



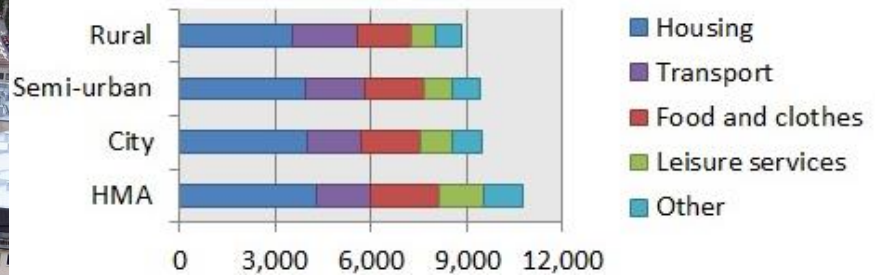
Urbanization, lifestyles and climate change

10.11.2020



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Professor

Carbon footprints in Finland (kg/a)

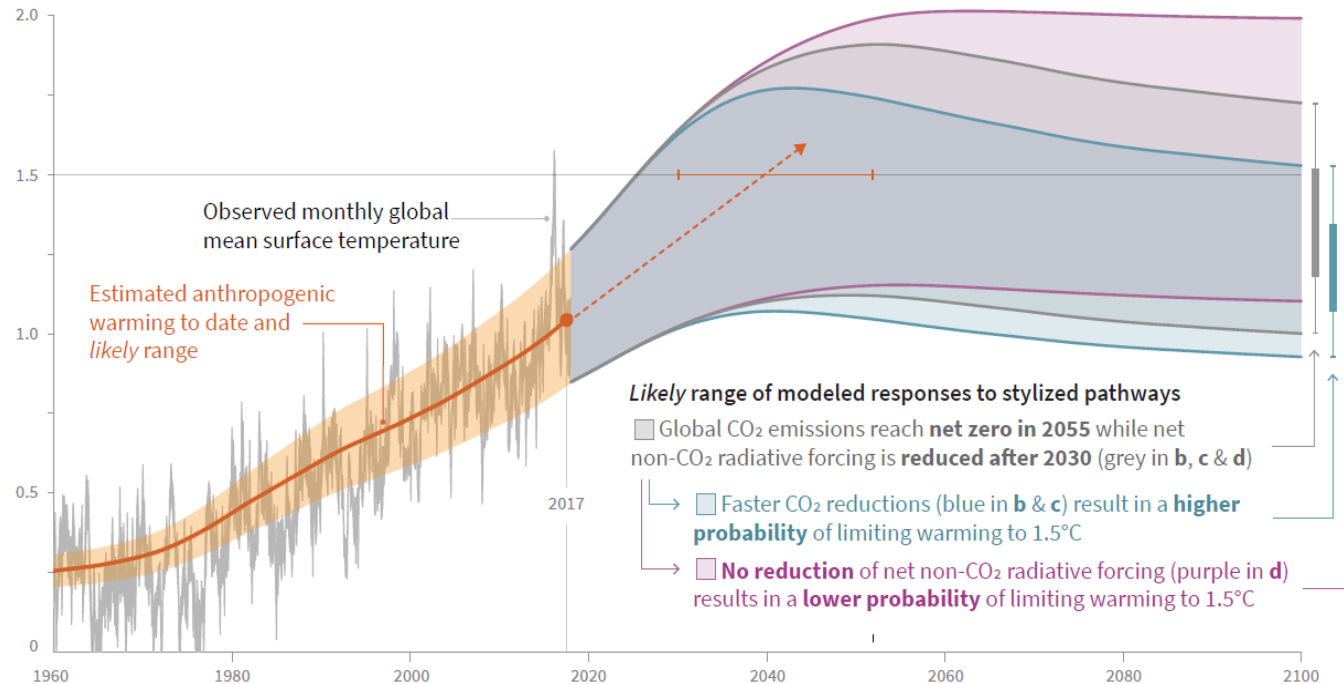




Climate change

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways

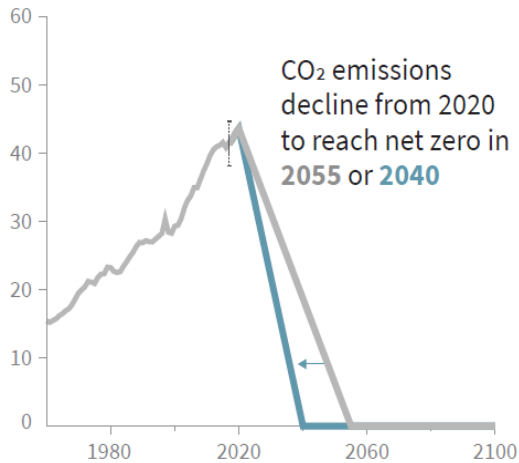
Global warming relative to 1850-1900 (°C)





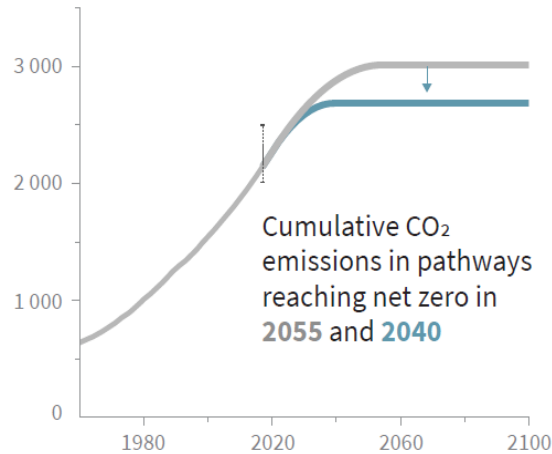
Climate change

b) Stylized net global CO₂ emission pathways
Billion tonnes CO₂ per year (GtCO₂/yr)



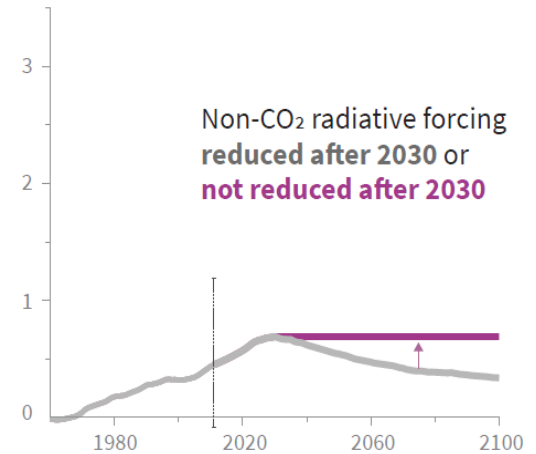
Faster immediate CO₂ emission reductions limit cumulative CO₂ emissions shown in panel (c).

c) Cumulative net CO₂ emissions
Billion tonnes CO₂ (GtCO₂)



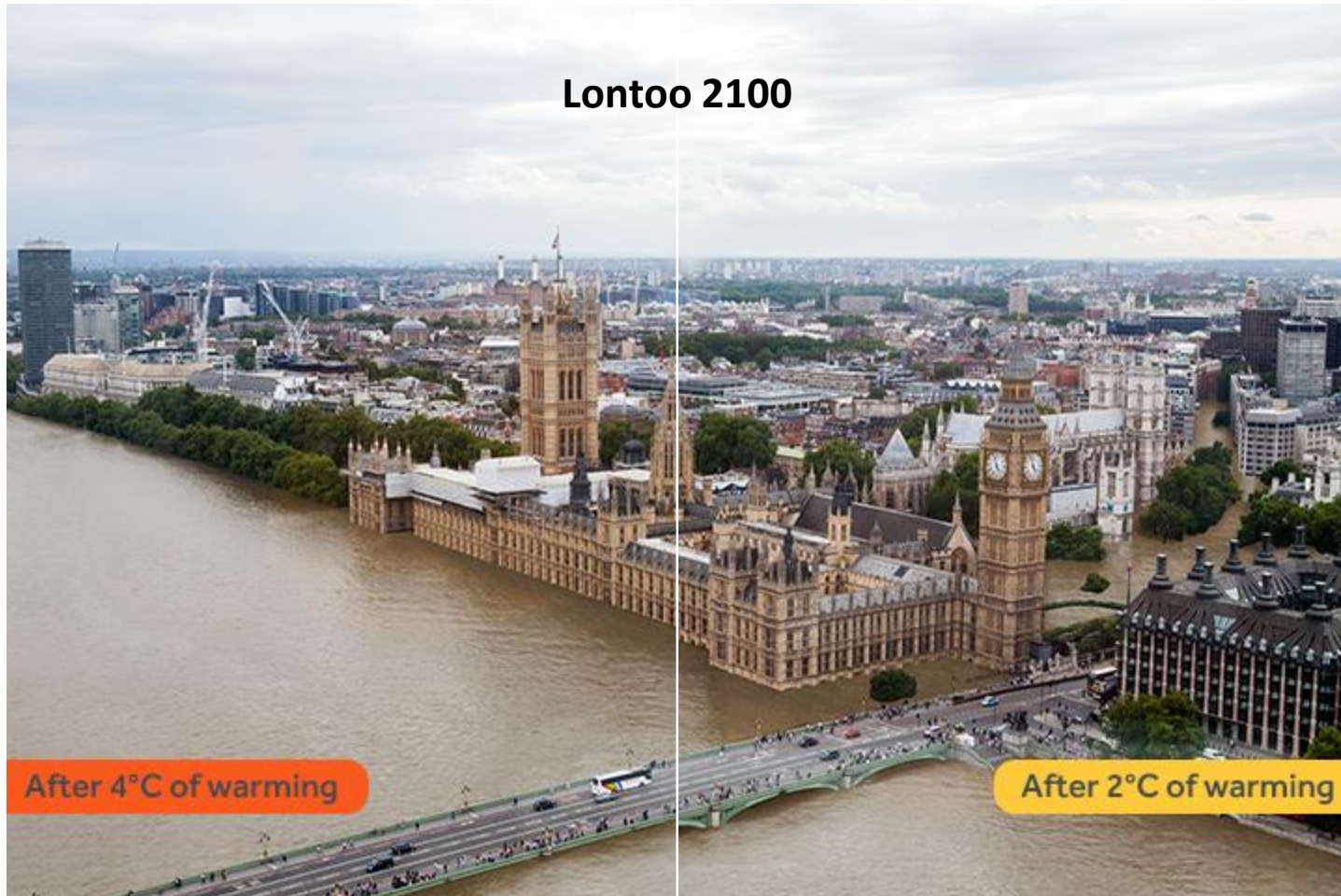
Maximum temperature rise is determined by cumulative net CO₂ emissions and net non-CO₂ radiative forcing due to methane, nitrous oxide, aerosols and other anthropogenic forcing agents.

d) Non-CO₂ radiative forcing pathways
Watts per square metre (W/m²)





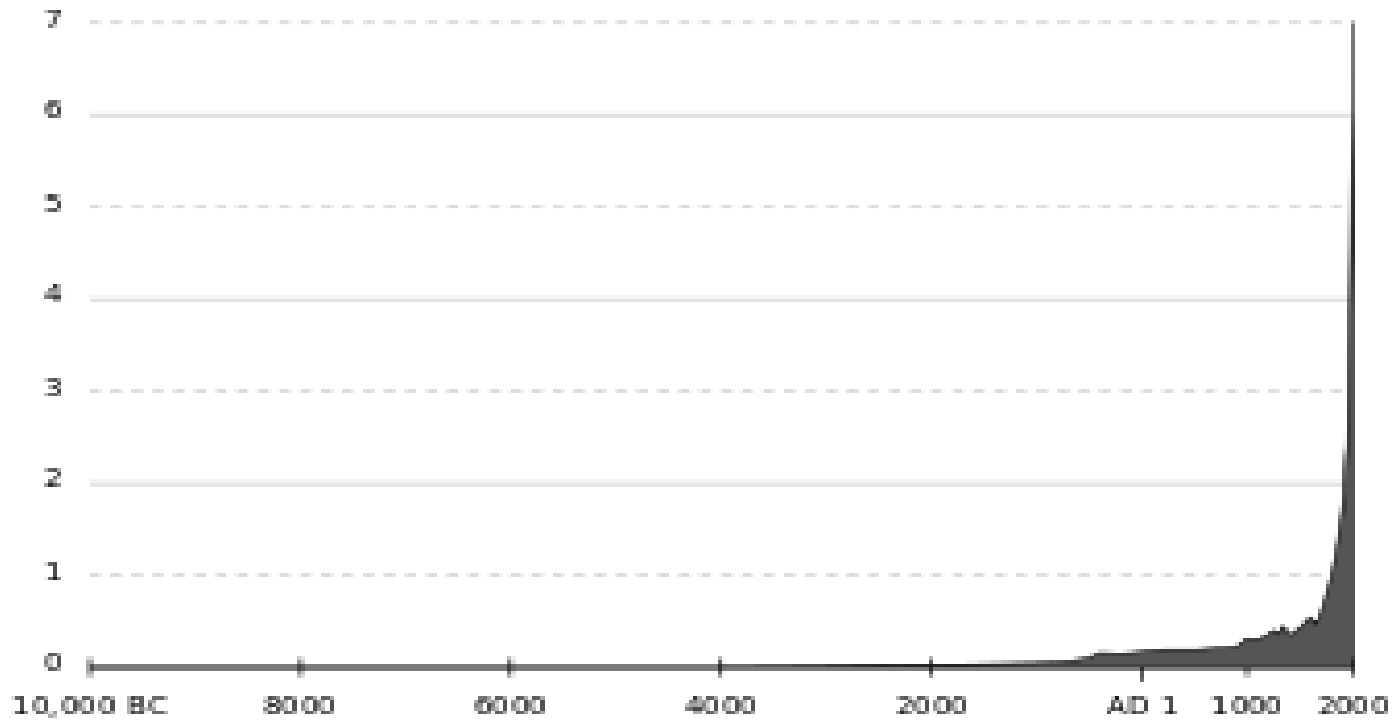
Lontoo 2100





Why?

World population, billions



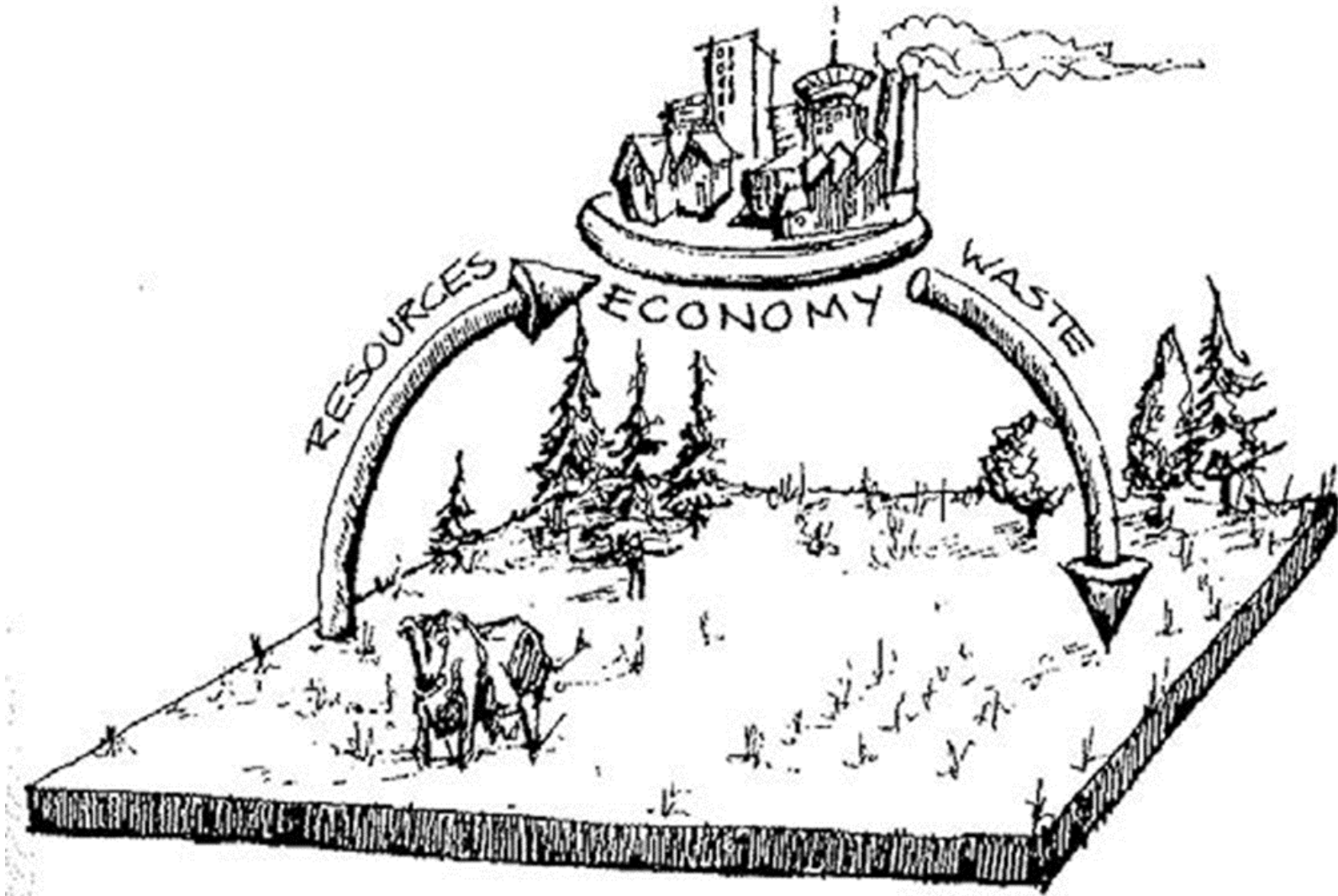


I WANT TWO
SCOOPS!!!



Mother
earth





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Figure: William Rees & Mathis Wackernagel (1996) Urban Ecological footprints:
Why cities cannot be sustainable – and why they are a key to sustainability



Sustainable human settlements

- One of today's hot questions is

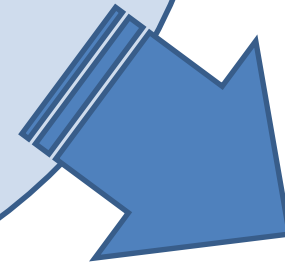
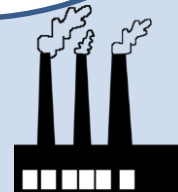
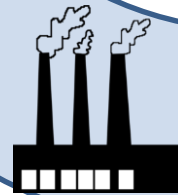
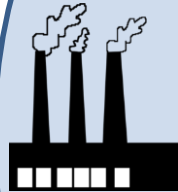
”How should we arrange our societies and the built environment to minimize the environmental loads?”
- Currently planning / urban development mostly follows the idea of higher density being the policy guideline to follow
- However, so far the result has been just an illusion of low-carbon cities





Consumption of imported goods: little direct emissions, but high population = low territorial footprints

Production for export: a lot of direct emissions, low population = high territorial footprints



Hinterlands

City

Consumer responsibility vs. producer responsibility

"The low-carbon illusion of cities"





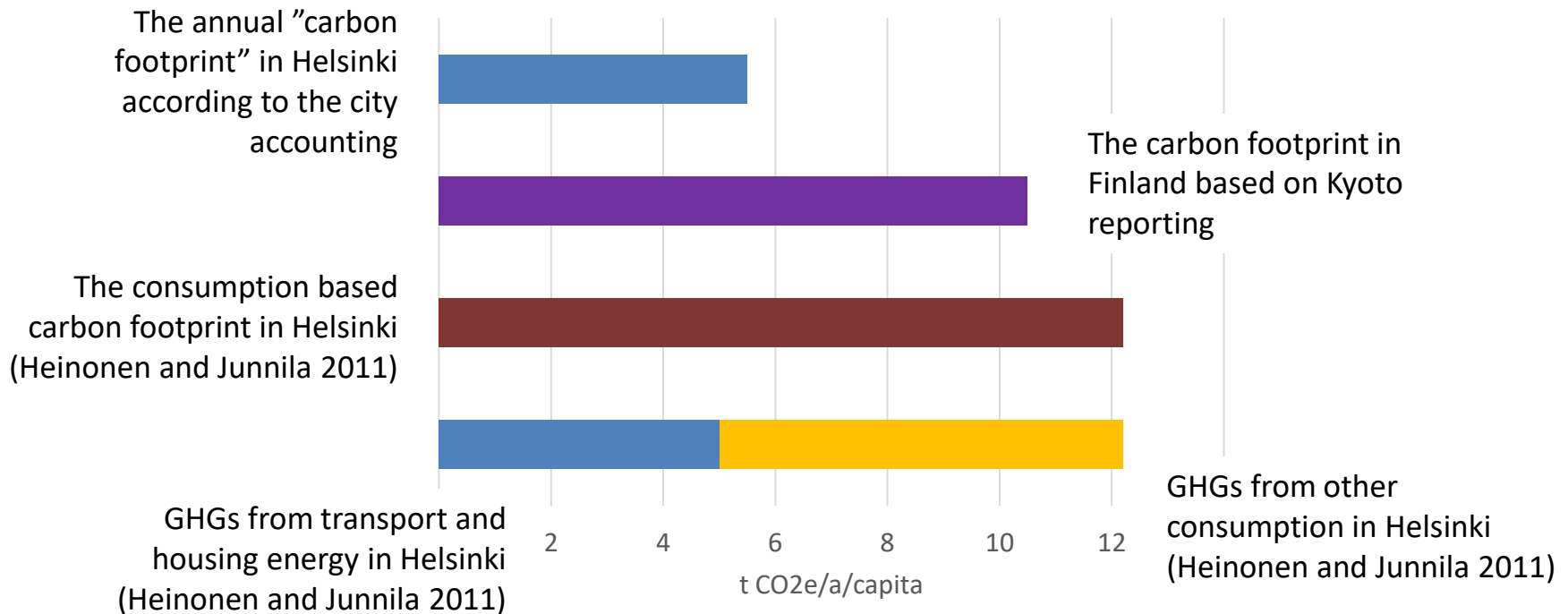
Considering the density principle

- Type of housing inevitably affects the consumption patterns of the residents
- The surrounding urban structure affects the consumption patterns
- All the consumption activities cause GHG emissions somewhere
- Also, remember not to make low-carbon a synonym to environmentally friendly or sustainable!





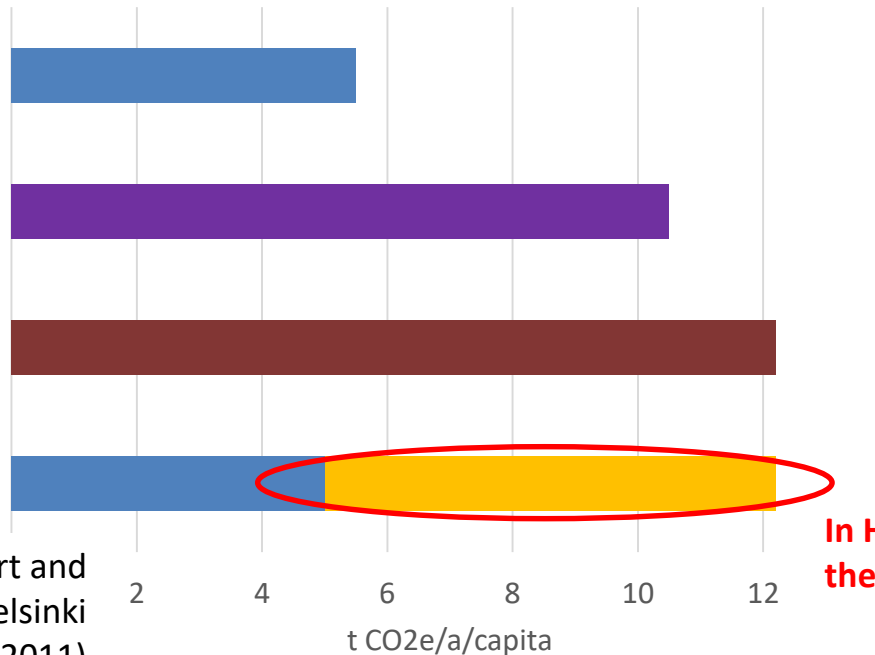
"The low-carbon illusion of cities"





"The low-carbon illusion of cities"

The annual "carbon footprint" in Helsinki according to the city accounting



GHGs from transport and housing energy in Helsinki (Heinonen and Junnila 2011)

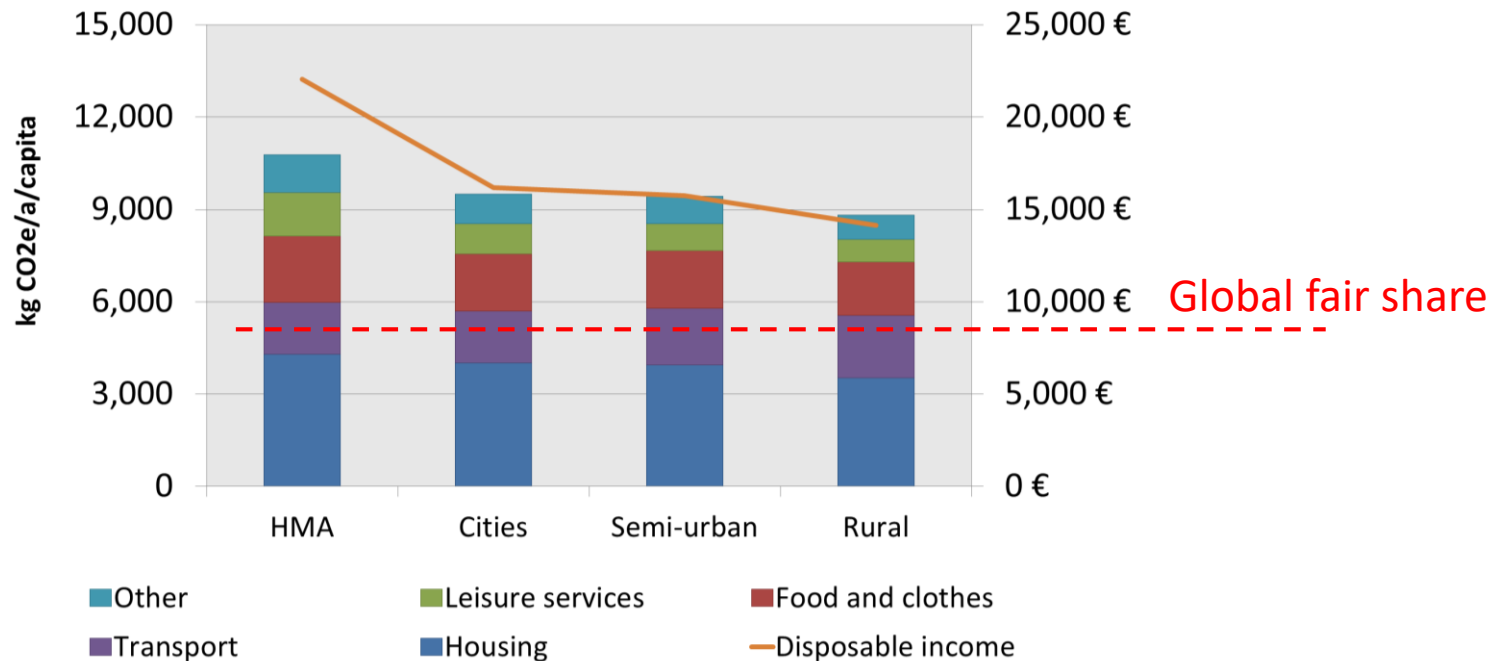
In Helsinki this is basically the outsourced share!





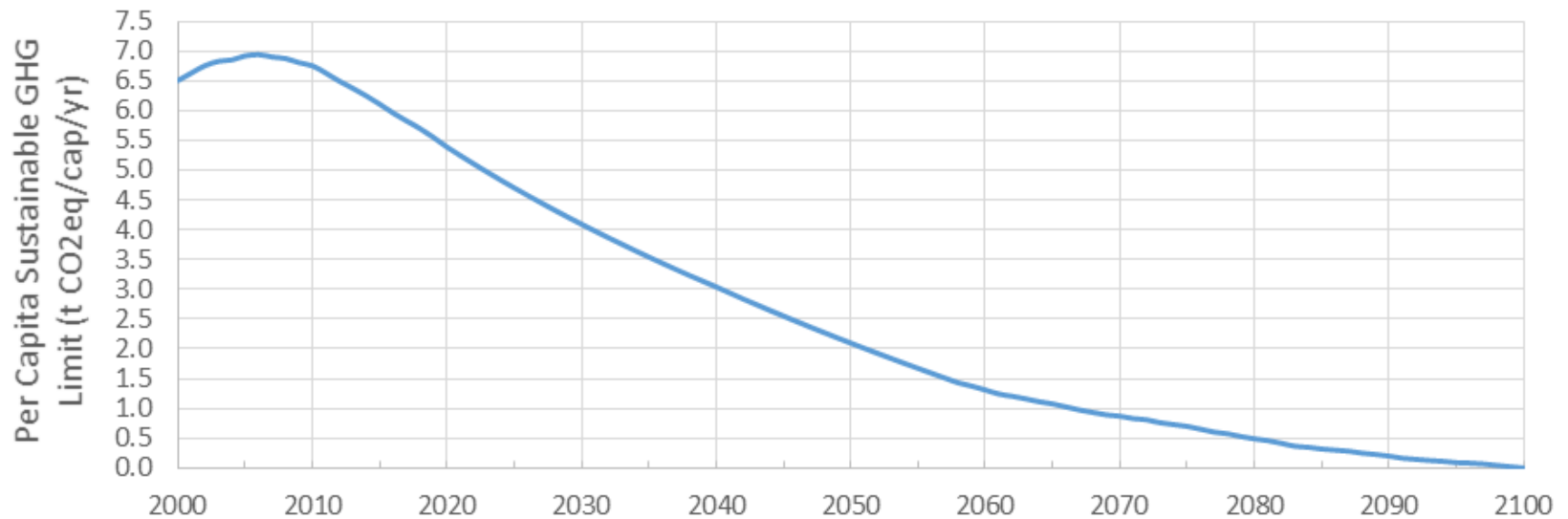
One planet boundary

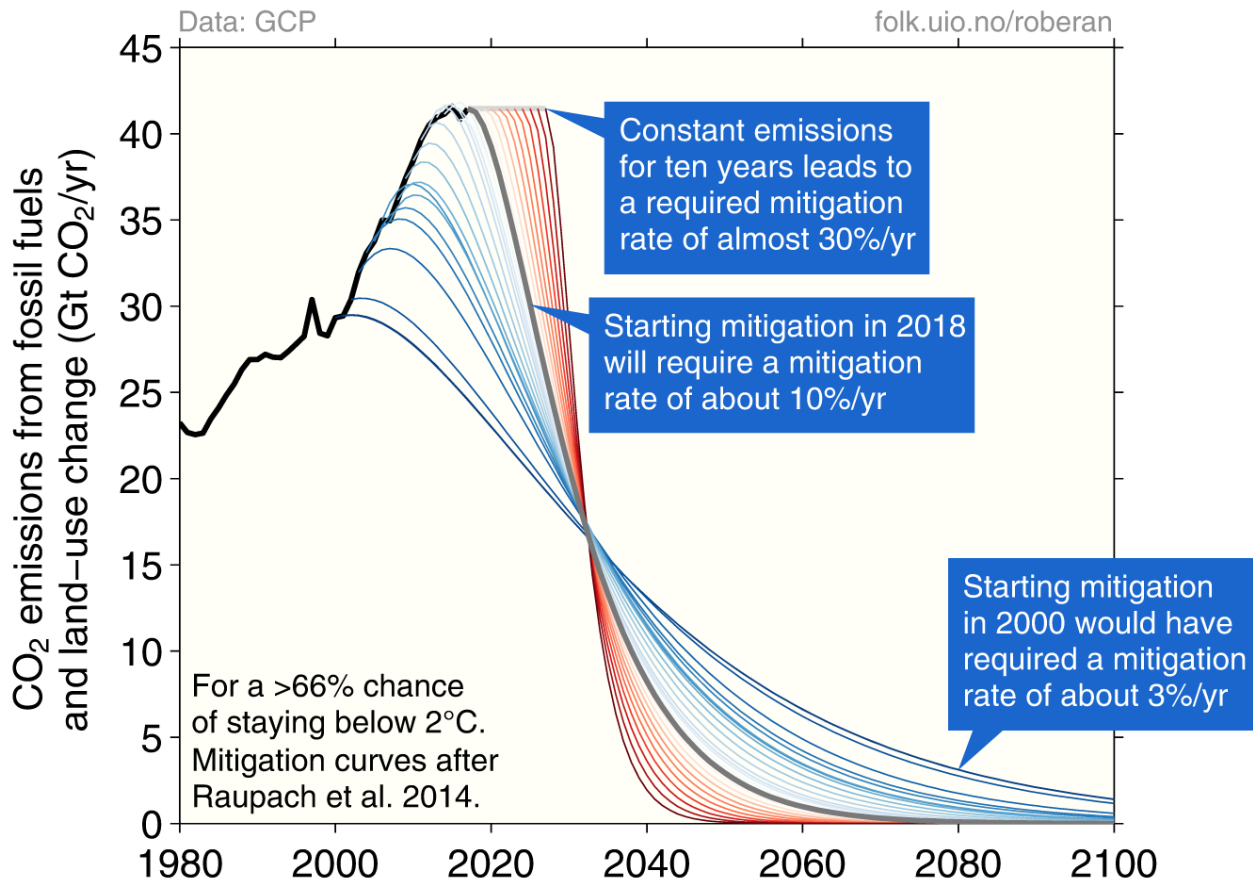
Carbon Footprints in Finland (kg/a)





2 degree target over time







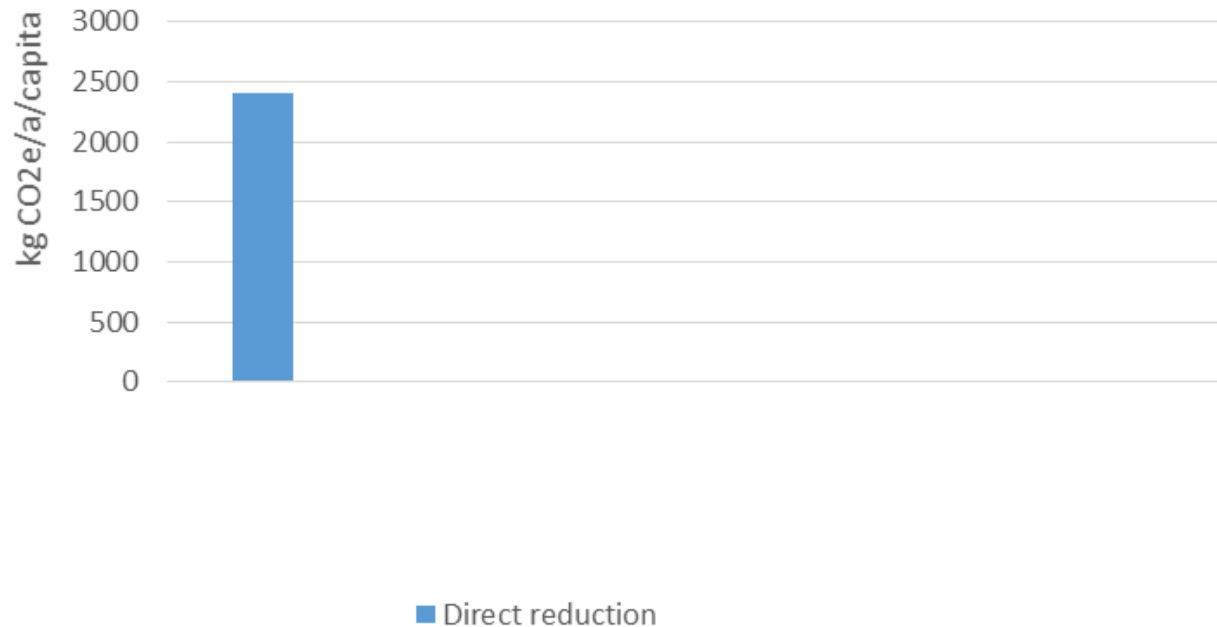
The issue very poorly understood, but destroying most mitigation schemes, is called the rebound effect





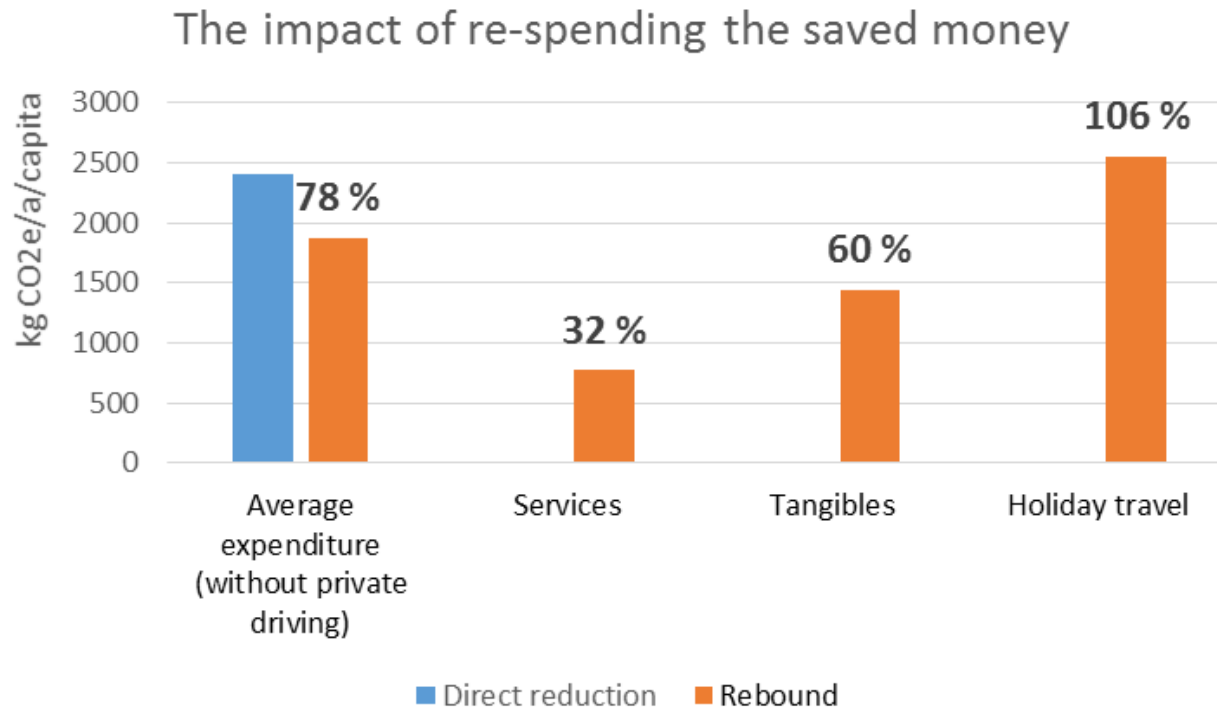
Driving has high GHG reduction potential – but is also expensive

The impact of giving up on the car



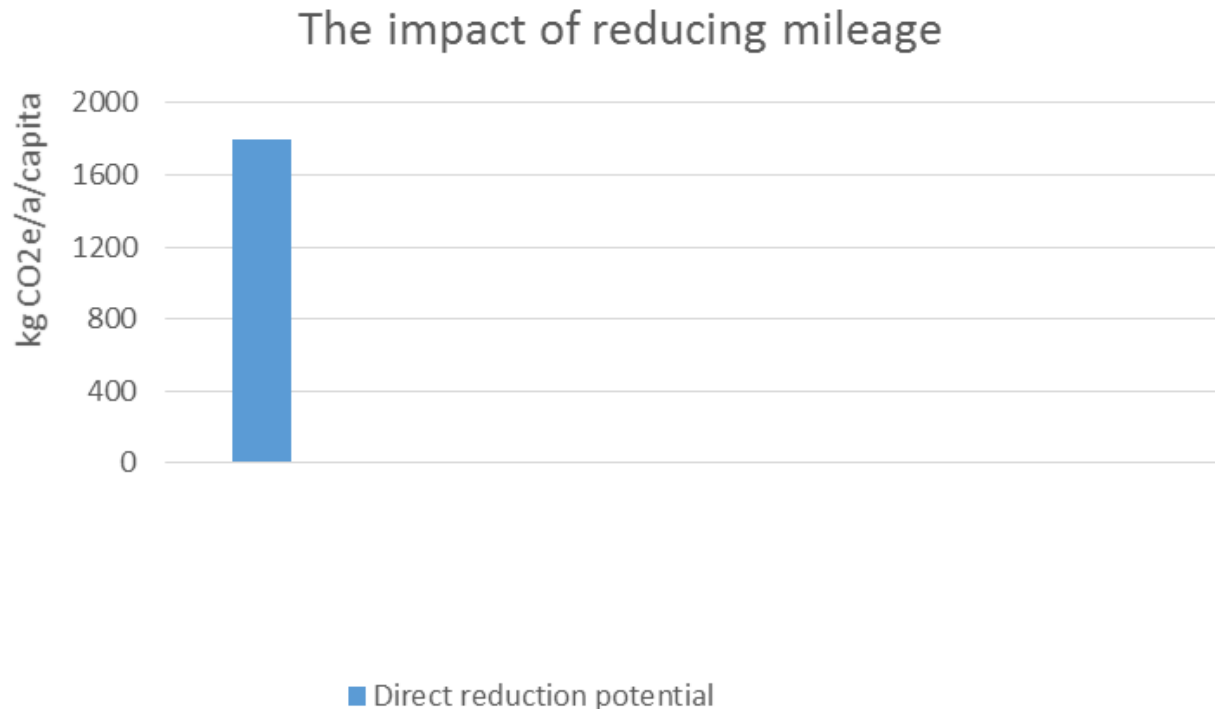


...thus having a high rebound potential as well



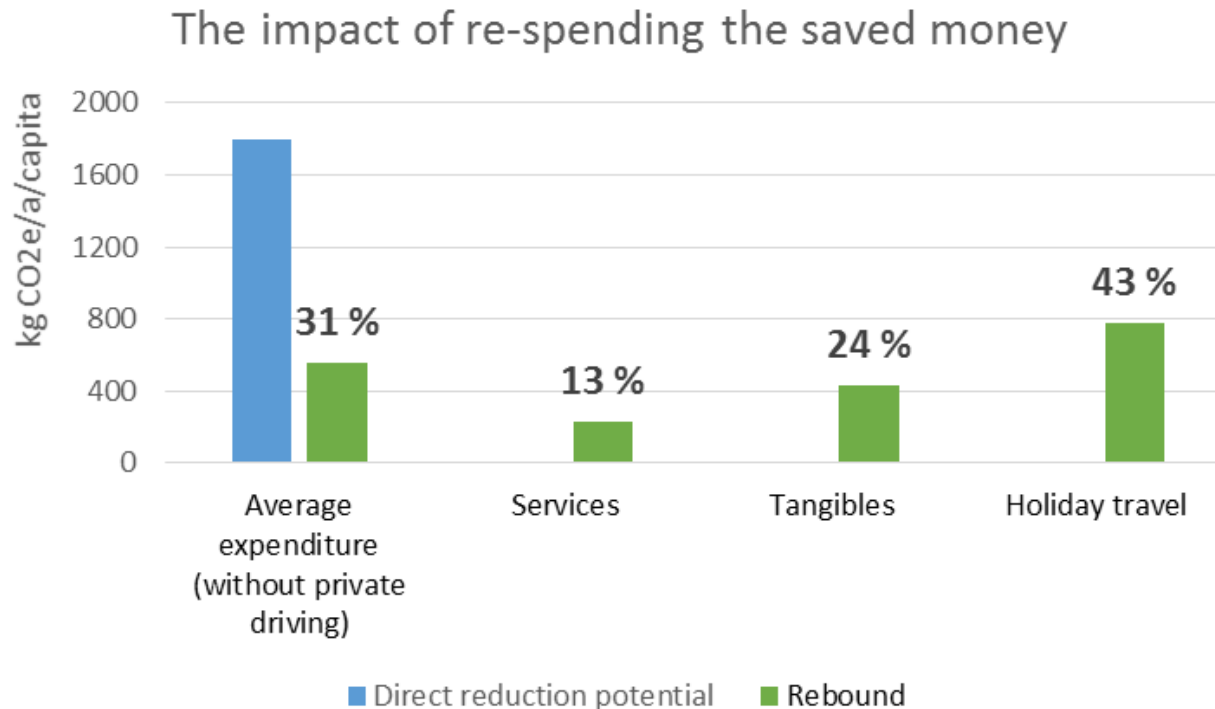


The majority of the costs are often related to owning and maintaining the car





...reduced driving thus having significantly lower rebound-potential



Bensín eða utanlandsferð?

e-Golf 100% rafmagnaður.

Think Blue.

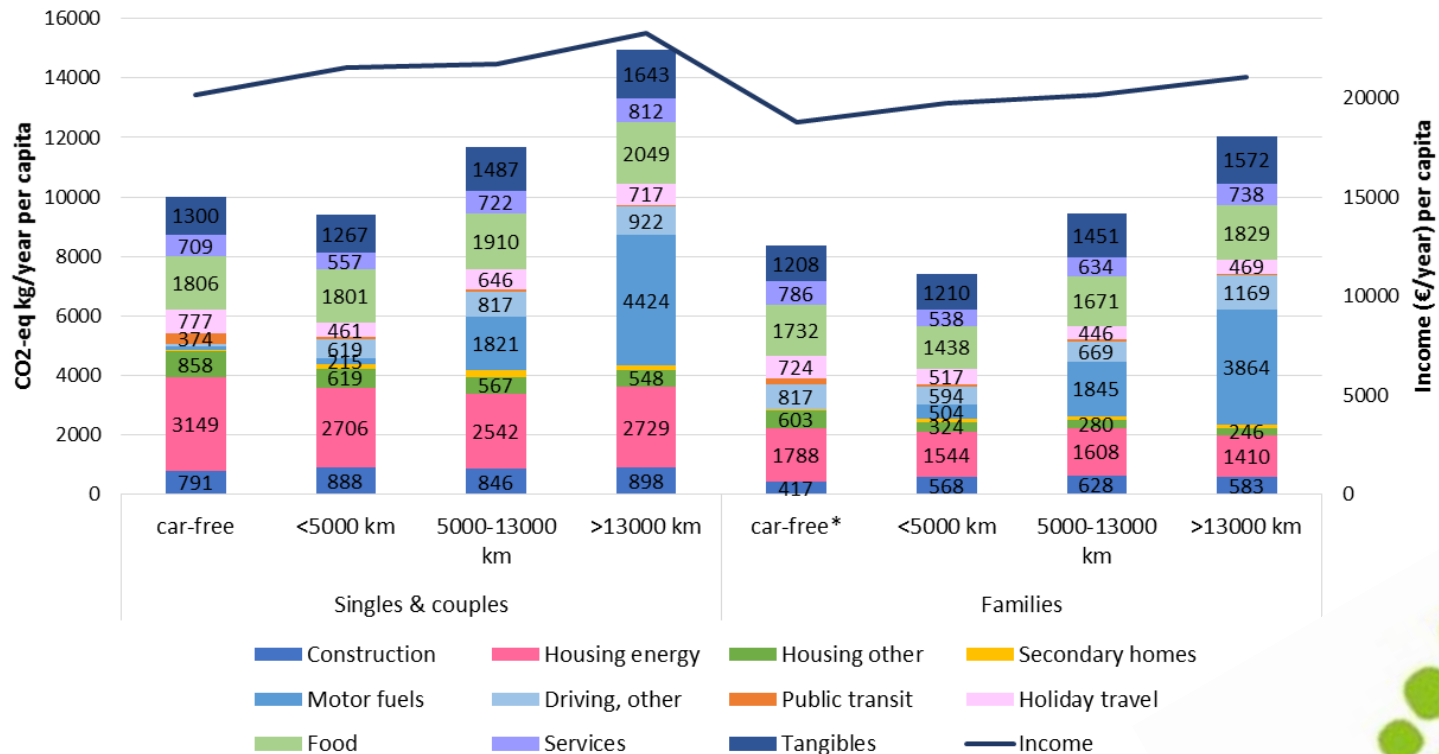


Das e-Auto.





An interesting overall implication is that the non-motorized might not have the smallest carbon footprints





How much carbon can we "invest" in the development of the low-carbon urban structure?





The only ecocity model we currently know



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What to do then?

- ***Instead of just looking at GHG reductions from certain individual sectors, we should concentrate more on understanding the complex systemic interdependencies***
- ***The aim should be at finding such time-use and monetary consumption activities which improve the state of the natural environment rather than deteriorate it***
 - ***regenerative goods and services***
- ***The rebound effect works the other way round as well***
 - ***an investment in something reducing the emissions has a positive rebound in leading to reduction in harmful consumption elsewhere***
- ***An example: carbon storing construction materials, e.g. wood***
 - ***long-term storage, new sink capacity, continuous positive positive cycle, positive rebound***





Thank you!
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