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Energy sufficiency
Why, what, and how?

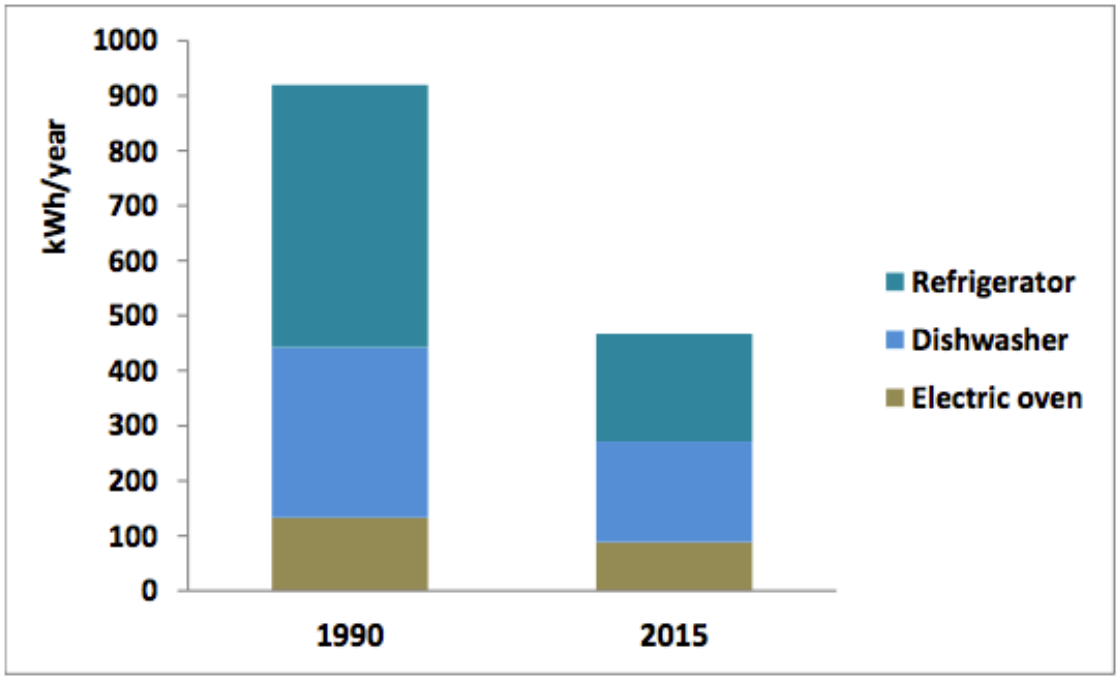
Katharina Bohnenberger

Wuppertal Institute for Climate, Environment and Energy

President's Unit

Where has sustainable energy brought us?

Energy demand of household appliances



Energy use (in standardised conditions) of the market average in 1990 and 2015 for three products (source: VHK 2016, Toulouse/Attali 2018)

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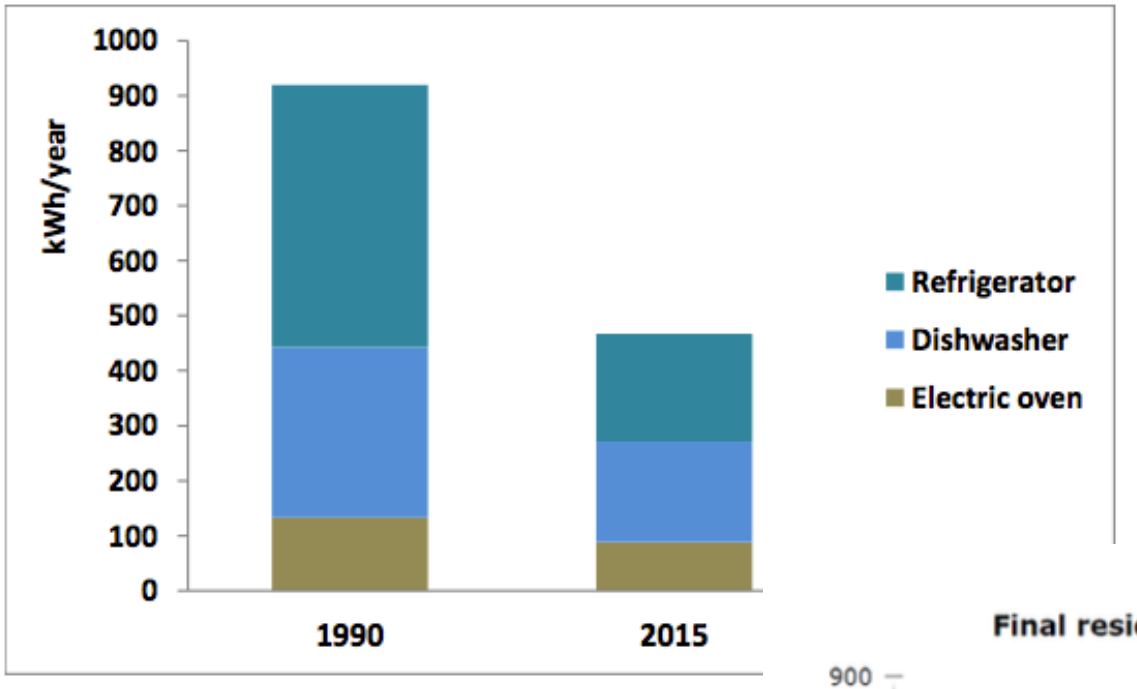

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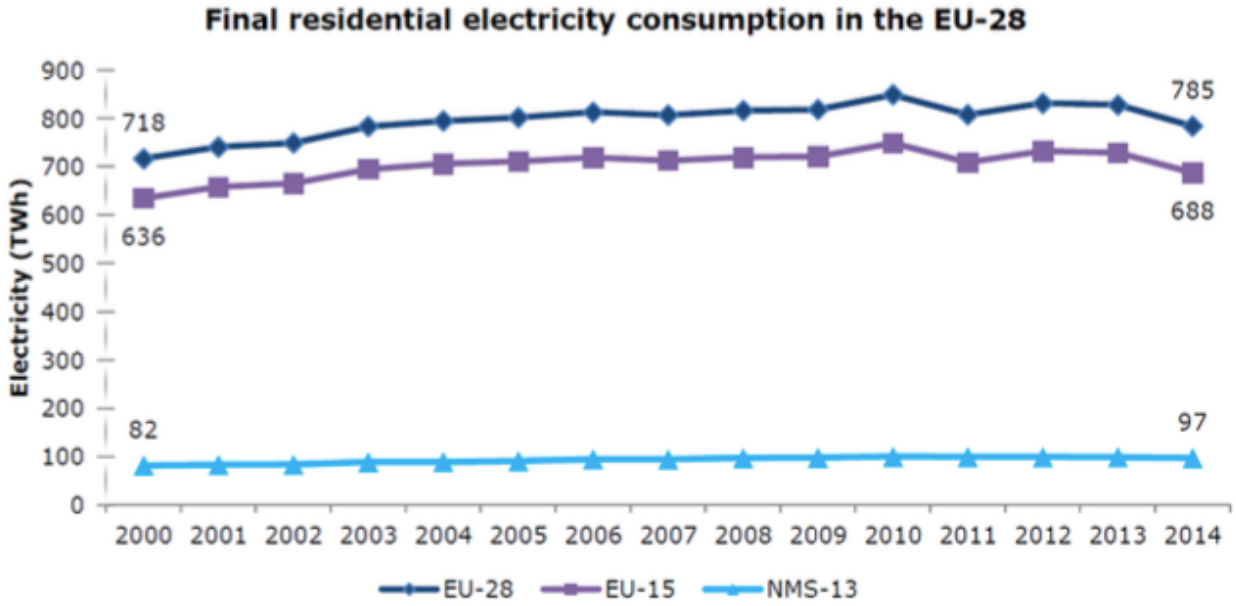

Total electricity consumption trends in the EU residential sector (source: JRC 2016, Toulouse/Attali 2018)

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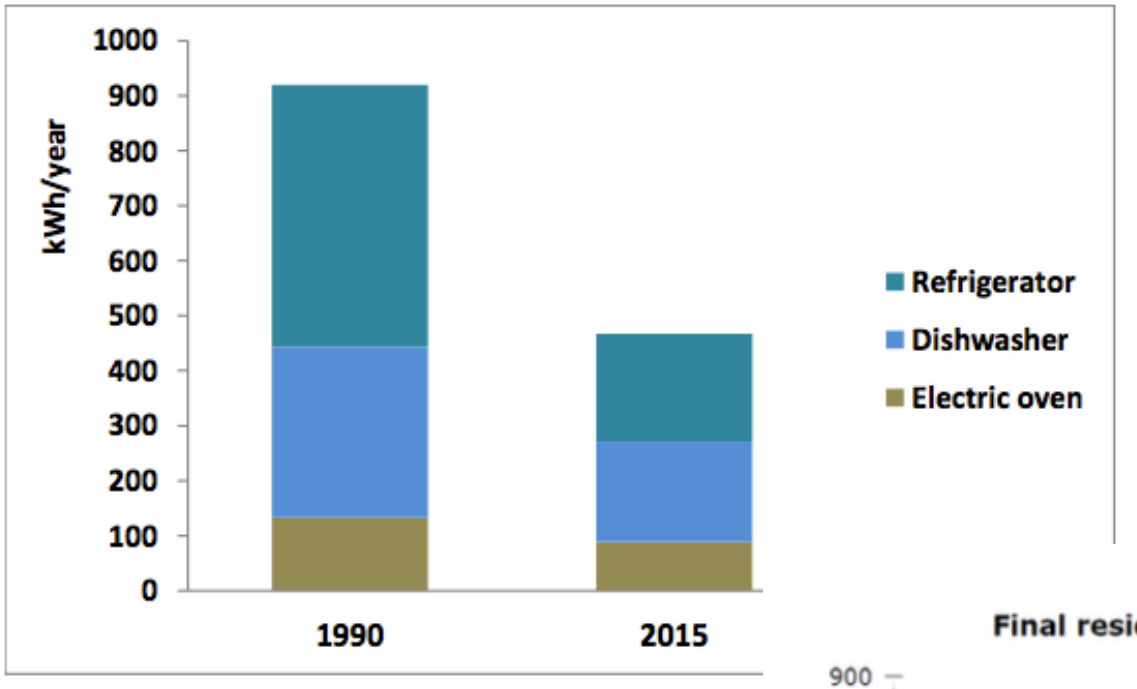

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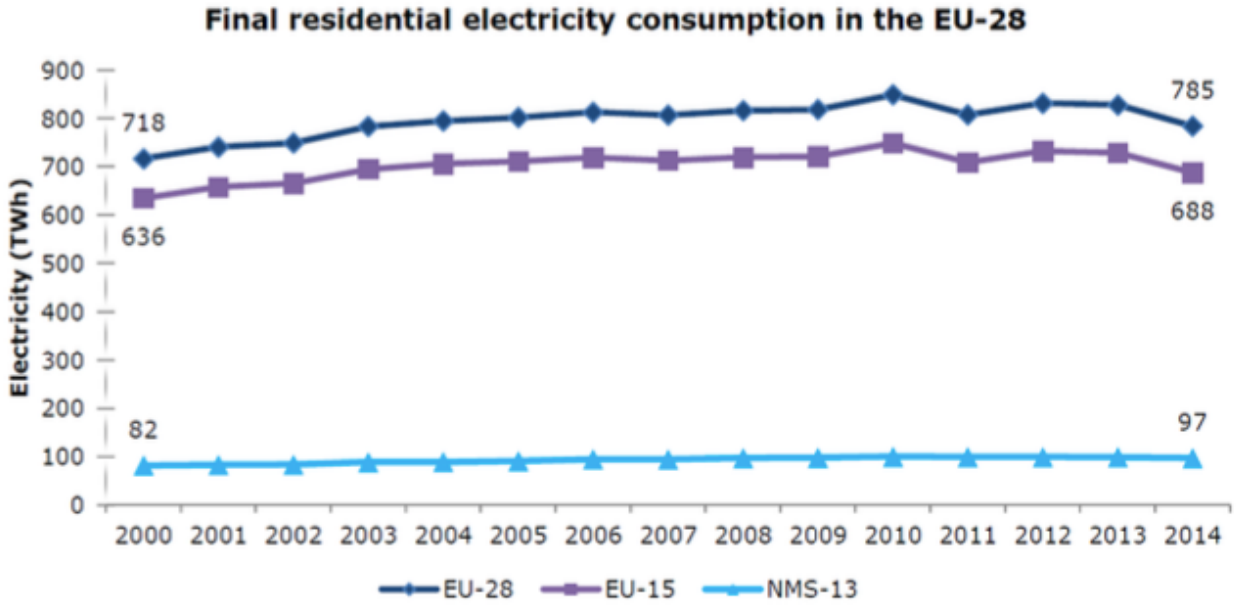

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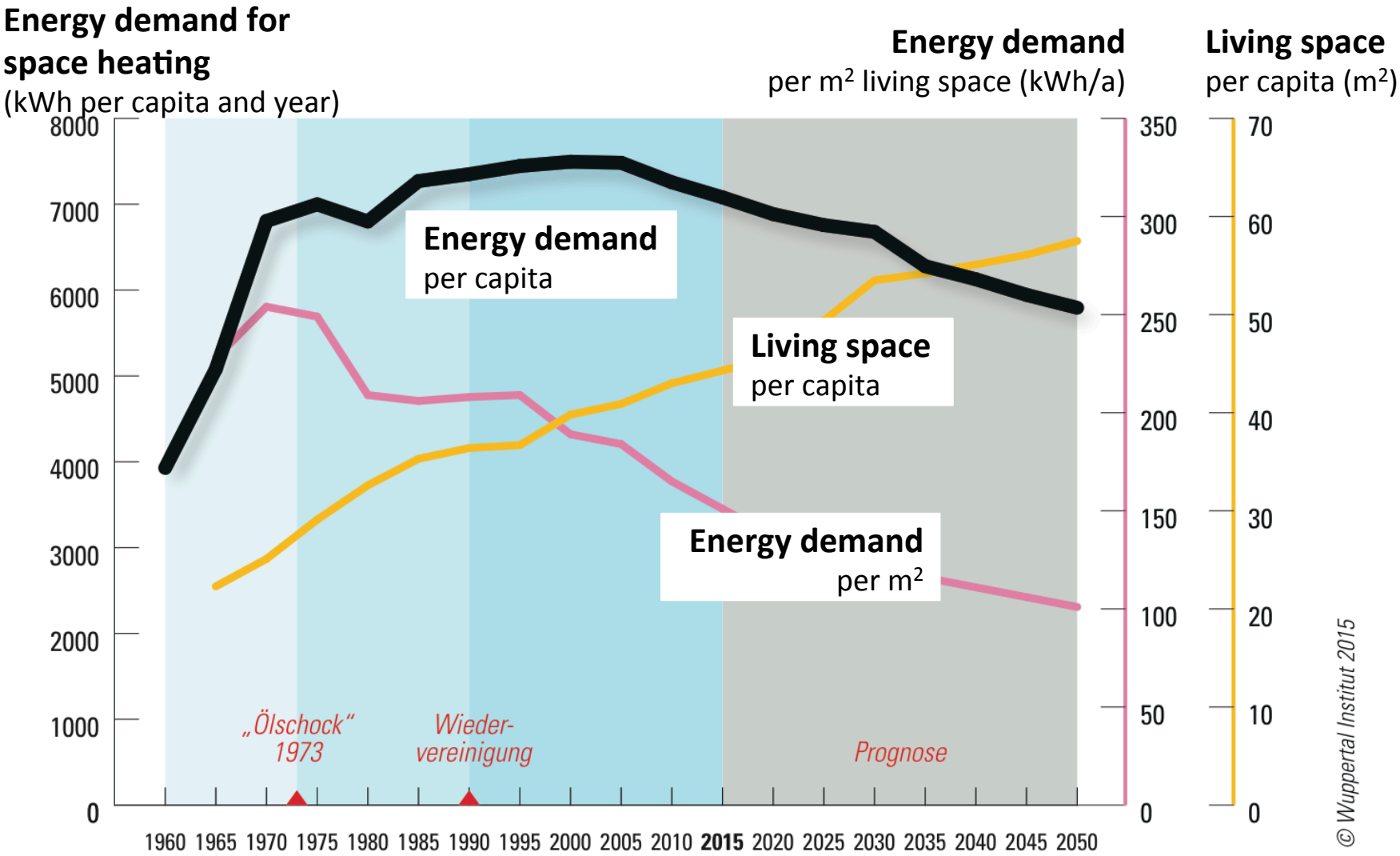
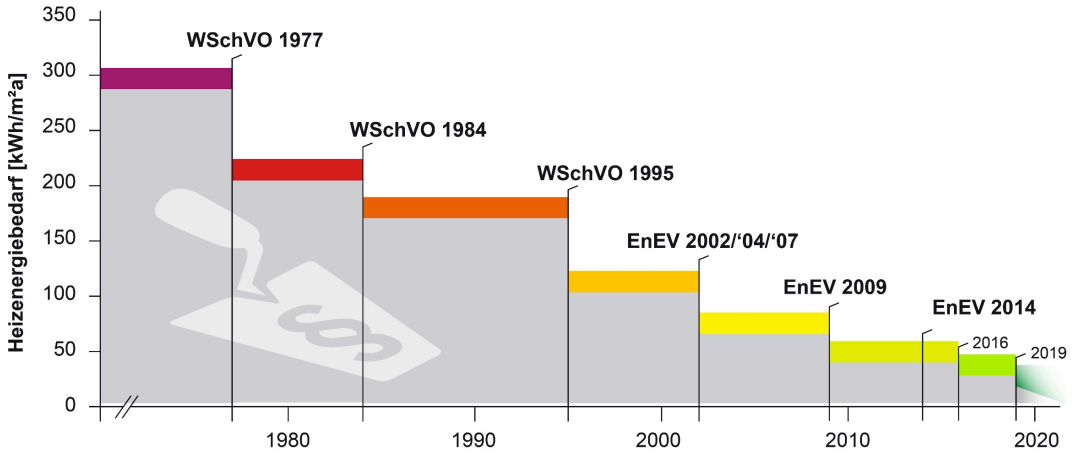
Growing living space beats efficiency gains (Germany)



Energy efficiency & energy demand



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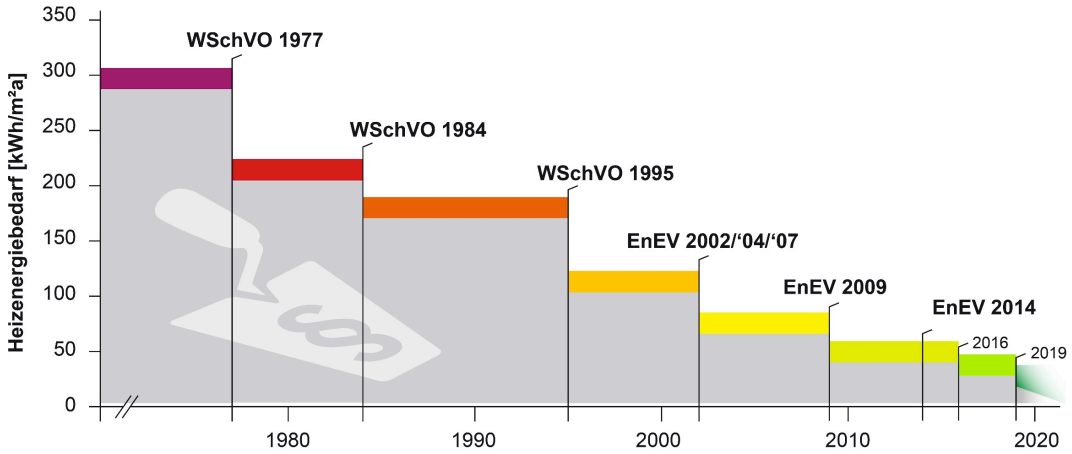

Reasons:

- **higher number of households**
- **new energy-using gadgets**
- **inflation in size and fuctionality**
- **longer usage time**

Three strategies of sustainability

efficiency

Improved input-output relation
(better)

Fewer inputs of material or energy are needed per service unit.
more goods and services are produced from the same amount of material or energy

- technical limitations
- rebound effect

Source: S. Samadi et al. 2017

Three strategies of sustainability

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efficiency

consistency

Improved input-output relation
(better)

Fewer inputs of material or energy are needed per service unit.
more goods and services are produced from the same amount of material or energy

- technical limitations
- rebound effect

changes in production input
(different)

substituting non-renewable resources (fossil fuels) with **renewable resources**

- Slow development
- conflicting use & other environmental targets

Source: S. Samadi et al. 2017

Three strategies of sustainability

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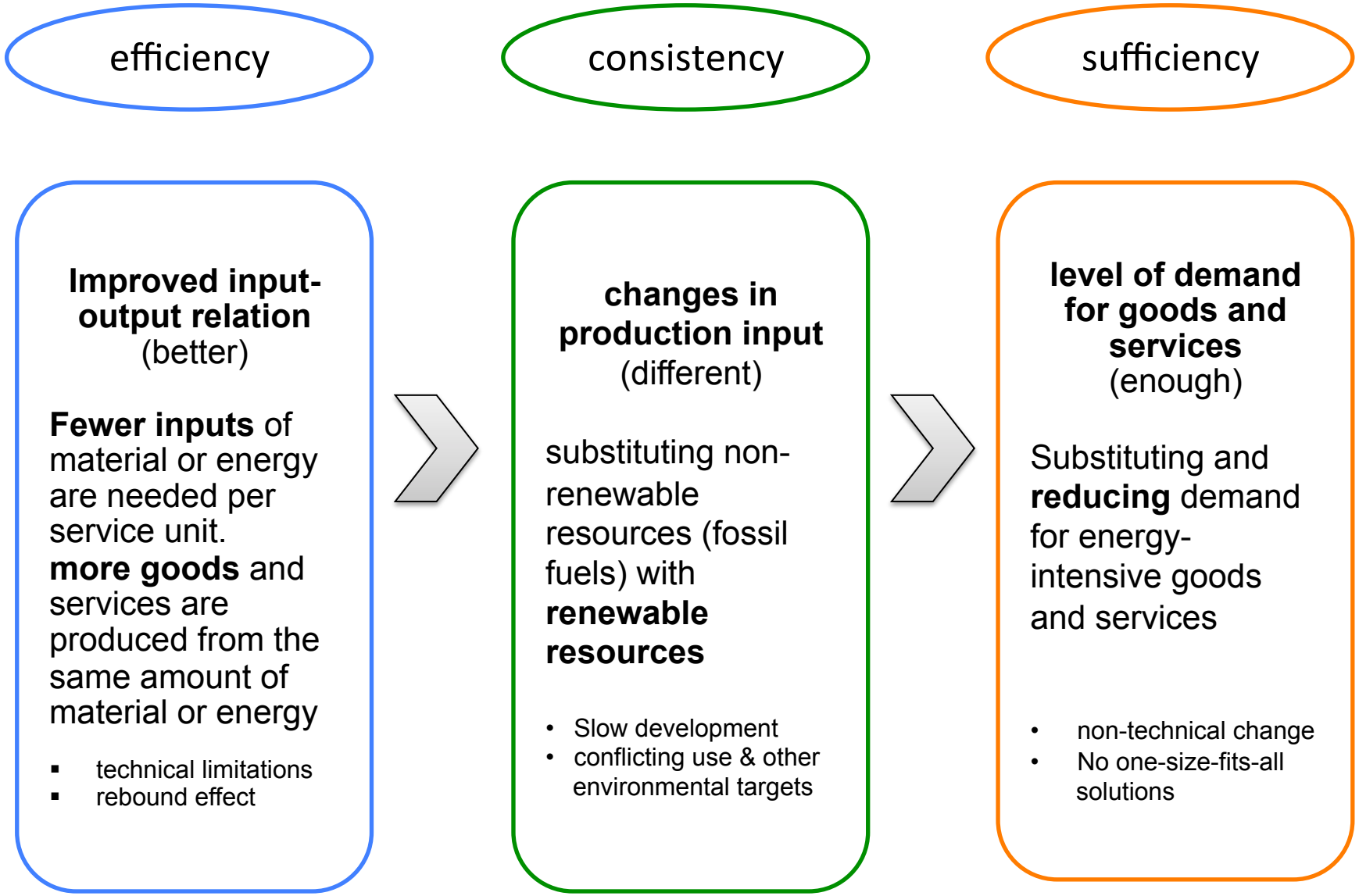

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What is “energy sufficiency”?

- there is not one unique definition of sufficiency:
  - “a **change of behaviour and consumption** patterns with the aim to reduce goods, services or functions” (Fischer/Grießhammer 2013)
  - “**reduction of the demand** of products and services with a high share of resources“ (Linz 2006)

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- Sufficiency is not abstinence and reduced welfare. – it can **enhance well-being.**
  Sufficiency is not individual, frugal behaviour. – policies, **infrastructures and institutions** can be designed to enhance or hinder sufficiency
  Sufficiency is not the opponent of efficiency. - Rather: **maximises efficiency gains**: “the ’efficiency revolution’ remains disoriented if it is not accompanied by a ’sufficiency revolution’. After all, nothing is more irrational than chasing with a maximum of efficiency in the wrong direction” (Sachs 1993).

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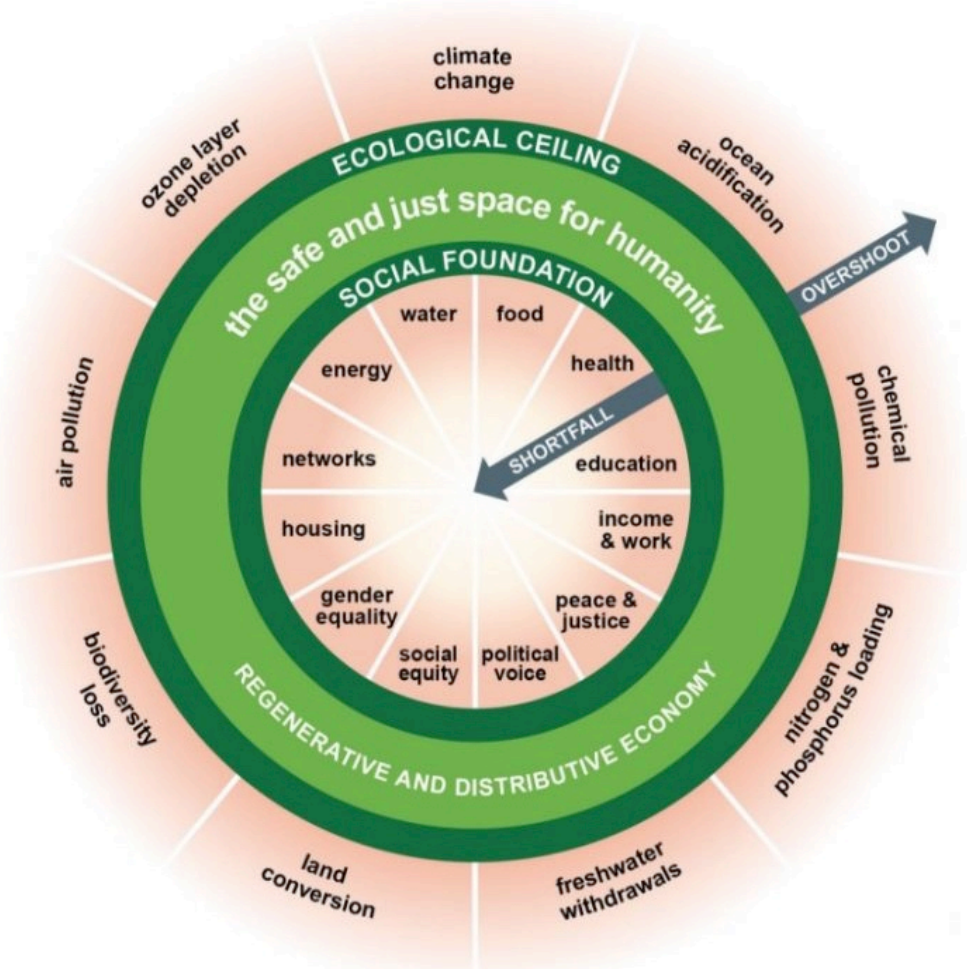
- Energy sufficiency: “Energy sufficiency is a state in which people’s **basic needs** for energy services are met equitably and ecological limits are respected.” (Darby/Fawcett 2018).

What is sufficiency?
Neither too much nor too little



source: Kate Raworth "The Doughnut Economics"

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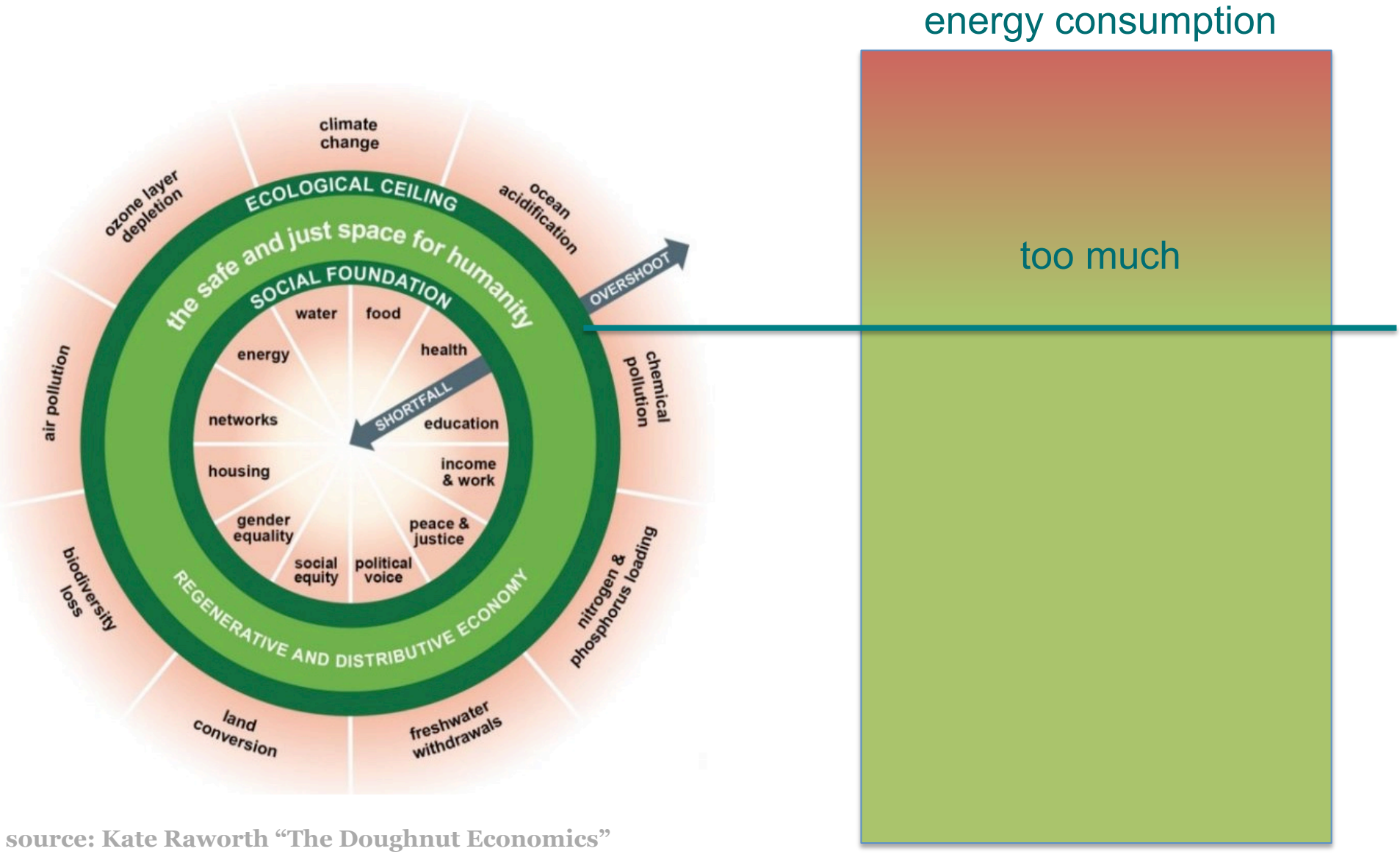

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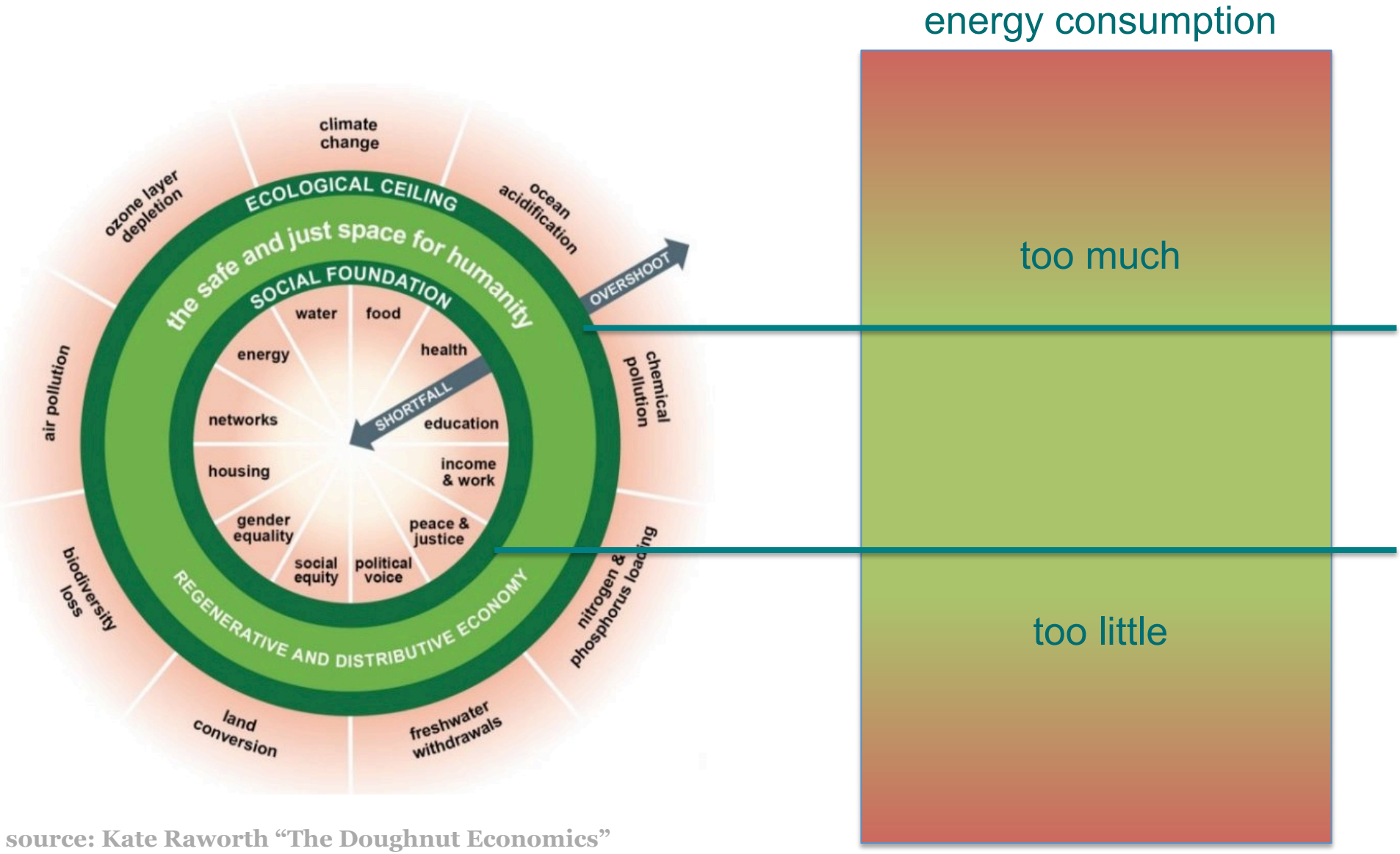

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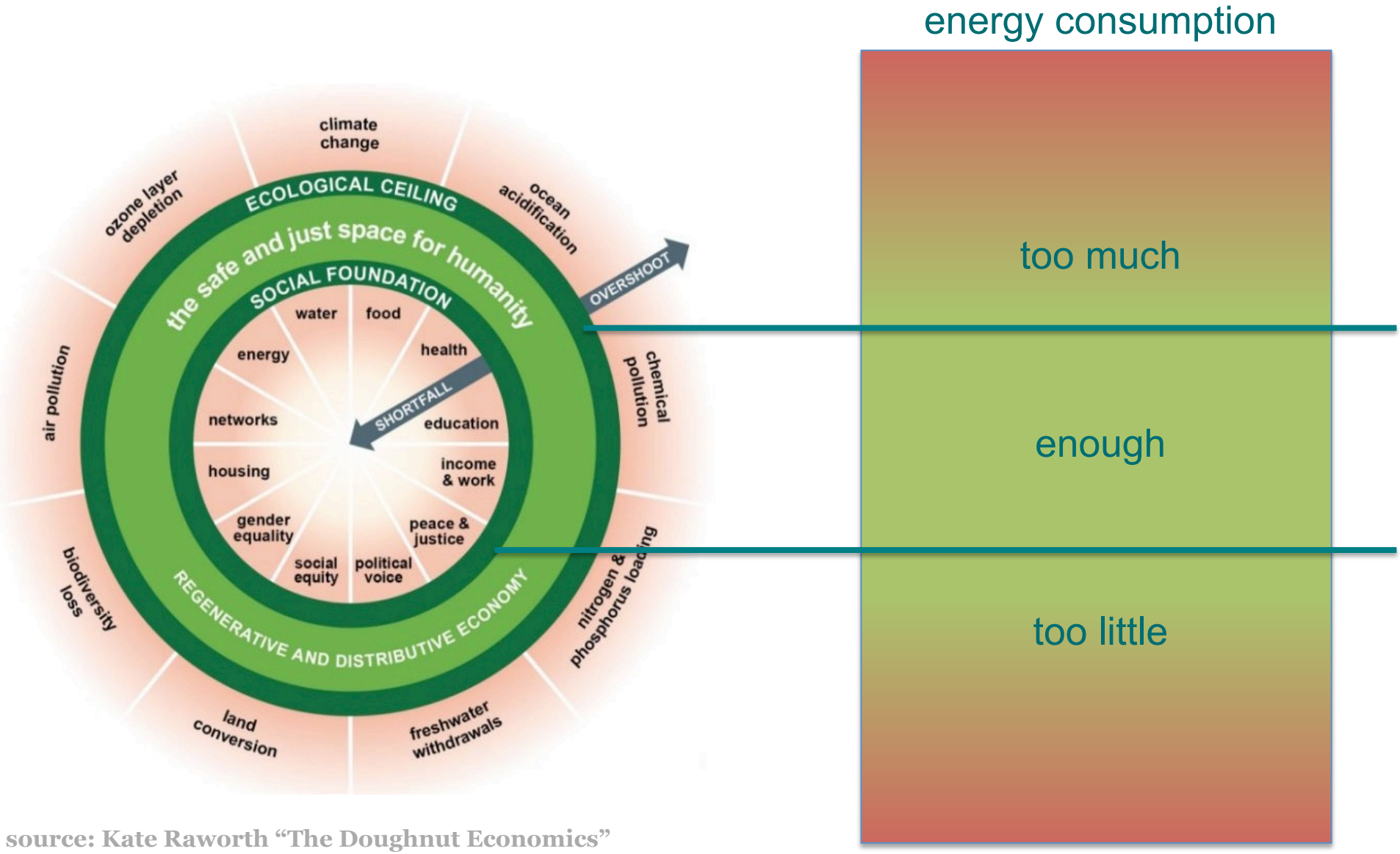

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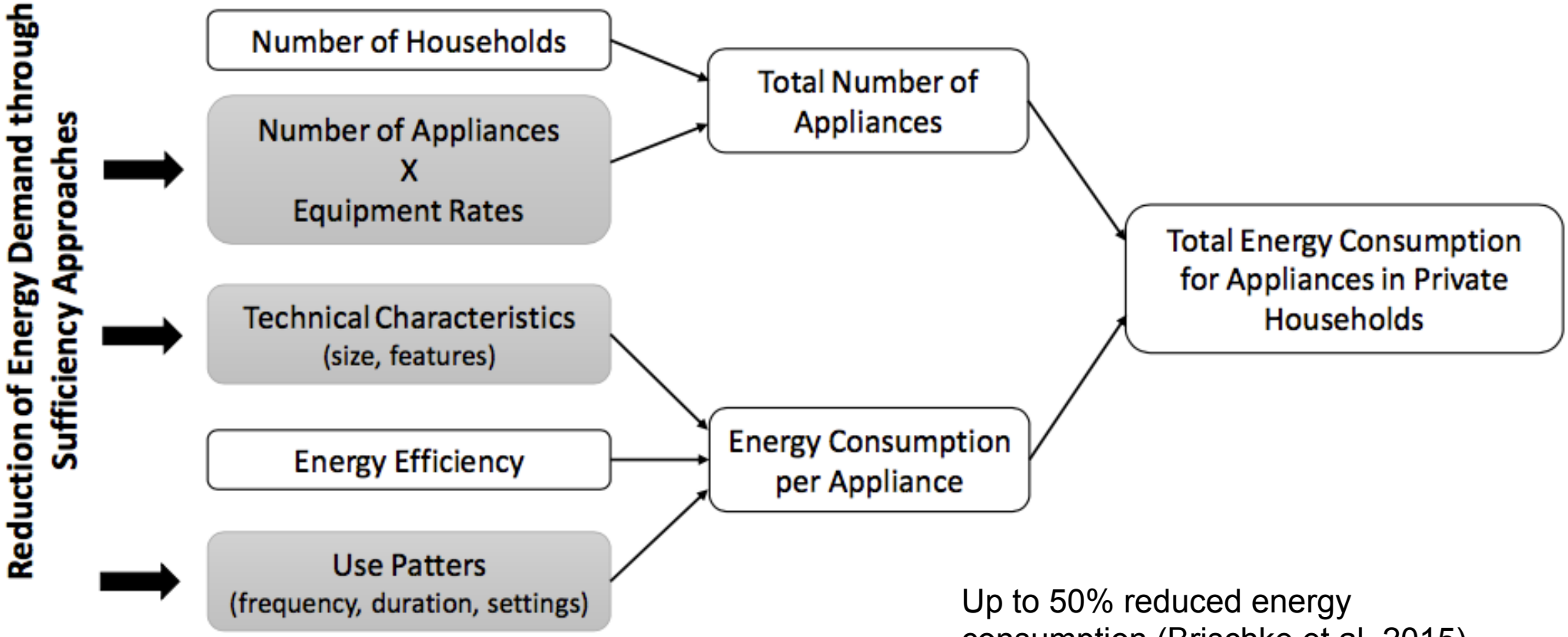
Energy sufficiency in the household: theory



Up to 50% reduced energy consumption (Brischke et al. 2015)

Example of sufficiency in household applicances (Brischke et al 2015)

Energy sufficiency in the household: options

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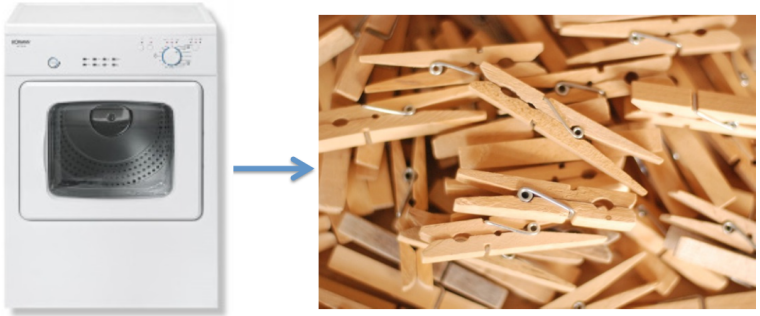
reduction

substitution



adaptation

Housing & spatial sufficiency: the facts (Germany)

Wuppertal Institut

2002		2016
82.5	inhabitants (billion)	82.5
“no housing shortage”	political situation	“housing shortage”
40.1	housing (m^2/Person)	

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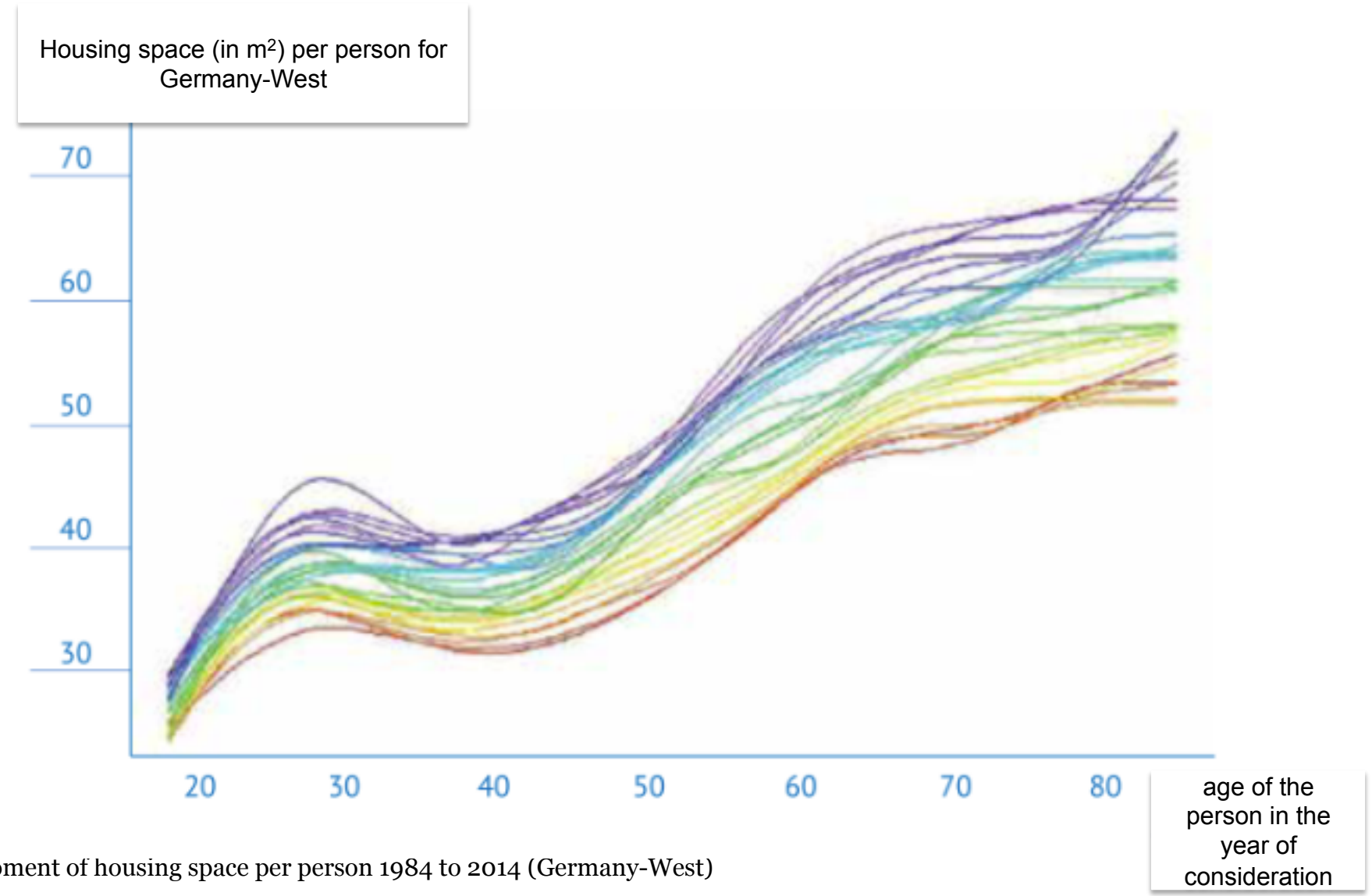
40.1	housing (m^2/Person)	46.5

Housing & spatial sufficiency: some reasons of„anti-sufficient“ housing development



Development of housing space per person 1984 to 2014 (Germany-West)

Red = 1984, Purple = 2014;

Source: (Deschermeier/Henger 2015)

Housing & spatial sufficiency: Side-effects of „anti-sufficient“ housing development & actual potential

- **increased land use** for living e.g. +9%, population: –2% (Germany, 2004 – 2013, Bierwirth 2017)
- **More space needs more equipment** and results in higher energy consumption
- **Rising costs for infrastructure** (energy, roads, water, waste) and urban sprawl on cities' outskirts
- **“Housing shortage”, rising rents**
- **big flats or houses** become a burden for housekeeping person with physical capacity decreasing

→ ***Rising interest in different forms of living***

→***High acceptability of sufficiency***

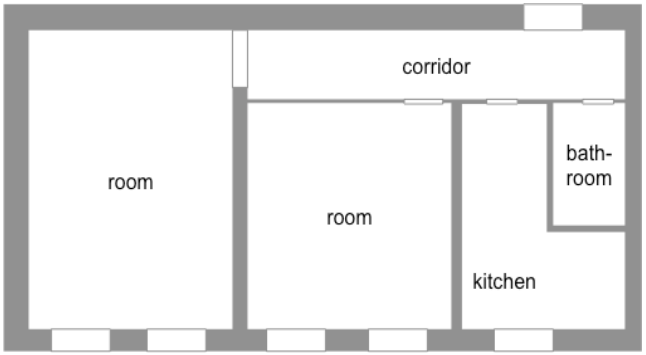
e.g. up to 23% of Germans willing to **move to smaller apartments in the future (Bierwirth 2018)**

Housing & spatial efficiency: design options

Concept	Building design	Building use
Less	• Tiny Houses / caravan, container housing • Studio flat	• Organisation (home office) • Virtual rooms
Flexible	• Growing / shrinking floor space (joker rooms) • Inner development • Multi-functional planning	• Multiple use • Reuse / change of use • temporary use
Shared	• Residential homes for special groups • Community areas / rooms	• Shared areas / rooms • Shared furniture

100-Euro-flat – Berlin

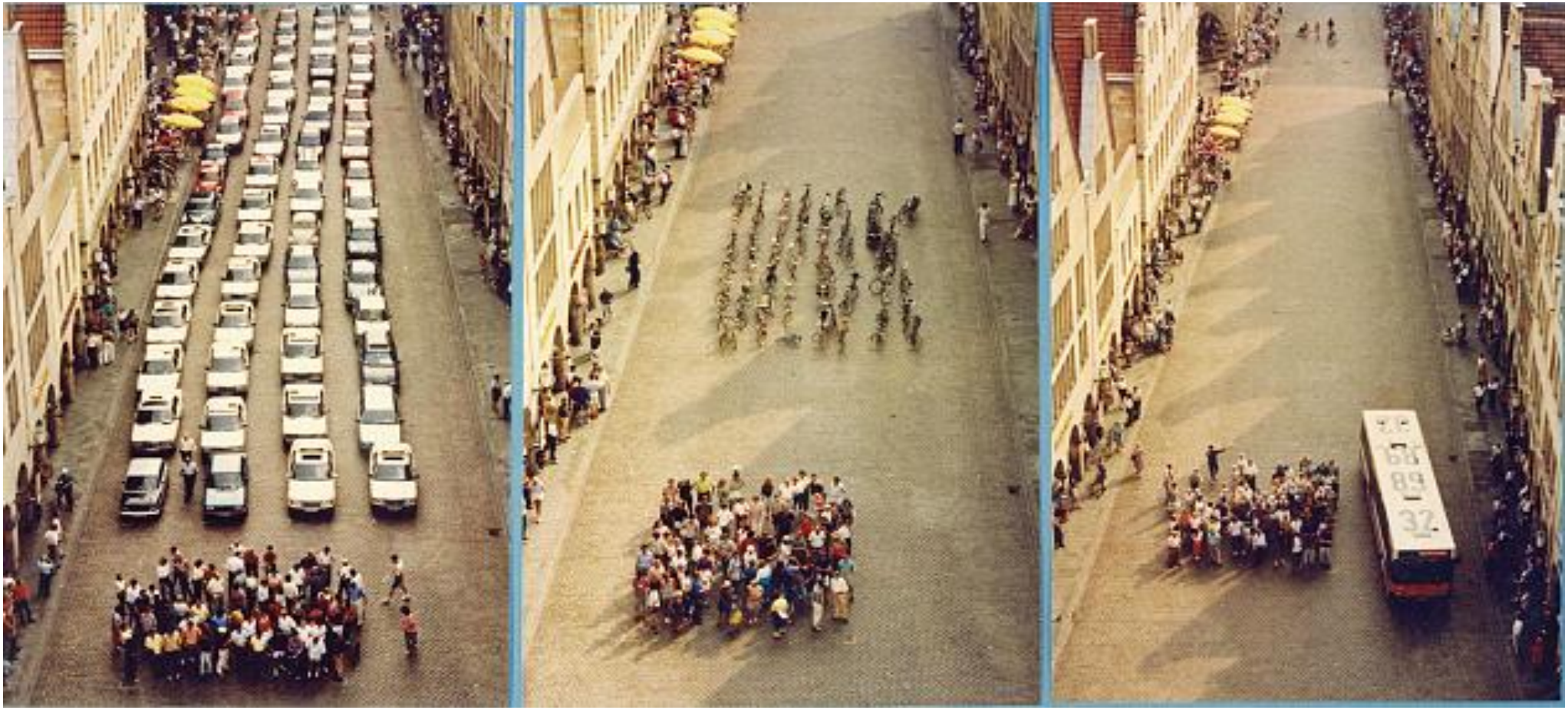
Adapted floor plans



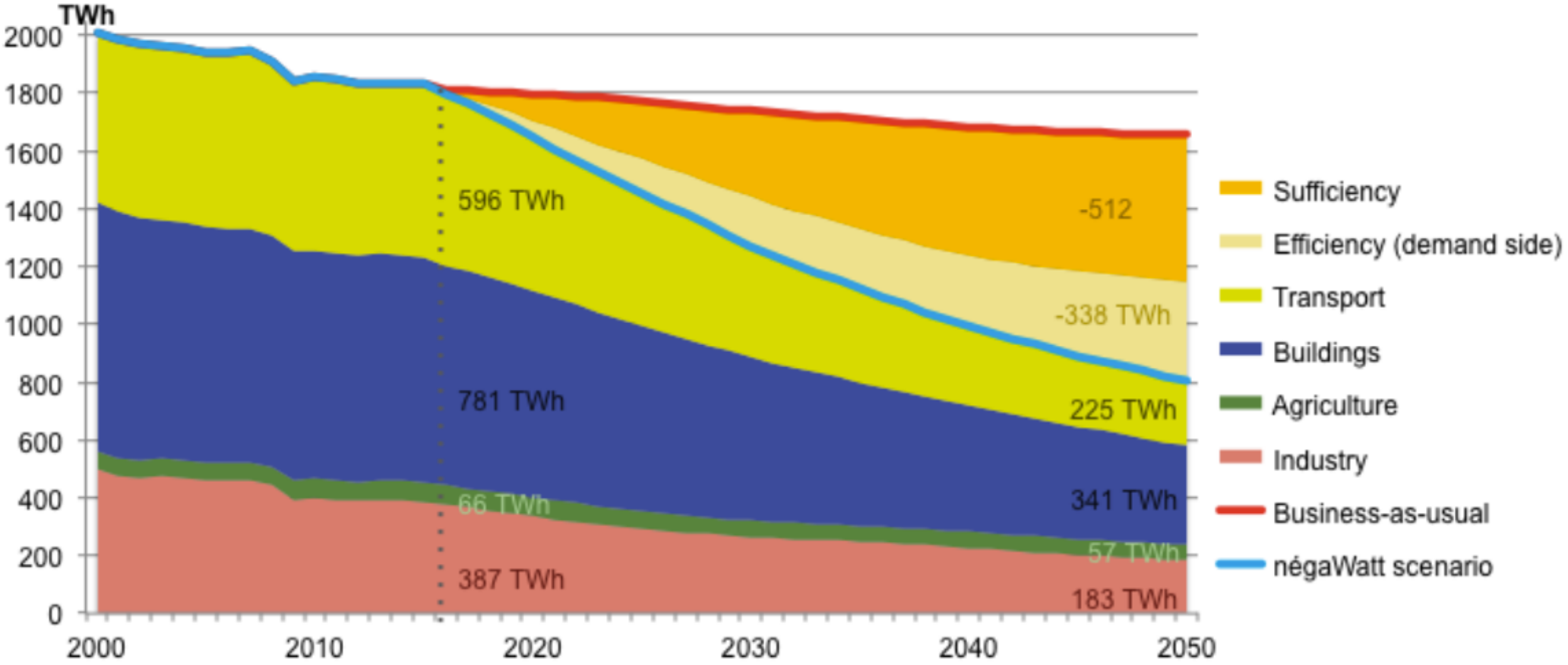
Housing cooperative Kalkbreite – Zurich

Co-benefits of sufficiency

- affordability also for low-income households(e.g. sharing of devices)
- less rebound-effects (absolute reduction of energy-intensive activities)
- better distribution of scare resources (housing shortage)
- quality of life (more time, space, health, social interaction)



Sufficiency in scenarios – example France



Final energy consumption in the business-as-usual and négaWatt scenarios

NégaWatt Association 2017

Sufficiency in energy scenarios

- **Barely explicit** modeling of sufficiency, rather integrated in „behaviour change“, „lifestyle change“, „consumer choice“ (e.g. EC 2018)
- Behaviour change mainly in the **field „transport“** modeled (e.g. modal shift, reduction of aviation) (Samadi et al. 2017)

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- EU: net zero GHG emissions in 2050 (e.g. EC 2018):
  - Significant amounts of **negative emissions** (1.5TECH)

    or change in consumer choice (1.5LIFE)

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➢ **Importance of sufficiency likely to rise**

Finally: what can be done about energy sufficiency

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Energy scenarios:

- Have an integrated look on energy goals, including other environmental and social targets
- Include explicit sufficiency options in scanarios and models

Data & Labelling:

- Evaluate energy consumption data per person, not per device
- Apply capacity-independent labelling (e.g. absolute consumption, not relative to size)
- Increase visibility of sufficiency products (e.g. label low-tech devices)

Projects & Programmes:

- Fund demonstration projects to diffuse sufficiency practices
- Support local authorities & community-practices (e.g. repair-café, “free shop”)
- Develop sufficiency business plans (e.g. rent contract with fixed $m^{2/}$person, not per contract)

Policies & Grants

- Public procurement rules that include energy sufficiency criteria
- Increasing efficiency standards with size of device or spatial consumption/person
- Building standards for bike parking, line drying space, flexible floor plans

Take-home messages

- **Sufficency policy can complement efficiency to reach sustainability targets**
- **Sufficiency measures have many co-benefits**
- **Sufficiency research provides many new solutions**

THANK YOU for your attention!

enough International Network for Sufficiency Research & Policy

https://www.researchgate.net/project/ENOUGH

Selected references & further readings

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Housing & spatial sufficiency: policy options

Reduction to what is needed

- financial incentives for alternative forms of housing with smaller per capita area, e.g community housing
- Incentives for reduction of housing space: housing association GEwoba Potsdas offers their residents a smaller flat to the price of 10% below the rent index, if households reduce their housing size by 1 room (Fuhrhop 2015).
- municipal living space agencies: living space advice, practical support for moving, and the provision of financial support

Substitution of housing and energy needs

- Compact interior design and multifunctionality of furniture, use height of rooms
- securing and creating shared energy-sufficient building infrastructure, e.g. clothes drying or cool storage rooms

Flexibilization and optimization of space and device use

- vacancy detection avoiding the need for new construction
- temporary use of buildings

facilitating policies

incentivising policies

enforcing policies