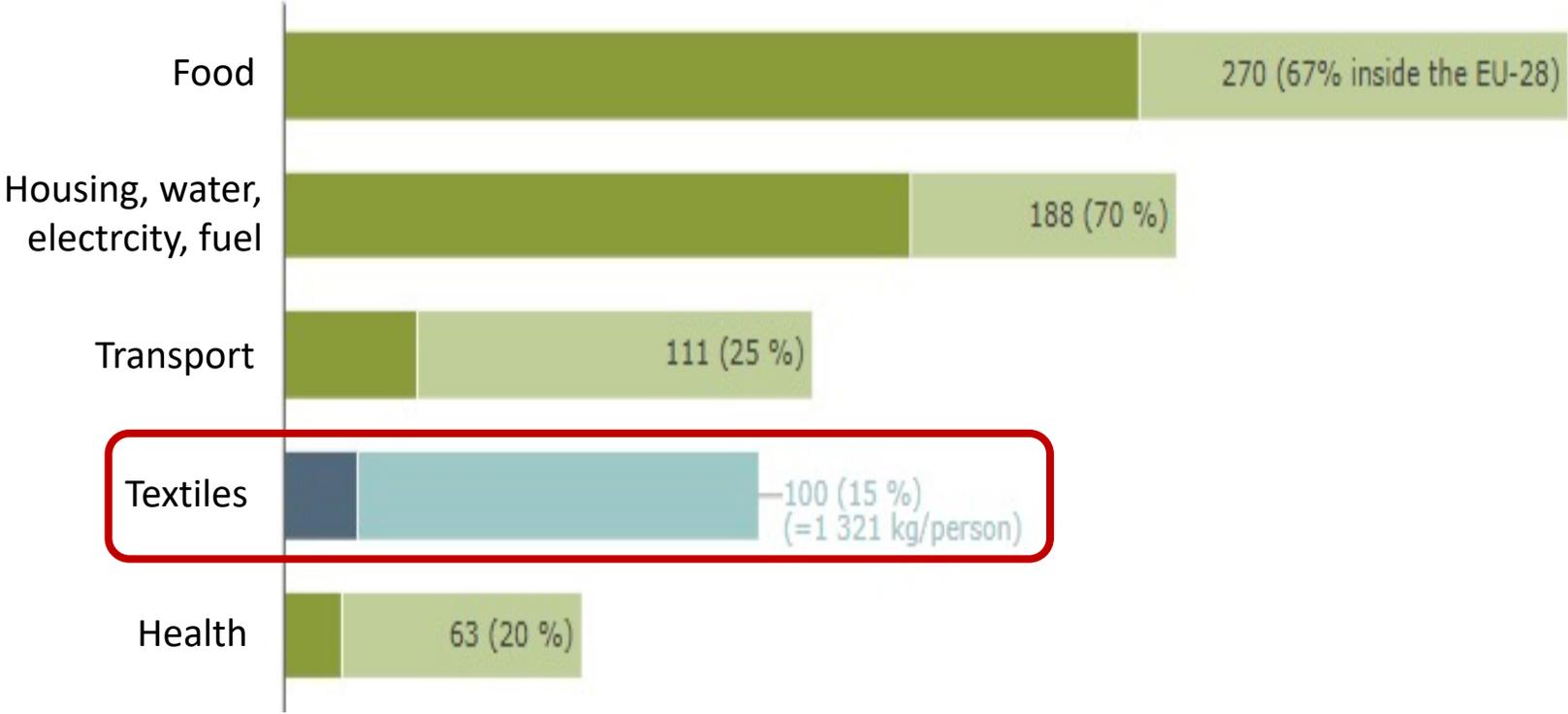
1 A Appropriate Technologies for the Developing World	3 Cw Chemistry for Wellness	4 Dd Design to Avoid Dependency	11 Sw Access to Safe and Reliable Water	12 Fg Ensure Access to Material Resources for Future Generations	19 Bf Chemistry for Benign Food Production and Nutrition	20 Tc Transparency for Chemical Communication	21 Wu Waste Material Utilization and Valorization	22 Sa Molecular Self-Assembly	23 Ru Reduce use of Hazardous Materials	24 Dg Design Guidelines	25 Aq Aqueous and Biobased Solvents	26 Ee Energy and Material Efficient Synthesis and Processing	27 Ib Integrated Biorefinery	28 E Enzymes	29 Bm Benign Metabolites	30 Sn Sensors	37 J Ensure Environmental Justice, Security, and Equitable Opportunities	38 Cs Chemistry for Sustainable Building and Buildings	39 Op One-Pot Synthesis	40 Ip Integrated Processes	41 Gc In-Situ Generation & Consumption of Hazardous Materials	42 Cm Computational Models	43 Il Ionic Liquids / Non-Volatile Solvents	44 R Renewable / Carbon-Free Energy Inputs	45 C Carbon Dioxide and other C1 Feedstocks	46 Ac Earth Abundant Metal Catalysis	47 Md Molecular Degradation Triggers	55 Pc Chemistry to Preserve Natural Carbon and Other Biogeochemical Cycles	56 Ic An Individual's Molecular Code Belongs to that Individual	57 Pi Process Intensification	58 As Additive Synthesis	59 Ch C-H Bond Functionalization	60 Ba Bioavailability / ADME	61 Sc Sub- and Super-Critical Fluids	62 Es Energy Storage / Transmission Materials	63 Sb Synthetic Biology	64 Ht Heterogeneous Catalysis	65 Dp Degradable Polymers and Other Materials	66 Ex Exposome	73 Wo No Chemicals of War or Oppression	74 Nc Molecular Codes of Nature Belong to the World	75 Ss Self-Separation	76 W Non-Covalent Derivatives / Weak Force Transformation	77 Is Inherent Safety and Security	78 Ts High Throughput Screening (Empirical / In Vivo / In Vitro)	79 S "Smart" Solvents (Obedient, Tunable)	80 V Waste Energy Utilization and Valorization	81 Bt Biologically-Enabled Transformation	82 Hm Homogeneous Catalysis	83 Pd Prediction and Design Tools	84 Ga Green Analytical Chemistry
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Stronger and more concrete sectoral emphasis



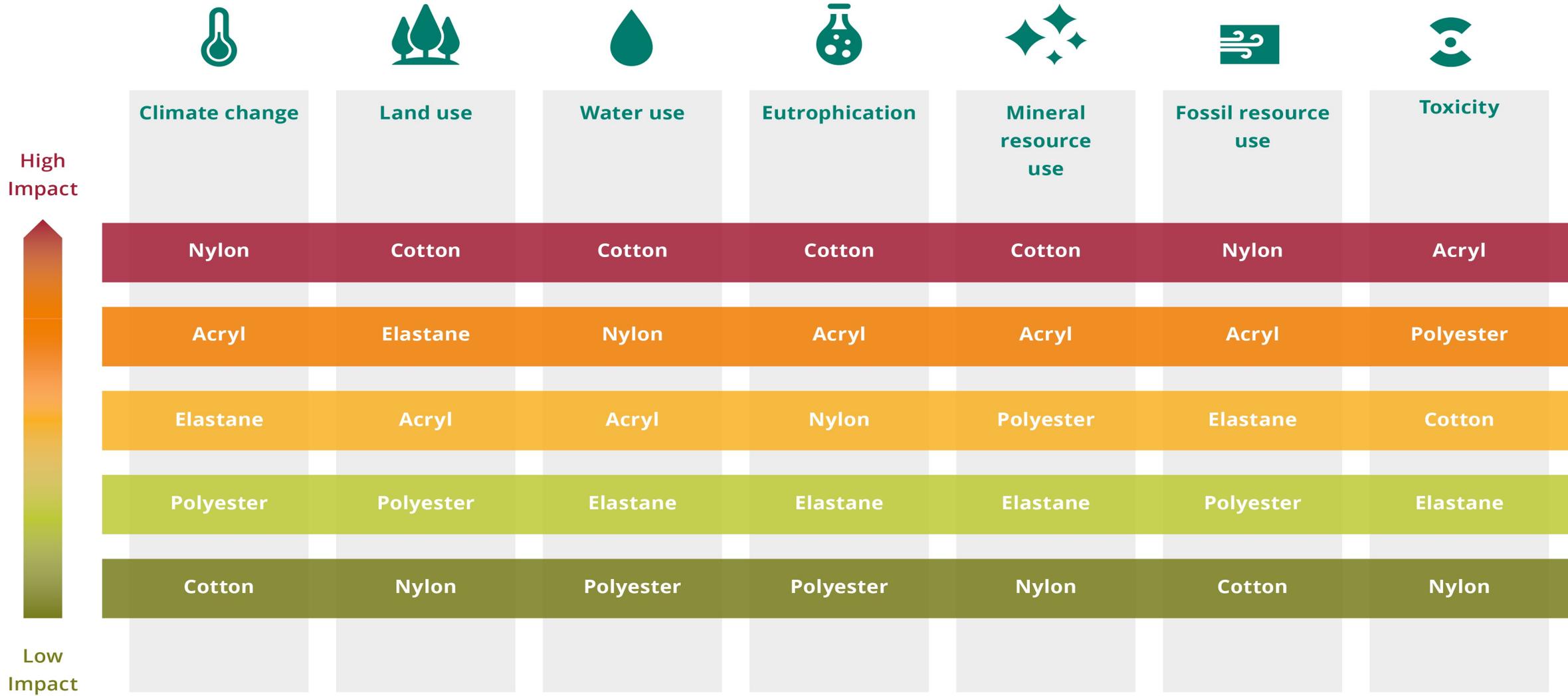
Resource-intensive: impacts of textiles

Use of primary raw materials



(Source ETC/WMGE based on Exiobase v. 3.4)

Making the right choice: no easy solutions



Electronic waste: significant loss of resources

e-waste

10.3 million tonnes (Mt)
of waste generated in EU (2015)

40 %
is officially
collected

60 %
is lost



LOSSES OF E-WASTE



0.75 Mt
thrown in
waste bin



2,2 Mt
collected with
metal scrap



0,95 Mt
recycled under
non-compliant
conditions



0.75 Mt
scavenged
for valuable
parts



1,5 Mt
exported

Designing products and systems that change behaviours

Probably negative

Increasingly complex products



Probably positive

Modular design

Sharing economy

Product services



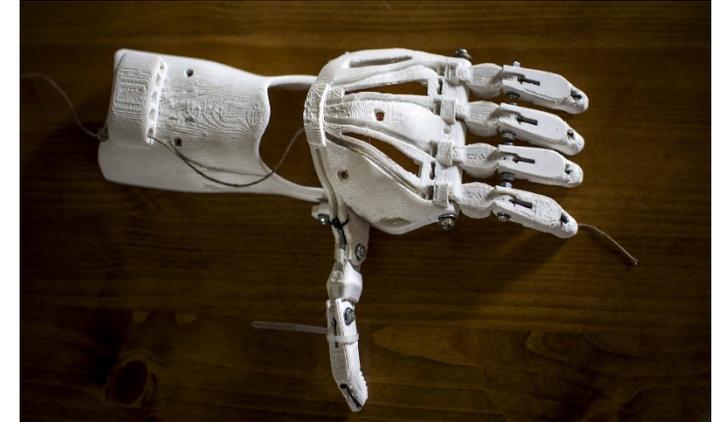
Still unclear

Home delivery systems

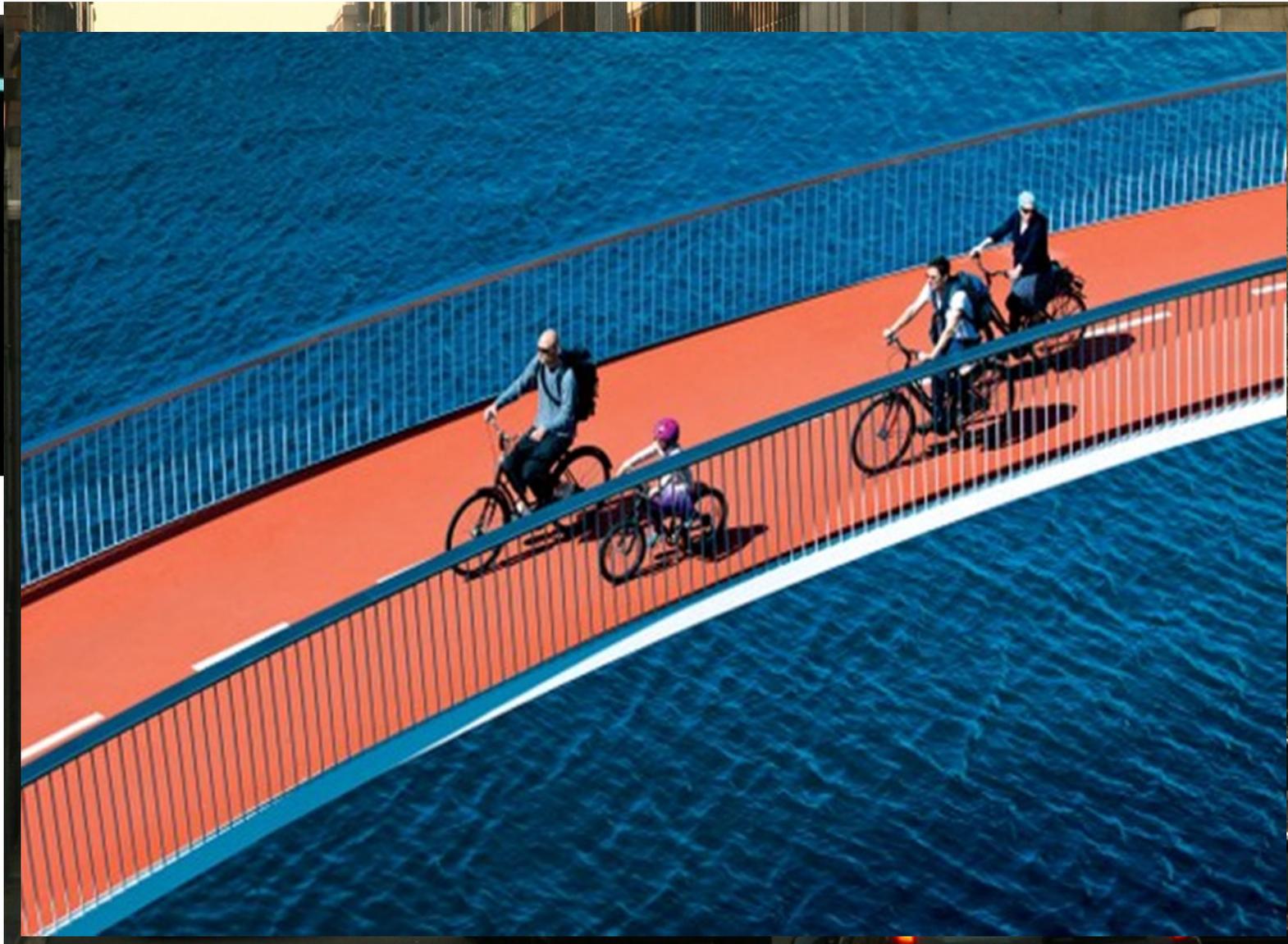
Internet of things

3D printing

Markets for recycling



Resource implications of fragmented solutions



All Canada Photos/D. Reade

Another silver bullet?
The digital **panacea**?

The background of the image is a vibrant, abstract digital space. It features a central perspective of a tunnel formed by glowing, translucent blue and cyan rectangular planes that recede into the distance. The space is filled with numerous thin, bright lines of various colors (blue, green, yellow, red) that crisscross and radiate from the center, creating a sense of depth and connectivity. Scattered throughout are many small, glowing spheres and particles in various colors, including red, blue, yellow, and white, which appear to be floating or moving through the digital environment. The overall color palette is dominated by cool blues and greens, with occasional warm accents of red and yellow.

Re-configuring the (circular) economy is an international challenge

**Increasing global material use
& globalised value chains**

**Changing demographics
& incomes**

**Distribution of social
impacts of material use**

**Distribution of supply
chain know-how**

**Virgin vs recycled
materials**



Addressing monitoring gaps: Bellagio process



1 Monitor the circular economy transition



2 Define indicator groups



3 Follow indicator selection criteria



4 Exploit a range of data/information sources



5 Ensure multilevel monitoring



6 Measure progress towards targets



7 Ensure visibility and clarity





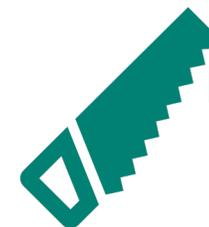
Coalition building

- **Bellagio partnership**
- **Country level**
- **Eurostat**
- **UNECE / OECD**



Innovation and pilots

- **Harvesting data from product passports**
- **Piloting the use of novel data sources**
- **Experimental Dashboard**



Delivery and implementation

- **CE State and Outlook report**
- **Experimental dashboard on CE**
- **EEA Indicator set**
- **Doubling CMUR**



EUROPEAN CLIMATE LAW

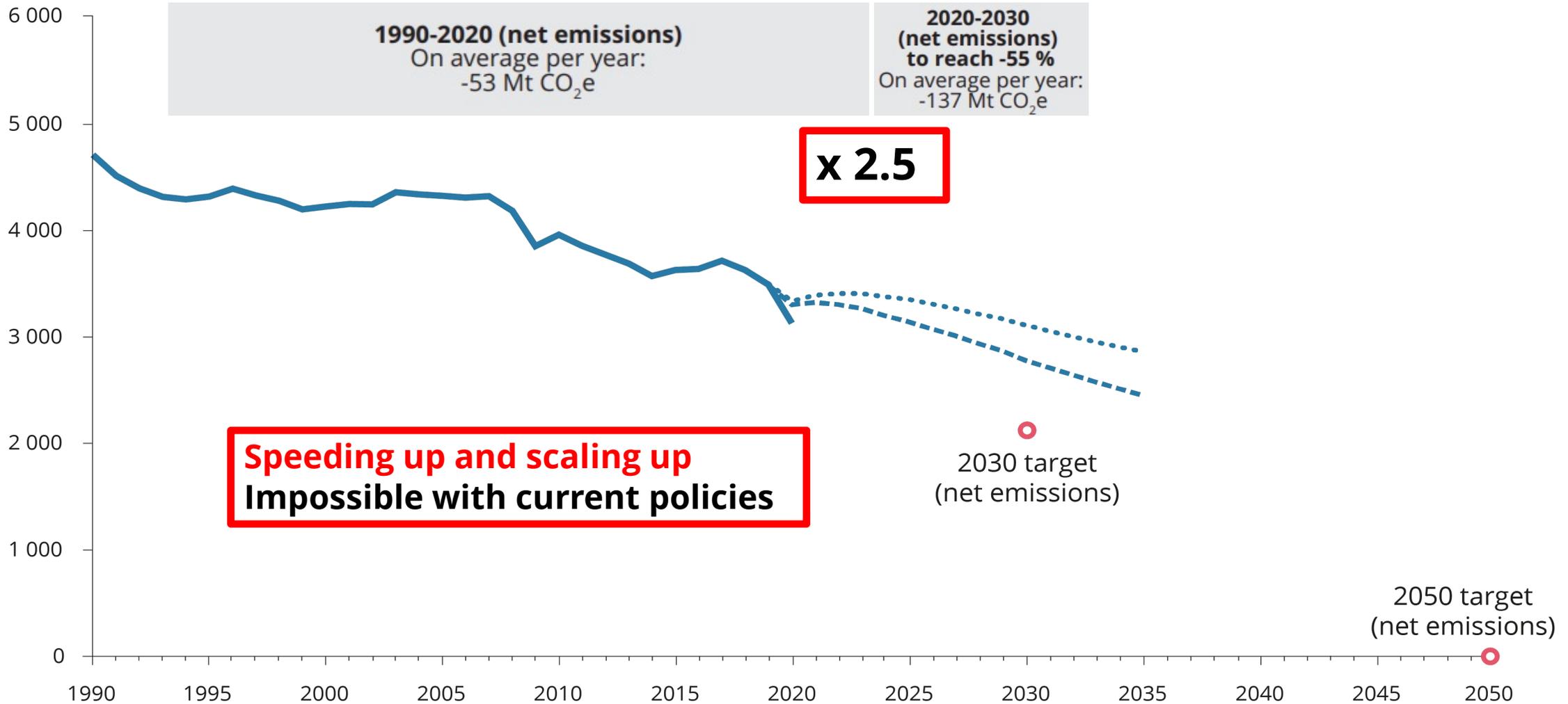
2050

CO₂



The link with Climate change ambitions

Million tonnes of CO₂ equivalent (Mt CO₂e)

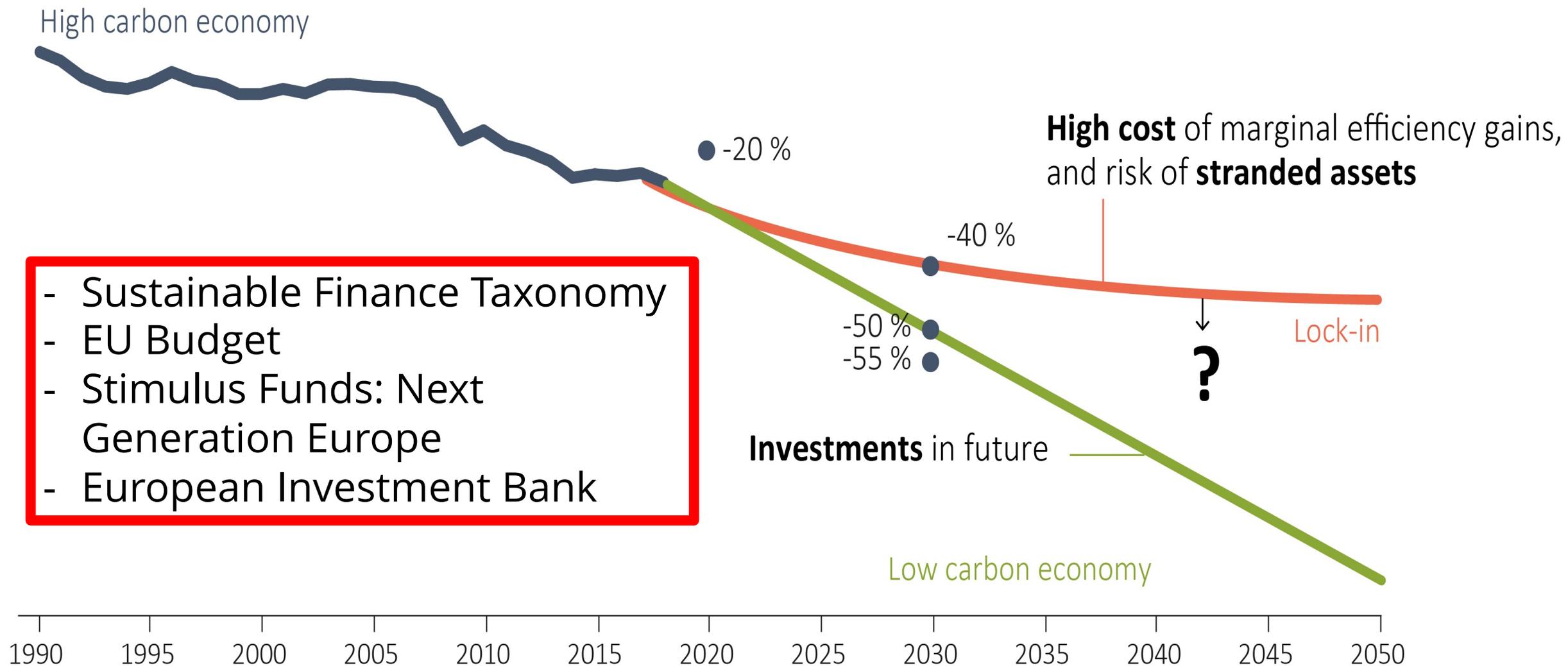


— Historical net greenhouse gas emissions

..... Projections of net emissions 'with existing measures' (WEM)

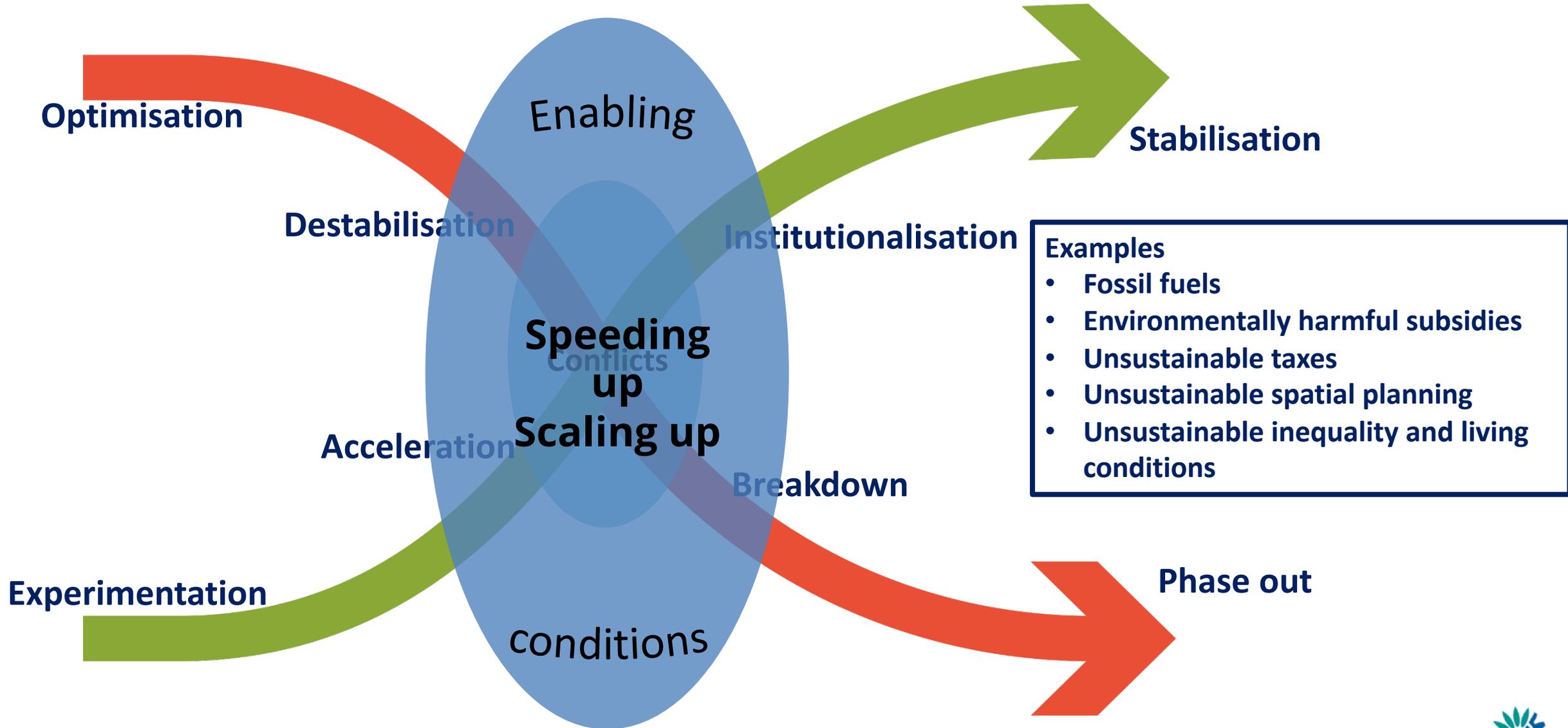
- - - - Projections of net emissions 'with additional measures' (WAM)

Investing in sustainability, not dead-end streets



- Sustainable Finance Taxonomy
- EU Budget
- Stimulus Funds: Next Generation Europe
- European Investment Bank

The 'x-curve': lacking attention for the difficult part



Conclusions

- SDGs, EGD, Climate objectives, ... impossible without fundamental shift in how we use resources
- More focus on impact decoupling needed
- Based on upstream measures and changes
- Much stronger understanding of links with biodiversity agenda needed
- Distributional issues are at this moment largely forgotten in the Circular Economy debate in Europe

A large, colorful pile of plastic waste, including bottles, containers, and toys, piled up on a boat or dock. The waste is piled high and is the central focus of the image. The background shows a body of water and a cloudy sky.

Thank you

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