

### Carbon footprints of time-use activities:

# Can we adress quality-of-life and sustainable development at the same time?

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### **Social Ecology**



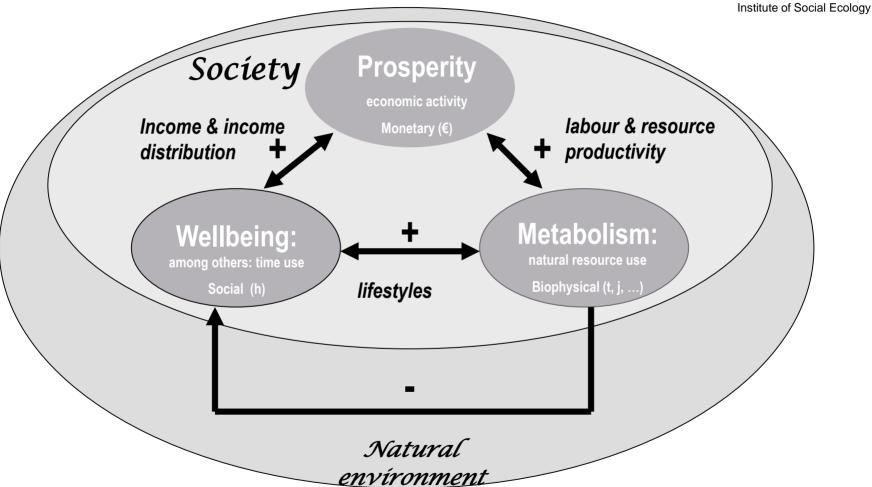


- Social Ecology wants to research Society-Nature-Interactions =
   Societal impact on natural environment and viceversa
- 1st global attempt to adress societal and environmental goals for development: SDGs
- 17 different goals present a lot of possibilities for synergies and tradeoffs or even conflicts → need for systemic perspective and bridging concepts

#### Sustainability triangle







Source: Fischer-Kowalski & Haberl (1998), Int'l Social Science Journal 50(4), 573-587

#### **Functional Time Use**





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Re/production of system	Functional time-use category	Encompasses activities from time-use survey	And carbon footprints from (examples)
Person	Personal time	Personal Care & Sleep	Food, hot water, personal hygiene products,
Household	Committed time	Household; Family, Care & Support	heating and cooling, cooking, supply chain emissions from white goods, appliances, furniture, dwelling maintenance,
Economy	Contracted time	Employment & Study	During employment incomes are eared, which enable consumption during all other activities.
Community	Free time	Social activities, politics, culture, leisure	Entertainment activities, sports, socializing, expenditures related to various hobbies,
Mobility time "enables" other activities by allowing people to perform spatially distinct activities		Various forms of travel	Direct emissions from fuels, embodied emissions in transport equipment and infrastructures,

Table 1: Functional time use as re/production of systems, time-use categories, encompassing detailed activities and carbon footprints, adapted from (Aas, Ringhofer 2016, Haselsteiner et al., 2015; Wiedenhofer et al., 2018).



### SUSTAINABLE G ALS





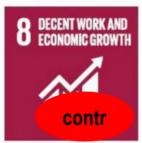
































### Time-use research and sustainable development



- Quality of life = comprises indicators, which encompass different aspects of the social and economic situation of humans.
- Carbon footprints = an indicator for societal impacts on the environment and especially for climate change.
- Time-use research can provide a bridging concept and analysis.
  - Time use mostly time scarcity is a significant factor determining quality of life on the one hand.
  - On the other hand time-use activities determined through time preferences, needs and practices – can differ widely in their carbon intensity.

#### **Carbon footprints**





- Based on the Austrian time-use survey (hours) and the Austrian household budget survey (money),
- we calculated carbon footprints (CO2 equivalents) of household consumption using a consumers-price version of the environmentally extended multi-regional input-output model Eora
- resulting in the total volume of household related carbon footprints (CO2e) and the average carbon footprint of each time-use activity (Co2e/h).

Wiedenhofer, D., Smetschka, B., Akenji, L., Jalas, M., Haberl, H., 2018. Household time use, carbon footprints, and urban form: a review of the potential contributions of everyday living to the 1.5 C climate target. Current Opinion in Environmental Sustainability, Environmental change assessment 30, 7-17.

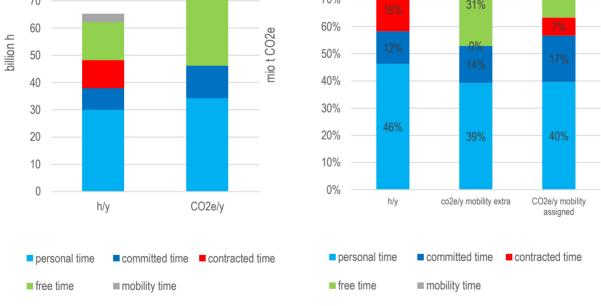
Smetschka, B., Wiedenhofer, D., Egger, C., Haselsteiner, E., Gaube, V., Moran, D.: Time matters: the carbon footprint of everyday activities in Austria, paper submitted

### Time use in h and carbon footprint: Austria 2010







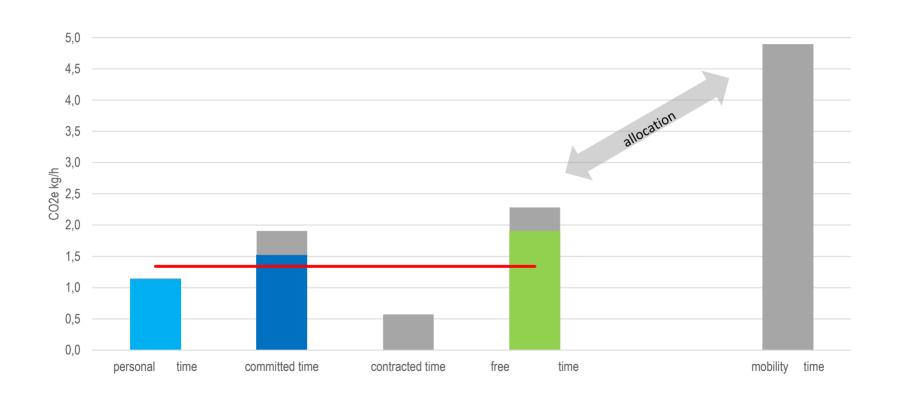


Total time use by activity in billion h/y and total carbon footprint of households by activity in million t CO2e/y in absolute values (1a) and as shares of the total (1b) for Austria in 2010

### Carbon intensity of time-use categories







----average intensity = 1,3 CO2e kg/h

Average carbon footprint intensity of functional time-use category, with mobility allocated (bars on the left, incl. grey component) versus all mobility time and footprint extra (right hand side, grey bar).

### Carbon footprints of average day





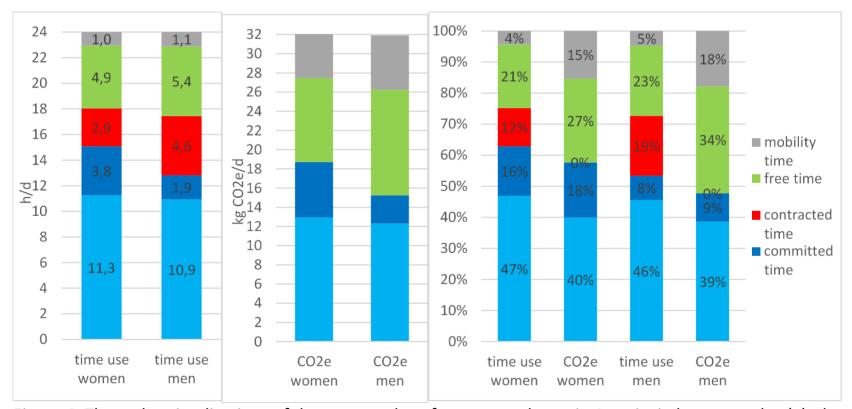
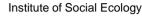


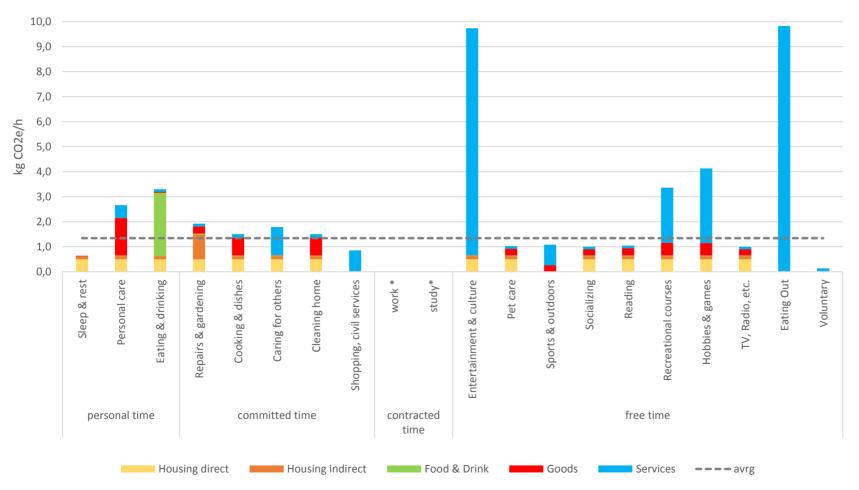
Figure 4: The carbon implications of the average day of women and men in Austria, in hours per day (a), the respective average carbon footprint in CO2e per day (b) their compositions (c).

### **Carbon intensity of activities**







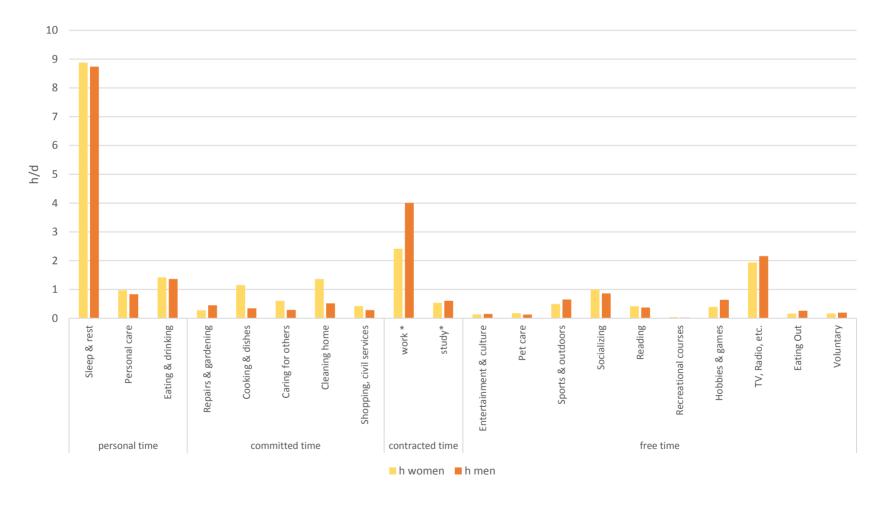


# Daily activities of average woman (f) or man (m)





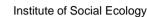
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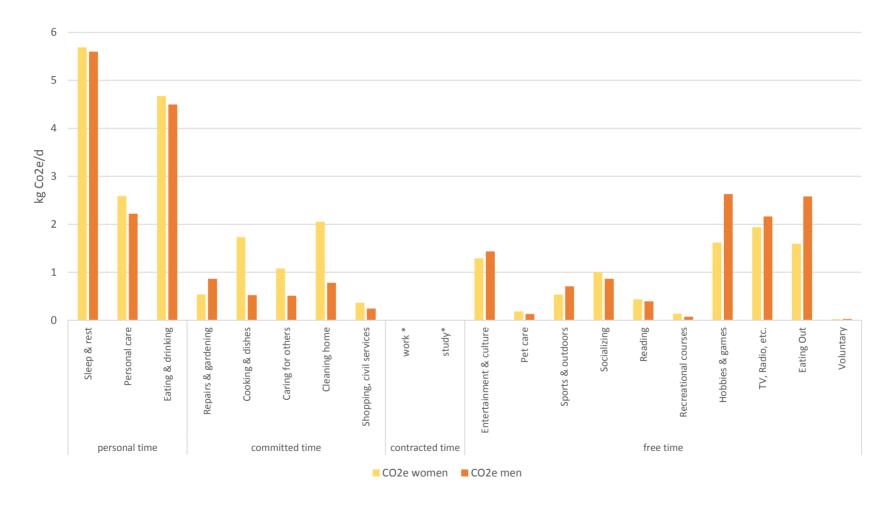


# Carbon intensity for average woman (f) or man (m)









### Learnings from analysing carbon footprints of activities



- Functional time-use research provides a systems perspective on household consumption and environmental footprints
- Carbon footprint of time use of Austrian households in 2010 estimated. We find an average direct and indirect carbon intensity of time use of 1.3 kg
   CO2eq/hour (similar to Druckman 2012 for UK)
- Gendered division of labour, as well as time- and infrastructure-related constraints are important
- A good quality of life requires goods and services which are available (distance), affordable (economy) and enough time to use them (time prosperity and sovereignty)
- Sustainable development needs changes in everyday life:
  - more time spent with low carbon activities
  - low carbon alternatives for necessary activities

### Open questions and future plans for discussion



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- Carbon footprints are related to available income, but we do not know time use per income
- A huge part of carbon footprints relates to holiday making (hotels, gastronomy, air travel), but we do not have time-use data on holiday making
- Analysing changes over time would be valuable, but Austria just cancelled the next time-use survey
- With MRIO databases available cross-national comparisons would be interesting – cooperation in projects? Relating time-use research to the SDGs?



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