

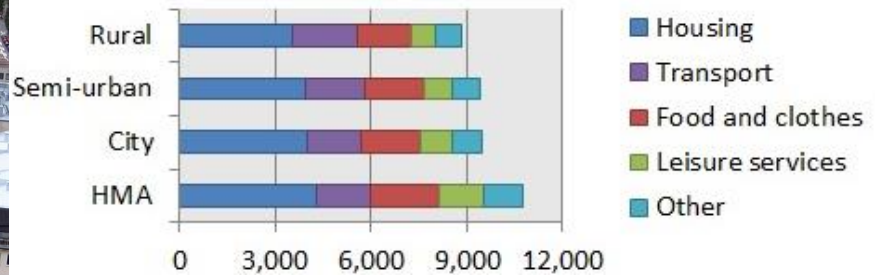
Density and low-carbon illusion

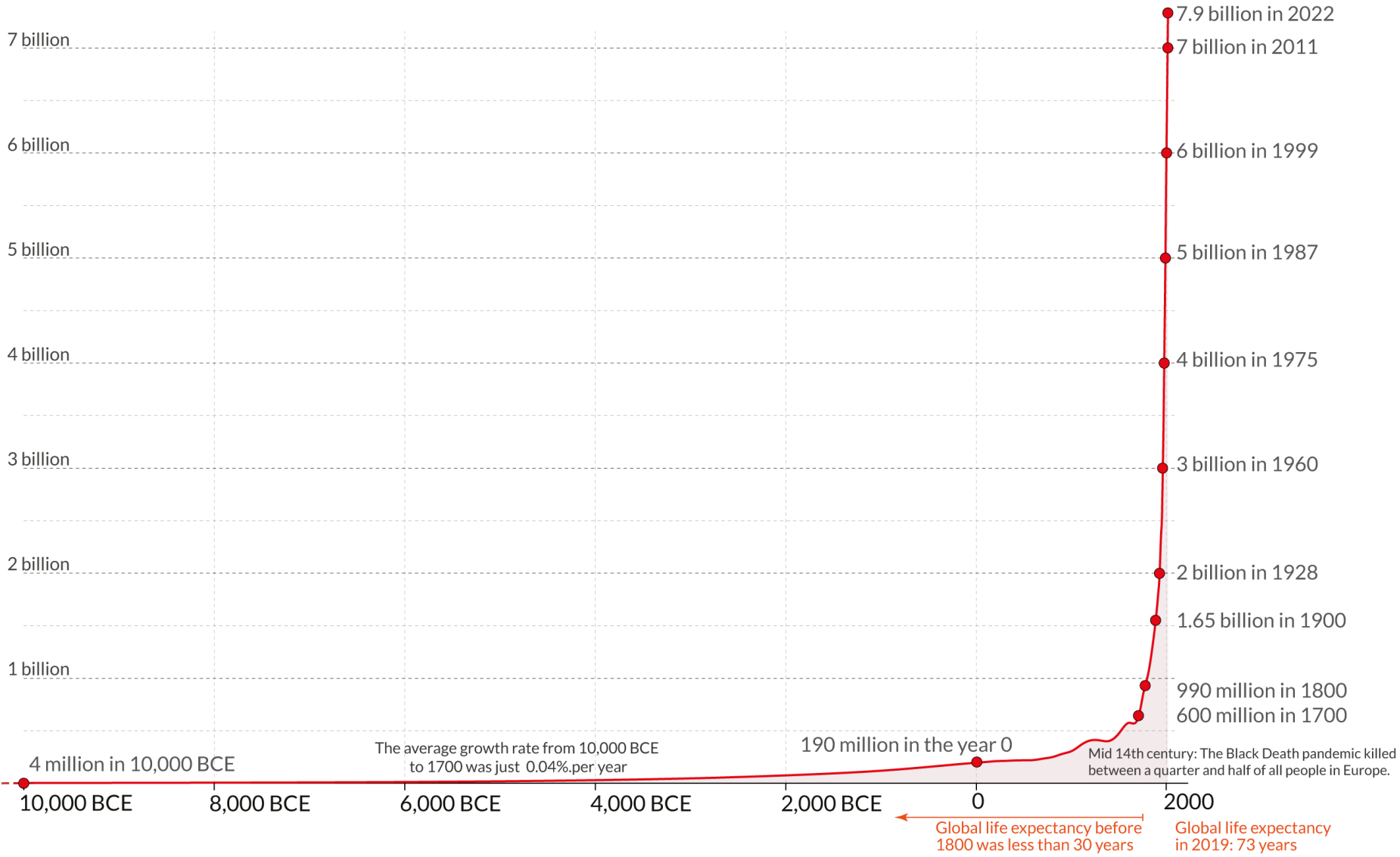
1.6.2023



Jukka Heinonen
Professor

Carbon footprints in Finland (kg/a)



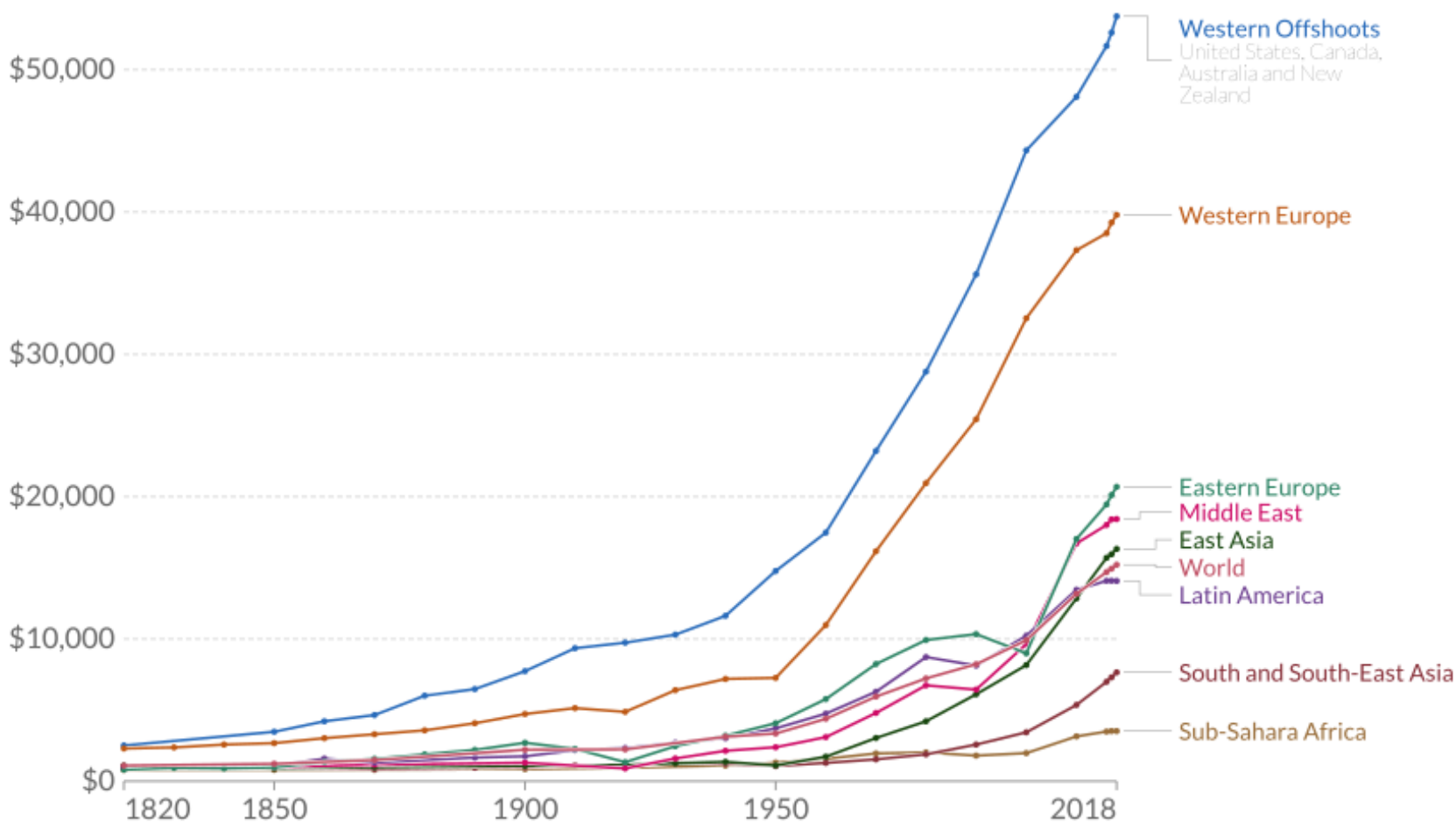




GDP per capita, 1820 to 2018

Our World
in Data

This data is adjusted for differences in the cost of living between countries, and for inflation. It is measured in constant 2011 international- $\$$.

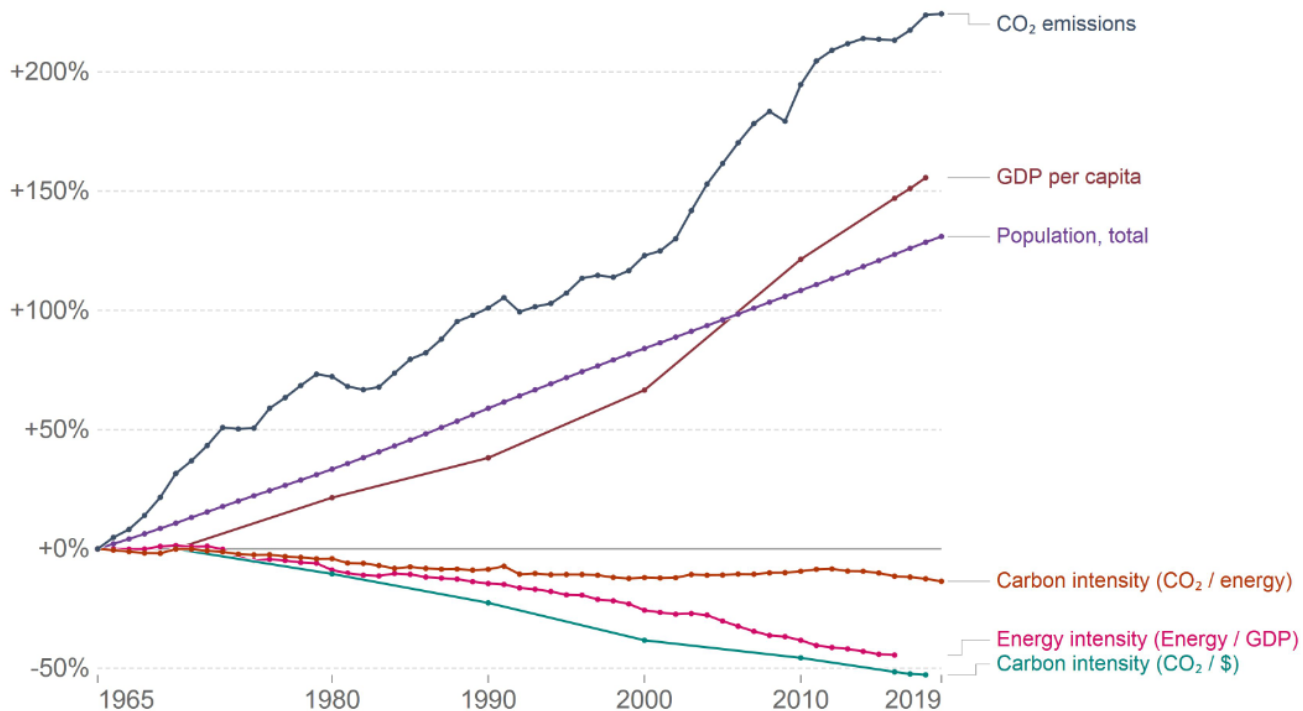




Kaya Identity: drivers of CO₂ emissions, World

Percentage change in the four parameters of the Kaya Identity, which determine total CO₂ emissions.

Our World
in Data



Source: Our World in Data based on Global Carbon Project; UN; BP; World Bank; Maddison Project Database

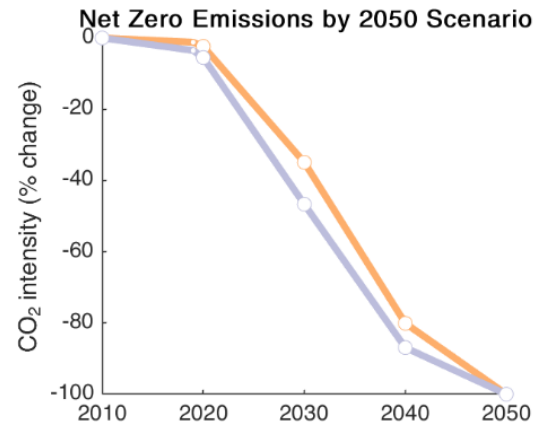
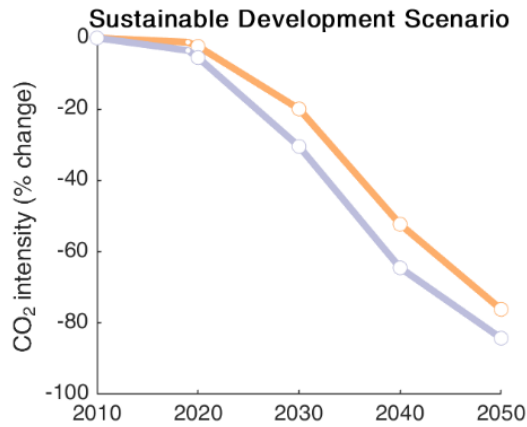
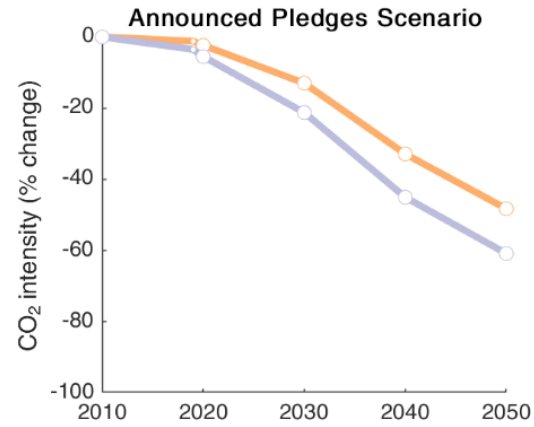
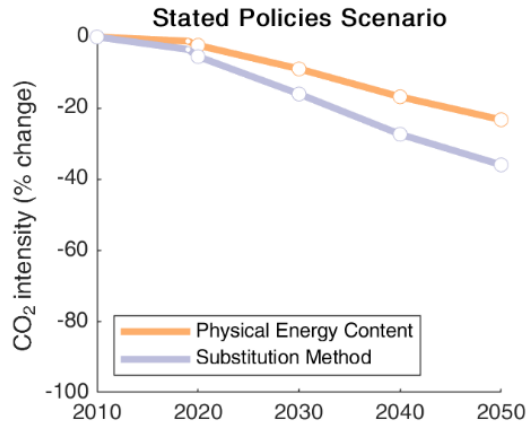
Note: GDP per capita is measured in 2011 international-\$ (PPP). This adjusts for inflation and cross-country price differences.

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY



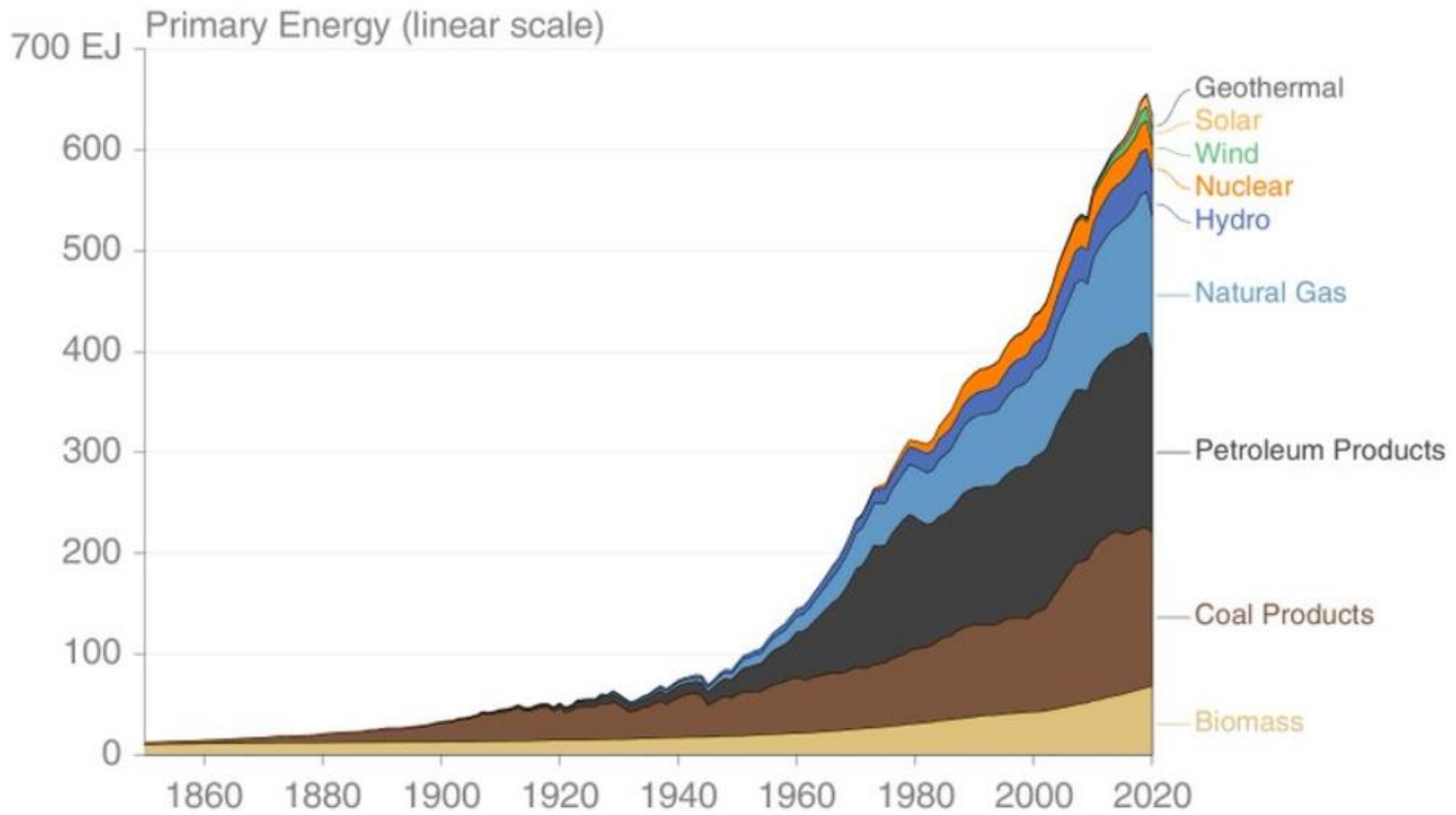
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@Peters_Glen • Data: IEA World Energy Outlook (2021)

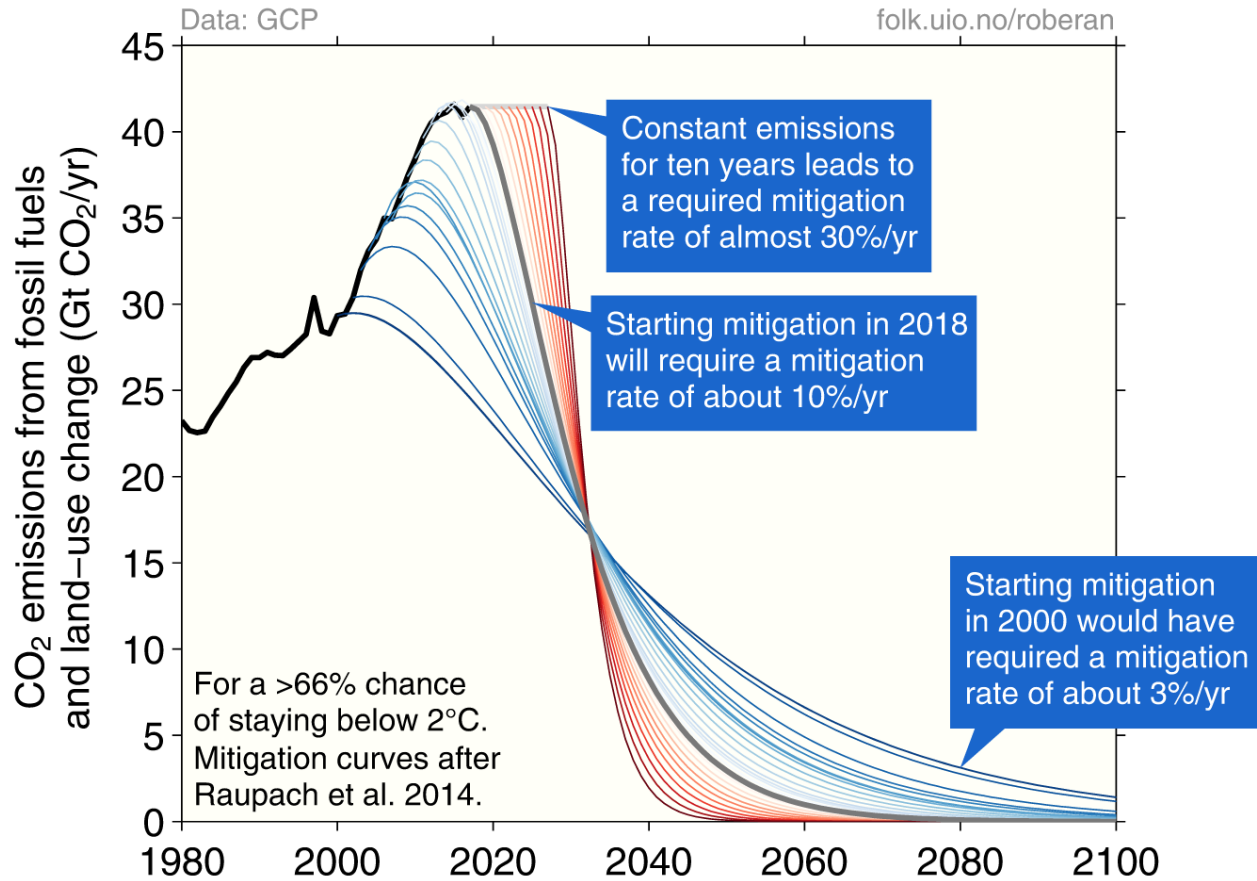




© i@Peters_Glen • Data: GCB (1750-1900); IIASA PFU (1900-2014); BP (2015:2020)

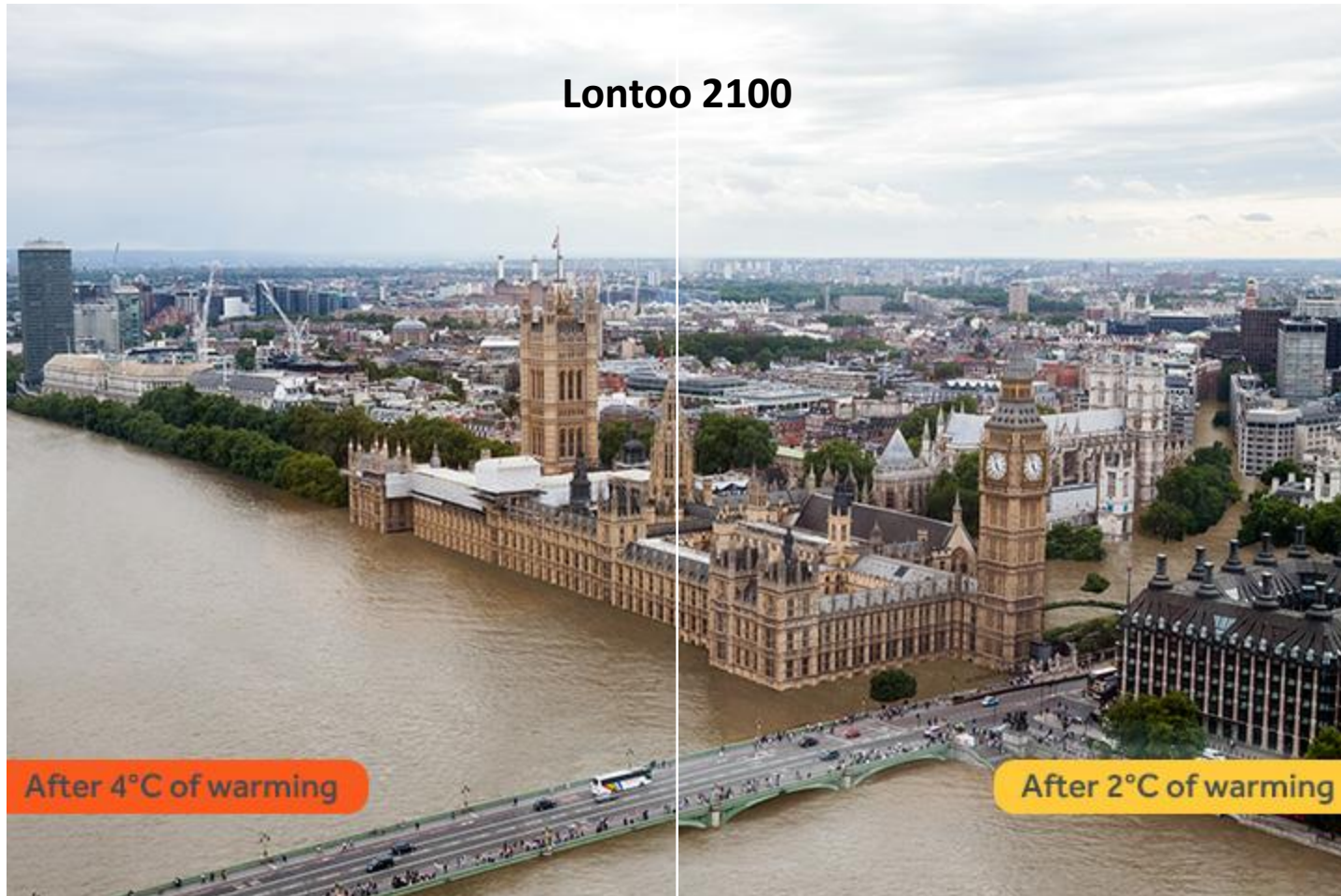


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Lontoo 2100



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<http://www.climatecentral.org>

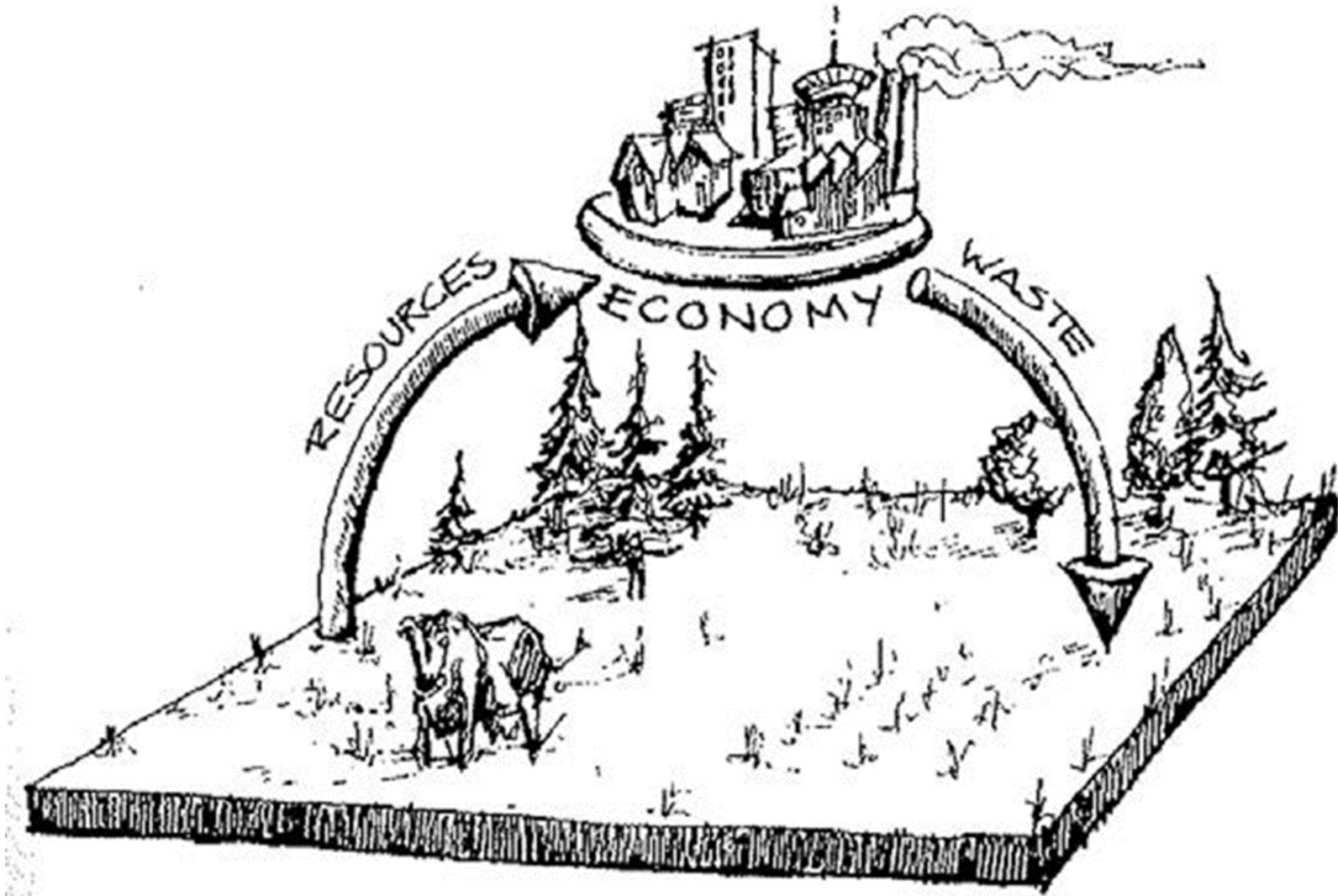


I WANT TWO
SCOOPS!!!



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

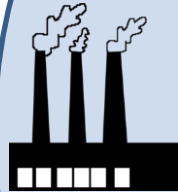




What is actually largely the aim of high density is to bring as much consumption power together as possible to create business opportunities and economic growth

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

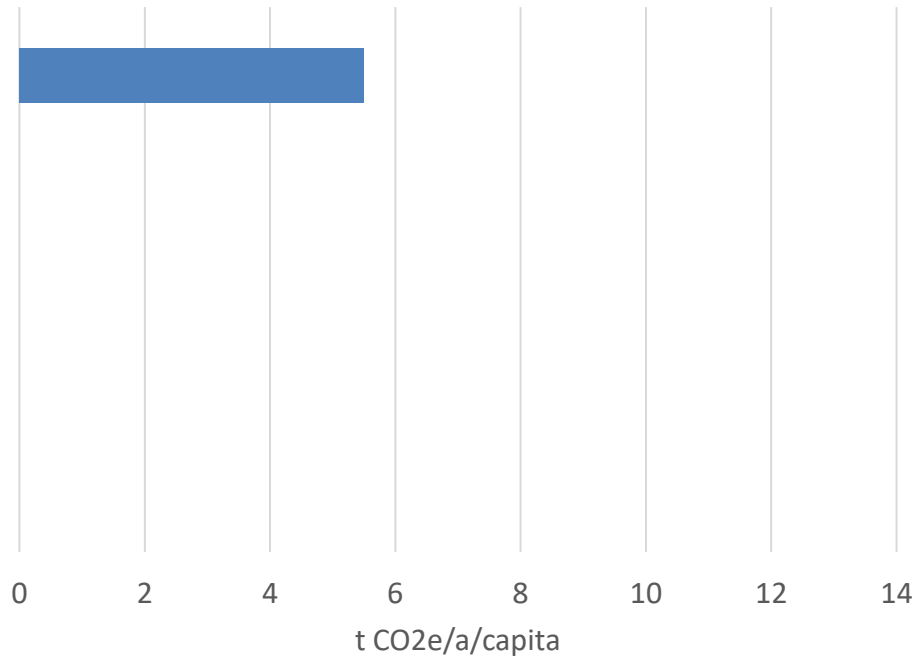
- Type of housing inevitably affects the consumption patterns of the residents
- The surrounding urban structure affects the consumption patterns
- All the consumption activities cause GHG emissions somewhere
- Also, remember not to make low-carbon a synonym to environmentally friendly or sustainable!





“The low-carbon illusion of cities”

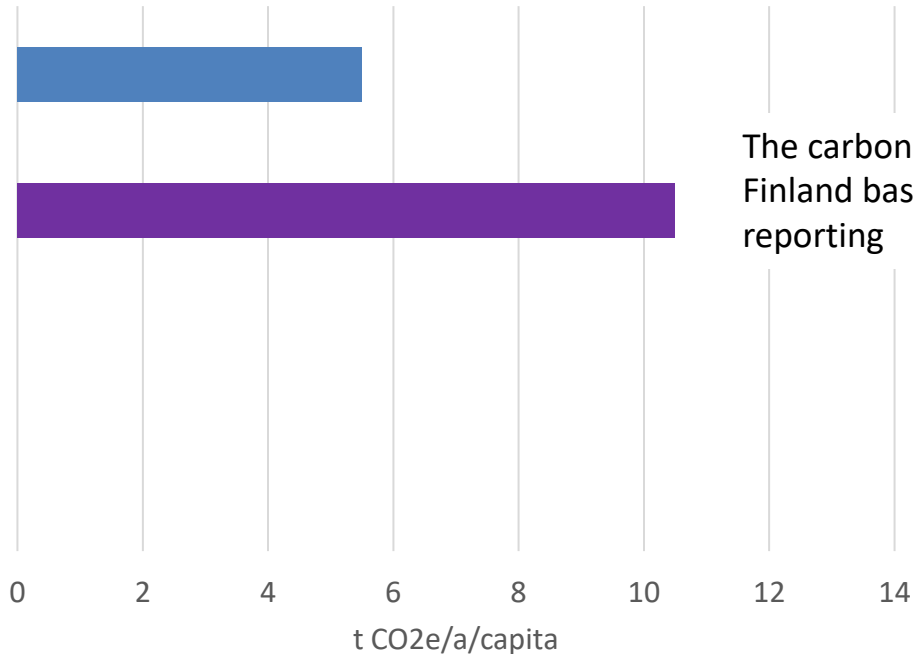
The annual “carbon footprint” in Helsinki according to the city accounting





“The low-carbon illusion of cities”

The annual “carbon footprint” in Helsinki according to the city accounting

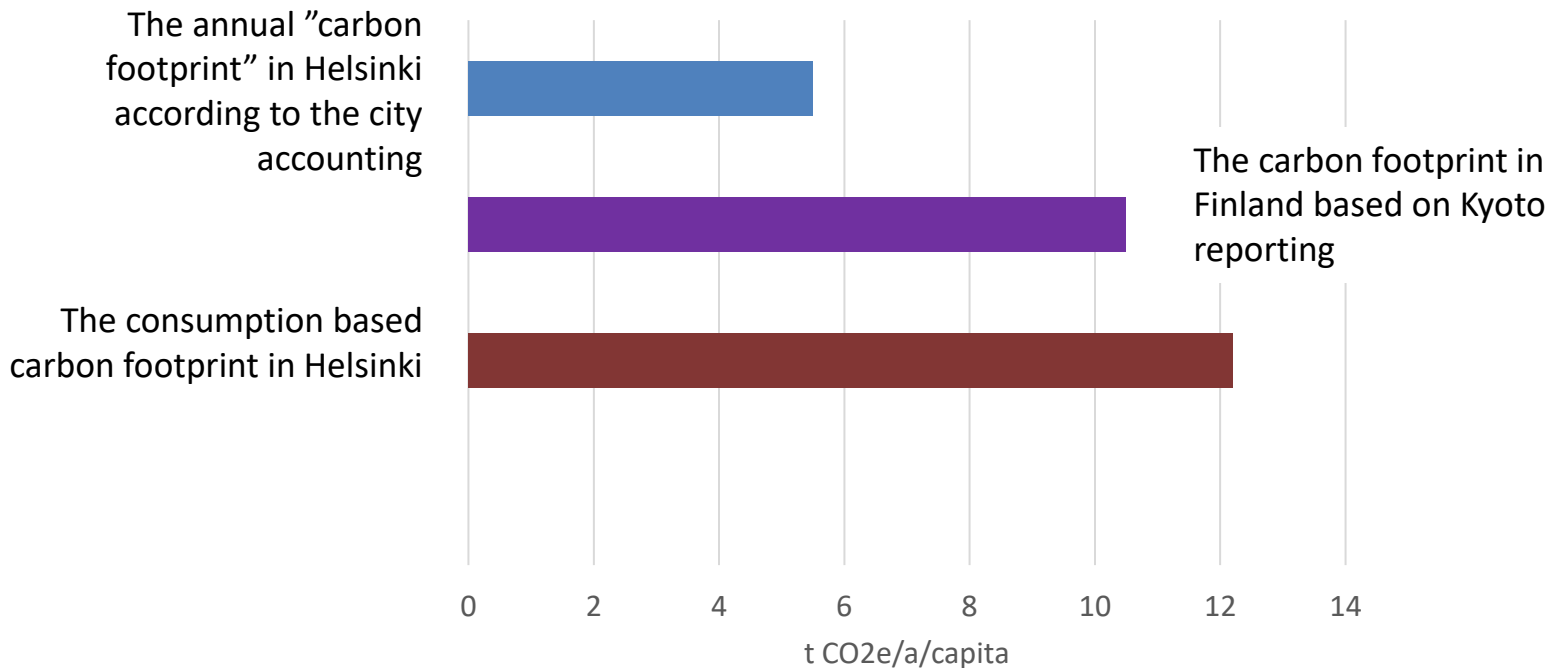


The carbon footprint in Finland based on Kyoto reporting



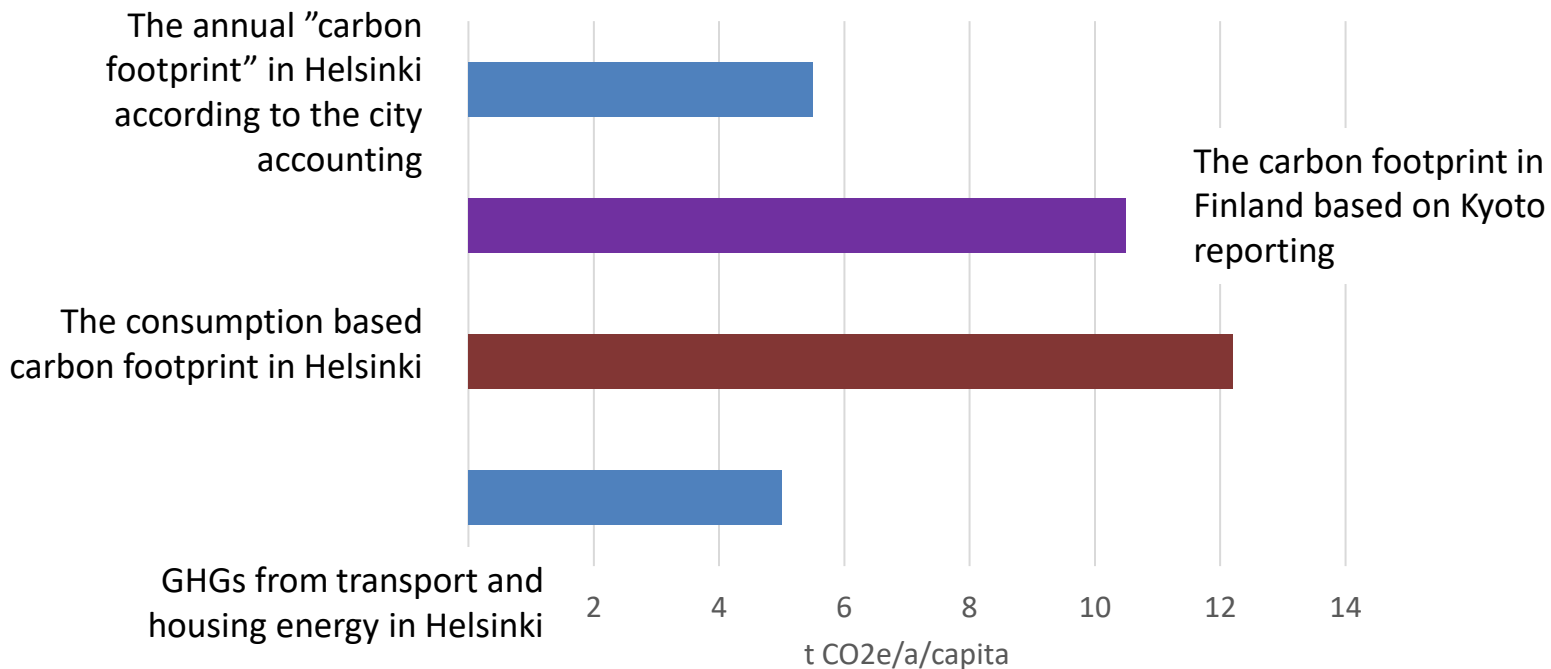


“The low-carbon illusion of cities”



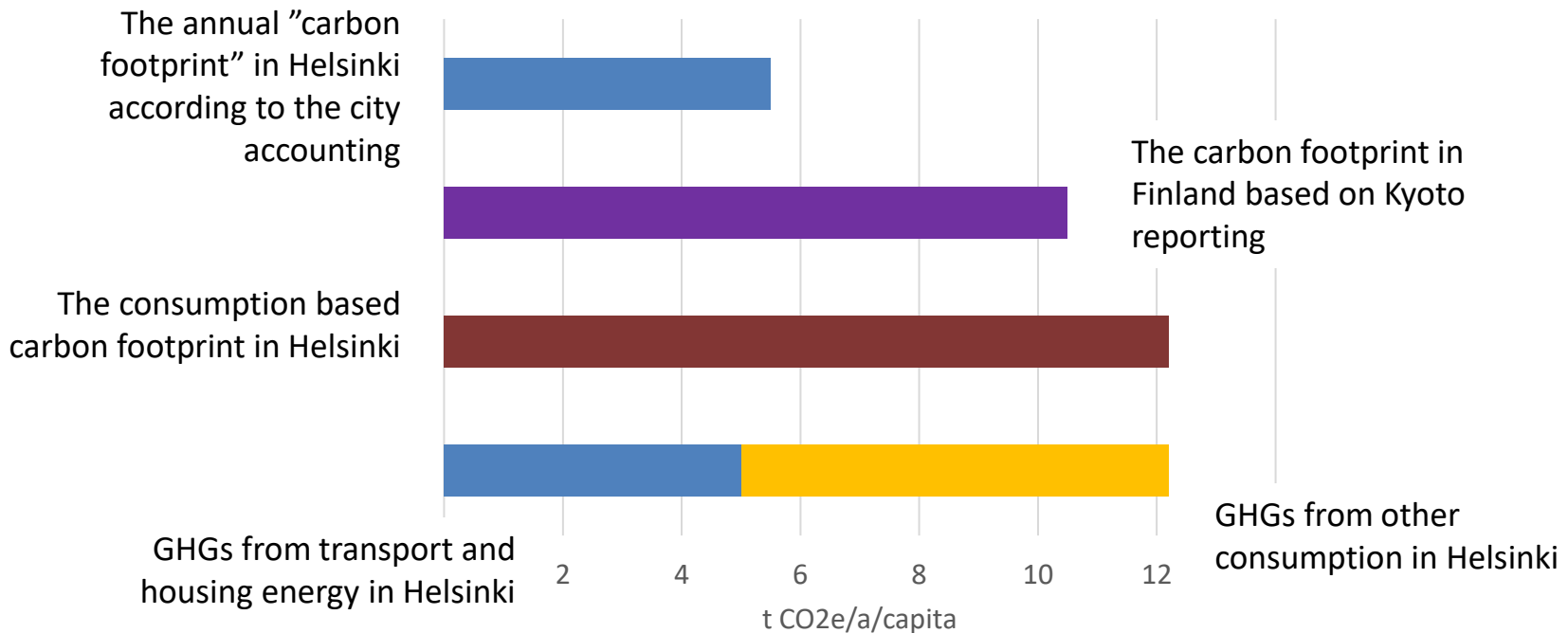


“The low-carbon illusion of cities”





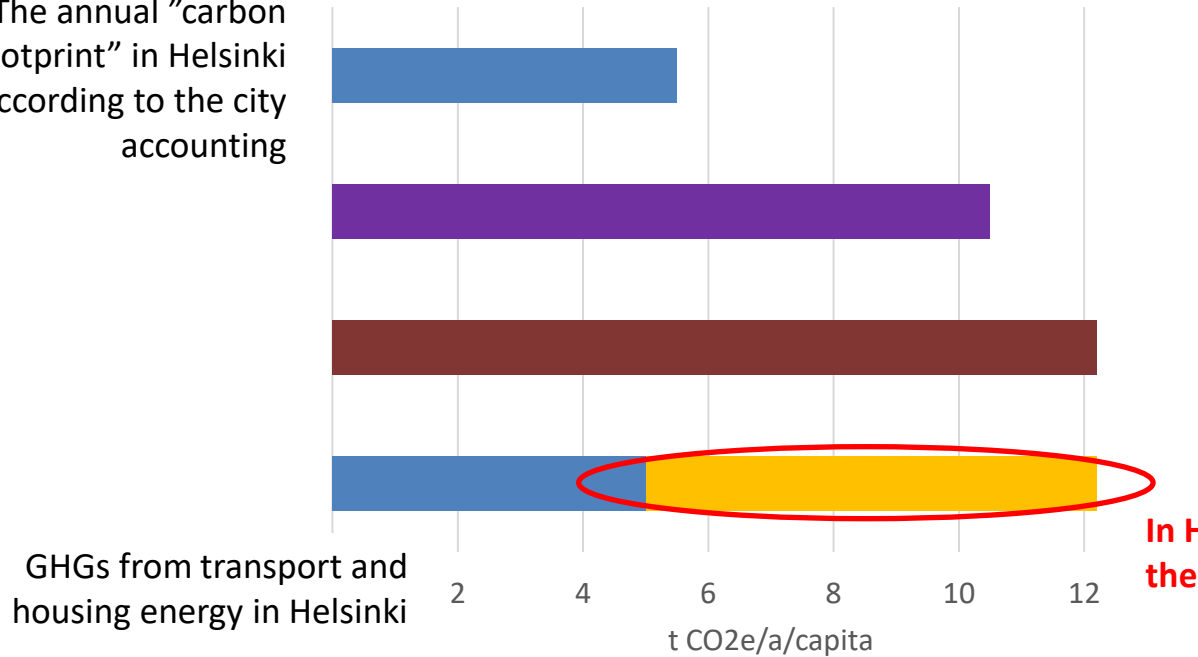
"The low-carbon illusion of cities"





"The low-carbon illusion of cities"

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



In Helsinki this is basically the outsourced share!

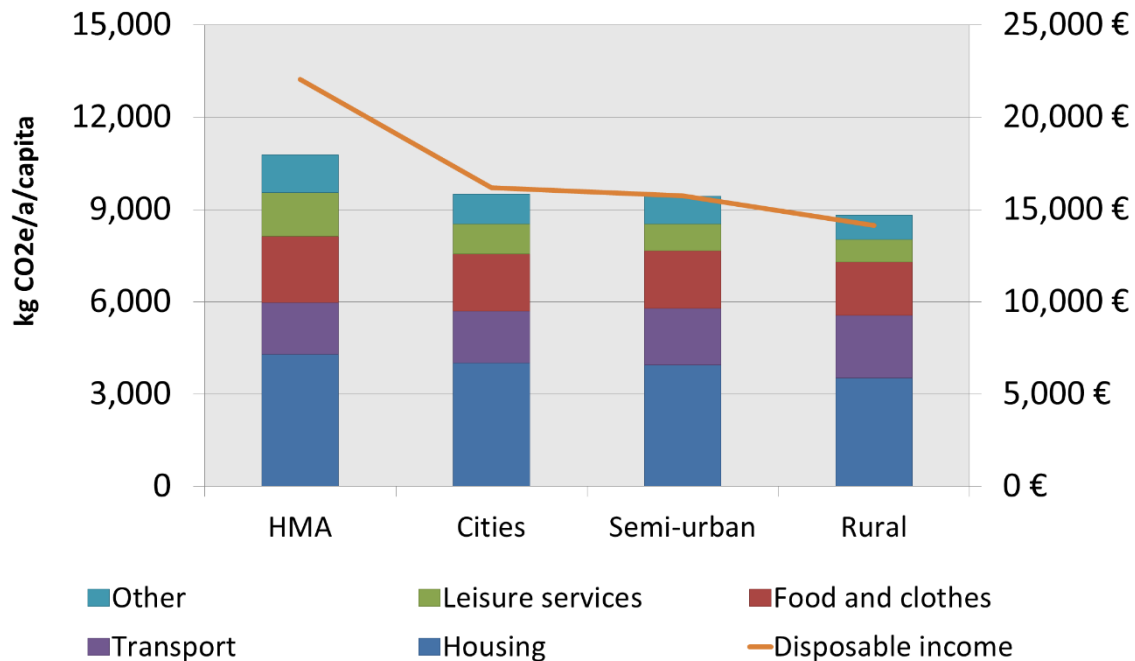




“The low-carbon illusion of cities”



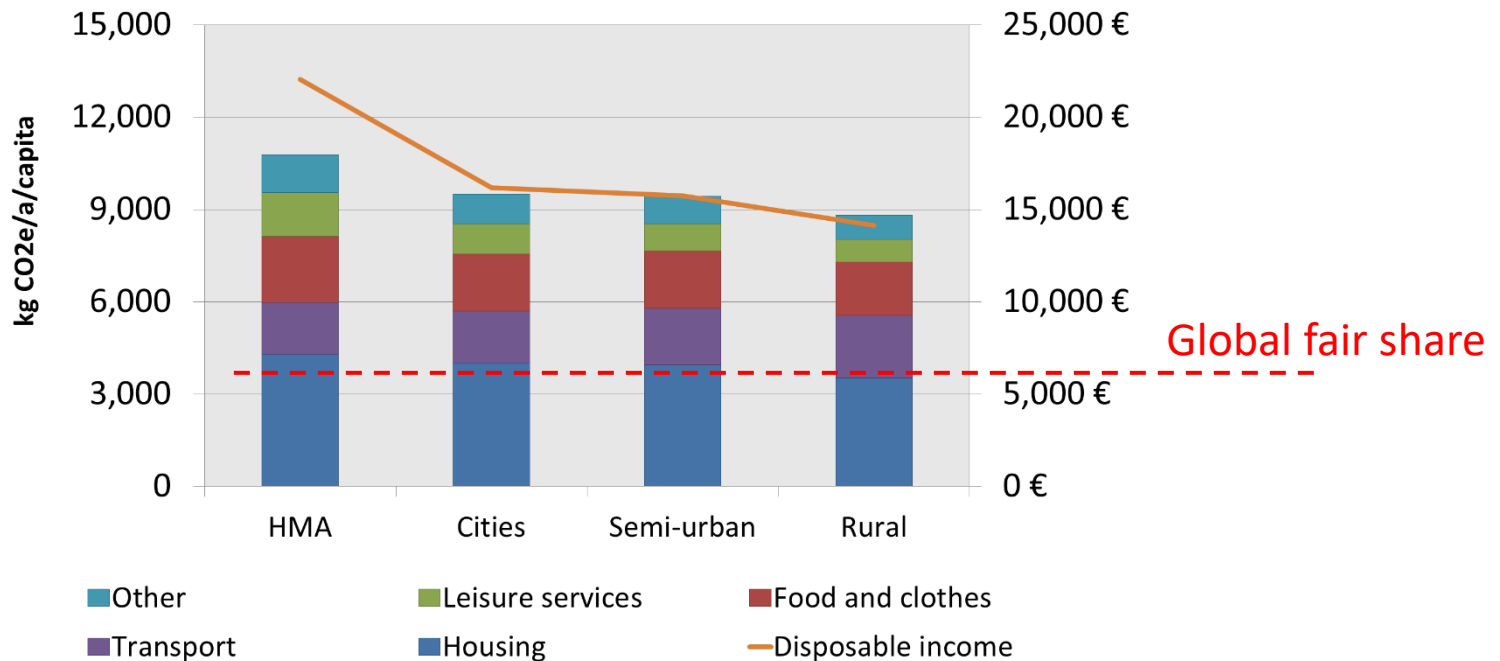
Carbon Footprints in Finland (kg/a)





One planet boundary

Carbon Footprints in Finland (kg/a)





However: is the "global fair share" really fair?

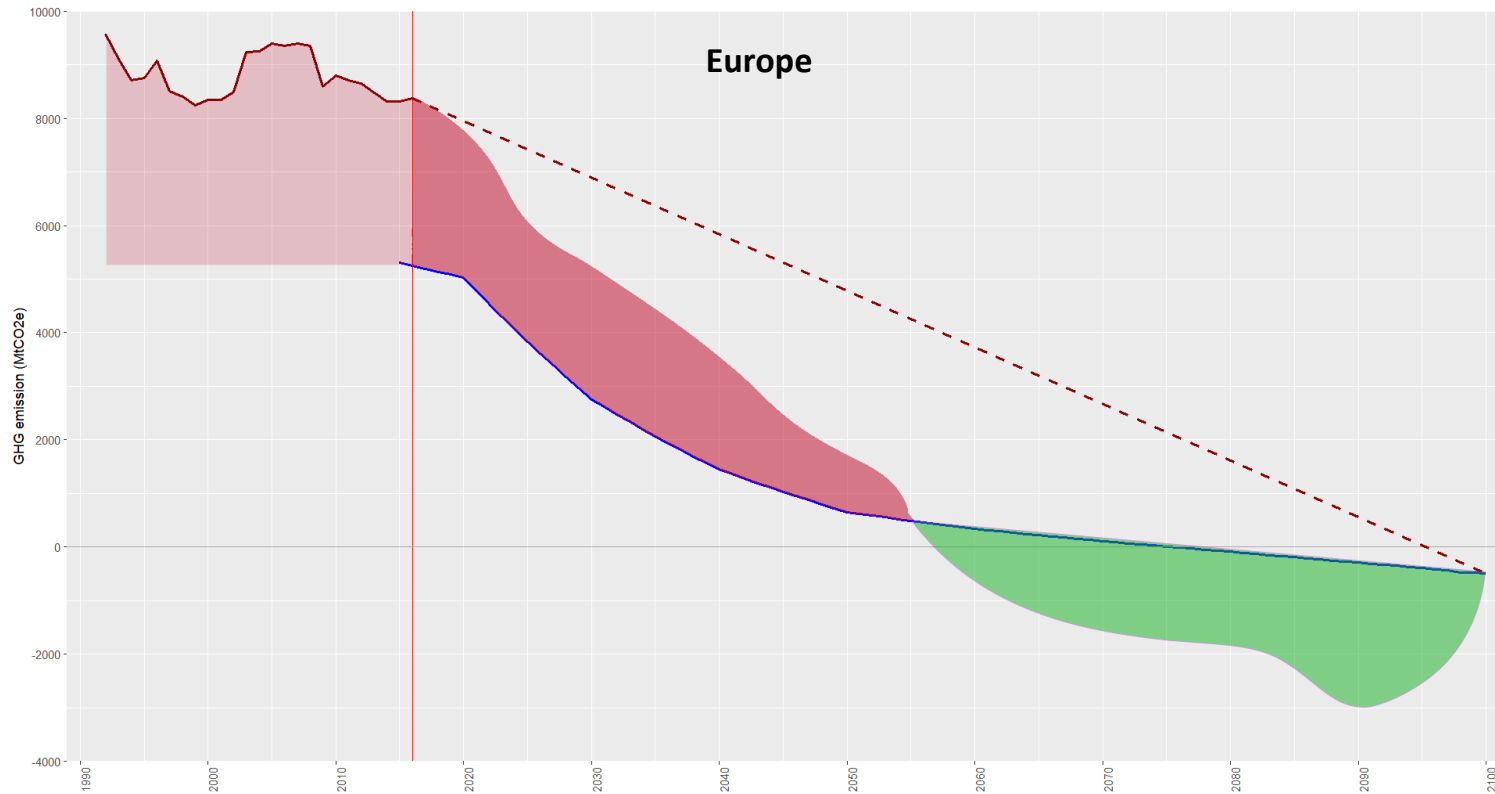


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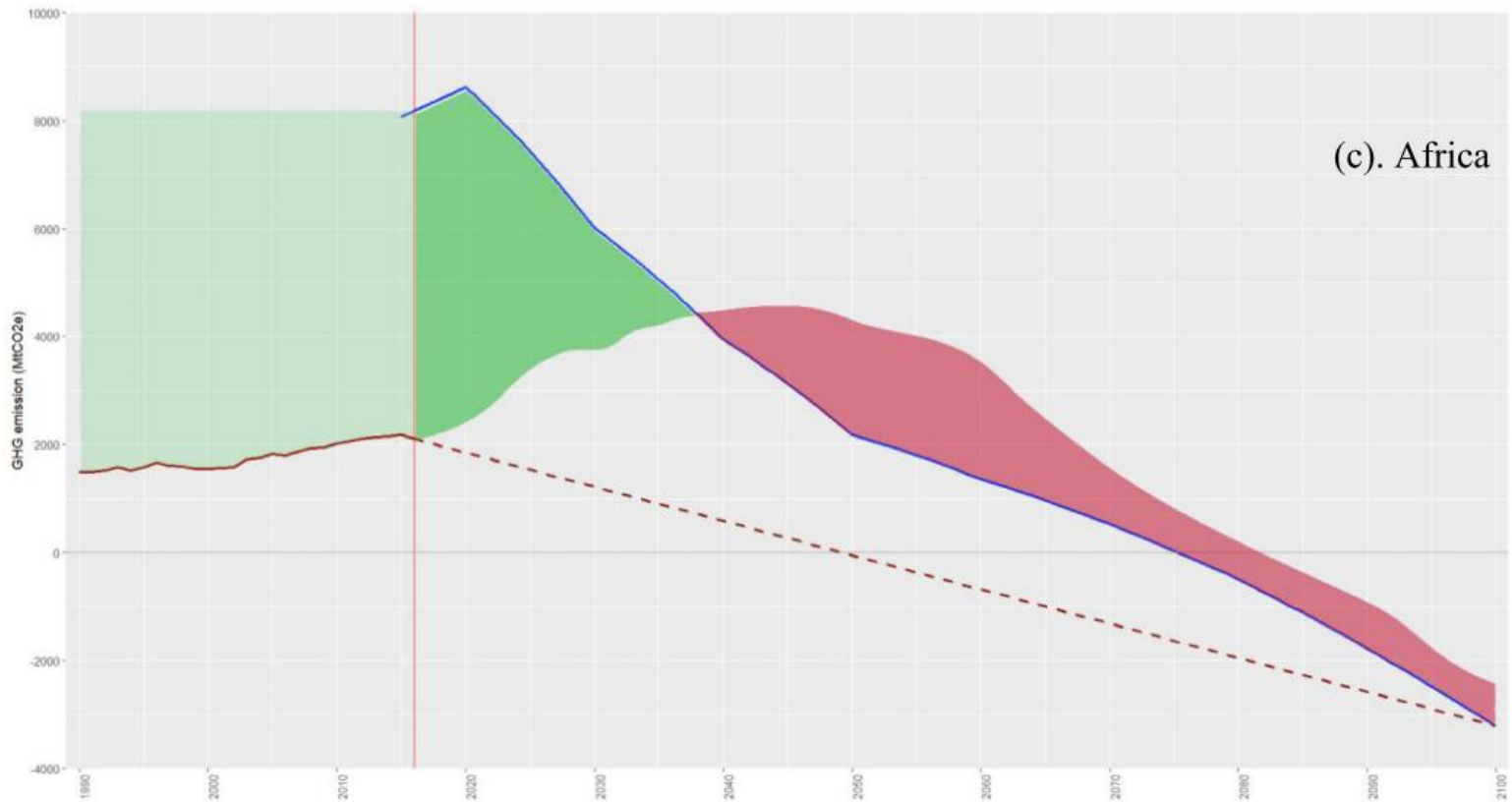


While it might if there was no history





...some might think that the historic responsibility is not equally distributed and should show in the "fair share"





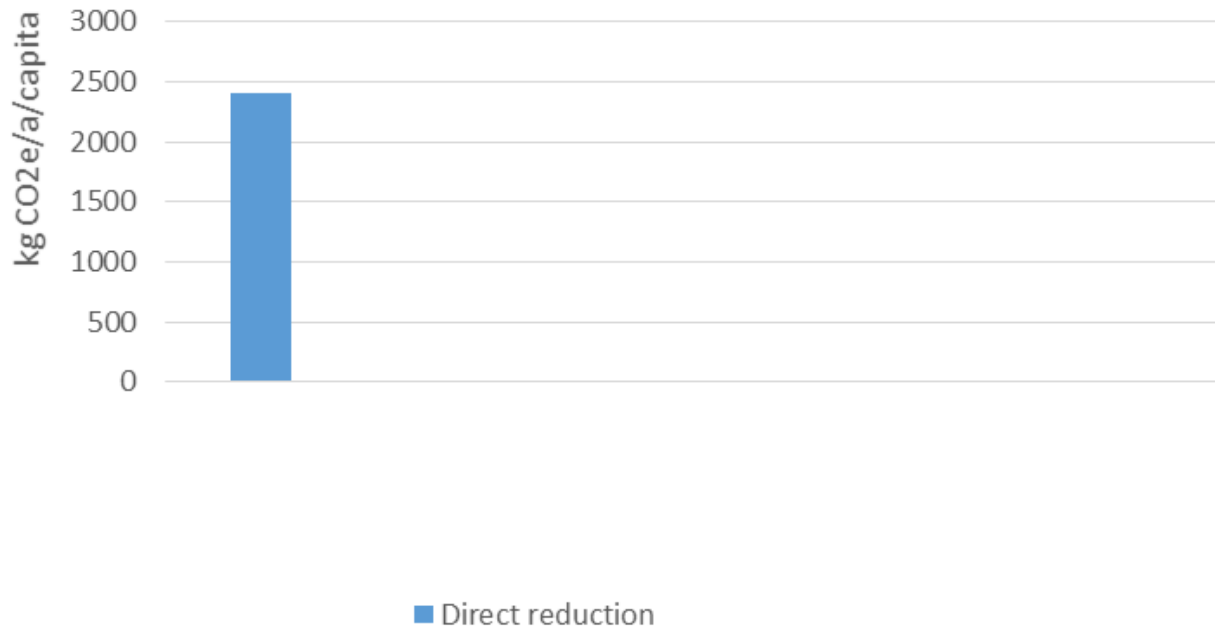
The issue very poorly understood, but destroying most mitigation schemes, is called the rebound effect





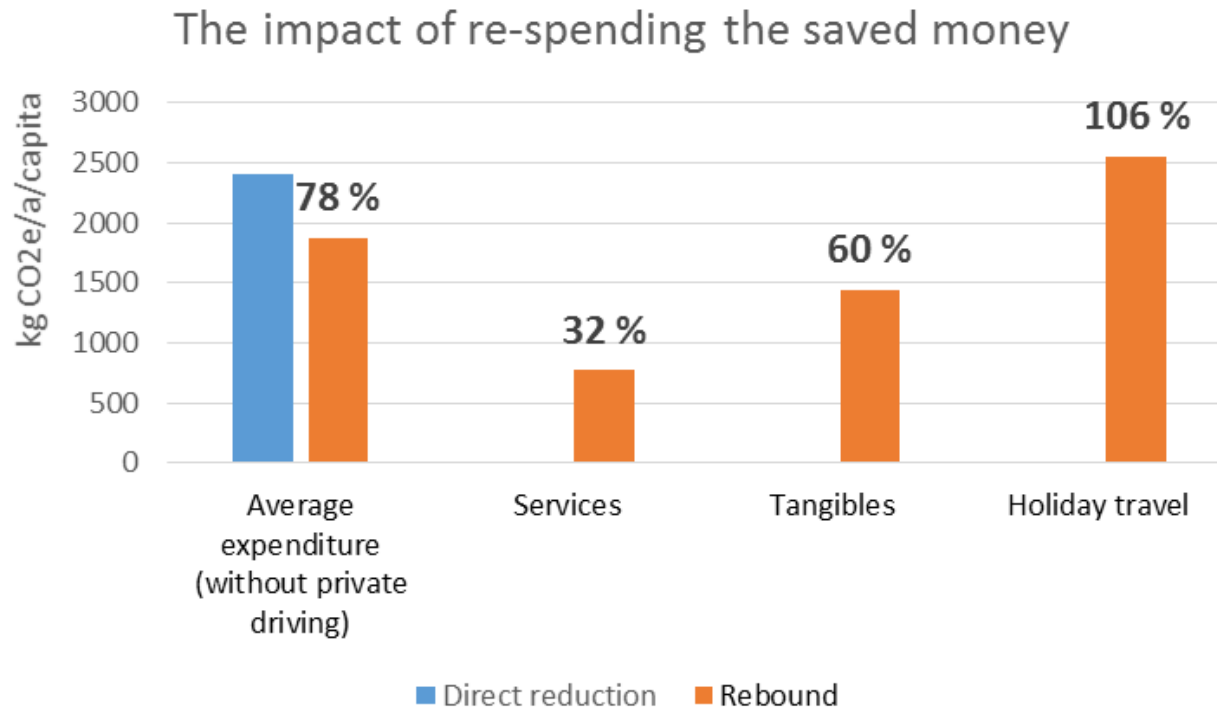
Driving has high GHG reduction potential – but is also expensive

The impact of giving up on the car





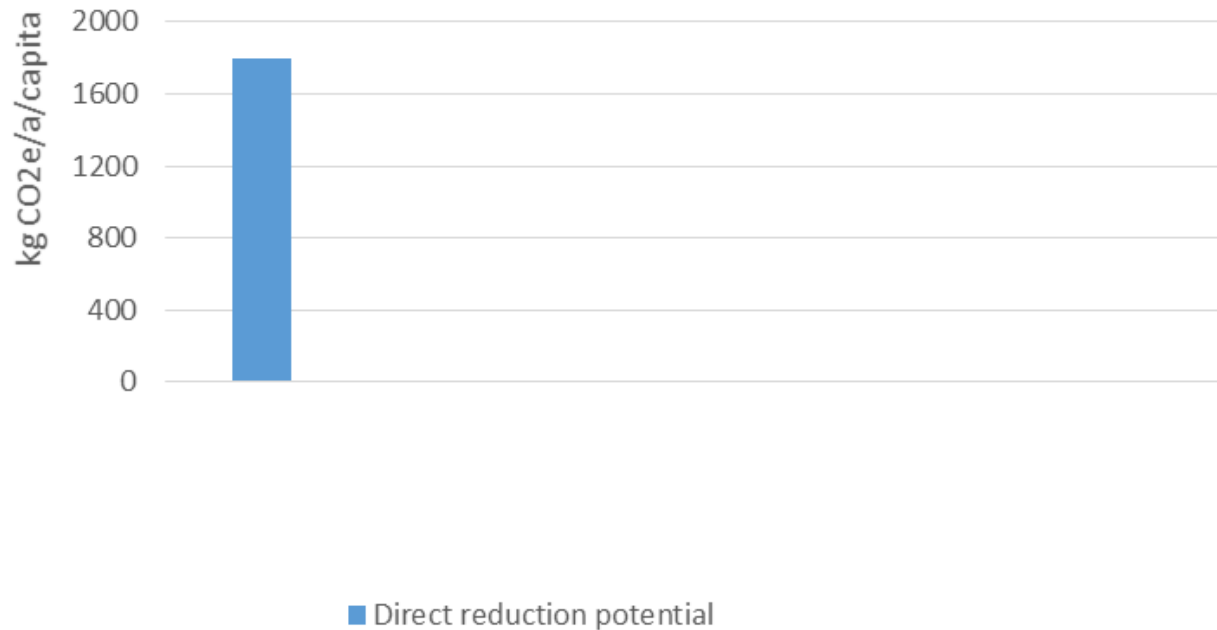
...thus having a high rebound potential as well





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

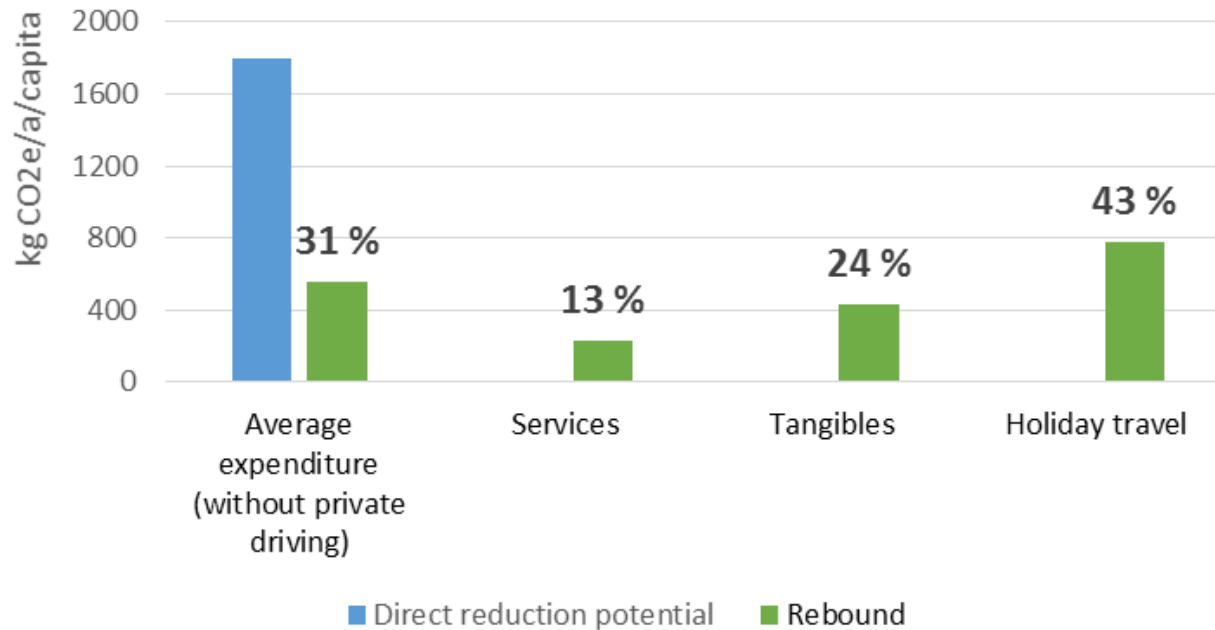
The impact of reducing mileage





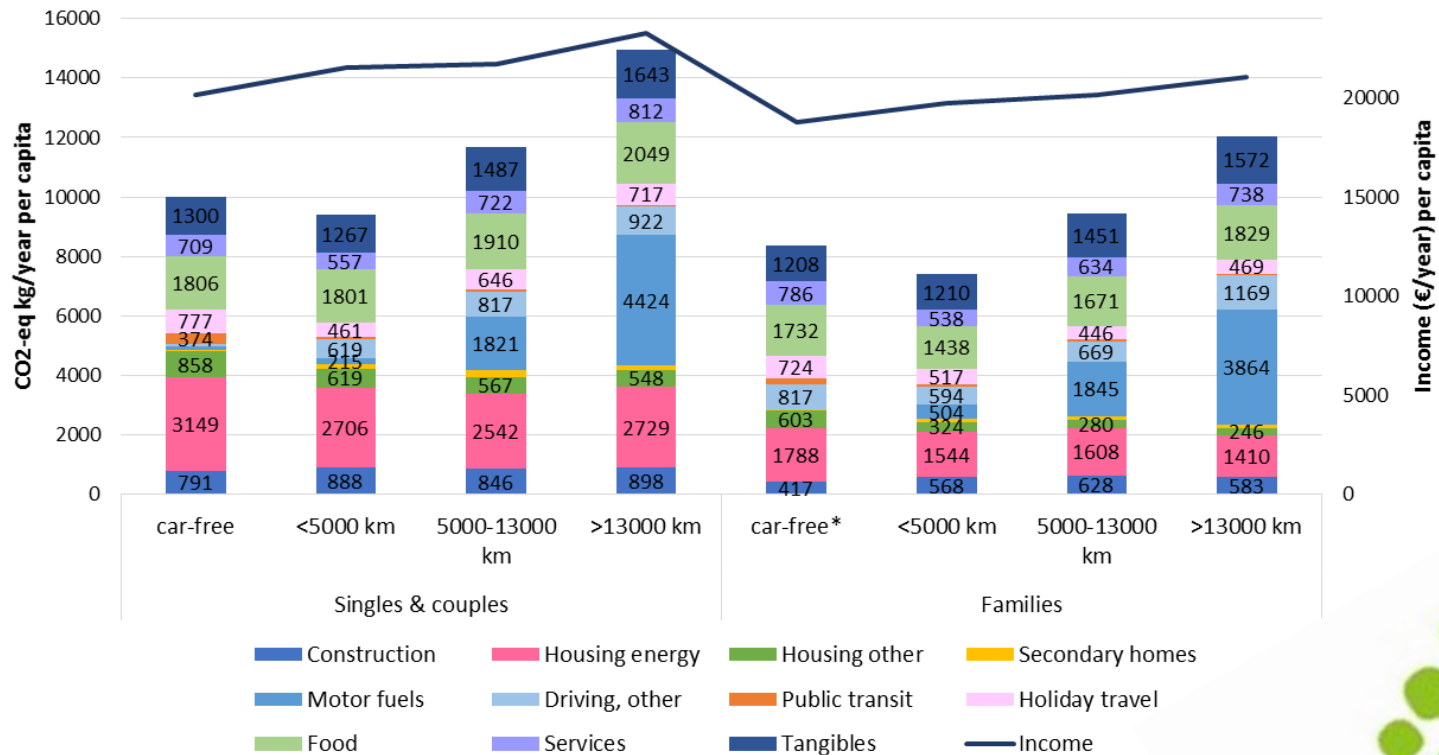
...reduced driving thus having significantly lower rebound-potential

The impact of re-spending the saved money





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



Bensín eða utanlandsferð?

e-Golf 100% rafmagnaður.

Think Blue.



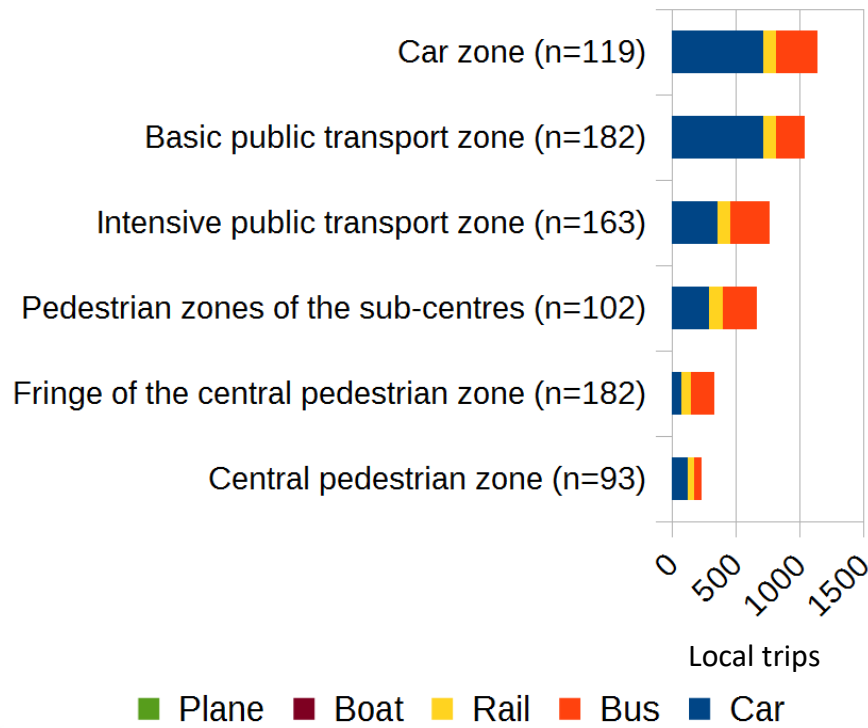
Das e-Auto.





Car ownership and overall mobility-related emissions

yearly GHG emissions per capita - all trips [kg CO₂e]





The only ecocity model we currently know



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So, what we need to ask ourselves

- Are we really doing something real, or just easy minor changes to look better?
- Do we just set distant future targets not requiring immediate strong action?
- How is it possible that after decades of talk and commitments the emissions have not even stabilized, let alone started decreasing?
- Do we understand it that when we start seeing the real consequences, it is already too late to act?





What should happen?

- We need commitment to change
 - Funding directed to improvements with transformative potential
 - Stronger push towards radical improvements in the industry practices
 - Courage to move away from old practices
 - Ambition now, not ambitious targets set for our children





Examples of steps towards the right direction

- *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*
 - *freetime as a good we purchase by working less*
- *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*
 - *overall, we should rapidly transform the built environment from a huge emissions source into a big carbon sink and storage*
 - *regardless of the level in a rating scheme such as LEED or BREEAM, no concrete and steel building is sustainable*





Thank you!
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