TRANSITION TOWARDS RENEWABLE ENERGIES IN THE THERMAL SECTOR IN GERMANY

Fraunhofer Institute for Solar Energy Systems ISE

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Mexico-City, July 31st, 2019

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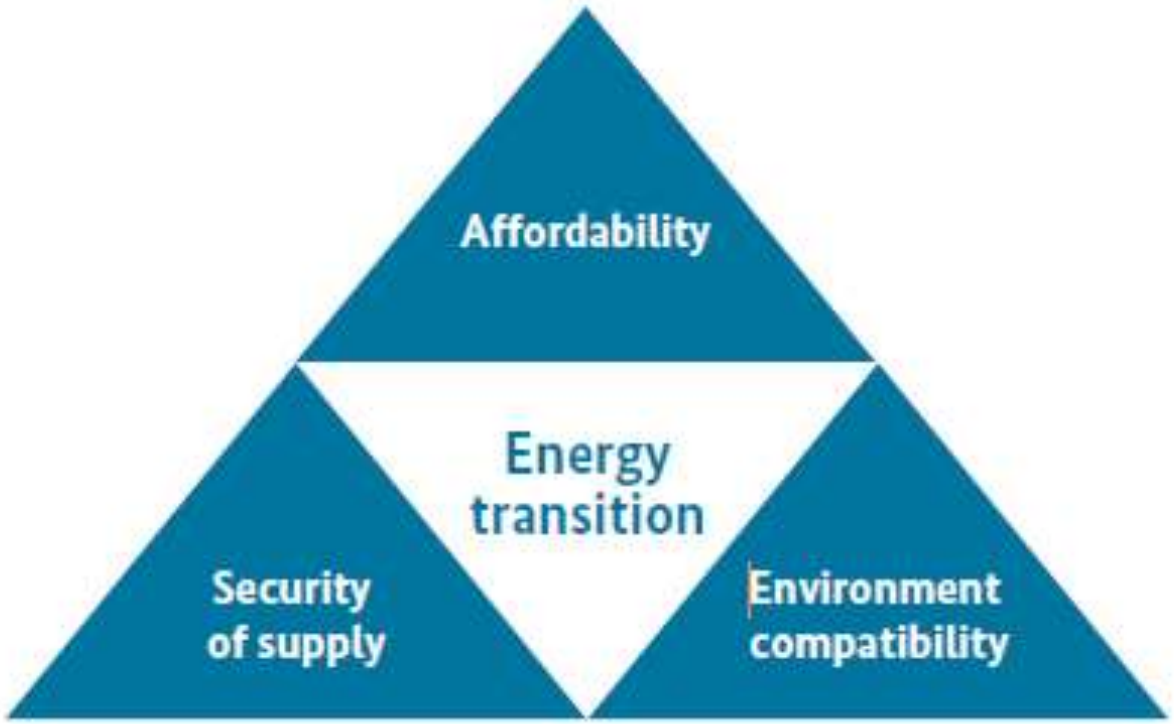
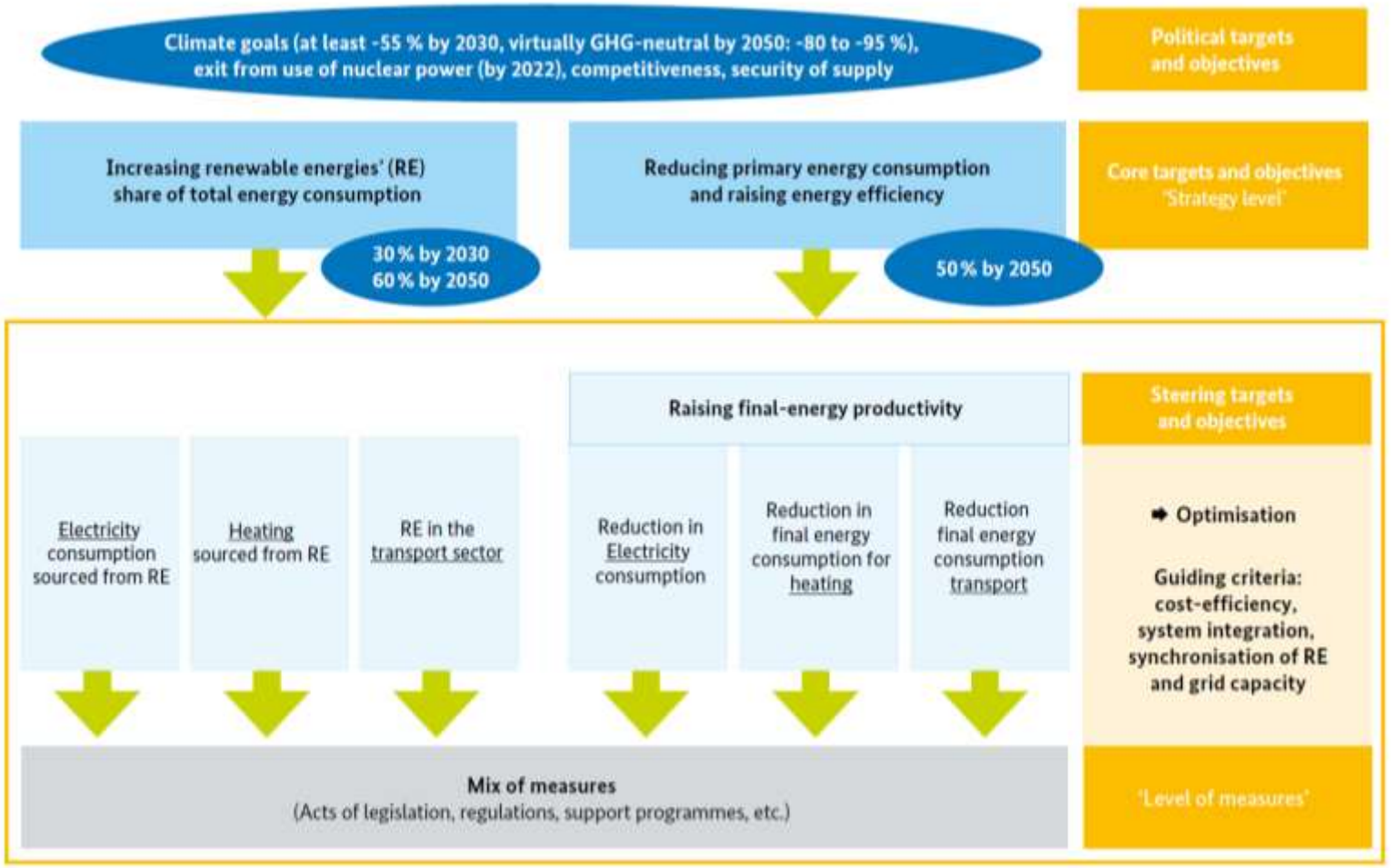
Goals of the German Energy Transition



source: BMWI 2019: Draft of the Integrated National Energy and Climate Plan

Structure and Targets of the German Energy Transition



source: BMWI 2019: Draft of the Integrated National Energy and Climate Plan

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German Targets of Energy Efficiency

Energy efficiency	2020	2030	2040	2050
Greenhouse gas emissions (from 1990)	-40%	-55%	-70%	-80% to -95%
Primary energy consumption (from 2008)	-20%			-50%
Electricity consumption (from 2008)	-10%			-25%
Energy demand in buildings (from 2008)				-80%
Heat demand in buildings (from 2008)	-20%			
Energy consumption in transport (from 2005)	-10%			-40%

source: German Renewable Energies Agency: (2019) Key Facts about the Energy Transition in Germany

German Targets of Renewable Energy

Renewable energy	2020	2030	2040	2050
RE share in final energy consumption	18%	30%	45%	60%
RE share in electricity consumption	35%	65%		>80%
RE share in heating	14%			
RE share in transport	10%			

source: German Renewable Energies Agency: (2019) Key Facts about the Energy Transition in Germany

Targets and Framework of the Energy Transition

- security of energy supply
- end of nuclear energy supply by 2022
- affordable energy and competitivness of german industry
- environment and climate-friendly
- development of the electric grid
- use of the potential of sector coupling and digitization
- energy transition as a driver for modernization and innovation
- preserve jobs, wealth and quality of life in Germany

Measures of the Energy Transition

- 190 measures listed by BMWi (2018): 6. Monitoringbericht zum Stand der Energiewende für das Jahr 2016, Juni 2018
  - incentives
  - regulation
  - research funding
  - awarenes campaigns

Incentives Market Stimulation
Markt Anreiz Programm (MAP)

- investment support buildings
  - Biomass 2000-5250 EUR/boiler
  - Heatpumps 40-100 EUR/kW
  - Solar Thermal 50-100 EUR/m²
- investment support process heat
  - Biomass 30% of investment, max 40000 EUR
  - Heatpumps
  - Solar Thermal 50% of investment

- additional bonus for combination or innovation

Incentives Market Stimulation

Directive of financial support of energy consulting in buildings

- financial support for energy consulting, planing and supervision of buildings
- 60% of bill max 800 EUR for EFH/ZFM max 1100 EUR for multi dwelling houses

Energy Transparency
Energy Labelling

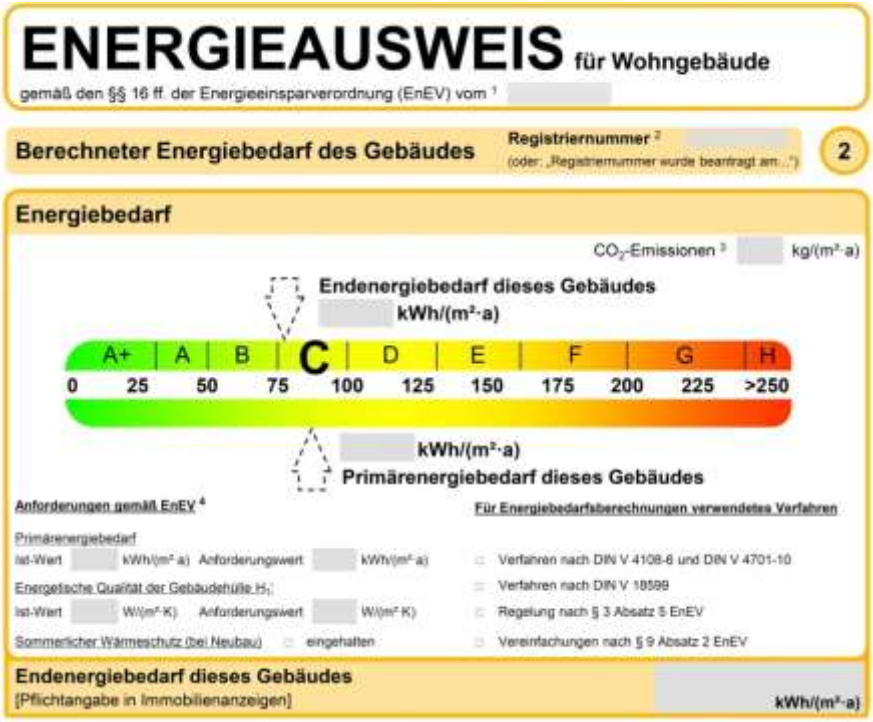
- mandatory energy audit for bigger companies DIN EN 16247
- energy labelling for household electric and heating devices

source: European Commission

Mandatory Energetic Standards for Buildings

Energieeinsparverordnung (ENEV)

- definition of minimum insulation quality of the building envelop
- minimum renewable energy share



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Public Awareness Actions

Campaign „Deutschland macht‘s effizient“

- national campaign
  - cinema spots
  - posters
  - homepage
  - public events

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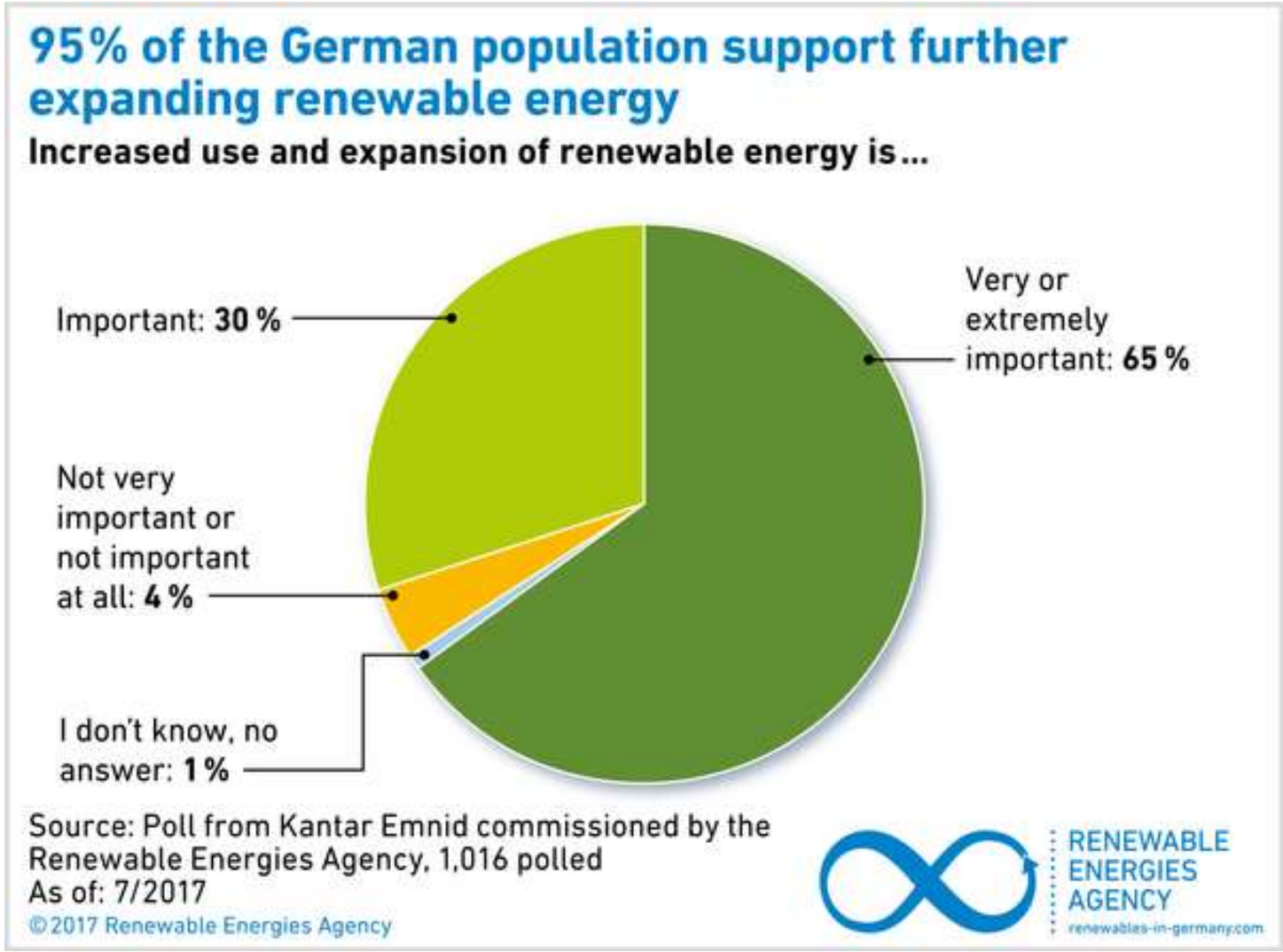
Research Funding

7. Energieforschungsprogramm

- research funding
  - buildings, industry, mobility
  - energy generation
  - energy transport and storage
  - digitization
  - energy system analysis
  - materials and ressources
  - socio-economic aspects
  - volume 7 billion Euro for the comming years

Awareness



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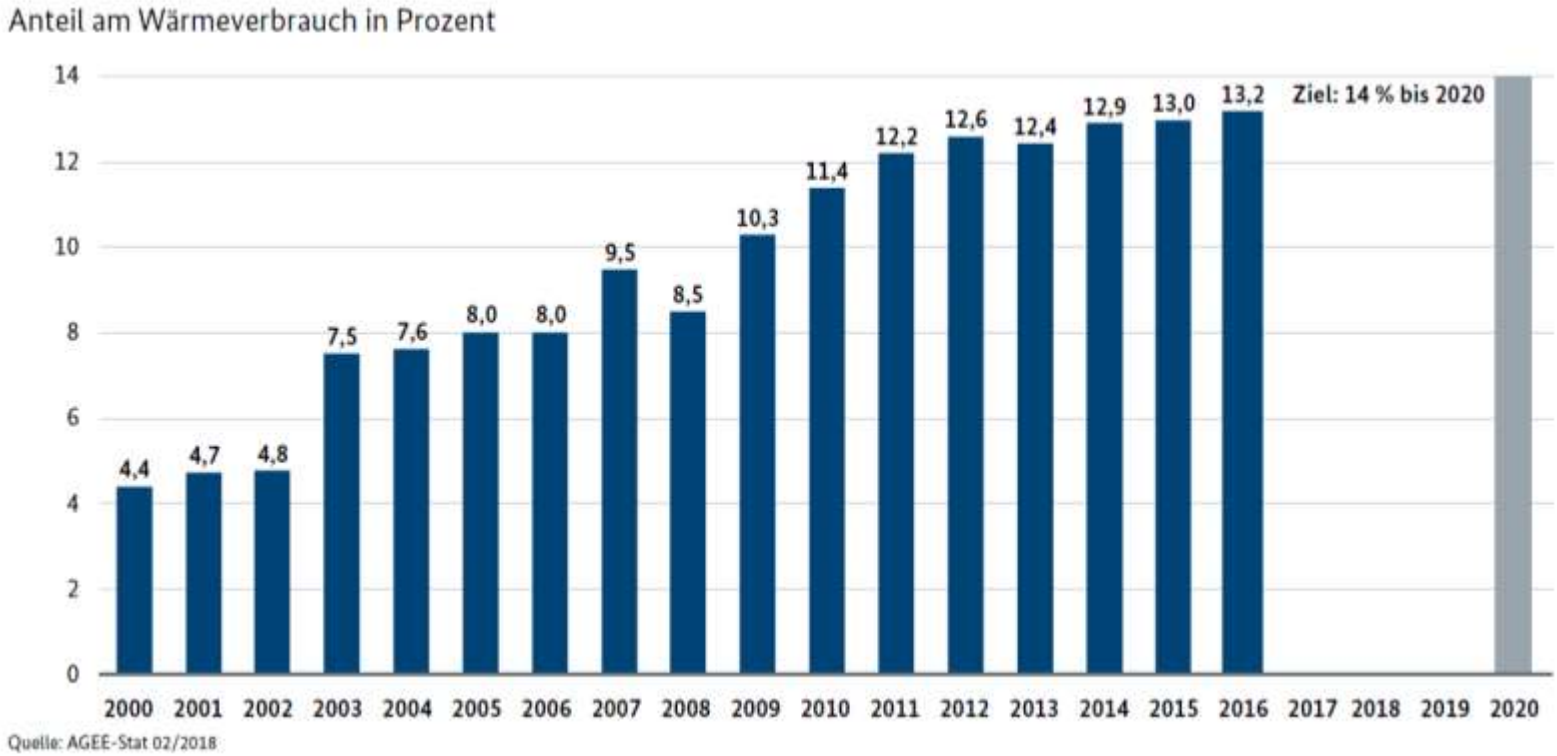
Status Energy Transition

Share of Renewable Energy in Heating and Cooling



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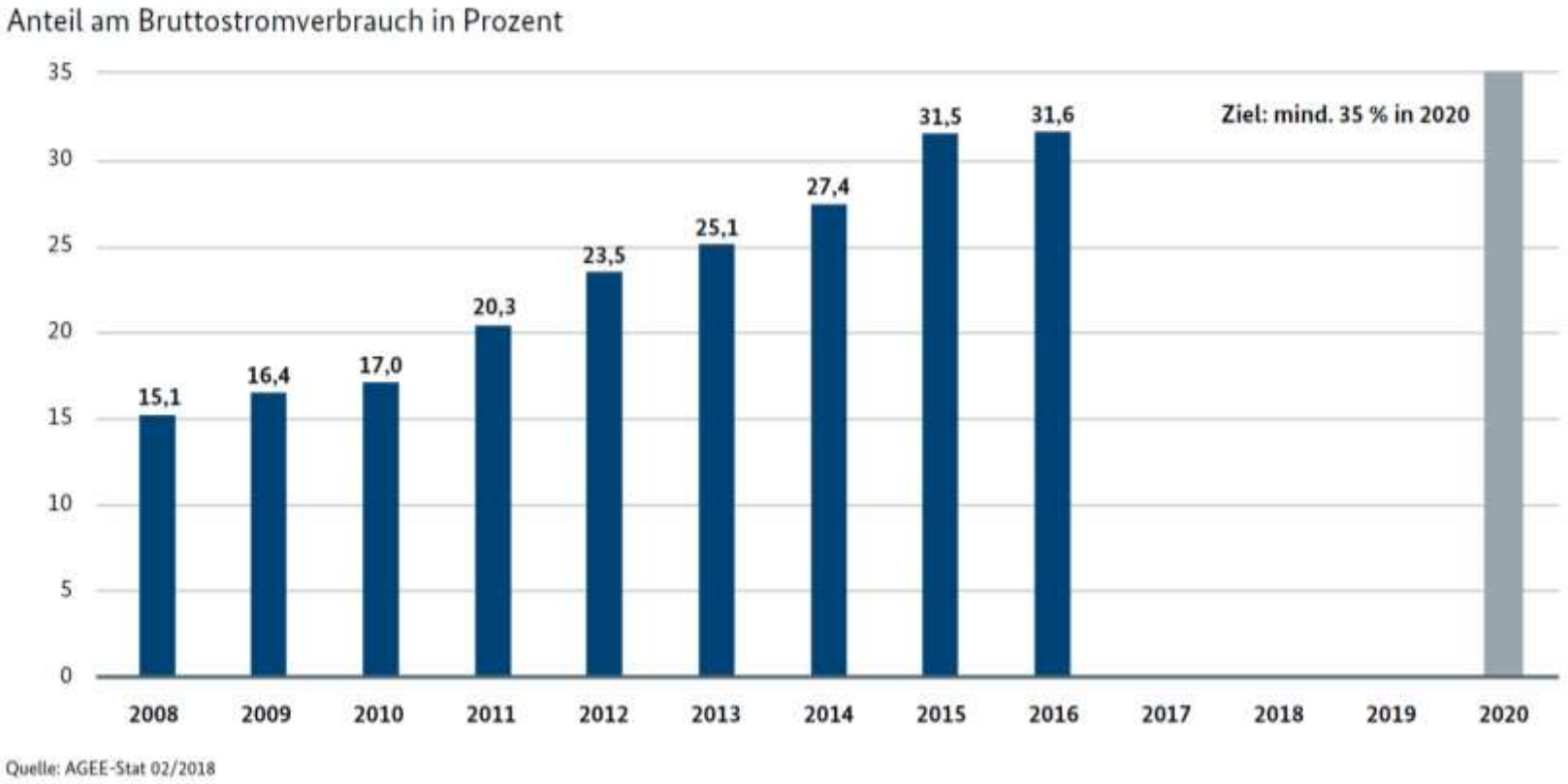
Status Energy Transition

Share of Renewable Electricity in Power Demand



Quelle: AGEE-Stat 02/2018

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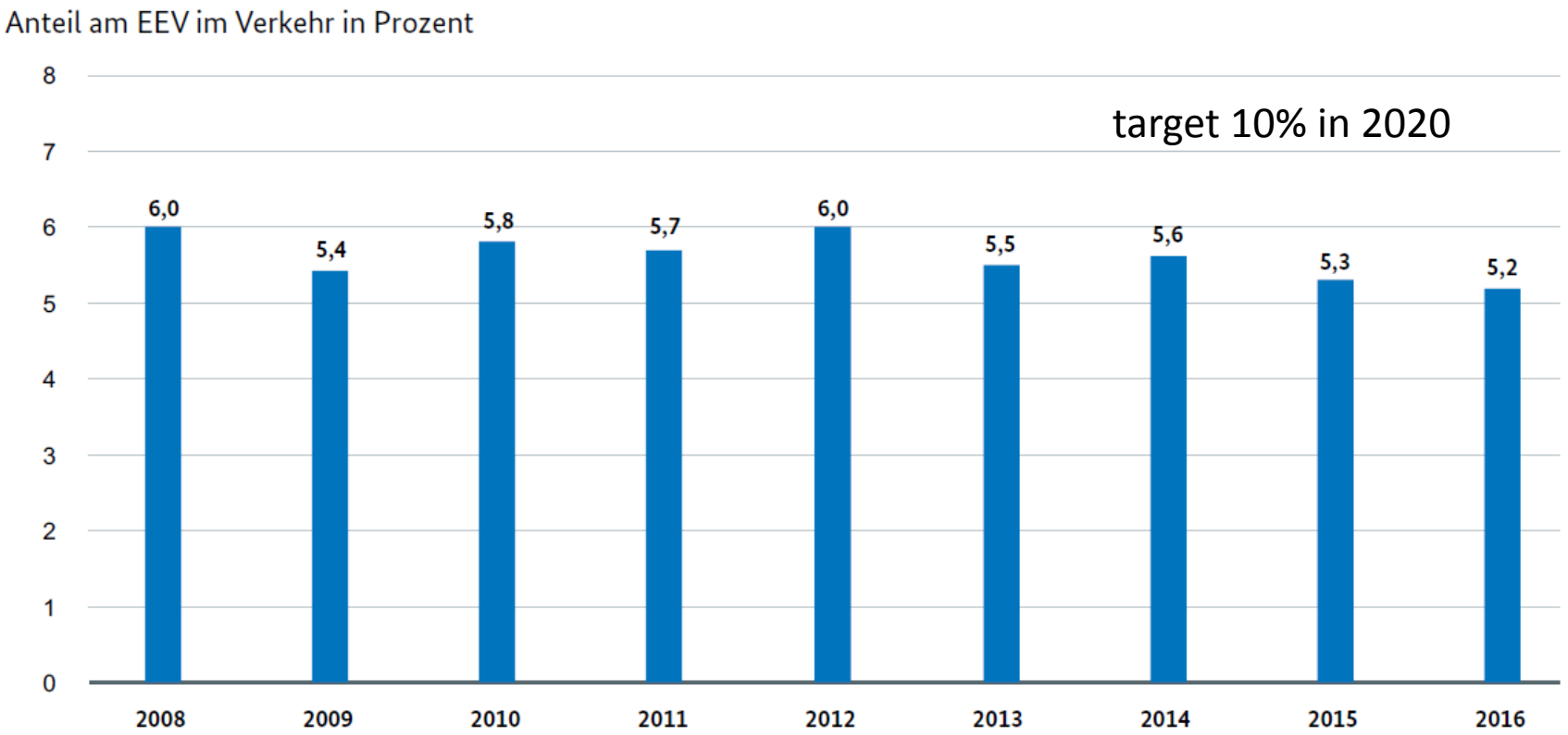
Status Energy Transition

Share of Renewable Energy in Mobility



Quelle: AGEE-Stat 02/2018

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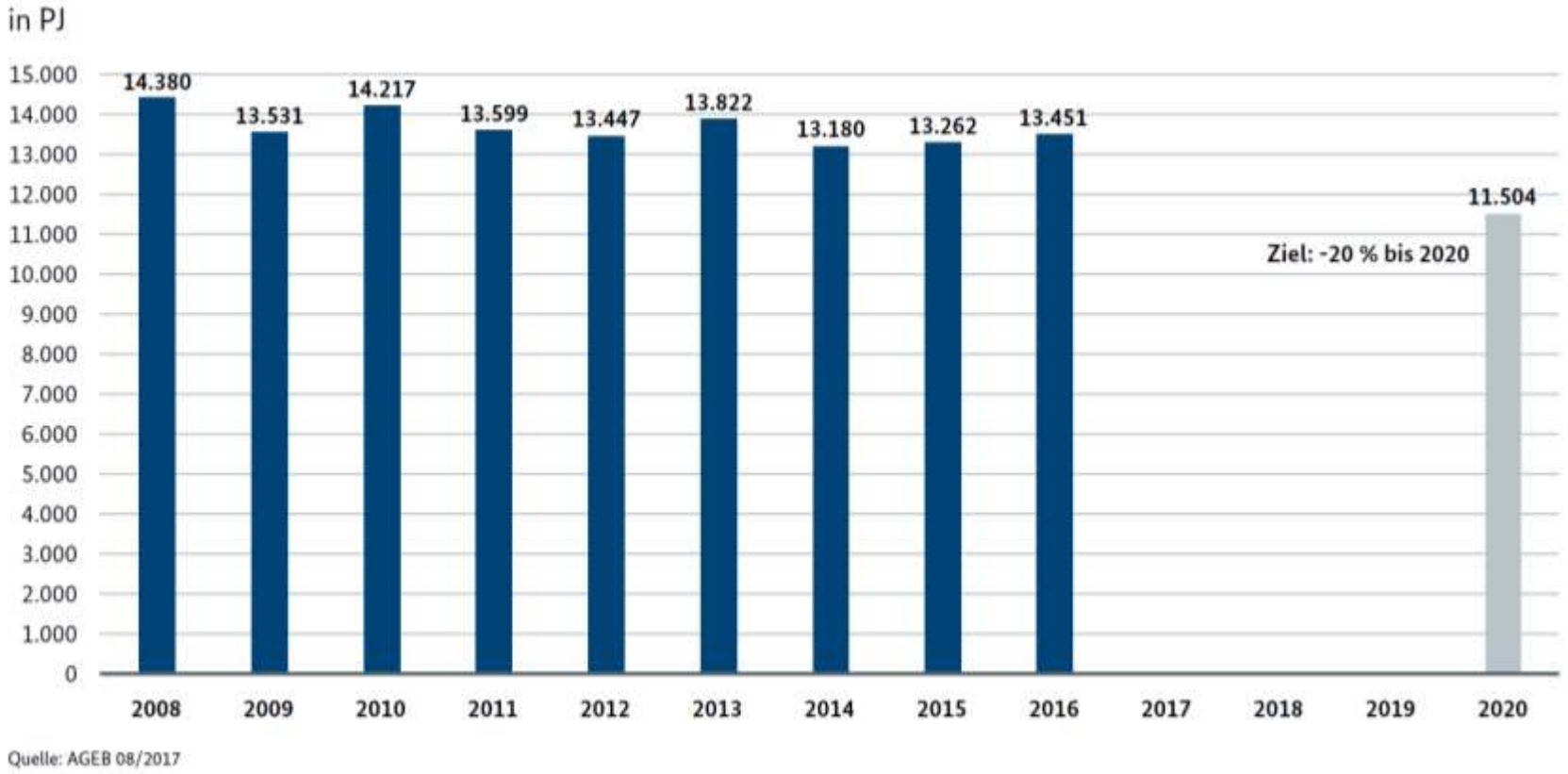
Status Energy Transition

Reduction of Primary Energy Demand



Quelle: AGEB 08/2017

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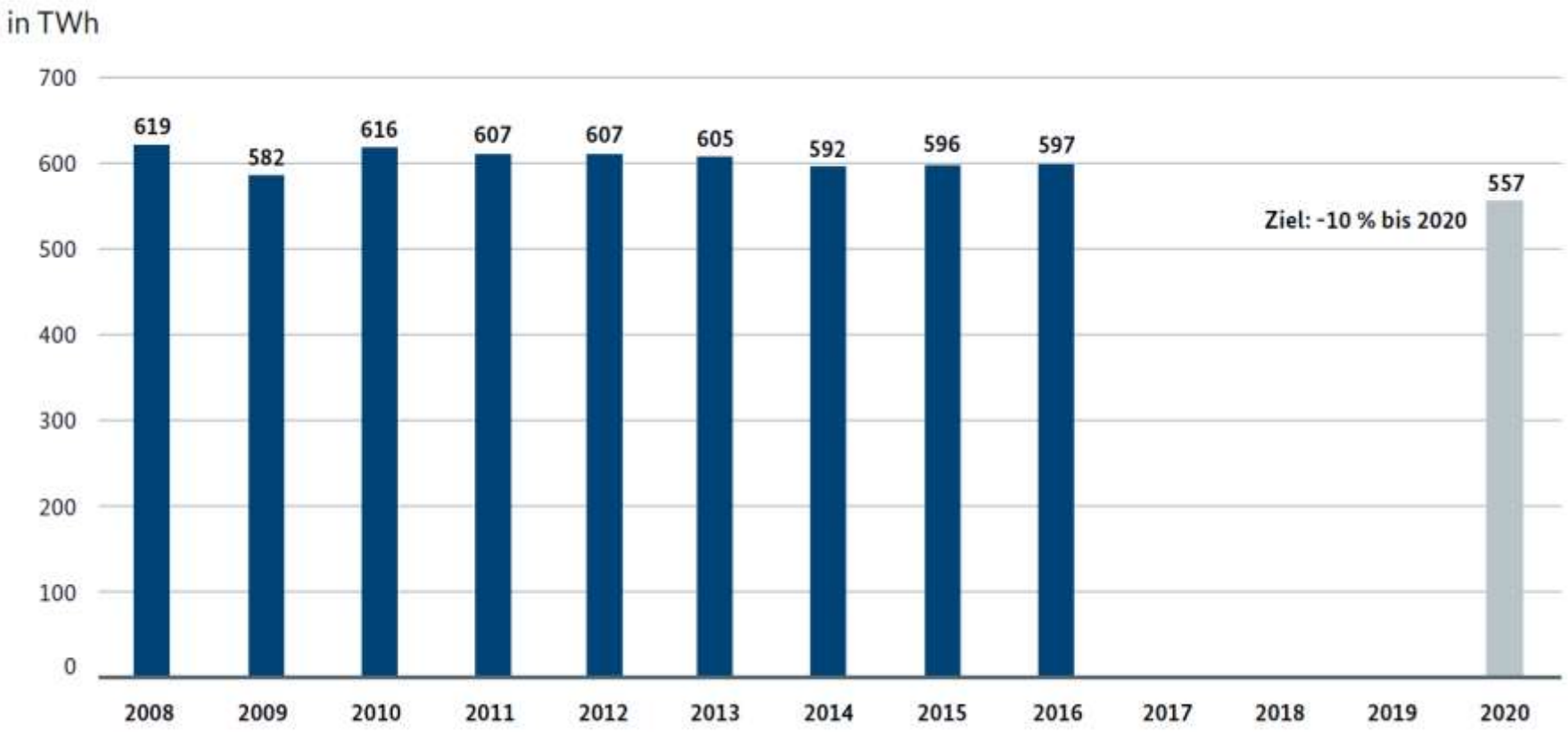
Status Energy Transition

Reduction of Electric Power Demand



Quelle: AGEB 12/2017

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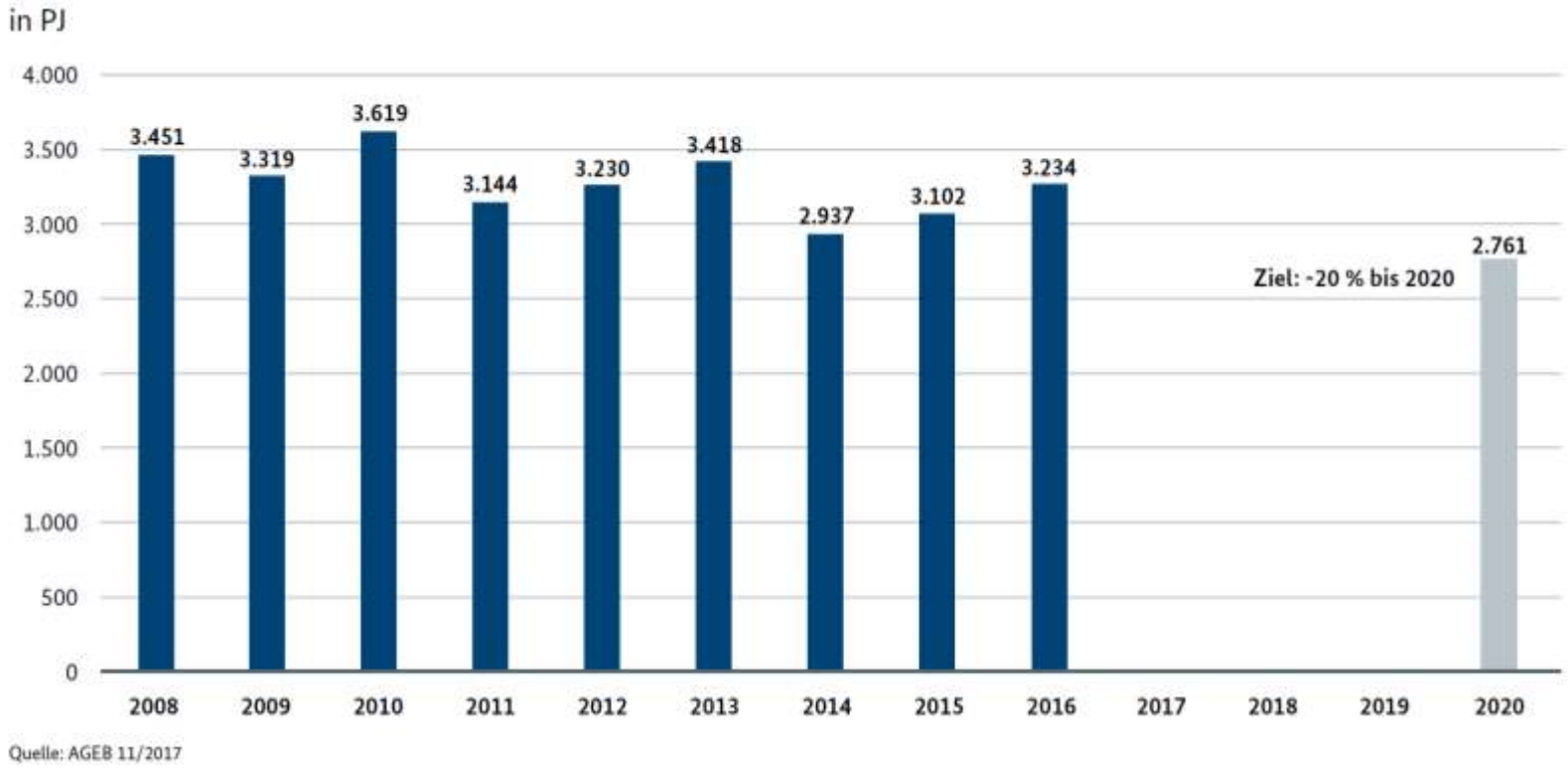
Status Energy Transition

Reduction of Energy Demand for Heating



Quelle: AGEB 11/2017

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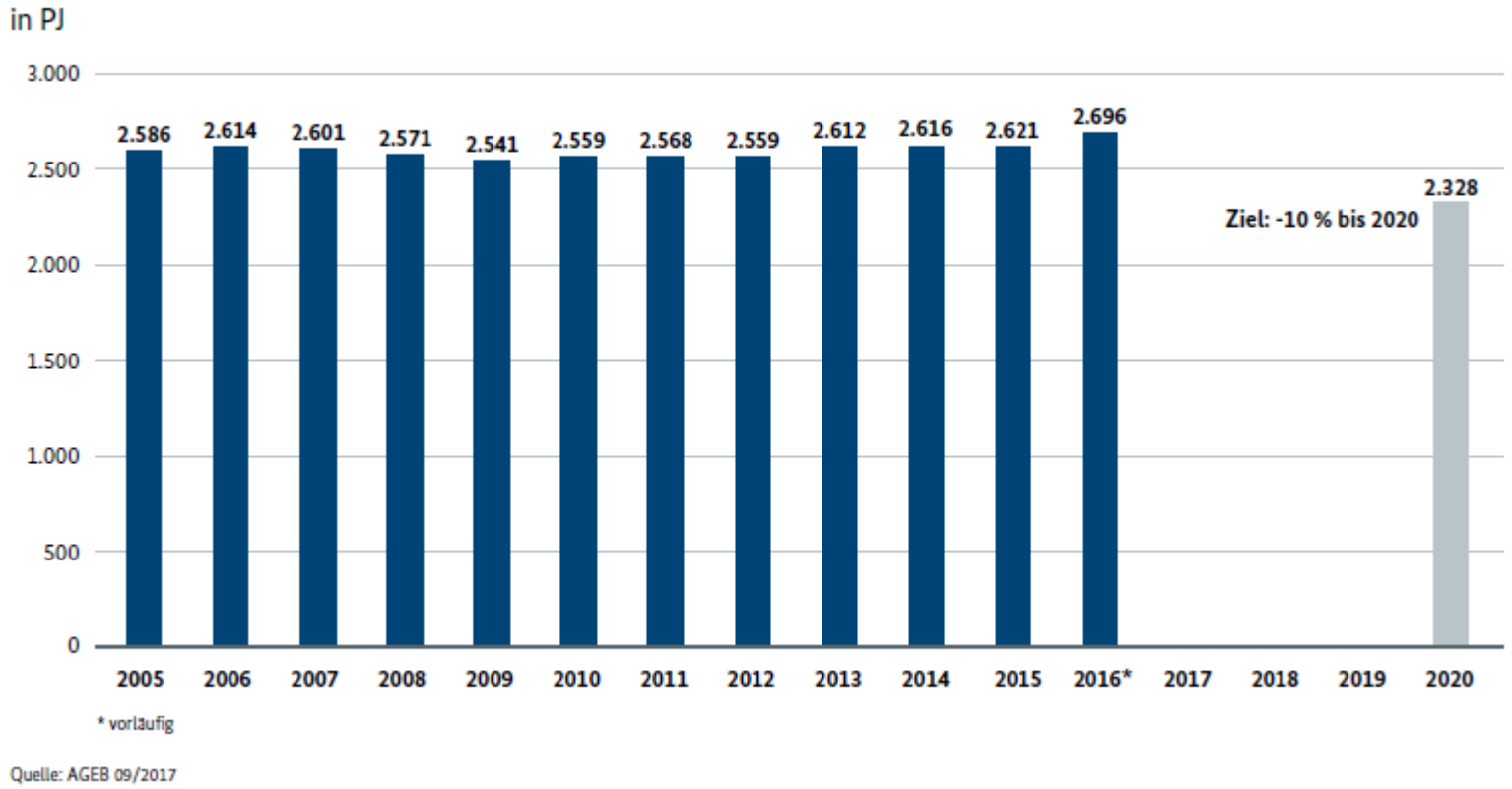
Status Energy Transition

Reduction of Energy Demand in Mobility



Quelle: AGEB 09/2017

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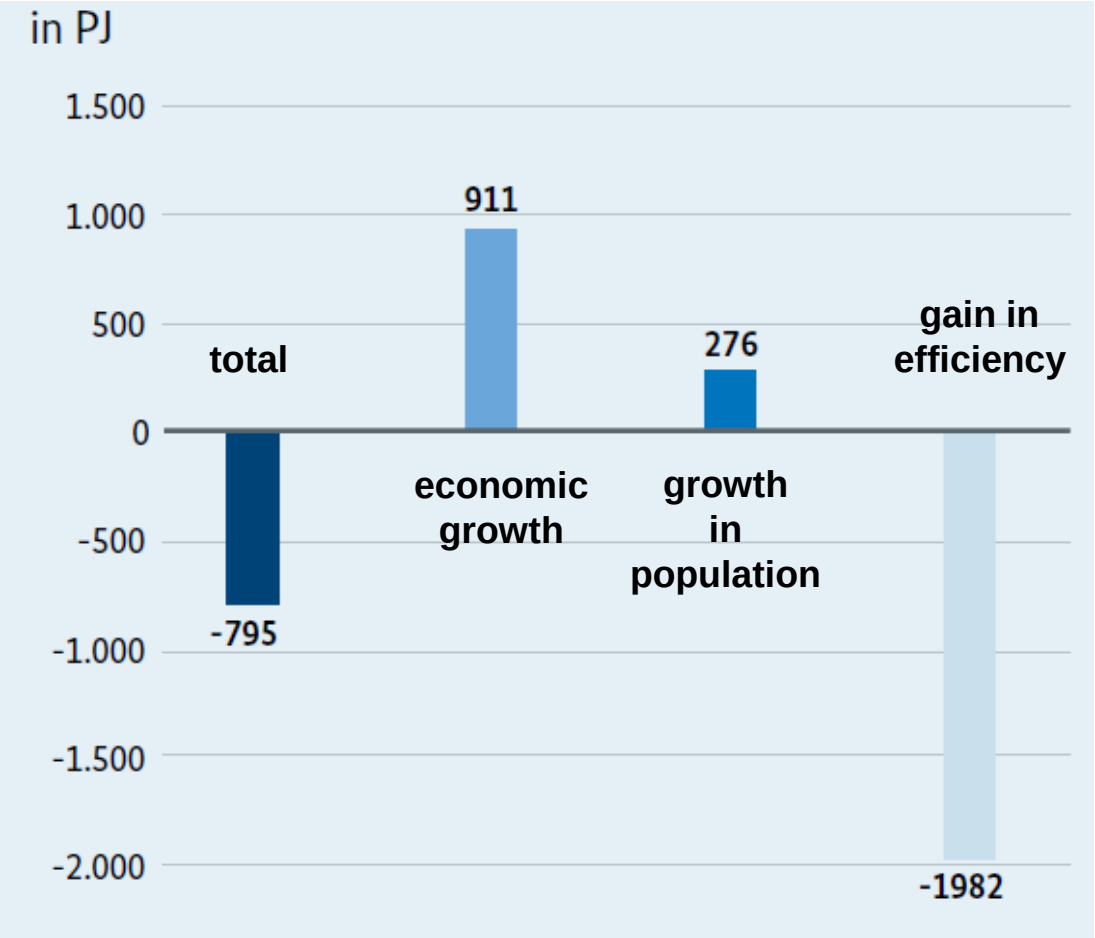
Status Energy Transition

Reduction of Primary Energy Demand



contributions to the change of primary energy demand in Germany 2008 until 2016

source: BMWi (2018) Sechster Monitoring-Bericht zur Energiewende

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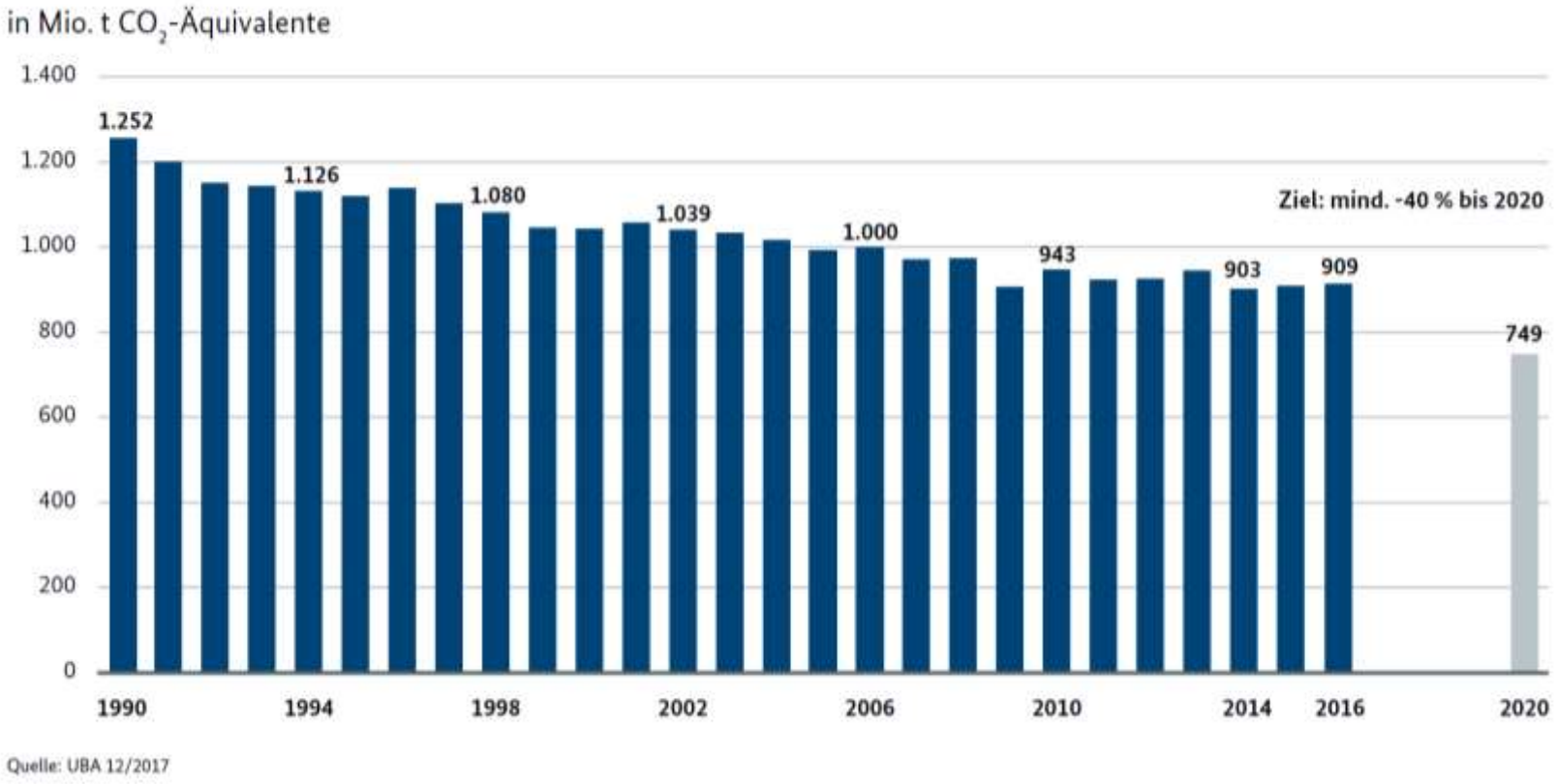
Reduction of Green House Gas Emission



Quelle: UBA 12/2017

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Status Energy Transition

Conclusions

- replacement of conventional energy in electrical power and heat by renewables is on track
- strong efforts are needed to reach short term golas in terms of reduction of energy consumption in all sectors and share of renewables in mobility

Current Developments

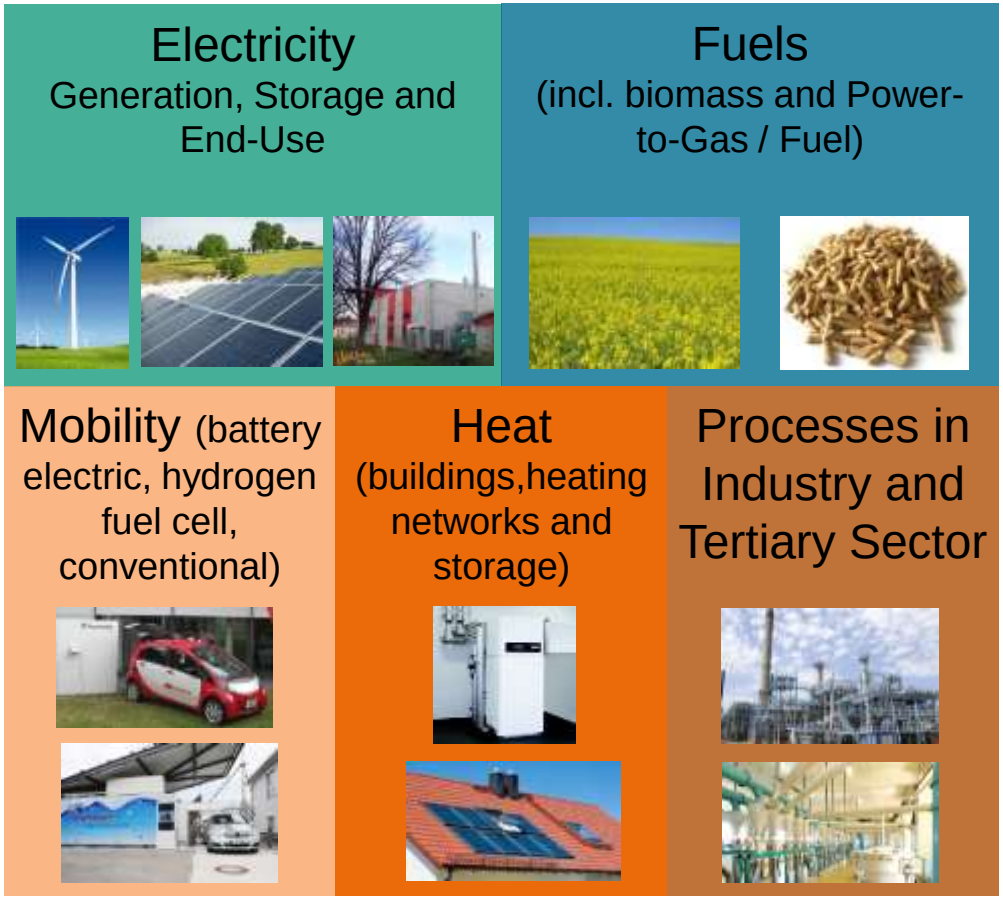
- Discussion about CO2 pricing by tax or by extended emmission trading scheme
- Integration of several laws concerning ennergetic demands into one law (ENEV and Renewable Heat LAW into GEG (Building Energy Law)
- Proclamation of climatic emergency by several cities

Energy System Analysis

Renewable Energy Model for Germany (REMod-D)

Set up an energy system based predominantly on renewable energy.

- All energy end-use sectors included
- Goal: Develop a cost-optimized transformation strategy to reach goal of reducing carbon emissions by 80 % and beyond



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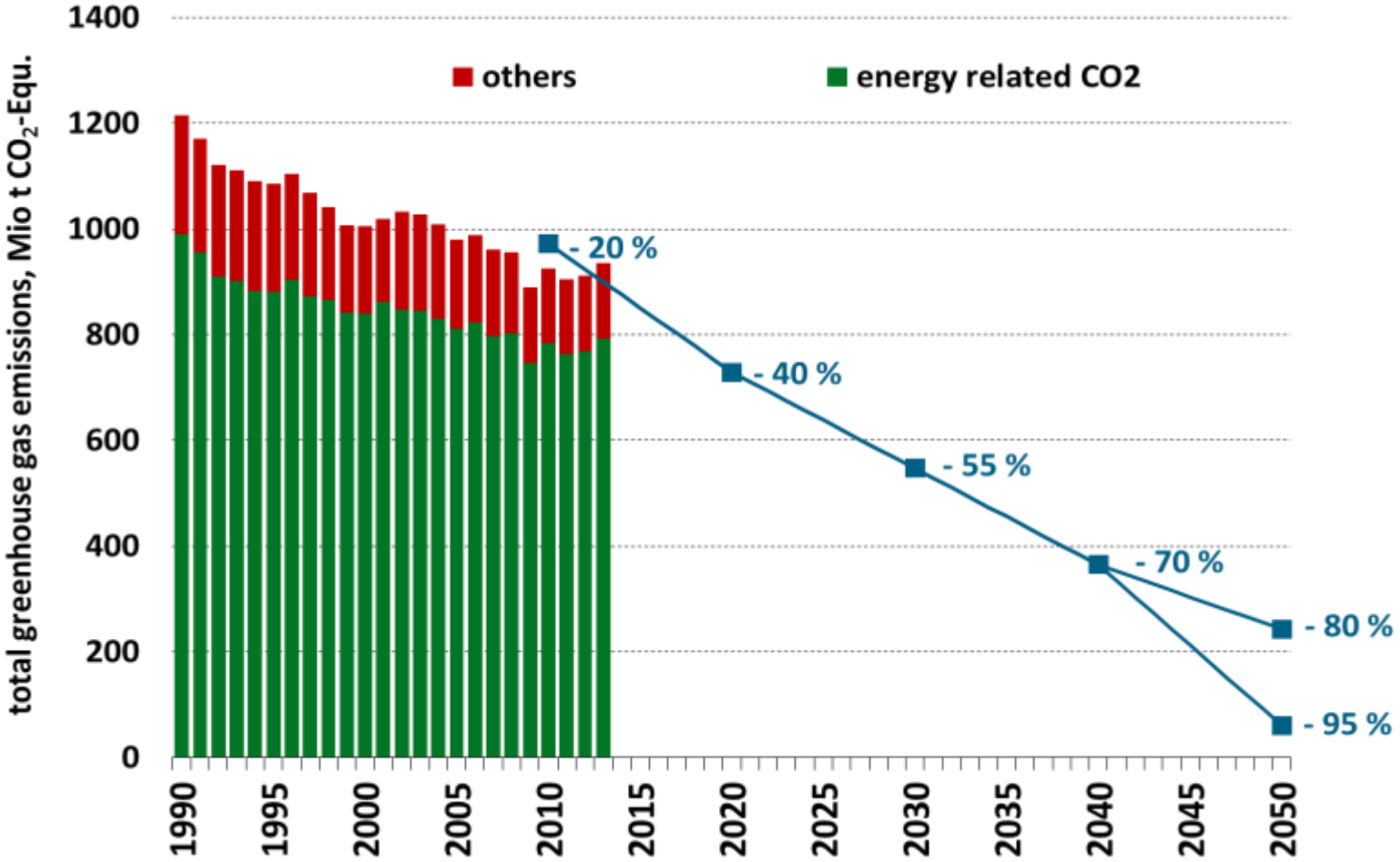
Development of German GHG emissions 1990 – 2013 & target values until 2050



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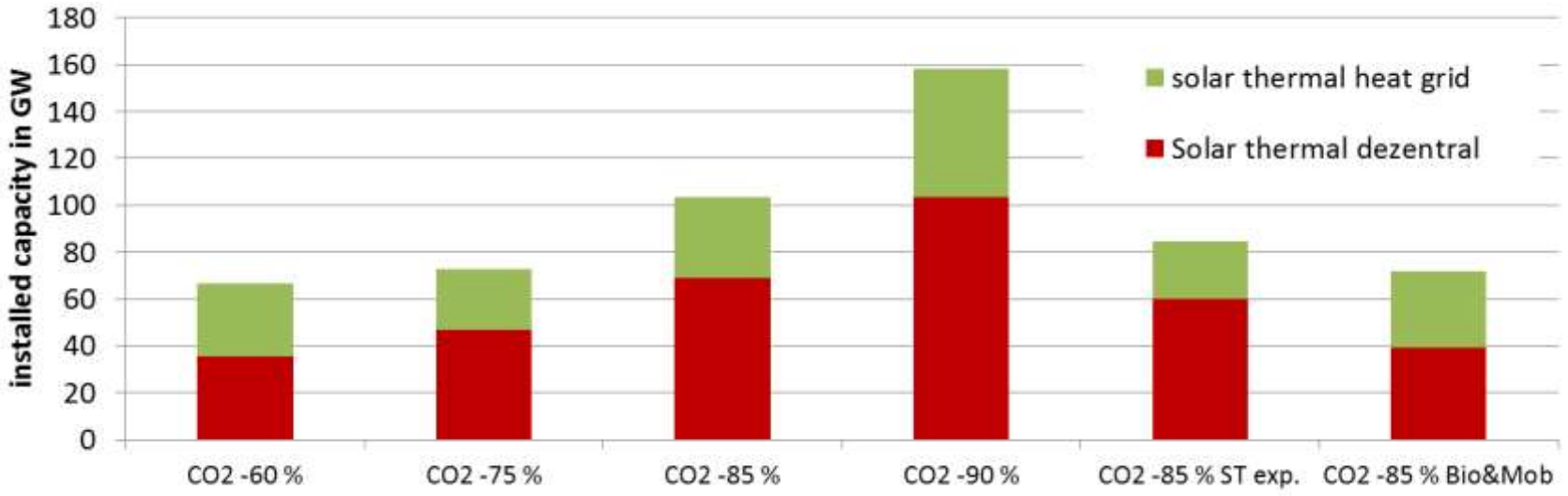
Installed Solar Thermal Capacity in Buildings 2050



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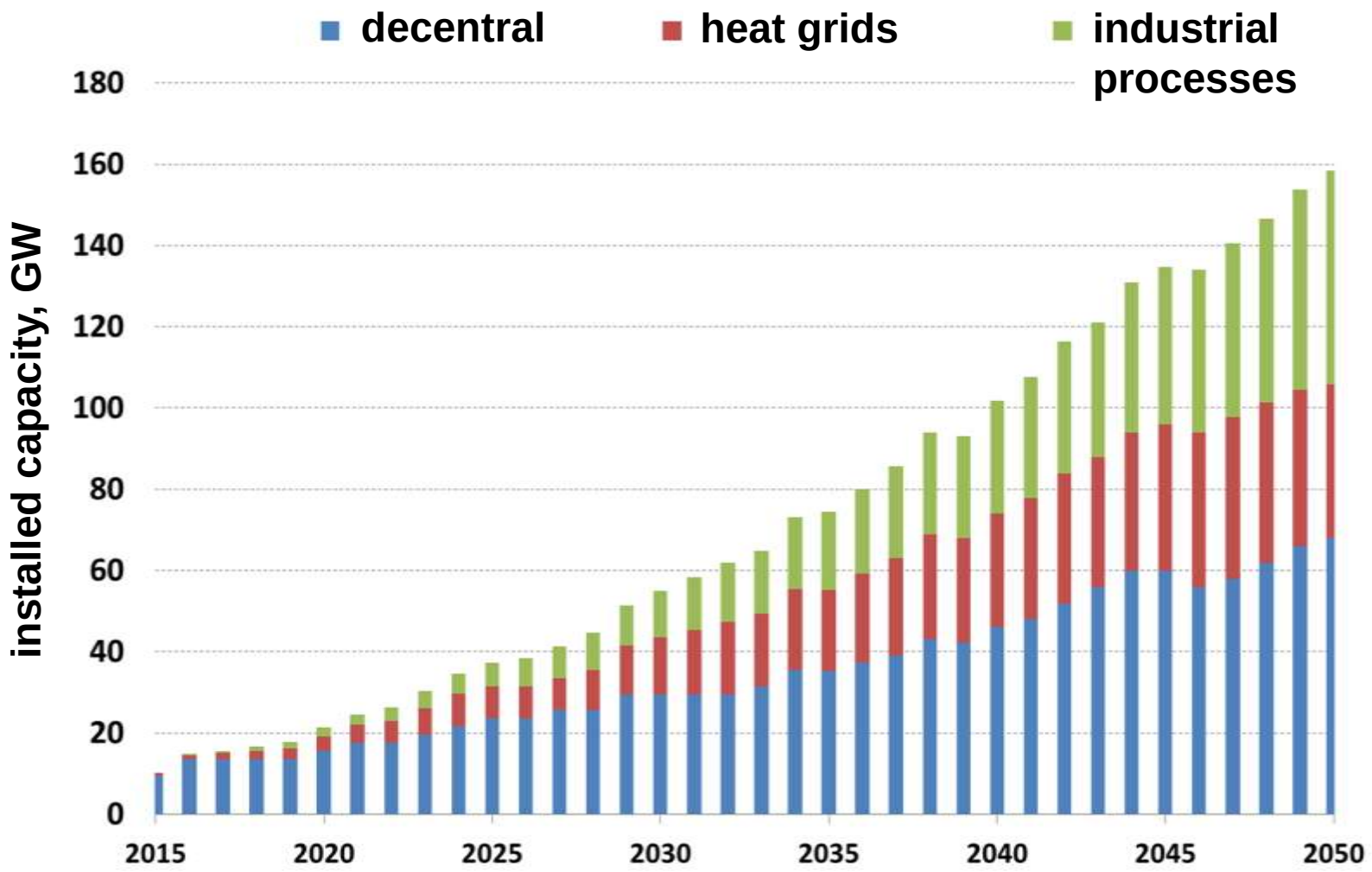
Installed Solar Thermal Capacity until 2050



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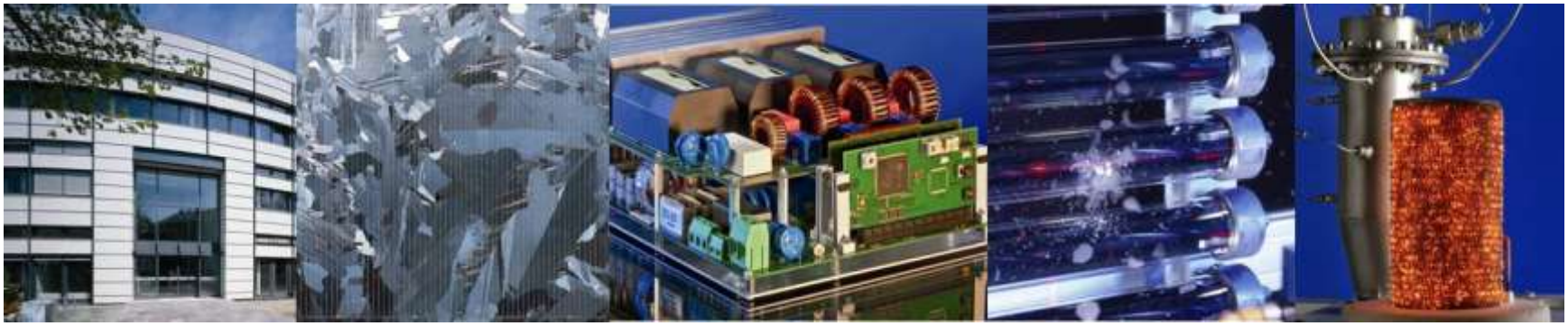
Conclusion REMOD-Analysis for Germany

- Solar thermal will play a role in a future energy system
- The overall solar thermal potential is up to 3-10% of the total heat production.
- Solar thermal could ease the pressure on scarce renewable resources such as biomass
- District heating: good potential but competition with waste heat

Thank you for your attention!



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