Living Well Within Planetary Limits: Is it possible? And what will it take?

Aalto University

YHS colloquium, 25.11.2021

Professor Julia Steinberger
Institute for Geography and Sustainability, University of Lausanne
Julia.Steinberger@unil.ch @JKSteinberger http://lili.leeds.ac.uk

LEVERHULME TRUST

UNIL | Université de Lausanne

Outline

- Climate context
- Living Well Within Limits project
  - Is it possible? No and yes.
  - What will it take?

Implications for research & action?

26 August 2021, Impossible Rebellion, London

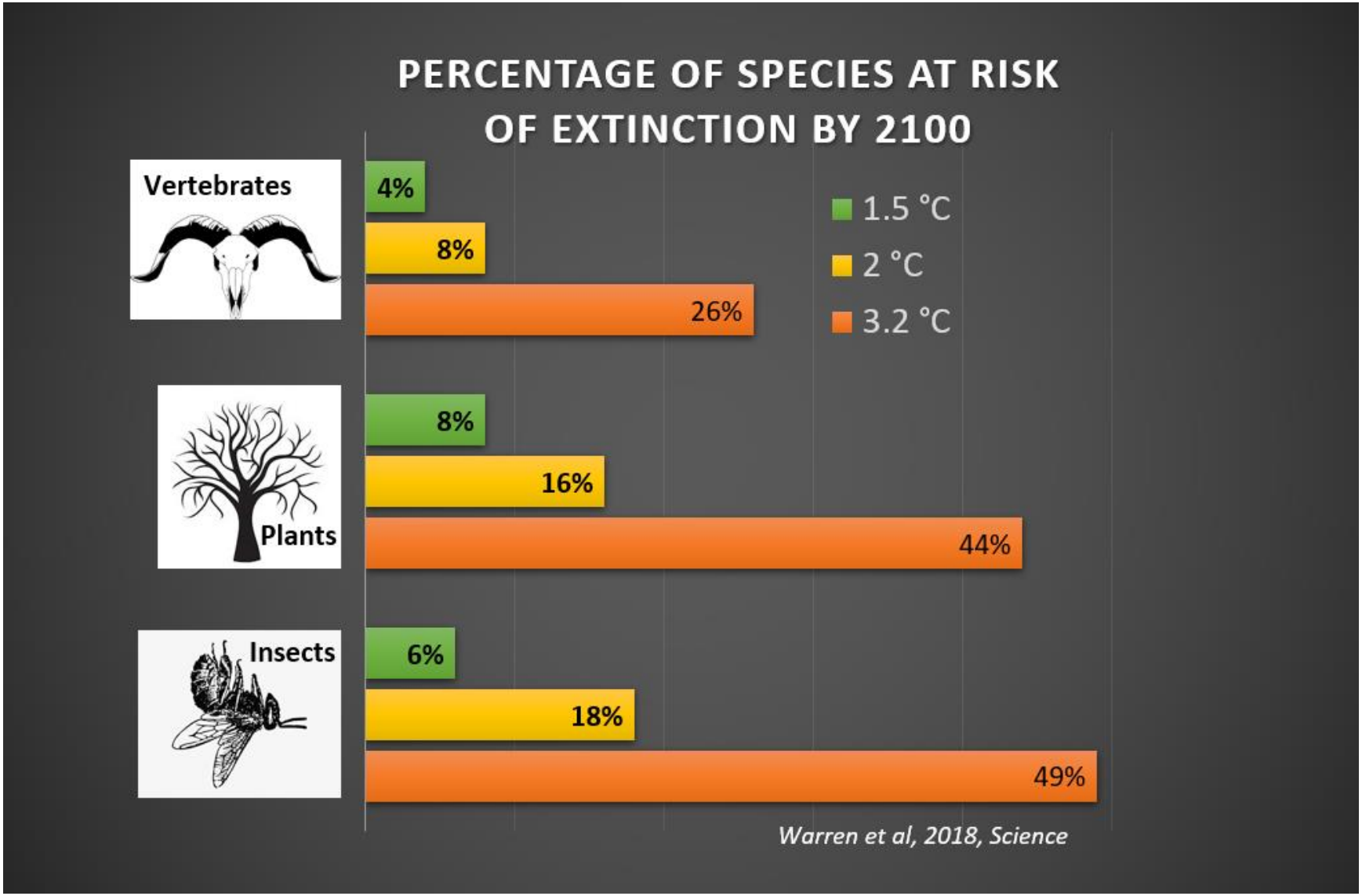
CLIMATE CONTEXT

Vesubie, France, Photo AFP

The Special Report SR1.5 compares 1.5 et 2 degrees warming

What level of warming above pre-industrial levels are we already at? **1.2 degrees**

Impact	**1.5°C**	**2°C**	**2°C versus 1.5°C**
Deadly Heatwaves At least once every 5 years	14% of population	37% of population	2.6x worse
Arctic free from sea ice in summer	Once every 100 years	Once every 10 years	10x worse
Insect species losing 50% of their range	6%	18%	3x worse
Dying coral reefs	70-90%	99%	Total extinction


PERCENTAGE OF SPECIES AT RISK OF EXTINCTION BY 2100
Vertebrates
4%
8%
26%
1.5 °C
2 °C
3.2 °C
Plants
8%
16%
44%
Insects
6%
18%
49%
Warren et al, 2018, Science

We are doing this… …our emissions need to do this.

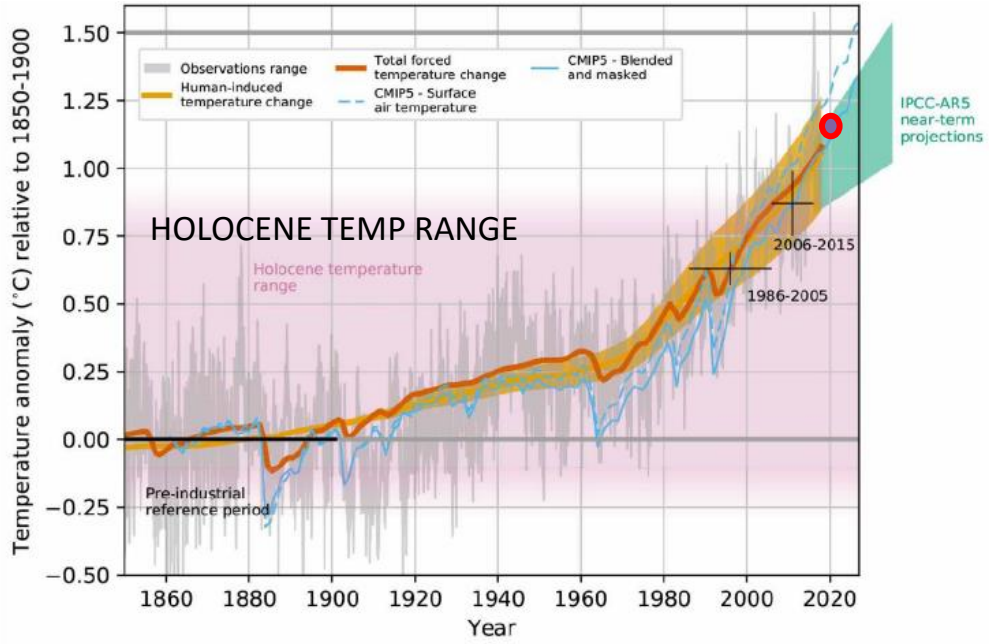
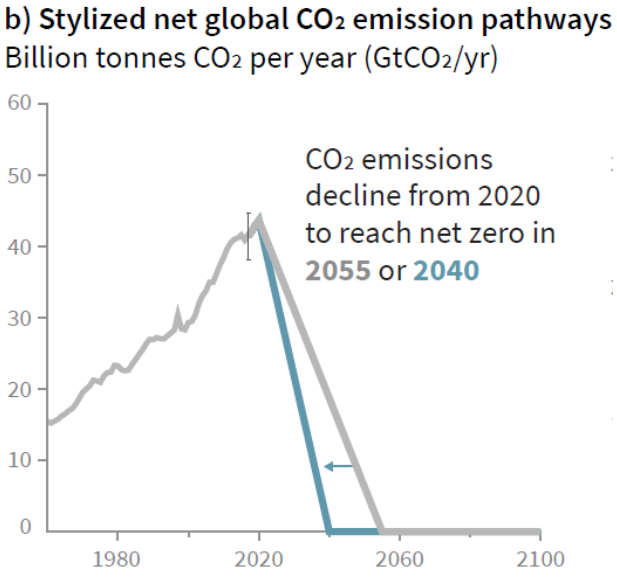


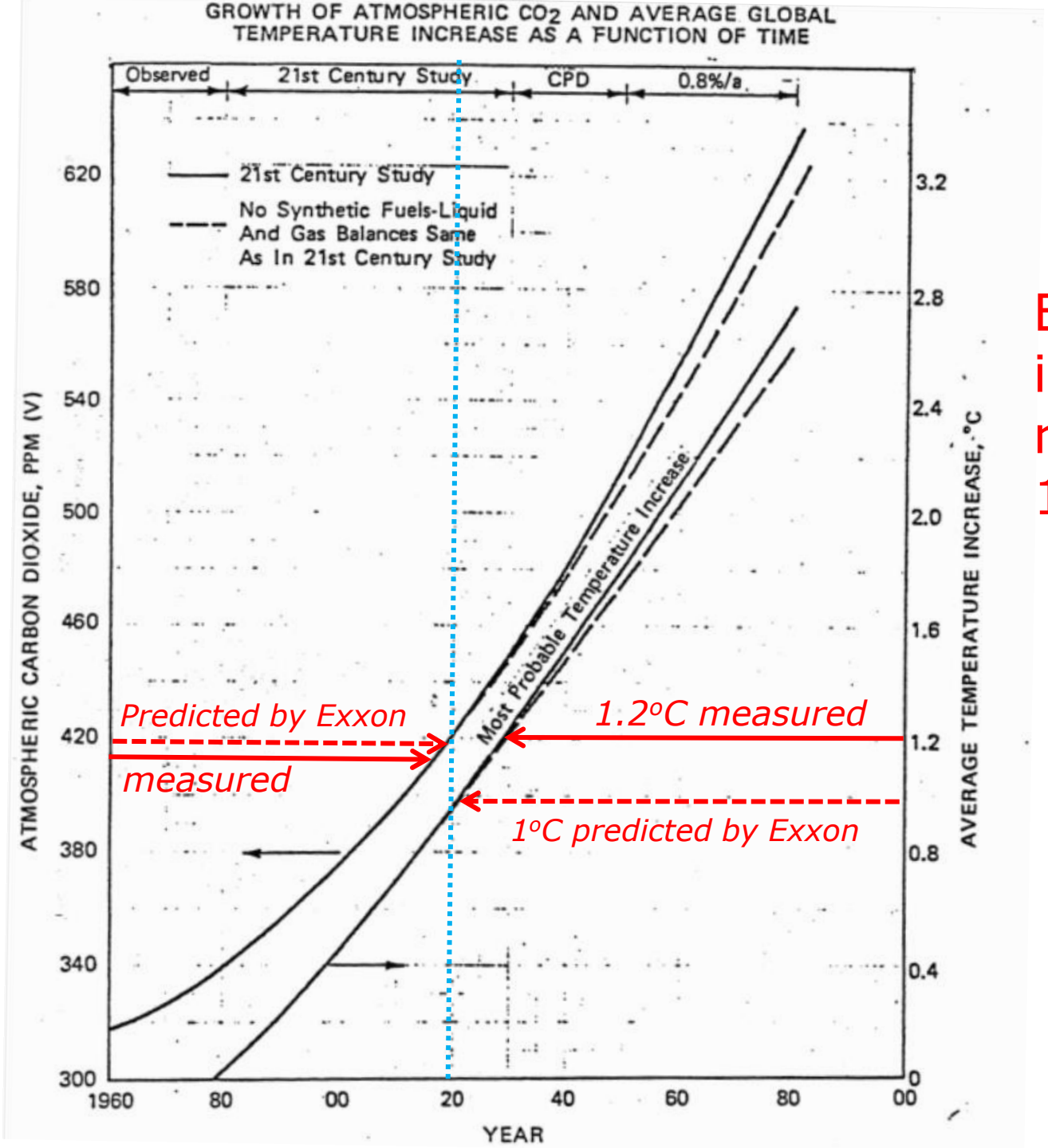
Figure 1.2: Evolution of global mean surface temperature (GMST) over the period of instrumental observations. Grey line shows monthly mean GMST in the HadCRUT4, NOAA, GISTEMP and

IPCC SR1.5



Faster immediate CO_2 emission reductions limit cumulative CO_2 emissions shown in panel **(c)**.

Who could possibly have known?



Exxon internal report, 1982

Implications

1. Urgent & large scale action is required ("Radical emission reductions")
   - Getting to zero or close WITHIN next twenty years.
2. Fastest & surest way to do that is reduce consumption
   - Reducing consumption doesn't require [as much] new technology or infrastructure.
3. But to date very little (no?) research into how consumption could be reduced while preserving/enhancing well-being.

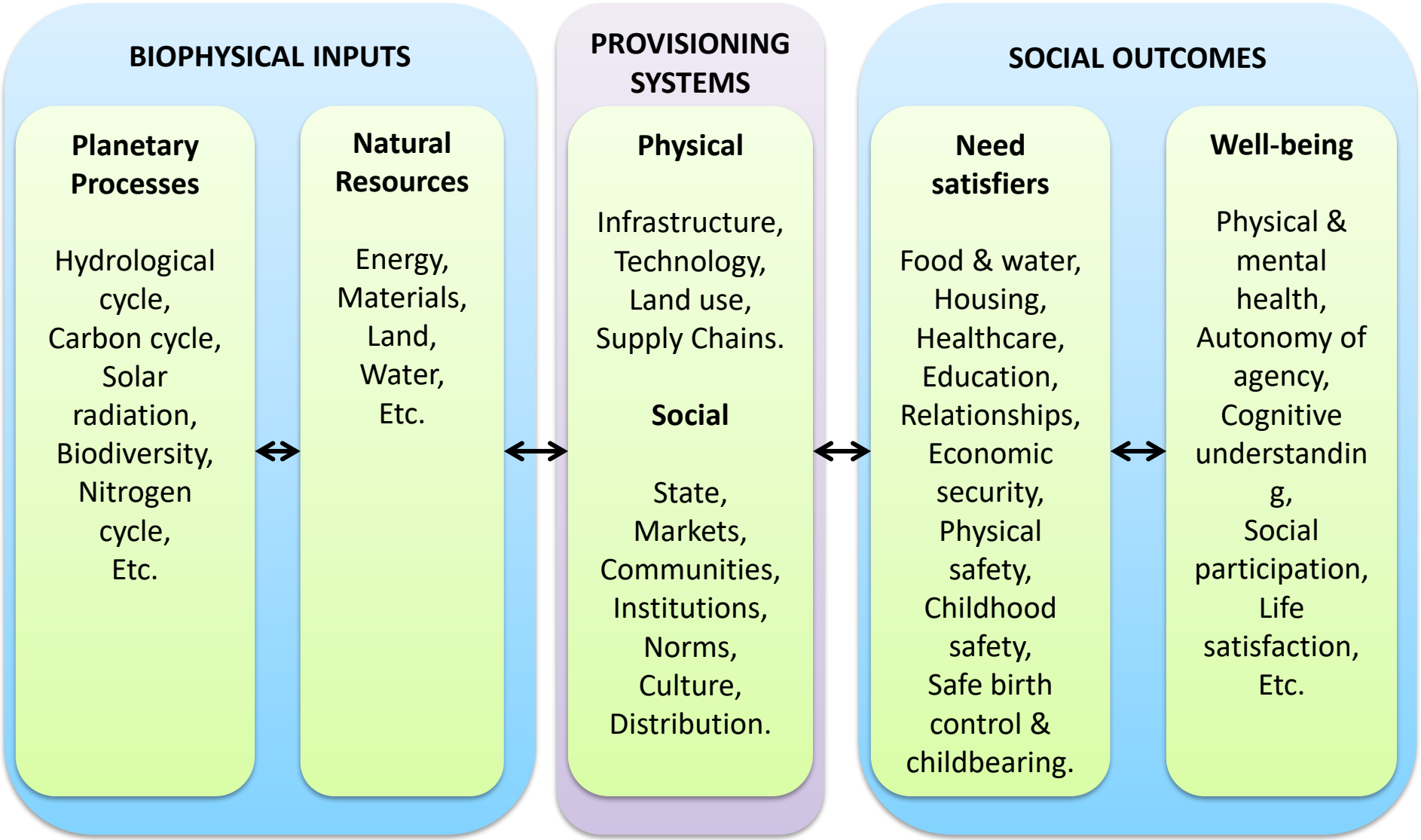
"We haven't even TRIED mitigation yet."

Professor Kevin Anderson, University of Manchester

THE NEED FOR A NEW FRAMEWORK: THE LIVING WELL WITHIN LIMITS (LILI) PROJECT

The LiLi analytic framework

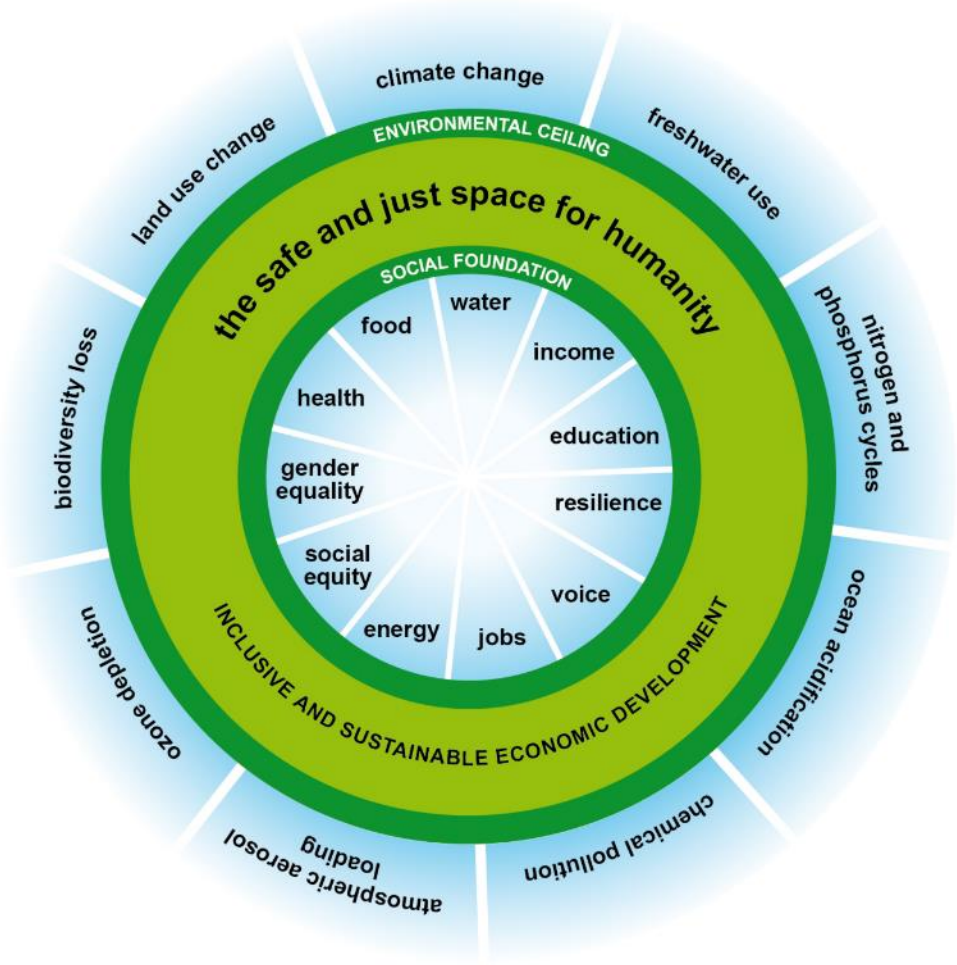
Living Well Within Limits [LiLi]

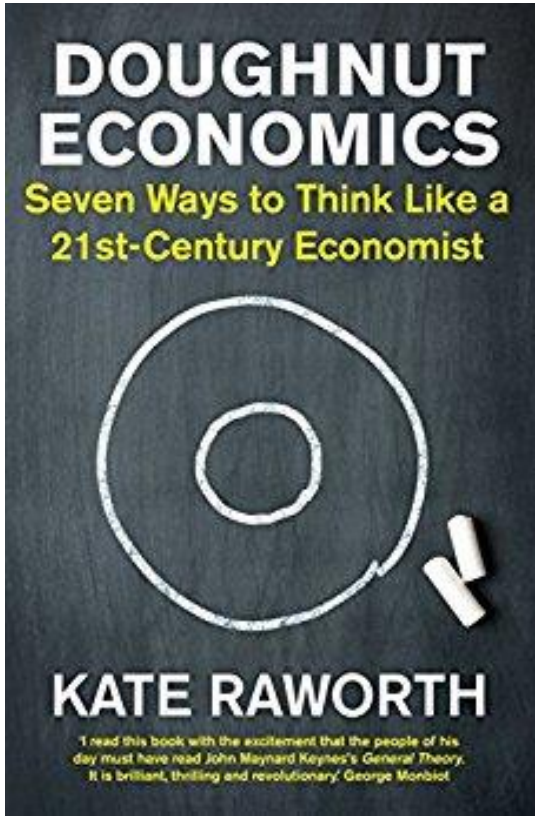


O'Neill, Fanning, Lamb & Steinberger 2018, Nature Sustainability

Is it possible to live well within limits?

Testing Kate Raworth's Doughnut.

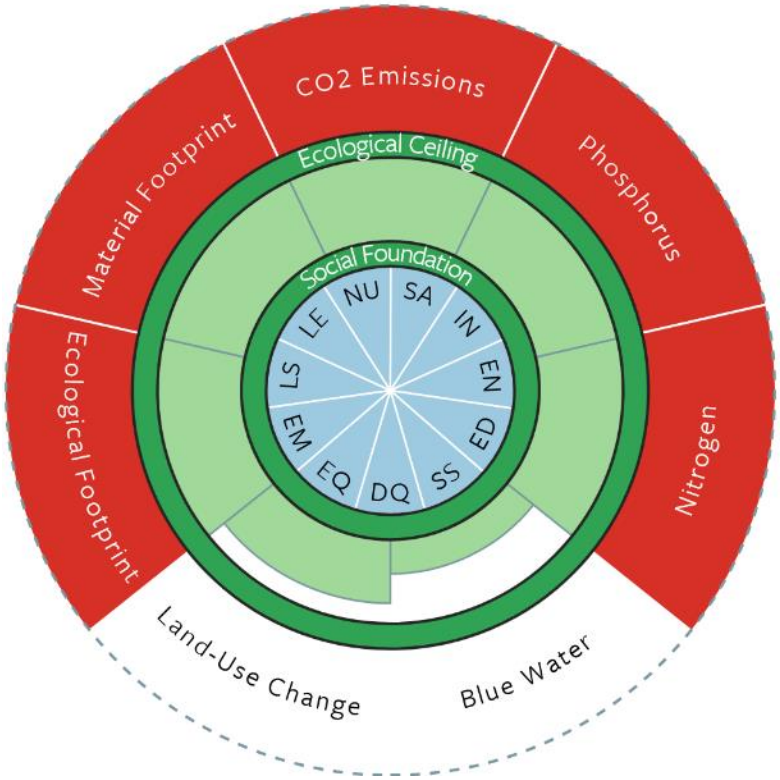




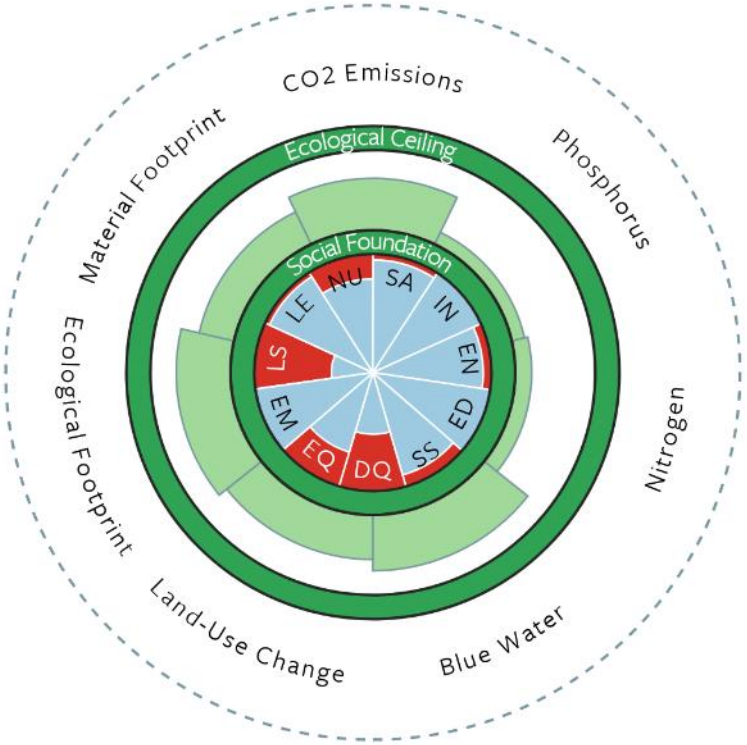
National results

LiLi

Germany

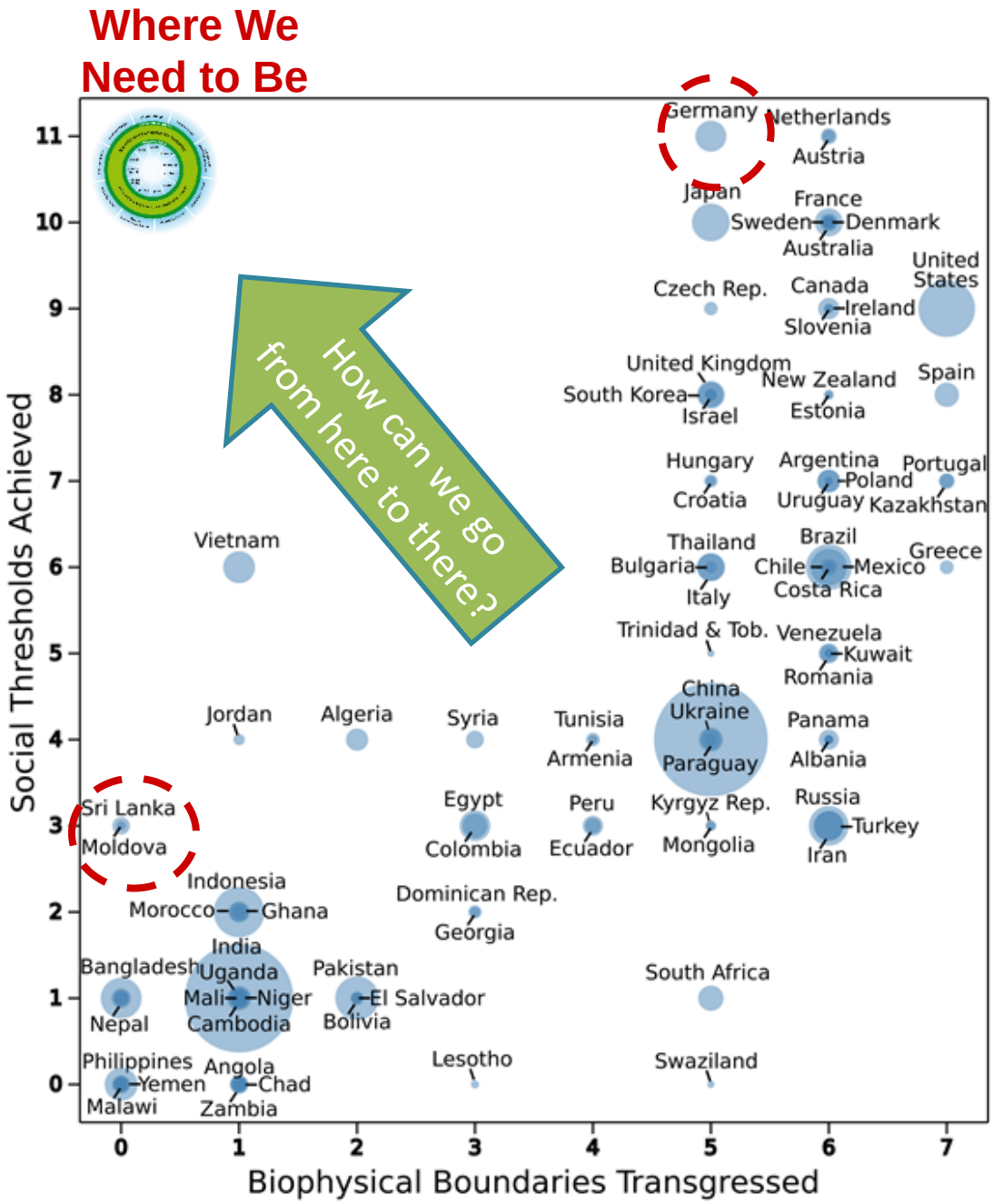


Sri Lanka



LS	Life Satisfaction	IN	Income	DQ	Democratic Quality
LE	Healthy Life Expectancy	EN	Access to Energy	EQ	Equality
NU	Nutrition	ED	Education	EM	Employment
SA	Sanitation	SS	Social Support		

O'Neill, Fanning, Lamb & Steinberger 2018, Nature Sustainability



https://goodlife.leeds.ac.uk

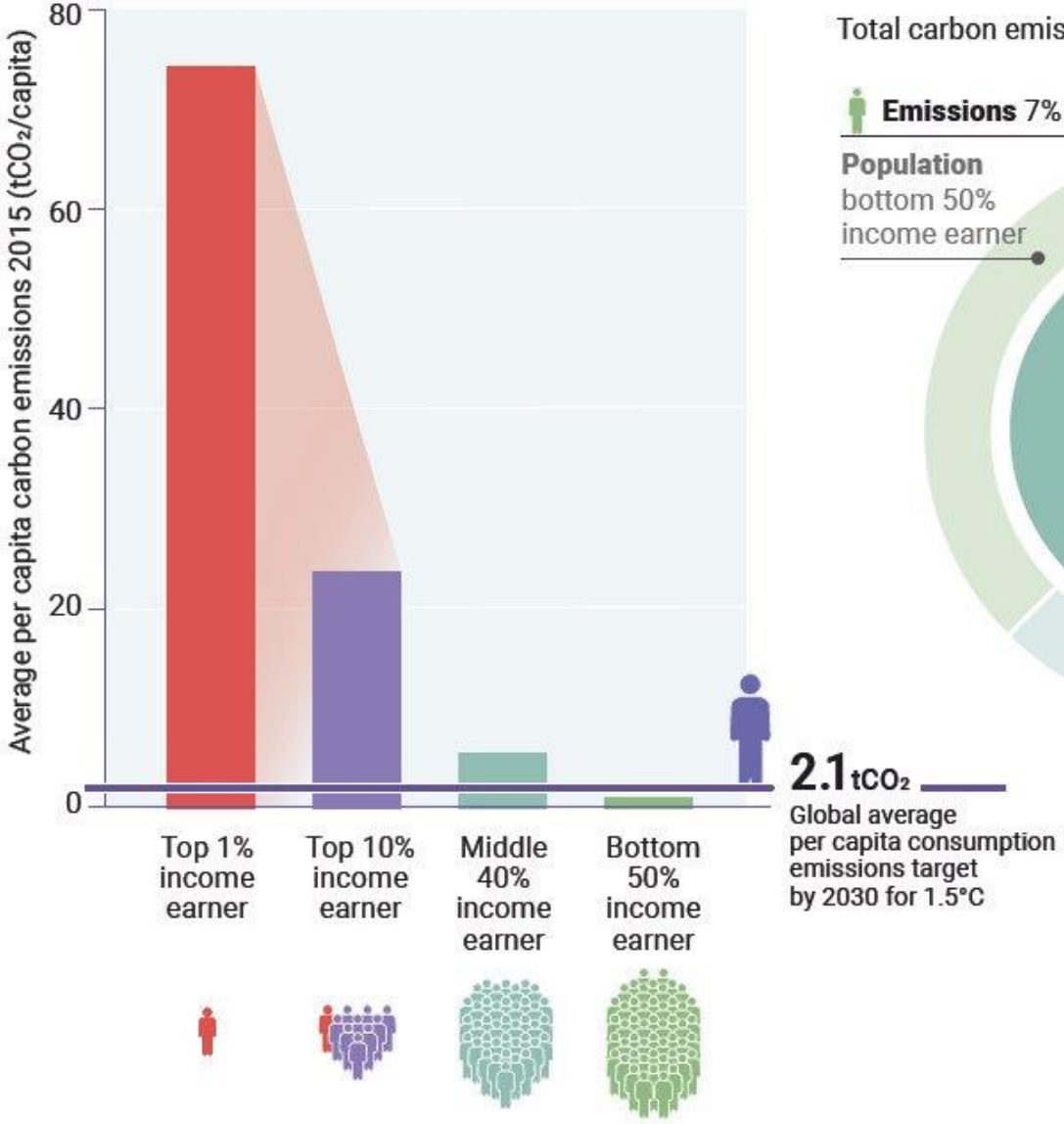
O'Neill, Fanning, Lamb & Steinberger 2018, Nature Sustainability

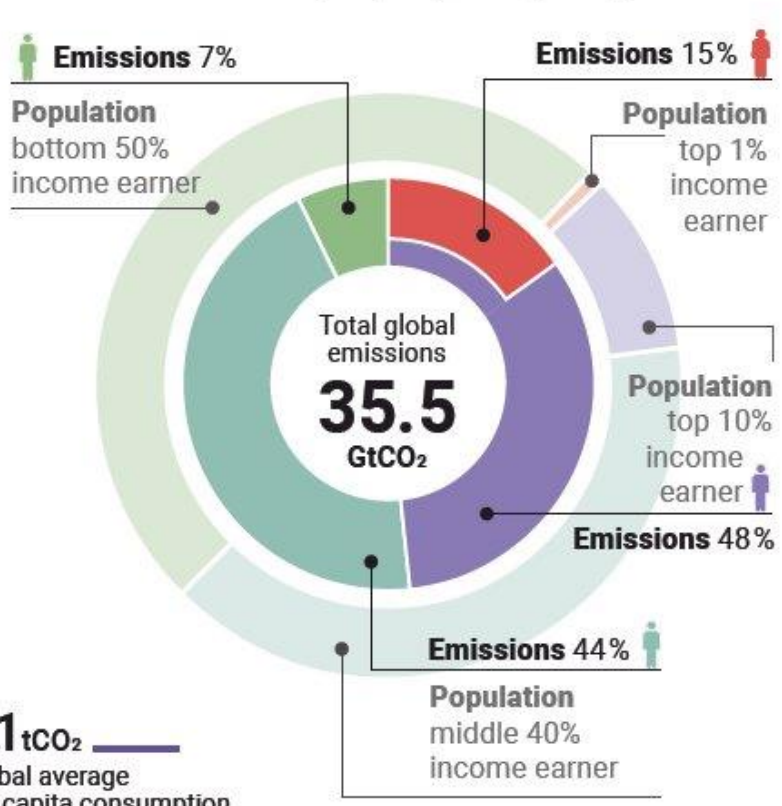
Question: Is it possible to live well within limits?

Answer: No. Not in current international reality.

Can we find out how to get inside Kate Raworth's Doughnut?

Part 1: Equity & distribution





Emissions Gap Report 2020

Perspective | Open Access | Published: 19 June 2020

Scientists' warning on affluence

Thomas Wiedmann, Manfred Lenzen, Lorenz T. Keyßer & Julia K. Steinberger

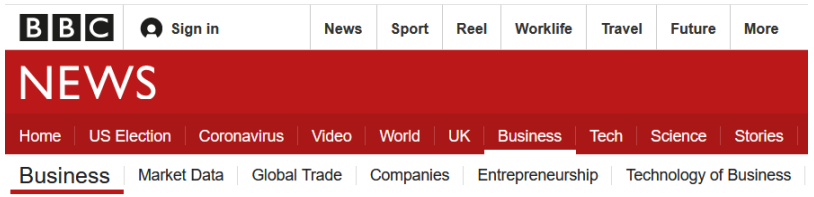
Nature Communications **11**, Article number: 3107 (2020) | Cite this article

- Overconsumption is designed in by states, industries and markets (necessary as outlet for growth: lack of low-consumption alternatives, advertising etc).
- Positional consumption: the affluent drive consumption norms and aspirations.
- Existence & survival in unequal neoliberal economies compels overconsumption (private vehicles, time saving appliances)

International and intranational inequality in energy use

Large inequality in international and intranational energy footprints between income groups and across consumption categories

Yannick Oswald, Anne Owen and Julia K. Steinberger



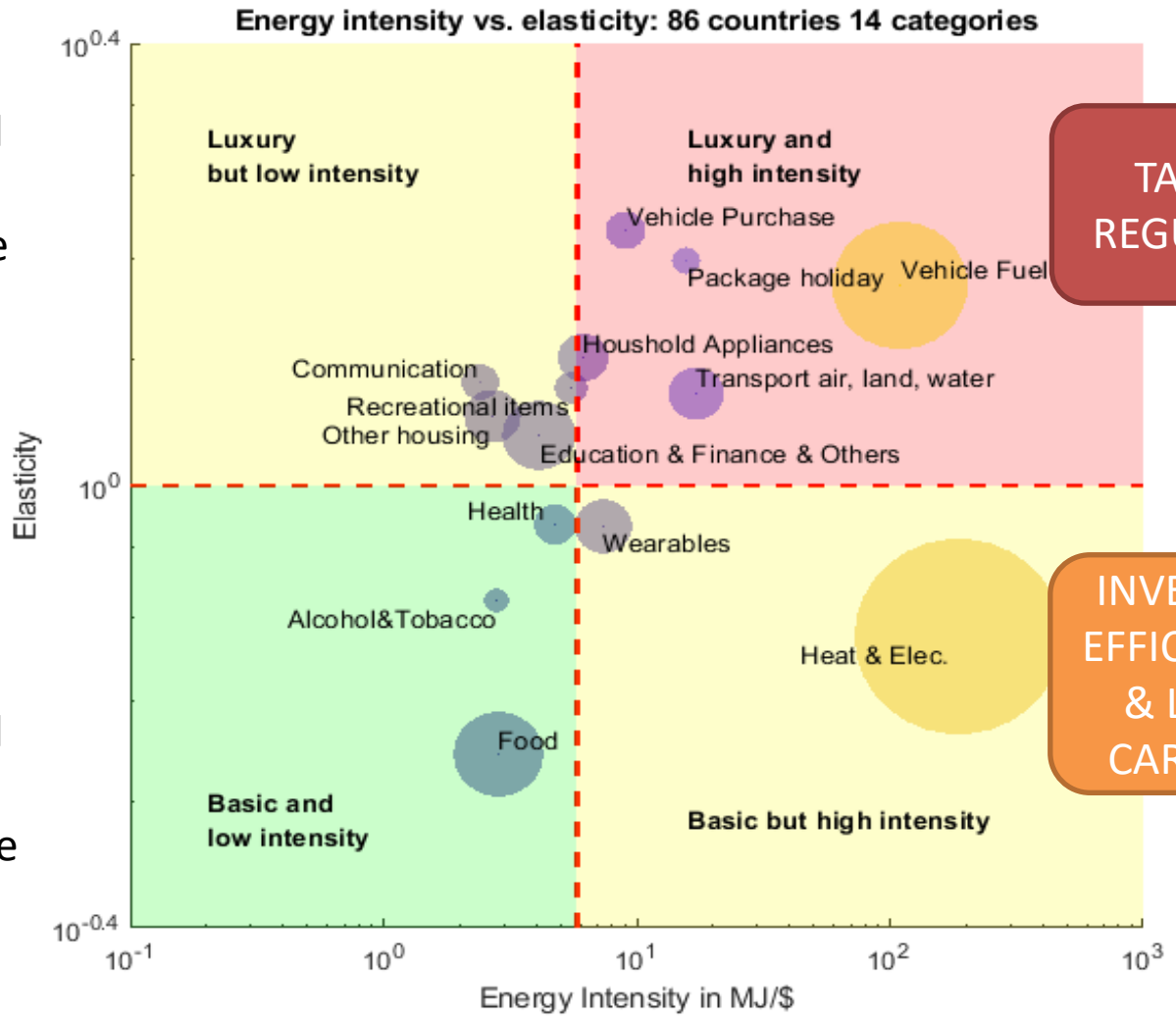
Climate change: The rich are to blame, international study finds

By Roger Harrabin
BBC environment analyst

- Measure direct and indirect **energy footprints**
- Using Environmentally-Extended Multi-Regional **Input-Output** (EE-MRIO)
- For different **categories of products** based on expenditure.
- In **86 countries** (EU & World Bank)
- Divided into **income classes**.

Mapping product categories

Consumed more by rich people



Consumed more by poor people

TAX & REGULATE

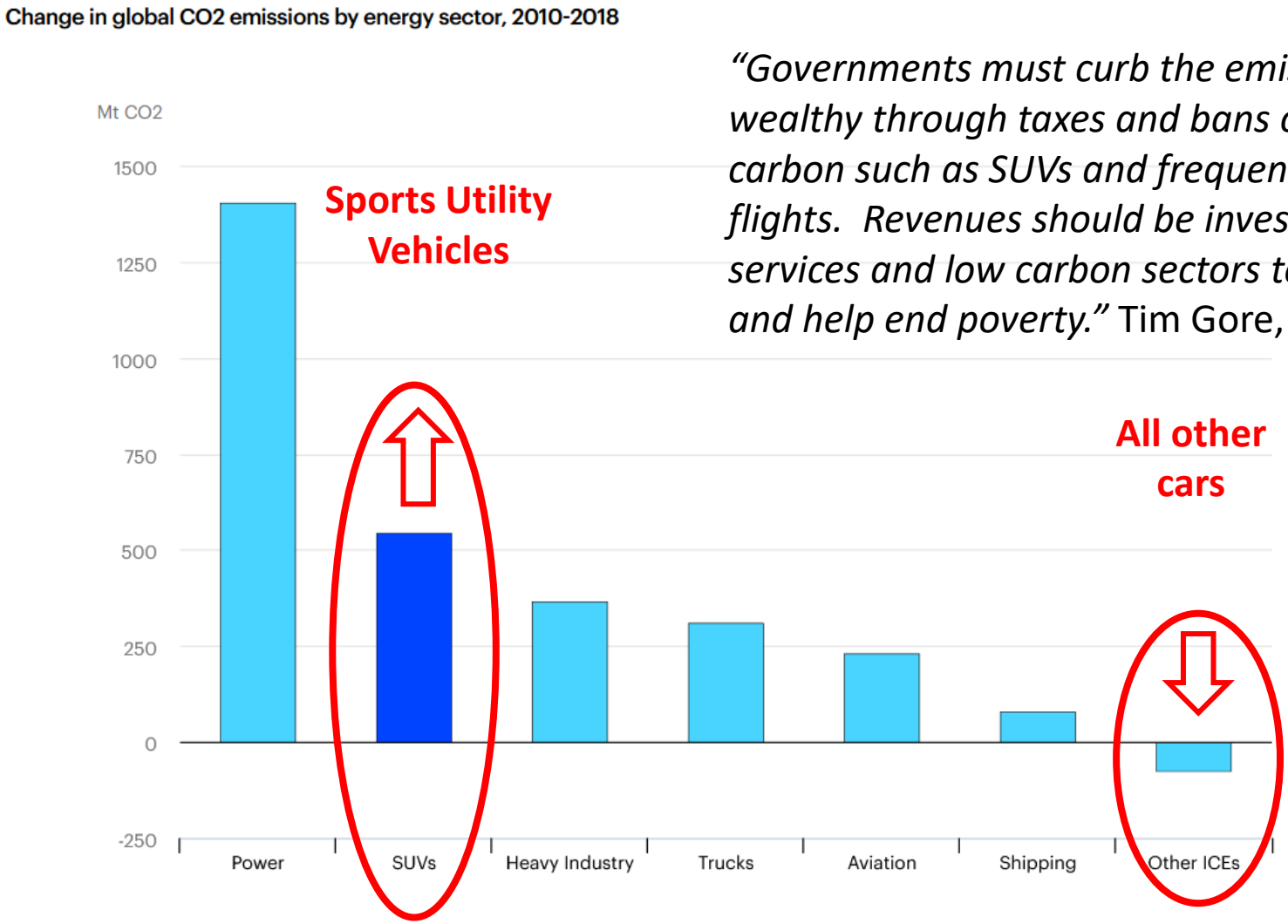
INVEST IN EFFICIENCY & LOW CARBON

Less energy per $ spent

More energy per $ spent

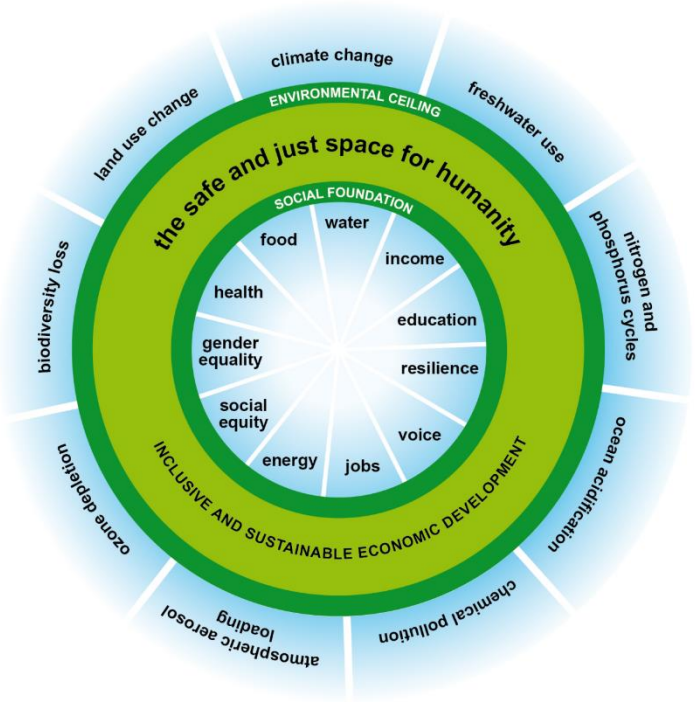
Oswald , Owen & Steinberger,2020, Nature Energy

Car transport increasingly drives climate breakdown



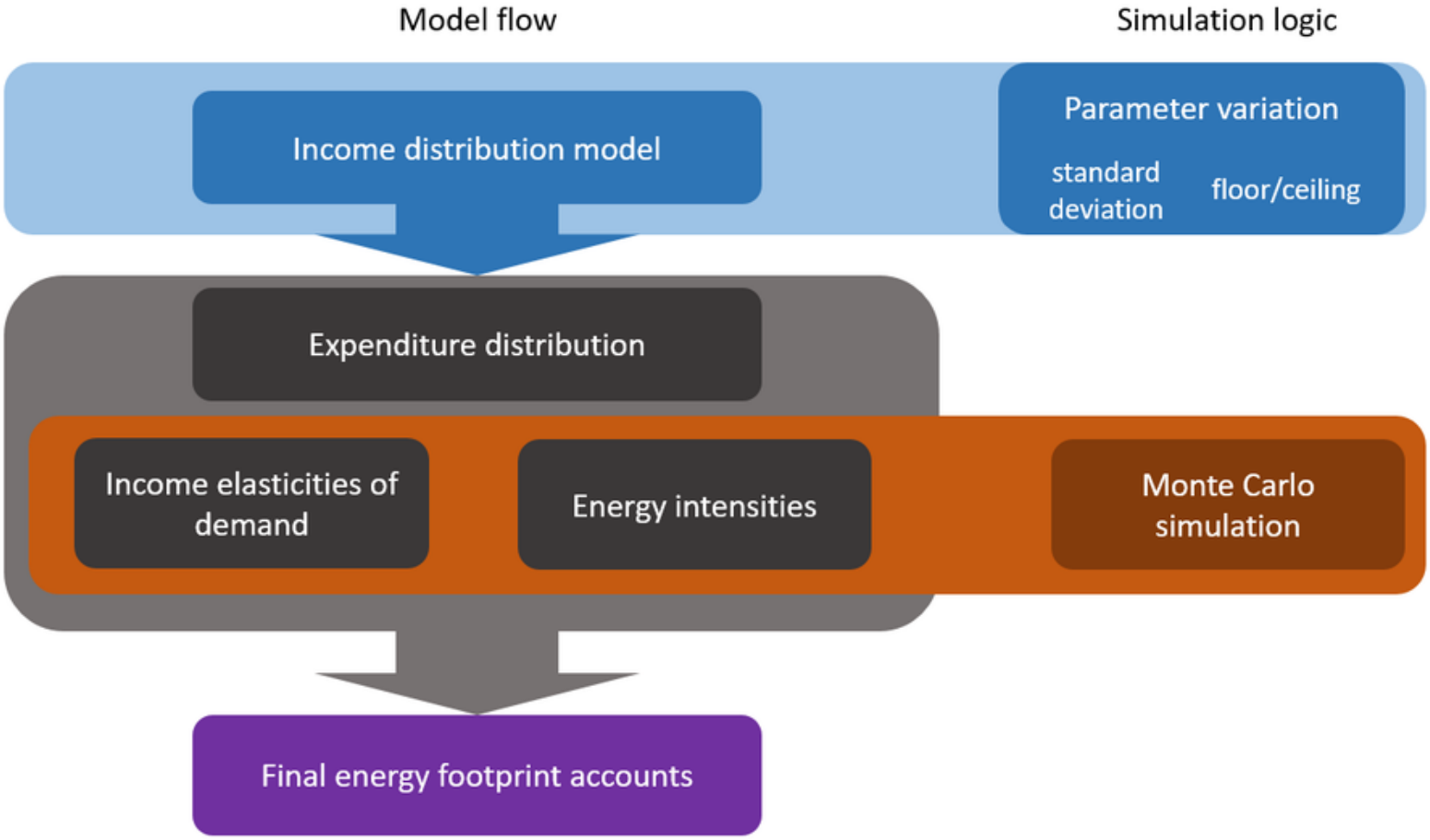
"Governments must curb the emissions of the wealthy through taxes and bans on luxury carbon such as SUVs and frequent flights. Revenues should be invested in in public services and low carbon sectors to create jobs, and help end poverty." Tim Gore, Oxfam

Cozzi & Petropoulos, IEA, 2019



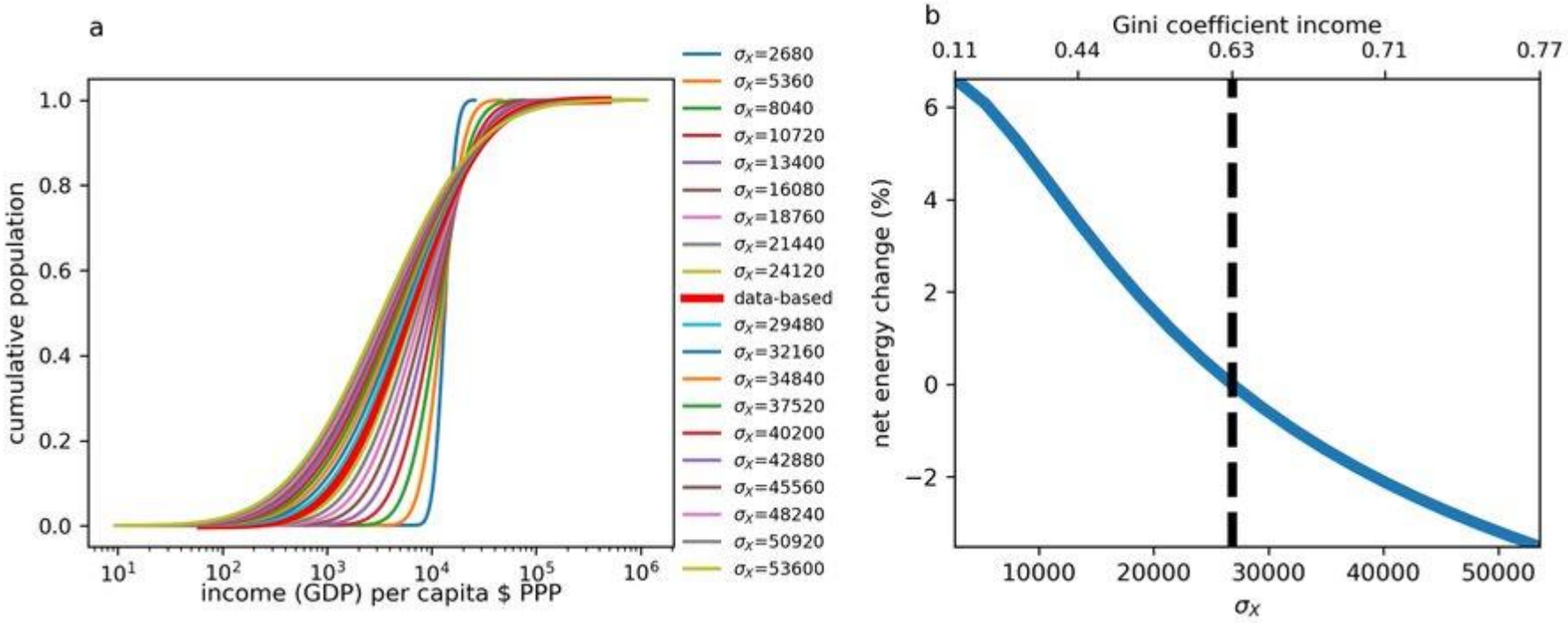
What happens if we make distributions more equal? Inequality in resource use comes from inequality in income …

What happens to energy if we redistribute income?

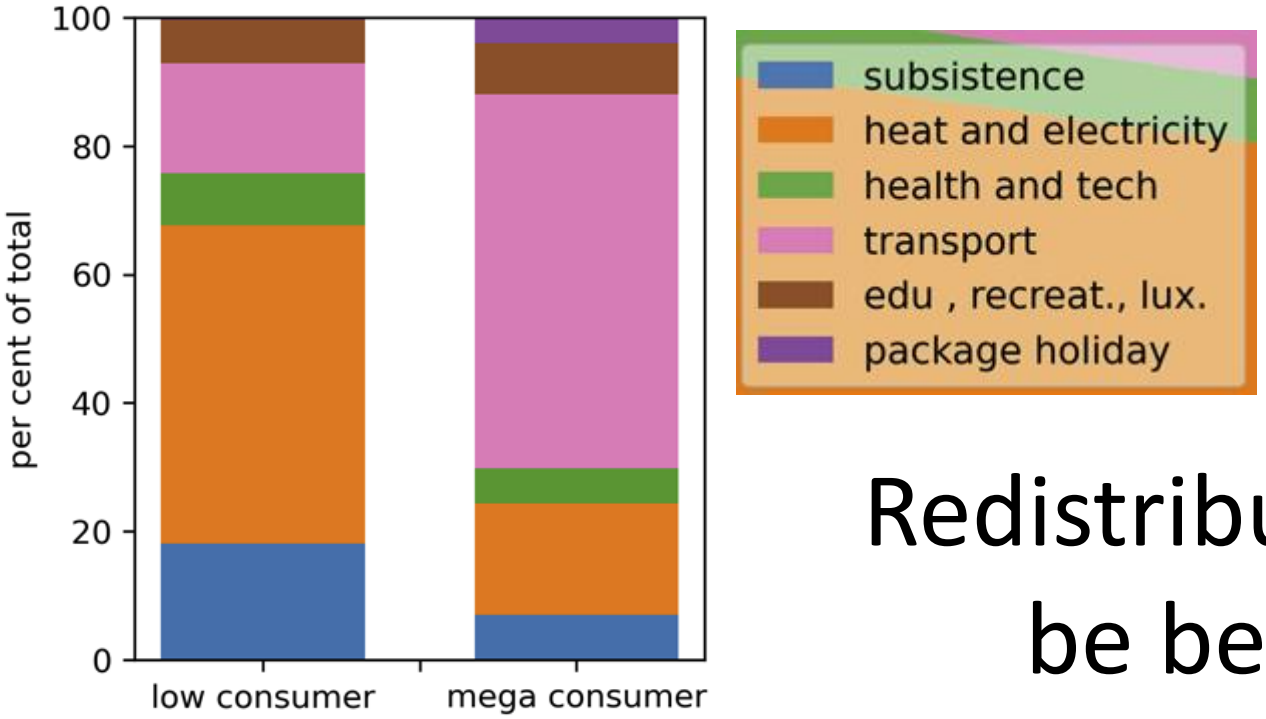


Oswald et al, 2021, Environmental Research Letters.

Not much: global energy goes up by less than 7%



Oswald et al, 2021, Global Sustainability



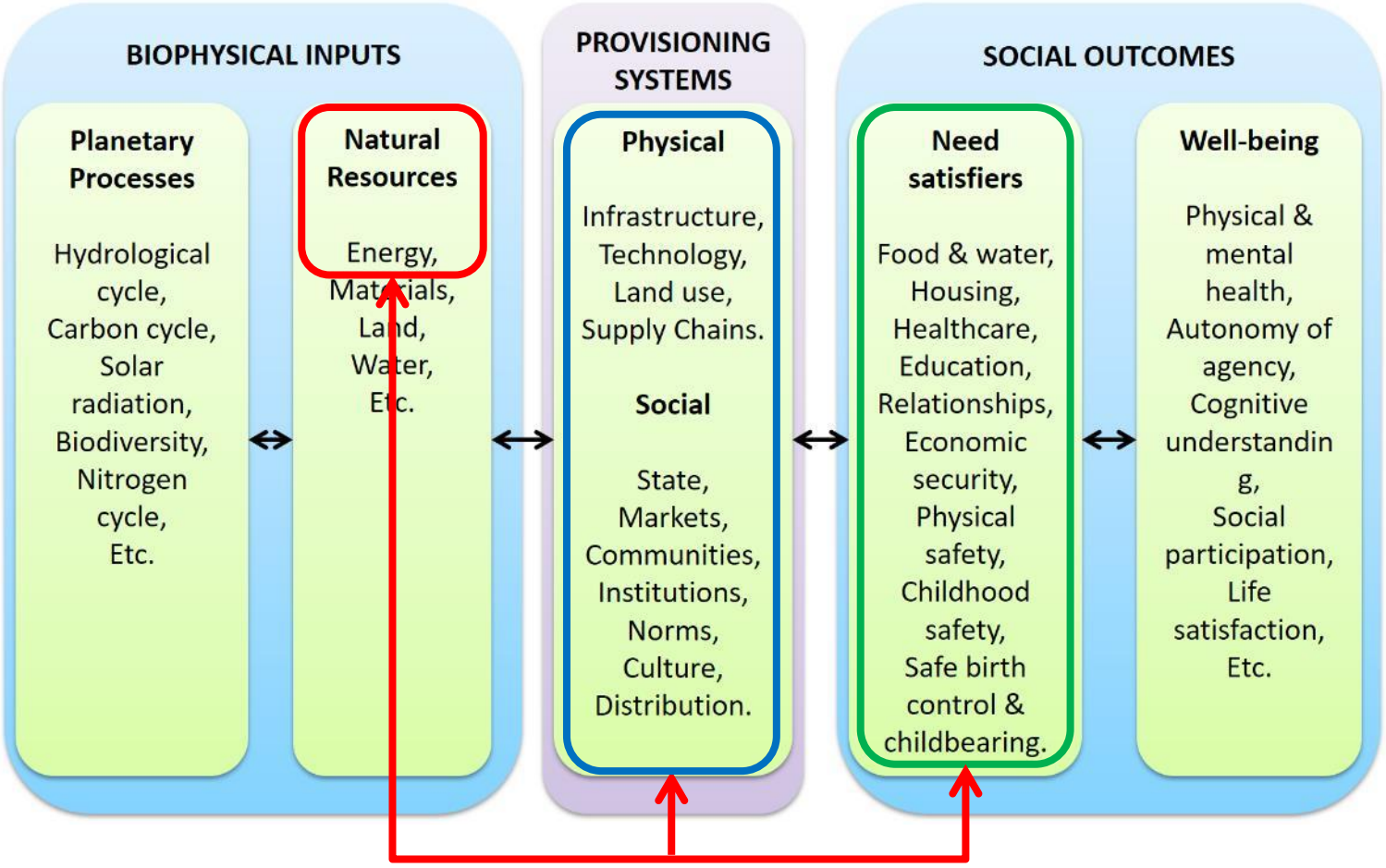
Redistribution would be beneficial.

Oswald et al 2021

Can we find out how to get inside Kate Raworth's Doughnut?

Part 2: Socio-economic factors

International energy demand vs well-being: what are mediating factors?



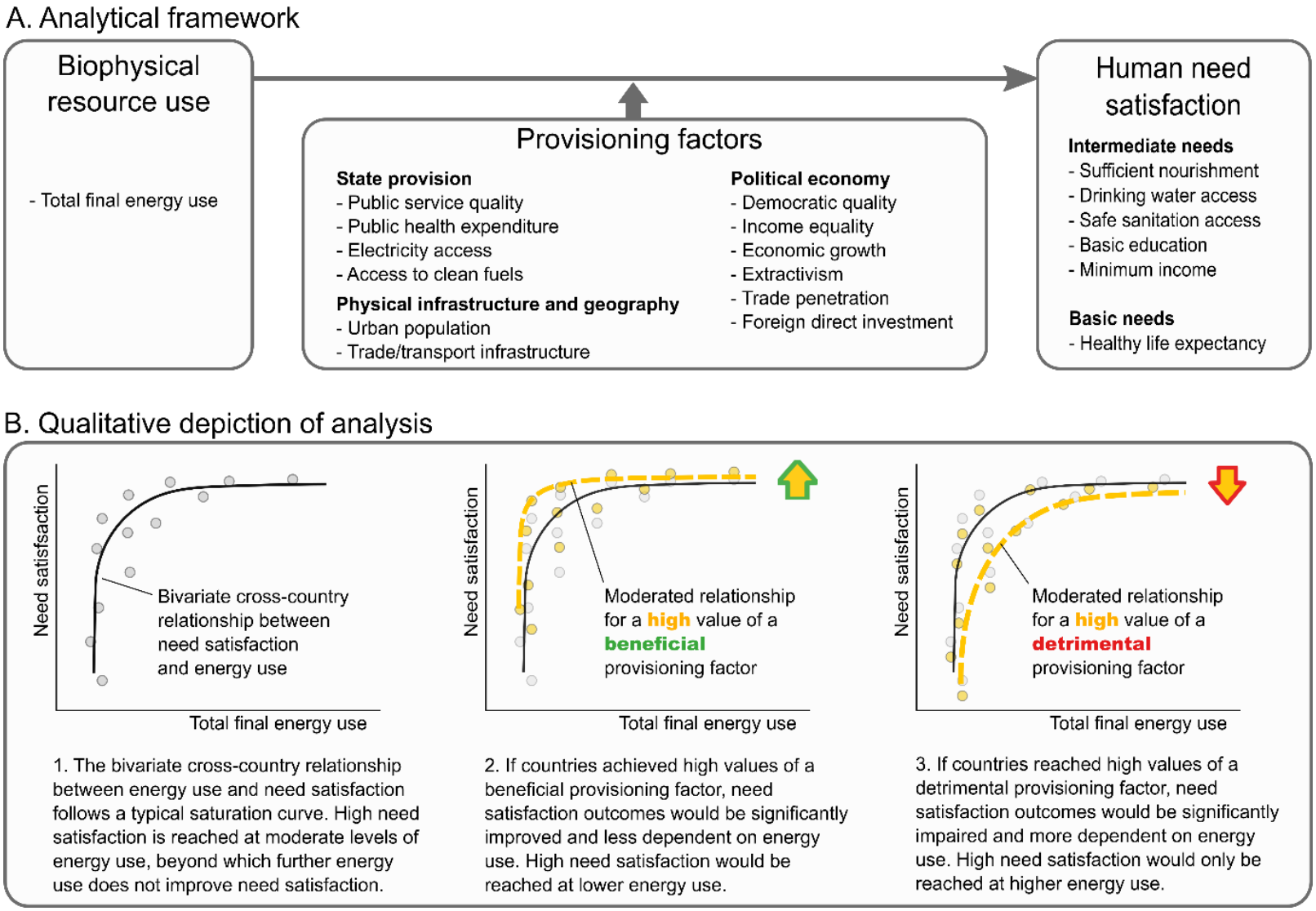
$$NS_{i,c} = a + b_1 ENU_{j,c}$$

Need satisfaction

Energy use

Vogel et al 2021

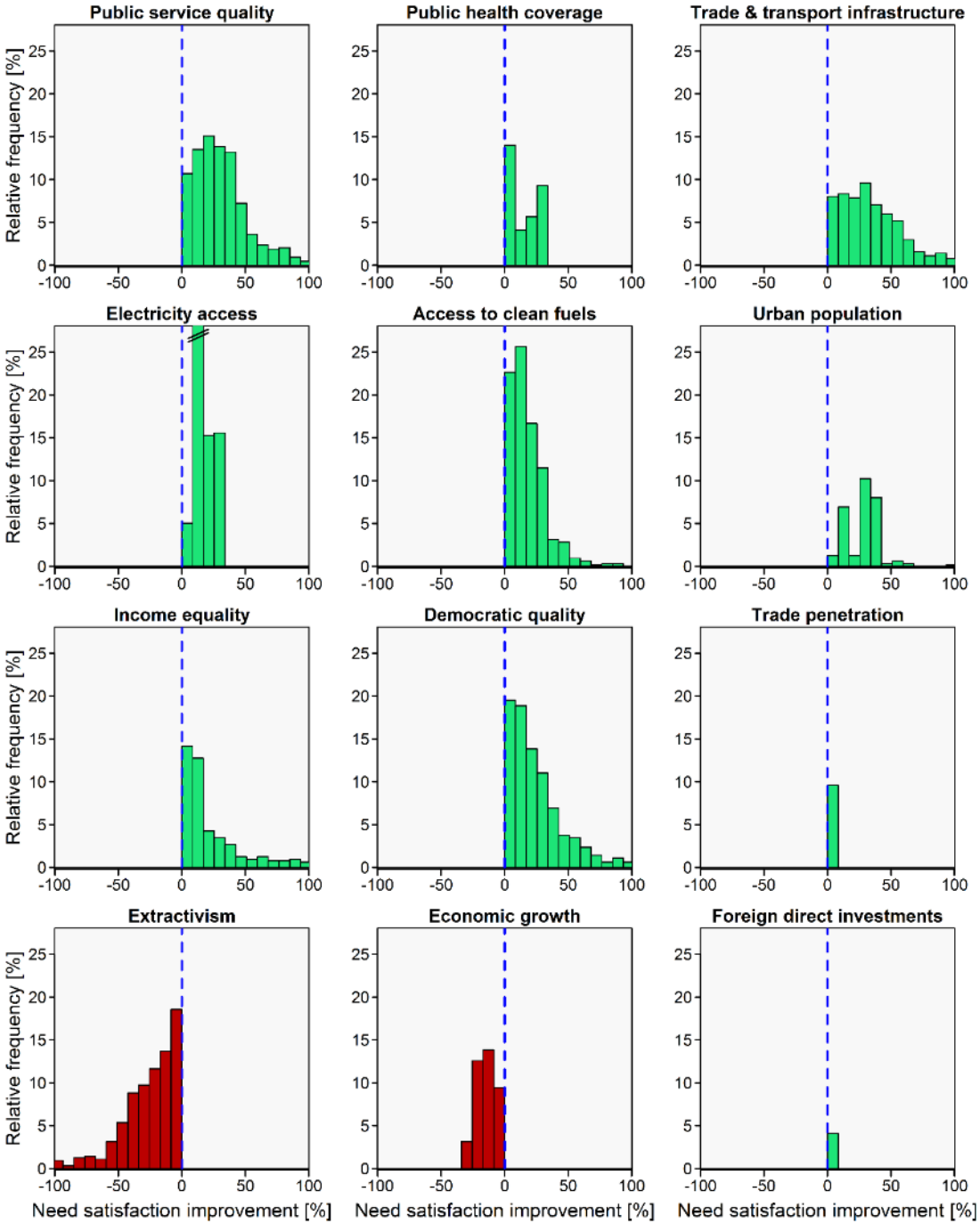
International energy demand vs well-being: what are mediating factors?



Vogel et al 2021 Global Environment Change

Results

Which provisioning factors have positive effects? Which are negative?



Vogel et al 2021 Global Environmental Change

Can we find out how to get inside Kate Raworth's Doughnut?

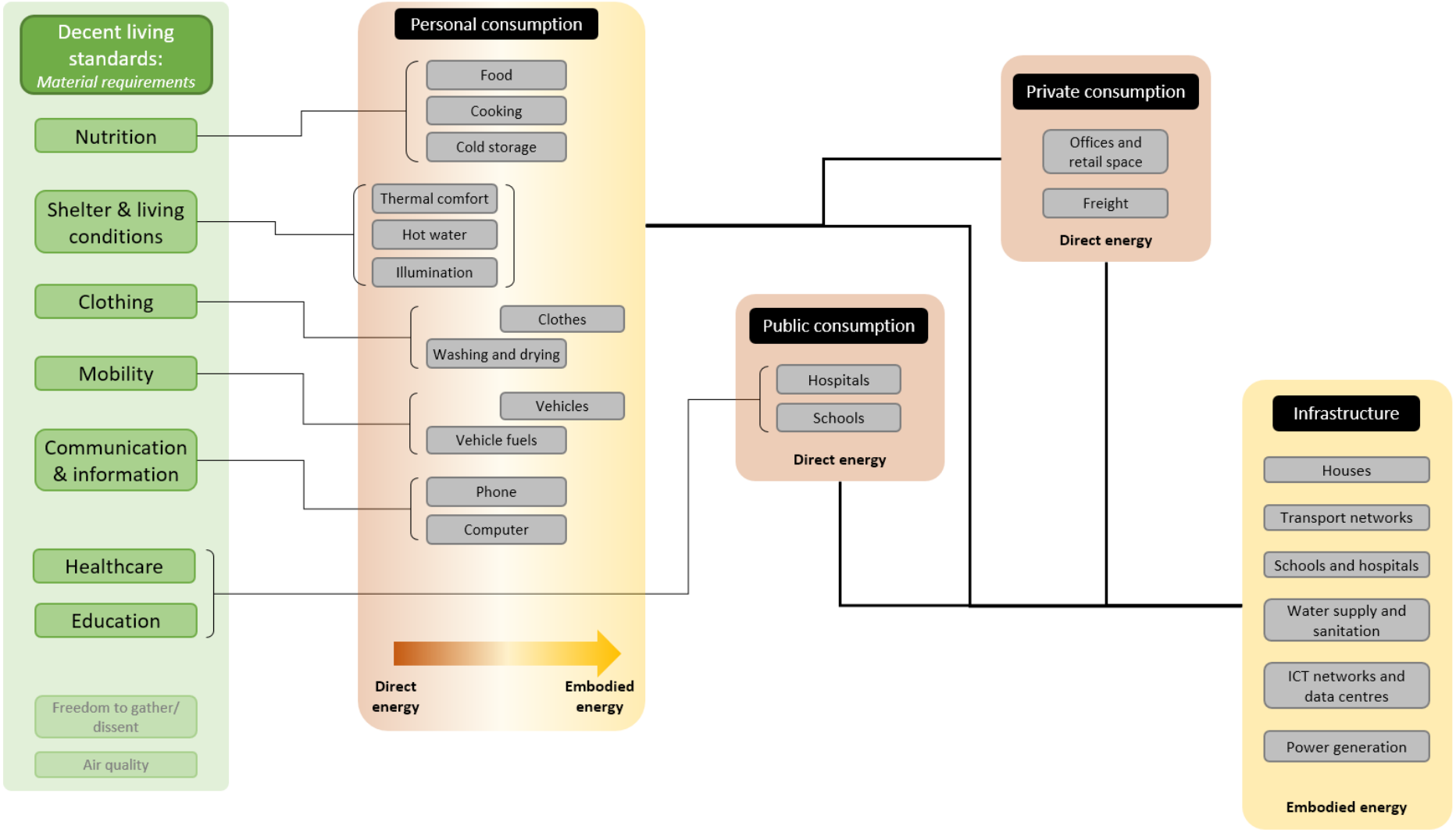
Part 3: Sufficiency & Efficiency Modelling

Can we model a different future?

- Based on the “Decent Living Energy” framework of Professor Narasimha Rao, Yale.
- Connects needs to sufficient levels of energy services.
- Global model takes into account technology improvements, equal distribution, result sin lower demand levels.

Millward-Hopkins, Steinberger, Rao & Oswald, 2020, Global Environmental Change

What the model looks like, and takes into account



Millward-Hopkins, Steinberger, Rao & Oswald, 2020, Global Environmental Change

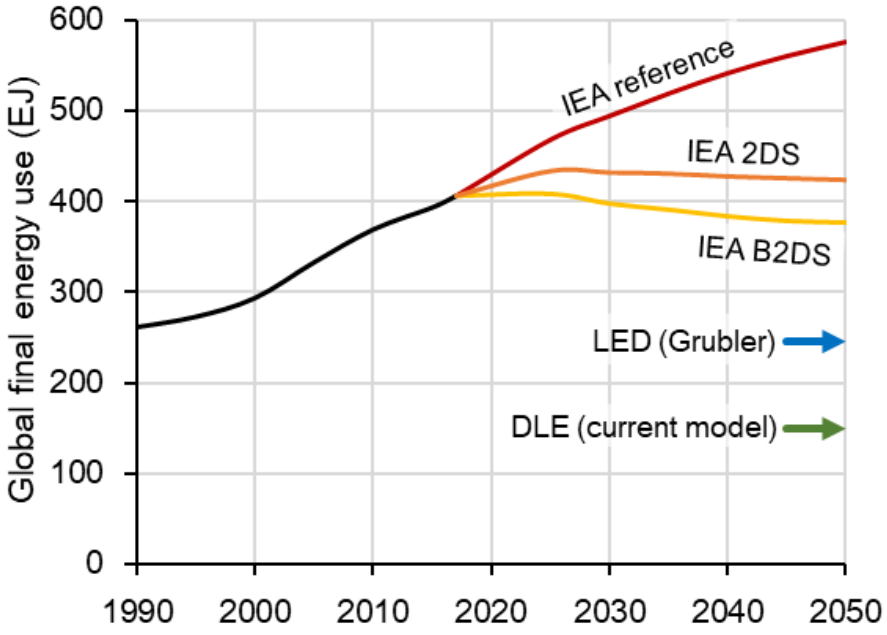
Sufficient energy for each person

Energy service	Level per person	Depends on …
Nutrition	2000–2150 kcal/day	Demography
Living space heated or cooled to 20 degrees year round	15 m2 per person	Rural-urban Climate
Clean water	50 liters, of which 20 heated	
Communication	1 mobile phone per person 1 laptop per household	
Mobility	5’000 - 15’000 km/year	Rural-urban
Health	8 hospital beds per 1000 persons	
Education	5-19 year-olds in school	Demography

And the embodied energy in appliances, infrastructure, etc.

Millward-Hopkins, Steinberger, Rao & Oswald, Global Environmental Change, 2020.

Global decent living energy results



Decent Living Energy for all achievable at 40% of current energy use, despite population growth until 2050.

Millward-Hopkins, Steinberger, Rao & Oswald, 2020, Global Environmental Change

A good life for all within planetary limits may be technically possible.

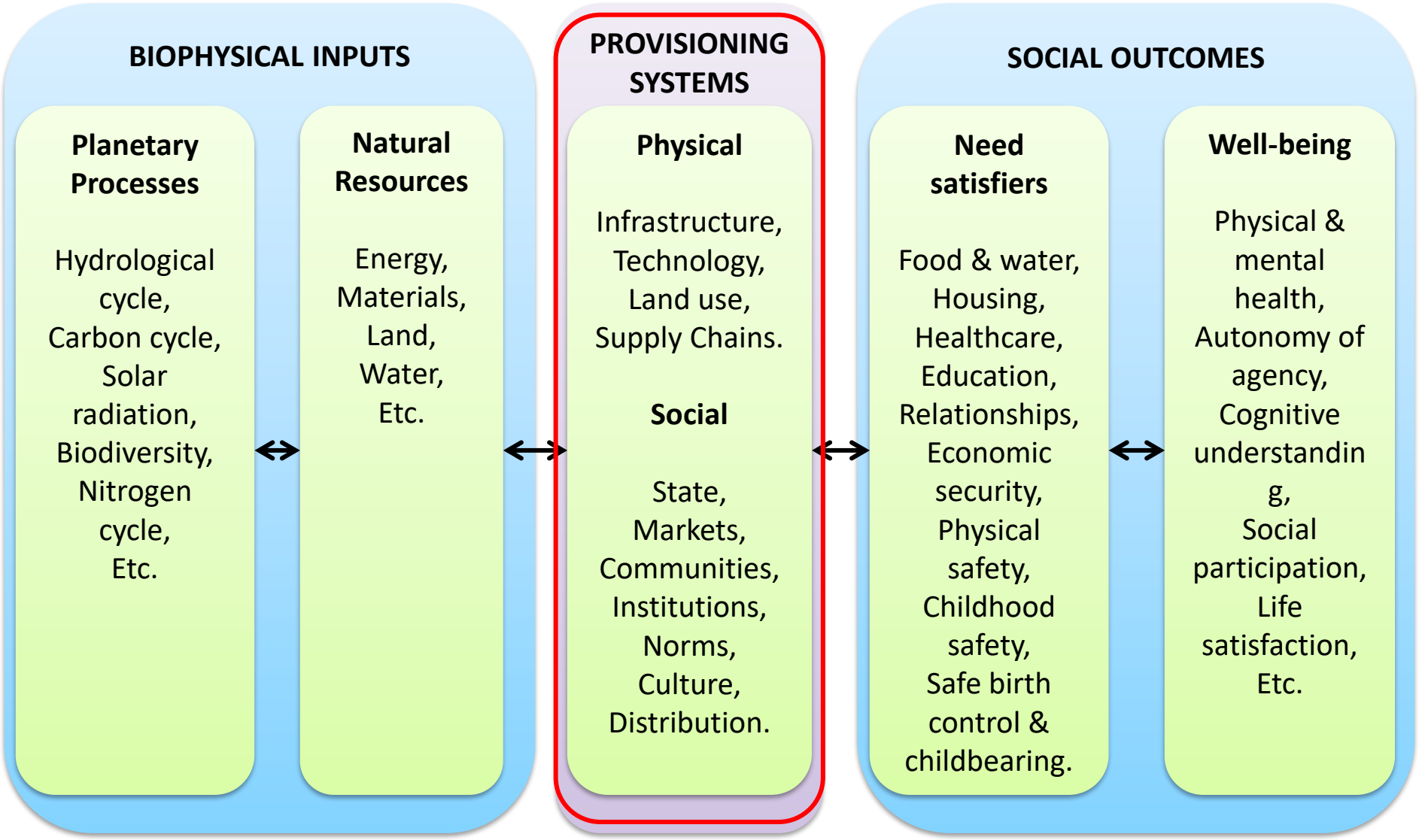
What is standing in our way?

Recent results regarding the political economy of car dependency …

A political economy of car dependence

Wikimedia, creative commons

Systems of provision of car dependence



J. Steinberger, D. O'Neill & W. Lamb

Question: Is it possible to live well within limits?

Answer: Yes, but only through a complete transformation of our economic systems: towards

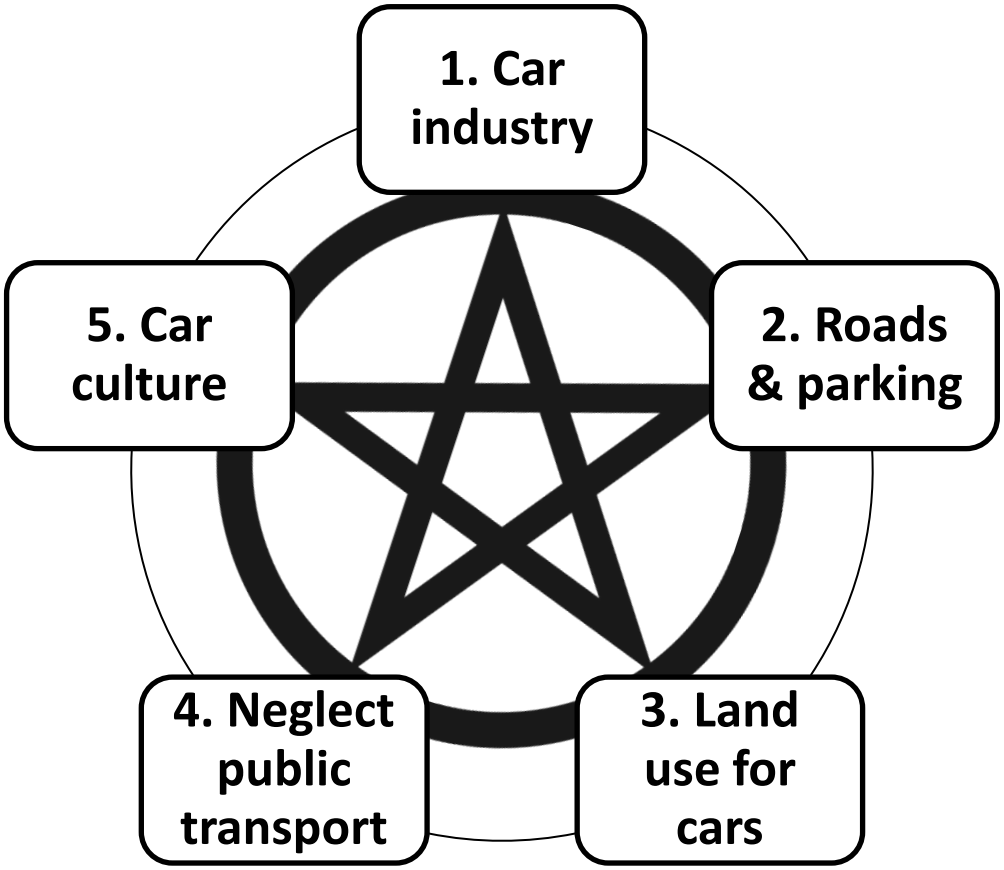
1. equity,

2. sufficiency and

3. maximal efficiency.

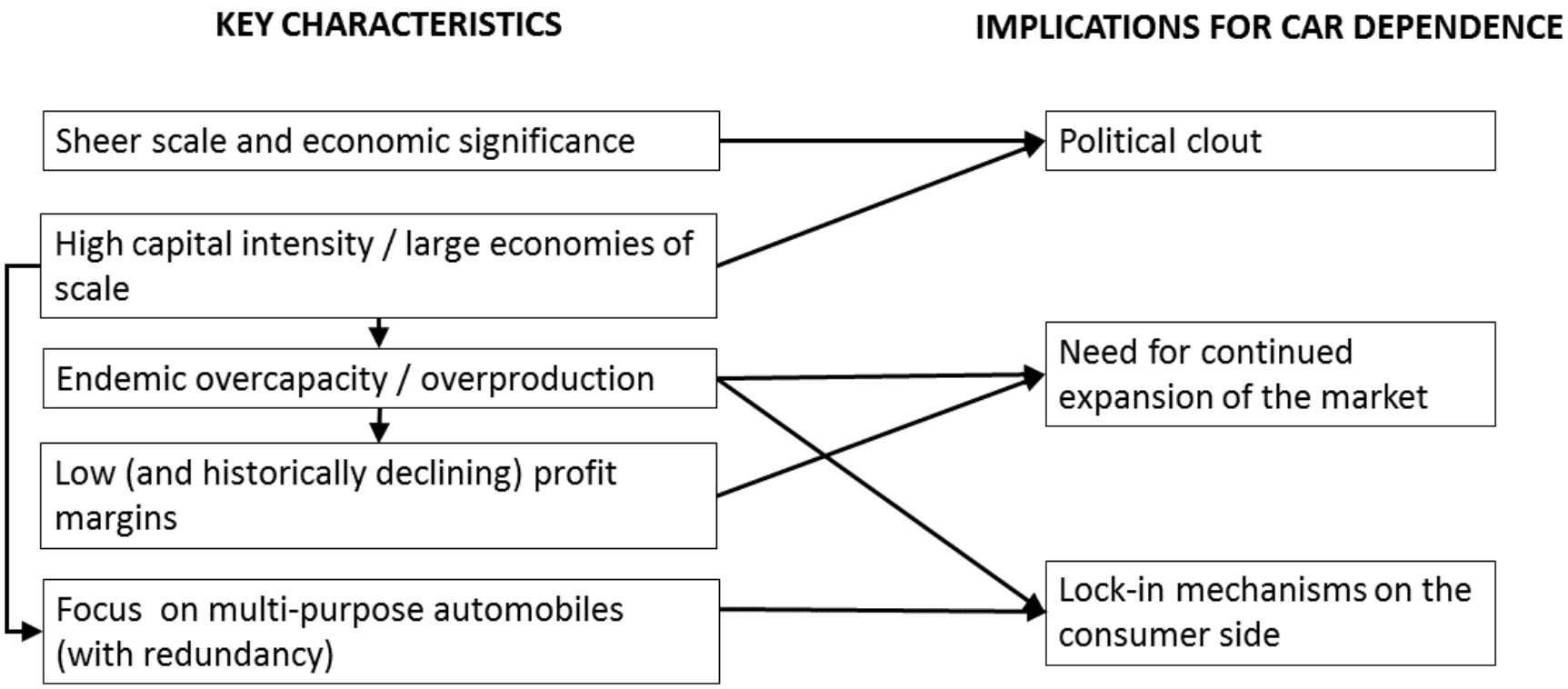
A political economy of car dependency

Energy demand research requires historical, political & institutional analysis if we are to escape high energy consumption: not just engineering & economics.



Mattioli, Roberts, Steinberger & Brown, 2020, Energy Research and Social Science

Systems of provision of the automotive industry:
an integrated socio-economic & technical perspective.



Mattioli, Roberts, Steinberger & Brown, 2020, Energy Research and Social Science

Opportunistic use of economic theories: the apolitical façade of road building

Table 1 – Main strategies of legitimisation for road building

Strategy	Variant	Summary	Application & purpose
1. Appeal to economic growth	Neoclassical	'road building is necessary to accommodate economic growth'	Used in times of economic growth
	Keynesian	'road building is required to stimulate economic growth'	Used in times of economic crisis
2. Appeal to popular consumerism		'car infrastructure is required by consumer preferences'	Appeals to the political right
3. Road building as a means to regional development and social inclusion		'car infrastructure is required for region X to grow and 'catch up' with the rest of the country', or to facilitate social inclusion	Appeals to the political left
4. Road building as a solution to the problems caused by increasing motorisation		'the answer to current transport problems is road building'	Fuels self-reinforcing cycle of road building, traffic growth and congestion, through induced demand
5. Appeal to technical expertise		'road building is sanctioned to be in the public interest'	Removes road building from public/political debate

Mattioli et al 2019, Energy Research and Social Science.

A political economy anatomy of lock-in

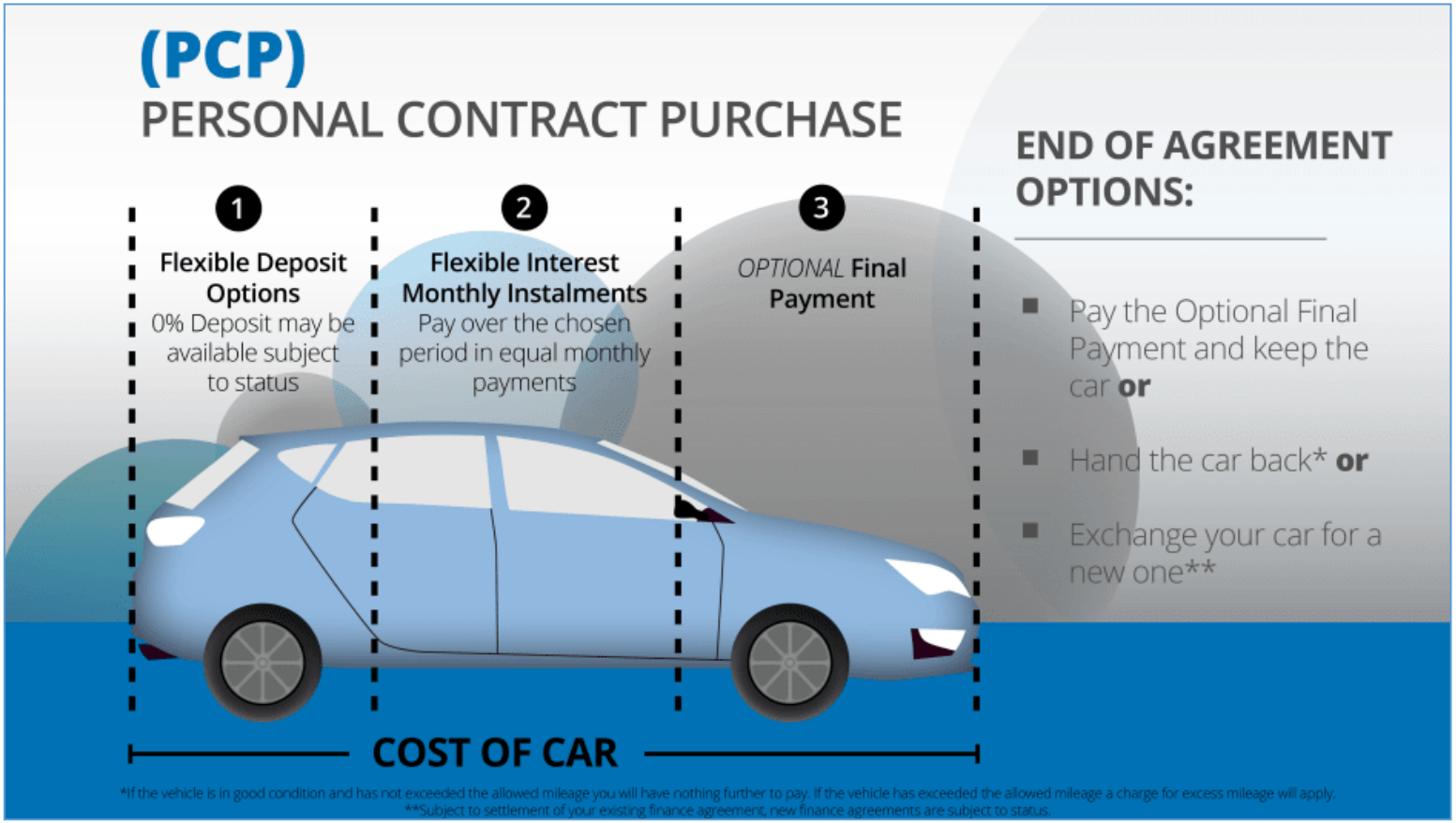
Cause: / *Effect:*	1 Automotive Industry	2 Car Infrastructure
1 Automotive industry		Car infrastructure enables the sale of more cars, by providing space to accommodate them. The status of roads goes from shared public spaces to motorised flow spaces, literally driving other modes out, and enhancing the value of car ownership.
2 Car Infrastructure	The automotive industry plays a key role in lobbying coalitions which pressure government to invest public resources, and co-opt public space, to make room for cars.	

5 Car Culture	The car industry actively supports the development of car culture, both deliberately, through advertising and marketing, and tacitly, through the built-in redundancy in the vehicles they sell, and the effects this has on people's daily practices.	Car infrastructure creates practices, habits and cultural trends (e.g. it is normalised as a symbol in children's toys).	Land use patterns, both for residential and work developments, normalise car transport, ensuring that alternatives are portrayed as marginal.	Poor public transport networks encourage more people to adopt car-centric lifestyles.	

Mattioli, Roberts, Steinberger & Brown, 2020, Energy Research and Social Science

Another angle: Financial lock-in

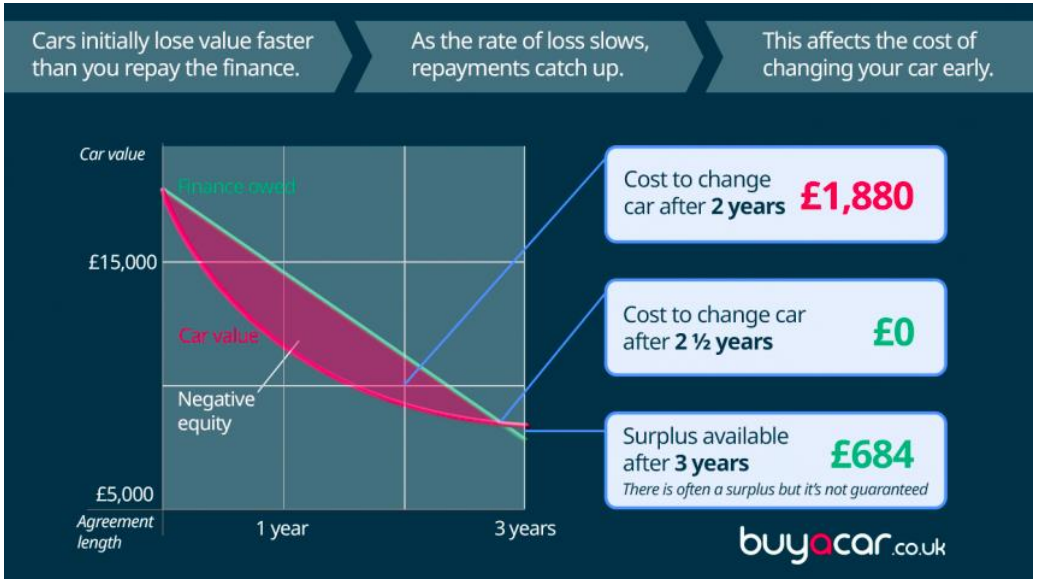
UNIVERSITY OF LEEDS



Thomas Haines-Doran, in preparation

- An important feature of new cars is that their decline in value begins at a fast pace, slowing over time, as this illustrative graphic shows.

- Early termination of a PCP contract results in the customer needing to address their ‘negative equity’.



- Rather than having to pay the difference, it is loaded onto a new PCP contract, for a new car, which itself then begins rapid depreciation in value, compounding the customer’s negative equity problem. The consumer has entered a debt spiral.

Thomas Haines-Doran, in preparation

Multinational state capture

From understanding to action

- Urgency of climatic situation does not allow for gradualistic transitions (in research or reality), but calls for radical transformation.
- Popular movements (student strikes world-wide, Sunrise Movement in USA, Extinction Rebellion) all realise this.
- Is our research supporting them? How can we contribute and participate?

From analysis to rebellion

nature ecology & evolution

Credit: Louise Gardner

Credit: Alfredo Romero-Muñoz

Scientists must act on our own warnings to humanity

We face interconnected planetary emergencies threatening our climate and ecosystems. Charlie J. Gardner and Claire F. R. Wordley argue that scientists should join civil disobedience movements to fight these unprecedented crises.

"The scientists who alerted the world to the climate and ecological crises have a moral duty to join the popular movements demanding political action."

ENVIRONMENT OCTOBER 13, 2019 / 3:09 AM / 3 DAYS AGO

Scientists endorse mass civil disobedience to force climate action

Matthew Green 5 MIN READ

LONDON (Reuters) - Almost 400 scientists have endorsed a civil disobedier
aimed at forcing governments to take rapid action to tackle climate change, v
failure could inflict "incalculable human suffering."

From Publications to Public Actions: The Role of Universities in Facilitating Academic Advocacy and Activism in the Climate and Ecological Emergency

Charlie J. Gardner[1*], Aaron Thierry[2], William Rowlandson[3] and Julia K. Steinberger[4]

Environment protest being criminalised around world, say experts

More than 400 climate scientists sign letter that says activists are being targeted at pivotal time in fight against global heating

"It has become abundantly clear that governments don't act on climate without pressure from civil society: threatening and silencing activists thus seems to be a new form of anti-democratic refusal to act on climate."

Thanks! Any questions?

References:

O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, *1*(2), 88-95.

Oswald, Y., Owen, A., & Steinberger, J. K. (2020). Publisher Correction: Large inequality in international and intranational energy footprints between income groups and across consumption categories. *Nature Energy*, 1-1.

Oswald, Y., Steinberger, J., Ivanova, D., & Millward-Hopkins, J. (2021). Global redistribution of income and household energy footprints: A computational thought experiment. *Global Sustainability, 4*, E4. doi:10.1017/sus.2021.1

Steinberger, J. K., Lamb, W. F., & Sakai, M. (2020). Your money or your life? The carbon-development paradox. *Environmental Research Letters*, *15*(4), 044016.

Millward-Hopkins J, Steinberger JK, Rao ND, Oswald Y. **Providing decent living with minimum energy: A global scenario.** *Global Environmental Change.* 2020 Nov 1;65:102168.

Mattioli, G., Roberts, C., Steinberger, J. K., & Brown, A. (2020). The political economy of car dependence: A systems of provision approach. *Energy Research & Social Science*, *66*, 101486.

Vogel, J., Steinberger, J. K., O'Neill, D. W., Lamb, W. F., & Krishnakumar, J. (2021). Socio-economic conditions for satisfying human needs at low energy use: an international analysis of social provisioning. *Global* Environmental Change, 102287

Wiedmann, T., Lenzen, M., Keyßer, L.T. and Steinberger, J.K., 2020. Scientists' warning on affluence. Nature communications, 11(1), pp.1-10.