

Consumption-based options for reducing GHG emissions – where to start?

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- Consumption based policy has consequences for supporting data and analysis: from Regional to Functional systems
 - Production-consumption chains not regionally bounded
 - In a globalising economy chains are increasingly worldwide
 - Impacts of trade
 - Re-locating of emissions and environmental impacts



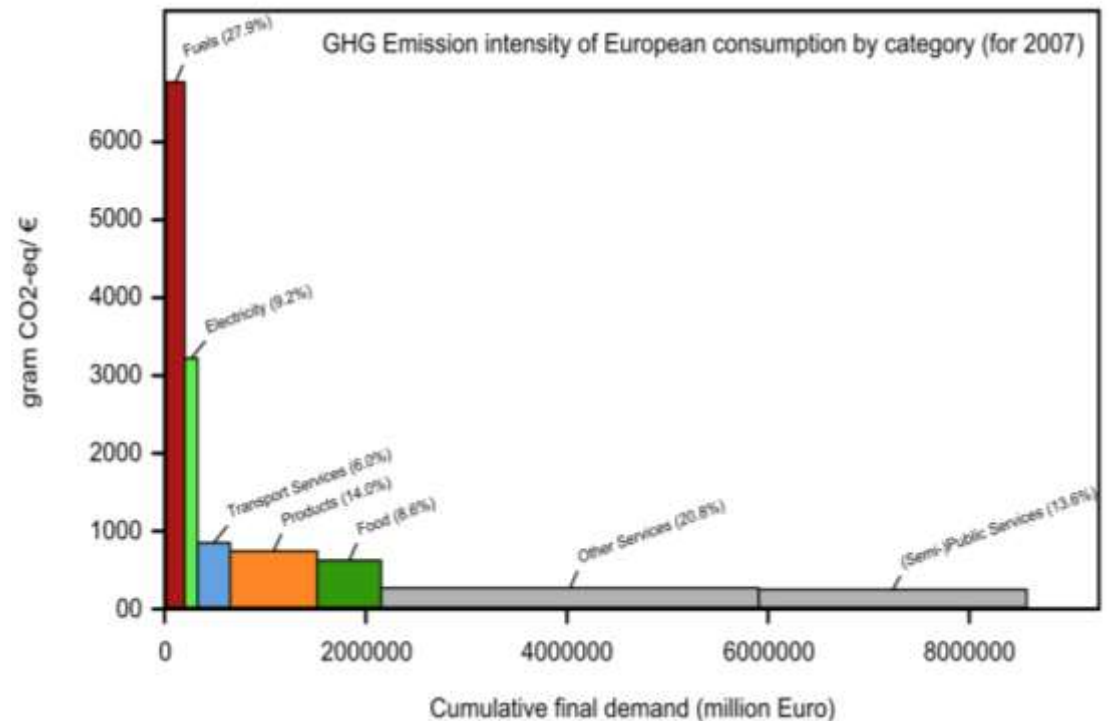
- Survey of methods and tools:
 - Macro-level methods use a regional system
 - Functional methods operate at micro-level
 - Solution: region = world, then everything is included
- Combining both worlds: hybrid LCA using MR-EE-IOT as background



- Identifying options for consumption based GHG emission reduction: Origins analysis
- Using MR-EE-IOT, attributing to consumption categories in EU
- Methodological challenges:
 - Attributing fuel and electricity use to consumption categories
 - Distinguishing in life cycle phases: production, consumption, waste ...
 - ... as well as direct vs upstream ...
 - ... as well as intra- and extra- EU territory



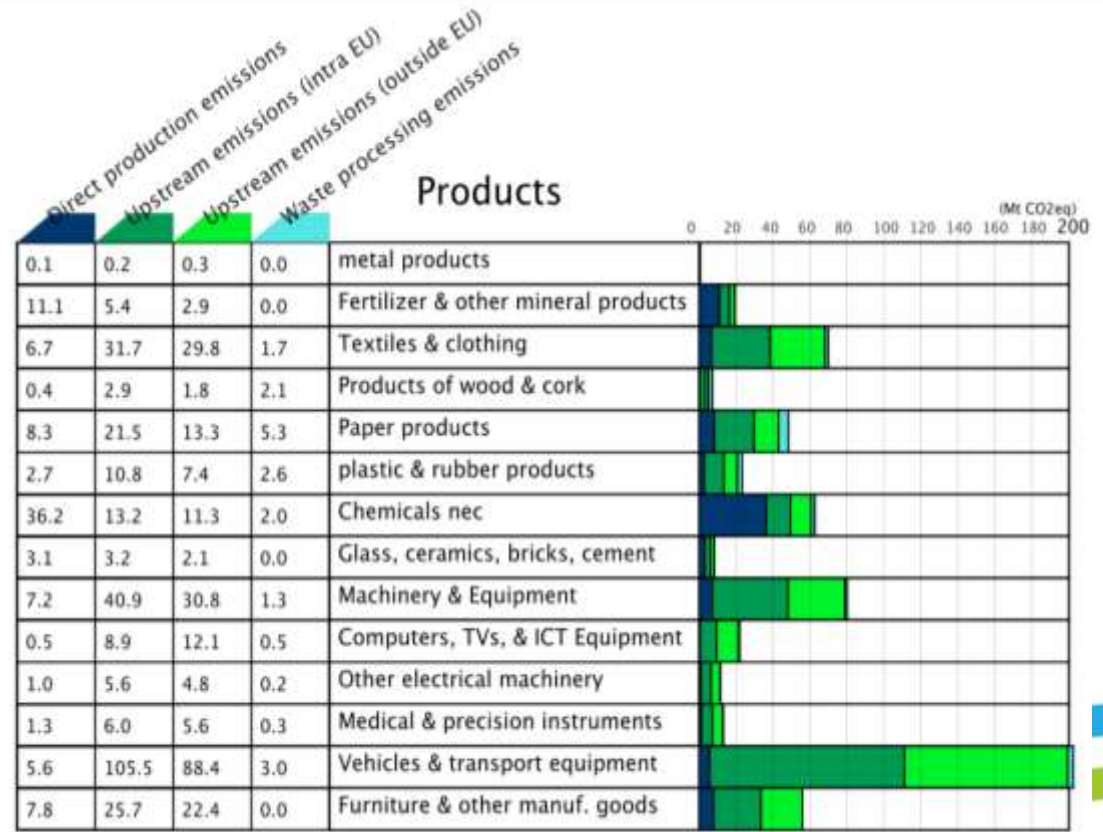
- GHG emission intensity of aggregate consumption categories
- Multiplied by final demand: GHG emissions by category
- No category can be excluded



- Food products:
 - Most GHG emissions upstream
 - Significant part outside EU
 - (Food products nec: too aggregate)



- Products:
 - Most GHG emissions upstream
 - Significant part outside EU
 - Vehicles very large category

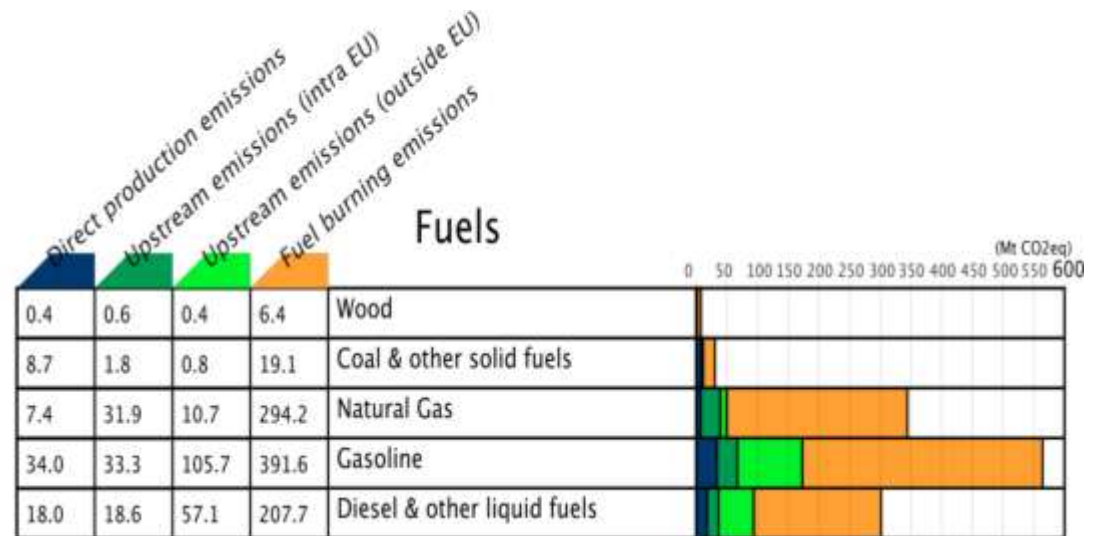


- “Other services”:
 - Most GHG emissions upstream
 - Significant part outside EU
 - Low emission intensity, but large share in GDP
 - Emissions “household-like”

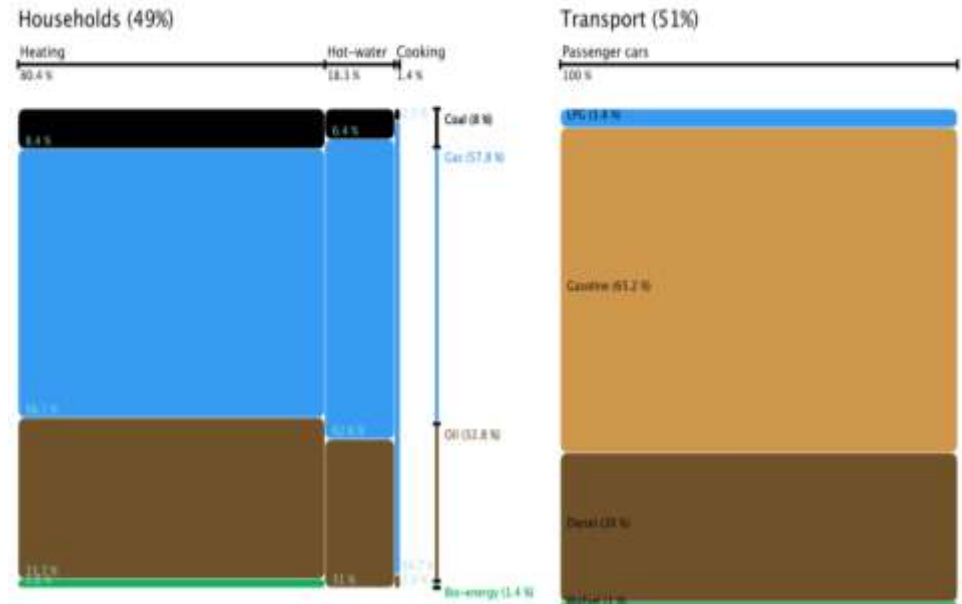


- Fuels:

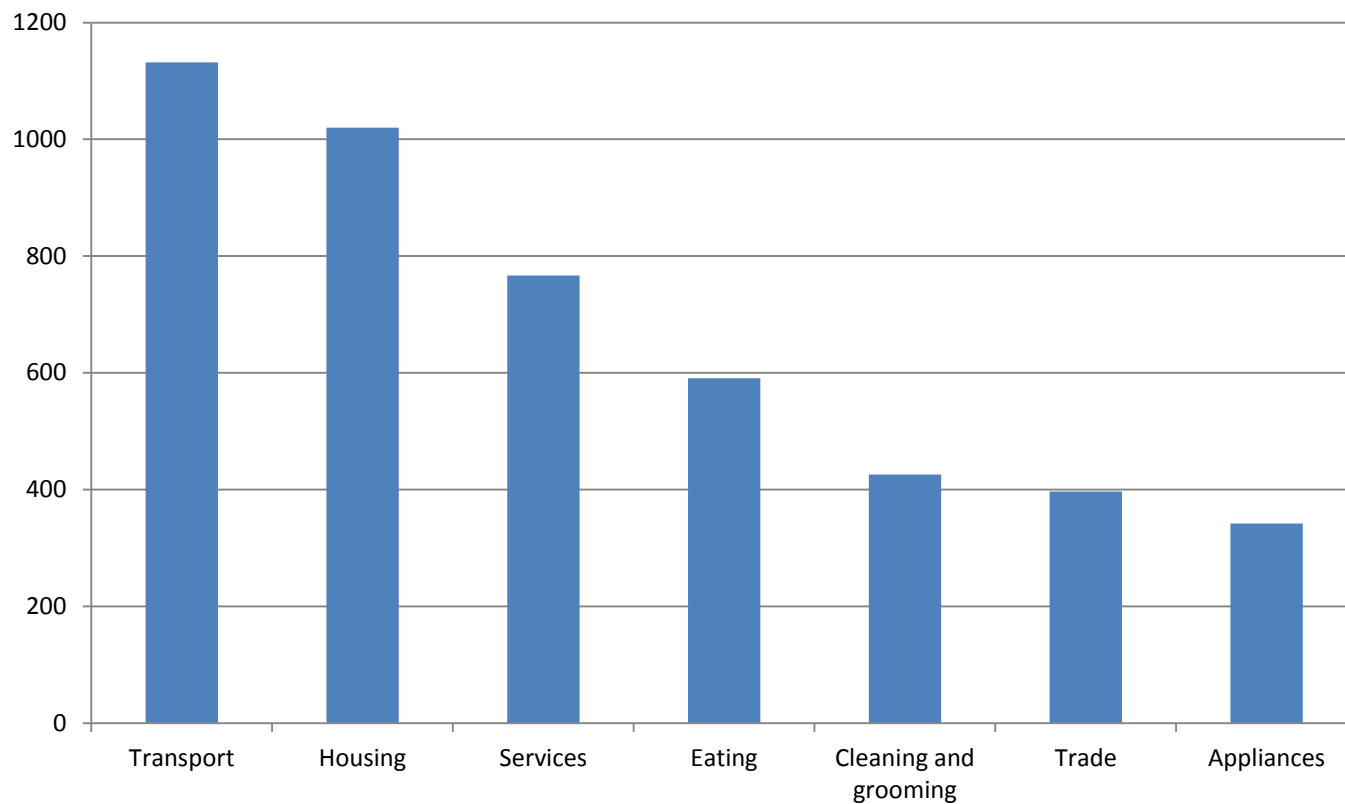
- Most GHG emissions in use phase (dissipative use)
- Broken down into fuels, not consumption categories!
- Same problem for electricity



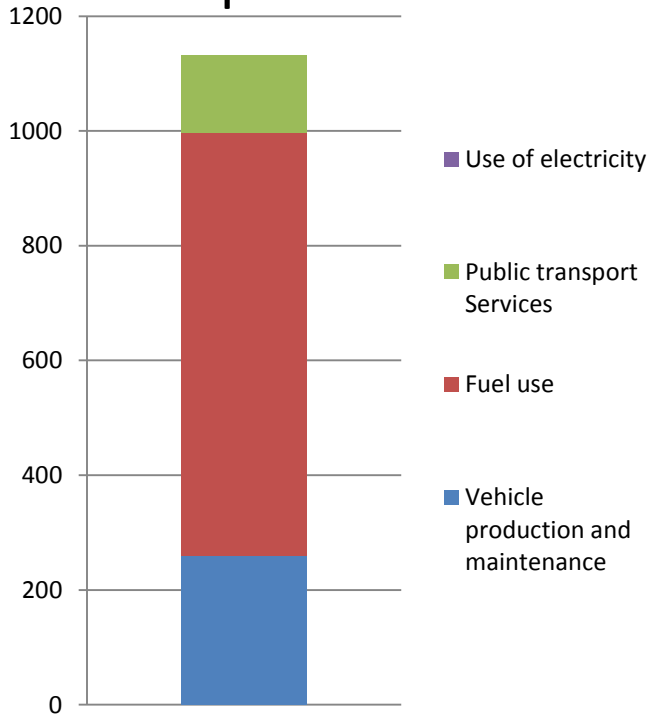
- Attributing fuel use to consumption categories:
- Household / transport 50/50
- Transport: passenger cars
- Households: heating, hot water, cooking



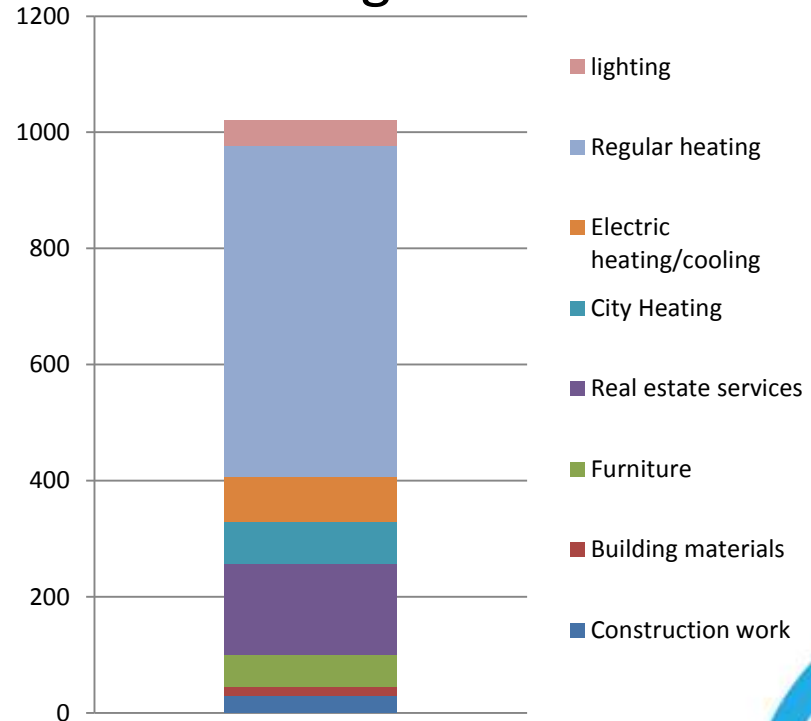
- Emissions from consumption categories (Gg CO₂-eq per year)



• Transport



• Housing



- Literature review accompanying EXIOBASE evaluation
- Huge body of carbon footprint literature, but only small share allows identification of hot spots across consumption areas and product groups
- Difficult to compare: different data sources, system boundaries, models, etc.



Key results:

- Food, mobility and housing confirmed as consumption areas with highest CF
 - “Recreation and leisure” already biggest contributor (UK study)
- Production-related emissions larger than direct emissions of households (Eurostat: 73%:27%; UK: 55%:45%; different in the US!)



Key results:

- Transport: private car use leading, air transport less important, but rapidly growing
- Housing: energy mix (incl. electricity production) and climate conditions determine housing CF
- Food: meat and dairy products as main contributors; hotels and restaurants almost as important as food consumption at home



- Which consumption categories to be targeted by a consumption based GHG reduction policy?
- Which consumption categories to be addressed in the CarbonCap project?
 - Passenger transport, especially cars
 - Food, especially food production (meat/diary)
 - Space heating
 - Consumer electricity use
- Services have significant share but very low GHG intensity



Consumer options for CF reductions

- Based on analysis of hot spot consumption areas
- Identify options with largest potential for absolute reductions
- Evaluate them with set of criteria: synergies / trade-offs with other resource categories, applicability (far-reaching vs. limited), consumer acceptance, etc.



Development of framework to structure consumer options:

1. Indirect improvements: in production & along supply chains
2. Direct improvements: efficiency, conservation efforts, changes in consumption patterns, etc.
3. Demand reductions



	Improvement strategy	Food	Mobility	Housing
Indirect Improvement	Efficiency improvements in the production phase	<ul style="list-style-type: none"> – Buying food from low-carbon production processes (labelled food) 	<ul style="list-style-type: none"> – Buying and using a smaller and lighter car 	<ul style="list-style-type: none"> – Build houses from alternative materials , e.g. wood – Use carbon light construction materials
Direct Improvement	Efficiency improvements in use phase		<ul style="list-style-type: none"> – Buying and using an electric/plug-in hybrid car – Fuel cell vehicles – Direct fuel injection systems – Diesel instead of gasoline engines 	<ul style="list-style-type: none"> – Thermal insulation of houses – Zero-emission houses/passive houses – Energy efficient electrical and household appliances – Renewable energy / electricity
	Conservation efforts	<ul style="list-style-type: none"> – Reduction of avoidable food waste 	<ul style="list-style-type: none"> – Fuel efficient driving style 	<ul style="list-style-type: none"> – Not leaving appliances on stand-by – Turning off lights
	Changes of consumption patterns	<ul style="list-style-type: none"> – Reduction of consumption of meat and dairy products – Consumption of more regional and seasonal food 	<ul style="list-style-type: none"> – Shift to public transport, cycling or walking – Car pooling, car sharing and trip chaining – Park & ride systems 	
	Quality over quantity/Durability		<ul style="list-style-type: none"> – (Extending the life time of the car) 	<ul style="list-style-type: none"> – Repair / reuse of electrical and household appliances – Buying less but qualitatively high products
Demand Reduction	Consumption reduction	- Reduction of caloric intake	Decrease transportation demand e.g. reduced air travel, teleworking/ videoconferences	<ul style="list-style-type: none"> – Reduction of living space p.c. – Lowering room temperature

- Challenges:
 - Linking micro-level options to macro-level models
 - Including linkages in the analysis (incl. rebound effects)
 - Detecting shifting of emissions to other times and places
 - Linking options to policies
- We welcome your feedback and thoughts!

