INSTITUT FÜR ENERGIE- UND UMWELTFORSCHUNG HEIDELBERG

Energy sufficiency in private households enabled by adequate appliances Paper No. 7-294-15

Lars-Arvid Brischke, Franziska Lehmann, Leon Leuser, Stefan Thomas, Carolin Baedeker

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ifeu - Institut für Energie- und Umweltforschung Heidelberg GmbH

(Institute for Energy and Environmental Research)

65 scientists

Waste Management and Resource Conservation
Concepts and valuation methods for a recycling management
Example: Analysis of alternative fuels and recyclable concrete.

Energy
Technologies, strategies and politics of sustainable energy systems

Nutrition and Biomass
Assessment of ecology, sustainability and potential of biomass
Example: Biomassenachhaltigkeitsverordnung (biomass regulation on sustainability) and biofuels.

Industry and Products
Life Cycle Assessment (LCA), Strategic Environmental Assessment, Ressource and Risk Assessment. Example: LCA for packaging systems

Traffic
Assessment and quantification of the environmental impact of traffic, political instruments, pollution reducing concepts, e-mobility

Research Project „Energy Sufficiency“

Investigation of strategies and instruments for a

- technical
- systemic and
- cultural

transformation towards sustainable restriction of energy demand in the field of construction and everyday life

June 2013 – May 2016

In cooperation with

Wuppertal Institut für Klima, Umwelt, Energie GmbH

Universität der Künste Berlin

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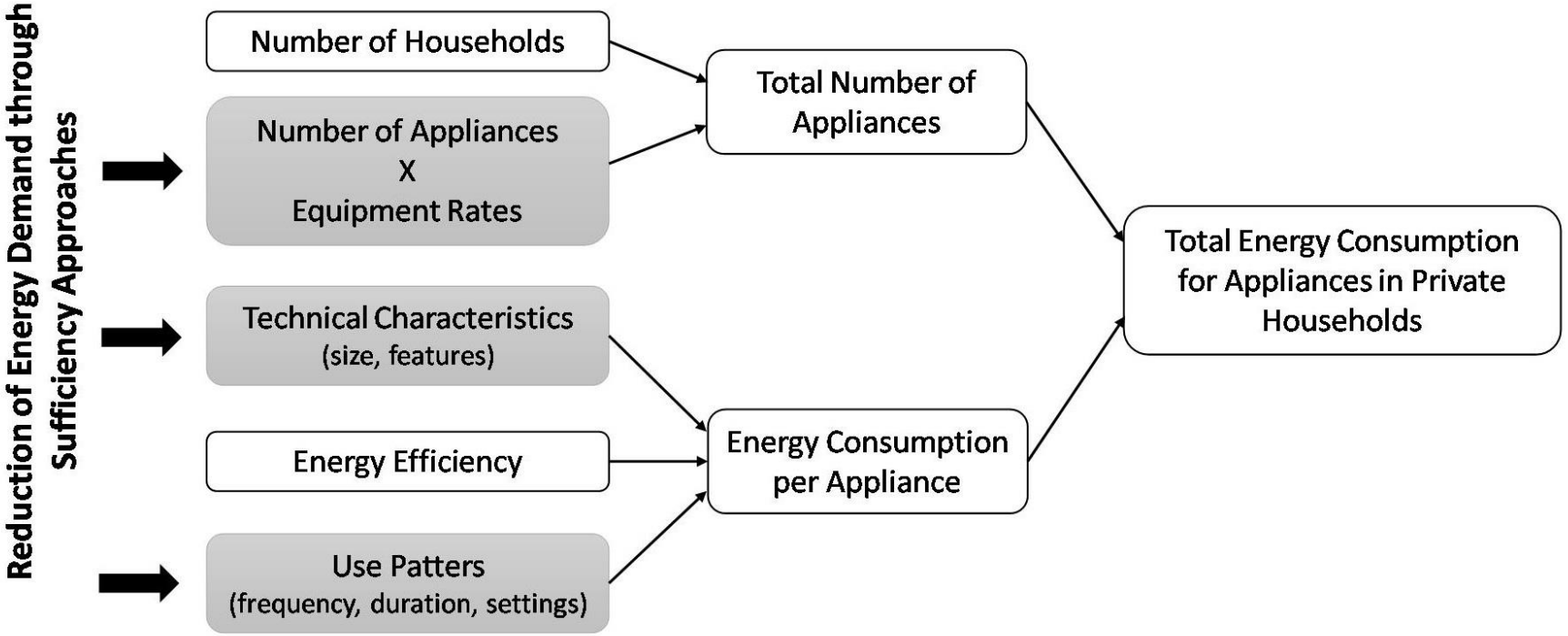
Energy Sufficiency wants us to ask:

- Which needs / desires are to be satisfied by energy services?
- What do we use energy for?
- When and why do we consume utility supplied by energy services?

Photo: IFEU

Energy Sufficiency – Research Question 1

- Can we force **absolute reduction of energy consumption** by complementation of energy efficiency with energy sufficiency approaches?



Energy Sufficiency – Research Question 2

- Which **technical, infrastructural and political framework** is necessary to enable consumers and users to practice energy sufficiency?

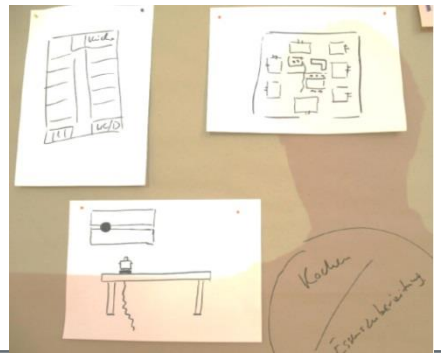
Photo: Udo Lambrecht (IFEU)

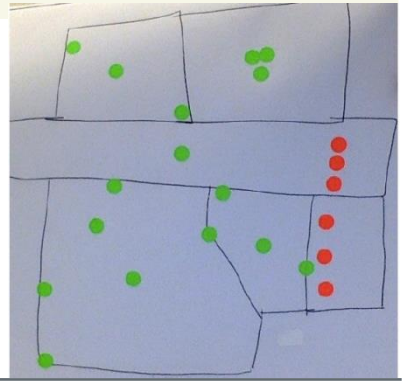
Observations and transdisciplinary investigations on three levels

Appliances	Private Households	Urban Services & Infrastructures

- Open Innovation Workshops (Design Thinking Method)
  - White goods
  - ICT
- Design Guide (October 2015)
	- Cultural Probes
	- Case studies: 12 households
		- Interviews
		- Analysis of municipal climate and energy concepts

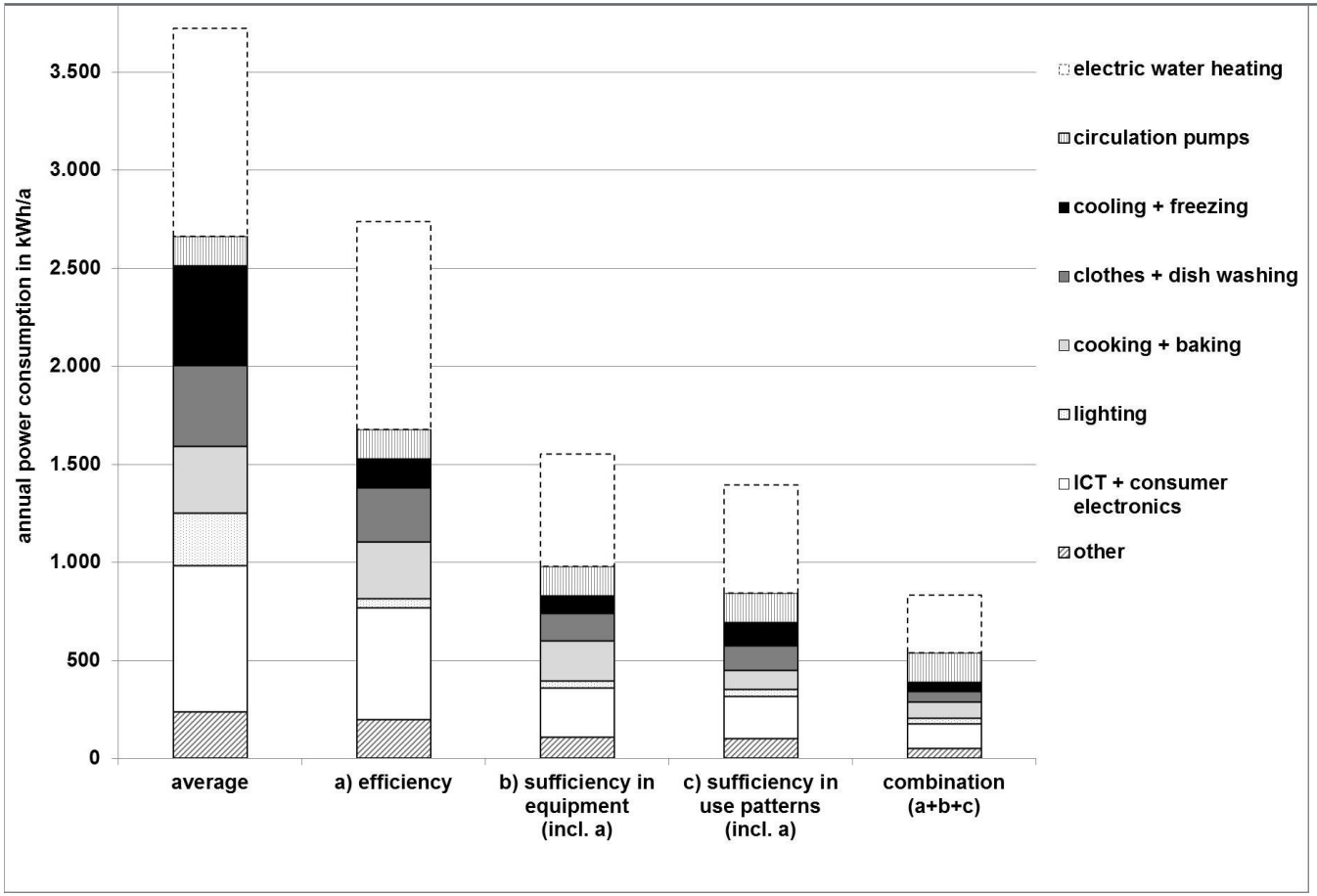
- Bottom up quantification of power consumption by modelling of appliances use patterns in households		
- Survey (500 personal interviews) in July 2015		



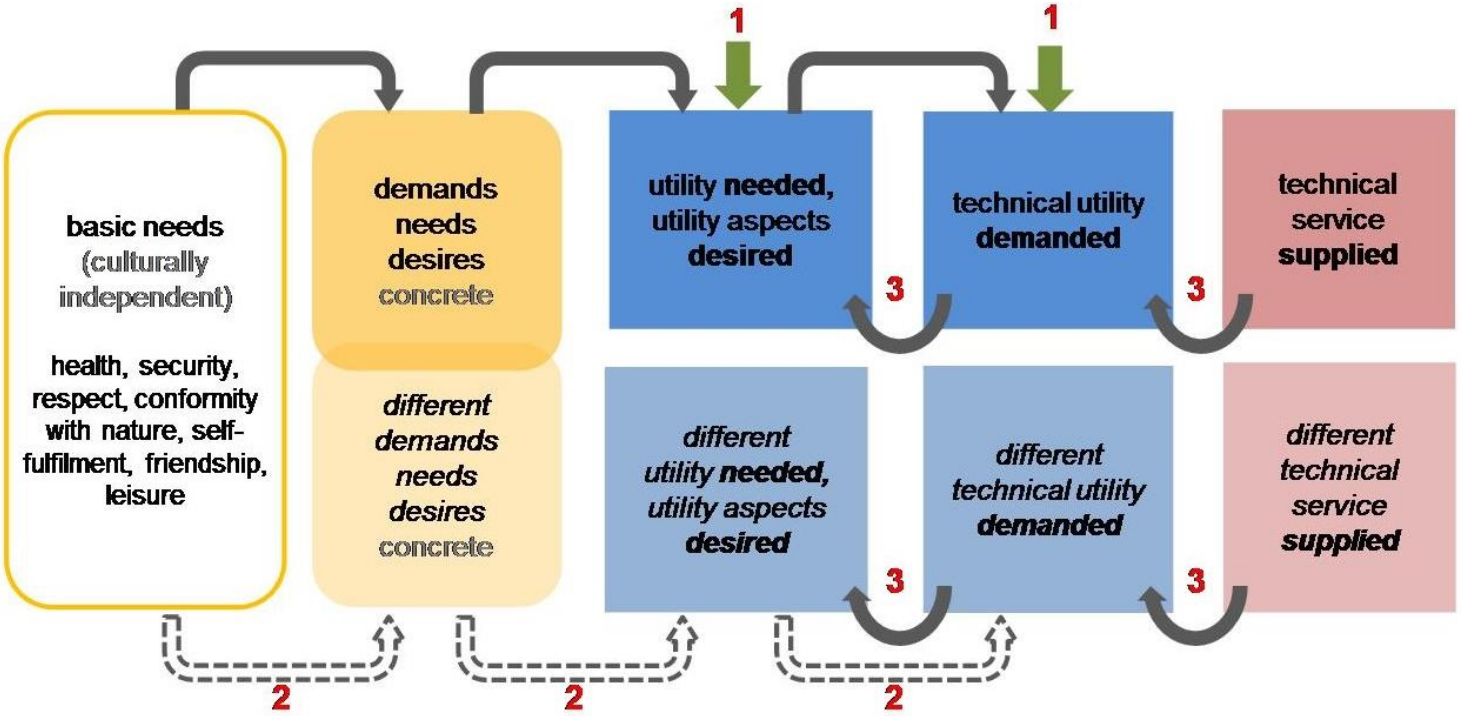
Sources: Wuppertal Institut, Universität der Künste Berlin

Efficiency and sufficiency effects quantified on the example of a two-person household



Total reduction of power consumption by efficiency and sufficiency: 75 %

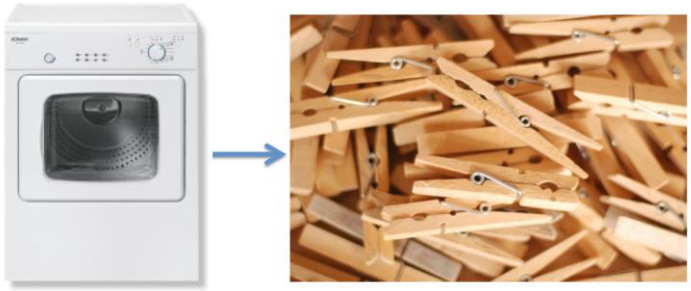
What do we need energy for - Causal chain from basic needs to services supplied



Energy Sufficiency – Three Approaches

Reduction

Substitution



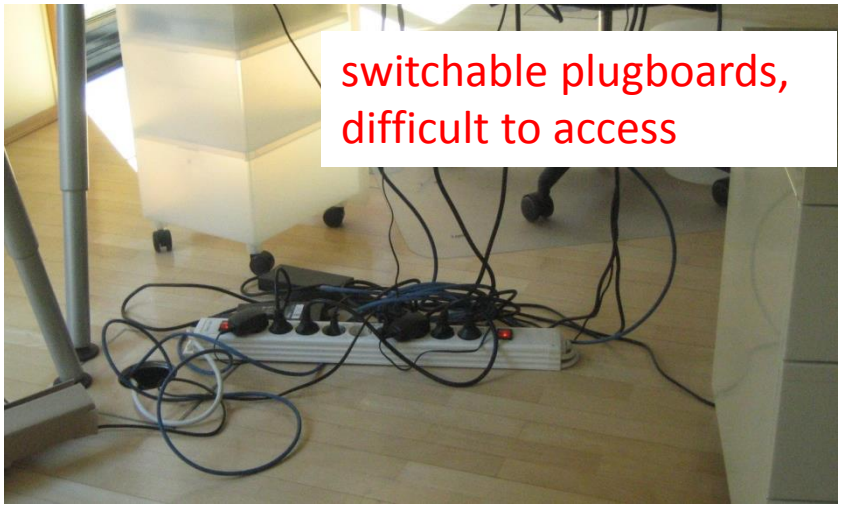
Adjustment

→ adequate appliances

Examples for inadequate appliances, installations or use

fridge, oversized

electric lighting vs. daylight



switchable plugboards, difficult to access

Photos: Lars-Arvid Brischke

Examples for adequate appliances, installations or use

Suggestions to realize adjustment (1)

- Implemention of features that adjust the operation mode automatically to the actual needs, wants and routines of users, e.g.
  - Identification of pot size and automatic adjustment

  - Size flexible appliances: Identification of needed cooling volume and automatic adjustment

Suggestions to realize adjustment (2)

- Appliances should give relevant information, e.g.
  - Temperatures (fridges, freezers, heating) instead of numbers
  - Information signals (washing machine: full load achieved)
  - Warning signals in case of inadequate use
- Energy saving features and functions of appliances should consider needs, desires and common use patterns
  - e.g. the duration of washing programmes

Questions for the discussion

- How could Labelling and Ecodesign requirements be developed to make appliances more adequate?
- How could common use patterns be integrated into measurement standards?
- How could appliances be developed which enable users for more energy saving or more sustainable practises and routines?

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Thank you for your attention!

Dr Lars-Arvid Brischke

Wilckensstraße 3 69120 Heidelberg Tel.: +49 (0)6 221 47 67 - 0 www.ifeu.de

IFEU Office Berlin Reinhardtstr. 50 10117 Berlin Tel.: +49 (0)30 28 445 78 -18 lars.brischke@ifeu.de

	average	efficiency	sufficiency in equipment	sufficiency in use patterns	combination
cooling + freezing	2 separate devices 190(+5)l/30l efficiency class B 5°C (-12°C)/-22°C	2 separate devices 190(+5)l/30l A+++ 5°C (-12°C)/-22°C	1 combination unit 100l/15l A+++ 5°C/-22°C	2 separate devices 190(+5)l/30l A+++ 7°C (-10°C)/-20°C 1 month off	1 device 100l A+++ 7°C 1 month off
washing machine	7 kg efficiency class A 2,25 uses/week 60°C	7 kg A+++ 2,25 uses/week 60°C	6 kg A+++ 2,25 uses/week 60°C	7 kg A+++ 1 use/week 40°C	6 kg A+++ 1 use/week 40°C
tumble dryer	efficiency class A 1,3 uses/week	A++ 1,3 uses/week	-	A++ 1 use/week 3 months off	-
dish washer	efficiency class B 12 place setting 2 uses/week	A+++ 12 place setting 2 uses/week	A+++ 8 place setting 2 uses/week	A+++ 12 place setting 1 use/week	A+++ 8 place setting 1 use/week
cooker + oven	2,5 h/week	2,5 h/week	2,5 h/week	1 h/week	1 h/week
lighting	incandescent bulbs, energy saving bulbs 1,7 h/day 80 lx	LED 1,7 h/day 80 lx	LED 1,5 h/day 75 lx	LED 1,5 h/day 75 lx	LED 1,25 h/day 70 lx
television	flatscreen 80 cm + hard disk efficiency class B 2 h/day	flatscreen 80 cm + hard disk A+ 2 h/day	flatscreen 60 cm + hard disk A+ 2 h/day	flatscreen 80 cm + hard disk A+ 1,5 h/day	flatscreen 60 cm + hard disk A+ 1,5 h/day
	tube TV set-top-box 0,5 h/day	flatscreen 51 cm A+++ 0,5 h/day	-	flatscreen 51 cm A+++ 0,5 h/day	-
	standby mode	standby mode	standby mode	disconnected	disconnected
audio	stereo system 1,5 h/day standby mode	stereo system 1,5 h/day standby mode	-	stereo system 1 h/day disconnected	-
ICT	1 PC, 1 laptop 1 monitor each 3 h/day 1 smartphone standby mode	1 PC, 1 laptop 1 monitor each 3 h/day 1 smartphone standby mode	1 laptop 4 h/day 2 smartphones incl. dockingstation standby mode	1 PC, 1 laptop 1 monitor each 2 h/day 1 smartphone disconnected	1 laptop 2 h/day 2 smartphone incl. dockingstation disconnected
other	...	...	...	...	...