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Sufficiency in Buildings and Cities: Concepts and Examples

Anja Bierwirth

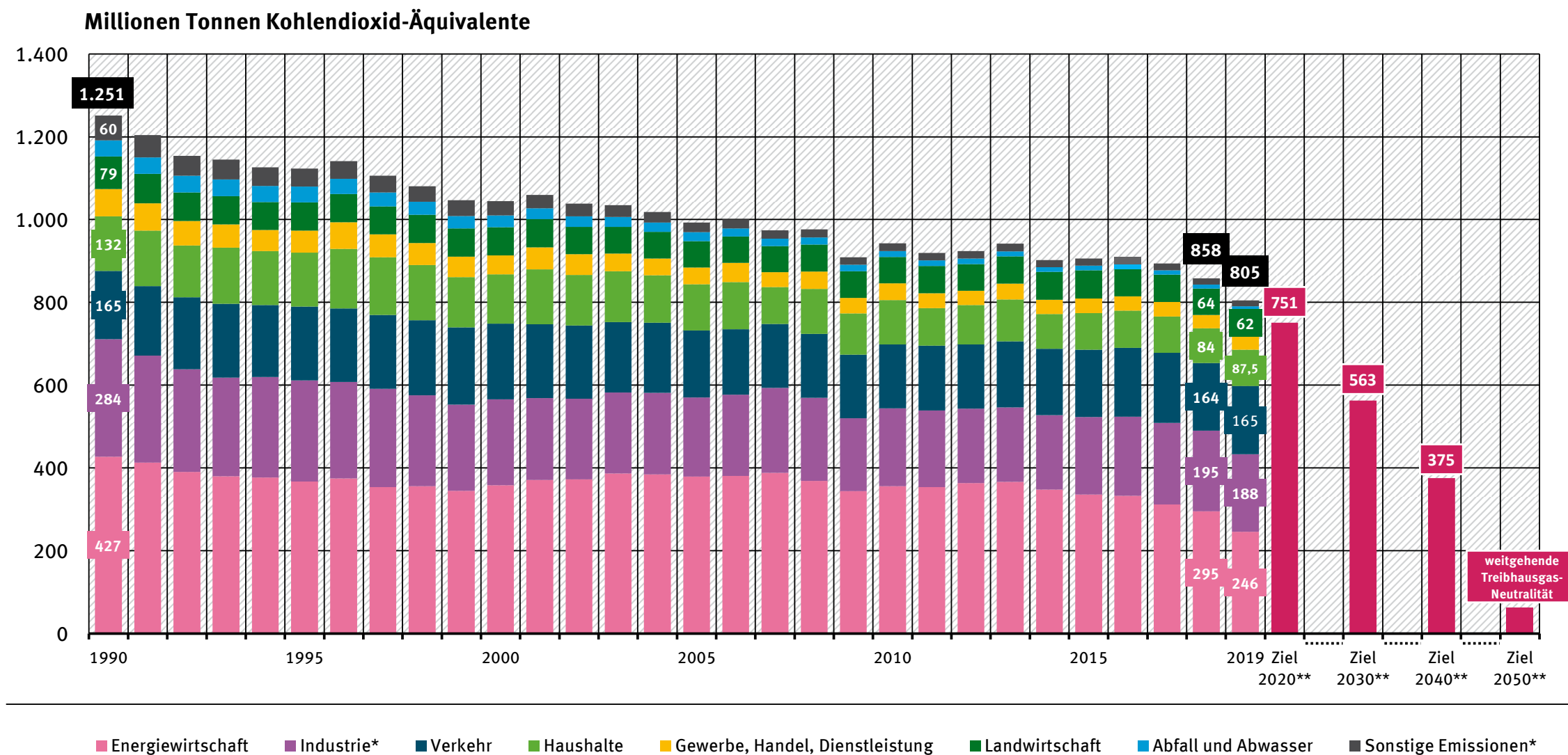
Head of Research Unit 'Urban Transitions'

Division 'Energy, Transport and Climate Policy'

Wuppertal Institute for Climate, Environment and Energy

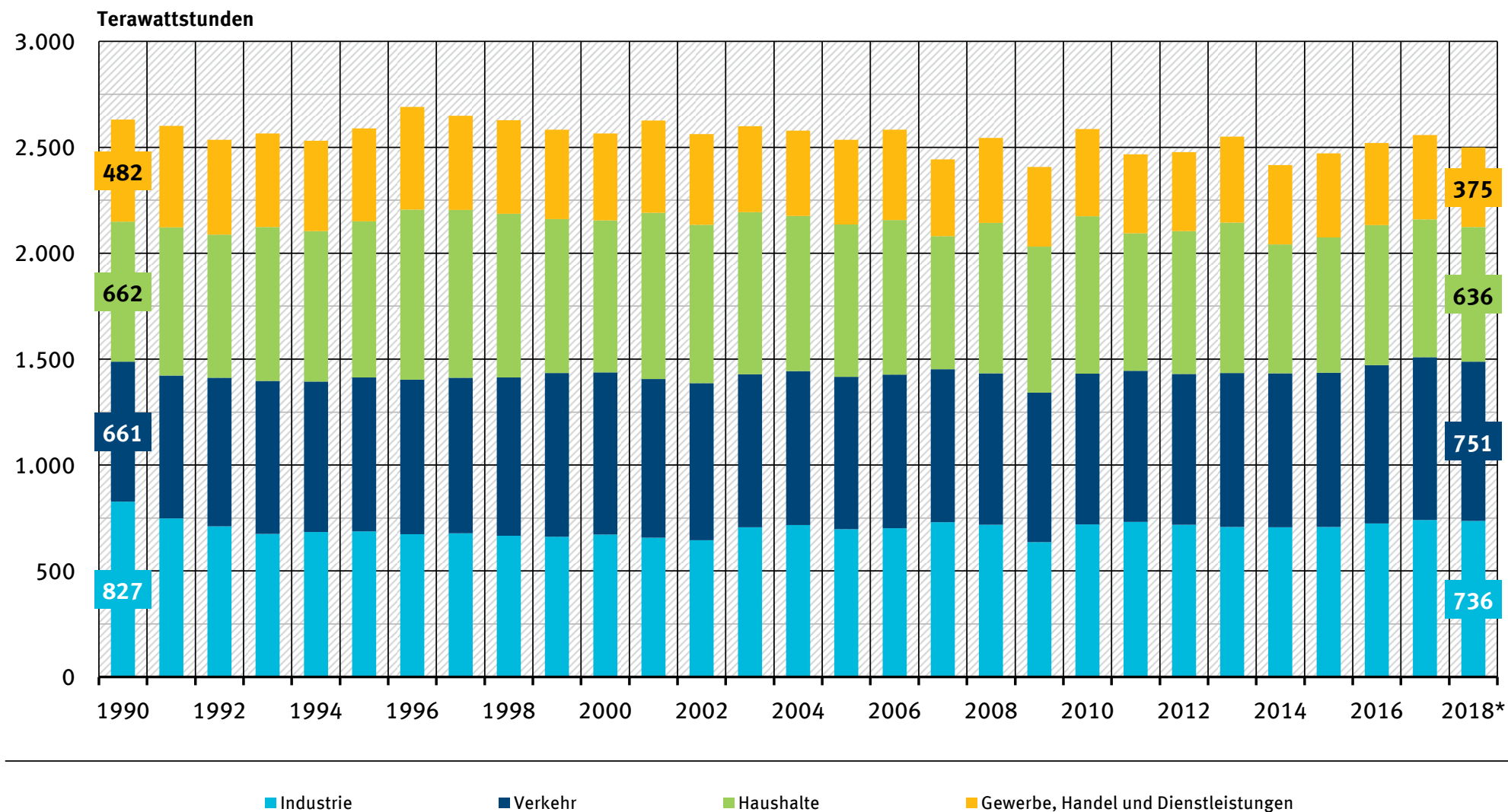
- The Wuppertal Institute undertakes research and develops models, strategies, and instruments for **transitions to a sustainable development** at local, national, and international level
- Sustainability research at the Wuppertal Institute focuses on the resources, climate, and energy related challenges and their relation to economy and society
- The Research Unit Urban Transitions develops innovative concepts and instruments that implement sustainable transformation strategies.



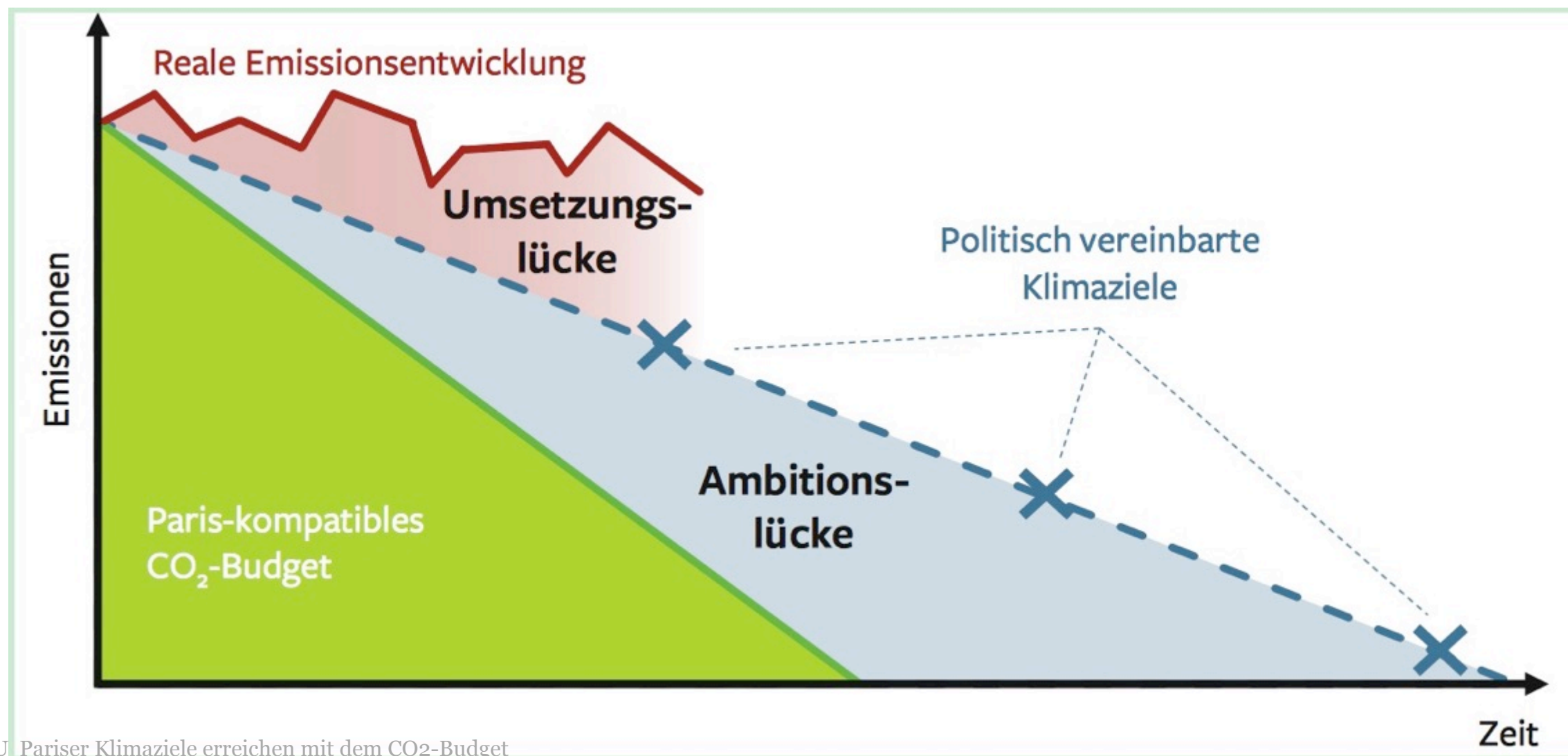


Quelle: Umweltbundesamt, Nationale Treibhausgas-Inventare 1990 bis 2018 (Stand 12/2019) und Zeitnauschätzung für 2019 aus UBA Presse-Mitteilung 15.03.2020

Development of energy use in Germany by sectors

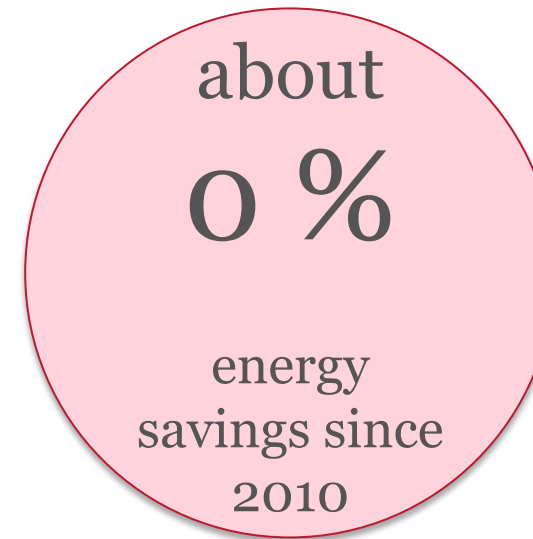
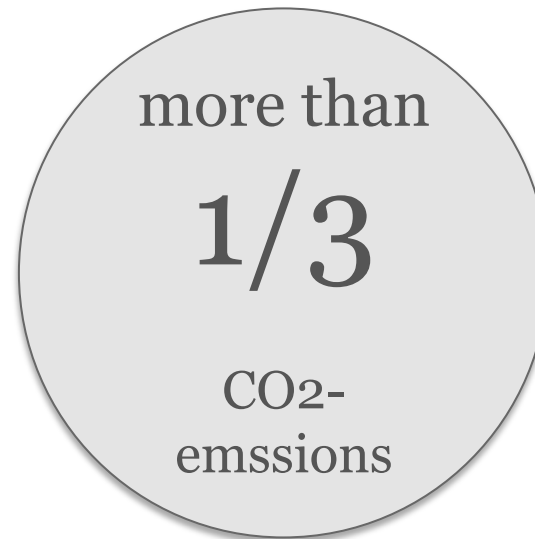
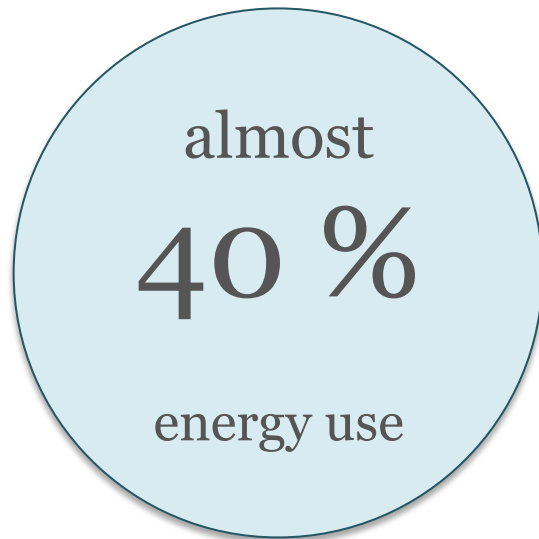


Quelle: Umweltbundesamt auf Basis AG Energiebilanzen, Auswertungstabellen zur Energiebilanz der Bundesrepublik Deutschland 1990 bis 2018, Stand 10/2019



Quelle: SRU Pariser Klimaziele erreichen mit dem CO₂-Budget

Built effects



Built effects



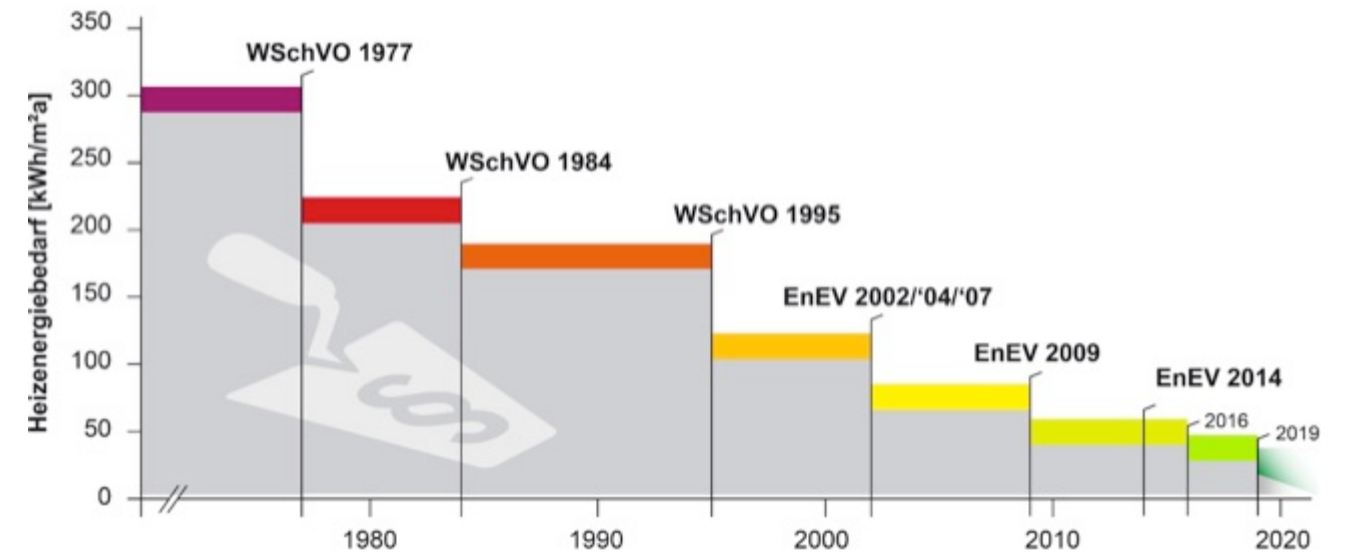
Deconstructing our goals

60 %
renewables
(total energy
use)

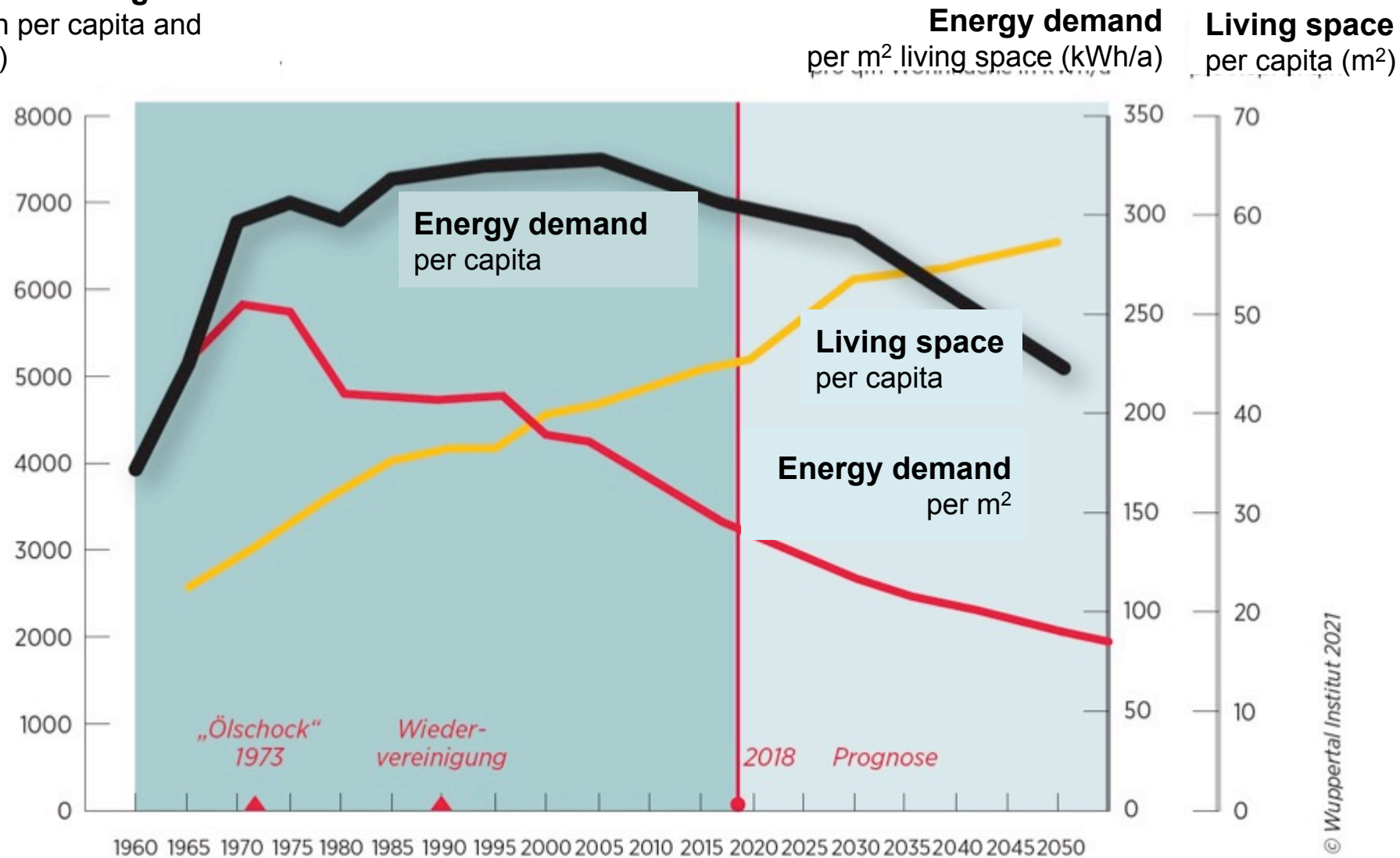
almost
climate
neutral
building stock

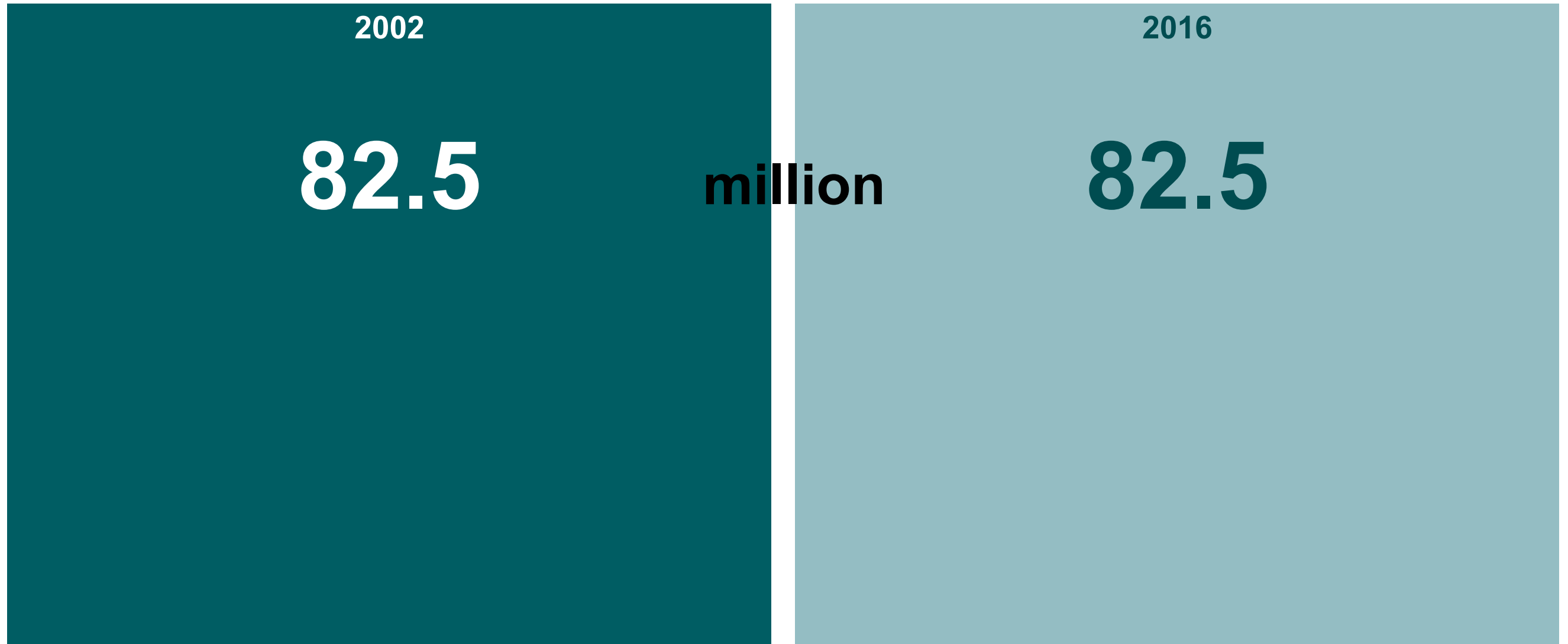
2045
climate
neutrality

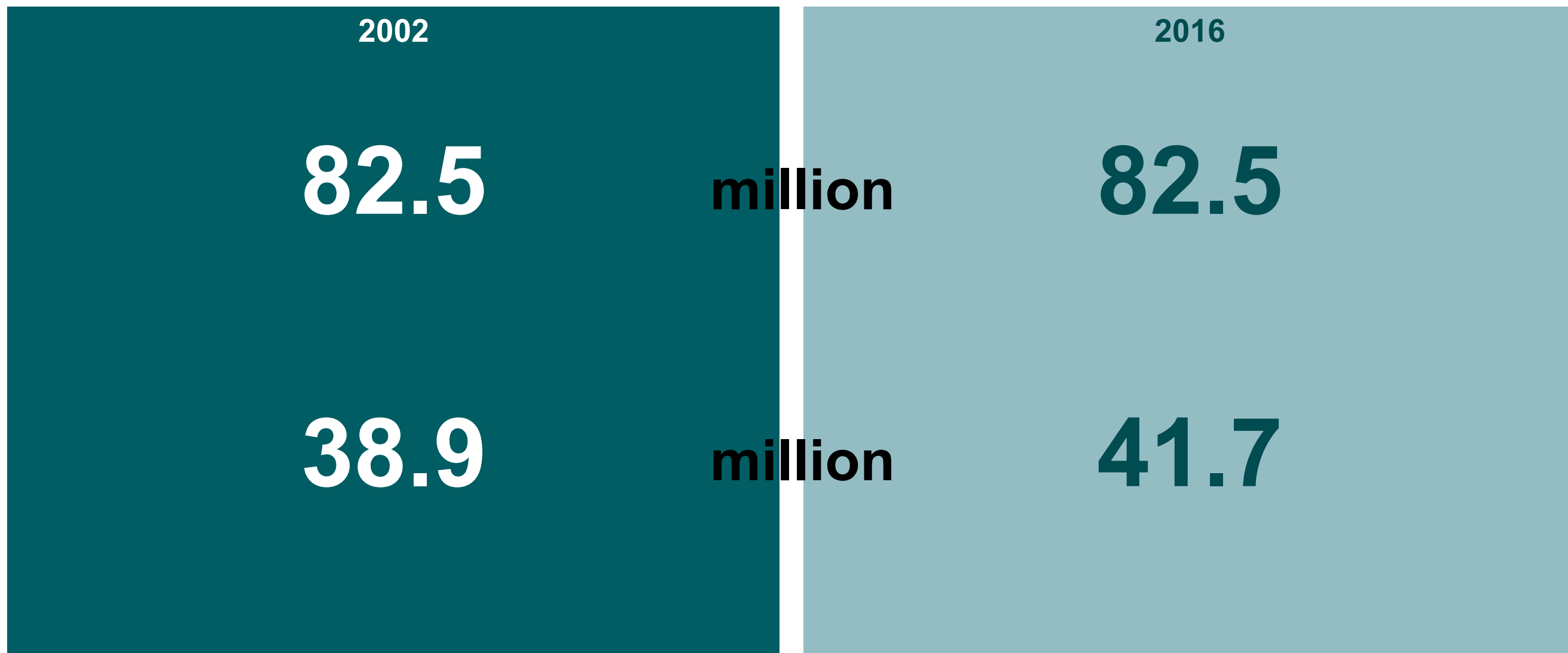
net
0 ha
land use for
settlements
2050

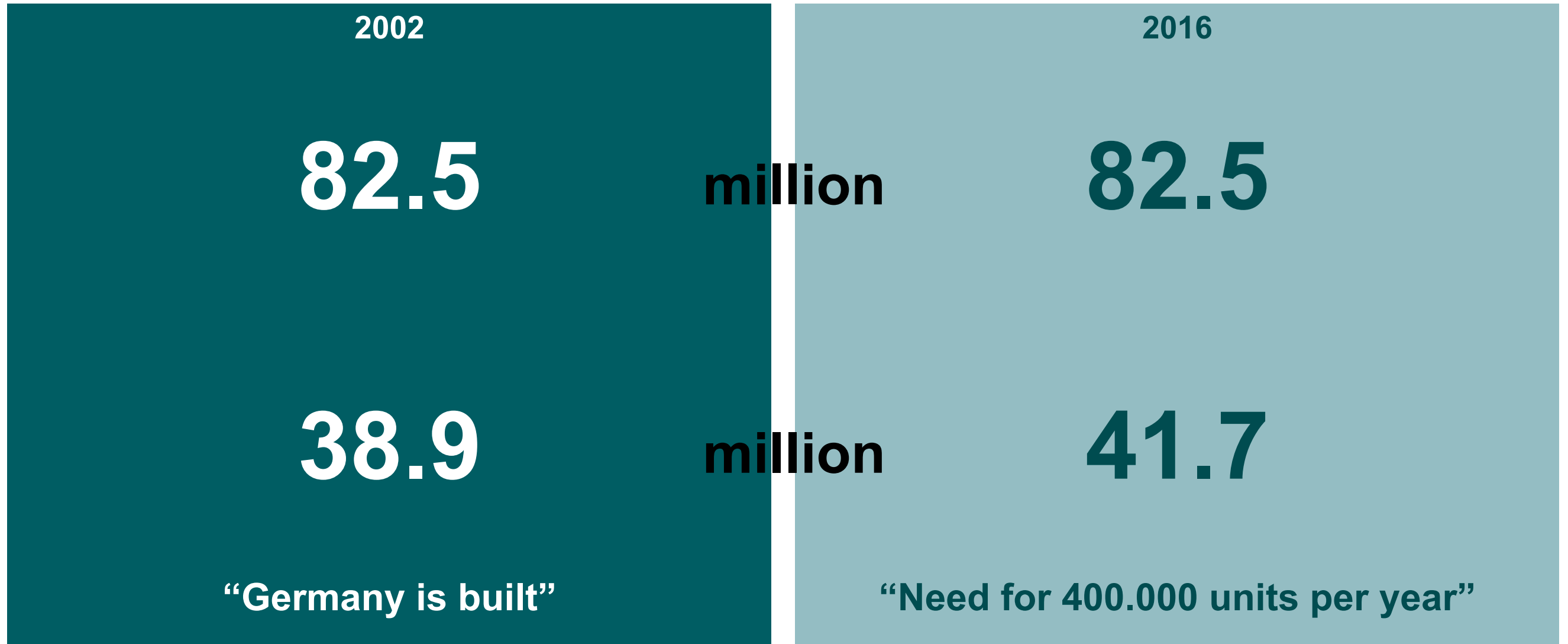


Energy demand for space heating (kWh per capita and year)









- bigger rooms (new buildings)
- more single family buildings (bigger in comparison to units in multi family buildings)
- smaller households (more space in relation to more person households)
- more owners (more space in relation to renting households)
- aging effect (older households live in bigger flats than younger)
- cohort effect (households today use more space)
- 'empty nest' effect (no change after children moving out)

	18-25	25-35	35-45	45-55	55-65	65-70	70-80	80+
living space per household (m ²)	56.5	76.1	100.3	99.8	96.5	92.1	93.4	89.7

Average living space per household in Germany with regard to the age of the household's principal earner

Environmental

Social

- **daily land use for settlements**
- **consumption of energy and resources**
- **adaptation to climate change**

- **housing shortage – it's reality**
- **physical capacity – wealth becomes burden**
- **housing for elderly people – social inclusion, help and support**

Urban development strategies

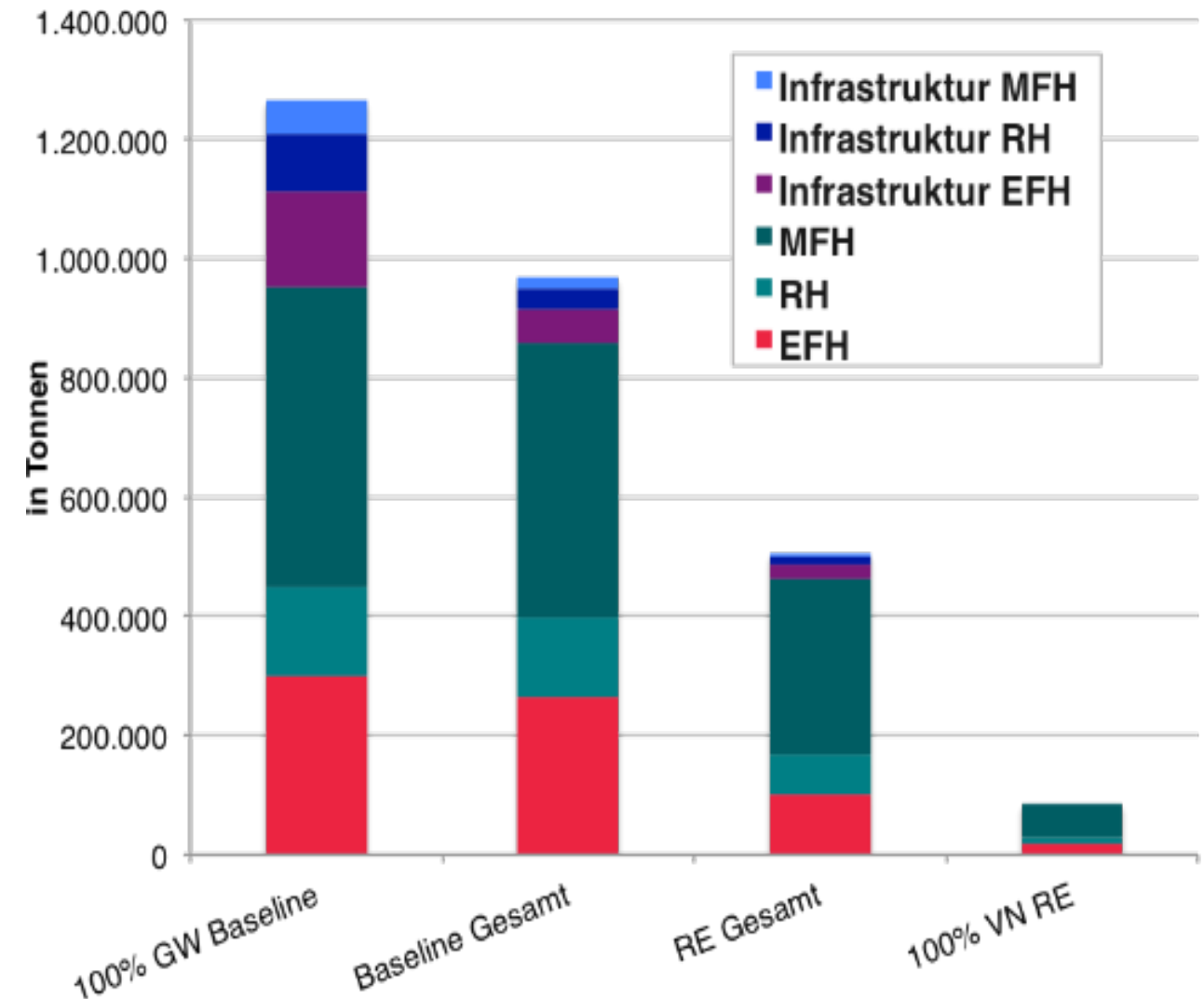
Example: 3000 new housing units until 2030

Urban development strategies:

- › Vertical densification
- › Horizontal densification
- › Conversion
- › „Green meadow“

Scenarios

- › Baseline-Scenario („business as usual“)
- › Resource efficiency scenario („ambitious but realistic“)
- › Extreme scenarios (100% „vertical densification“ and „green meadow“)



Urban development strategies:

- Vertical densification
- Horizontal densification
- Conversion
- „Green meadow“

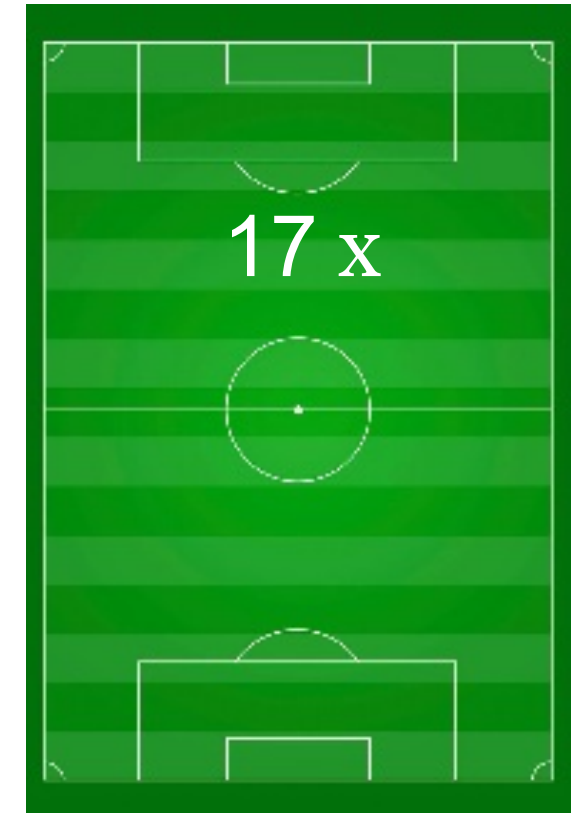
Scenarios

- Baseline-Scenario („business as usual“)
- Resource efficiency scenario („ambitious but realistic“)
- Extreme scenarios (100% „vertical densification“ and „green meadow“)

Baseline: 31,5 ha



Resource efficiency: 11,8 ha



Building Design

➤ Building small

- Tiny Houses, caravan / container housing
- Studio flat

➤ Building flexible

- Growing / shrinking floor space
- Inner development
- Multi-functional planning

➤ Building shared

- Residential homes for special groups
- Community areas / rooms

Building Use

➤ Less use

- Organisation (home office)
- Virtual rooms

➤ Flexible use

- Multiple use
- Reuse / change of use
- temporary use

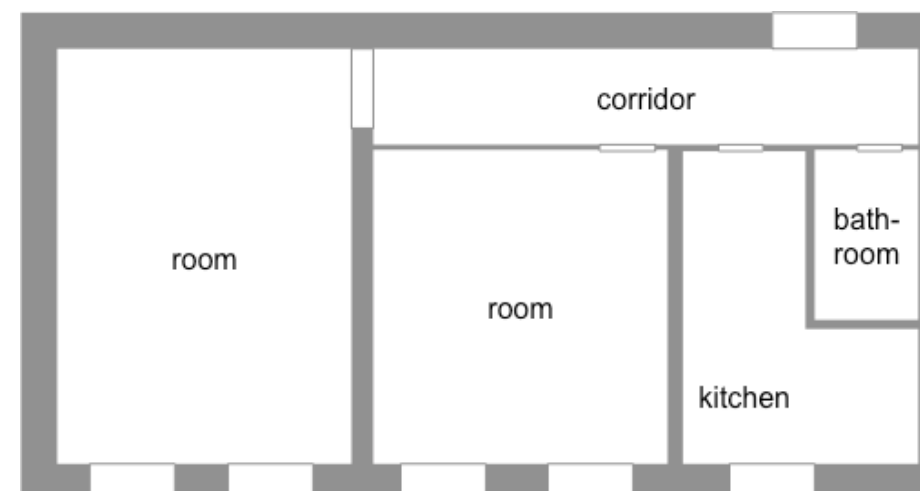
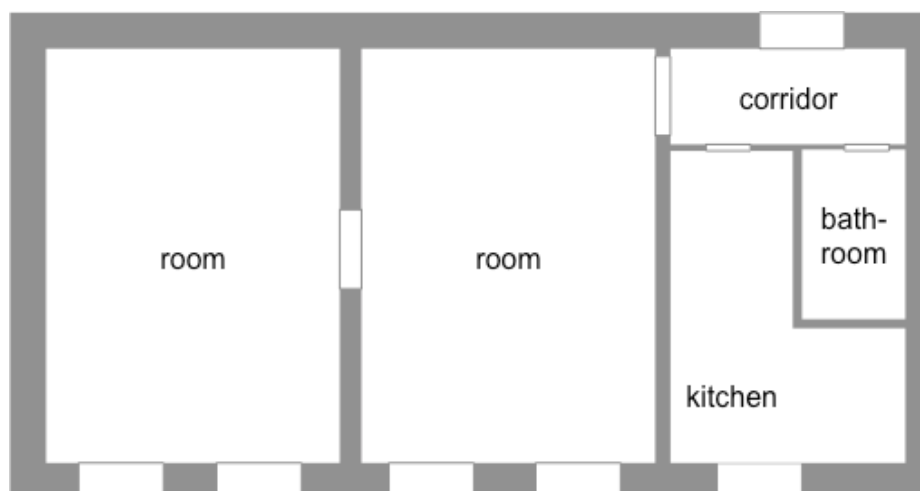
➤ Shared use

- Shared areas / rooms
- Shared furniture

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







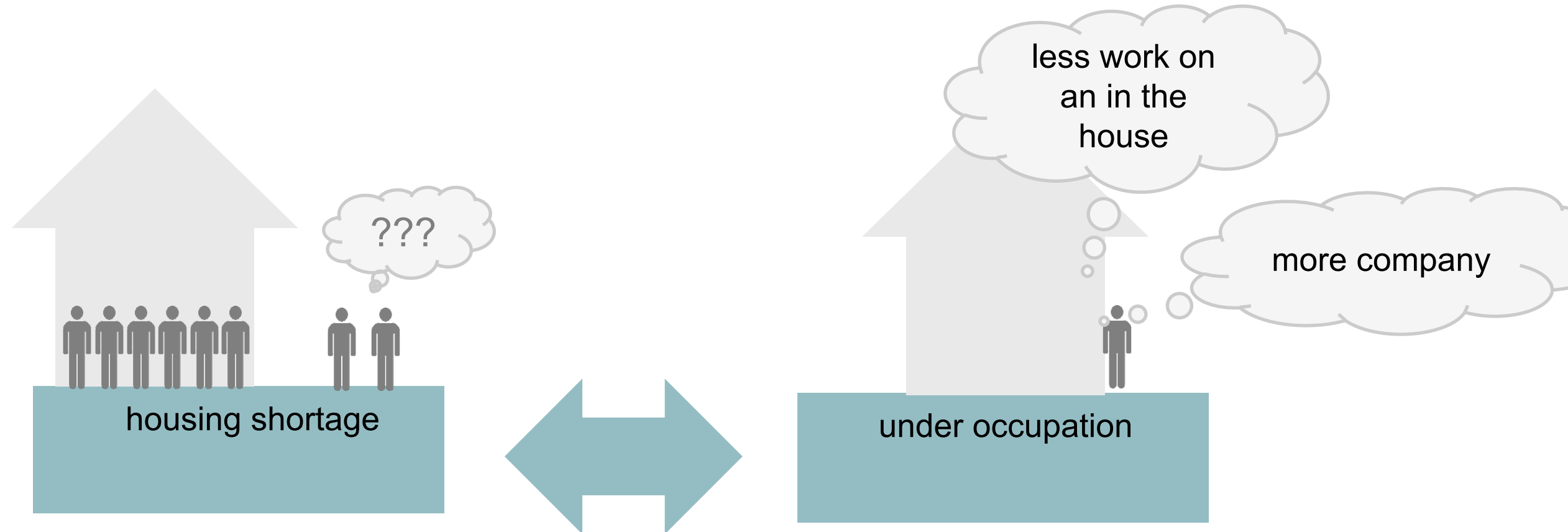




Foto: CCo Public Domain

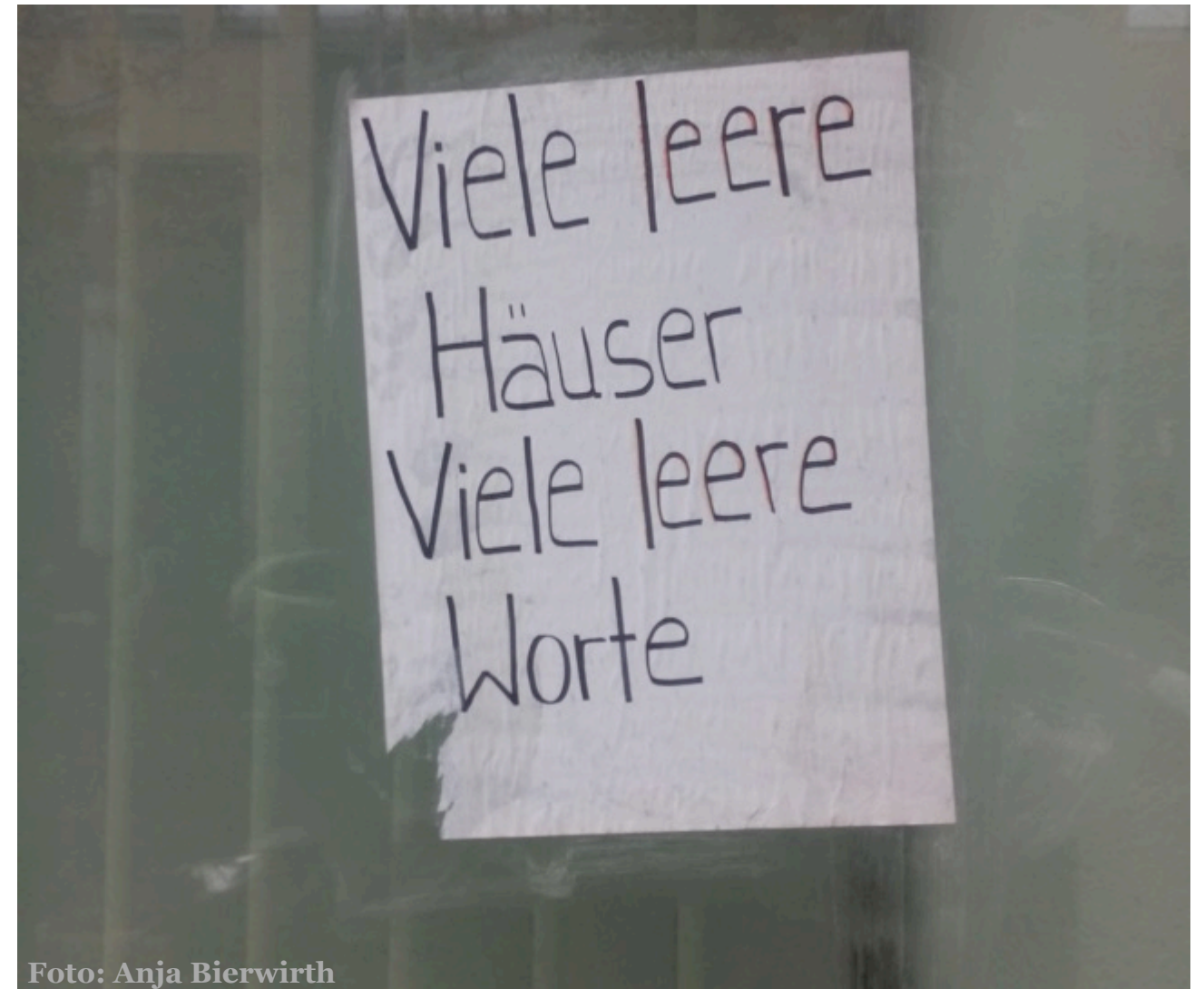
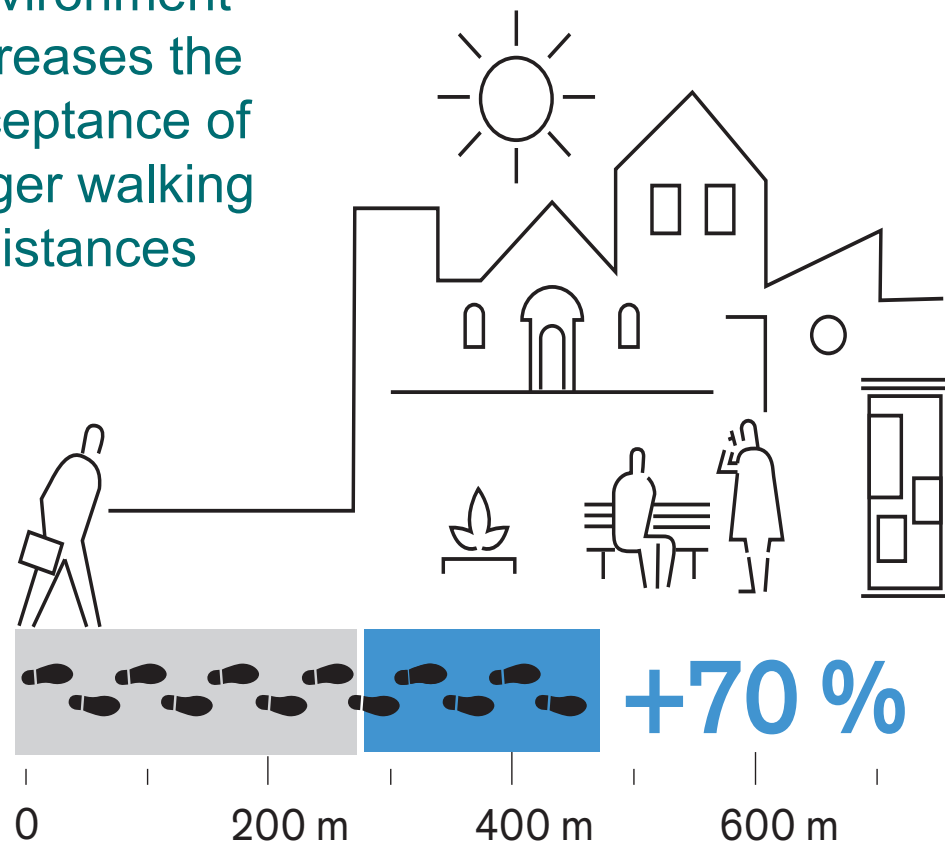


Foto: Anja Bierwirth

An attractive
environment
increases the
acceptance of
longer walking
distances



Grafik: © Bundesstiftung Baukultur; Design: Heimann + Schwantes



Foto: Anja Bierwirth



Visualisierung Projekt LesSON II: Neuer Graben in Dortmund



Lacking quality of monofunctional areas



Example: Hunziker Areal, Zurich







Legal

Financial

Public

- Living space moratorium
- Buildings Energy Regulation
- Parking Space Regulation
- Moving support, Rental Fee Guarantee
- KfW-support programme for density, community, change of use
- Flat exchange
- Advice, campaigns
- Competition and pilot projects

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Thank you
for your attention!

For further information see
www.wupperinst.org