

5th June 2019 | eceee Summer Study

Estimating the sufficiency potential in buildings: the space between under-dimensioned and oversized

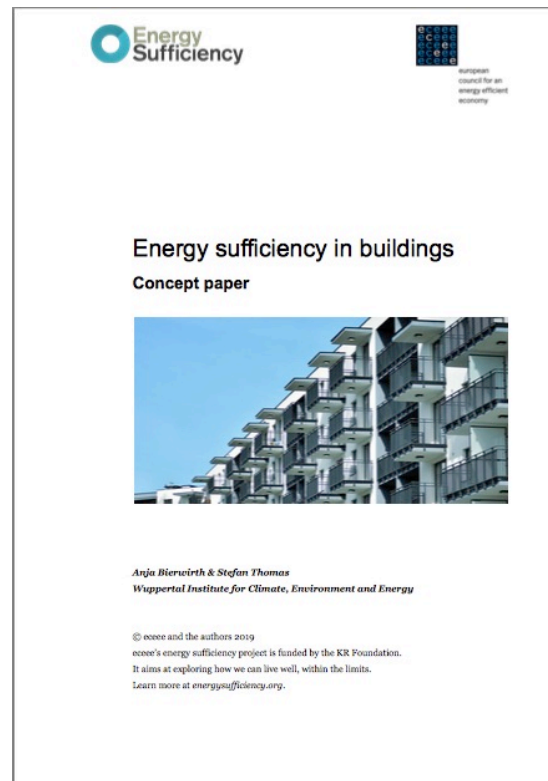
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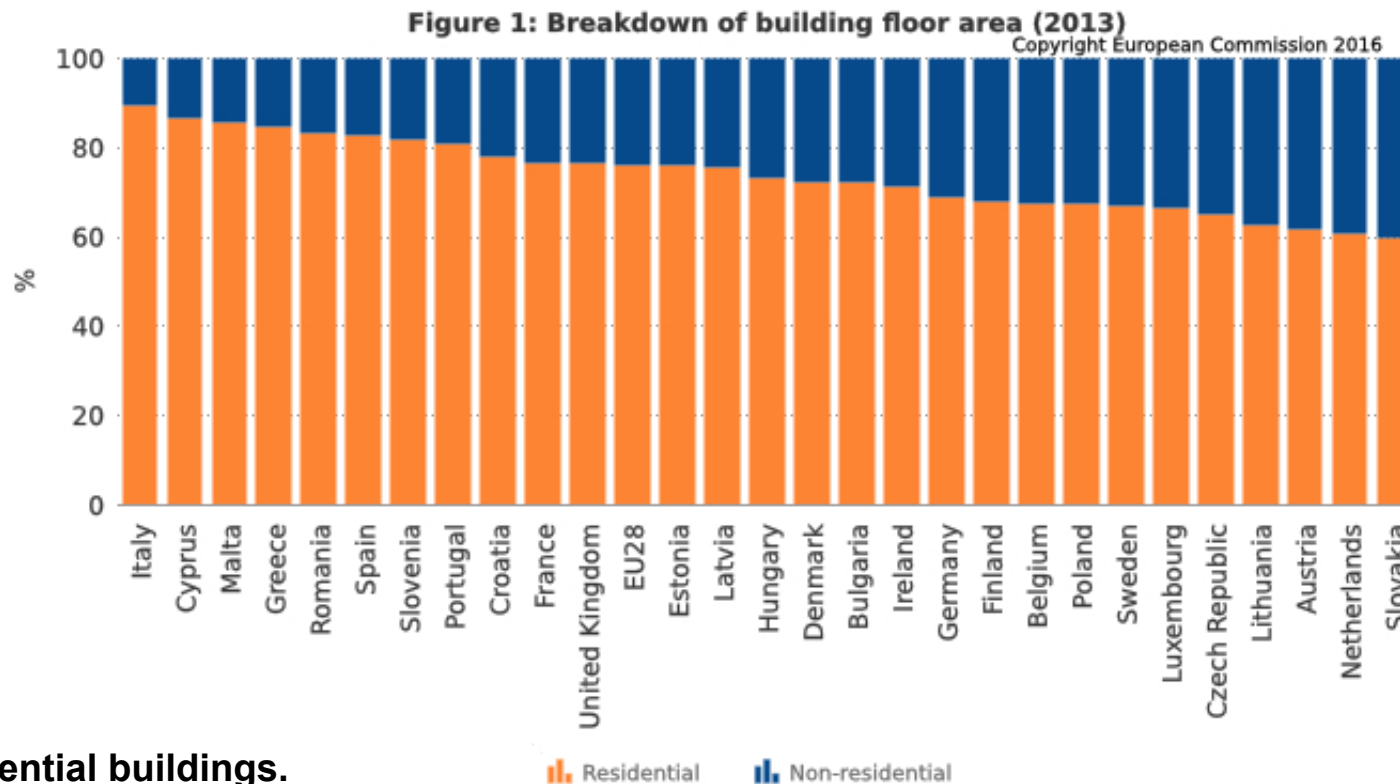
Division Energy, Transport and Climate Policy

Wuppertal Institute for Climate, Environment and Energy

Background



This paper is NOT about...



... non-residential buildings.

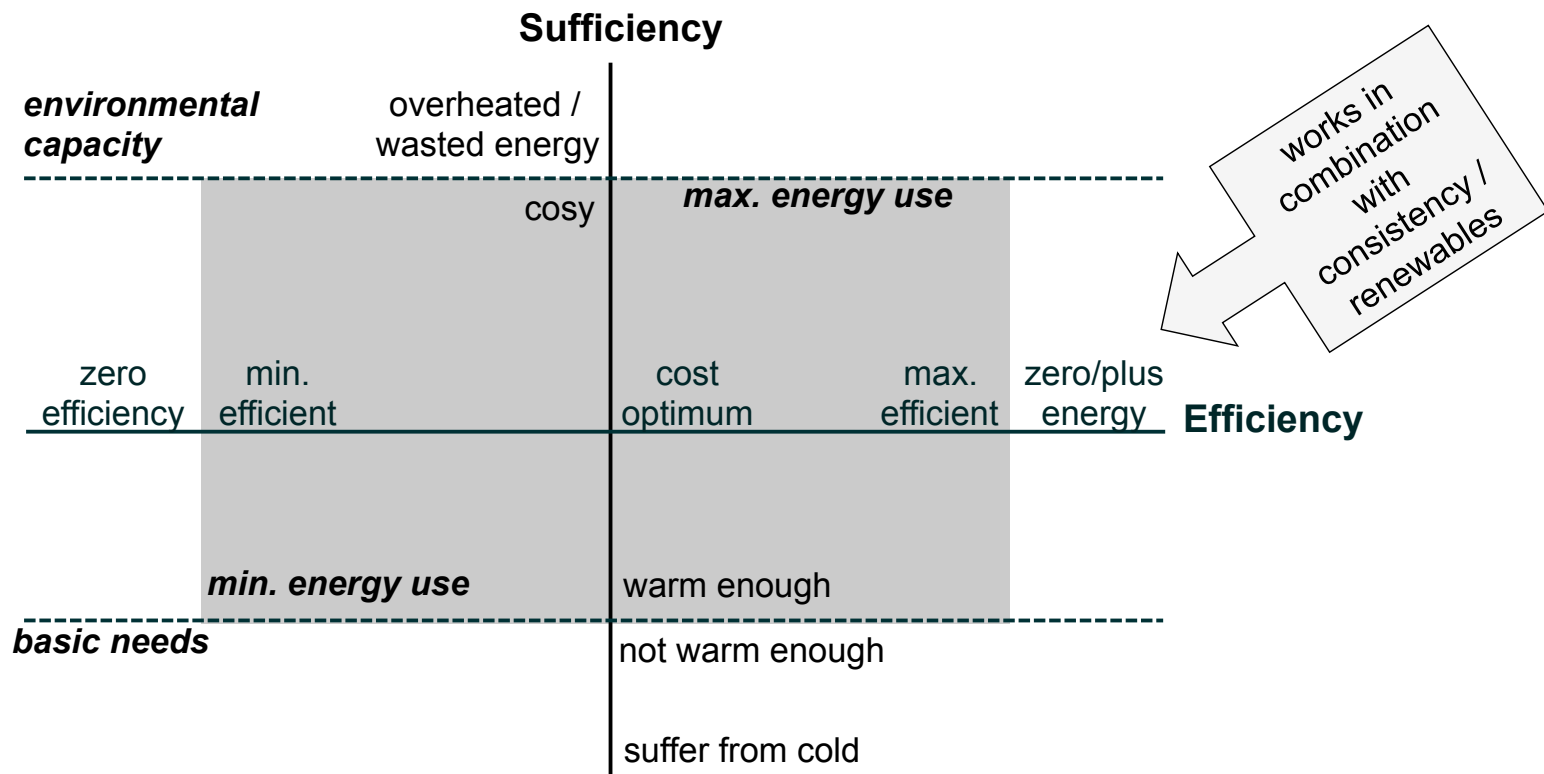
This paper is NOT about...



Source: Own illustration

... energy efficiency and sufficiency arguing about:
Which are whose savings?

It is about...



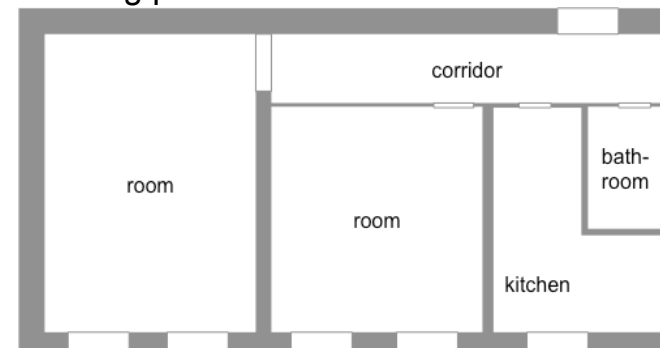
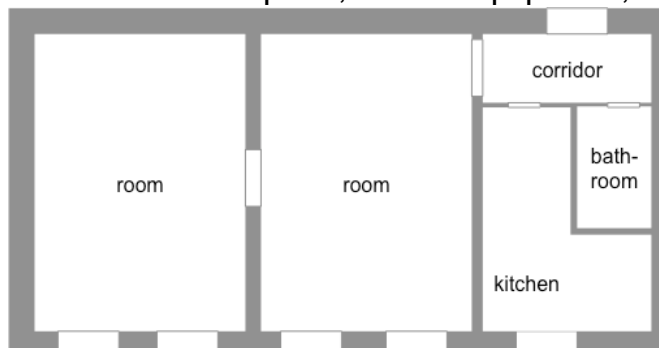
Source: Own illustration

It is about...

... identifying areas for sufficiency in residential buildings: **space, construction, equipment, use**

adequate space **thoughtfully** constructed and **sufficiently** equipped for **reasonable** use

- **adequate:** e.g. EU adequate housing, UK bedroom standard, German definition of adequate space in the living space usage regulation for persons receive housing allowances
- **thoughtfully:** with attention to detail of material, adaptation to changing use and needs, deconstruction instead of demolition
- **sufficiently:** equipment for specific needs and use, without equipment not used or needed
- **reasonable:** use of rooms / space, use of equipment, heating and airing practices



Source: Own illustration

Living space per person in EU countries (may include holiday residences)

Country	m ² /cap	Country	m ² /cap
Romania	18,1	Germany	46,6
Poland	27,1	France	46,9
Lithuania	29,8	Sweden	48,5
Estonia	31,5	Italy	49,1
Slovakia	31,6	Luxembourg	51,1
Croatia	33,0	Spain	52,4
Latvia	34,6	Netherlands	52,4
Slovenia	34,6	Finland	52,6
Czech Rep.	35,6	Greece	53,8
Belgium	38,3	Austria	55,0
UK	42,0	Cyprus	59,0
Ireland	45,5	Malta	62,2
Hungary	45,7	Denmark	62,7
Bulgaria	46,1	Portugal	63,7

Source: Eurostat (2018), EU Building Database

Simple approach to analyse a sufficiency potential:
theoretical energy savings from space reduction / enlargement to 35 m² / cap

Country	Reduction		Country	Reduction	
Romania	-93,8%	0	Germany	24,9%	3
Poland	-29,3%	0	France	25,3%	3
Lithuania	-17,6%	0	Sweden	27,9%	3
Estonia	-11,2%	0	Italy	28,8%	3
Slovakia	-10,6%	0	Luxembourg	31,5%	3
Croatia	-6,1%	0	Spain	33,2%	3
Latvia	-1,3%	0	Netherlands	33,3%	3
Slovenia	-1,2%	0	Finland	33,5%	3
Czech Rep.	1,7%	1	Greece	34,9%	3
Belgium	8,3%	1	Austria	36,4%	3
United Kingdom	16,7%	2	Cyprus	40,7%	4
Ireland	23,1%	3	Malta	43,8%	4
Hungary	23,4%	3	Denmark	44,2%	4
Bulgaria	24,1%	3	Portugal	45,1%	4

Rating: sufficiency potential		
0	very low	≤ 0%
1	low	0,1-10%
2	average	10,1-20%
3	high	20,1-40%
4	very high	> 40%

Energy Savings:

➤ **1.232.915 TJ / 342.5 TWh***

*missing data from Belgium, Estonia, Cyprus, Slovakia, Norway

**More detailed approach to analyse a sufficiency potential in buildings:
further potential indicators based on EU data**

Under-occupation and overcrowding rate

- › High overcrowding rate and low under-occupation rate => less potential for sufficiency

Rate of unoccupied buildings

- › Low rate => less potential for sufficiency

Population without bath, shower, indoor flushing toilet in household

- › High share of population => less potential for sufficiency
- › Hints at more space needed

Height of ceilings

- › High ceilings support impression of spaciousness

Dwelling not comfortably warm during winter time

- › High share of population => less potential for sufficiency
- › Hints at need for efficiency and / or heating system

More detailed approach to analyse a sufficiency potential in buildings: further potential indicators based on EU data

Under-occupation and overcrowding rate

- › High overcrowding rate and low under-occupation rate => less potential for sufficiency

Rate of unoccupied buildings

=> No data

- › Low rate => less potential for sufficiency

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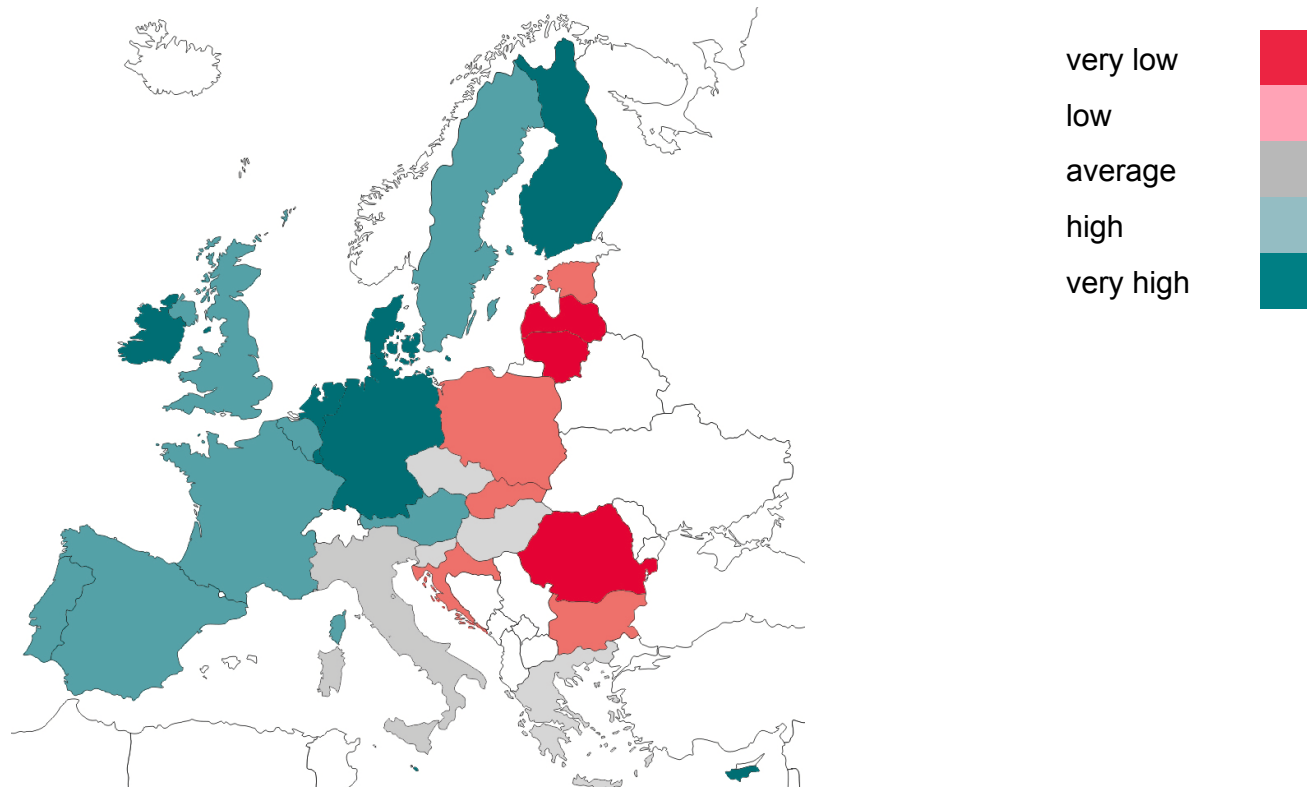
- › High share of population => less potential for sufficiency
- › Hints at need for efficiency and / or heating system

**Sufficiency potential in EU countries,
based on the four indicator approach**

Country	Overall rating	Country	Overall rating
Luxembourg	3,8	Portugal	2,5
Germany	3,5	Italy	2,3
Ireland	3,5	Czech Republic	2,0
Netherlands	3,5	Slovenia	2,0
Denmark	3,3	Greece	1,8
Cyprus	3,3	Hungary	1,8
Malta	3,3	Estonia	1,5
Finland	3,3	Slovakia	1,5
Spain	3,0	Croatia	1,3
Austria	3,0	Bulgaria	1,0
Sweden	3,0	Poland	1,0
United Kingdom	3,0	Latvia	0,8
Belgium	2,8	Lithuania	0,8
France	2,8	Romania	0,8

very low	0 - 0,8
low	0,9 - 1,6
average	1,7 - 2,4
high	2,5 - 3,0
very high	3,1 - 4

**Sufficiency potential in buildings in EU countries,
based on the four indicator approach**



Yet too simple and experimental approach

› Indicators needed

- LCA for material and building components
- Secondary homes and holiday residences
- Vacancies
- Heating systems to estimate CO₂ emissions

› Weighting indicators

- Equal or non-equal weighting
- Classification of indicators (from very low to very high potential)

› Knowledge basis

- Differentiation needs from wants in housing
- Differentiation: potential in buildings ⇔ potential of households

› Targets and definitions for sufficient housing

- Adequate floor area
- Equipment rates
- Resource rates

› How to get there?

› Recognition

- Sufficiency in residential buildings has a high potential
- Need for locally tailored policies:
adequate housing to meet basic needs ⇔
sufficiency policies to address high potential

› Policy design

- Integrating energy sufficiency into efficiency policies (e.g. EPBD, Ecodesign)
- Development of an energy-sufficient building infrastructure
- Municipal living space agencies
- Financial incentives for housing concepts with smaller per capita area and dwelling space

› Experiments and assessment

- Housing concepts
- Implementation of policies

› Overarching instruments

- Energy pricing instruments
- Cap on average dwelling floor area per person

Fostering synergies

- › quality of life
- › affordable housing
- › energy poverty

not conflicts

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Thank you
for your attention!

For further information see

www.wupperinst.org

www.energysufficiency.org