



RUHR-UNIVERSITÄT BOCHUM

CLIMATE PROTECTION AND CLIMATE NEUTRALITY – THE ROLE OF CITIES

Prof. Dr. Andreas Löschel

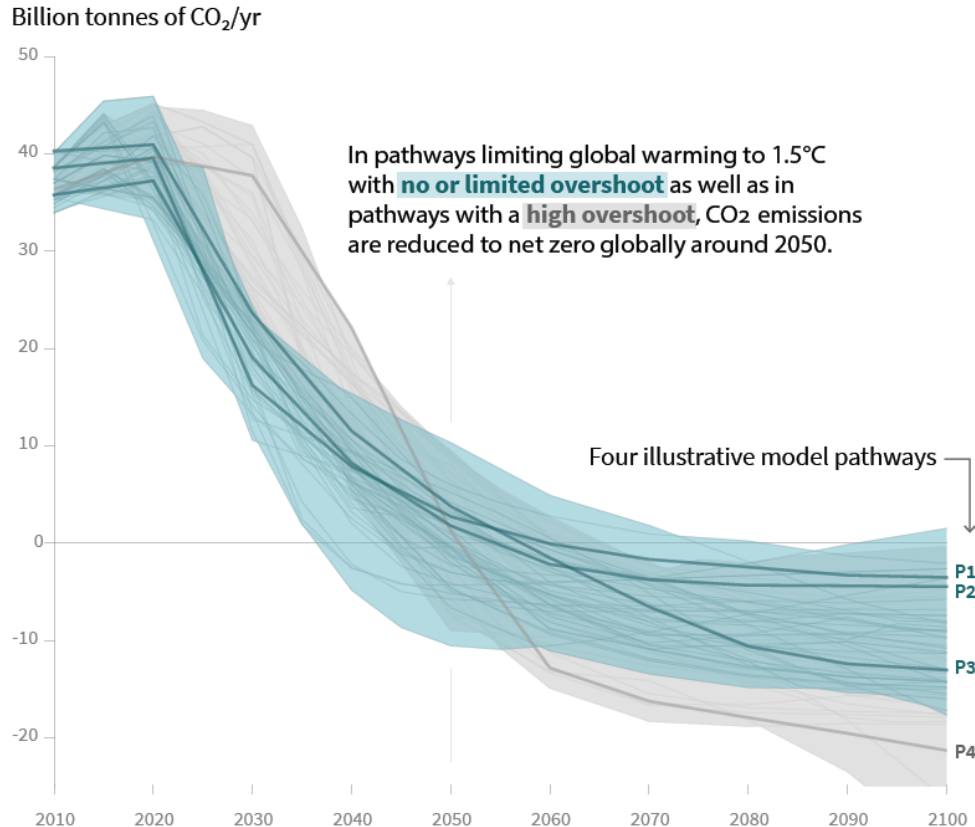
Chair of Environmental/Resource Economics and Sustainability, Ruhr University Bochum
Chair of the German Federal Government's Expert Commission "Energy of the Future"

Operationalizing SDGs: 6 Transformations



Quelle: Sachs et al. (2019), Nature Sustainability

1.5°C pathways with overshoot (SR1.5)



Timing of net zero CO₂
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios

Pathways limiting global warming to 1.5°C with **no or low overshoot**

Pathways with **high overshoot**

Pathways limiting global warming below 2°C
(Not shown above)

- Climate neutrality (net zero emissions): emissions and GHG removal (through biological and geochemical sinks as well as direct air capture and storage) are balanced.
 - 2050 with small exceedance
 - 2060 with exceedance
 - 2070 for 2C targets(see also Geden/Löschel 2017, Define Limits ..., Nature Geoscience)

Source: IPCC (2018), SR1.5 SPM

Net-zero energy transition

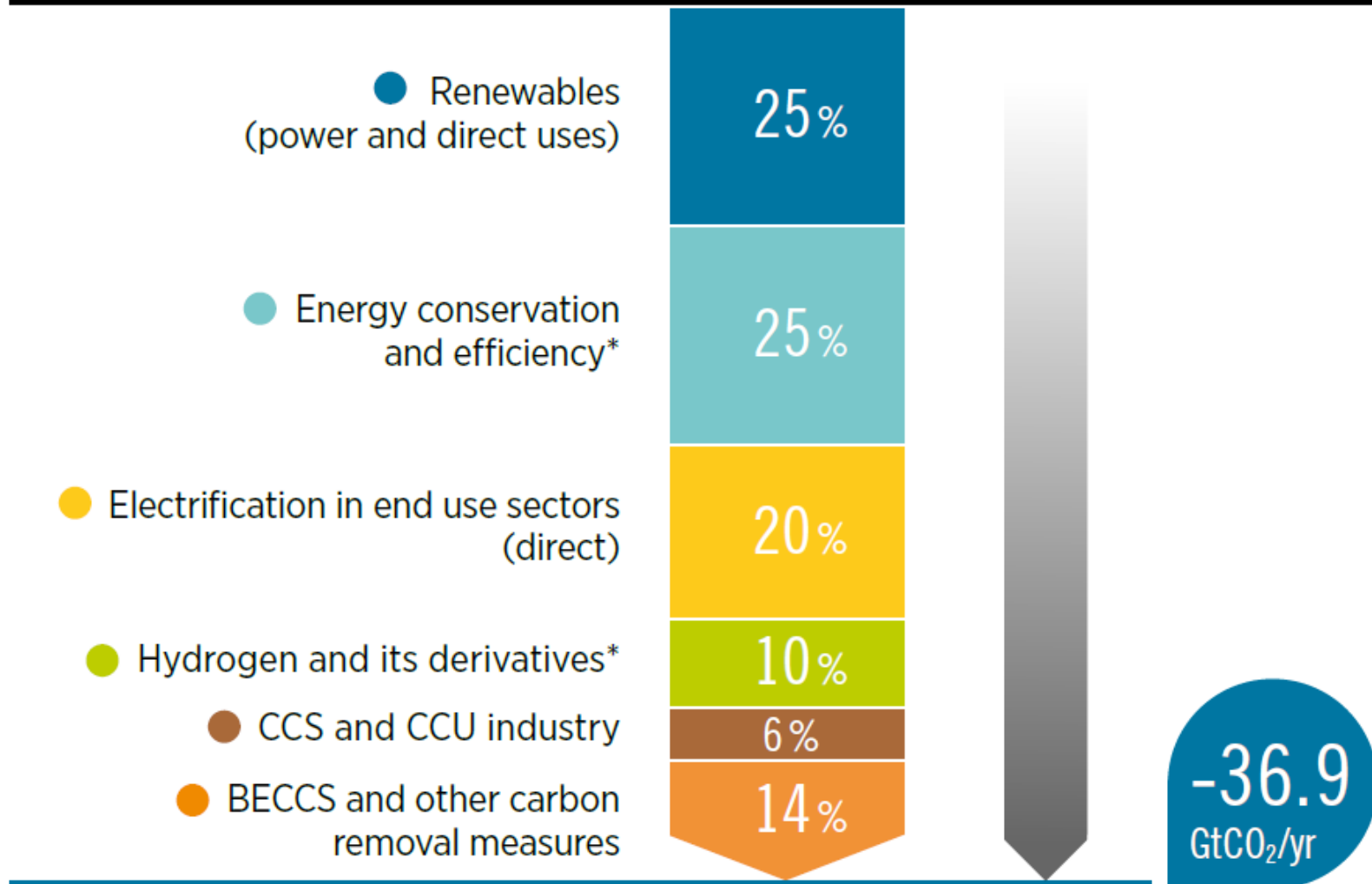
Critical areas for net-zero energy system transition (IEA 2020):

- Address existing assets in power generation and industry
- Spur clean energy innovation: Strengthen markets for technologies at an early stage of adoption and boost support for research, development and demonstration (electrification, H2/synfuels, CCS/CCU, bioenergy)
- Develop and upgrade infrastructure which enables technology deployment
- Foster international cooperation

Climate neutrality

Abatements

2050

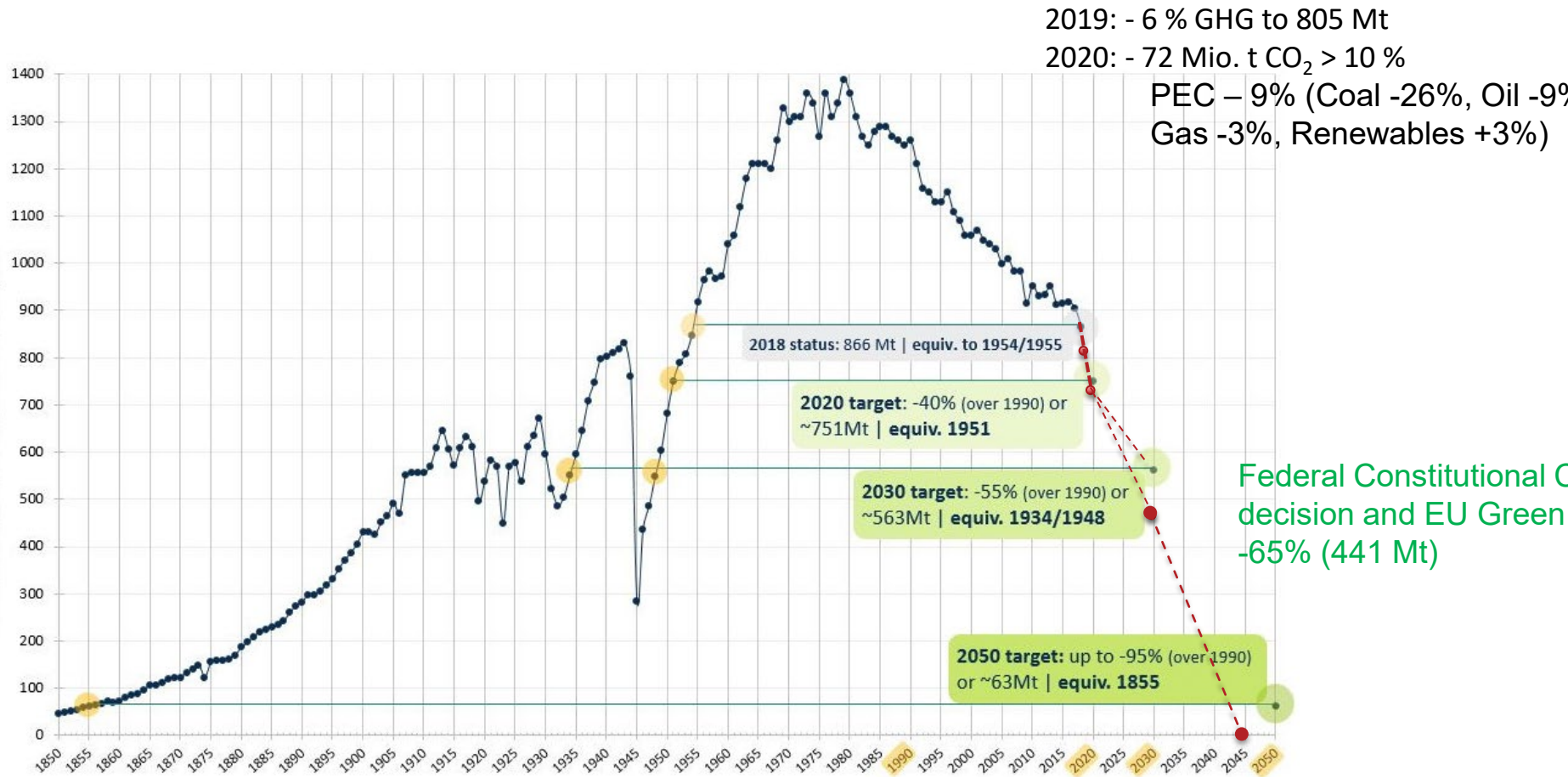


Monitoring the Energy Transition

<http://www.bmwi.de/Redaktion/EN/Artikel/Energy/monitoring-implementation-of-the-energy-reforms.html>

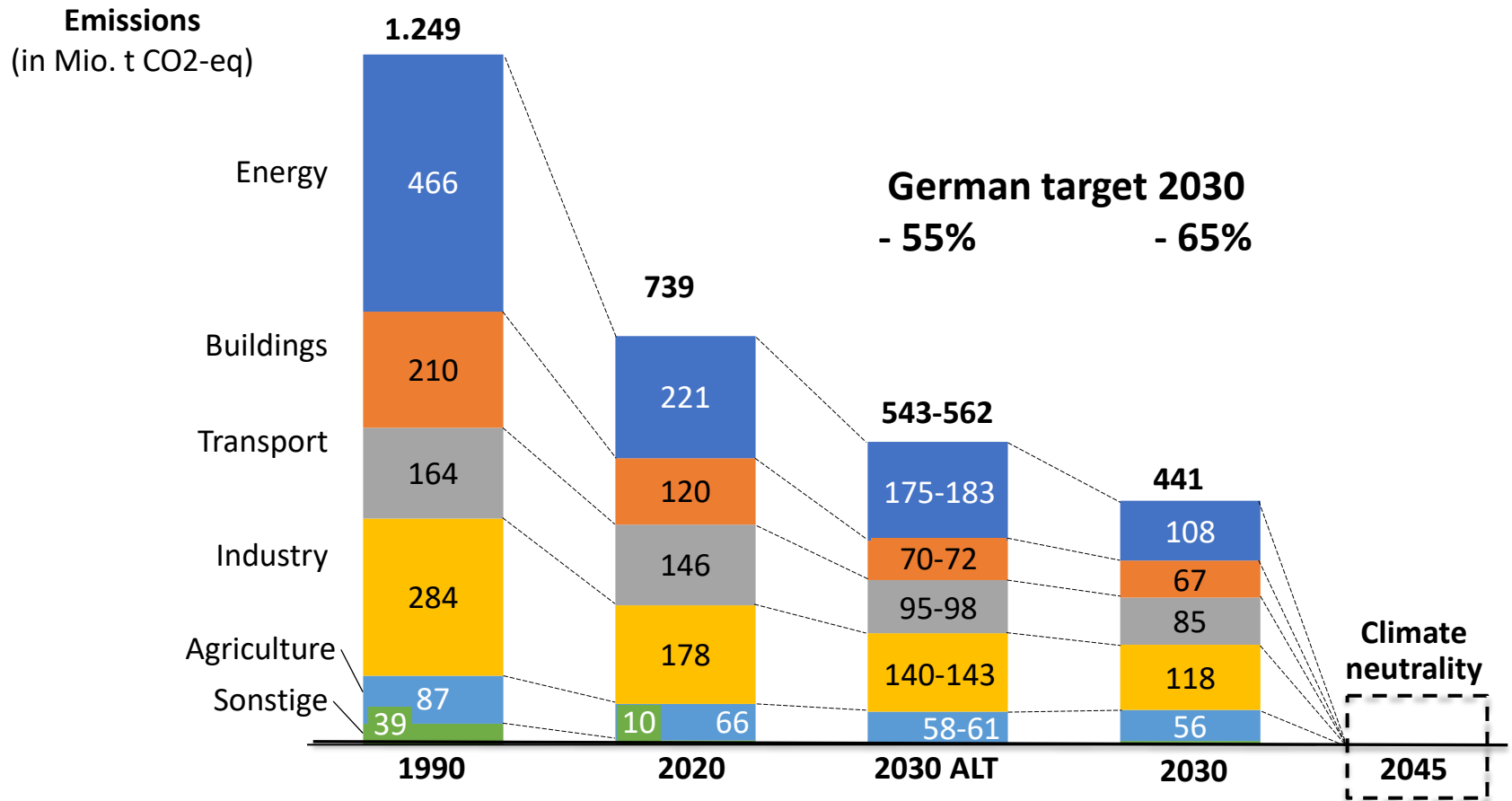


German GHG Emissions



Source: Clean Energy Wire (2019)

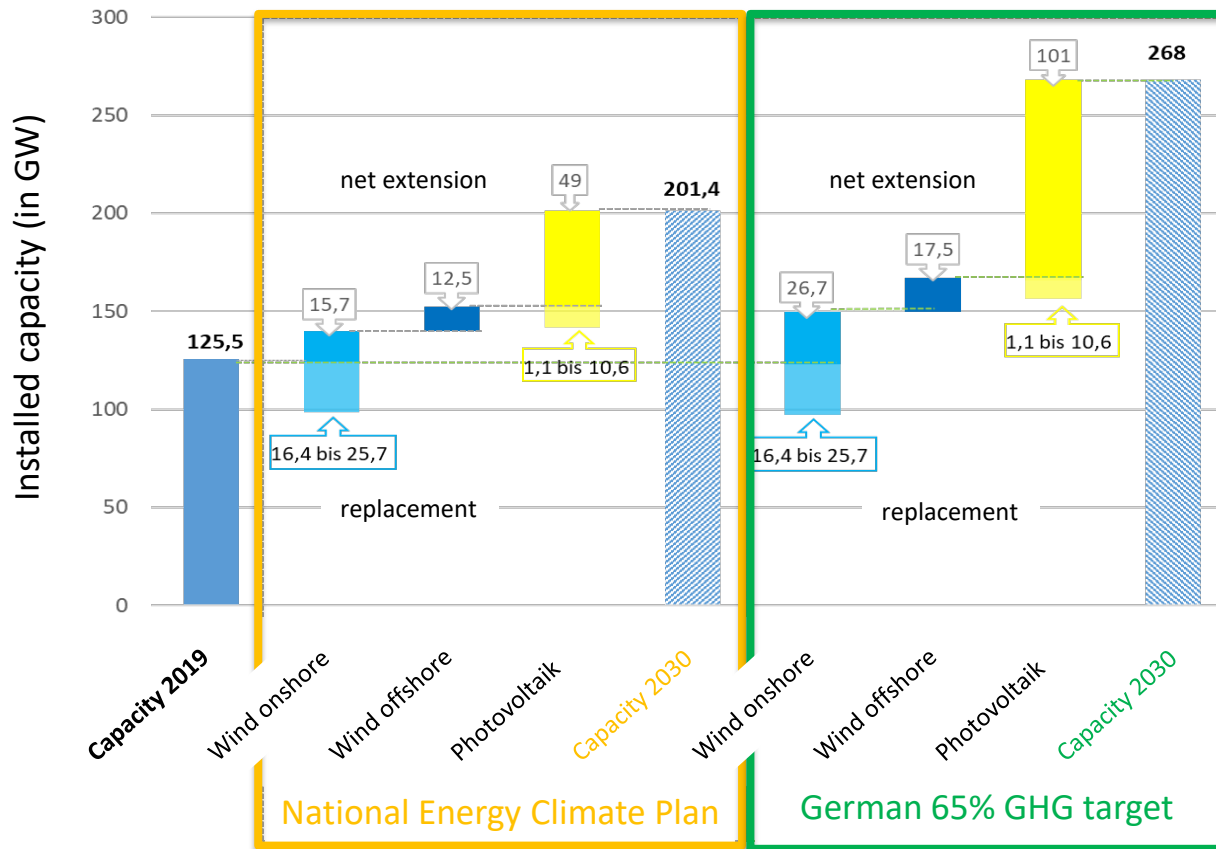
German Climate Change Act



Source: BMU (2019, 2021)

Electrification

- German renewable target of 65% with low electricity consumption 2030 (580 TWh) but: electrification with hydrogen strategy, industry demand, electric mobility
- Green Deal: 70 % renewable target for 2030 (2020: ca 45 %) & electricity price reforms



EEG 2021

Wind on 71 GW

Wind off 20 GW

PV 100 GW

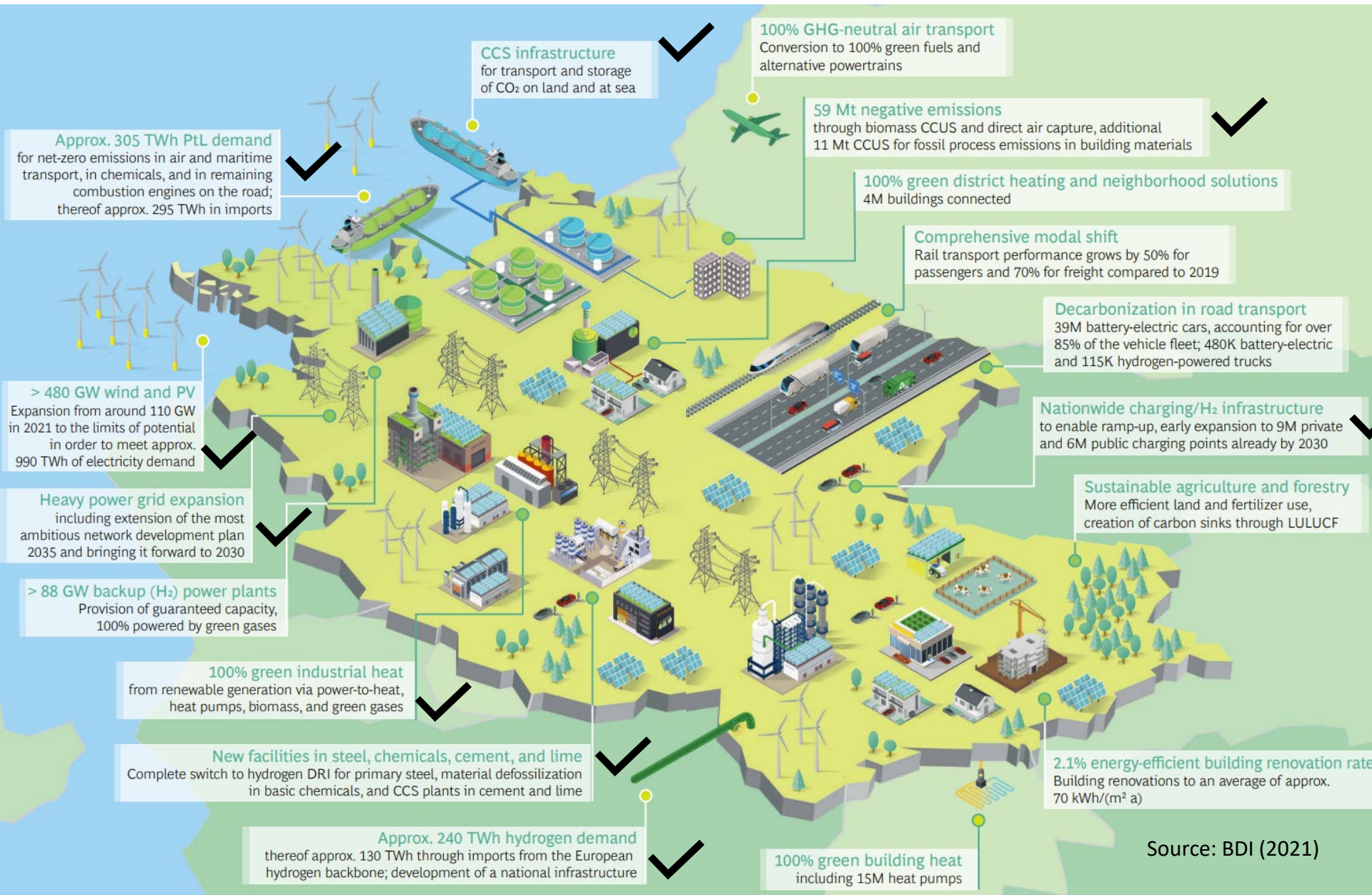
KOA-V

Wind 100-130 GW

Wind off 30 GW

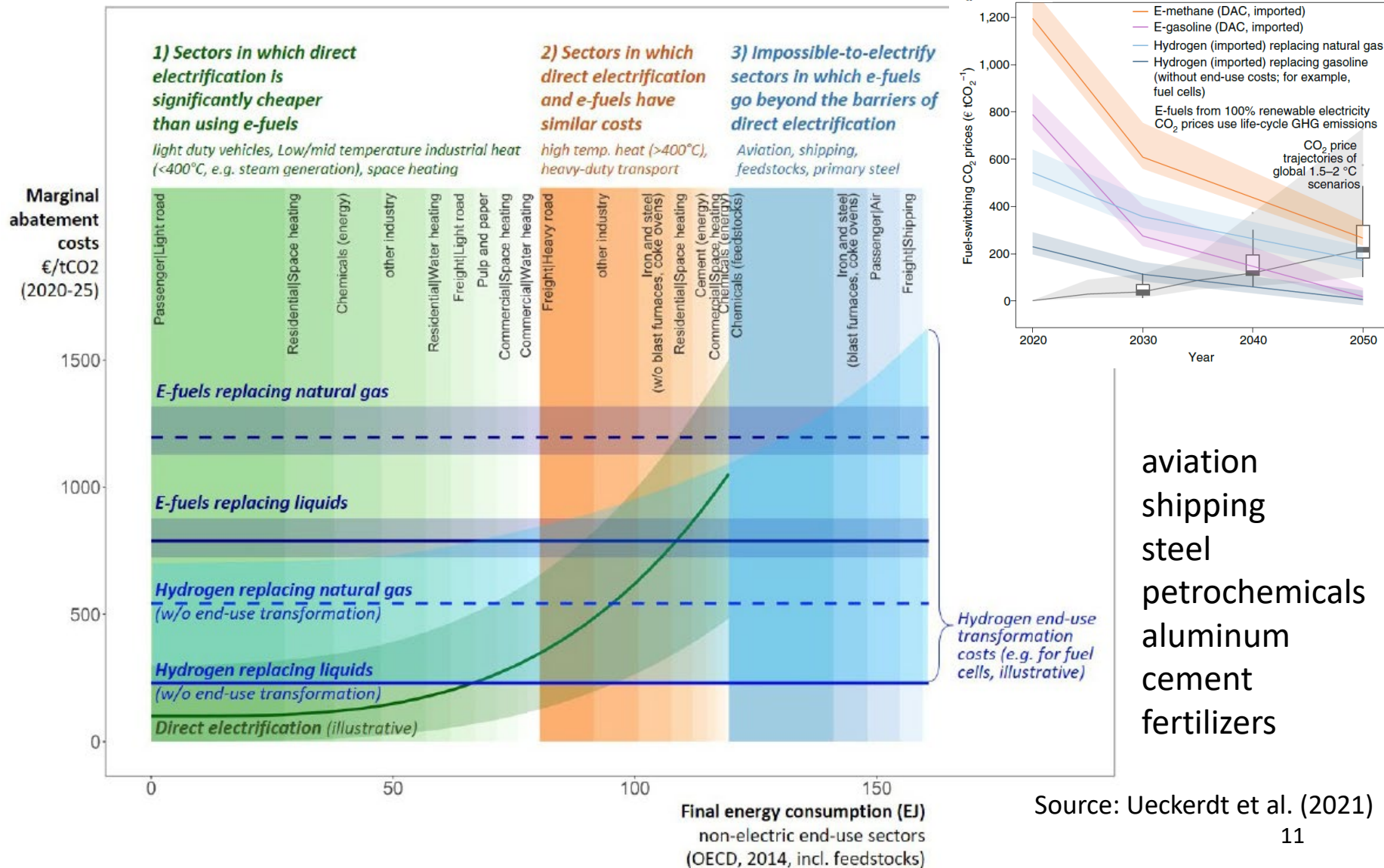
PV 200 GW

Climate-neutral Germany in 2045



Source: BDI (2021)

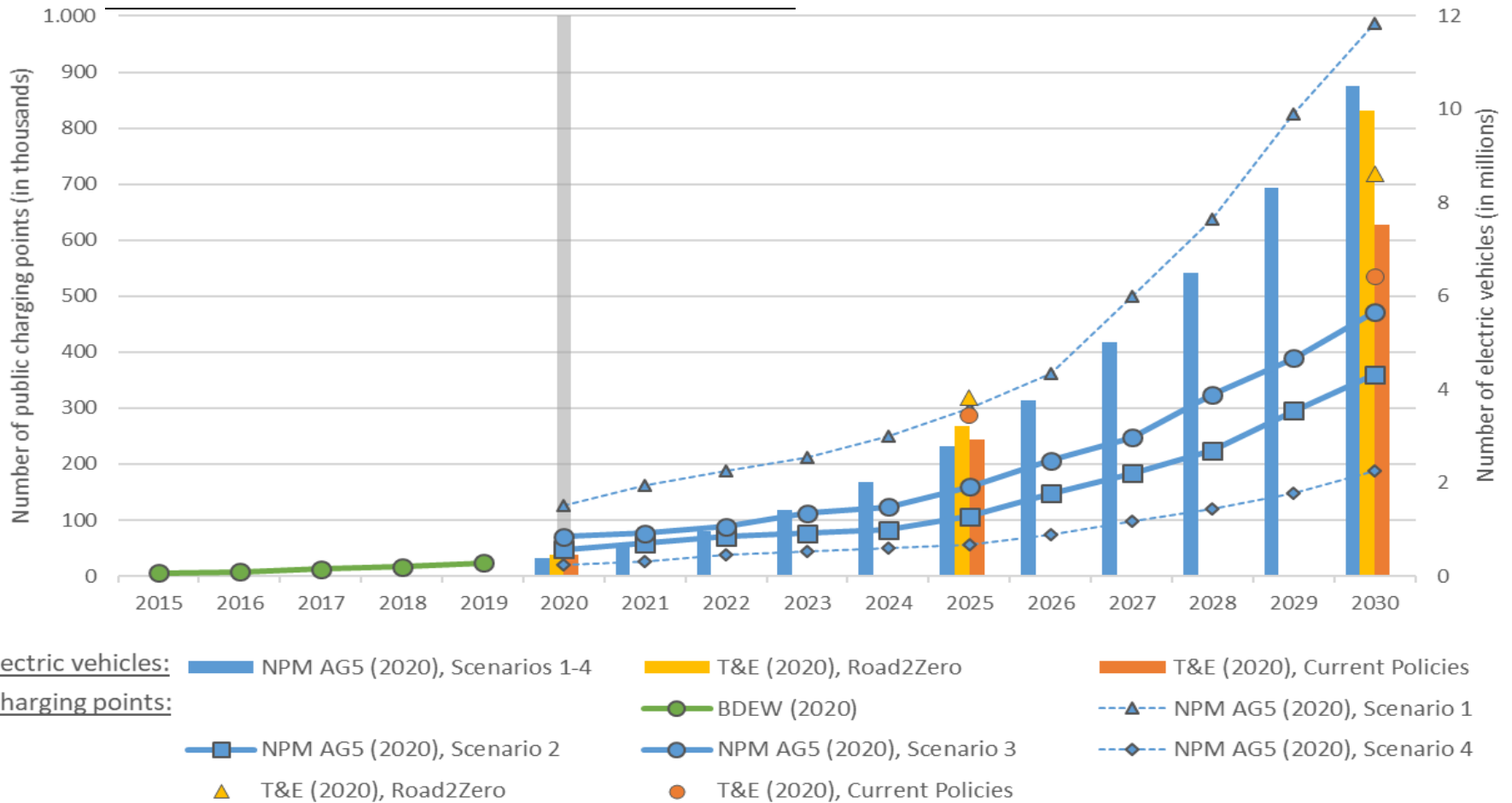
Hard to abate (defossilize) sectors: e-fuels



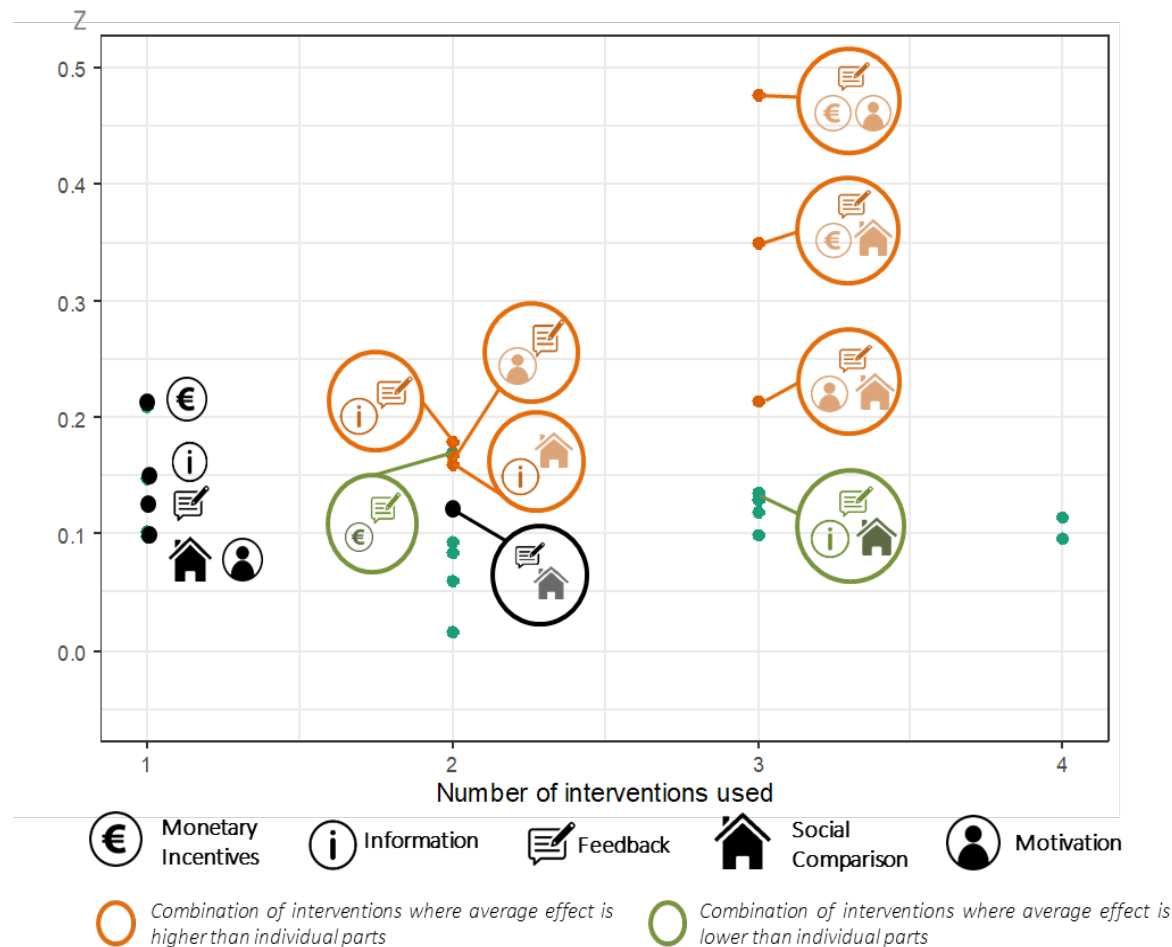
Passenger car fleet



Infrastructure



Reducing carbon emissions of residential buildings



Source: Tarun Khanna, Giovanni Baiocchi, Max Callaghan, Felix Creutzig, Horia Guigas, Neal R Haddaway, Lion Hirth, Aneeq Javaid, Nicolas Koch, Sonja Laukemper, Andreas Löschel, Maria Del Mar Zamora, Jan C Minx (2020), Reducing carbon emissions of residential buildings through monetary incentives and behavioral interventions: a meta-analysis, <https://www.researchsquare.com/article/rs-124386/v1>

Utilities as change agents

- Non-monetary incentives shown to be effective tools to change behavior in a variety of fields
- Often unanswered question relevant for public policy: How to scale up promising interventions?
- In cooperation with a large public utility in Germany, we develop an energy savings application for mobile phones that can be used by majority of the population
- App randomizes “goal setting nudge” prompting users to set themselves energy targets
- Roll-out of app is promoted by a mass marketing campaign and various financial incentives

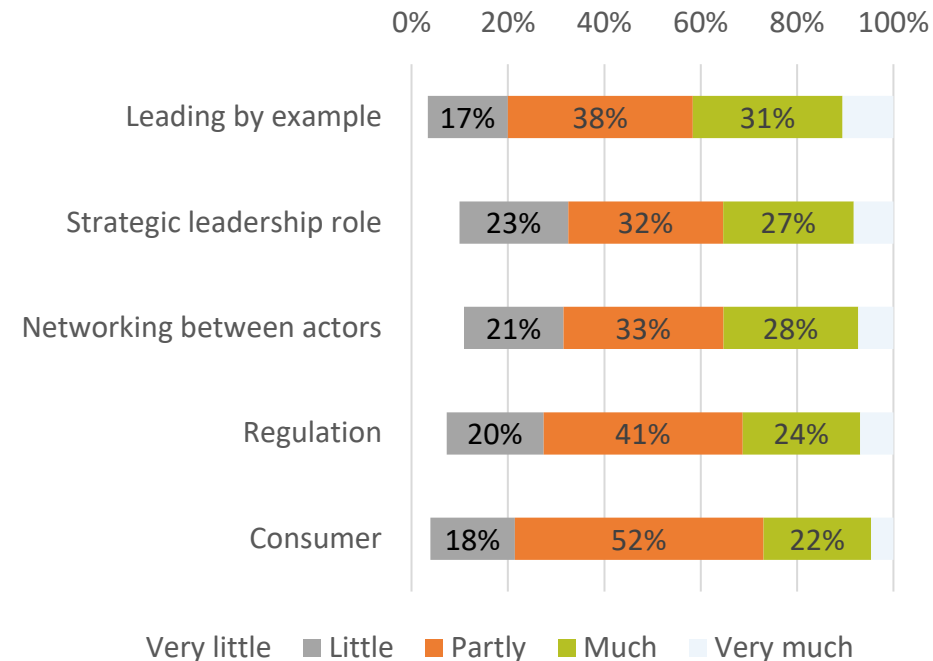
Source: Löschel, Wertschulte, Rodemeier, 2020: When Nudges Fail to Scale Field Experimental Evidence from Goal Setting on Mobile Phones

Energie sparen und gewinnen!



Tailored programmes: the role of cities

- Role of local governments in local climate protection
- Climate protection institutionalized
 - Climate protection concept (59%)
 - Climate protection targets (53%)
 - Budget for mitigation (45%)
 - CO₂ accounting (44%)
- Experiments on role model function: If city/municipality actively contributes to climate protection, will this motivate more climate-friendly behavior of citizens?
→ no crowding in / no crowding out



Source: Dütschke and Alsheimer, Fraunhofer ISI, 2021, NostaClimate

Thank you.

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