Aalto ARTS – Creative Sustainability

Design Approaches to Sustainable Consumption

4.2.2021

# One-Planet Lifestyles

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# Michael Lettenmeier

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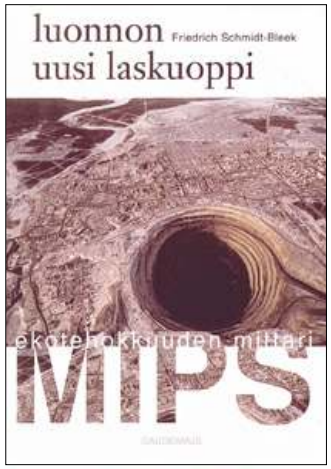
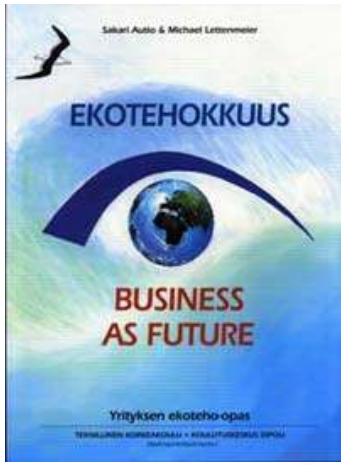
- From Germany to Finland in 1988 and 2010
- D-mat ltd., Wuppertal Institute, Aalto University
- Consulting, training, research, projects
- Resource-efficiency, Material Footprint, Sustainability
- Companies, authorities, universities, research institutes, NGOs



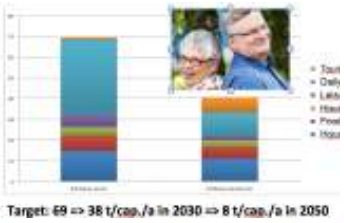



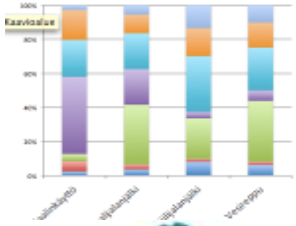


# D-mat ltd.

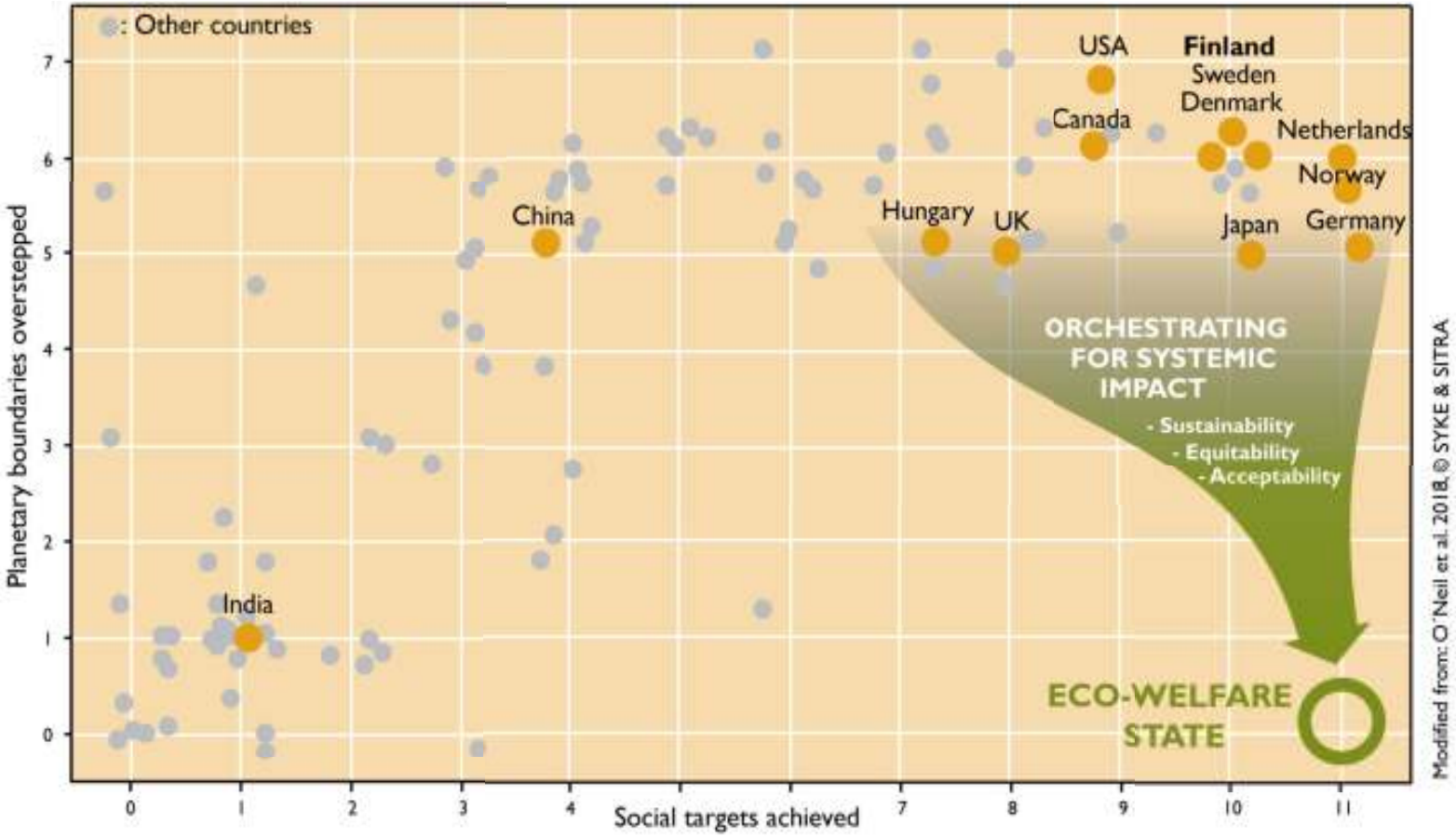
## Research, experimentation, consulting, training

- Mission: Make people and organisations enthusiastic about and active towards our sustainable future
- New ideas and coaching for companies, municipalities, research institutes, comsumers and others on the challenges and opportunities of our sustainable future
- Making sustainability visible and operationable by calculating material and other footprints of companies, products, processes, households, etc.



# No country in the world has achieved high welfare on an ecologically sustainable basis




www.ecowelfare.fi

# One-Planet Lifestyles
# – The Sustainable Consumption Challenge

- Overconsumption and the material footprint
- Impacts of consumption domains and consumption patterns
- MIPS and the Material Footprint:
  making (over)consumption measurable
- 1.5-Degree Lifestyles
- Assignment and The 1.5-Degree Puzzle

# Does anyone know what happened the 22nd August 2020?

# EARTH OVER SHOOT DAY

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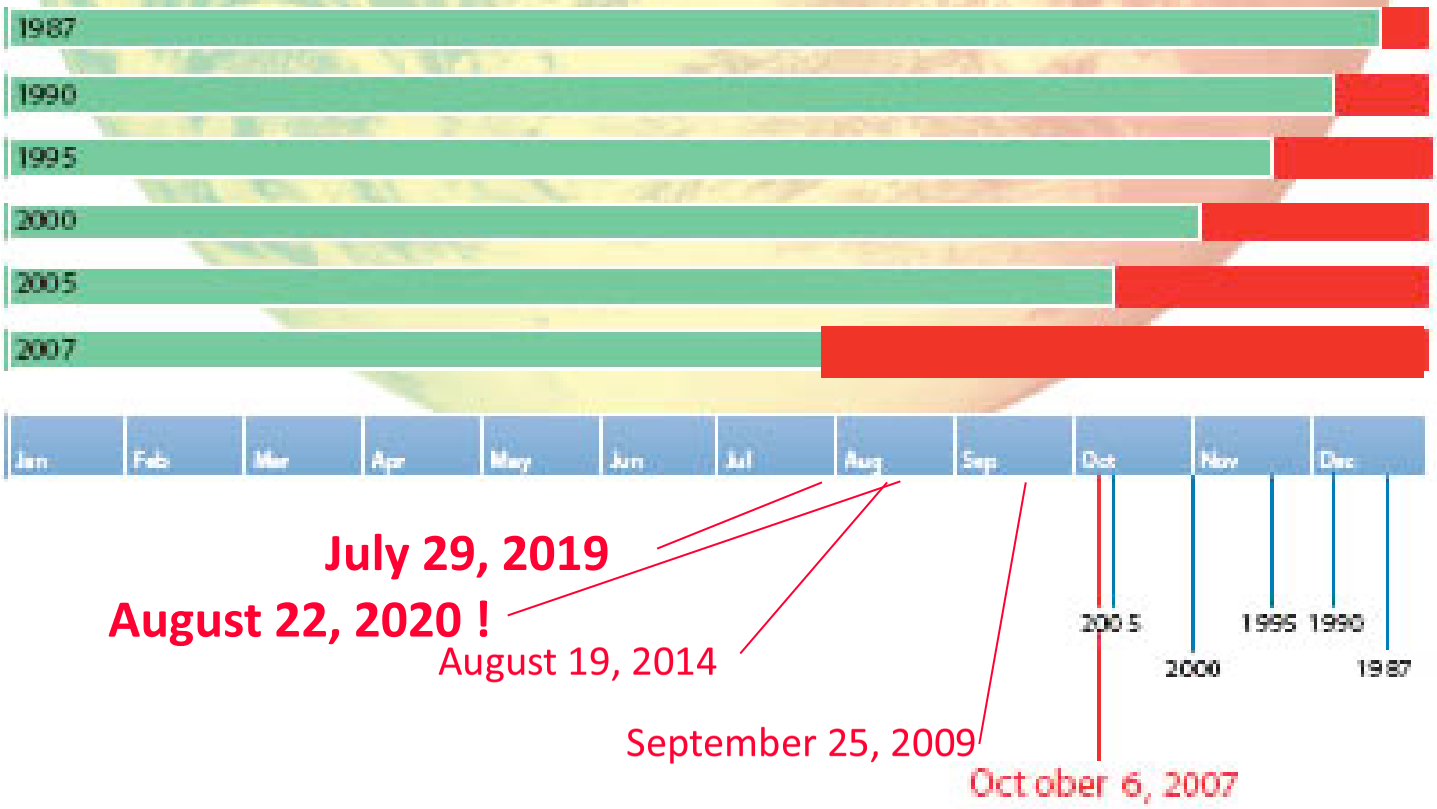
Wuppertal Institut

Aalto University




Source: WWF

# The slightly bigger sustainability gap

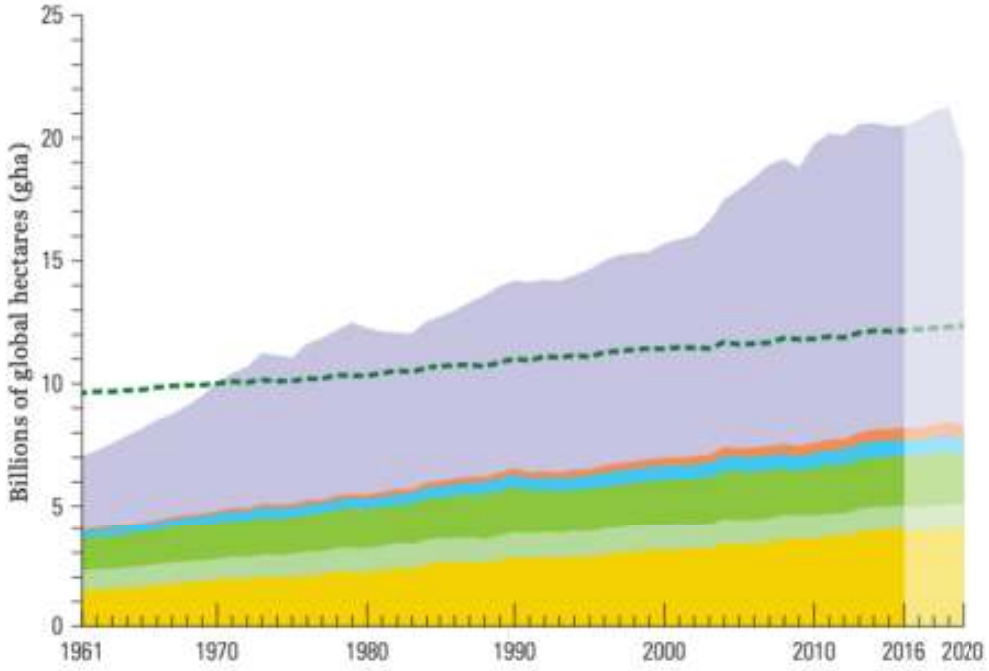



***Figure 12: Humanity's Ecological Footprint against Earth's biocapacity in global hectares, 1961-2020***
*Global overshoot, starting in the early 1970s, has increased since. The COVID-19 related footprint contraction - in lighter colours from 2016 onwards - is an estimate*[30, 31].

*Key*

- **Carbon footprint**[34] for absorbing emissions from fossil fuel burning and cement production
- **Built-up land footprint** for accommodating roads and buildings
- **Fishing grounds footprint** for wild and farmed seafood from oceans and freshwater
- **Forest product footprint** for fuel wood, pulp and timber
- **Grazing land footprint** for meat, dairy, leather and wool
- **Cropland footprint** for food, fibre, oil and feed crops, including rubber
- World biocapacity

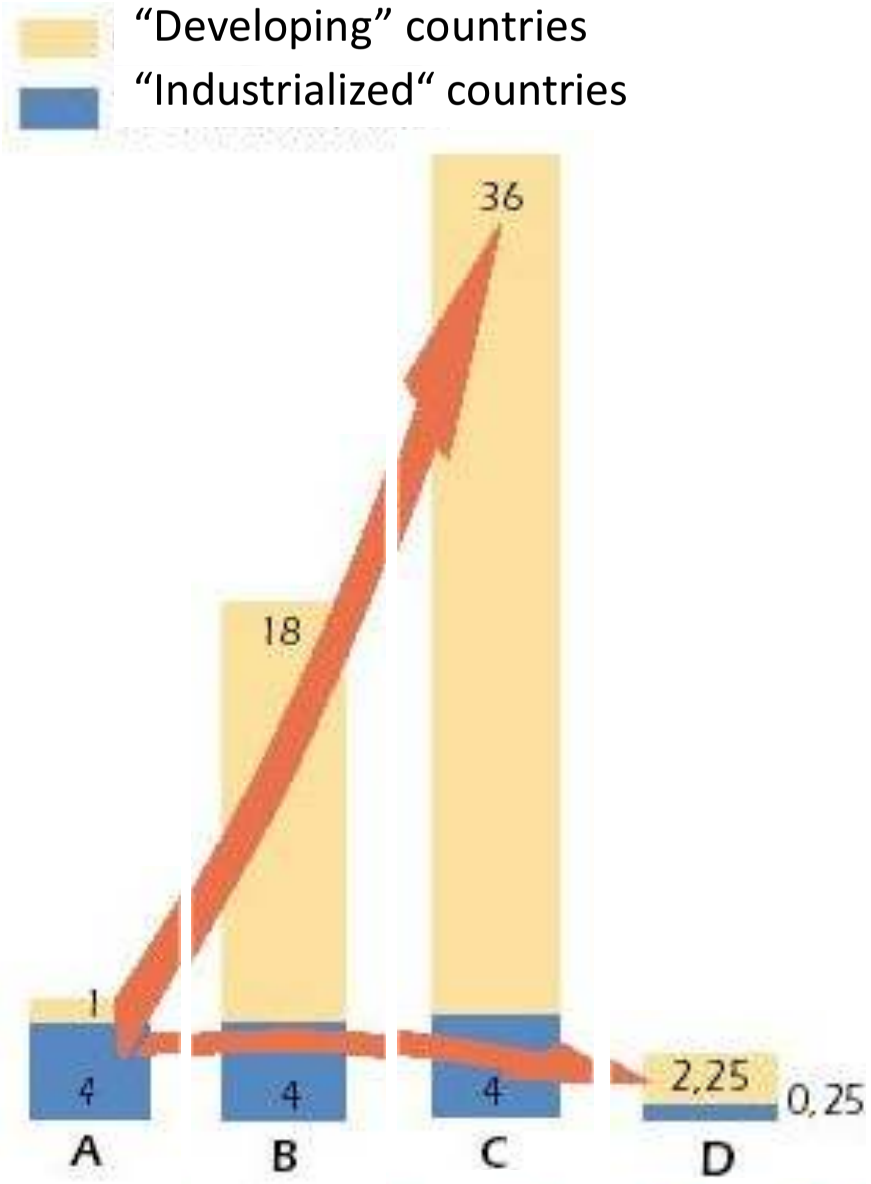
Source: WWF, Living Planet Report

# As if we had 4 planets...

"The industrial countries act as if there were several earths available. Thus, without a radical increase in resource productivity there will be no sustainable development."

Schmidt-Bleek (2009): The Earth.

# How to achieve sustainability




A = 1990ies

B = Consumption p. cap. in the whole world as in industrialized countries now

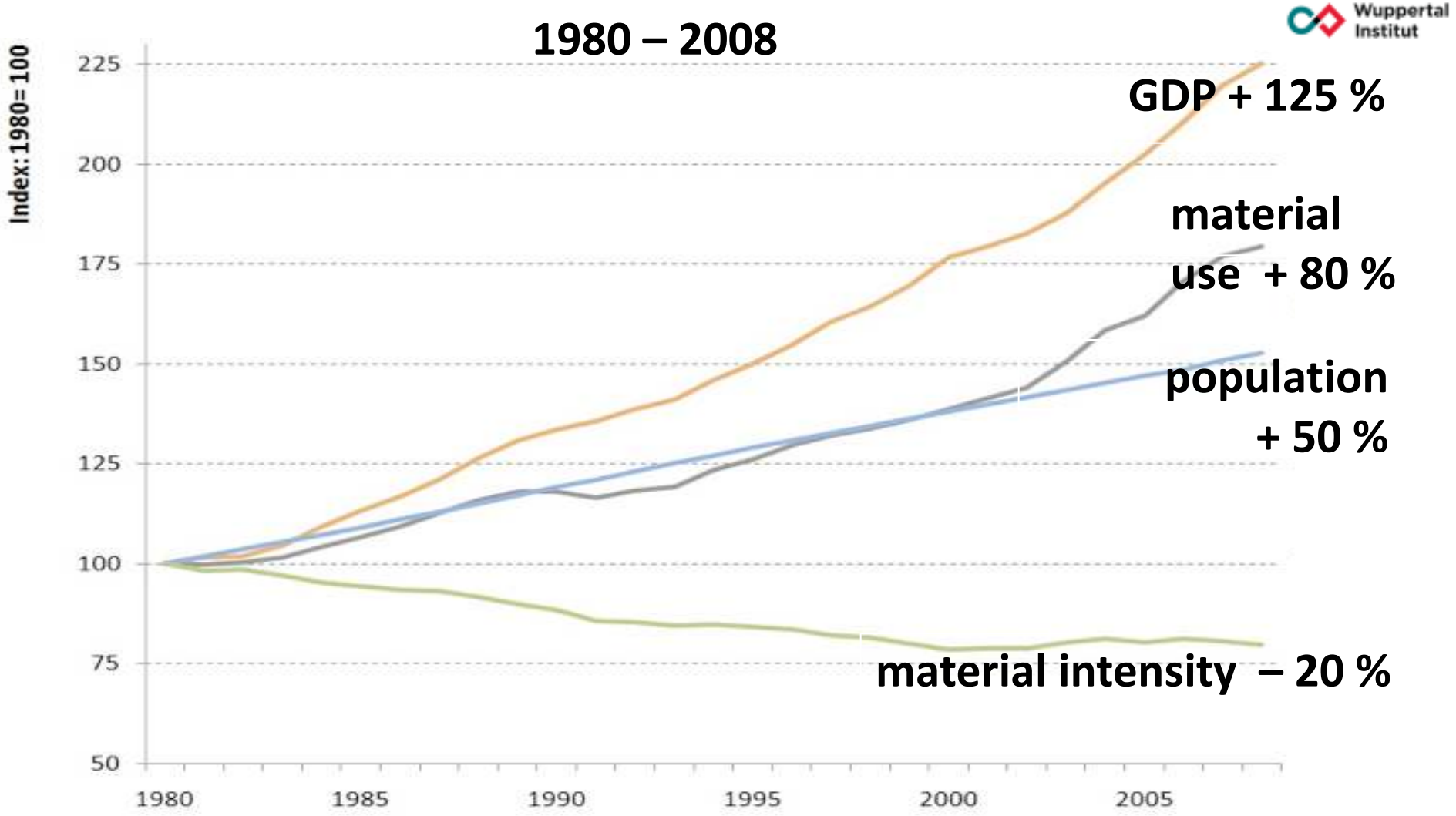
C = Same as B, incl. growing population

D = Halfing global resource consumption, doubling global welfare

**=> Resource productivity!**

# Trends since 1980

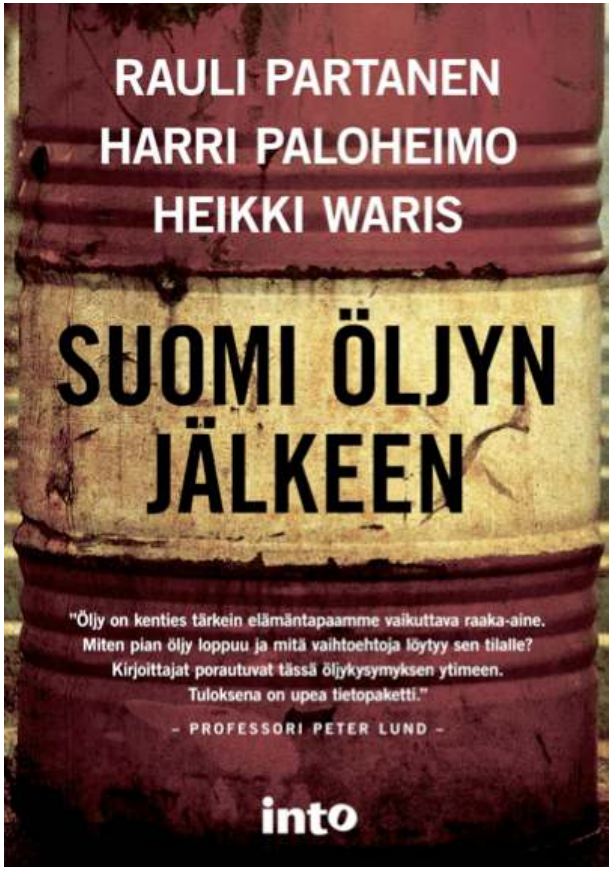
Source: www.materialflows.net, SERI



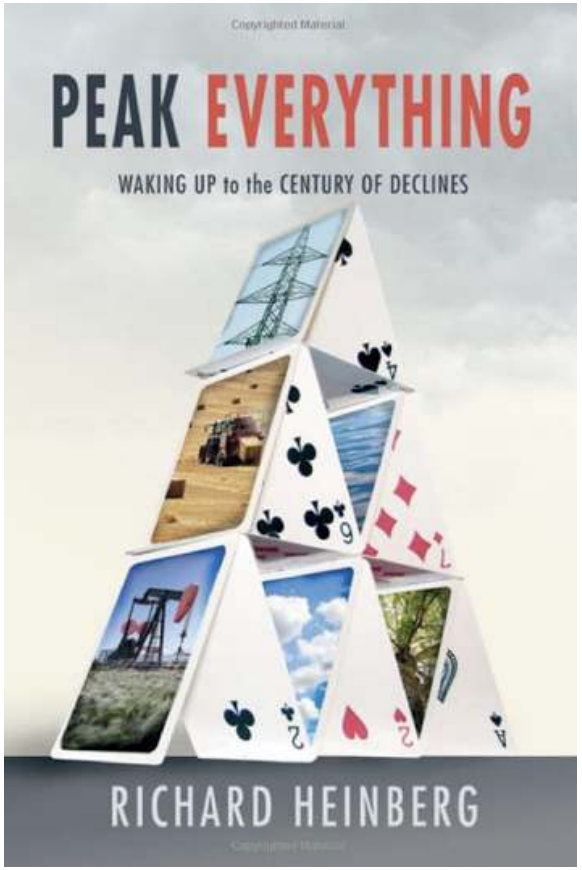
# Rising raw-material prices:
# Reuters Commodity Cash Index 1973 – 2012


Source: www.mrci.com

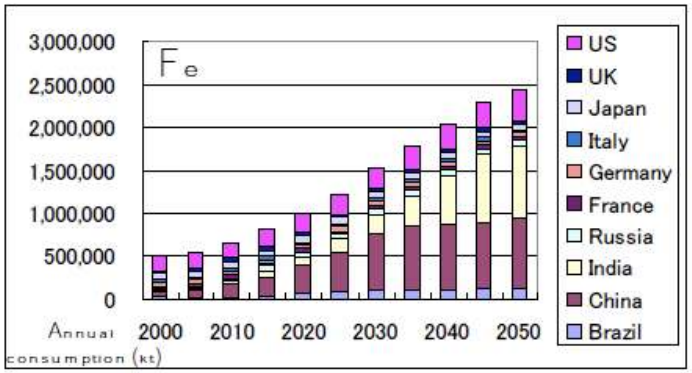
# Era of abundance has gone

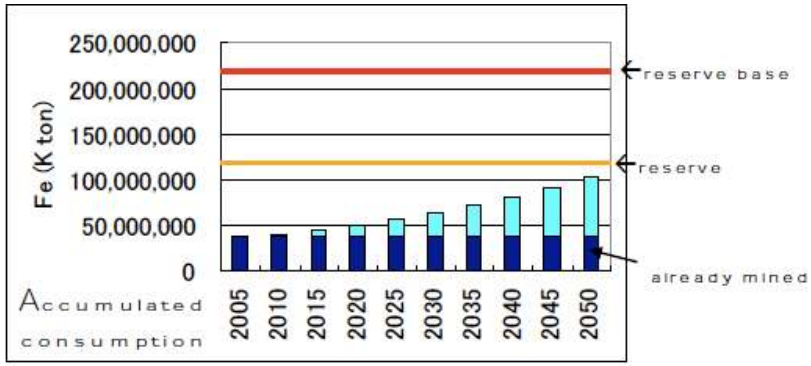


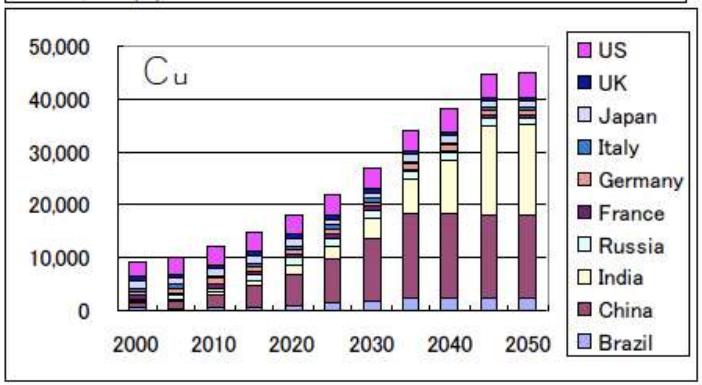

- Peak Oil
- Peak Corn
- Peak Gas
- Peak Soil
- Peak Water
- Peak Electricity
- Peak Rice
- Peak Metal

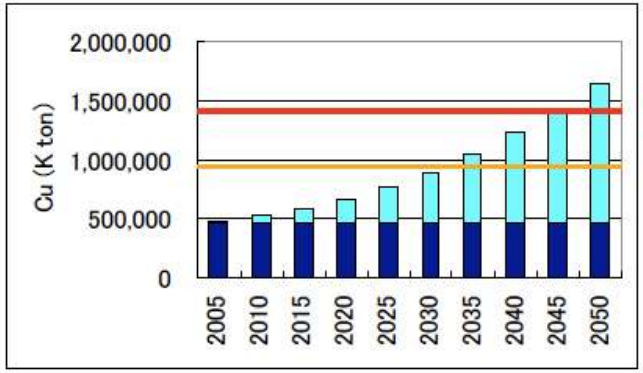


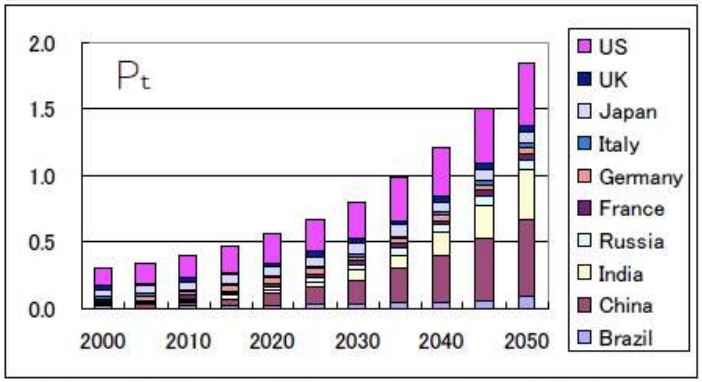
# Metal consumption and reserves

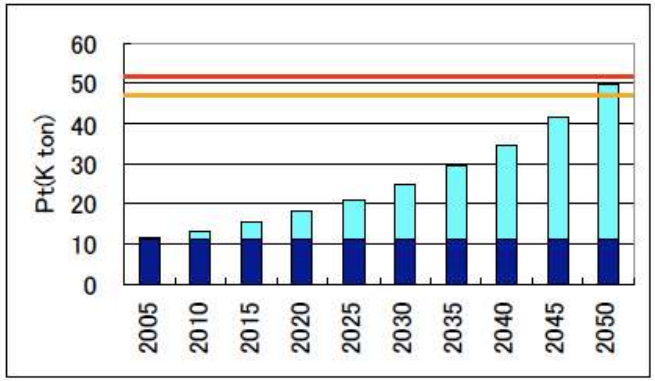



Source: Dr. Halada, National Institute of Material Science, Japan

# EU outsourcing material use

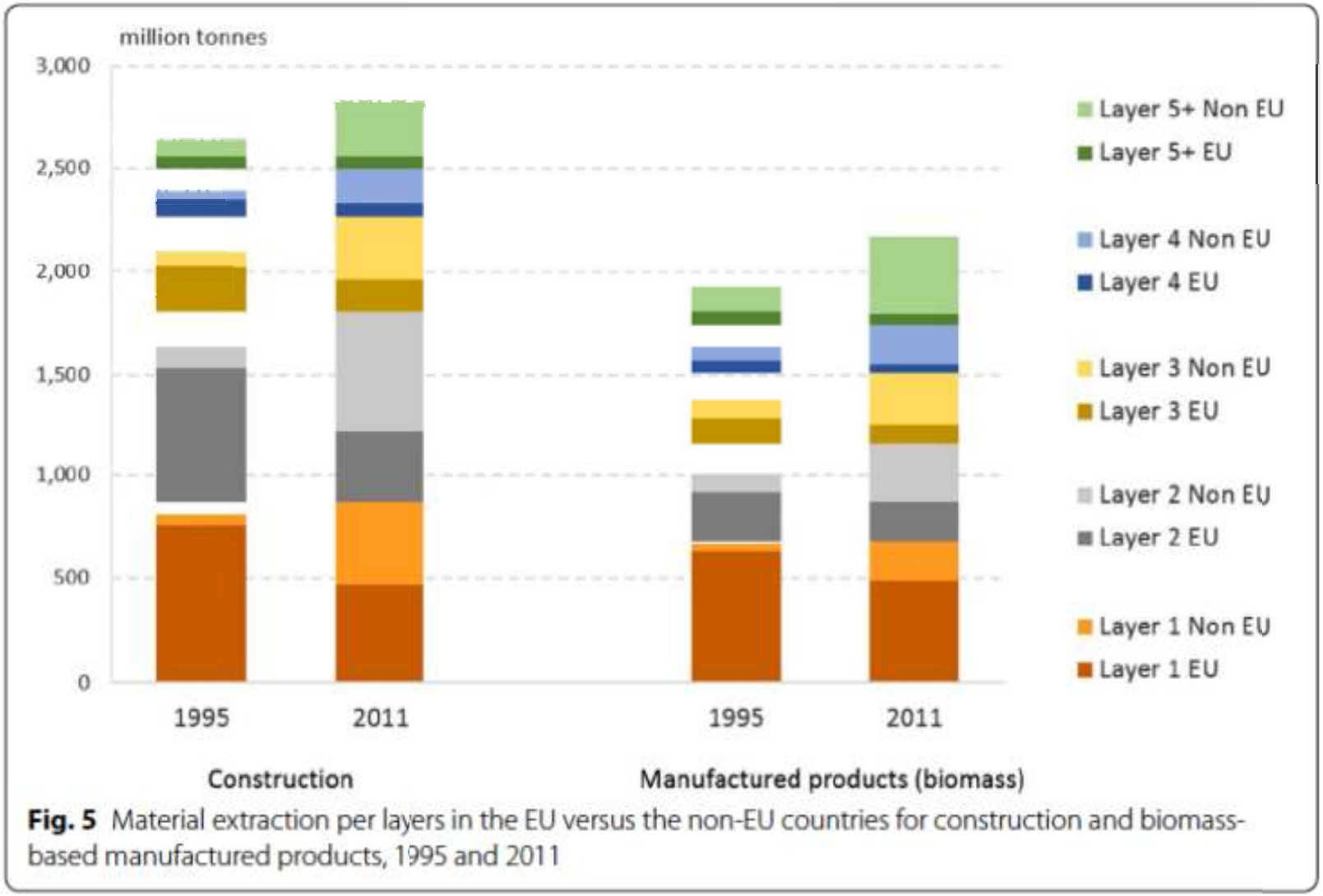
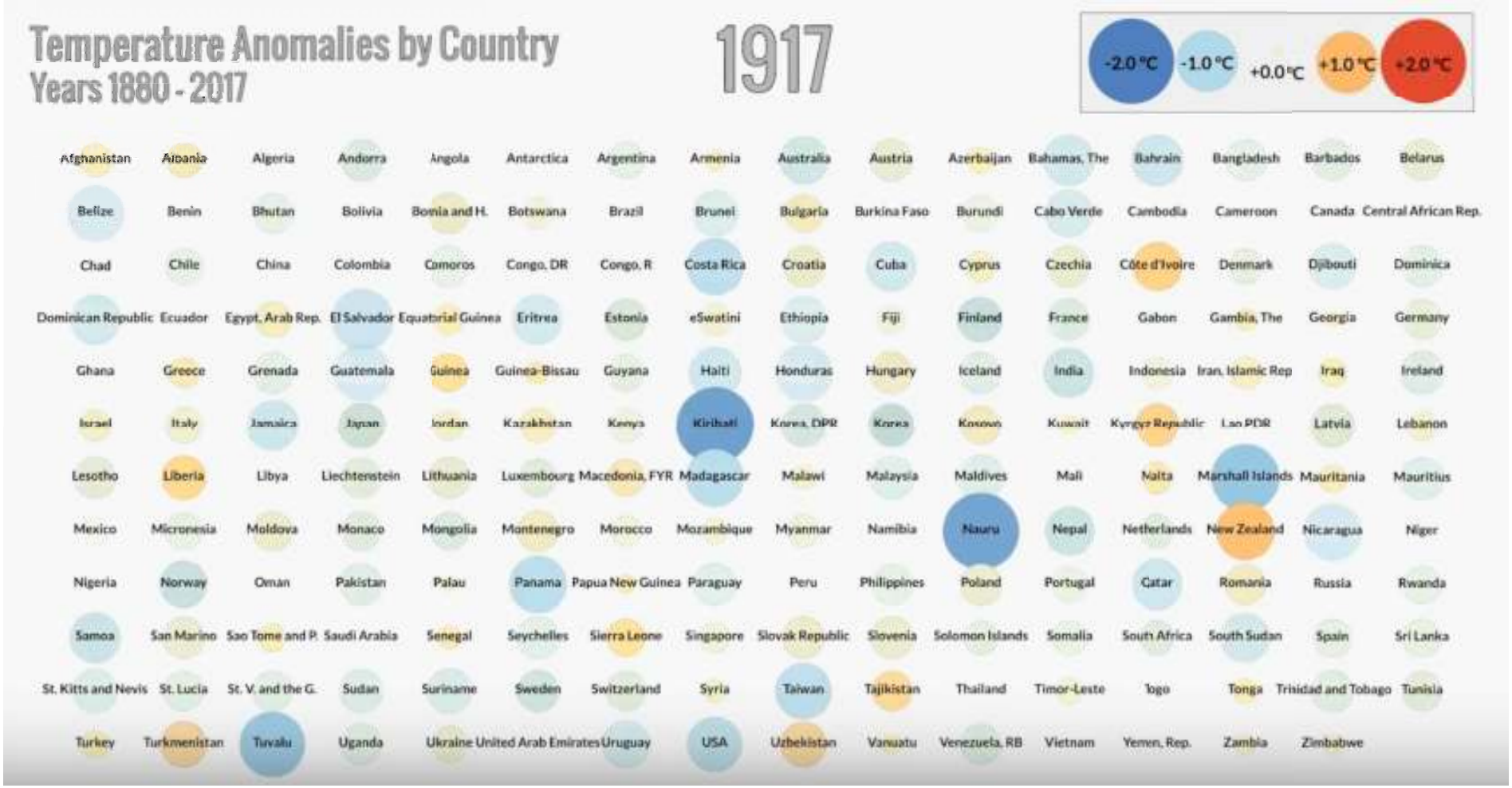



**Fig. 5** Material extraction per layers in the EU versus the non-EU countries for construction and biomass-based manufactured products, 1995 and 2011

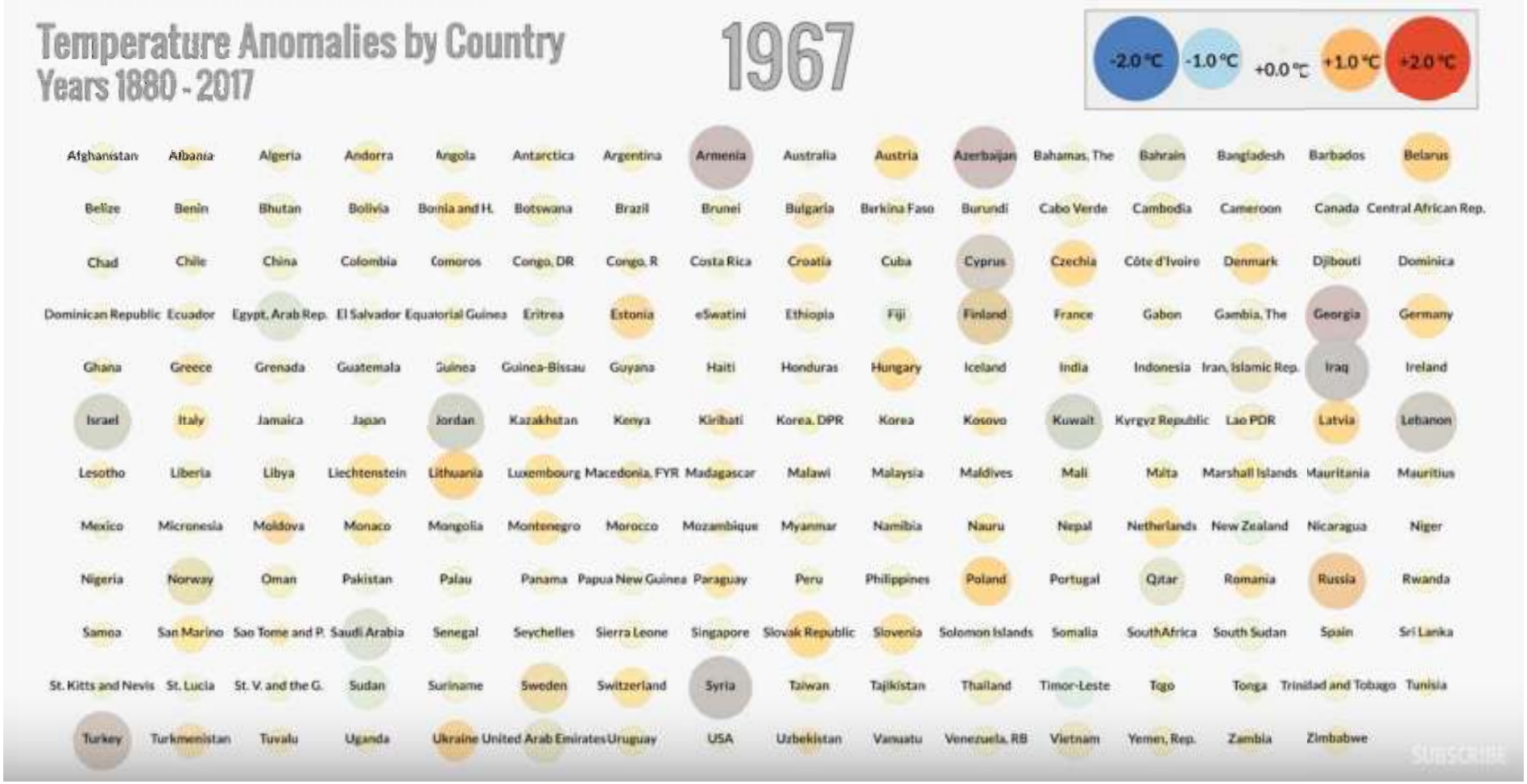
Lähde: Giljum ym. 2016, Journal of Economic Structures 5(1), 1-24

# The world as we know it?




Source: Antti Lipponen, FMI

# The world as we know it?




Source: Antti Lipponen, FMI

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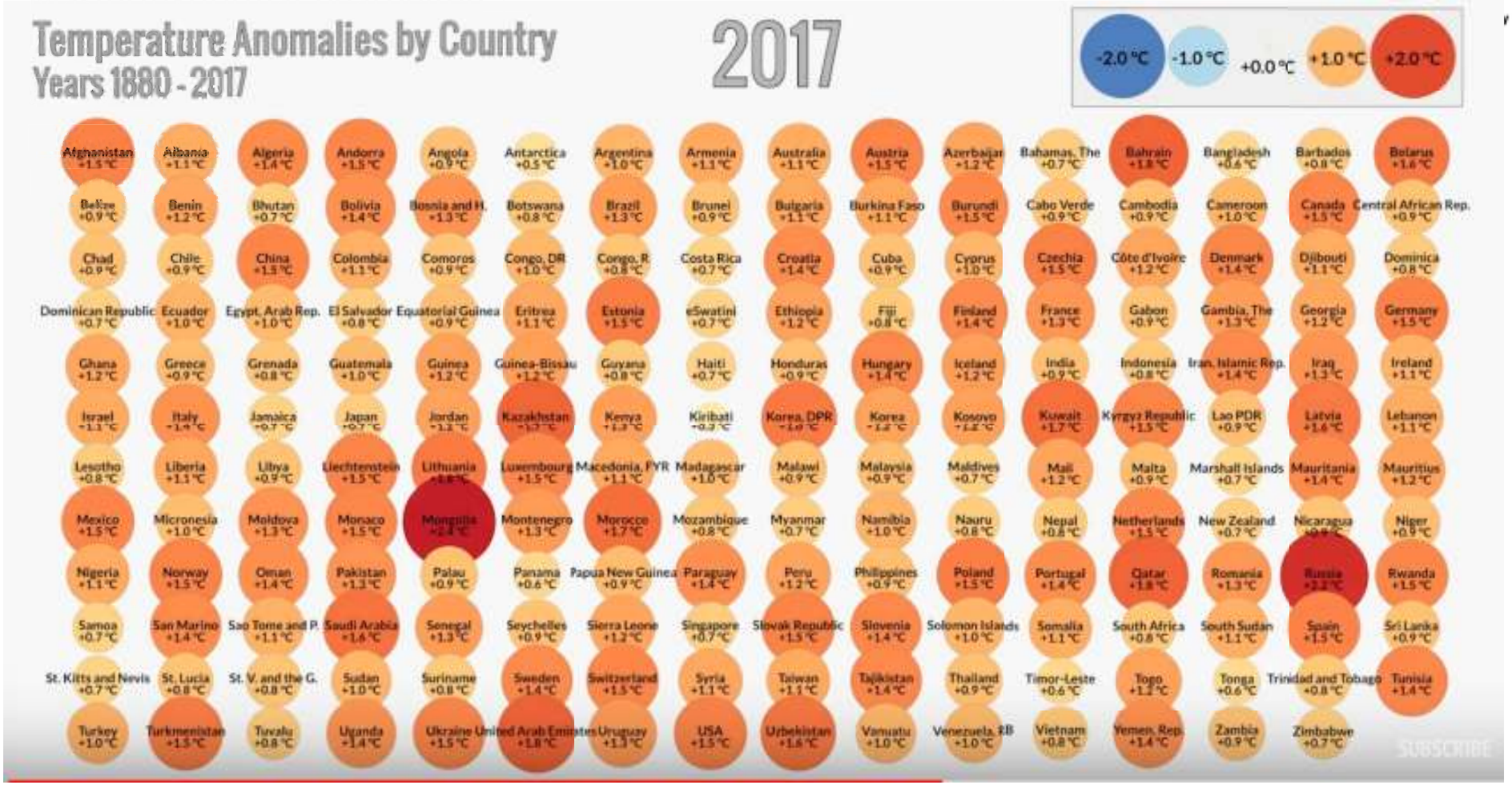
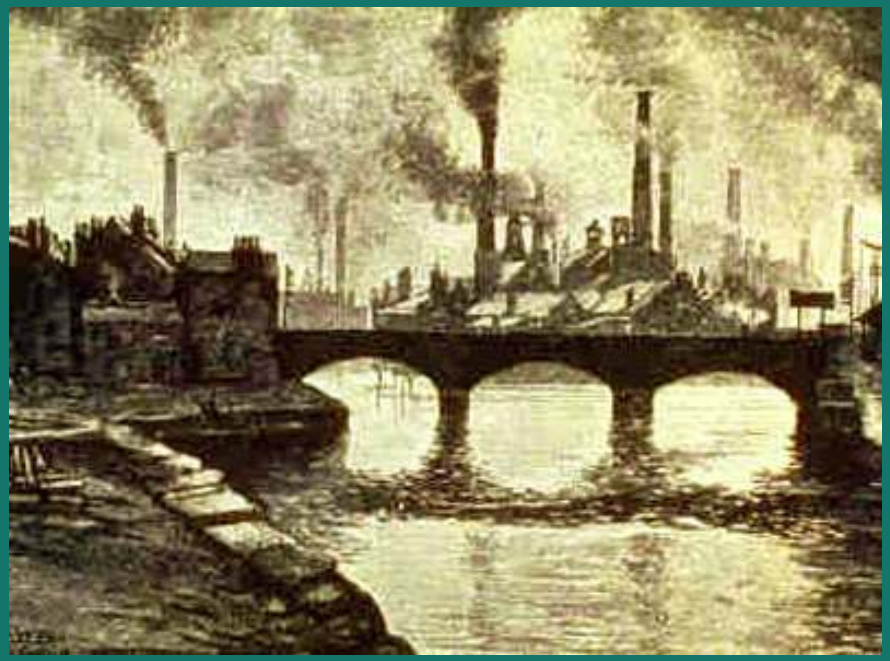


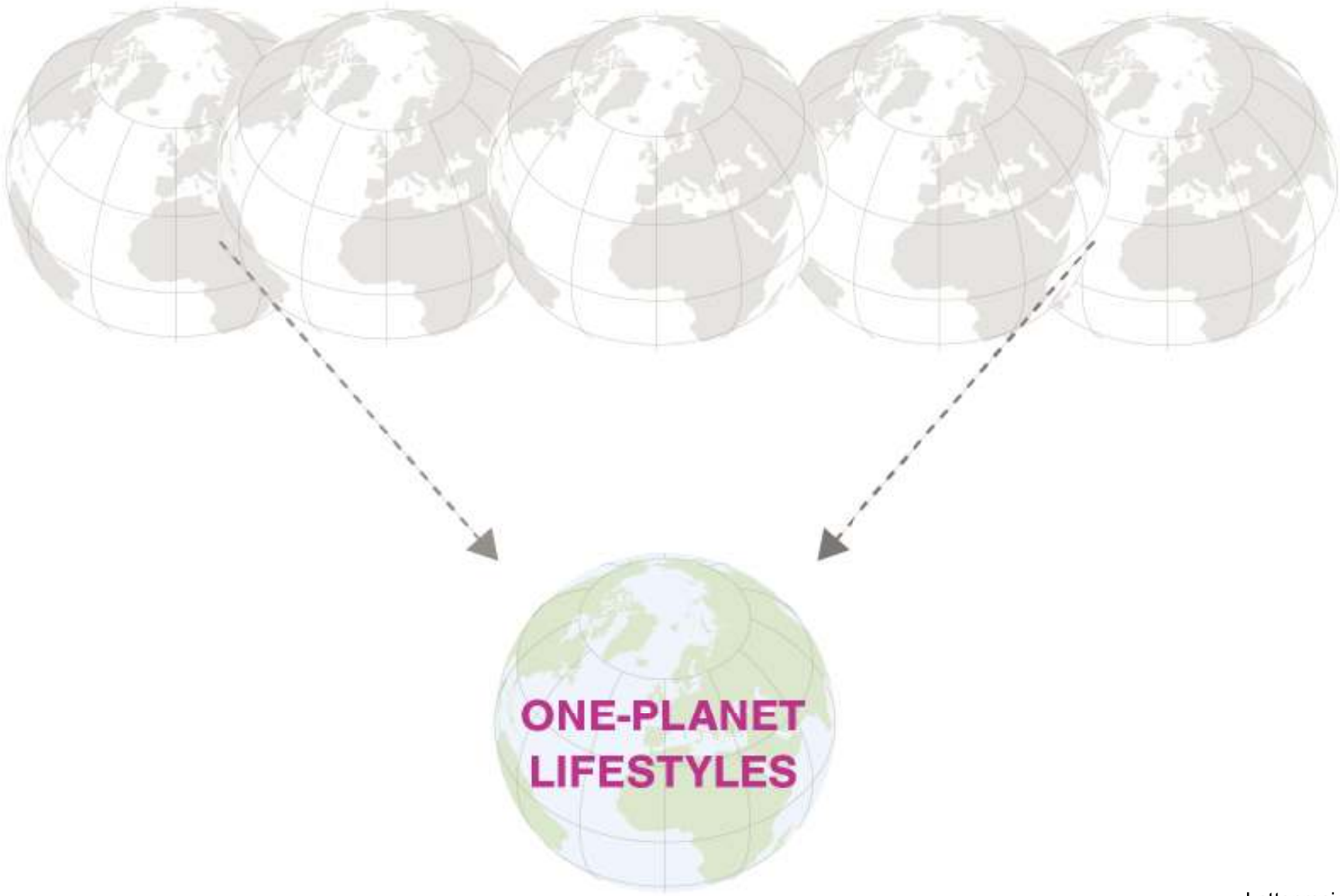

Source: Antti Lipponen, FMI

# One of the biggest lifestyle changes we know




# – by design or by disaster?

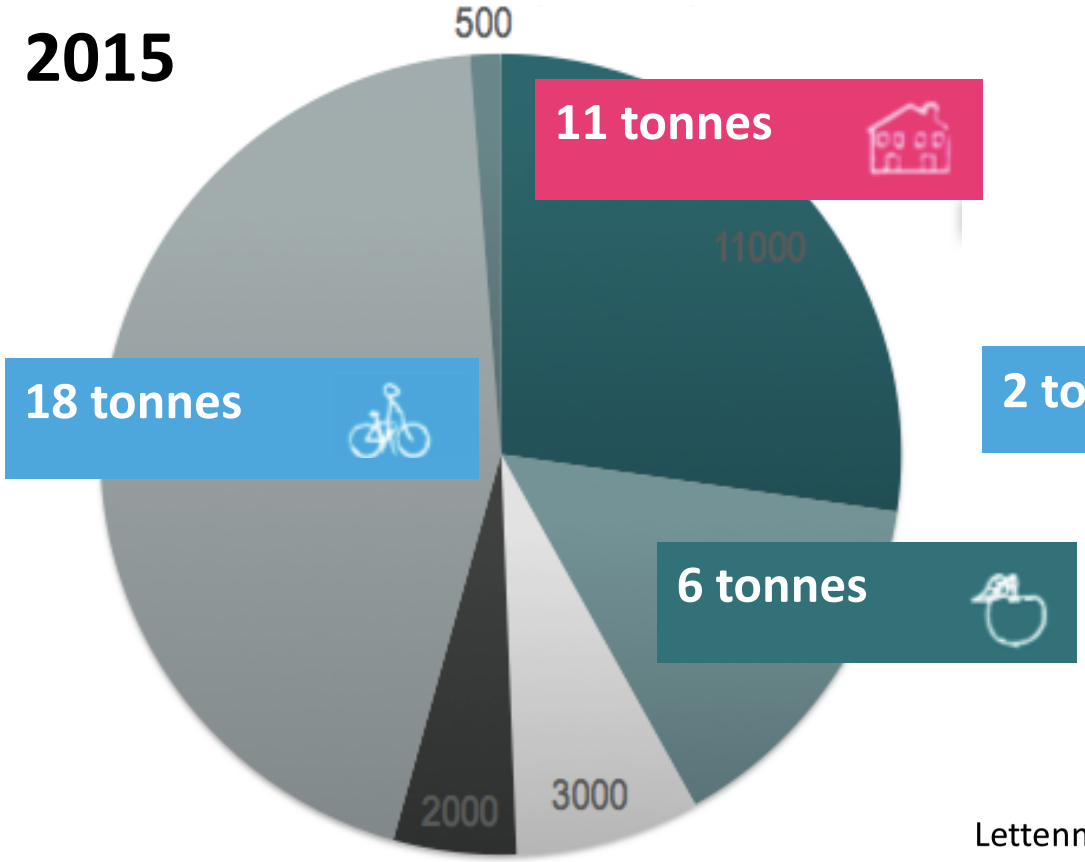
# Lifestyle Material Footprint
# from 40 tonnes to 8 tonnes



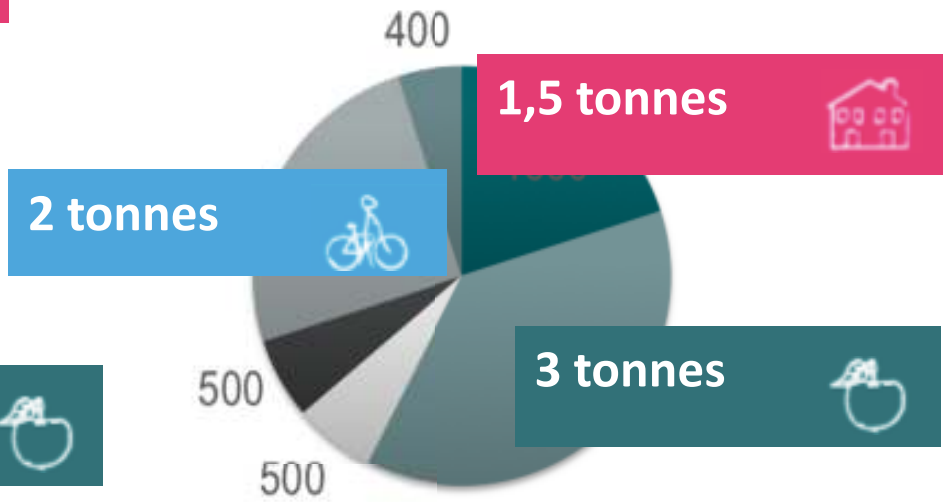
# The Sustainable Consumption Challenge

## Lifestyle Material Footprint from 40 to 8 Tonnes

**2015**




**2050**




Lettenmeier et al. 2014, Eight tonnes of material footprint, www.mdpi.com/2079-9276/3/3/488

# Measuring resource use
# Material Footprint

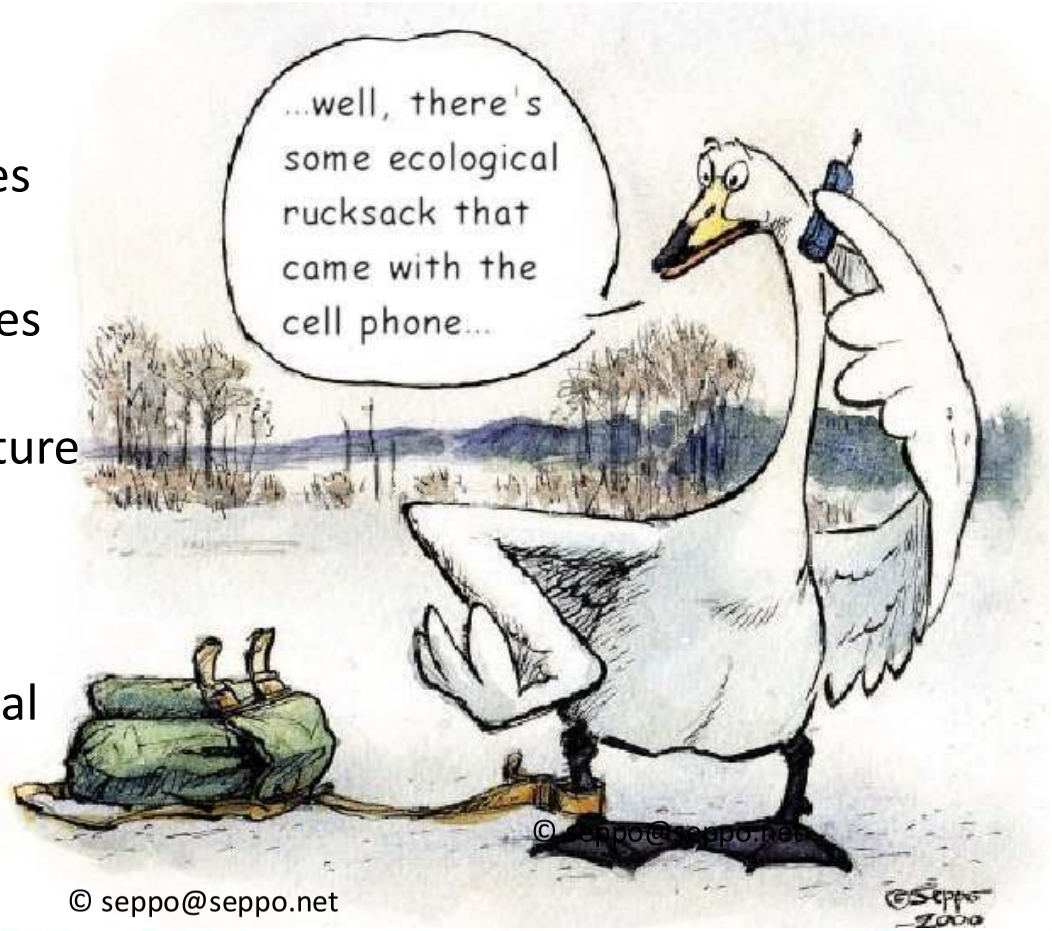
## Material footprint

## = ecological backpack

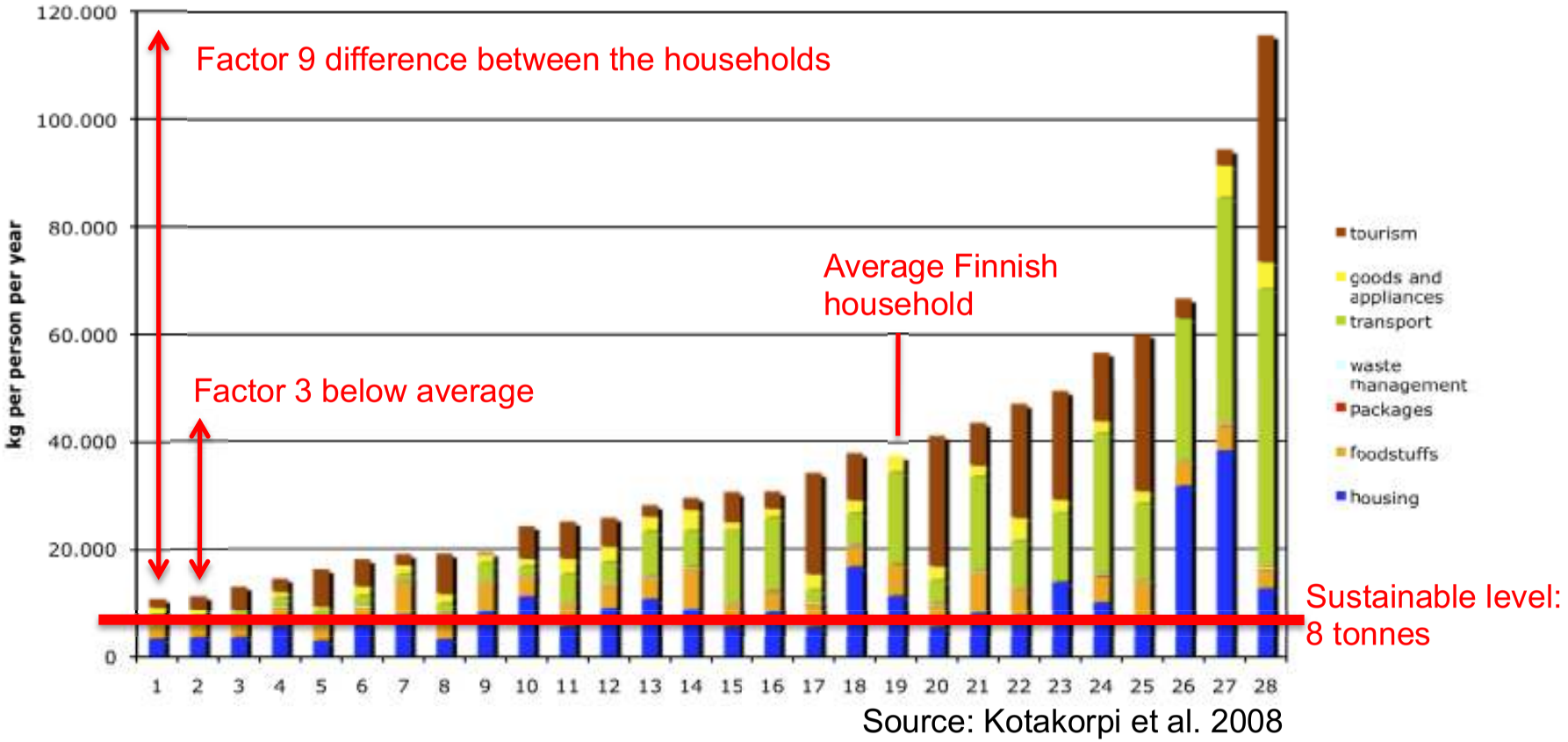
Invisible burden any product carries

- Non-renewable material resources
  + renewable material resources
  + top soil erosion in agri-/silviculture
- Holistic, though rough indicator
- Sufficient, input-based indicator although not addressing individual environmental problems

Schmidt-Bleek 1993, Schmidt-Bleek 2009, Lettenmeier et al. 2009



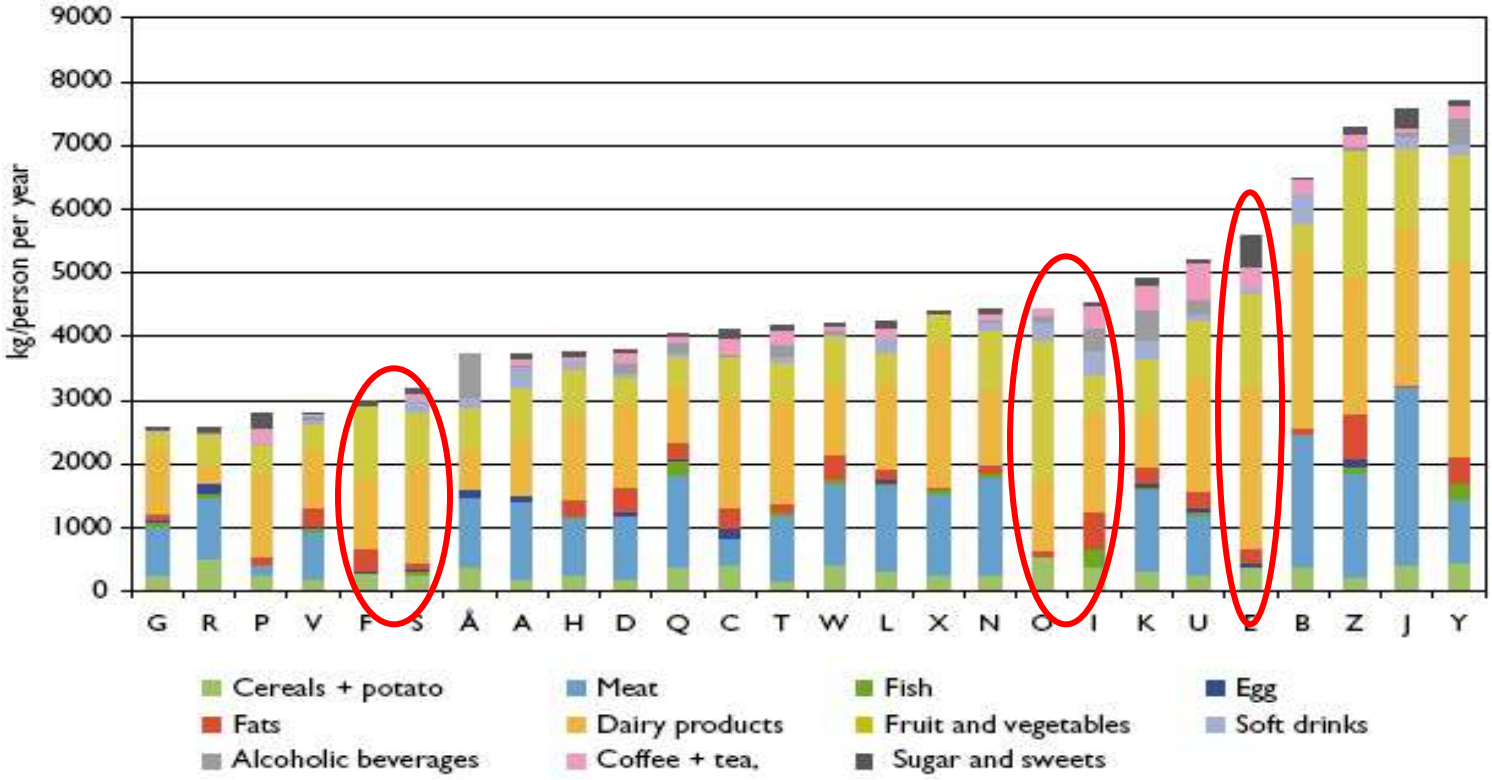
# 27 Finnish households:
# Factor 9 difference in Lifestyle Material Footprint




Source: Kotakorpi et al. 2008

# FIN-MIPS Households – Results on more detailed lifestyle level

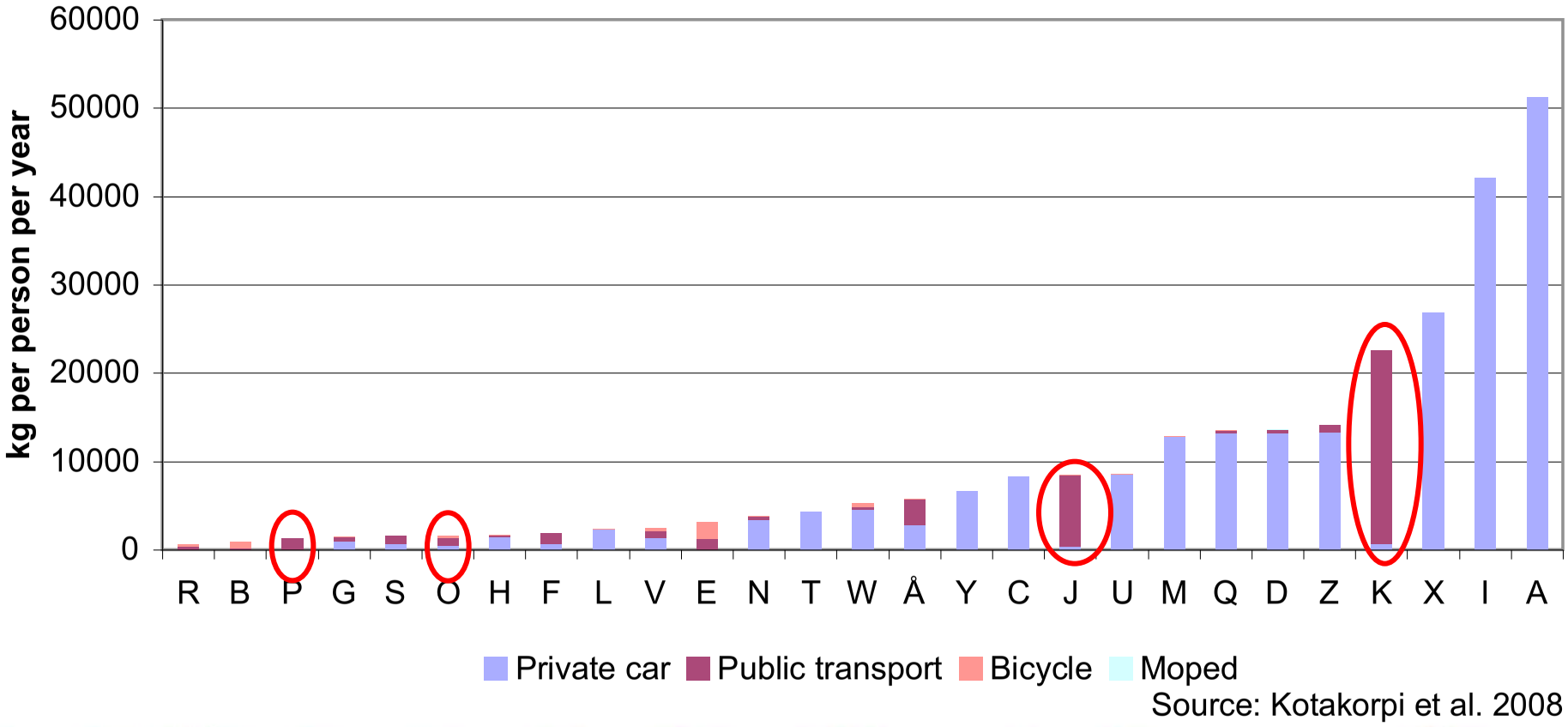
A vegetarian lifestyle does not necessarily result in a lower resource consumption




Source: Kotakorpi et al. 2008

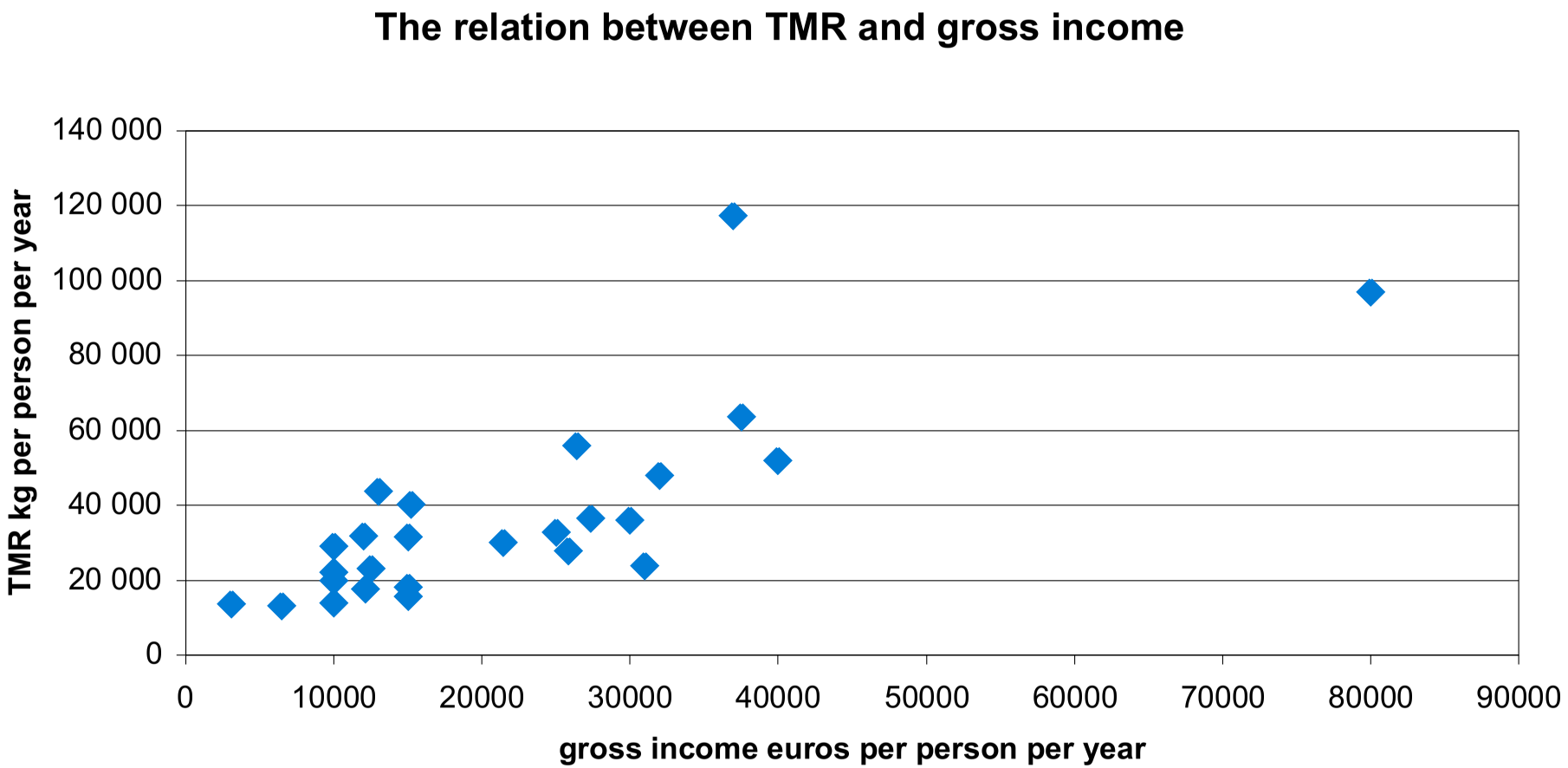
# Household MIPS – Mobility

Public transport-based mobility does not necessarily result in lower resource use




Source: Kotakorpi et al. 2008

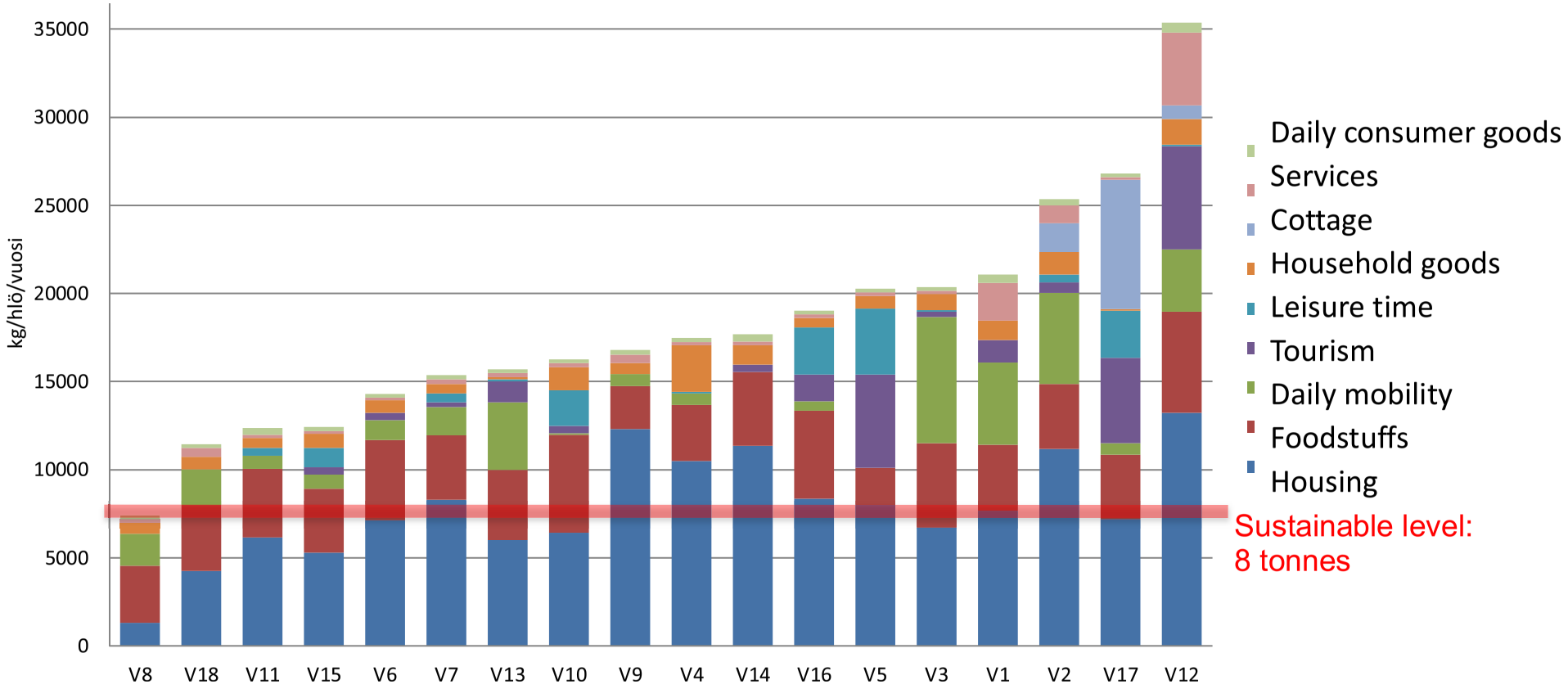
# Household income and resource use



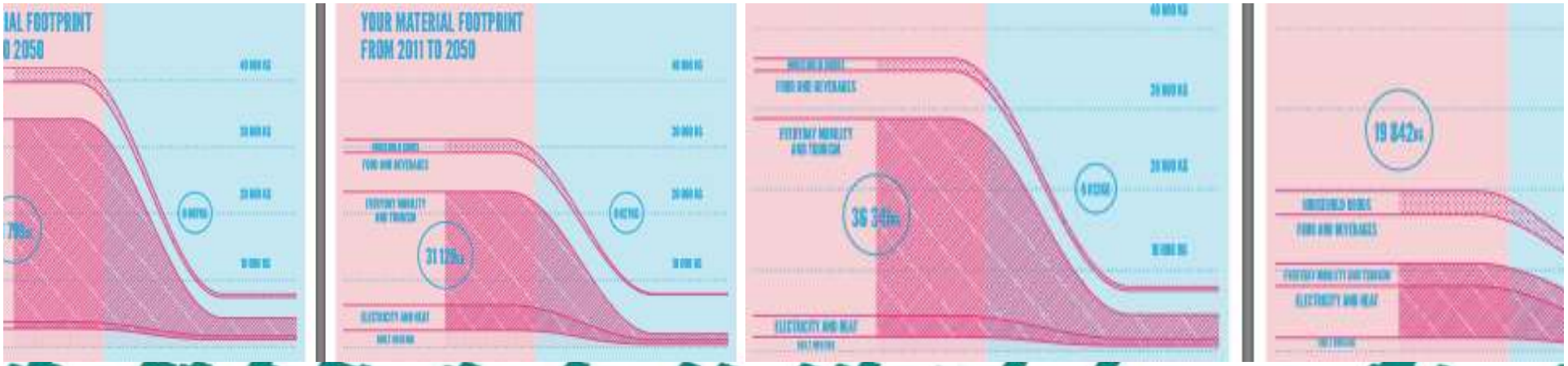

Source: Kotakorpi et al. 2008

# Material footprint of low-income households – the limits of sufficiency

- 18 Finnish low-income households: 6…35 tonnes/cap./a (Lettenmeier et al. 2012)



# How to get household consumption to a sustainable level?



# Food: from 6 to 3 tonnes

# Material Footprint of lunch meals
# 3 kg/day = 1 tonne/year

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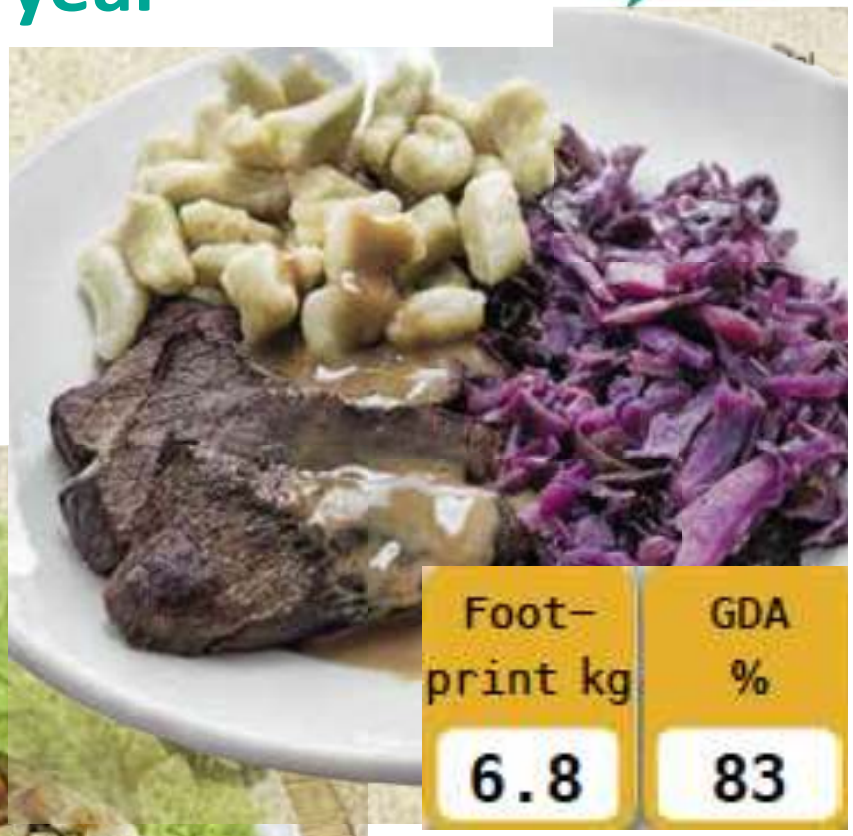
| Foot-print kg | GDA % |
|---|---|
| 2.6 | 31 |



| Foot-print kg | GDA % |
|---|---|
| 6.8 | 83 |

| Foot-print kg | GDA % |
|---|---|
| 1.7 | 20 |

# Housing: from 11 to 1.6 tonnes

resource-efficient
zero energy houses

20 m² per person

wind and
solar power

A++++++++++

# Mobility: from 18 to 2 tonnes