Personal Consumer-driven Resource Extraction

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The paradox of our time is paralysis: We are acutely aware of the global issues facing us, particularly those related to climate change and resource depletion. We need to urgently and voluntarily change our everyday behaviours whilst we find ourselves embroiled in debates, unable to resolve the political dichotomy.

The modern mode of production, highly efficient, measurable, and controllable, is a product of rapid urbanization and industrialization processes, which created the material foundations of modern society and personal consumption patterns. These patterns are reflected in our consumption of resources used for food, clothing, housing, transportation, and lifestyle. In our increasingly complex society, particularly in the era of internet-based consumerism, most of us lack a detailed understanding of our individual material consumption patterns. We tend to be swayed by product prices and quality, often gravitating toward overconsumption due to the incentives of an industrial consumer culture. These trends make it imperative to reduce resource consumption and greenhouse gas (GHG) emissions at the level of the individual consumer.

As individuals, we bear a dual responsibility: to regulate our own behaviours and to influence society around us through our choices and voices. For this, we must first grasp the effectiveness of a given (individual) action. This necessitates uncovering hidden truths about consumption, developing feasible measurement methodologies, and constructing a choice architecture. Three main questions arise:

(1) Can we establish a link between regional resource consumption patterns and CO_2 emissions per capita, visualising individual consumer behaviour?

(2) Can we identify the direct and indirect material/energy consumption processes encompassing production and waste management systems, and measure them using scientific and analytical approaches?

(3) Can we create an internationally applicable framework of indicators and choice architectures for individuals to embrace sustainable living, fostering change through education, incentives, and penalties?

National policies and major energy transformations often take decades to change locked-in infrastructure and institutions, but behavioural shifts have the potential to be more rapid and widespread (i.e., reduced reliance on cars can begin immediately). Whereas improved power plant efficiency occurs on a decadal time frame, adolescents who grow up accustomed to a certain lifestyle have the freedom to make major behavioural choices that will structure the rest of their lives. Adolescents can act as a catalyst to change their household's behaviour. **We investigate a comprehensive suite of lifestyle choices to identify those with the greatest potential to reduce individual greenhouse gas emissions.**

In this regard, a central finding is the role energy consumption plays in individuals reducing their emissions: While reducing energy consumption without altering one's standard of living is challenging, it is a core factor that can be altered. In this context, transitioning towards **clean energy** in private households can produce a significant improvement.

Looking at China as a case study, it faced the dilemma that it needed to encourage personal consumption to ensure domestic economic growth, while also mitigating the rapid increase in GHG emissions. The country aims to reach the national target of carbon neutrality by 2060 and respond to

international pressure on emissions. Introducing low carbon policies, such as the carbon labelling and green levy programmes, could be a way of incentivising industries to develop low carbon technologies and equipment. This, in turn, could also encourage individuals to consume low-carbon products and drive them to reuse and recycle more materials and energy.

Resource consumption patterns

First, we must understand the patterns of consumption that contribute to an individual's GHG emissions. Throughout the entire lifecycle of a product, these stem from both the direct emissions from energy use and the embodied emissions from their expenditure on goods and services, for example, as well as the final waste disposal.

Sectors that need to be considered in this context are:

- Food (e.g., processing of agricultural products, manufacture of beverages)
- Clothing and household textiles (e.g., textile manufacturing for clothing, leather manufacturing for footwear)
- Household facilities and services (e.g., building materials and furniture manufacturing, production and supply of gas and water)
- Education and cultural recreation (e.g., manufacturing of articles for culture, education, arts, and crafts, printing and reproduction of recording media)
- Medicine and medical services (e.g., production of pharmaceutical products)
- Communication services (e.g., manufacture of telecommunication equipment, operation of servers)

Examples of individual sustainable behaviour choices

Material Consumption	Changing food consumption	Reducing meat consumption in favour of plant-based options
		Purchasing local and seasonal foods to reduce long-distance transportation
		Reducing food waste by planning food purchases
	Reducing consumption of goods	Reducing the purchase of unnecessary goods and clothing
		Buying goods with less or zero packaging
		Repairing and reusing items instead of replacing them
		Buying second-hand goods or using shared economy platforms
	Managing water consumption	Reducing water use and fixing leakages
		Installing water-saving devices such as low-flow shower heads
		Collecting rainwater for watering plants, for example
	Material recycling	Practising waste sorting and recycling
		Reducing the use of disposable plastic products and choosing reusable alternatives
Energy Consumption	Improving home energy efficiency	Regularly checking and maintaining heating and air conditioning systems to ensure their efficiency
		Installing double glazing and insulation materials

		Choosing more energy efficient appliances (e.g., LED light bulbs)
		Using smart thermostats to adjust temperature for optimal efficiency
		Unplugging appliances from socket when not in use to reduce standby power consumption
	Reducing transportation carbon emissions	Using public transport, cycling, walking or carpooling to reduce the use of private cars
		Planning routes to reduce overall distance travelled
	Energy source options	Purchasing renewable energy supply contracts to support the development of renewable energy
		Installing solar panels or wind power equipment
Social Influence	Education and awareness	Participating in or organising environmental protection activities and community learning activities
		Sharing information about low-carbon lifestyles

Public regulation of individual sustainable behaviour

While the above constitutes a list of choices individuals can make voluntarily and can pursue without them being part of a collective agenda, governments as well as local administrations should play a role in either providing the structures necessary for individuals to behave sustainably or in regulating and preventing unsustainable consumption. Some examples could be:

- Waste management: cities can introduce mandatory waste sorting and recycling, enforced by financial penalties.
- Traffic management: cities can restrict the entry of certain vehicles or introduce low-emission zones to reduce traffic.
- Renewable energy: for a certain proportion of their output, governments can require energy suppliers to use renewables to develop clean energy infrastructure.
- Education: governments can take action to introduce sustainability issues into curricula to raise public awareness.
- Carbon tax: governments can levy a carbon tax to punish high carbon emissions and thereby increase the cost of certain products and activities in return for promoting other – more sustainable – ones.

Outlook

Gaining a deeper understanding of the patterns of personal greenhouse gas emissions would allow for more targeted and presumably effective methods of incentivising people's sustainable behaviour. Therefore, the inquiries we put forward during the Humboldt Residency Programme have led me to initiate a research project comparing the detailed resource consumption and relative GHG emissions in Shanghai (China), Berlin (Germany) and London (UK). Furthermore, we will investigate citizens' acceptance rates for behaviour changes and variations in perception between voluntary changes and legal mandates.