Economic effects of renewable energy subsidies: How to shape a fair burden sharing at times of an energy price crisis?

by Philip Heyer, Oguzhan Saglam, Jakob Kulawik, Jan Priesmann, Aaron Praktiknjo
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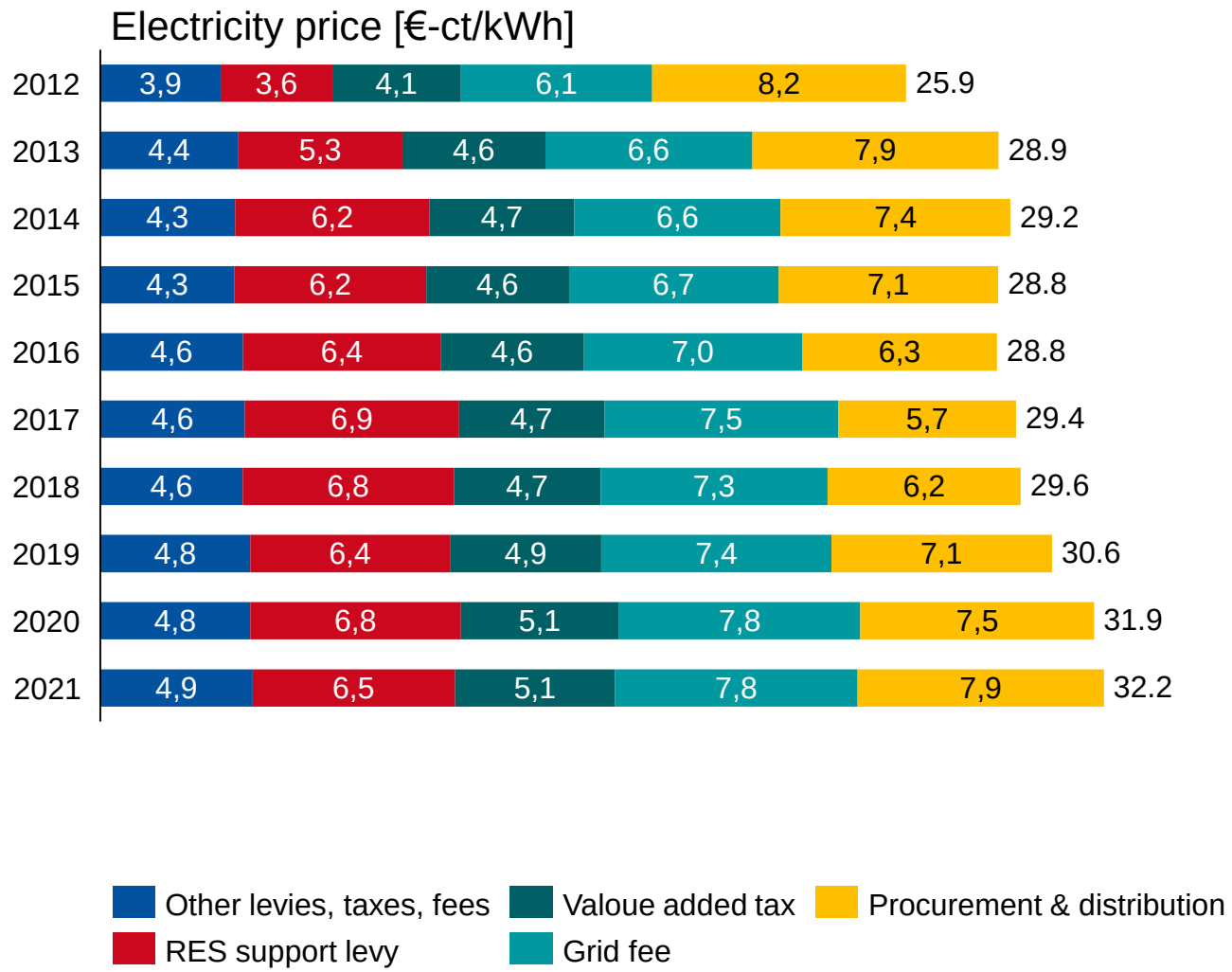
13. Internationale Energiewirtschaftstagung an der TU Wien

FCN | Future Energy Consumer Needs and Behavior | E.ON Energy Research Center | RWTH AACHEN UNIVERSITY

Electricity prices for residential consumers in Germany



- Regulatory price components account for an important share of the electricity price
- High energy prices at the end of 2021
- Further increases with since the Russian invasion in 2022

Bundesverband der Energie- und Wasserwirtschaft (bdew), 2022

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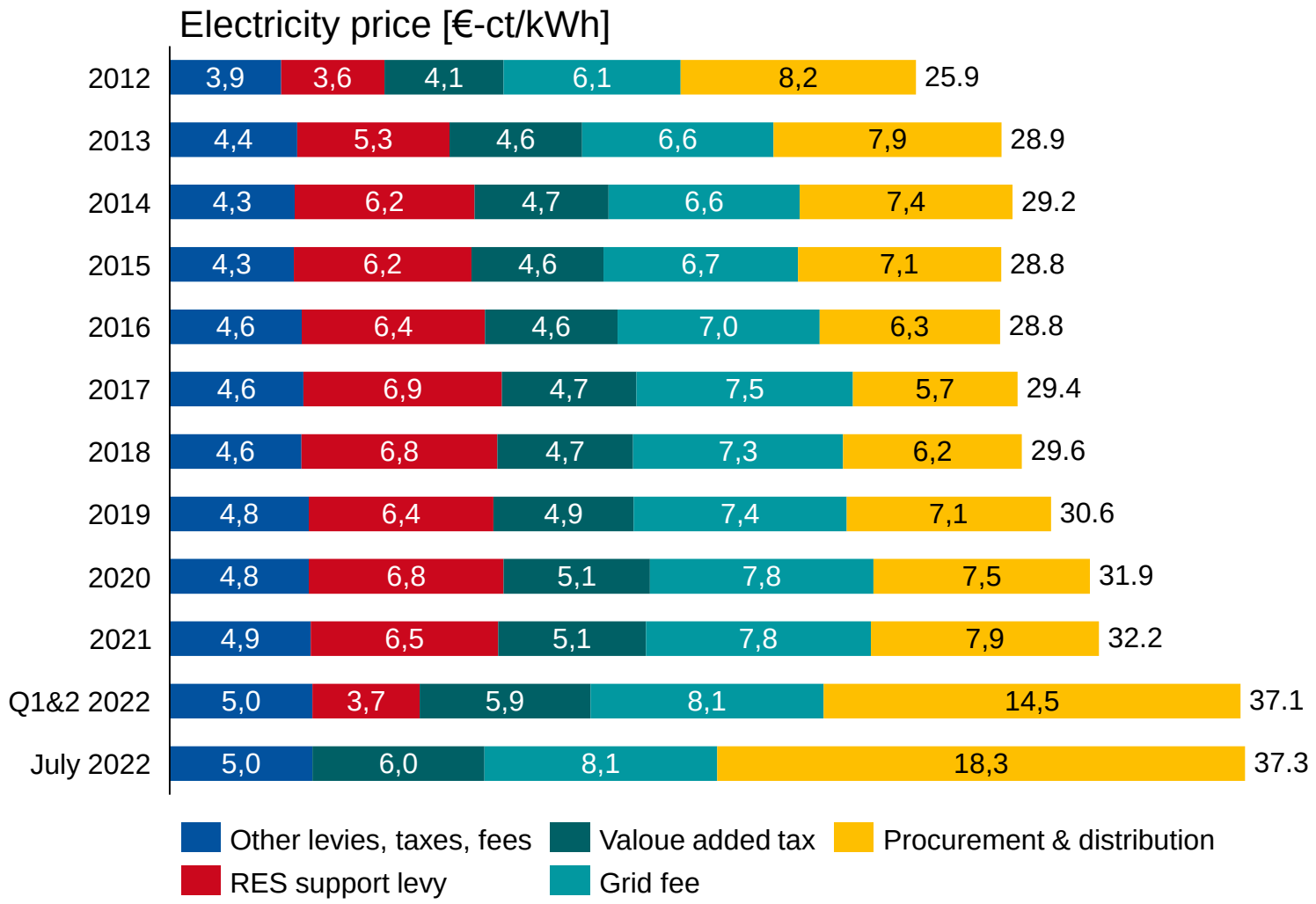

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➢ Decision to abolish RES support levy as part of the electricity price in summer 2022

How are different sectors affected by increasing electricity prices and relief measures?

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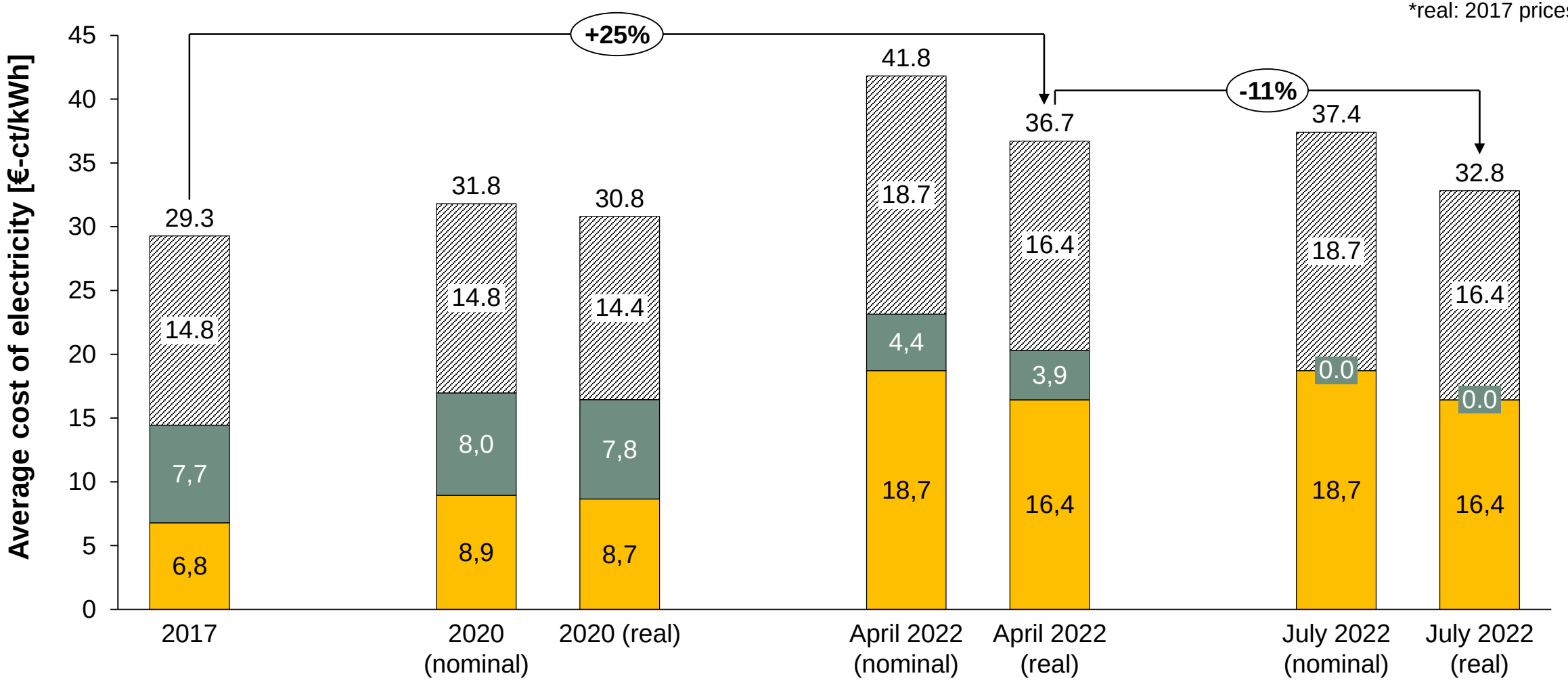
Price development for residential consumers

*real: 2017 prices



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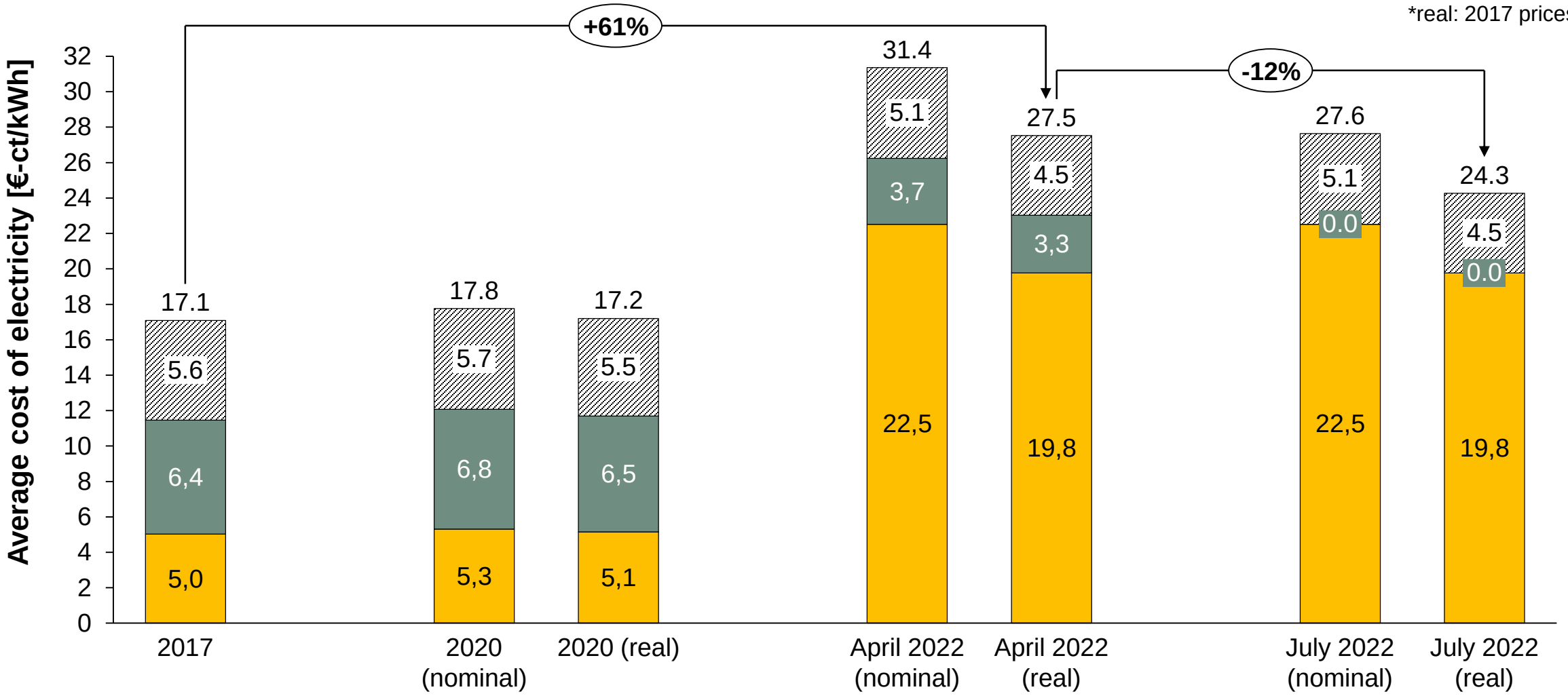
Price development for industrial consumers (new contracts)



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Input-Output-Analysis – Leontief price model

$$\Delta \vec{p} = ((I - \boldsymbol{A})^{-1})^T \times \boldsymbol{W} \times \Delta\overrightarrow{p_w}$$

$((I - \boldsymbol{A})^{-1})^T$ … Transposed Leontief inverse matrix

$\Delta\vec{p}$ … Vector of changes in output prices

$\Delta\overrightarrow{p_w}$ … Vector of changes in value added

$\boldsymbol{W}$ … Matrix of value added coefficients

Output \ Input		Intermediate demand 1	Intermediate demand 2	Intermediate demand 3	Application: Final demand	Total Input
Sectors	1	Performance			Final demand -vector -matrix	Σ
	2					
	3					
Value added		Advance performance matrix				
Importe						
Total output		Σ				

Analysis

- Effect of the electricity price increases and the abolishment of the RES support levy in 2022
- 3 alternative reform options:
  - Equally distributed RES support levy
  - Residential sector pays entire RES support levy
  - Non-residential sectors pay entire RES support levy

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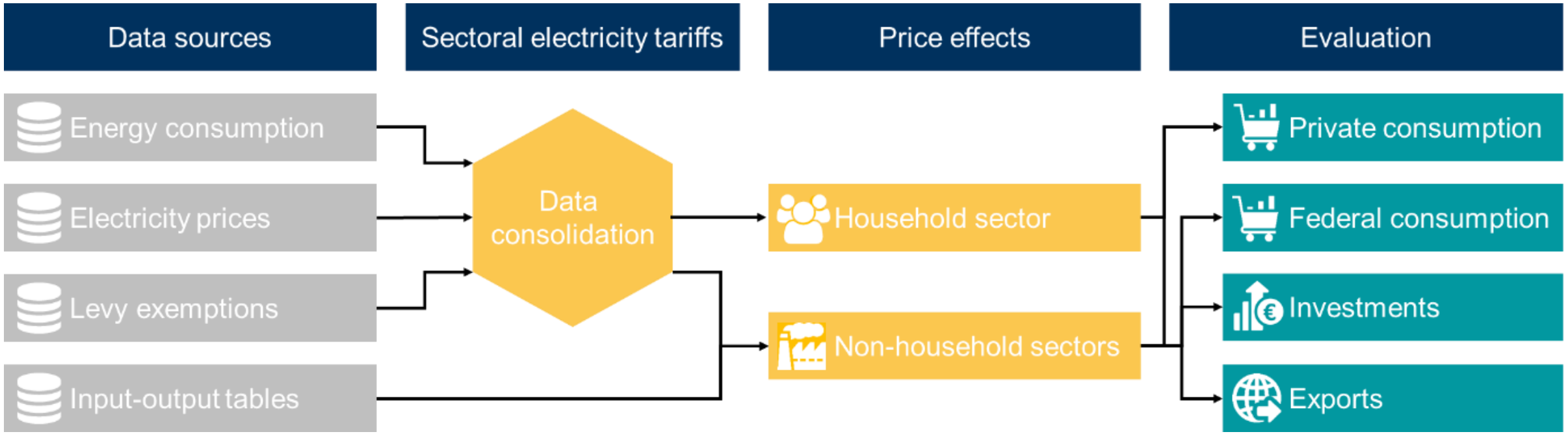
Research framework and data consolidation



Data

- Input-Output-Table and energy balances from 2017
- 12 sector resolution
- Price development from 2017 to summer 2022
- Share of privileged electricity consumption in each sector

- AGEB energy balances
- IO-Tables and sector specific information from the federal statistical office
- BDEW electricity price analysis (April 22)

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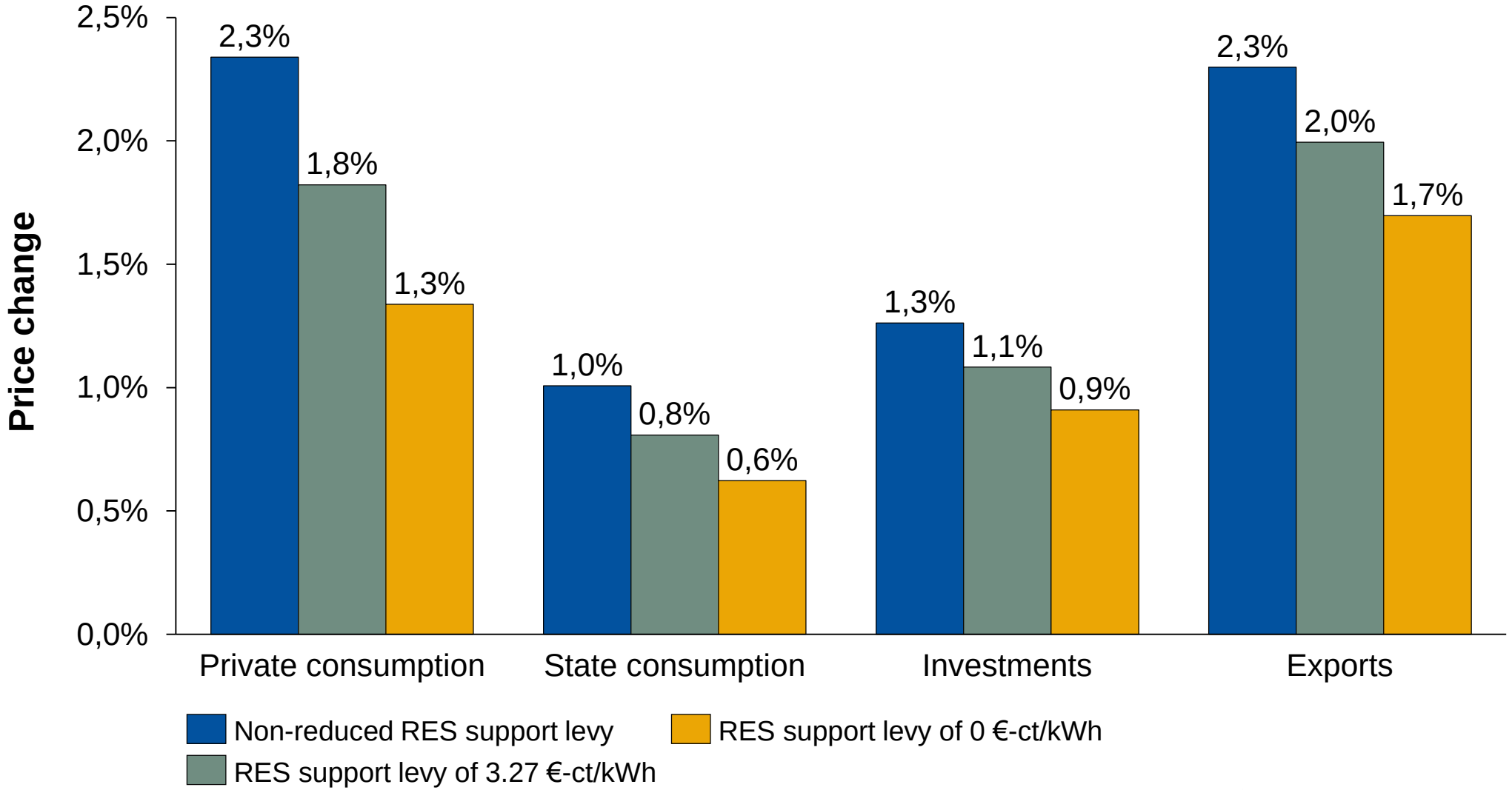
Effect of price increases in 2022 and different levels of the RES support levy



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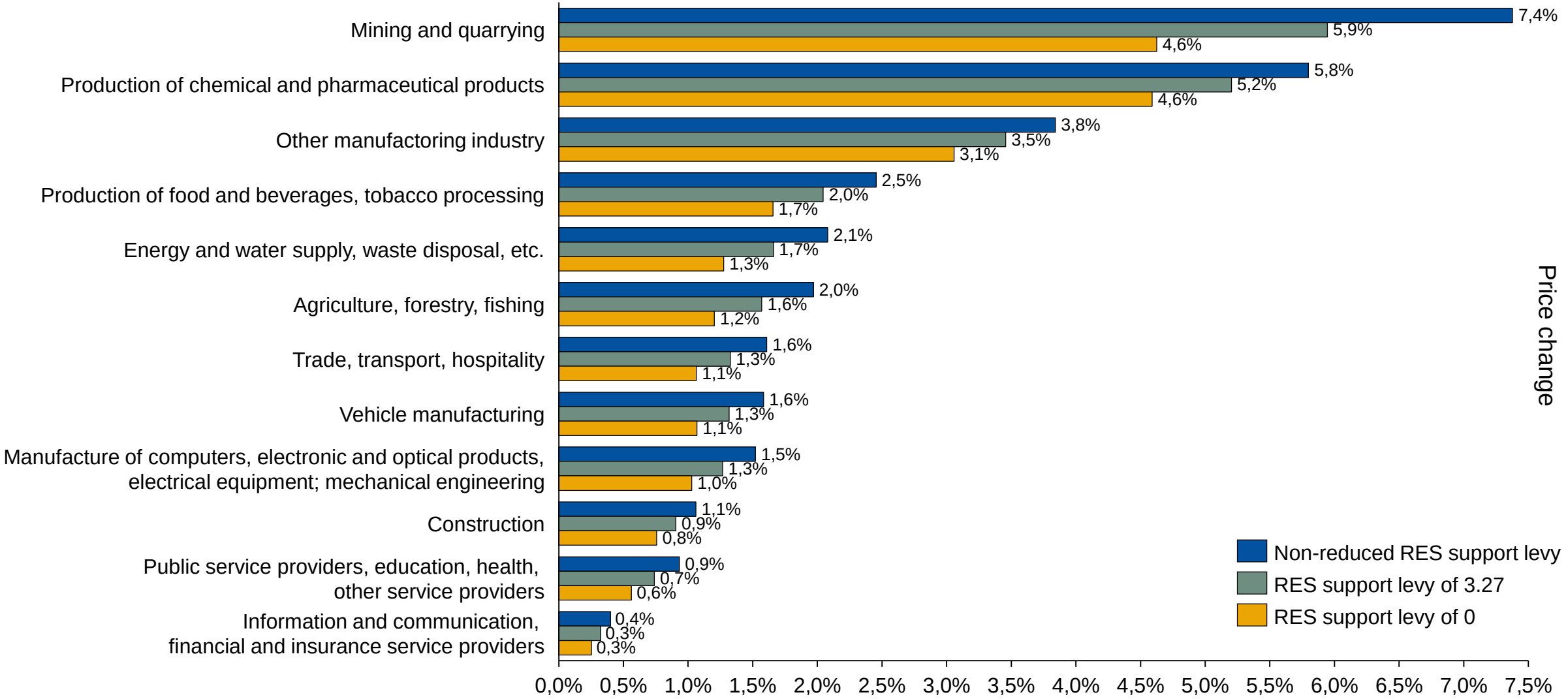

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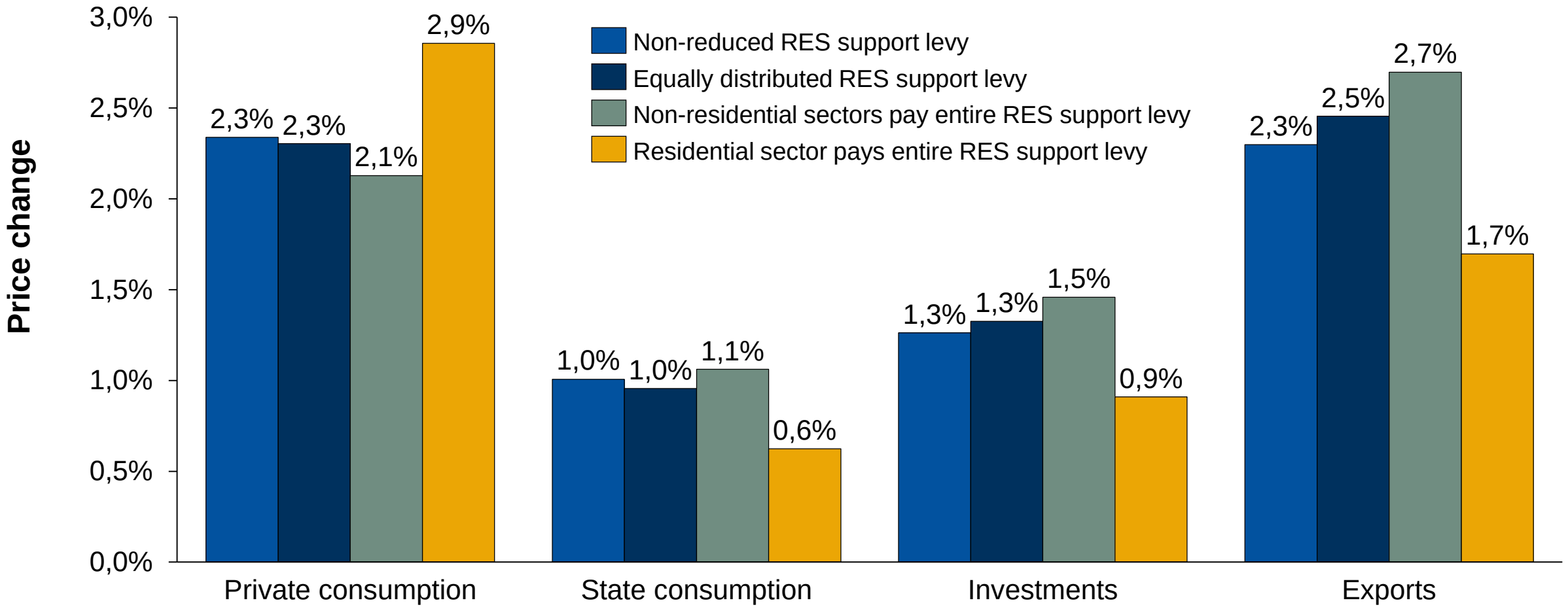
Effect of alternative approaches for financing RES support



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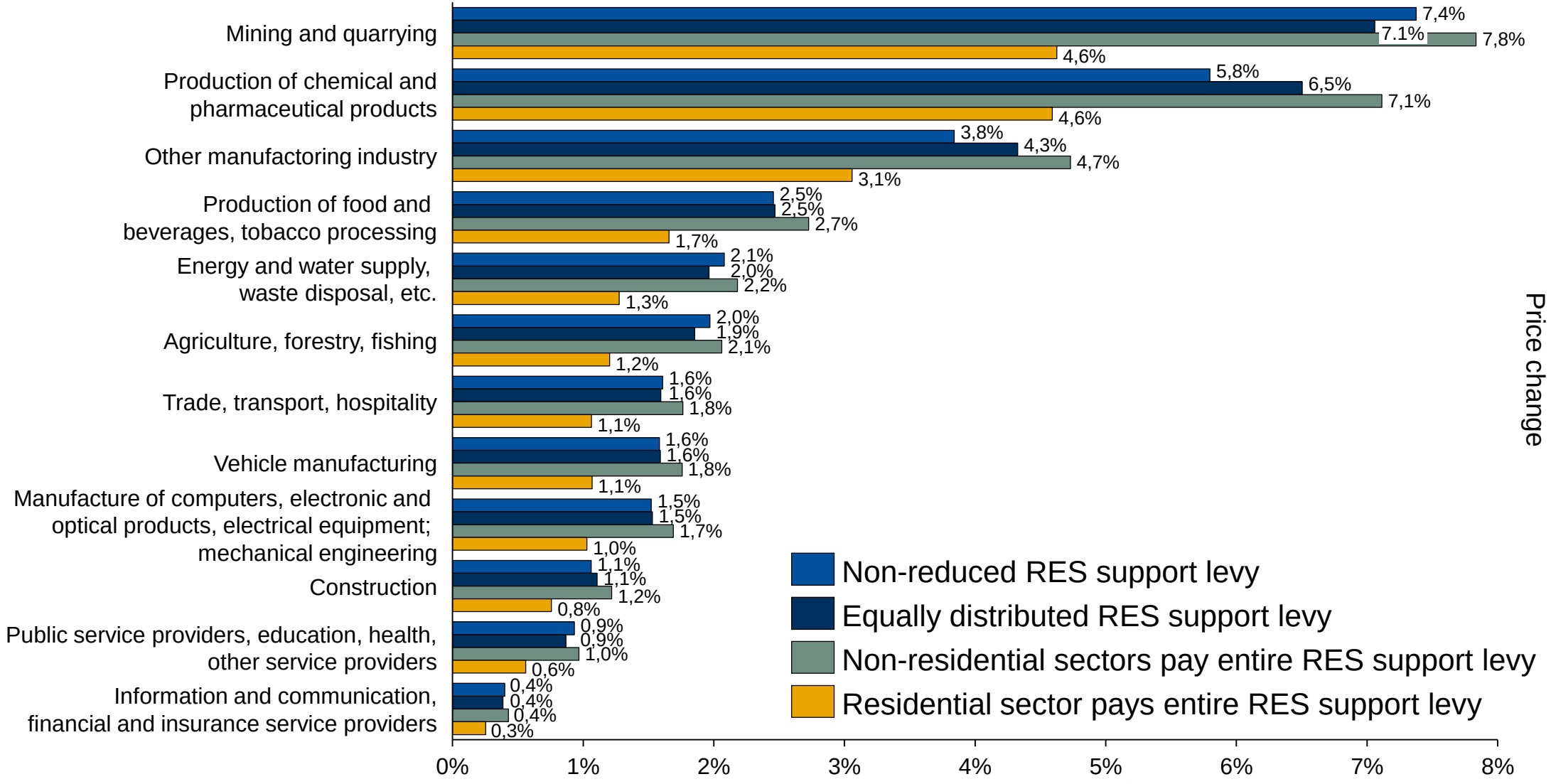

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Discussion and Outlook

- Abolishment of the RES support levy had a dampening effect on rising electricity prices
- However: in total the relief measure could not compensate the price increases
- Strength of relief effect varies greatly between sectors:
  - Low relief effect in electricity-intensive sectors with privileged electricity consumption
  - High effect in electricity-intensive sectors without privileged consumption and for private consumption
- Distributional consequences of RE support and relief measures have been highlighted and are important to consider in policy decisions
- Funding for RES support is now provided by the special fund Climate and Transformation as well as the general budget → distributional consequences should be evaluated in further research
- **Limitations of our study:**
  - Relatively low resolution of the individual sectors
  - Approach does not allow conclusions on long-term effects
  - Price increases for industrial consumers represent an upper-bound

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Thank you for your attention!

Datasources for the different sectors

No.	Summarized production areas	EB	ET	MS	CTS
1	Products of agriculture, forestry and fisheries	-	✓	-	-
2	Mining products, stones and earths	✓	-	✓	-
3	Food and feed, beverages, tobacco products	✓	-	✓	-
4	chemical and pharmaceutical products	✓	-	✓	-
5	electronic and optical products, electrical equipment, machinery	✓	-	✓	-
6	Vehicles	✓	-	✓	-
7	Other manufacturing products	✓	-	✓	-
8	services of energy supply, water supply, waste disposal, etc.	-	-	-	✓
9	Construction work	-	✓	-	-
10	trade and transportation services, hospitality services	✓	✓	-	✓
11	Information, communication, financial, insurance, business services, residential and real estate services.	-	-	-	✓
12	public service providers, education, health, other service providers	-	-	-	✓

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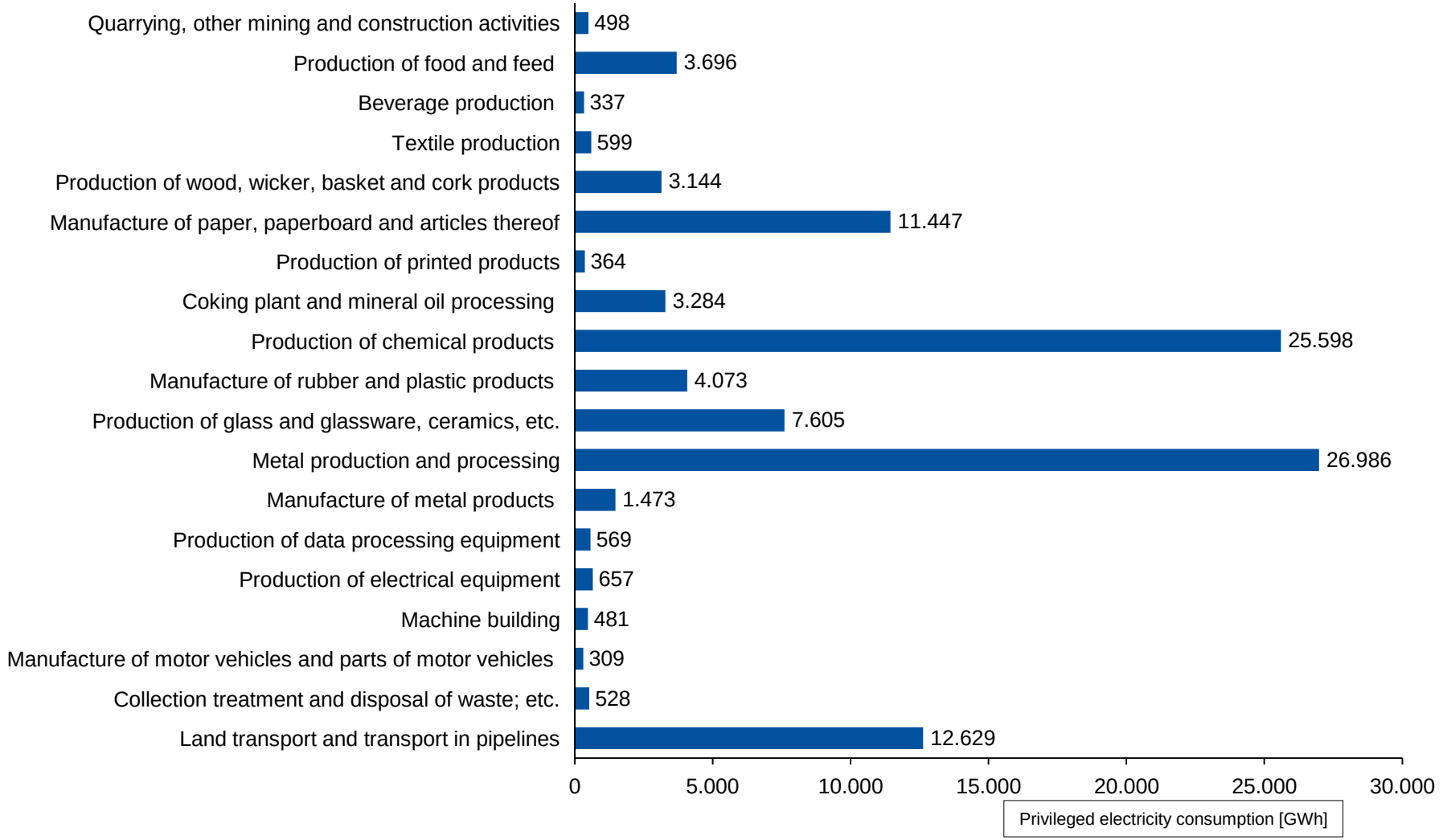
Priviliged electricity consumption



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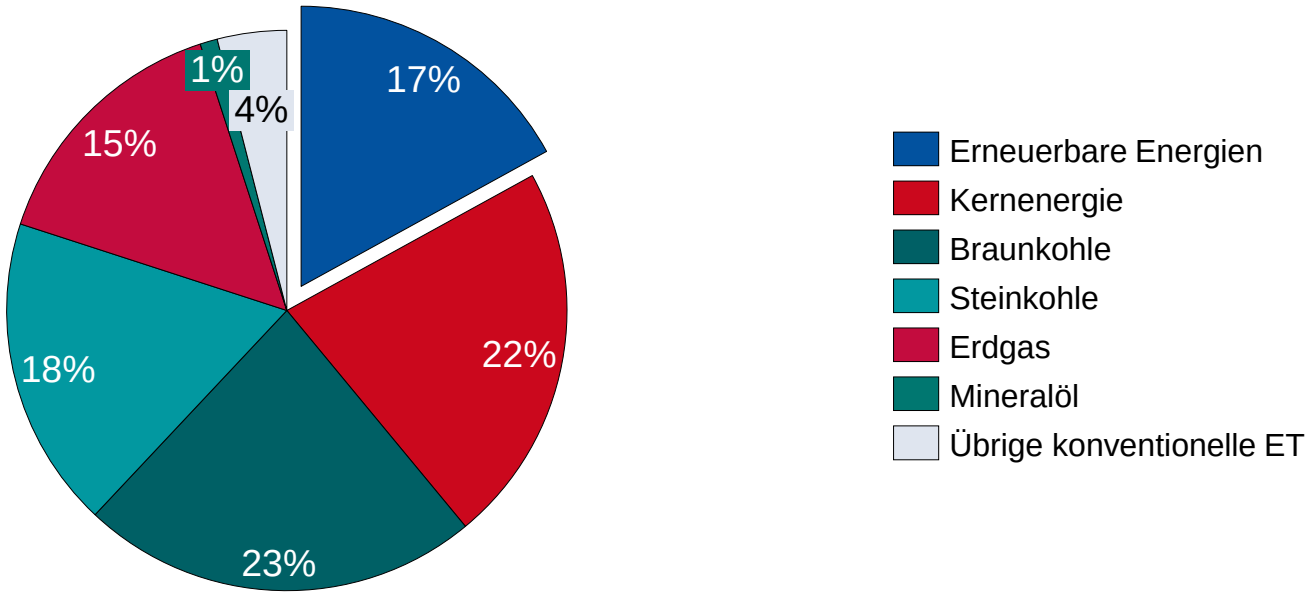
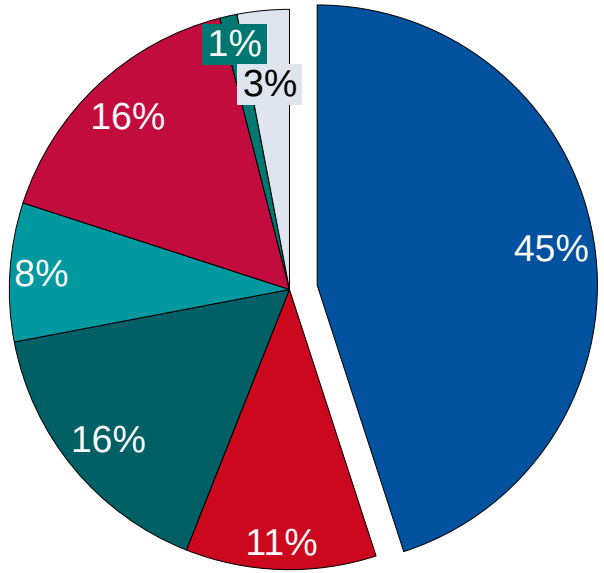
Increasing share of renewables over the years

Bruttostromerzeugung nach Energieträgern in Deutschland



2010: 626 Mrd. kwh



2020 : 565 Mrd. kwh

Quelle: AG Energiebilanzen e. V. (AGEB)

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