Aalto University
School of Arts, Design
and Architecture

Sustainable design S1

Mikko Jalas, Tatu Marttila, Anubhuti Bhatnagar
24.4.2023

Agenda

13.15-13.45 Course schedule and teacher introductions.

13.45-14.30 ‘Where do you think change comes from’ exercise

14.40-15.15 Sustainability approaches and priorities

- *Planetary boundaries, ‘Radar’, including climate change mitigation*
- *Safe and just space for humanity, ‘Donough’*
- *Circular economy, ‘Butterfly’*
- *Sustainable consumption and 1,5 degree lifestyles*
- *Relating to the ‘topical’ sustainability issues*

15.15-15.45 Design ‘on demand’ / ‘ at root causes’ / ‘for priority materials’

Mikko Jalas,
Associate professor, Co-Innovating for Circular Solutions

Teaching:
Creative Sustainability
BA Sustainable Design
Aalto BIZ

Research:
Time use, renewable energy, energy efficiency, DIY

Emerging interests:
Energy justice,
Eco-welfare state

ORSI
TOWARDS ECO-WELFARE STATE

Aalto-yliopisto
Taiteiden ja suunnittelun korkeakoulu

Tatu Marttila (D.A.)

Senior lecturer in Design for Sustainability

Main teaching roles:

- English BA Design
- Creative Sustainability Master's Programme

Research focus: Transition research, strategic codesign, service design, ecodesign

Other interests: Education for SD, Circular economy, Urban CO2 monitoring

the Learning Network on Sustainability

SMART ENERGY TRANSITION

NONTOX

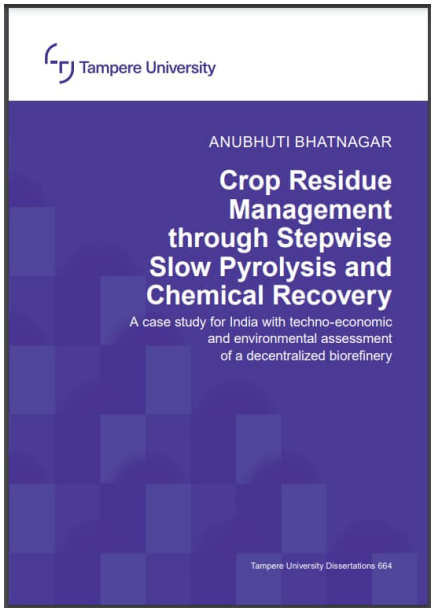
ICOS Integrated Carbon Observation System

Anubhuti Bhatnagar (D.Sc., Tech)

Teaching assistant for Design for Sustainability

Research focus: Social life cycle assessment of textile waste

Other interests: Circular economy, Environmental assessment, Biomass conversion process



t-rex

Recommended practices / housekeeping

- **Be active in the class. If you feel comfortable, introduce yourself when you ask a question or make a comment.**
- **Bring a laptop to the class. We use online whiteboards.**
- **If you did not get the chance to ask a question or want to make an anonymously comment, you can use the Presemo at https://presemo.aalto.fi/artx1008sustainabledesign.**
- **Assignment boxes have cut-off times. Please observe them.**
- **The reflections/learning diary is something that benefits your learning. Start writing it from the very beginning.**

Where do you think change comes from? Driving forces of sustainability?

- **Consumers and value change**
- **Innovative business**
- **Science and technology**
- **Regulation**

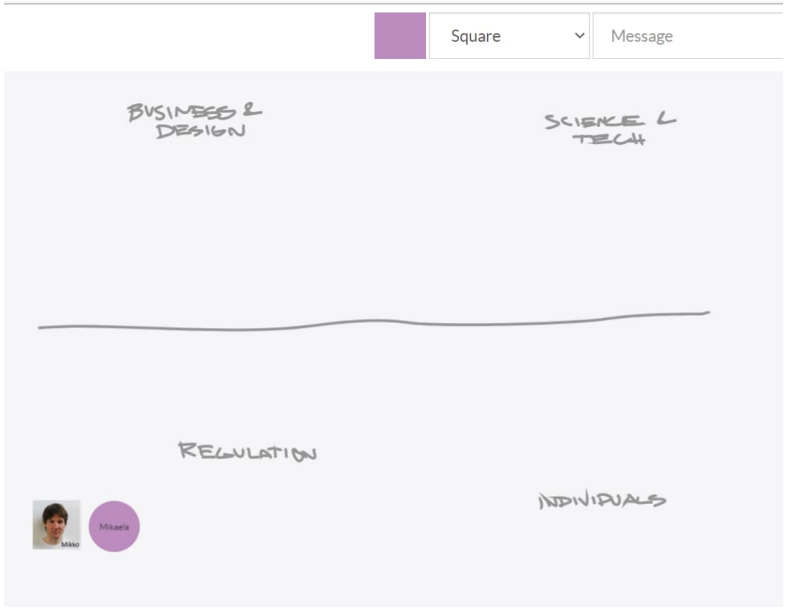
Pick a corner and go talk with others about your choice.

Be ready introduce your perspective,

Where do you think change comes from? Driving forces of sustainability?

Go to Flinga *https://flinga.fi/s/FQJP4ZQ* **and place a sticker with your name on the whiteboard. Instead of a sticker, you can place your photo with your name on it.**

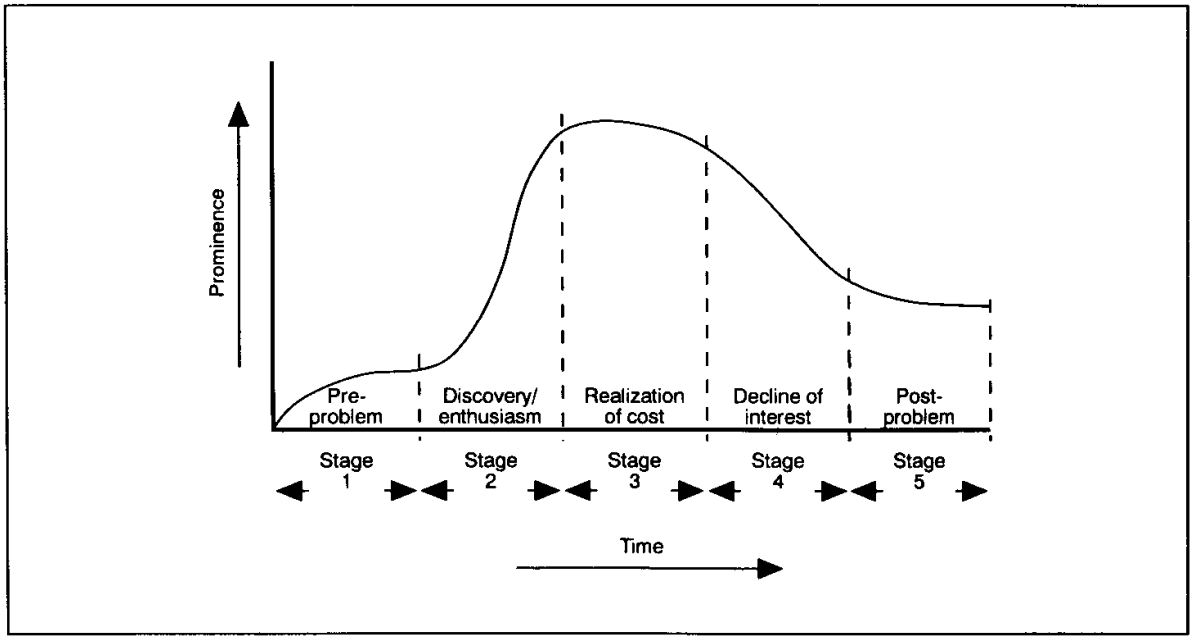
Use the Presemo Chat to comment (anonymously) *https://presemo.aalto.fi/artx1008sustainabledesign*



What issues to address: what is topical, when to get engaged

Caught in the ‘topical’

‘News’ as entertainment



Downs, A. (1996): The “Issue-Attention Cycle”. *The politics of american economic policy making*, 48.

Emergence of microplastics discourse

The scientific ‘discovery’ took place in 2005.

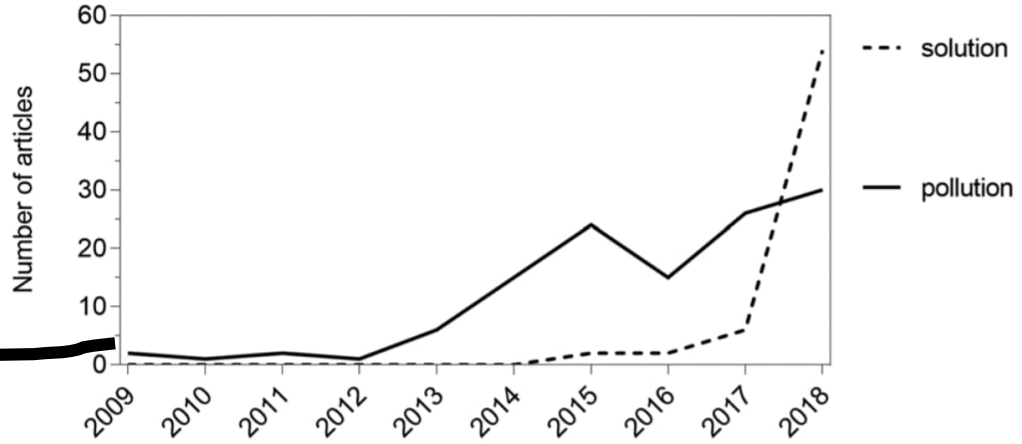
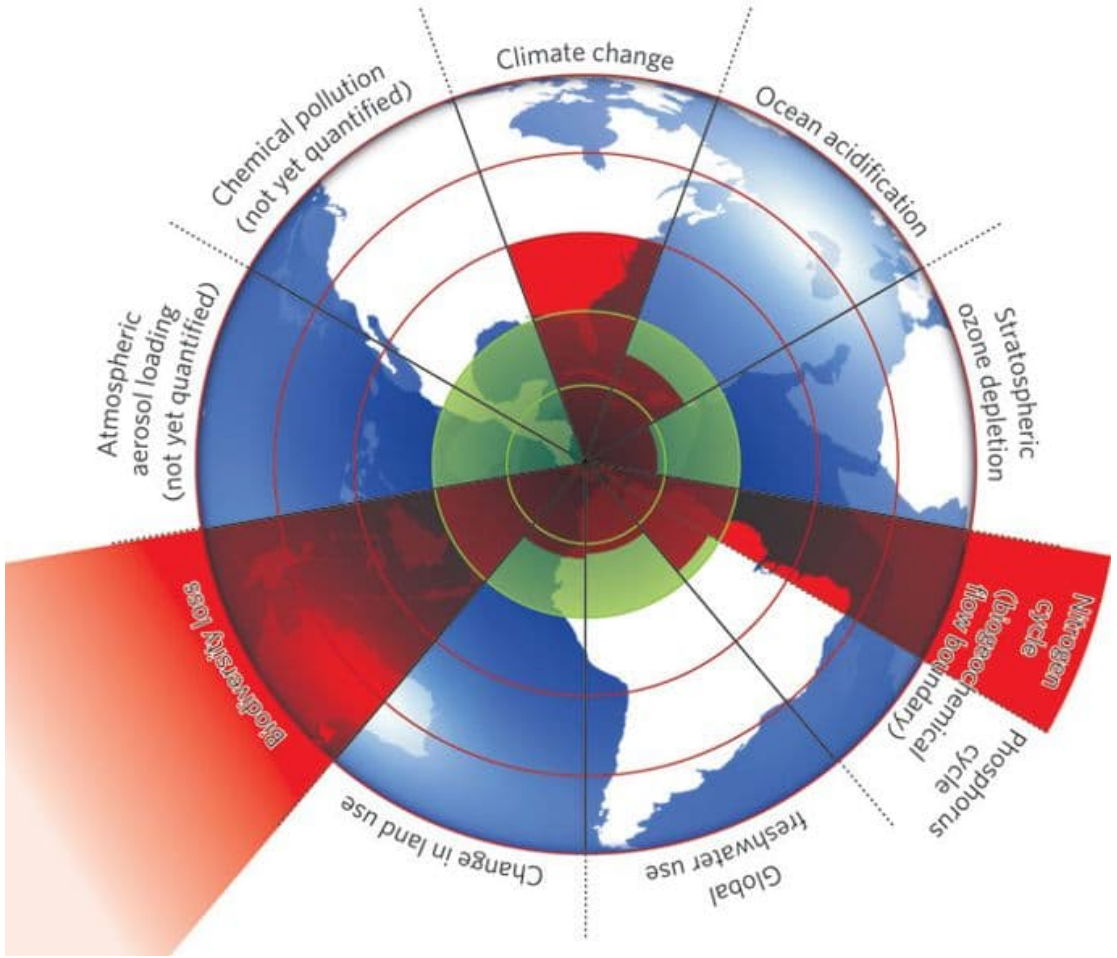


Figure 2. Number of published media articles on (micro)plastics per year addressing two main topics, $n = 186$.

The Guardian (UK), The New York Times (USA), and HuffPost (UK + USA) as quality newspapers and The Sun (UK) and USA Today as tabloids

Völker, C., Kramm, J., & Wagner, M. (2019). On the Creation of Risk: Framing of Microplastics Risks in Science and Media. *Global Challenges*, 1900010.

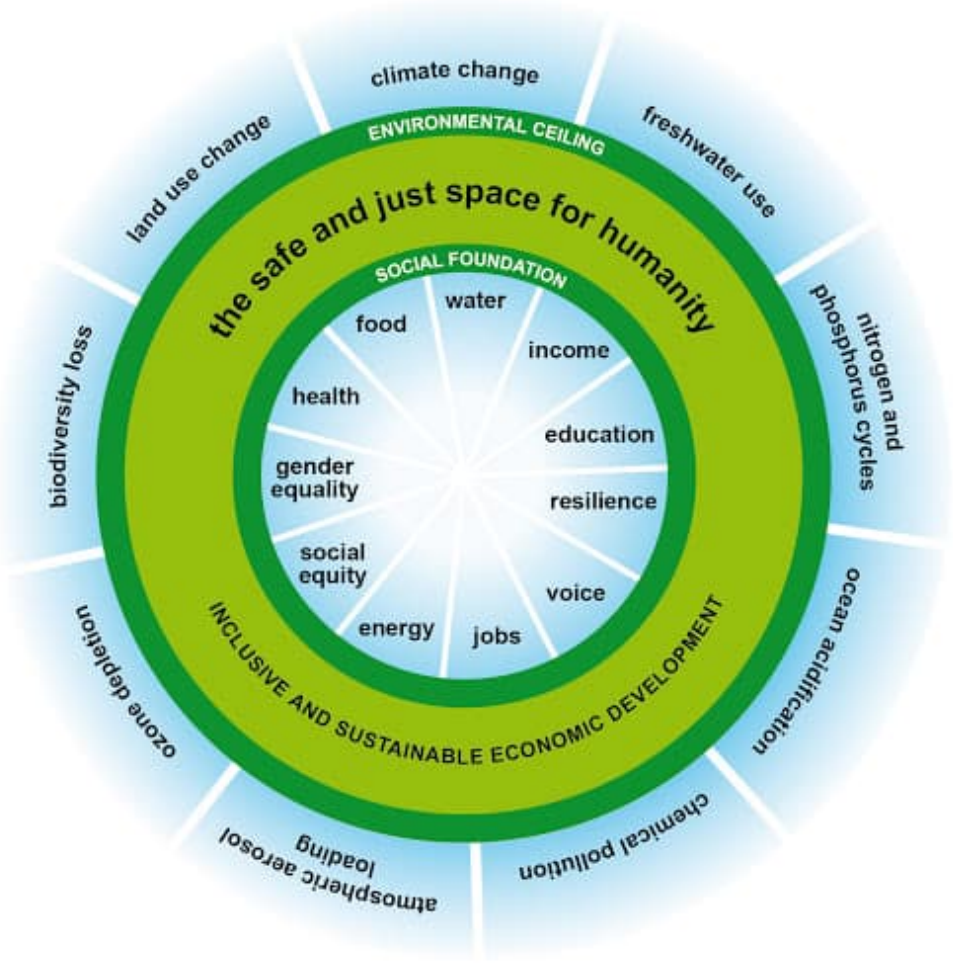
What issues are you dealing with: Planetary boundaries



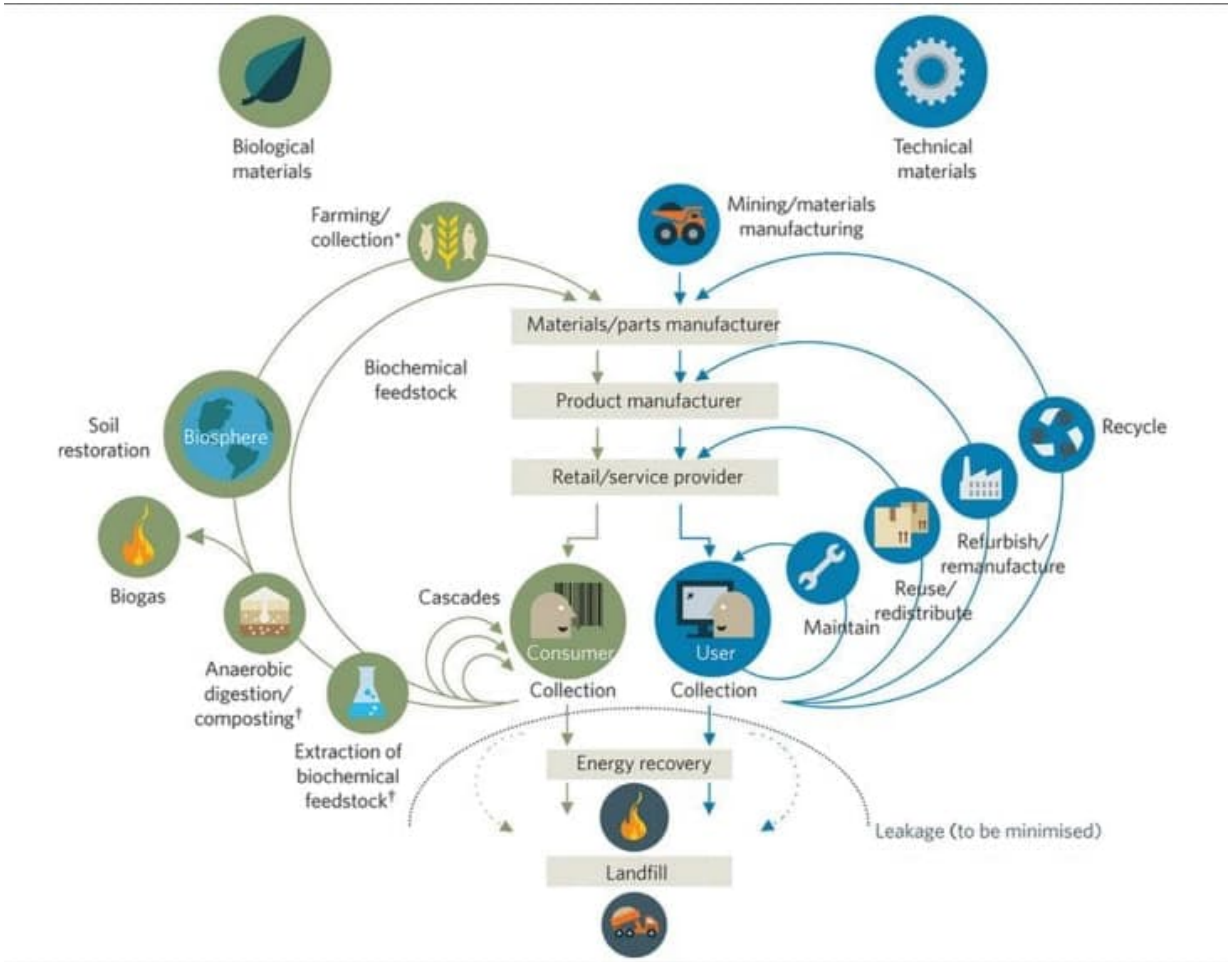
Short description of the logic and dimensions:
https://www.youtube.com/watch?v=8dCU6jd-S9Y
A view on how the economic and political systems are connected to the PP's
https://www.youtube.com/watch?v=qLV4wjdac8A

Safe and just space for humanity

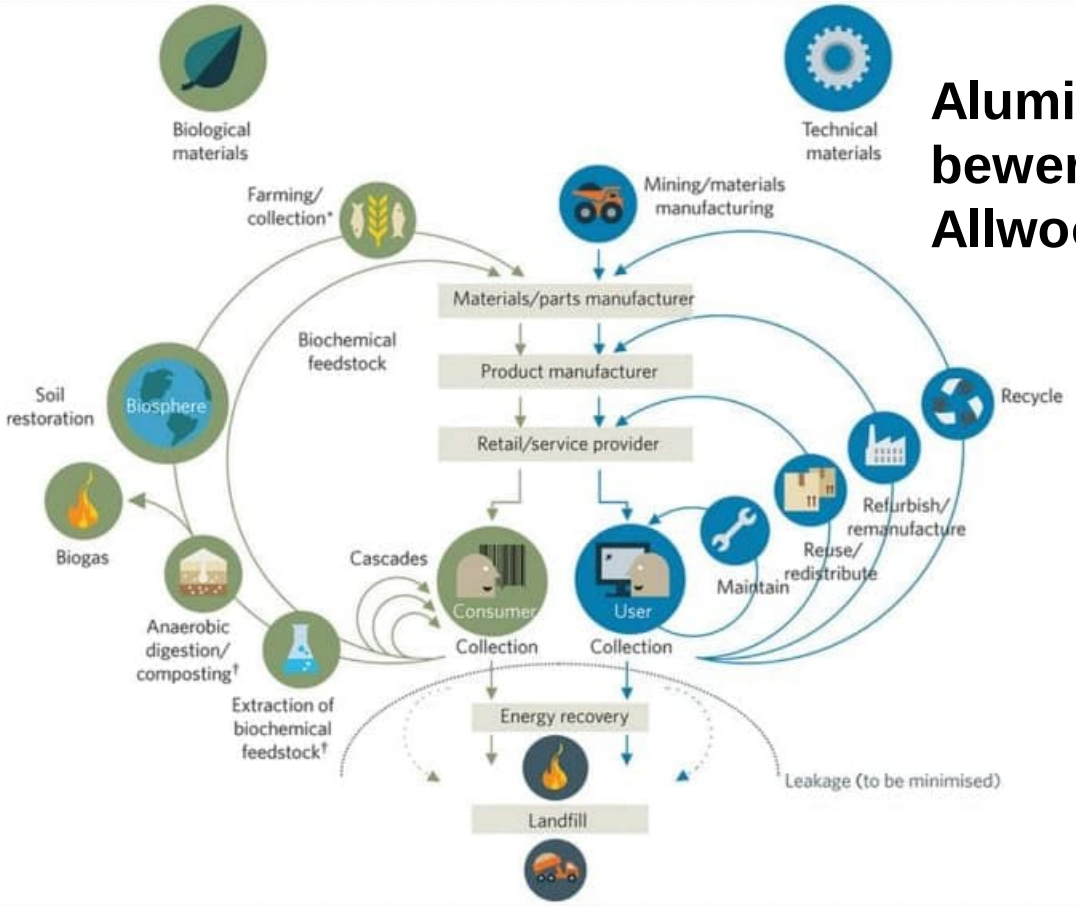
Raworth 2012



Circular economy

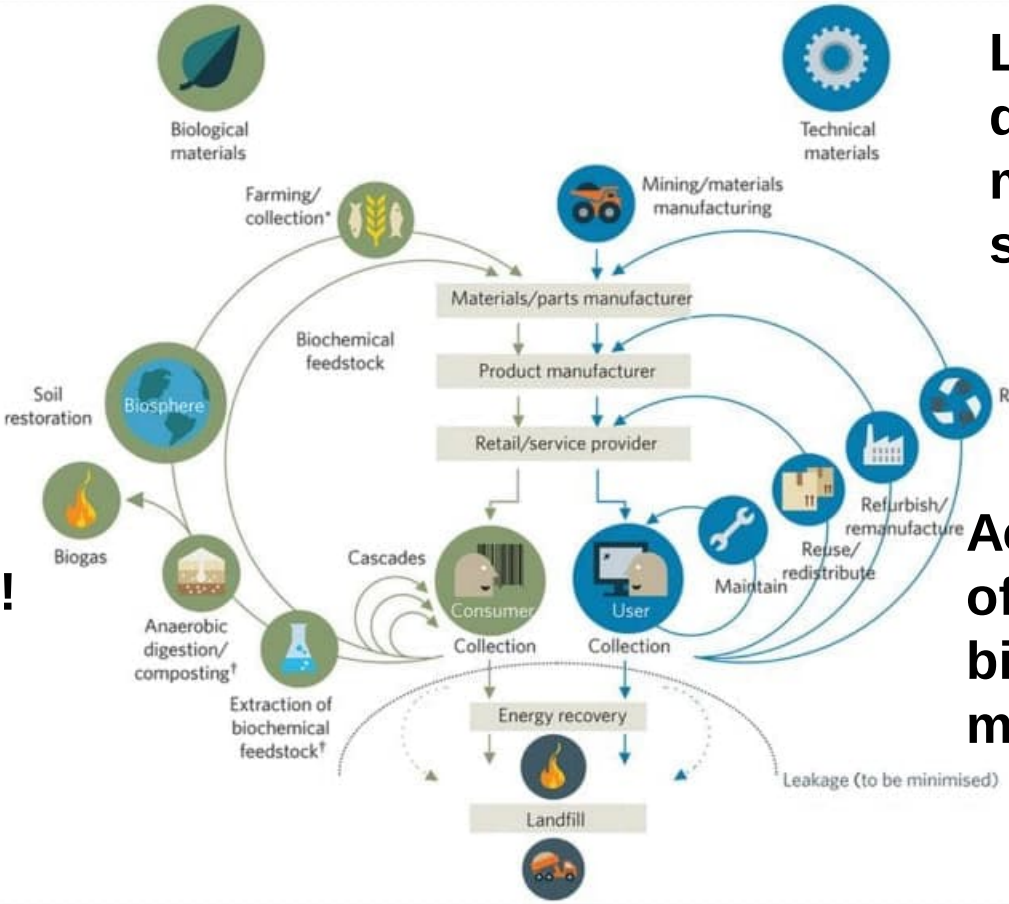


Circular economy



Aluminium bewerage can in Allwood et al ?

Circular economy

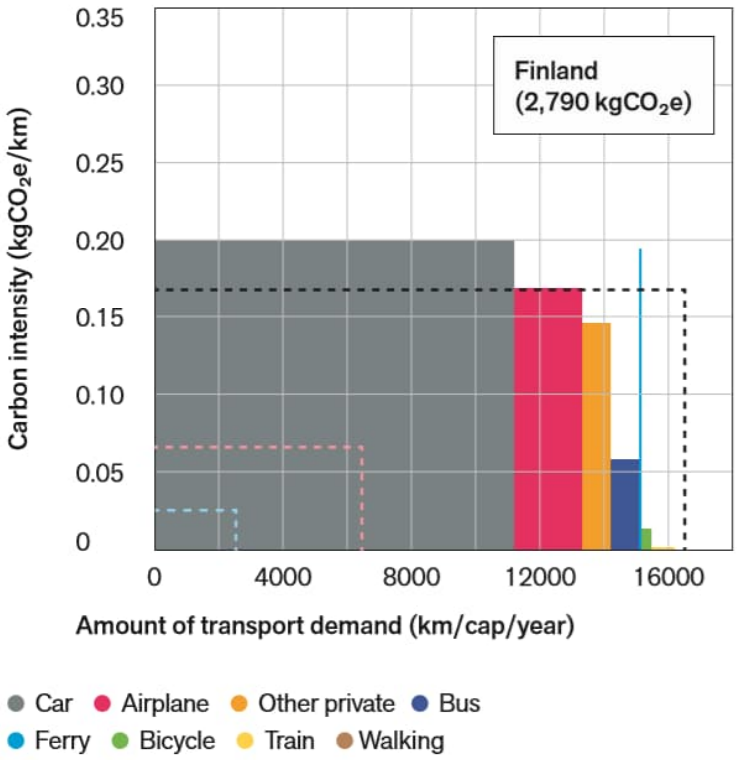


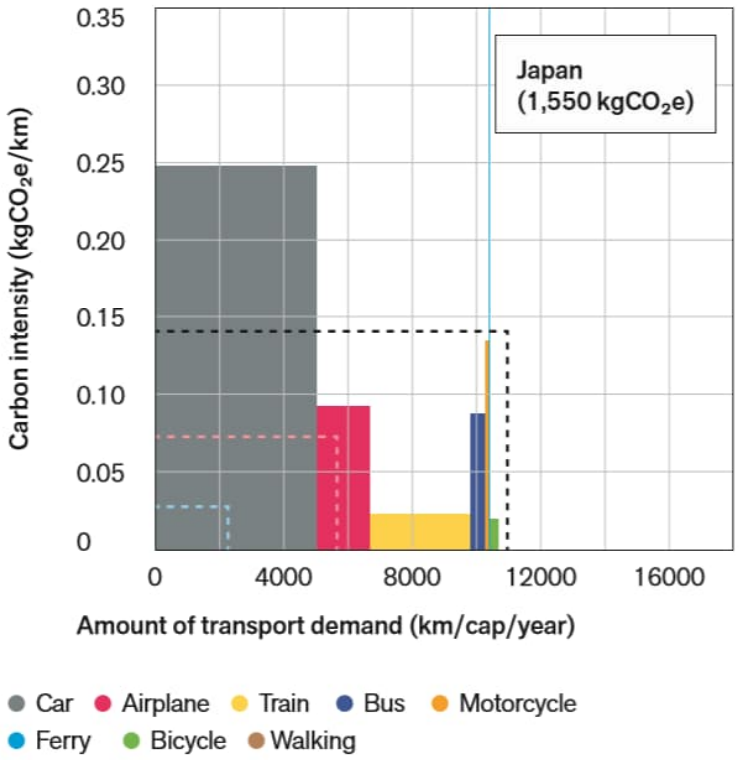
Loss/ quality of the material stock!

Biodiversity!
Land use!
Bio-accumulation!
Soil health!

Accumulation of non-biodegradable materials

Figure 3.8. A comparison of carbon footprints and their breakdown (mobility, in $kgCO_2e$/cap/year 2017)

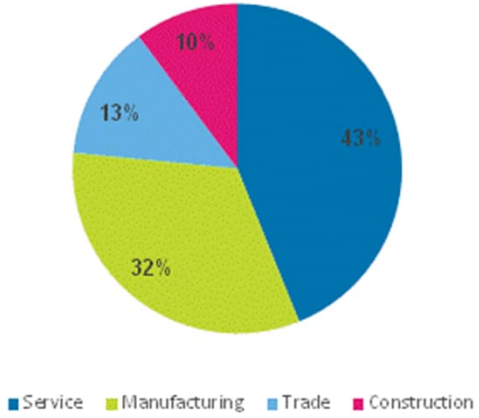




Source: 1,5 Degree Lifestyles. Targets and options for reducing lifestyle carbon footprint.

I=PAT

$$I_{mpact} = P_{opulation} \times A_{ffluence\ [€]} \times T_{echnology\ [impact/€]}$$



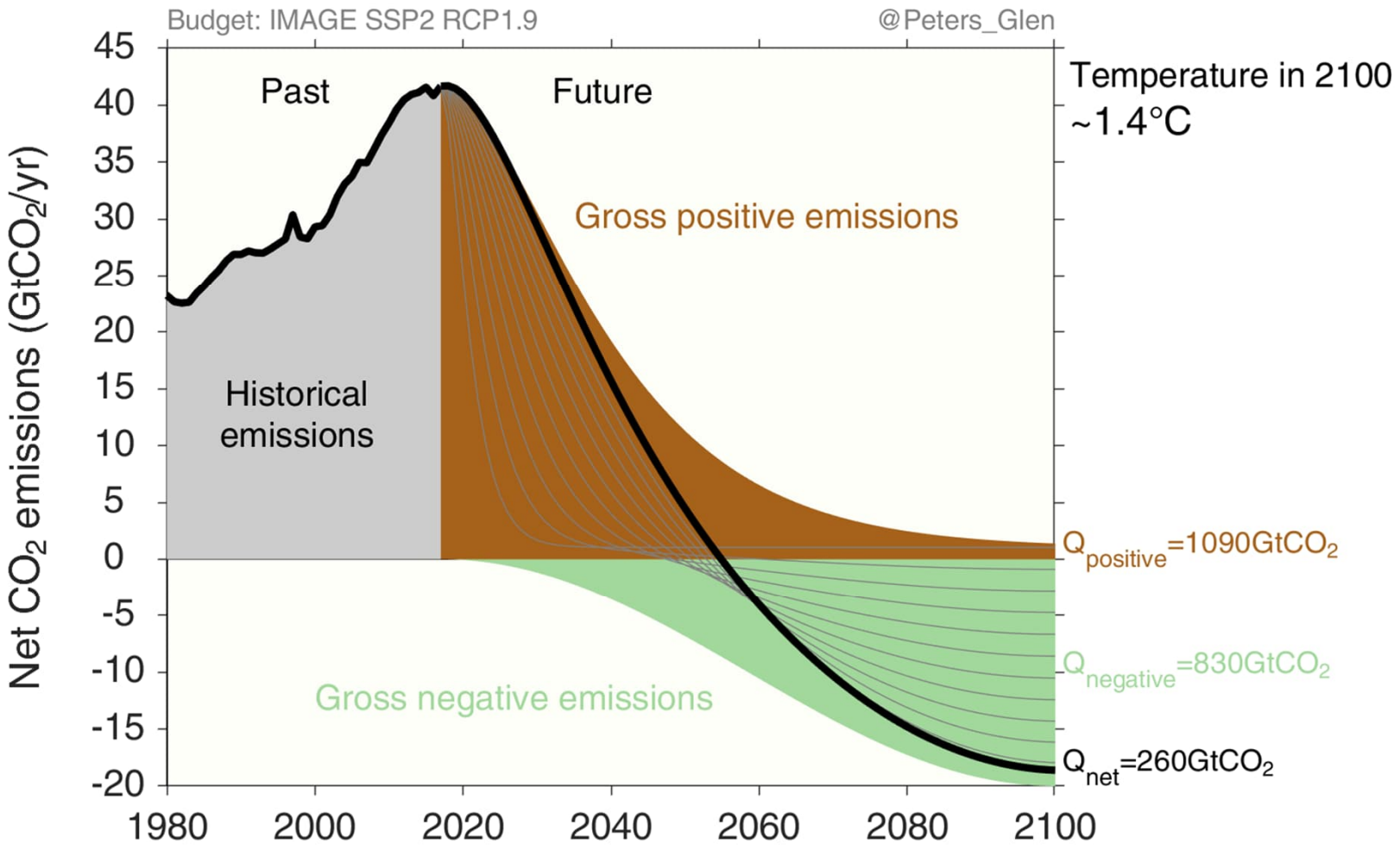
How to address issues?

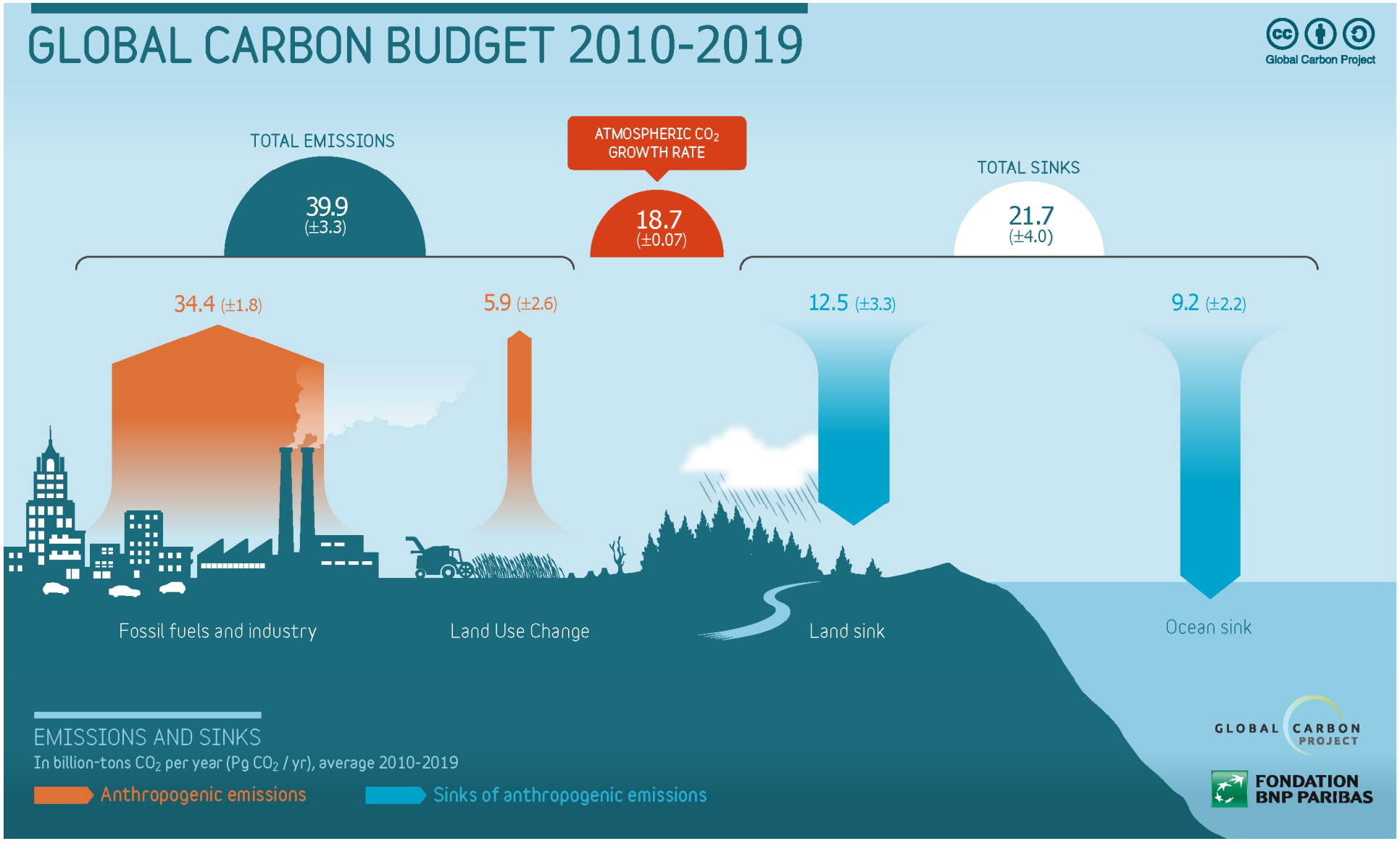
A systemic view to microplastic pollution can be found by studying the laundry practices of people and what cleanliness means for them.

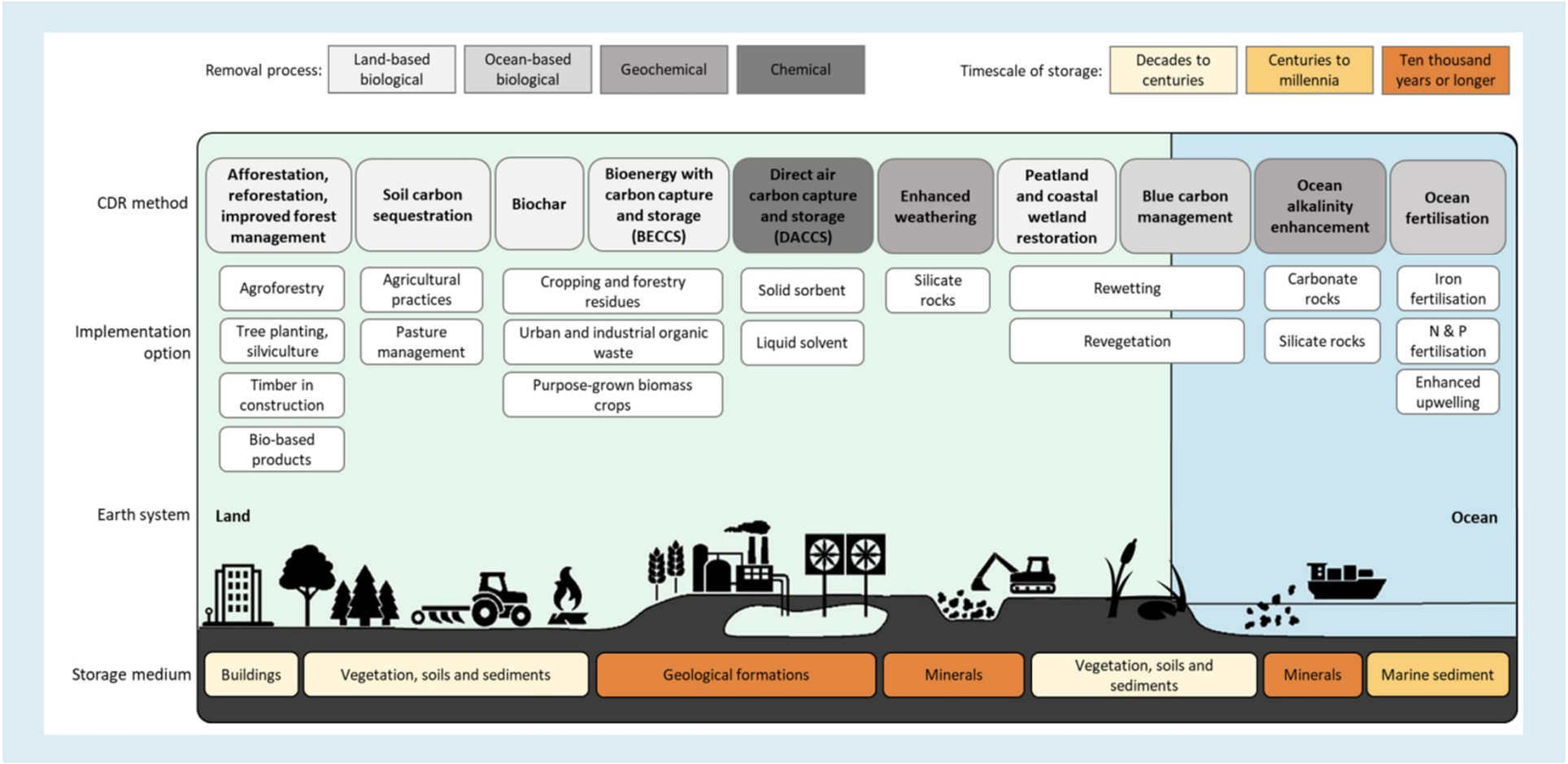
Svartström A. (2019): Towards reducing microplastic fiber pollution in local and global waterways. Master thesis in Creative Sustainability.

Flickr: Kasia

Flickr:Йоана Петрова


Budget: IMAGE SSP2 RCP1.9
@Peters_Glen
Net CO_2 emissions ($GtCO_2$/yr)
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
1980
2000
2020
2040
2060
2080
2100
Past
Future
Historical emissions
Gross positive emissions
Gross negative emissions
Temperature in 2100
~1.4°C
$Q_{positive}$=1090$GtCO_2$
$Q_{negative}$=830$GtCO_2$
Q_{net}=260$GtCO_2$


GLOBAL CARBON BUDGET 2010-2019
Global Carbon Project
TOTAL EMISSIONS
39.9
(±3.3)
ATMOSPHERIC CO_2 GROWTH RATE
18.7
(±0.07)
TOTAL SINKS
21.7
(±4.0)
34.4 (±1.8)
5.9 (±2.6)
12.5 (±3.3)
9.2 (±2.2)
Fossil fuels and industry
Land Use Change
Land sink
Ocean sink
EMISSIONS AND SINKS
In billion-tons CO_2 per year (Pg CO_2 / yr), average 2010-2019
Anthropogenic emissions
Sinks of anthropogenic emissions
GLOBAL CARBON PROJECT
FONDATION BNP PARIBAS


Removal process:
Land-based biological
Ocean-based biological
Geochemical
Chemical
Timescale of storage:
Decades to centuries
Centuries to millennia
Ten thousand years or longer
CDR method
Afforestation, reforestation, improved forest management
Soil carbon sequestration
Biochar
Bioenergy with carbon capture and storage (BECCS)
Direct air carbon capture and storage (DACCS)
Enhanced weathering
Peatland and coastal wetland restoration
Blue carbon management
Ocean alkalinity enhancement
Ocean fertilisation
Implementation option
Agroforestry
Tree planting, silviculture
Timber in construction
Bio-based products
Agricultural practices
Pasture management
Cropping and forestry residues
Urban and industrial organic waste
Purpose-grown biomass crops
Solid sorbent
Liquid solvent
Silicate rocks
Rewetting
Revegetation
Carbonate rocks
Silicate rocks
Iron fertilisation
N & P fertilisation
Enhanced upwelling
Earth system
Land
Ocean
Storage medium
Buildings
Vegetation, soils and sediments
Geological formations
Minerals
Vegetation, soils and sediments
Minerals
Marine sediment

IPCC AR6 WG3,

Allwood et al on materials
(and the embedded CO2 emissions)

Material use is the hidden source of unsustainability.

Fundamental for modern/urban lifestyles

High in volume and space

Toxic by-products

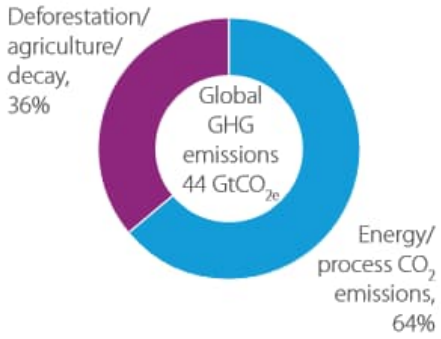
Rare and subject to conflict

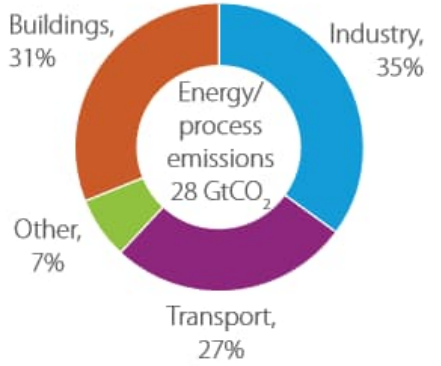
Why ‘With two eyes open’?

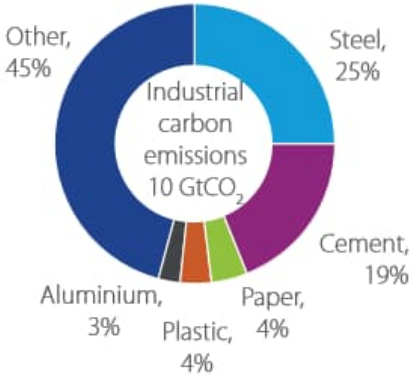

Flickr: Malin and Espen

Allwood et al ch2

- **Most of CO2 emissions are due to energy use and processes.**
- **Industrial processes are the single biggest source of CO2**
- **Steel, cement, aluminum, paper and plastics are most important materials ‘behind‘ CO2 emissions.**







Allwood et al ch2

Industrial production and treatment of materials accounts for half of worlds CO2 eq emissions.

A further breakdown of emissions in China give a proxy for the whole world.

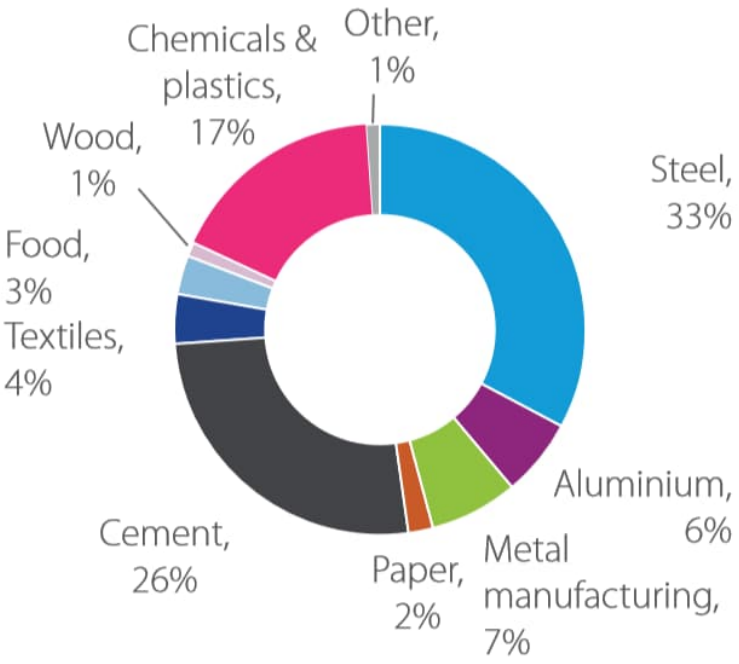
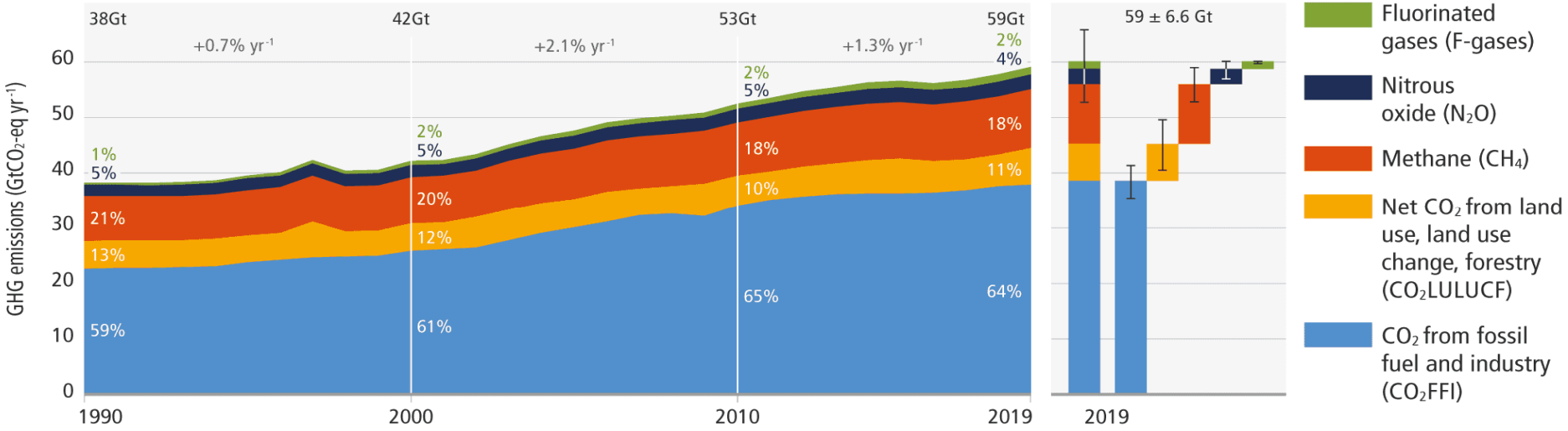


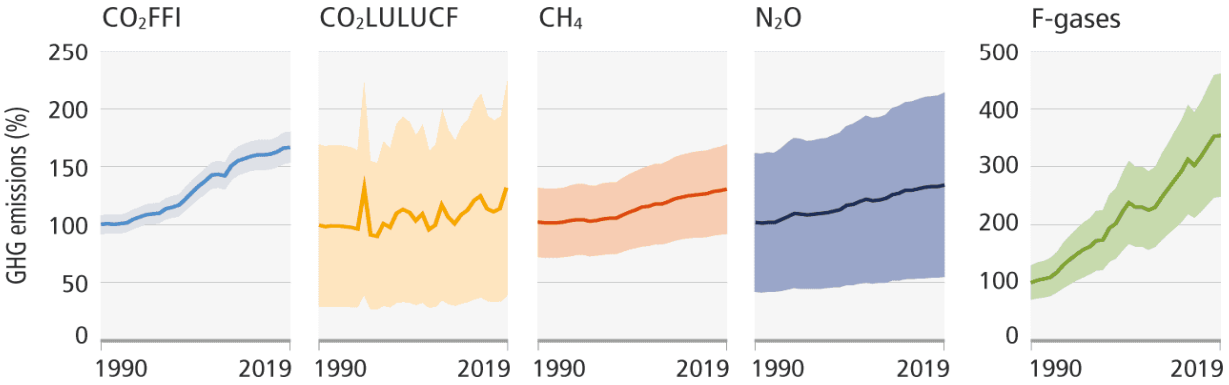
Figure 2.4—**Sources of Chinese CO_2 emissions**

Global net anthropogenic emissions have continued to rise across all major groups of greenhouse gases.

a. Global net anthropogenic GHG emissions 1990–2019 [5]



b. Global anthropogenic GHG emissions and uncertainties by gas – relative to 1990



	2019 emissions ($GtCO_2$-eq)	1990–2019 increase ($GtCO_2$-eq)	Emissions in 2019, relative to 1990 (%)
CO_2 FFI	38±3	15	167
CO_2 LULUCF	6.6±4.6	1.6	133
CH_4	11±3.2	2.4	129
N_2O	2.7±1.6	0.65	133
F-gases	1.4±0.41	0.97	354
Total	59±6.6	21	154

The solid line indicates central estimate of emissions trends. The shaded area indicates the uncertainty range.

For next time

Read the text by Ceschin and Gaziulusoy

Calculate carbon footprint with SITRA's lifestyle calculator
https://lifestyletest.sitra.fi/

Place your footprint score at https://flinga.fi/s/FQH5S2W
You are also free to choose to place your score anonymously without your name.

Indicate your groupwork preferences
at https://forms.gle/4tCxhwHYCpfAP4TQ9