

University of Stuttgart
Institute for Energy Efficiency
in Production EEP

Decarbonisation trends in energy intensive industries

A bird's view

**Stefan M.
Buettner**



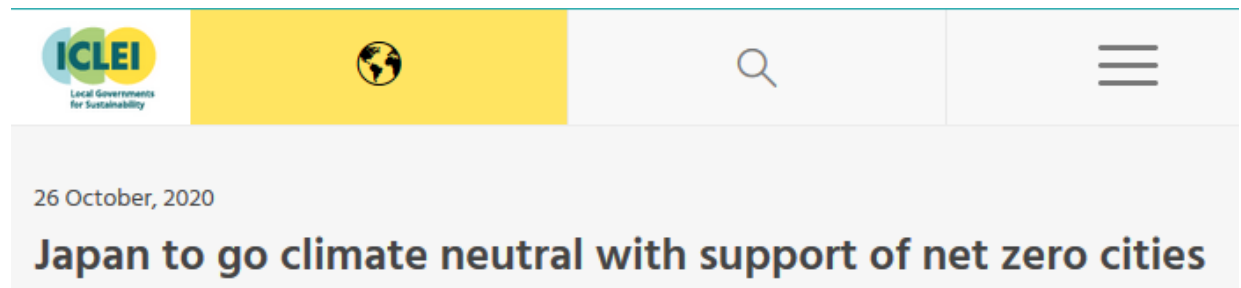
Create clarity about the terminology

Achieve a common understanding of the intended goal

The New York Times

Japan's New Leader Sets Ambitious Goal of Carbon Neutrality by 2050

The announcement, coming weeks after a similar pledge by China, will require a major overhaul of the infrastructure in Japan, which remains heavily dependent on fossil fuels.



Sources: The New York Times, ICLEI

Create clarity about the terminology

Measures to achieve various neutralities

CO₂ neutrality

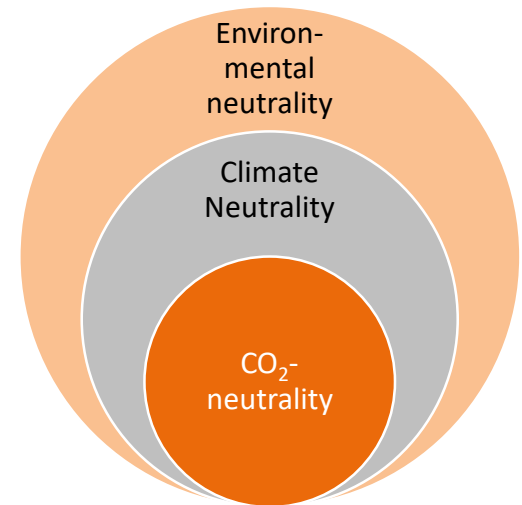
- Reduction of CO₂ emissions
- CO₂ compensation measures

Climate neutrality

- Reduction & compensation of other greenhouse gases with global warming potential such as:
 - Non-fluorinated GHGs: methane (CH₄), nitrous oxide (N₂O).
 - Fluorinated GHGs: hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF₆), nitrogen trifluoride (NF₃)

Environmental neutrality

- Avoidance & compensation of all other substances that have a negative impact on the environment and health such as
 - Particulate matter, soot, pesticides, nitrogen oxides (NO_x), sulfur dioxide (SO₂)

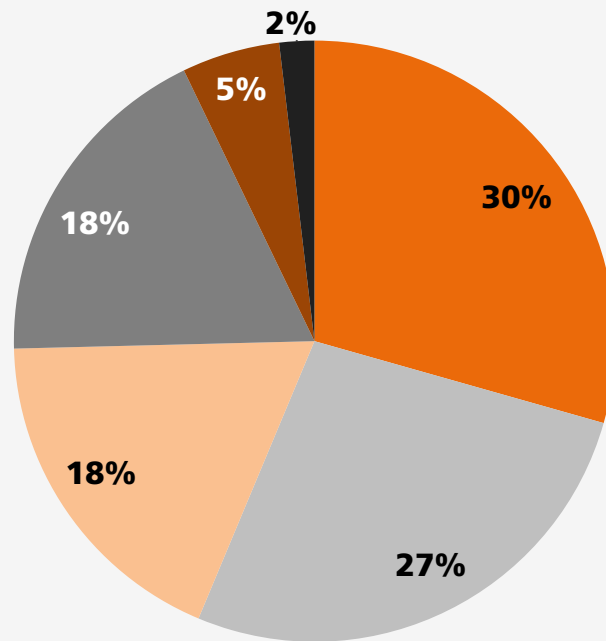


Source: <https://ee-ip.org/article/defining-carbon-neutrality-not-as-simple-as-it-might-seem-1811>

What goal are manufacturing companies working toward?

Optimization of energy demand most frequently mentioned

The EU has set a target to be climate neutral by 2050 and is currently revising the 2030 targets. What are you optimizing your business towards - which of the following options apply to your business? (n=834, n'=1663)



- Optimization of the energy demand
- Reduction of CO2 emissions (including energy demand)
- Reduction of greenhouse gas emissions (including CO2 emissions)
- Reduction of all environmental impacts (including greenhouse gas emissions).
- Optimization not planned
- Do not know

Societal Expectations are Rising

Why become carbon neutral now?



EU €750 billion Covid recovery fund comes with green conditions

Published on 27/05/2020, 2:37pm

A quarter of spending has been earmarked for climate action and a 'do no harm' clause rules out environmentally damaging investments

The New York Times

Big Business Says It Will Tackle Climate Change, but Not How or When

In Davos, business leaders were newly vocal about the danger, though they gave few details about how they would reform their practices.

Bloomberg Green

Finance

Long-Term Investors Now Hold Sway Over ESG

Investors are having more success on climate change, and increasingly are pushing companies on human rights, diversity and pay equity.



edie

Disclose climate risks or face divestment, investors warn Europe's largest companies

17 November 2020, source [edie newsroom](#)

A coalition of investors representing more than \$9trn of assets has asked some of Europe's largest and highest-emitting companies, like Shell and Maersk, to prove they are aligning with the Paris Agreement and to improve climate risk disclosure.

The Guardian

Climate change: How a green new deal really could go global

BBC NEWS

Trade unions around the world support global climate strike

Adults, businesses and trade unions asked to join youth climate campaign

What are the implications for my company?

Why Carbon Neutrality now?

Price on carbon in a rapidly growing number of countries.
Carbon Border Tax regimes are considered for products from outside these.



WHO WE ARE

WHAT WE DO

WHERE WE WORK

UNDERSTANDING POVERTY

WORK WITH US



What we Do / Data / Carbon Pricing Dashboard

Carbon Pricing Dashboard

HOME

ABOUT

MAP & DATA

WHAT IS CARBON PRICING?

RESOURCES

KEY STATISTICS ON REGIONAL, NATIONAL AND SUBNATIONAL CARBON PRICING INITIATIVE(S)

64

Carbon Pricing initiatives implemented or scheduled for implementation

46

National Jurisdictions are covered by the initiatives selected

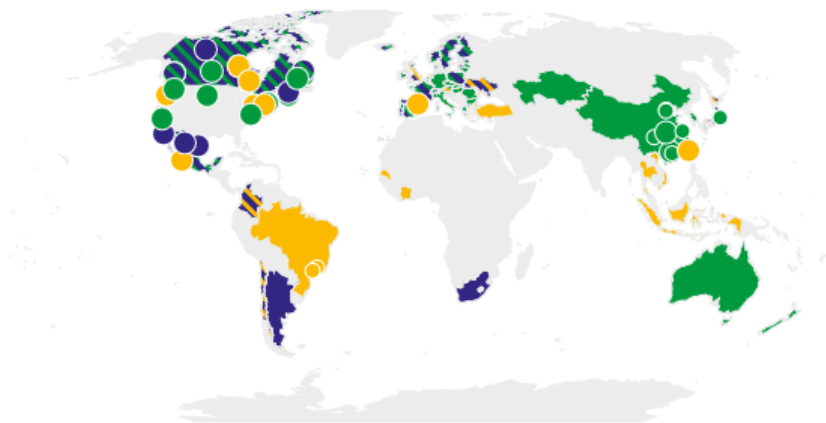
35

Subnational Jurisdictions are covered by the initiatives selected

In 2020, these initiatives would cover
12 GtCO₂e, representing **22.3%** of
global GHG emissions

Total value (US\$ Bn) of carbon pricing initiatives in
2020

Summary map of regional, national and subnational carbon pricing initiatives



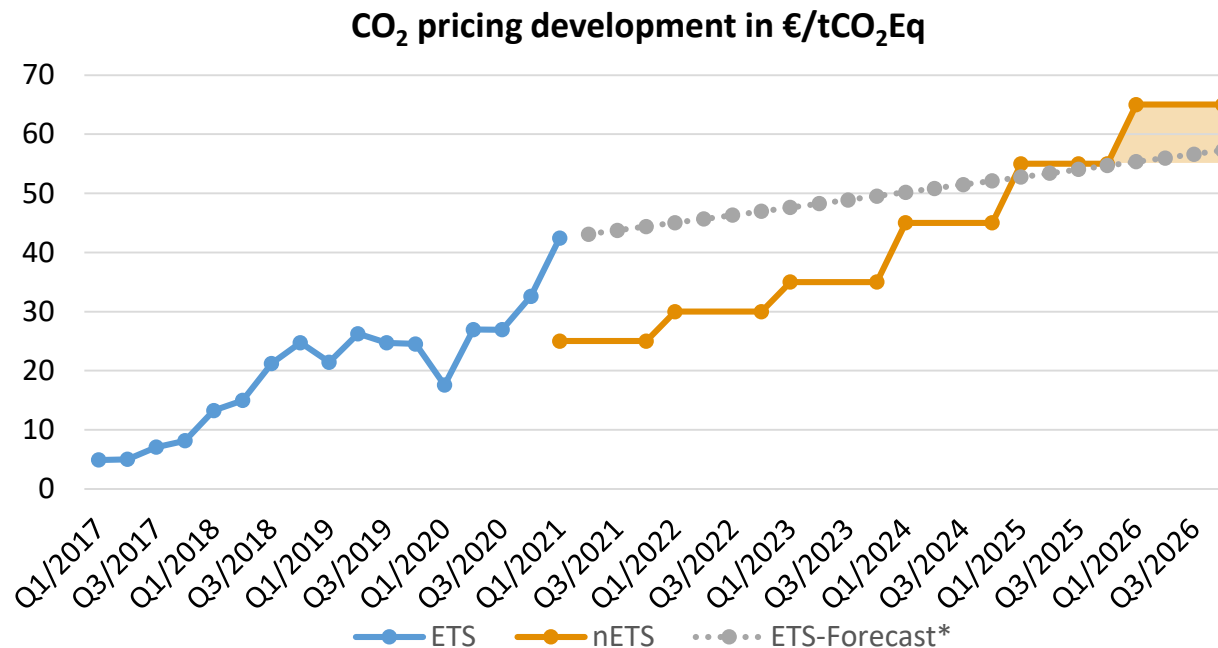
● ETS implemented or scheduled for implementation
● ETS or carbon tax under consideration
● ETS implemented or scheduled, ETS or carbon tax under ...

● Carbon tax implemented or scheduled for implementati...
● ETS and carbon tax implemented or scheduled
● Carbon tax implemented or scheduled, ETS under consid...

Source: <https://carbonpricingdashboard.worldbank.org/>

Why Carbon Neutrality now?

What does it mean for my company?



European ETS price

- Rising rapidly with tightening of EU 2030 emissions targets
- Expansion to additional sectors in clarification (currently electricity + selected industrial sectors)
- Projected €60 for 2030 likely to be exceeded
- Little planning certainty

National Emissions Trading Scheme Germany (nETS)

- On energy-related emissions (excluding electricity)
- Planning certainty until 2025/6

*EU Commission ALLBNK Scenario (-58% CO₂~65€ in 2030)

Why Carbon Neutrality now?

What does it mean for my company?

Expected increase in cost of energy-related emissions (excluding electricity)

CO ₂ - levy in nEHS (exemplary)	Energy consumption (without electricity)	2021	2022	2023	2024	2025	2026	Based on damage
€/tCO _{2e}		25€	30€	35€	45€	55€	55-65€	180€
Small size company	634 MWh	7.200€	8.700€	10.000€	13.000€	15.900€	18.750€	52.000€
Medium size company	13.5 GWh	157.000 €	189.000€	220.000€	283.000€	346.000€	409.000€	1.13 Mio.€
Large size company	7.5 TWh	78 Mio. €	93.8 Mio. €	109 Mio. €	140 Mio. €	172 Mio. €	203 Mio. €	562 Mio. €

What can you do?

1. accept additional costs at the expense of profit / margin / product prices
2. change of energy source for lower emissions (trade-off CO₂ price vs. additional cost tariff)
3. investing instead of paying the price of CO₂: Reduction of the due levy by investing in emission & cost reducing efficiency and process optimizations, as well as local generation

* Deutsches Global Compact Netzwerk 2018), https://www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/Diskussionspapier-Interner-Co2-Preis_screen.pdf

How do the companies react?

Carbon Neutrality Announcements of Companies

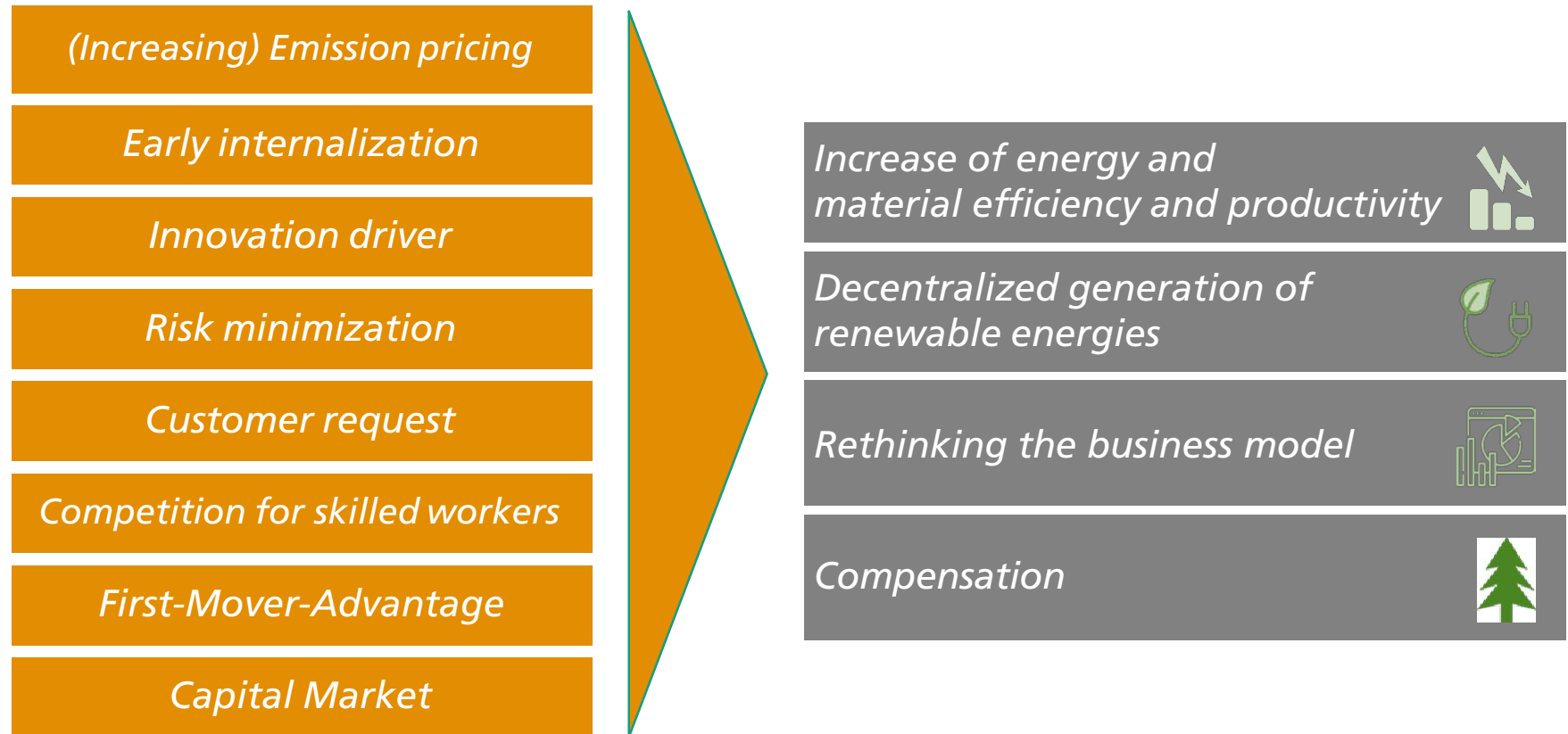
Assumed motivation, considerations and benefits:

Example: Automotive Industry Supplier

- display **leadership** and apply **pressure** on competitors (massive PR)
- appear **conscious** to **attract** scarce skilled personnel/graduates
- display being **on top of the game/innovate** to attract to future-proof in **disrupted** automotive sector
- Car manufacturers **imposing pressure** on their supply chain to deliver zero-carbon products
- remain **attractive to investors** that increasingly abandon non-future-proof business models
- it makes **economic sense**:
 - invest 2bn EUR over 11 years to have total cost of 1bn by 2030 (+ where applicable additional savings from avoided future CO₂-levies)
 - vertical internalisation:
 - early disconnect from increasing cost and supply shocks => gaining control over risks & costs
 - reducing payments to ,others' (general costs of energy);
 - compensate remaining emissions by i.e. 'scrappage bonus' for own product range; using own technology in aid-based compensation projects (and gain PR)
 - increased energy productivity/competitiveness
 - get paid for showing others how to replicate becoming carbon neutral

Triggers and strategy

Why carbon neutrality now?



Source: Fraunhofer IPA

Mapping out the path to climate neutrality

We need to know where we are for a realistic & effective roadmap

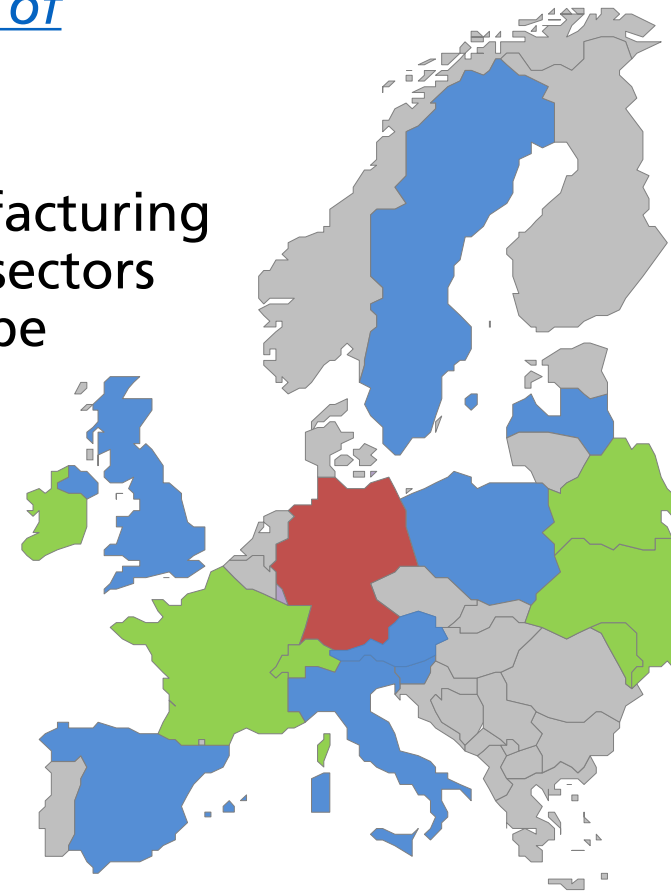
- How effective are current policies considered to facilitate an increase in energy efficiency in industry?
- What measures, if any, are being taken by companies to reduce their carbon footprint?
- Are energy, resource and carbon footprint being considered during product development?
- What GHG reduction do companies aim for within the next 5 years?
- Impact of Covid-19 on level of ambition and planned decarbonisation action

@StefanMBuettner

Ingredients to succeed

This is where the *Energy Efficiency Barometer of Industry* comes in:

- Attendees reaching out to their constituencies to aide gathering status quo evidence



The #EEBarometer covers 88 countries in 10 languages



United Kingdom:



Italy:



Associazione dei costruttori e distributori di impianti di cogenerazione

Germany:



Canada:



United States:



Mexico:



Sweden:



Latvia:



Poland:



Slovenia:



Spain:



Austria:



Global:

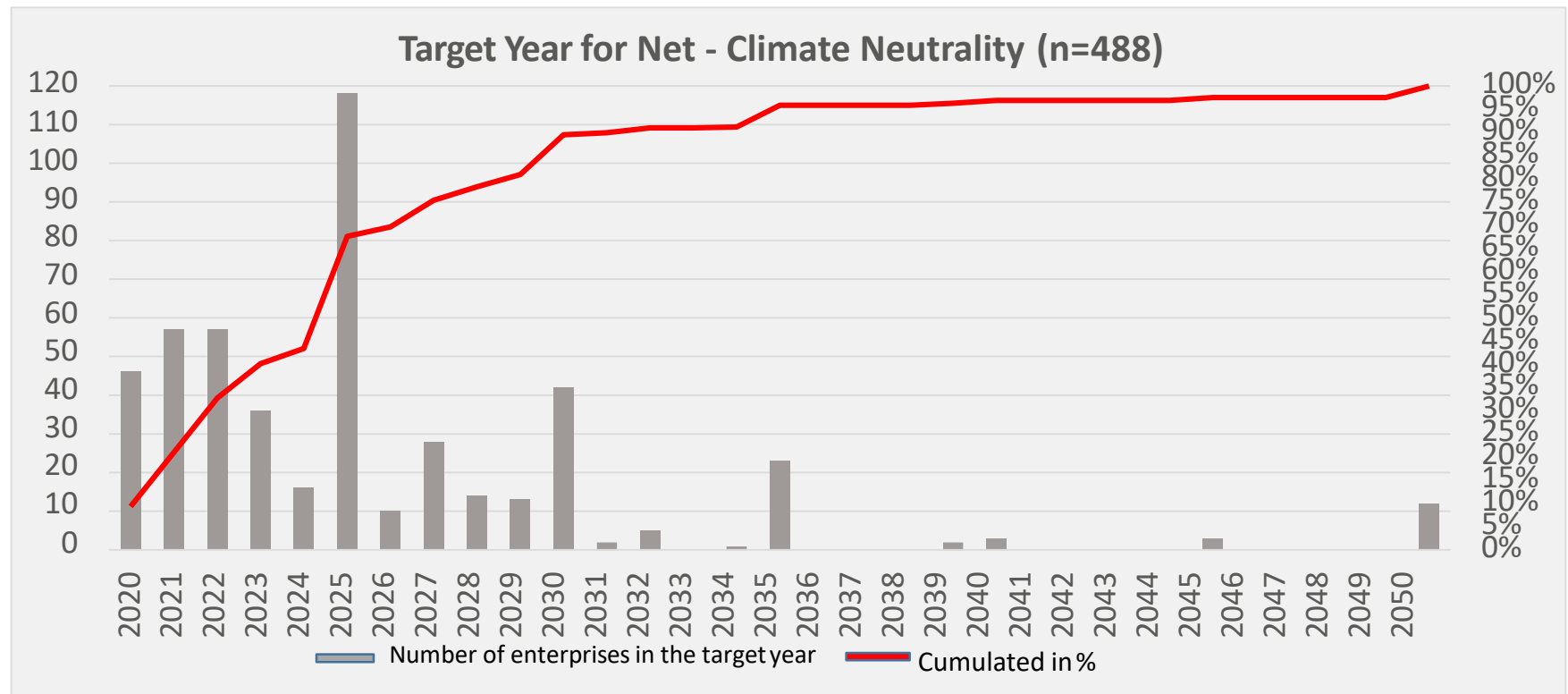


English · Spanish · French · Russian · German

- Country specific barometer and economic indicator
- Country specific barometer
- Global barometer in widely used languages
- Global barometer in English, French, Spanish, Russian or German

Who is following? By when?

How does German manufacturing react to the calls to decarbonize? 60% of companies aim for net-zero – 2/3rd by 2025

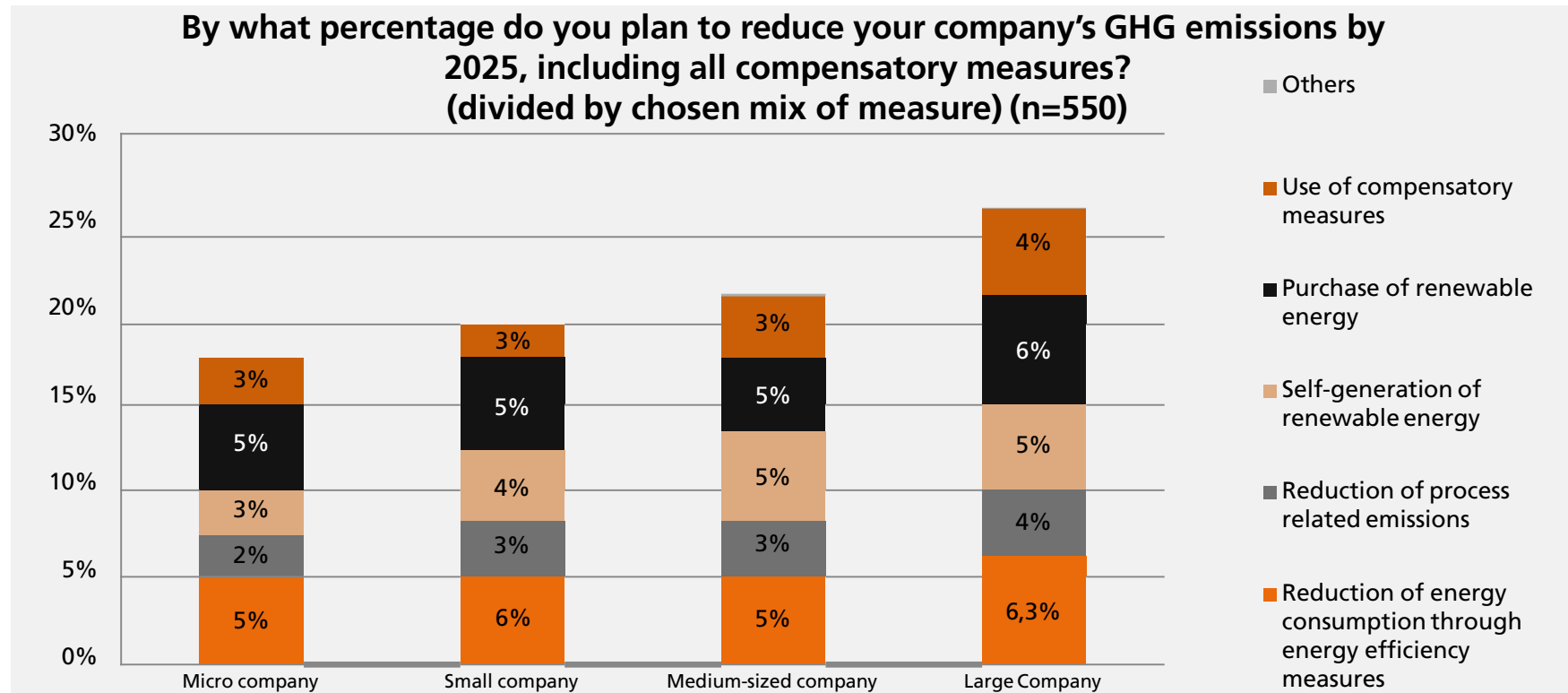


Half of the decarbonisation activities of the next 30 years will take place in the next 5 years.

Source: EEP Energieeffizienz-Index der deutschen Industrie 2019/II

Target GHG-Reduction by 2025, Base: 2019

Companies intend to reduce emissions by ca. 23% by 2025



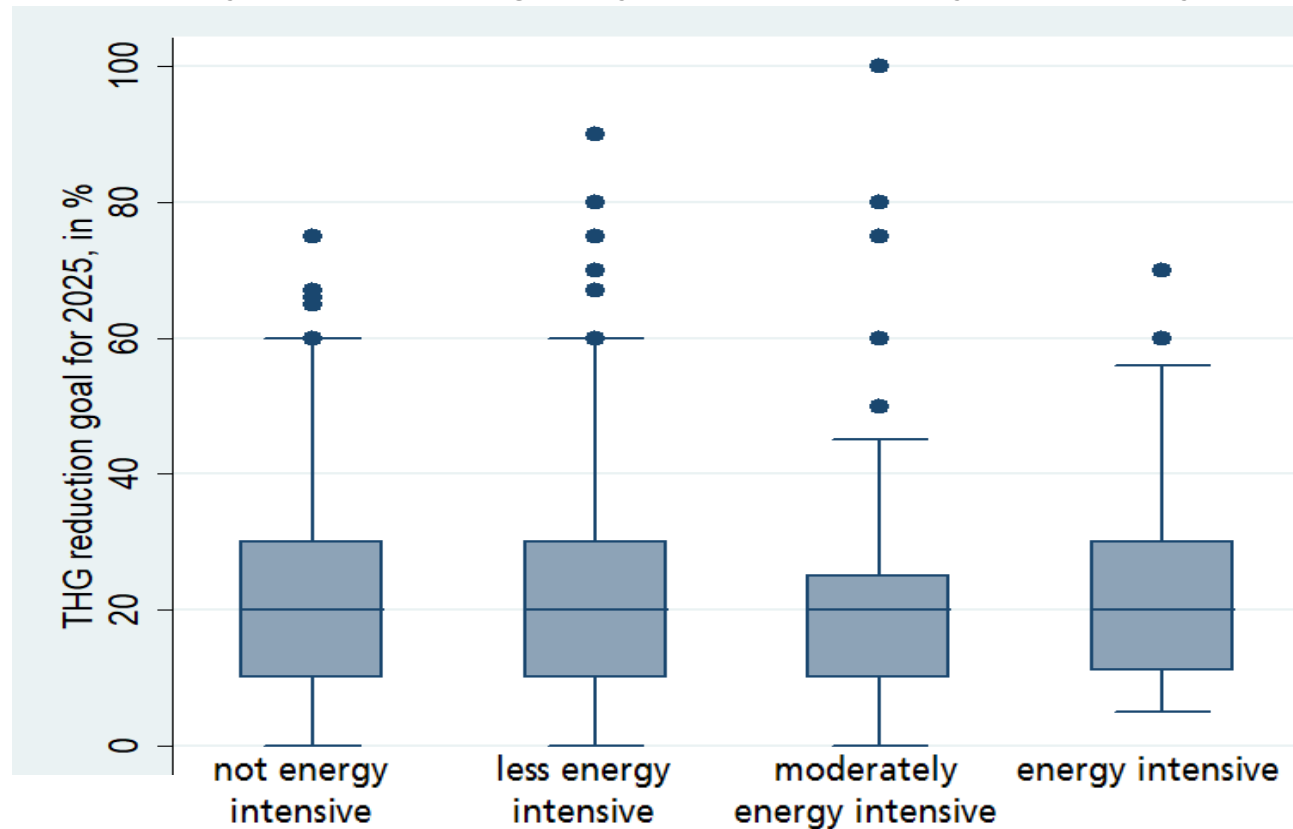
approx. 60% of the planned measures by 2025 are of a local nature (efficiency improvement, process change, self-generation)

© Energy Efficiency Index of German Industry 2020/1 | Data gathered during COVID-19 in May 2020 | Arithmetic mean of all answers

Target GHG-Reduction by 2025, Base: 2019

Companies intend to reduce emissions by ca. 23% by 2025

By what percentage do you plan to reduce your company's GHG emissions by

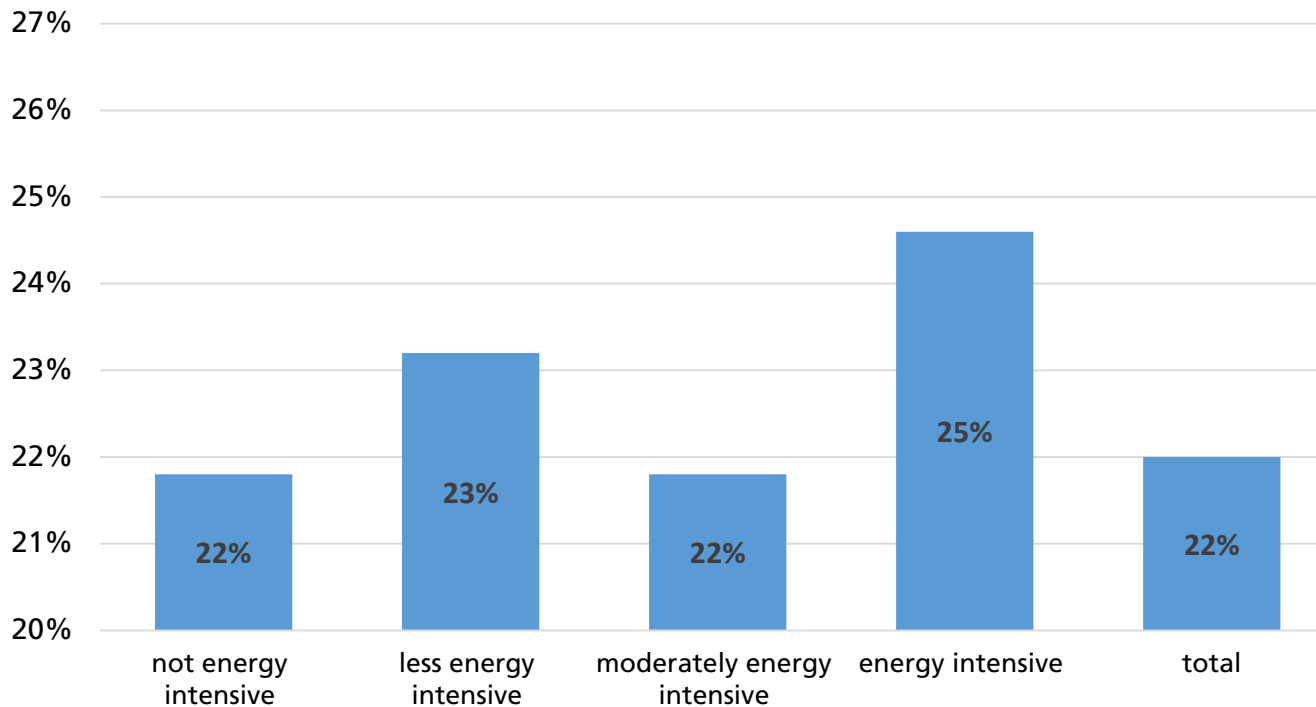


© Energy Efficiency Index of German Industry 2020/1 | Arithmetic mean of all answers; n(NEI)=122, n(LEI)=182, n(MEI)=139, n(EI)=31, n(total)=610

Target GHG-Reduction by 2025, Base: 2019

Companies intend to reduce emissions by ca. 23% by 2025

By what percentage do you plan to reduce your company's GHG emissions by 2025, including all compensatory measures? (n=610, n'=474)

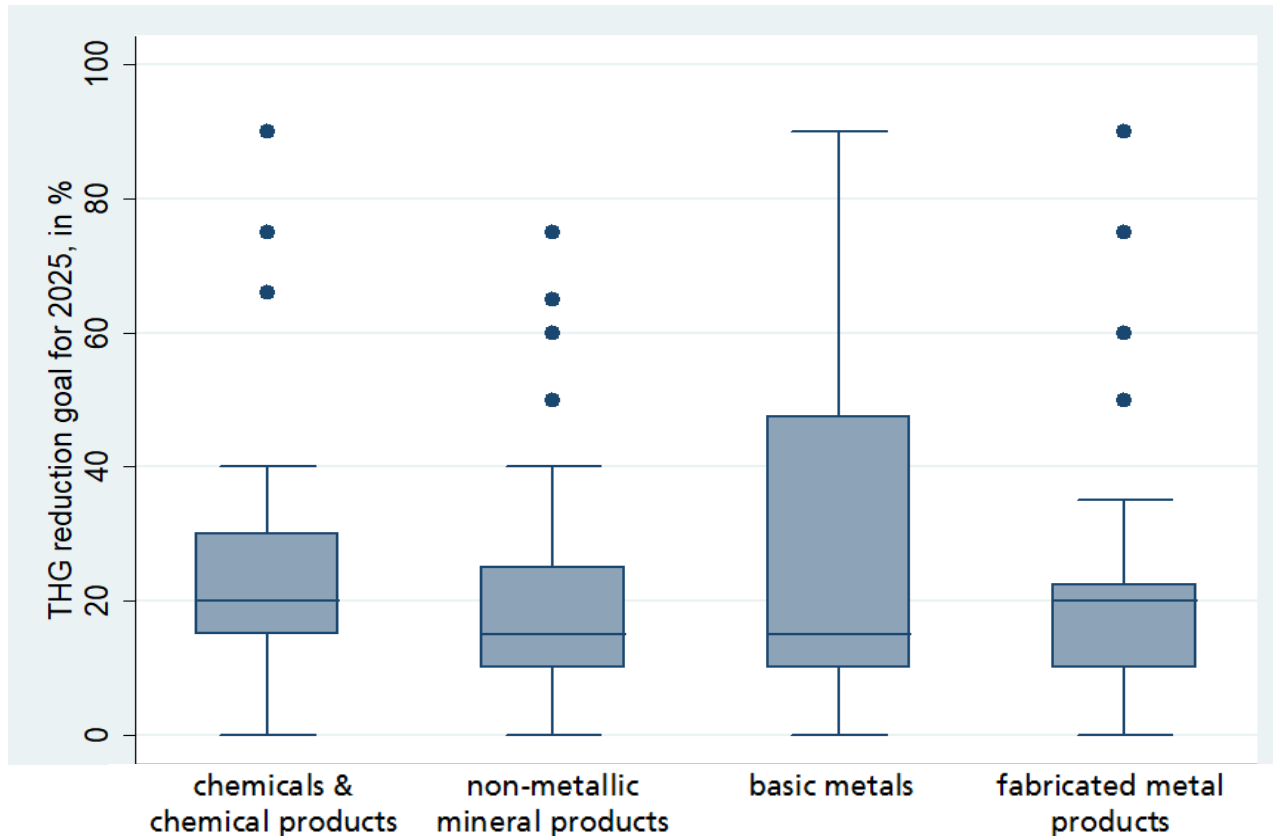


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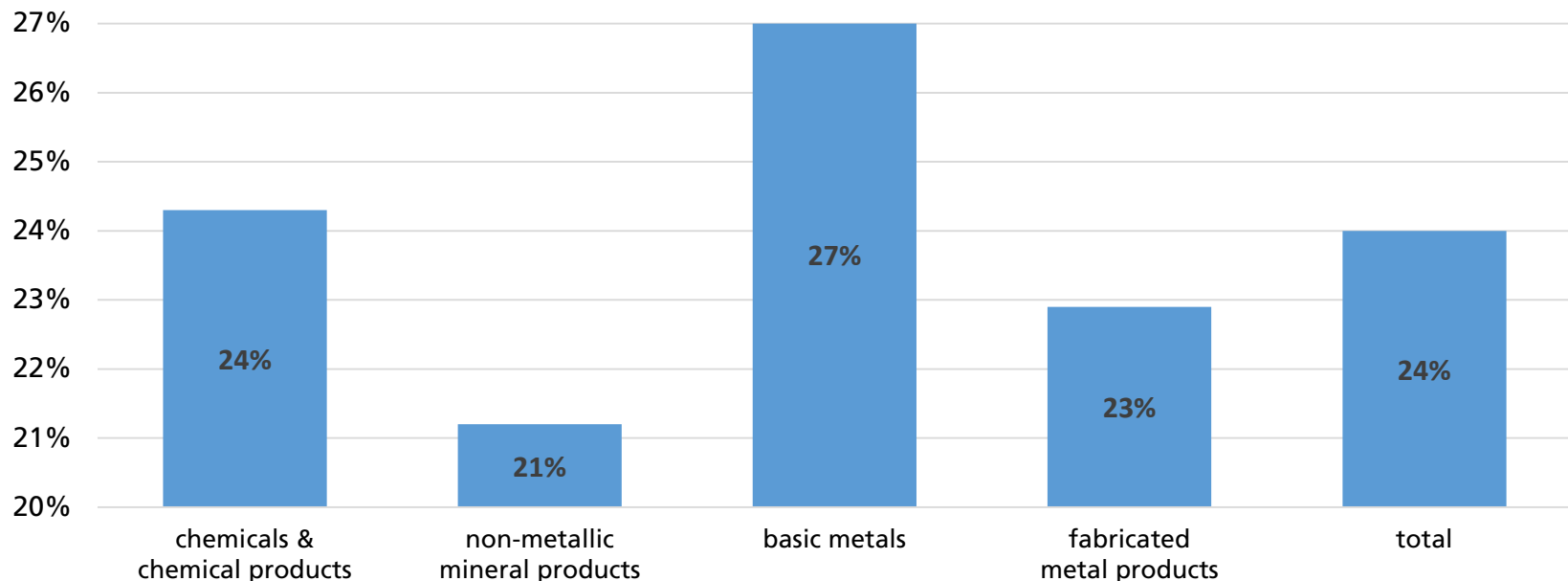


© Energy Efficiency Index of German Industry 2020/1 | Arithmetic mean of all answers; n(chem)=38, n(minerals)=33, n(basic metal)=32, n(fabricated metal)=44

Target GHG-Reduction by 2025, Base: 2019

Zooming-in on core sectors: ambition differs, mix similar – why?

By what percentage do you plan to reduce your company's GHG emissions by 2025, including all compensatory measures? (n=610, n'=147)



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Why should local measures be prioritised?

**Economic factors could help with sequence:
How do the measures have a lasting effect on running costs?**

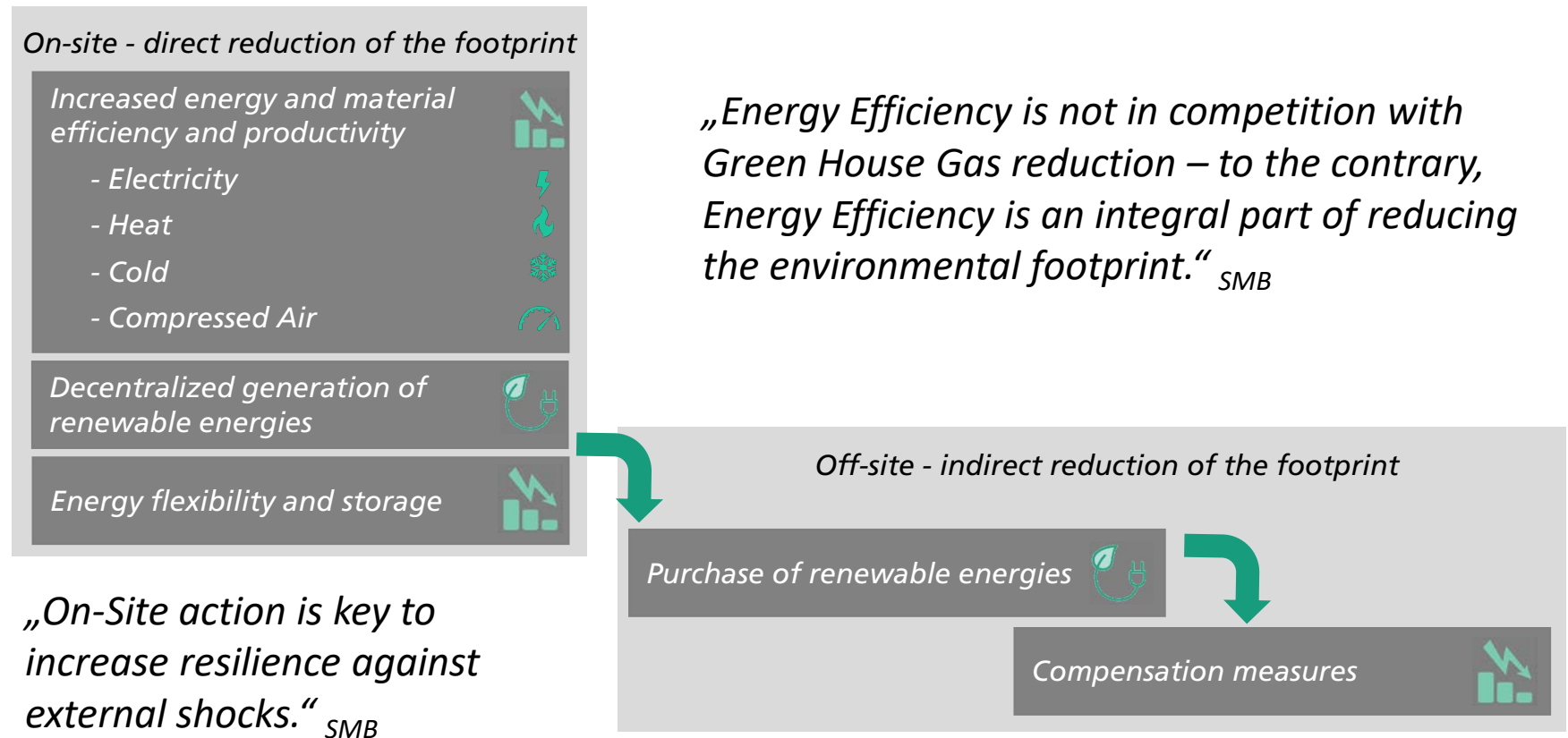
Mix of measures for the planned greenhouse gas reduction

- **Reduction:**
 - **Reduction of energy demand reduces emissions**
 - organizational optimizations/one-time investment required
 - running costs (energy) *decrease*
 - **Process adaptation reduces emissions**
 - one-time investment required
 - running costs (energy) *unchanged*
- **Substitution:**
 - **Own production of renewable energies** reduces emissions
 - but one-time investment required
 - running costs (energy) *decrease*
 - **Change of energy source** reduces emissions
 - Energy unit may cost more per unit, !availability!
 - running costs (energy) *increase slightly*
- **Compensation (or do nothing): Emissions still exist**
 - their **compensation** (or CO₂-price were applicable) costs permanently per unit
 - running costs (emissions) *increase*

Further developed according to ACEEE-EEP Industrial Decarbonisation Considerations (2020)

Boosting Resilience in Manufacturing

On-Site optimization, using local generation & integration, followed by off-site generation and lastly compensation



Future Concepts for Industry

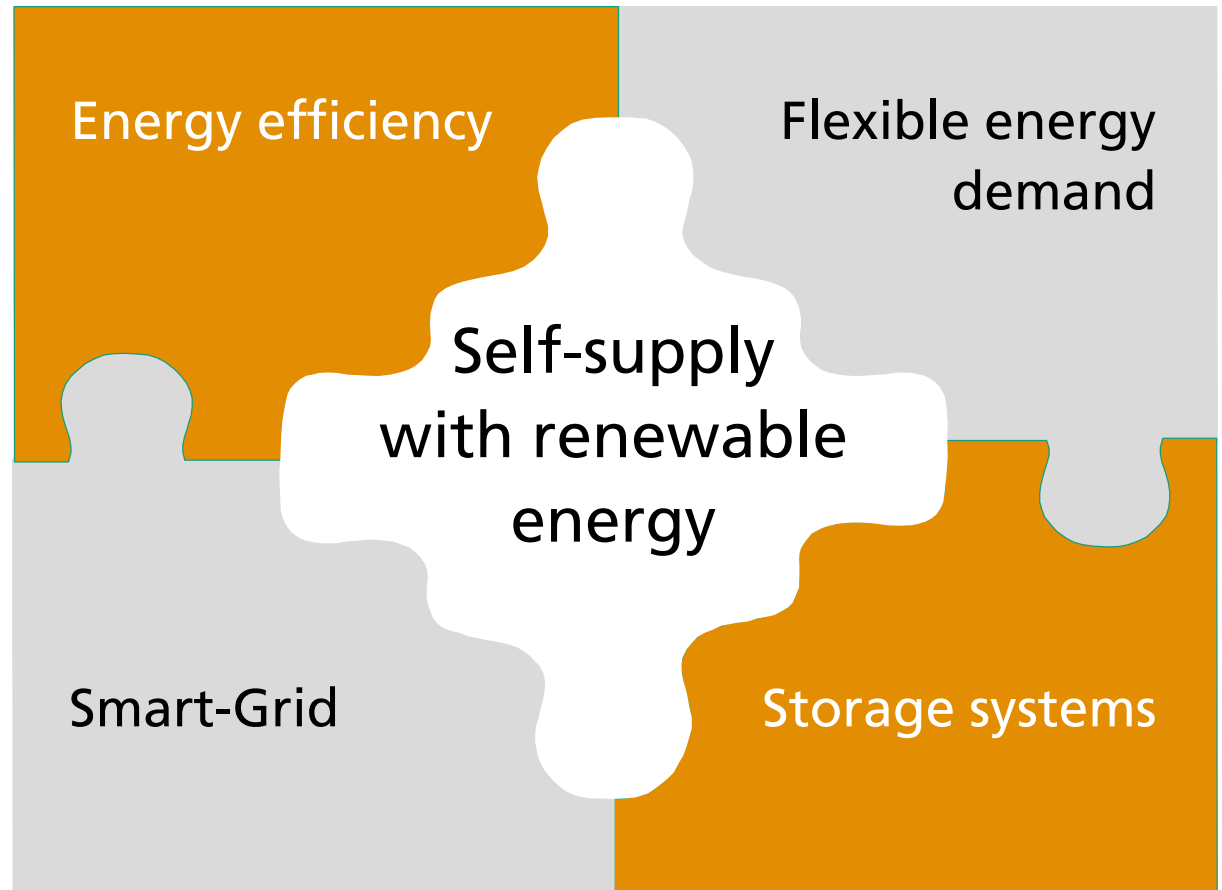
Identifying your optimal mix of measures – each puzzle differs

Key Questions:

1. How far?
2. Ideal mix?

Key factors:

1. Environment
2. Expertise
3. Cost (ratio)
4. Priorities
5. Needs



Source: Fraunhofer IPA



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Thank You!

Dipl.-Volksw.

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