Fraunhofer ISI

Fraunhofer Institute for Systems and Innovation Research ISI

Ruhr Lecture 2022/2023 « Transformation: Strategies for Urban Change »

Transitions in Urban Spaces: Energy, Mobility, Climate Adaptation and a Stakeholder Perspective

Overview

What will happen within the next two hours?

- Who we are
- Why Urban Spaces?
  - Energy Transitions
  - Mobility Transitions
  - Climate Change
  - Stakeholders
- The urban view – discussion

Who we are

Fraunhofer Institute for Systems and Innovation Research, Karlsruhe

Our research

INNOVATION

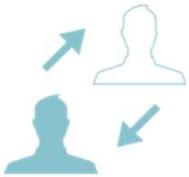
TRANSFORMATION

FUTURE SCENARIOS

Our mission

Analysing & evaluating Innovations

Designing future scenarios

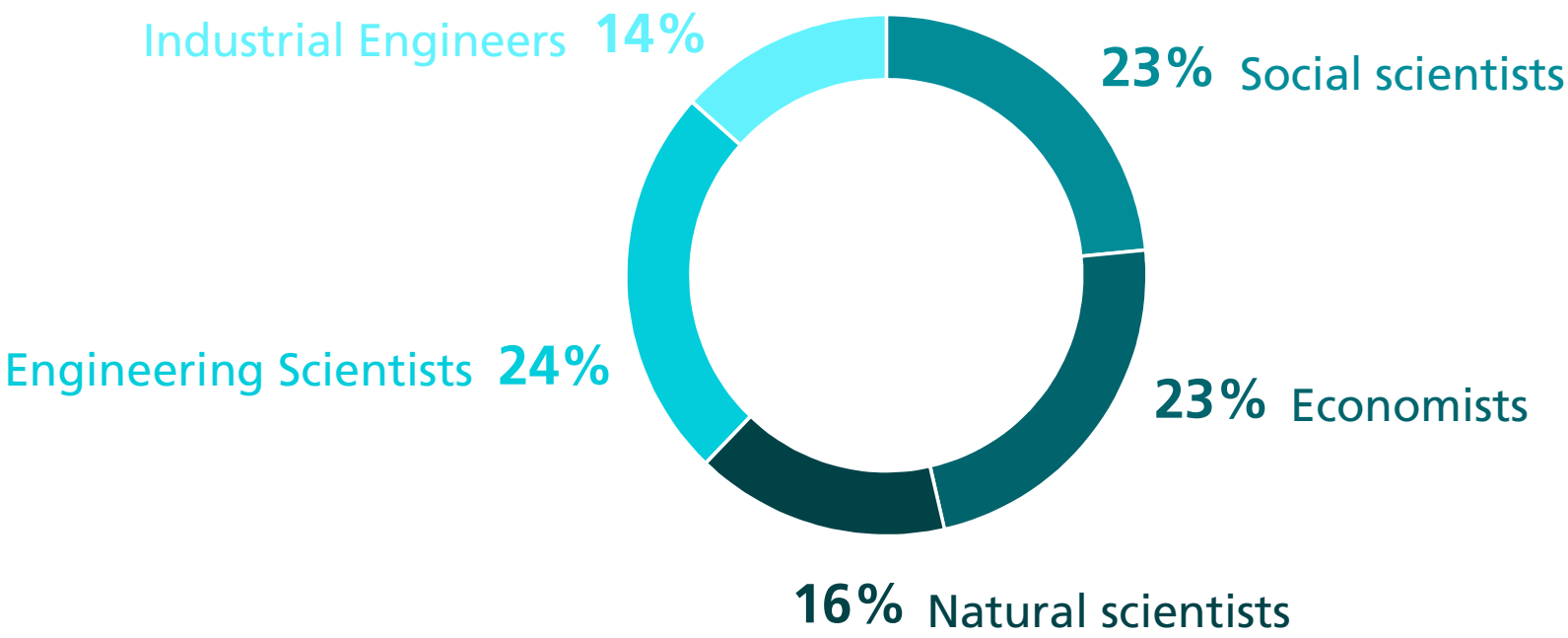


Supporting decision-makers

Advising Policy-makers

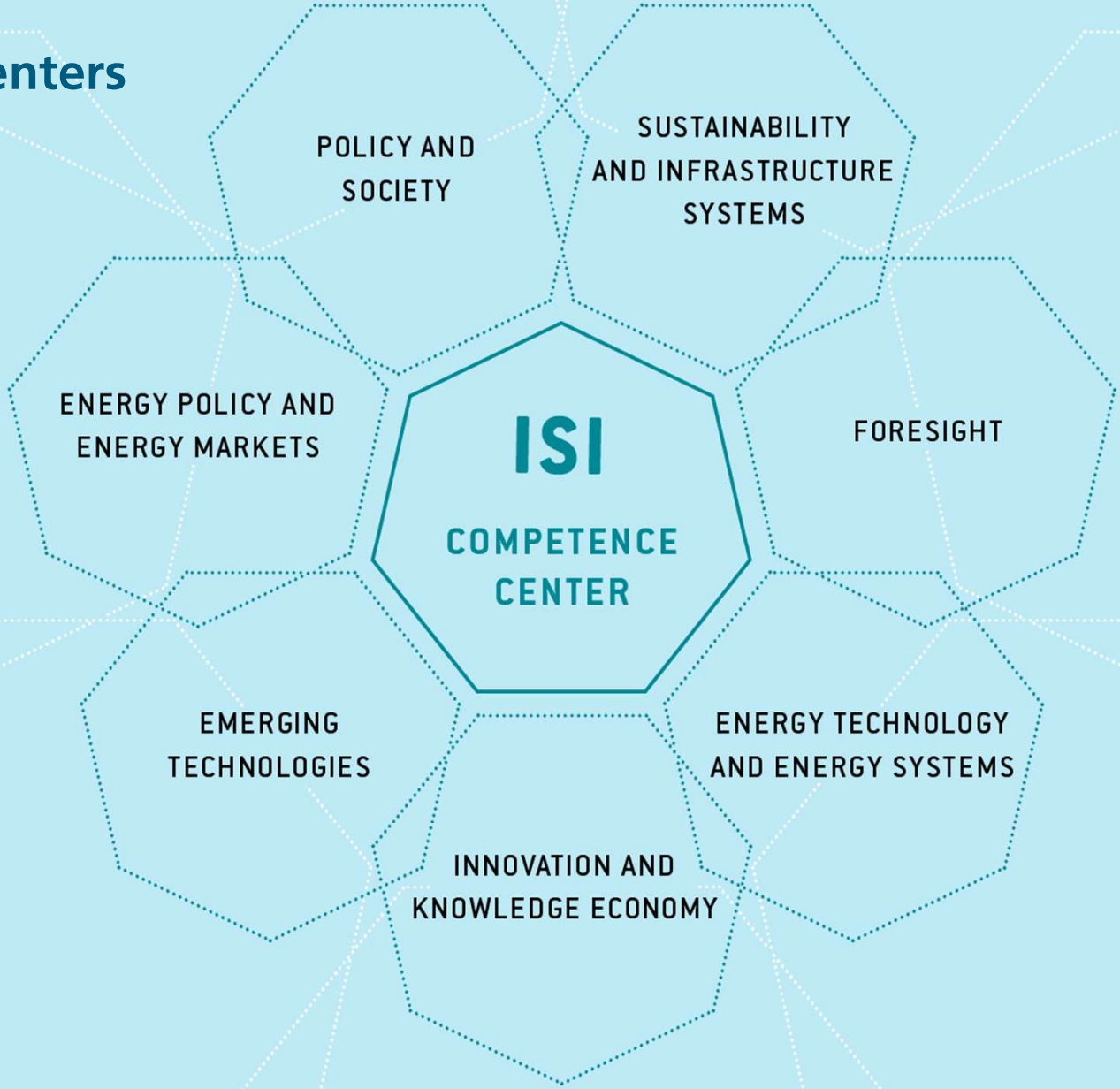
Informing the public

Our interdisciplinary approach



As of 10/2021

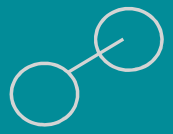
Competence Centers



Current cross-cutting research topics

AI

TRANSFORMATION AND INNOVATION SYSTEMS OF URBAN SPACES



HYDROGEN

TECHNOLOGY IMPACT ASSESSMENT

INDUSTRIAL COMPETITIVENESS CAPABILITY

ELECTROMOBILITY

INFORMATION SECURITY

POST-GROWTH

Transformation and Innovation Systems for urban areas

„Cities are where the battle for sustainable development will be won or lost.“

Ban Ki-Moon, Secretary General of the United Nations from 2007 till 2016

What we do

- Identification of transformation requirements at local level with the focus on the interfaces between sectors.
- Identification of obstructive and supportive factors for harnessing synergy effects.
- Develop of competences to act at local level in order to coordinate sectoral strategies and plans and make them future-proof.

climate change adaptation

energy transition

quality of life (just transitions)

SDGs and added value

mobility transition

climate change mitigation

www.isi.fraunhofer.de/en/themen/urbane-raeume.html

Who we are

Sven Alsheimer

Susanne Bieker

Uta Burghard

Anna Grimm

Urban Spaces

Latest figures

- „World population reaches 8 billion on 15 November 2022“ (UN)
- Half of the world's population lives in cities (already since the mid-2010s).

- In Europe, 74% of all people live in urban areas (UN)
- In Germany, 75.5% of all people live in urban contexts (statista, 2021)

Urban Spaces
A functional perspective (Functional Urban Area, FUA)

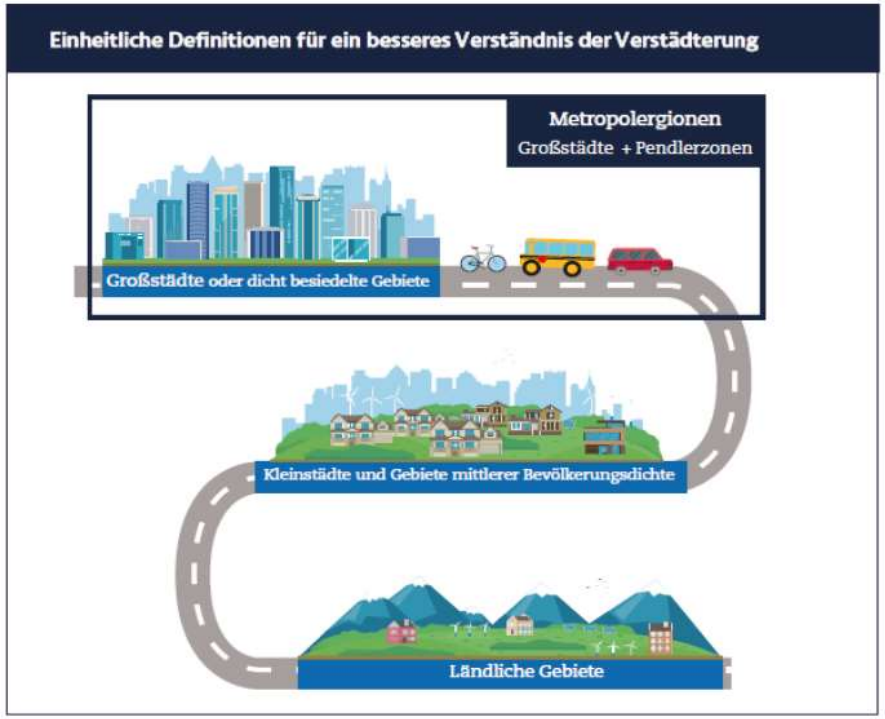
The degree of urbanisation reflects the urban-rural continuum and - unlike the urban/ rural classification - includes three different area categories:

1) **Large cities** (or densely populated areas)

2) **Small towns and areas of medium population density** (or moderately populated areas) and

3) **Rural areas** (or sparsely populated areas).

Accordingly, a functional urban area extends beyond the core city and also includes the commuter zones and economic relations in its surrounding areas.



OECD Zentrum für Unternehmertum, KMU, Regionen und Städte 2020

Urban Transitions

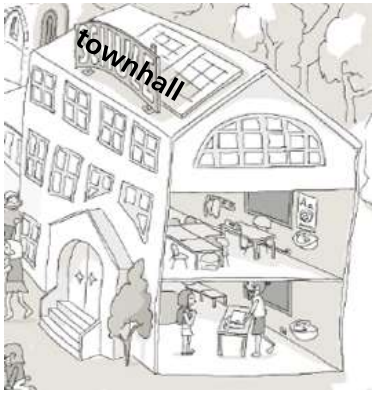
transitions...

... in cities

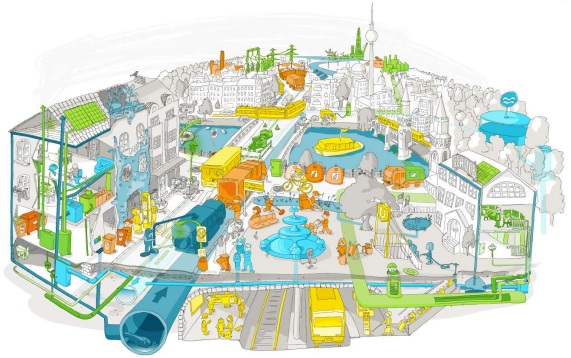
- within municipal boundaries
- the spatial perspective

... of cities

- municipalities as stakeholders
- needs and opportunities



... for cities

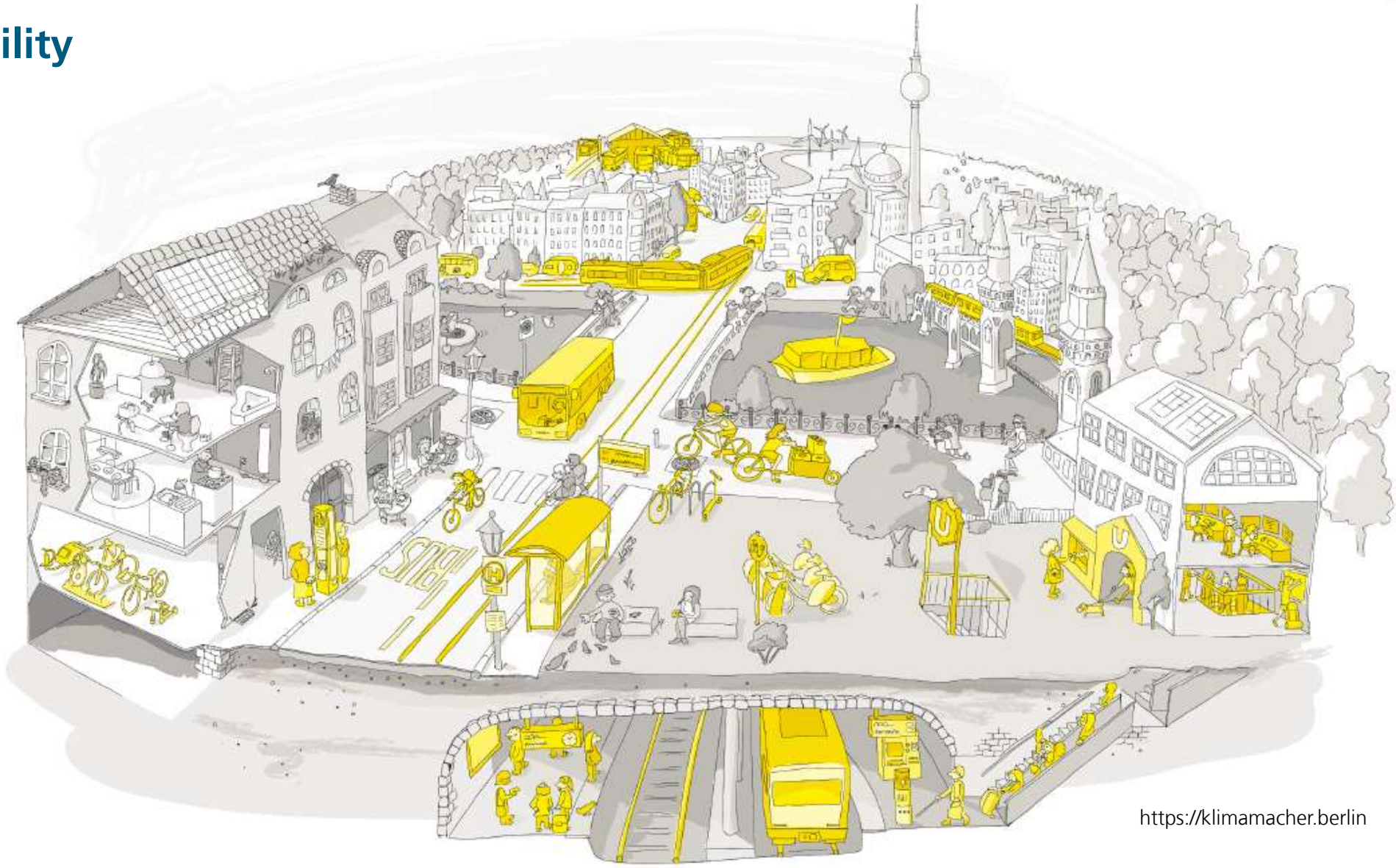


https://klimamacher.berlin

Energy

https://klimamacher.berlin

Mobility



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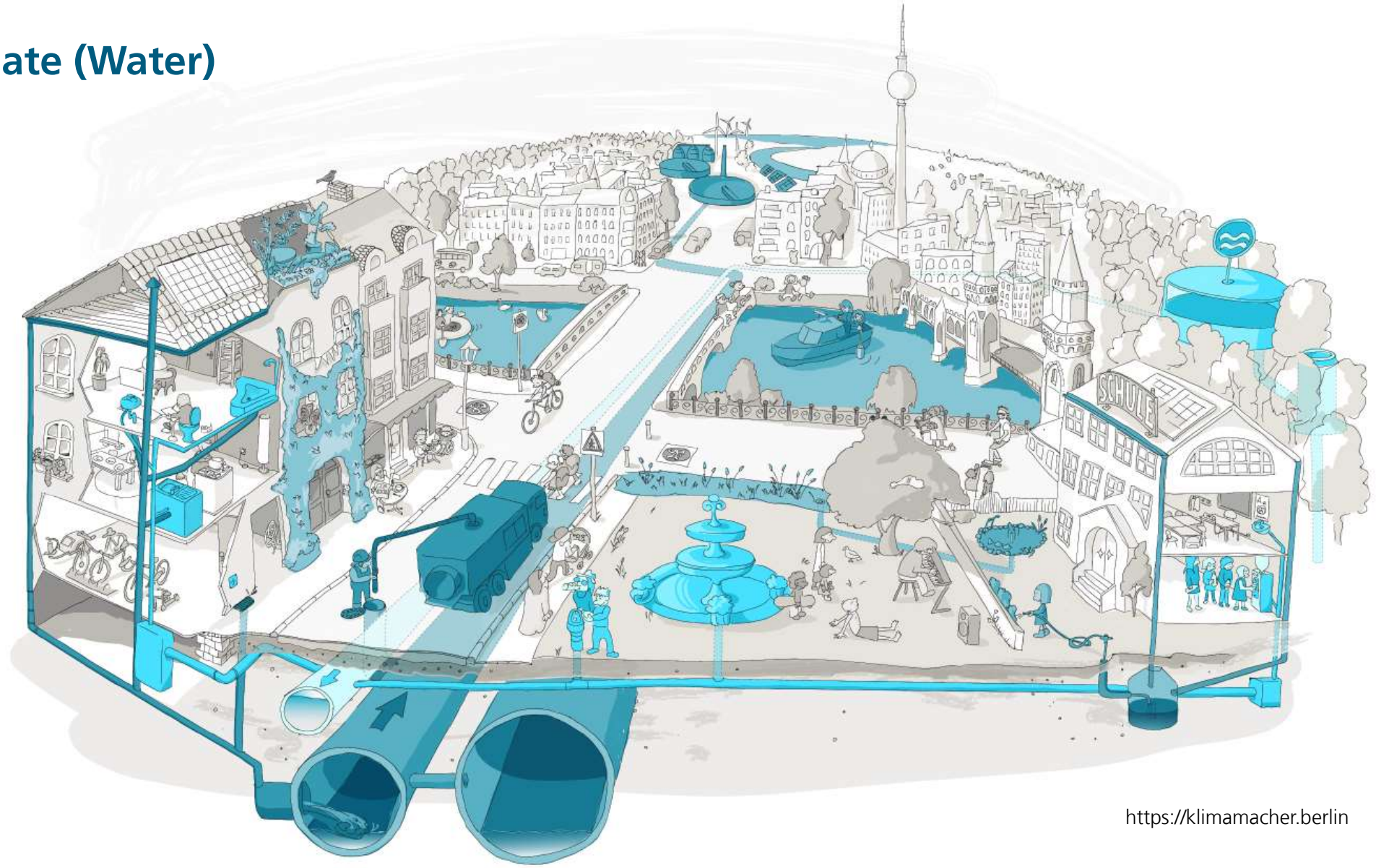
Climate (Water)



https://klimamacher.berlin

ISI

Stakeholder

https://klimamacher.berlin, *verändert*

Fraunhofer ISI

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Transitions in Urban Spaces: Energy

Uta Burghard, Markus Fritz

01
Municipalitites in the energy transition

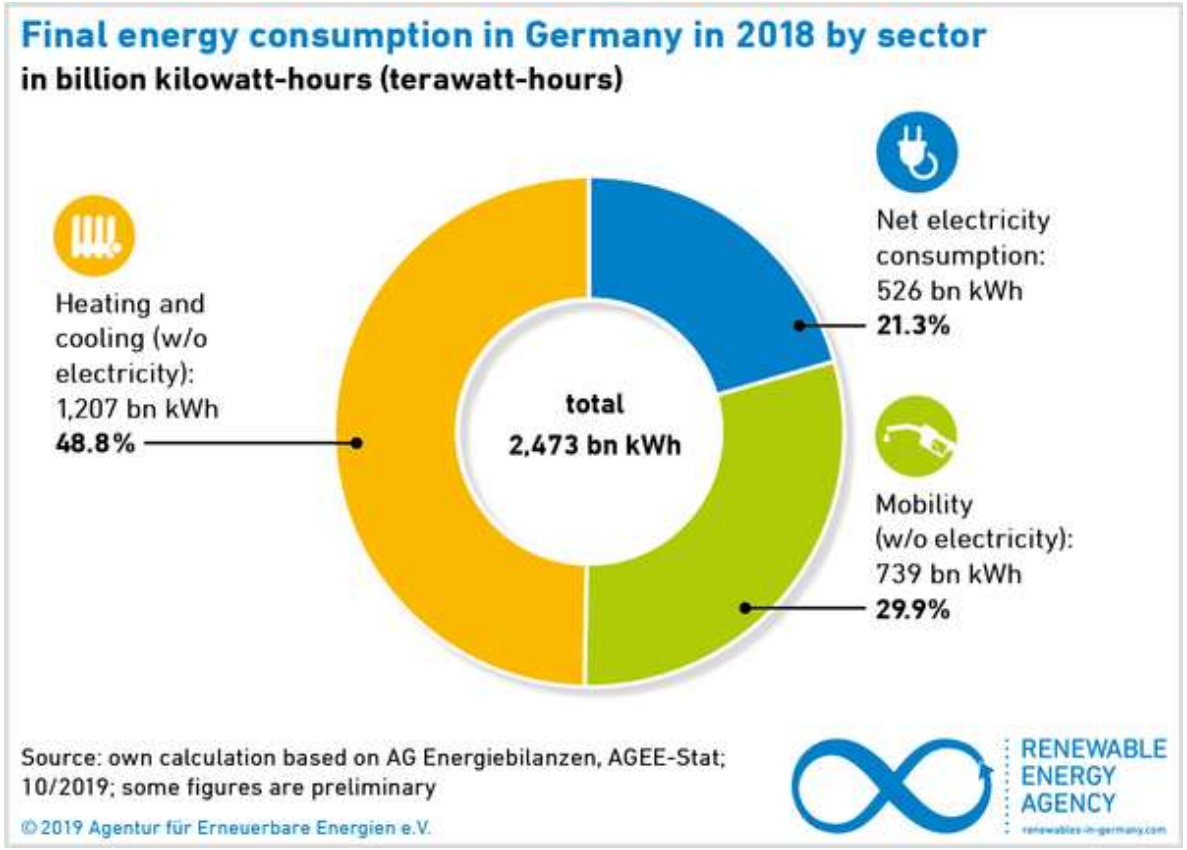
Municipalities play a crucial role in the energy transition

Municipalities in the energy transition:

- Major contribution to greenhouse gas emissions through the energy consumption of buildings and transportation (Strasser et al. 2018).
- Dominant role of urban political actors in the transition process (Cheung and Oßenbrügge 2020).
- Direct contact with citizens, potential to change citizen's behavior.
- Municipality can consider sustainability aspects in procurement.
- Municipality can act as a role model.

Final energy consumption in Germany in 2018 by sector

Heat plays an important role



Agentur für Erneuerbare Energien

Important sectors for the energy transition in municipalities

The heat transition is central to the energy transition

Examples for the role of municipalities in energy sectors:

Heat:

- Local solutions are needed, i.e. local or regional energy sources should be used and locally adapted. Therefore, specific solutions must be developed.
- Municipalities play central coordinating and steering role (UBA 2022), e.g. they can establish heat networks.

Electricity:

- Municipal utilities can build renewable energy generation facilities themselves.
- Municipalities can support renewable energy projects and energy communities.

(Mobility)

Focus heat : Heating structure in Germany

Estimate!

What do you estimate: how high is the share of gas heating in existing buildings in Germany at the moment?

- 30 %
- 50%
- 80%

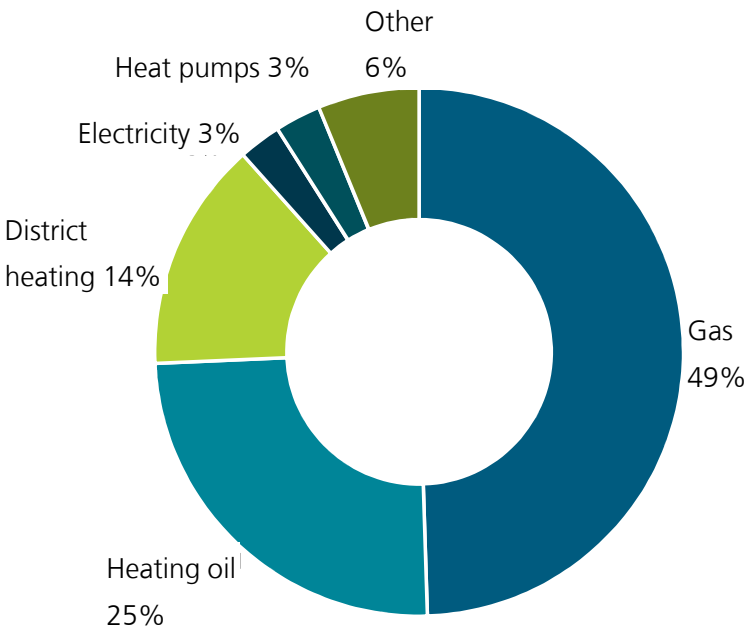
And in new buildings?

- 10%
- 25%
- 50%

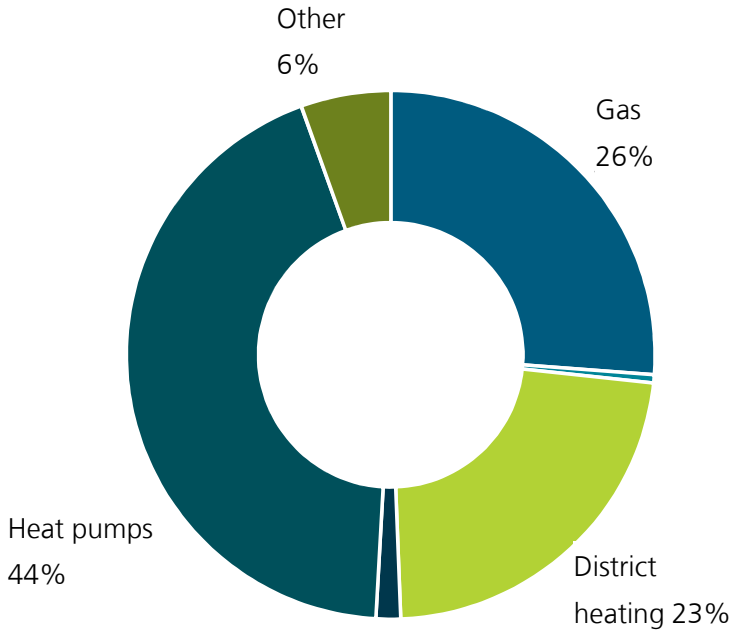
Quelle: bdew (2021): Die Energieversorgung 2021

Focus heat : Heating structure in Germany

Stock in Germany



New residential construction 2021

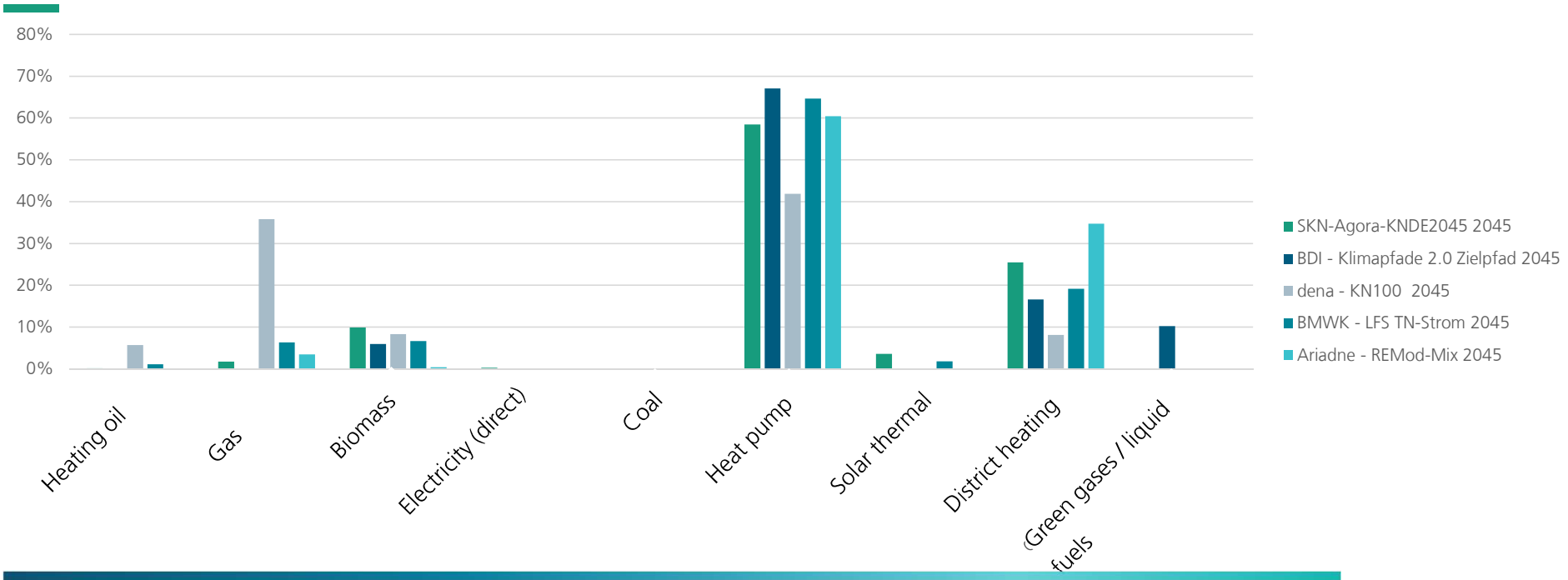


Even in new construction still about ¼ gas, i.e. fossil boiler.
That is, heat transition is a big challenge.
In addition, path dependencies play a big role here.

Source: bdew (2021): Die Energieversorgung 2021

Where do we want to go in the long term?

Scenarios for 2045

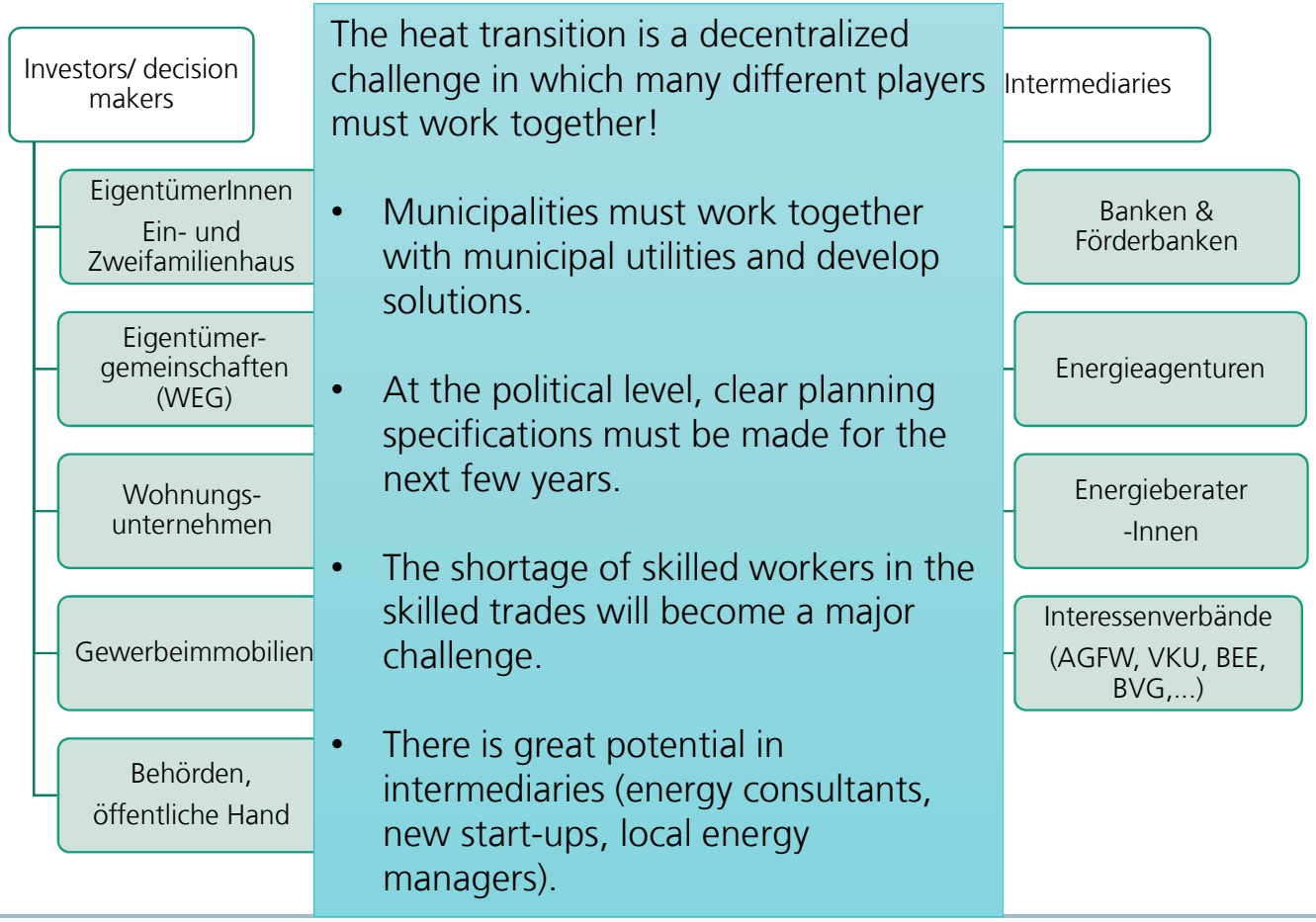


Heat pumps and district heating are the central technologies for heating buildings in the "Big 5" studies.

Source: Ariadne (2022): Szenarien zur Klimaneutralität: Vergleich der „Big 5"-Studien

However, the heat transition is complex

... and drawn by many actors...



02
Fraunhofer ISI projects on the energy transition in municipalities

PATH2LC

PATH2LC: Public Authorities together with a holistic network approach on the way to low-carbon municipalities

PATH2LC project brings together municipalities on regional and international level

PATH2LC: Public Authorities together with a holistic network approach on the way to low-carbon municipalities

Goal of the project: Support municipalities on regional and international level in the process of implementing their existing Sustainable Energy (and Climate) Action Plans (SEAPs / SECAPs).

'**Learning Municipality Network' (LMN) approach:** Link stakeholders in public authorities among municipalities enabling peer-to-peer learning and to increase the engagement for the energy and climate transition.

www.path2lc.eu

Policy instruments for municipalities

SEAP/SECAP: The Sustainable Energy and Climate Action Plan (SECAP) is the key document of a signatory of the **Covenant of Mayor (CoM)** since 2018.

It is an extension of the former Sustainable Energy Action Plan (SEAP).

These documents outline the key actions that Covenant signatories plan to reduce greenhouse gas emissions (GHG).

https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/covenant-of-mayors

Five existing networks of municipalities in five countries are part of PATH2LC

Italy (4 municipalities)

Greece (8 municipalities)

Portugal (9 municipalities)

Netherlands (4 municipalities)

France (4 territories)

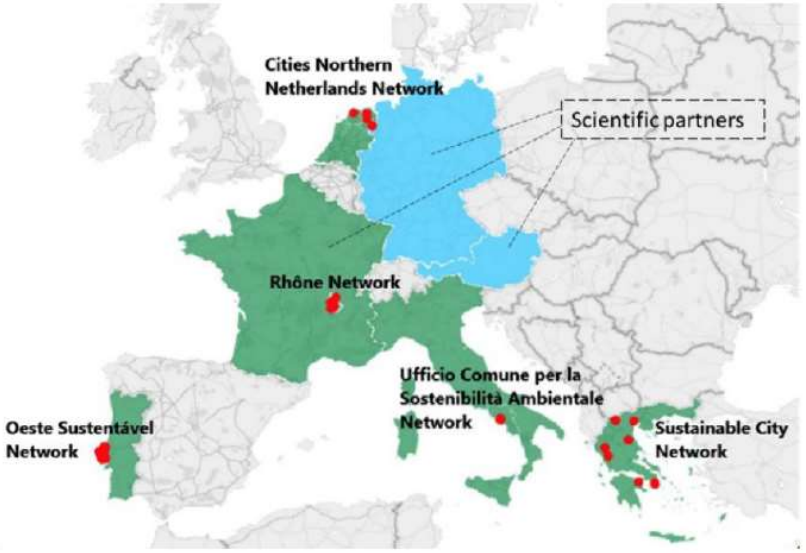


Figure 1: Project partners of the PATH2LC project. Red dots: Connected municipalities

Results of PATH2LC: SE(C)APs: From municipal planning to concrete action:

Barriers, success factors and decision processes (Deliverable 4.9)

Research questions: What hinders municipalities to implement measures planned in their SE(C)APs? What is the role of different (municipal) stakeholders and administrative decision making structures in this process?

Stages of preconditions and intervention possibilities to implement a SE(C)AP measures:

1. a sufficient number of motivated, skilled and networked **staff**
2. vertical and horizontal **integration of energy and climate topics** in municipal decision structures
3. sufficient municipal **budget**, **funds and investors** as well as beneficial **regulations**
4. **commitment** of all stakeholders who are affected by a measure
5. available **technology** and skilled technology **providers and craftsmen**
6. **absence** or mitigation of **limiting external factors** (as path-dependencies or pandemic).

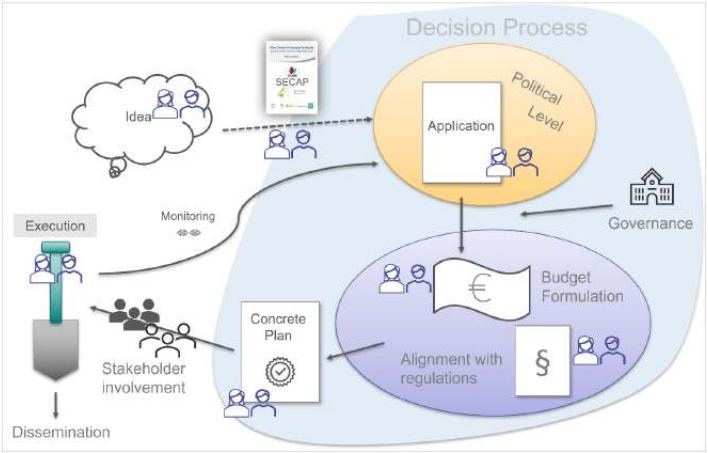


Figure 2: From SE(C)AP to execution – Implementation process of SE(C)AP measures (own presentation)

Act!onHeat

Turning heating & cooling strategies into low-carbon projects

Act!onHeat

Objectives of Act!onHeat

1. Strategic H&C planning is further disseminated and taken up.
2. The quality of strategic H&C planning is increased.
3. Strategic H&C planning leads to the implementation of decarbonisation measures.

Act!onHeat will engage and support local governments across Europe:

- 120 municipalities are supported in heating and cooling planning
- 30 Feasibility studies for individual projects are carried out
- 15 projects for which financing options are developed

→ Call for application

https://actionheat.eu/

Heating & Cooling planning („Kommunale Wärmeplanung“)

What is H&C planning?

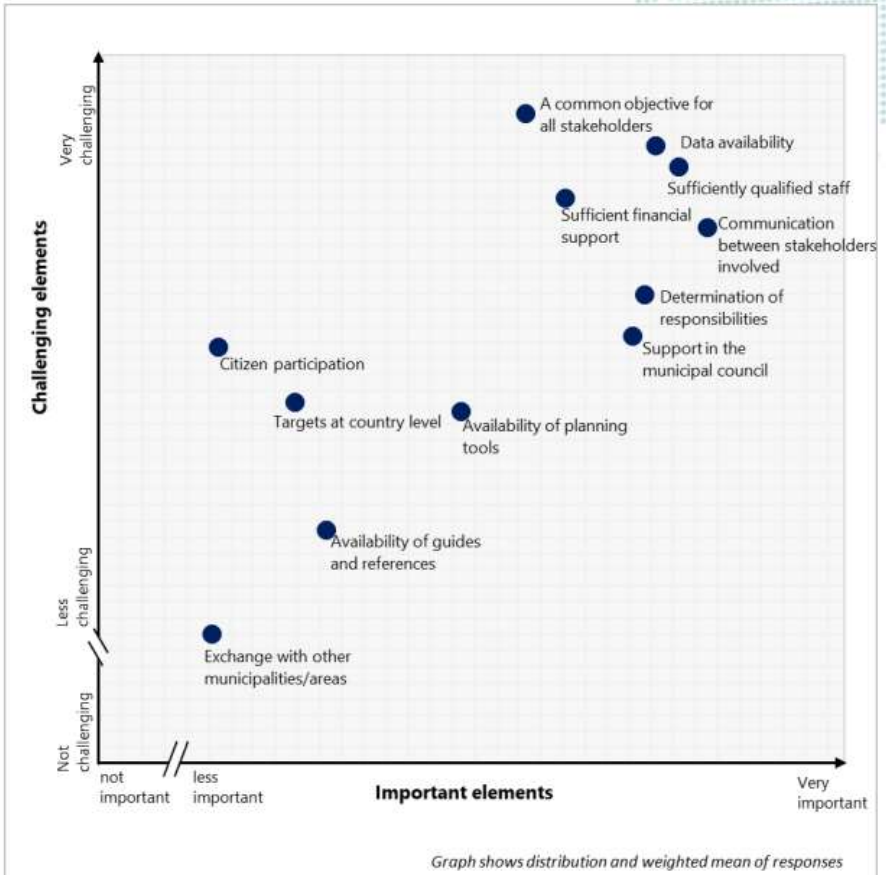
- **Strategic instrument** for greenhouse gas neutral heating and cooling supply of a municipality
- The **goal** is a consistent target picture of efficiency measures and renewable heat supply as a basis for urban development and energy planning
- *H&C planning* **typical questions**
  - How can H&C be supplied carbon-neutral?
  - How can more renewable energy be used? What is needed for this (e.g. land)?
  - Where are usable sources of excess heat?
  - Where are districts for heat networks? What should be used to heat them?
  - What standards should be required for new housing estates, industrial and commercial areas?
  - How can the renovation rate in the municipality be increased?

Act!onHeat

Strategic H&C planning success factors: Results of an online survey (n=349)

Important and challenging elements:

- Communication with stakeholders, sufficiently qualified personnel and data availability are particularly important and challenging.
- Guidelines and references as well as the exchange with other municipalities is less important and challenging in comparison.



https://actionheat.eu/sites/default/files/media//D2.1-Strat%20heating%20plans%20v11.pdf

03
Summary and discussion

Summary

Importance, role and challenges of municipalities in the energy transition

The energy transition at the municipal level is a complex undertaking: new issues are emerging, many players are affected.

There is great pressure to act, particularly in the area of the heat transition. Municipalities have an important role to play here.

However, the potential at the municipal level is not yet being exploited – not only when it comes to heat:

- **In particular (but not only) smaller municipalities often lack knowledge, time and (sufficiently qualified) staff.**

Further challenges:

- **Financial resources, communication with stakeholders, common objective for all stakeholders, data availability.**

➢ **Engage further stakeholders to accommodate the tight personnel capacities of the municipalities, e.g. further actors, further levels (federal level).**

Mobility Transition

Mobility Transitions

Estimate!

In average, how many cars did 1,000 inhabitants in Germany own in 2021?

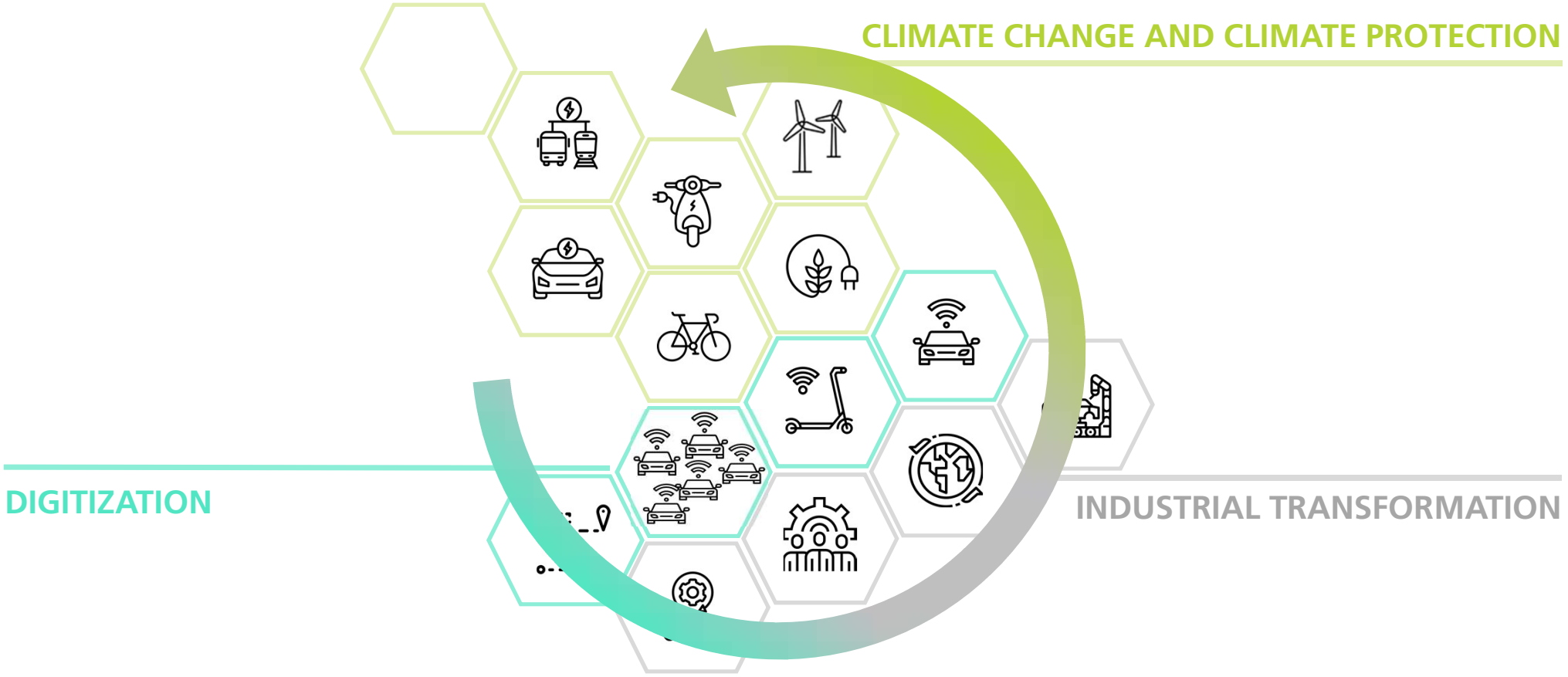
a. 420
b. 370
c. 510
d. 580

How much does transportation contribute to German CO2 emissions?

a. 14%
b. 19%
c. 8%
d. 24%

Mobility transition

Understanding mobility as a transforming system

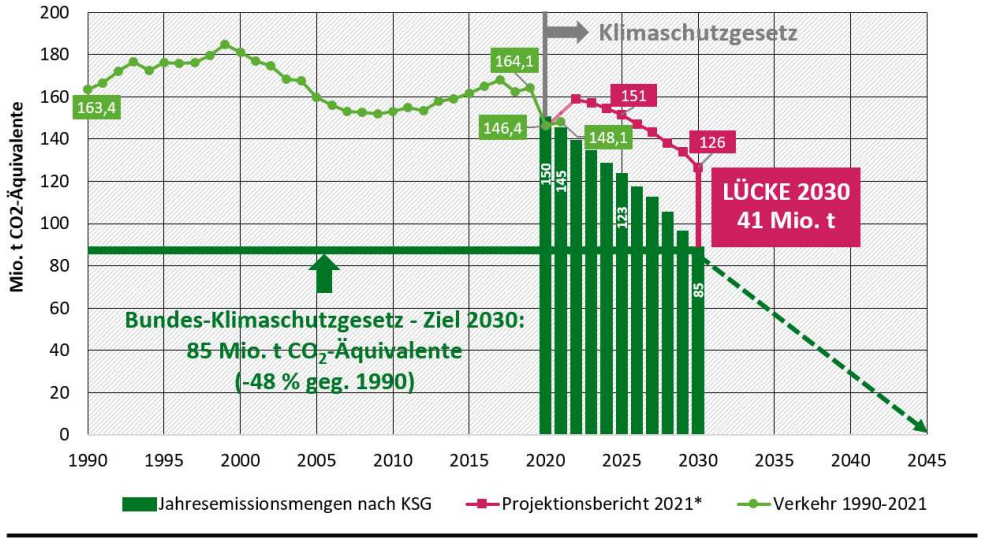


Why do we need to work on a more sustainable mobility system?

Society, politics and the industry

- **Transport** is responsible for 19 % of German GHG emissions
- **Society** is sensitized to environmental sustainability (e. g. Fridays-for-Future protests) and demands sustainable products
- Agreement on **binding climate targets** in the Paris Agreement 2015
- **Political regulation** at EU level (e.g., fleet limits, 2035 phase-out of internal combustion vehicles) and **climate protection law** in Germany with concrete targets for the transport sector
- Climate targets in the transport sector will be **missed**
- Additionally **other external costs**: air pollution, land use, congestion, accidents, ...

Entwicklung und Zielerreichung der Treibhausgasemissionen in Deutschland
im Sektor Verkehr des Klimaschutzgesetzes (KSG)



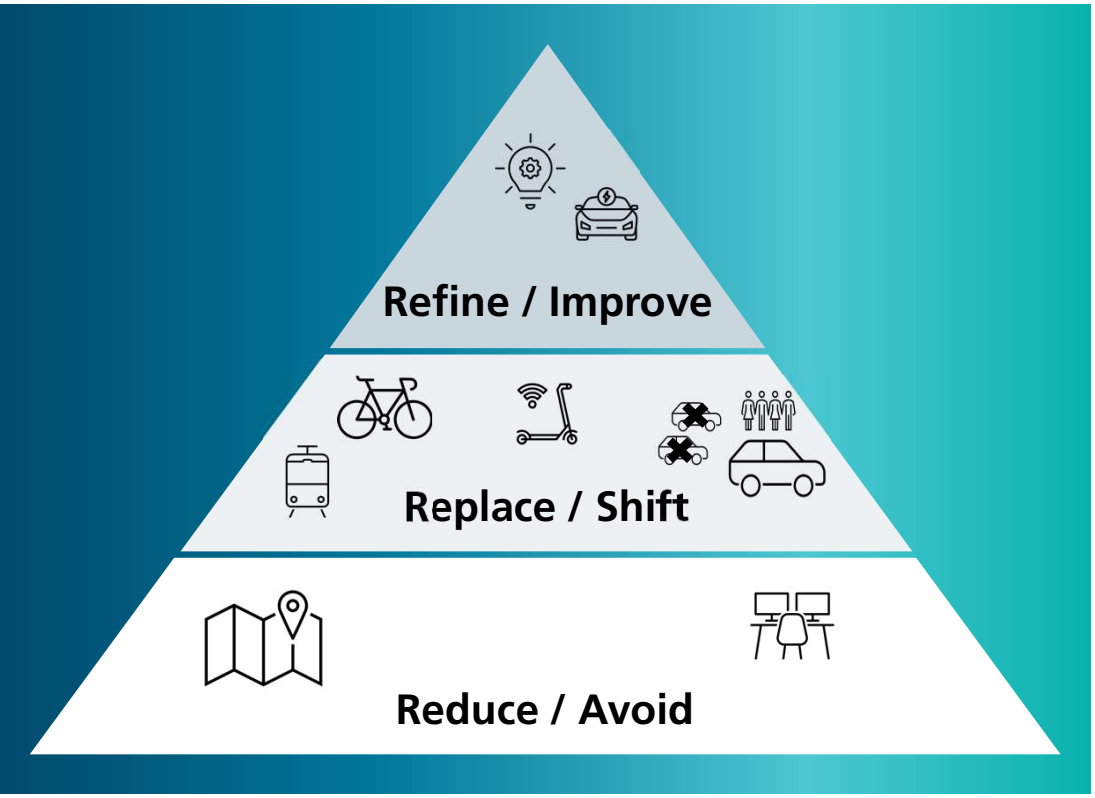
** Berechnete Werte des „Projektionsbericht 2021"(rote Linie, basierend auf Daten mit Stand August 2020) weichen für die Jahre 2020 und 2021 von den später veröffentlichten offiziellen IST-Werten (grüne Linie) ab.*

Quelle: UBA 22.03.2022

Umweltbundesamt (2022): Klimaschutz im Verkehr. *https://www.umweltbundesamt.de/themen/verkehr-laerm/klimaschutz-im-verkehr#ziele*

How can we reach a more sustainable mobility system?

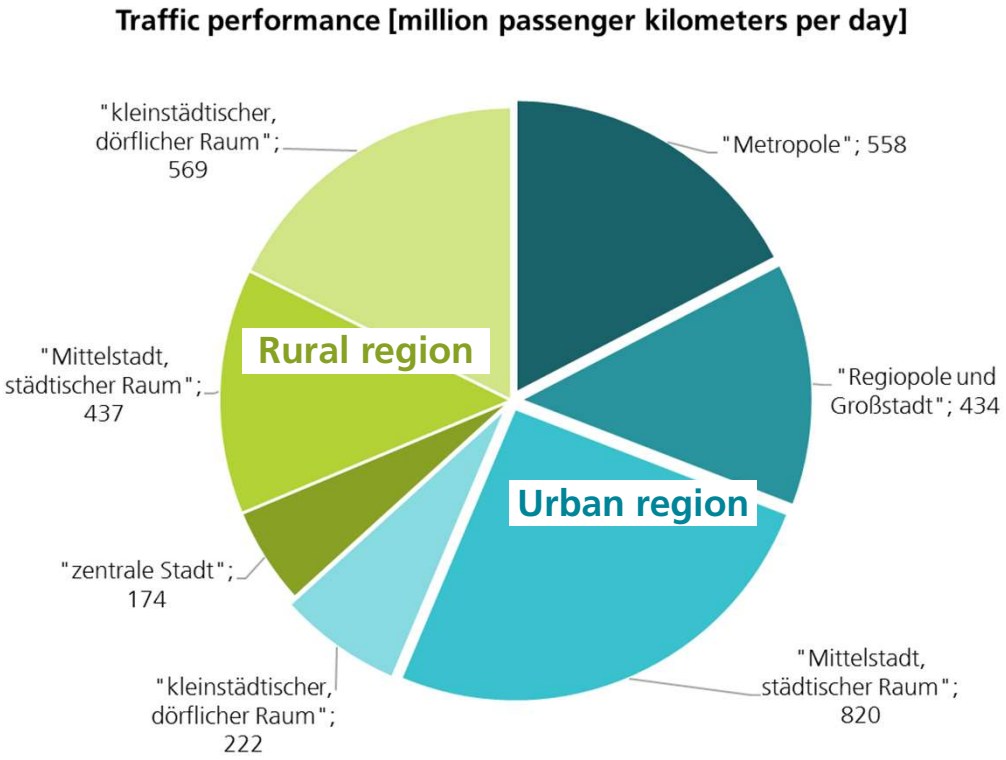
Reduce, Replace, Refine



- Transportation generates ...
  - emissions while **driving**
  - emissions while **producing vehicles**
  - emissions while **producing energy carriers** (fuels, electricity)
- **Resources** are needed ...
  - to build the vehicle and its components
  - to build the infrastructure for
    - streets, railways, ...
    - energy production
    - energy transmission and distribution
- Emissions / resource use **can be reduced** by ...
  - changing **behavior**
  - technological **innovation**
  - optimizing **transport organization**

Why look at cities?

- Cities ever **increasing** in size and population
- Cities might be **easier to steer** policy-wise than many different small municipalities
- **Substantial share of transport** is in cities (city regions)
- "**New mobility**" offers and **pilot projects** often in cities

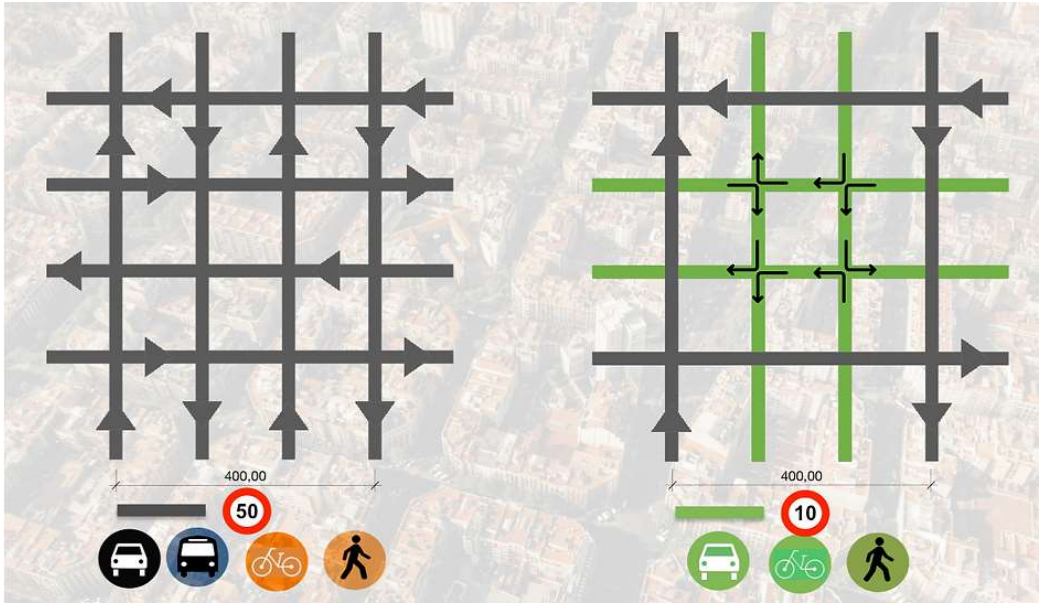


UN (2018): World Urbanization Prospects: The 2018 Revision, *United Nations, Department of Economic and Social Affairs, Population Division, New York.*
MiD (2017): Ergebnisbericht

How to REDUCE overall transportation?

- Two basic options:
  - **avoid** trip
  - **decrease** distance of the trip
- Example: "15-min-city", i.e. decreasing the distance of required trips
- Example: Superblocks in Barcelona

! For many people (in Germany), it is not about avoiding transport but enabling transport to increase accessibility (e.g. groups with low income)

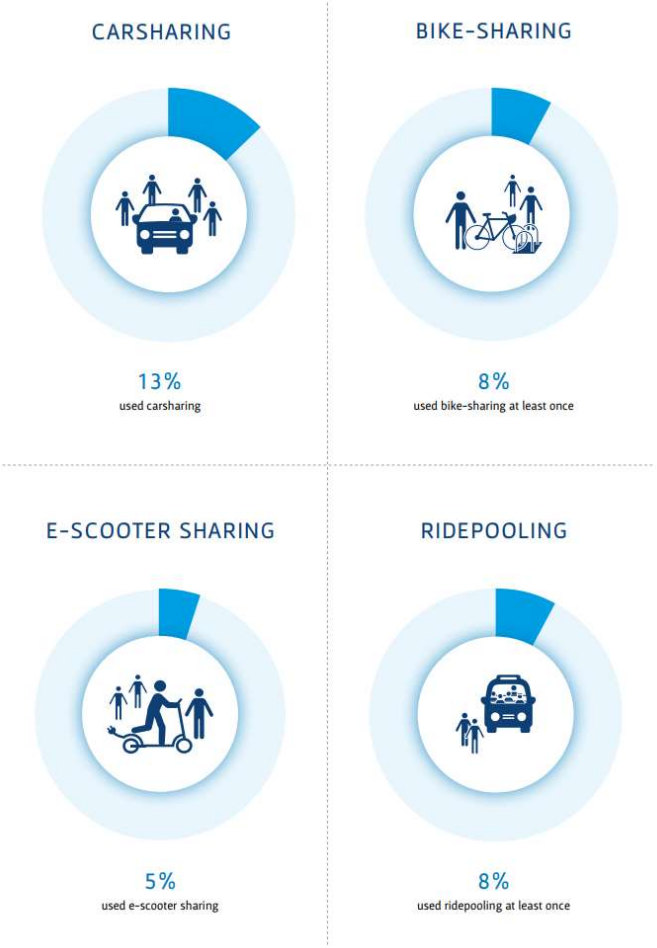


Principle of Barcelona Superblocks

Retrieved from https://www.superblocks.org/

Which modes / services can REPLACE less efficient means of transportation?

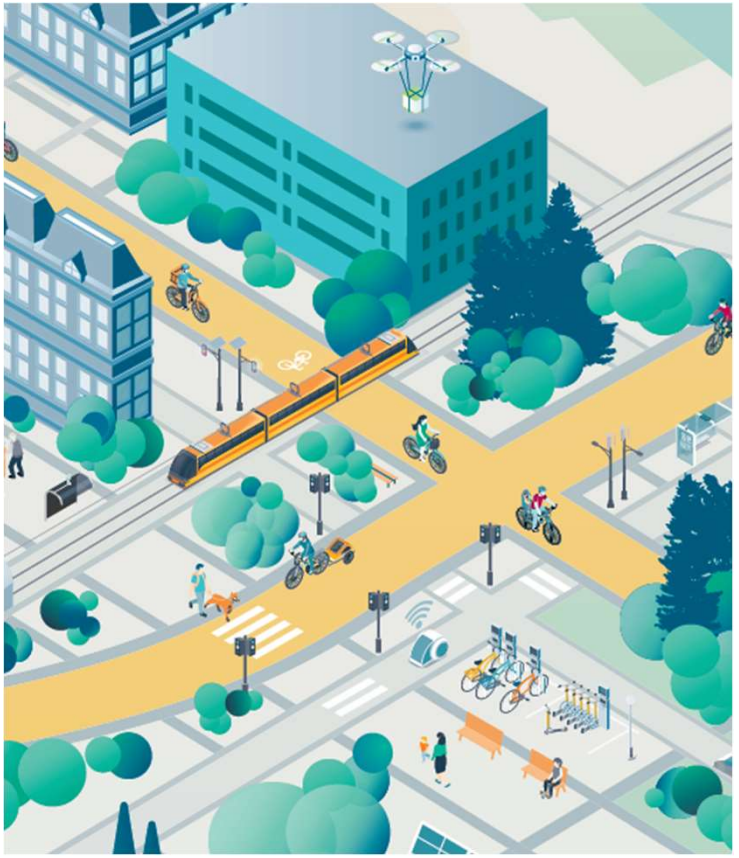
- **Active modes**
  - walking, biking, e-biking, ...
  - (almost) no emissions
  - positive health effects, less land use
- **Public transportation**
  - subway, tram, bus, ...
  - usually less emissions per traveler than cars due to higher rate of occupation
- **Mobility Services**
  - shared bikes, e-scooters, cars, ... + pooling options for cars
  - increased and eased access to active modes
  - smaller vehicle stock, quicker diffusion of technological innovation
  - increased rate of occupation through pooling



Krauss et al. (2021): Shared Mobility Facts. Wie lassen sich (geteilte) Mobilitätsdienste erfolgreich in kommunale Mobilitätssysteme integrieren - und wer nutzt sie?

How to REPLACE less efficient means of transportation?

- The offer of alternatives **exists**, but the modal split **does not improve sufficiently**
- **Pedelecs** as a game changer for biking
- Need to **increase the attractiveness of public transport** (e. g. expand offer, especially in rural areas, simplified ticketing, …)
- Consider factors that influence the **acceptance of the public for mobility services** (e. g. compatibility, trialability, …*)
- **Integration** of public transport and mobility solutions, shared micro-mobility for the first / last mile
- **Autonomous vehicles** as a potential booster for attractiveness?
  - Rebound effects!



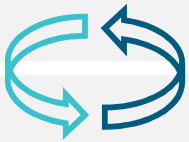
Köhler, J.; Bieker, S.; Doll, C.; et al. (2022): Eine Vision nachhaltiger urbaner Mobilität - MOWENDIS 2030. Karlsruhe: Fraunhofer ISI 2022.

** Burghard, U., & Scherrer, A. (2022):* Sharing vehicles or sharing rides - Psychological factors influencing the acceptance of carsharing and ridepooling in Germany. Energy Policy, 164, 112874. https://doi.org/10.1016/j.enpol.2022.112874

How to REFINE transport technology?

Emissions

- **Electric powertrains**
  - Battery electric vehicles (BEV) as the **most promising technological solutions**
  - Plug-In hybrid electric vehicles (PHEV) only as **interim technology**
  - Fuel cell electric vehicles (FCEV) no dominant technology, hydrogen needed for other sectors
- Further optimization and improved technologies needed, e.g. solid state batteries
- Electrification entails adjustments and investment in the **infrastructure**: charging as well as green electricity production

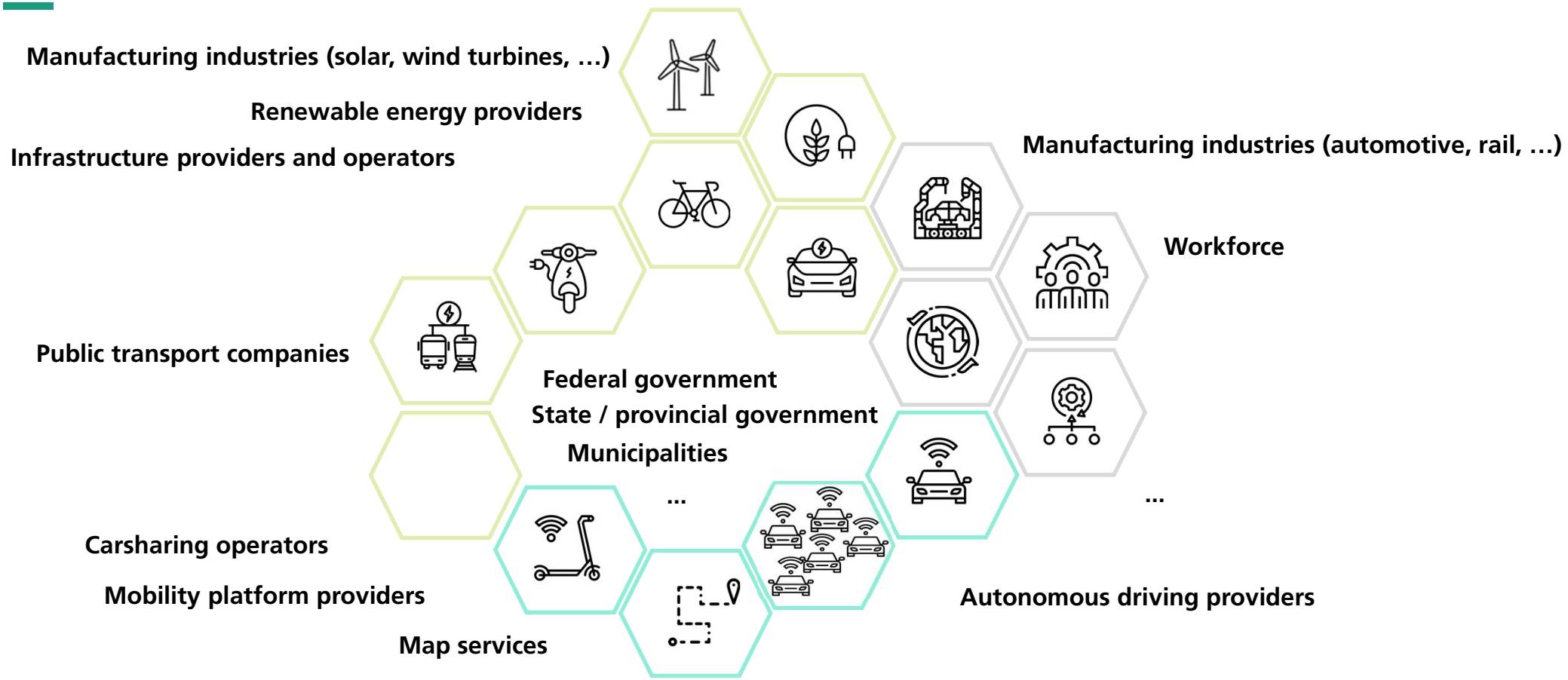


Resources

- Reduction of **material use**, substitution of materials
  - Consider feedback loops
  - E.g. lightweight construction: recycling capability of composite materials
- ...

Who is involved in the mobility transition?

Many stakeholders are affected and need to actively shape the new mobility system



It is not technology or alternatives, it is mostly the societal and political challenges that hinder the transformation!

- **Car-centric infrastructure**, design of cities, ...
- Push vs. Pull measures to induce **changes in the behavior**
  - Increased prices for (emission-intensive) cars and usage
  - Speed limits (limited options for municipalities themselves)
  - Improvement of railway system
- **Cities and municipalities do have options**:
  - Parking management and dismantling of parking space
  - City tolls
  - Infrastructure measures
  - Cooperative projects with public transport
  - Admission of MaaS offers
- **Bottom-up impulses can be given by anyone!**

Climate Adaptation

Climate Change

Estimate!

Climate Change in Germany – which statement is not true?

a. increasing number of tropical nights
b. increasing summer precipitation
c. increasing winter precipitation
d. so far increased average temperature beyond 1,5 °C
e. all true

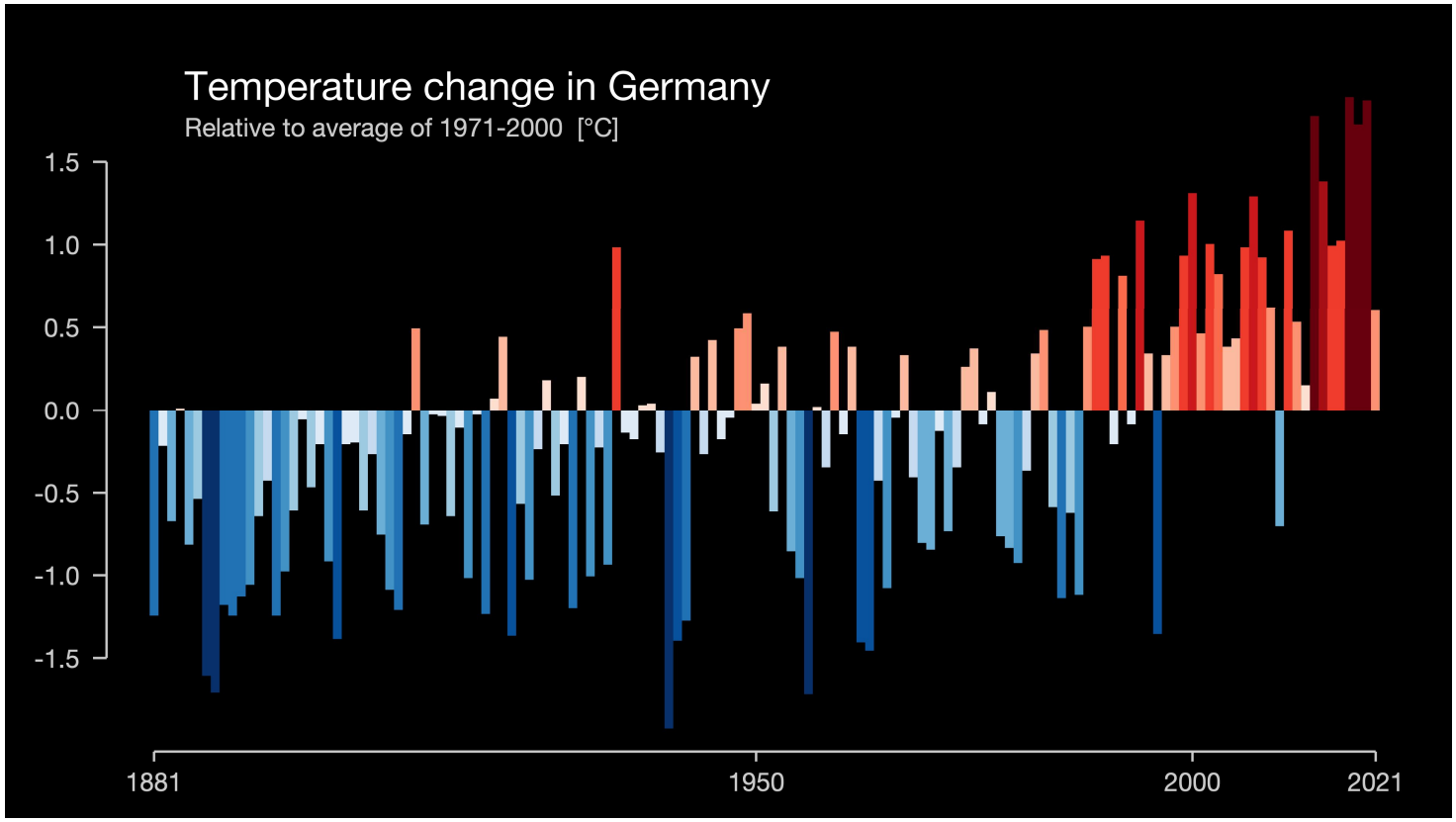
ø urban water cycle: 10% infiltration, 10% evaporation, 80% run-off.
What does the natural water cycle look like?

a. 1/3 infiltration, 1/3 evaporation, 1/3 runoff
b. 2/3 infiltration, 1/3 evaporation, +/- 0 runoff
c. 1/3 infiltration, 2/3 evaporation, +/- 0 runoff

Climate Change

Basic Facts

„**Warming Stripes**“

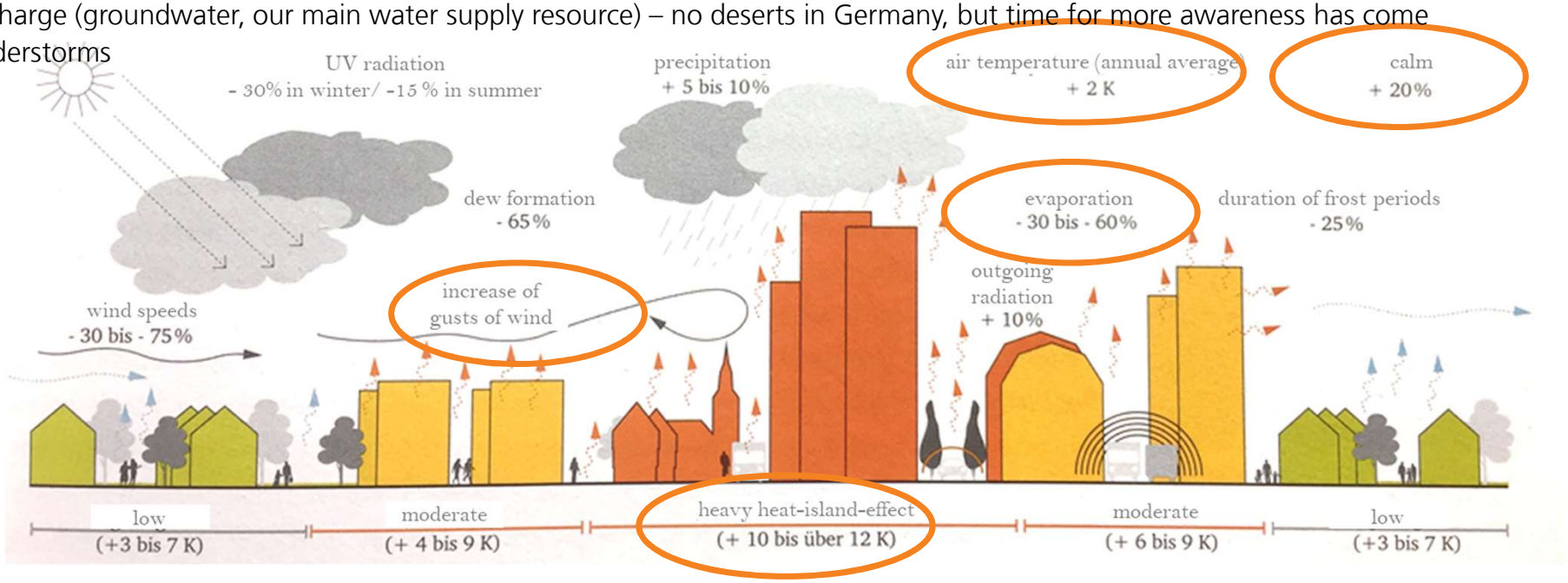


https://showyourstripes.info

Climate Change Adaptation

what we have to face

- rising average temp, rising tropical nights, increased temp. level in cities
- shift in rainfall regimes – varying; more heavy rainfalls, more dry periods
  reduced water recharge (groundwater, our main water supply resource) – no deserts in Germany, but time for more awareness has come
- storms, hail, thunderstorms



Dettmar et al 2020: Energetische Stadtraumtypen, pg. 9, adapted

Climate Change Adaptation

what we have to do

- **Unsealing** - improving infiltration and retention, enable storage
  - increased resilience against “too much” and “too less” water
- **Create** green spaces and water areas (**green and blue**) and plant trees and greens for increased evaporation
  - increased natural shading and cooling, reduced heat-island effect, higher quality of stay inside and outside

Ramboll Studio Dreiseitl, adapted

Climate Change Adaptation

Not so easy...

- **Conflicts of use** with existing uses
  - existing housing stock
  - existing centralized (grid-bound) infrastructures
  - installed technologies

path-dependencies:
decisions we make today last for at least 50 years
lasting for at least 15 years

  - existing procedures, habits and patterns
    - “It has always gone well so far...” (change means uncertainty)

- **New responsibilities**

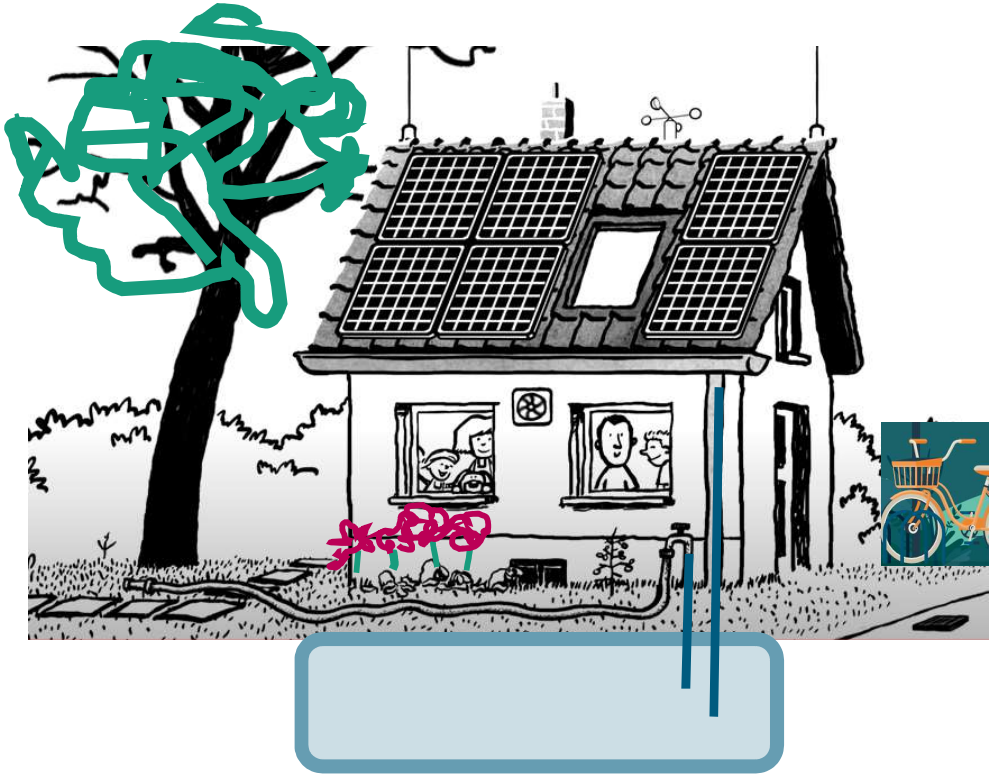
"Provision of public services (Daseinsvorsorge) is a municipal task" - "They'll do it...“.

  - property, legal rights, ... is with private stakeholders

Climate Change Adaptation

people and responsibilities

Private Properties



KLARO www.klaro-klimarobustbauen.de and www.youtube.com/watch?v=hSaSV6sr0Xw, adapted

Case Study Nach2Bo

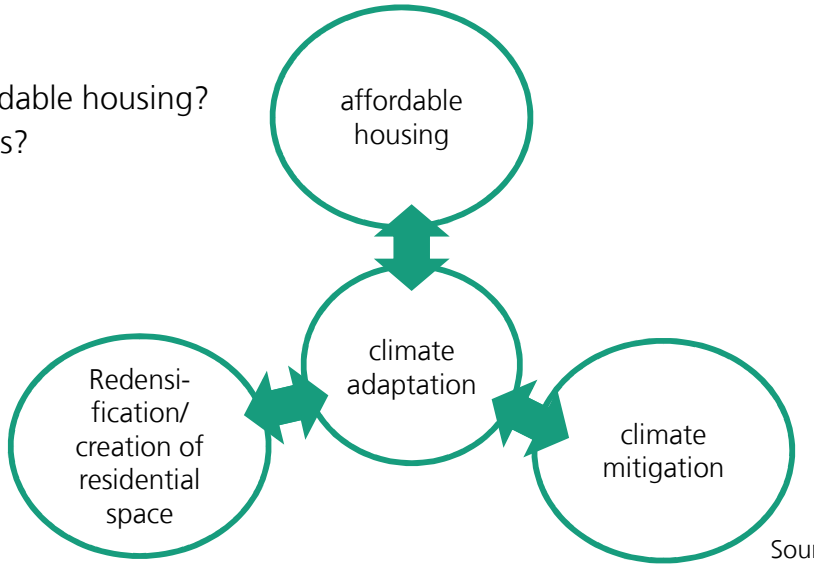
Joint Forces to cope with new challenges in housing

Nach2Bo – ISI study and consulting

- Climate adaptation in the housing industry in the field of tension of further challenges

- Study on **integration of climate adaptation means in re-densification projects**
- Identification of » windows of opportunities «
  - Are re-densification projects those windows of opportunities?
  - Which measures can be added – for quality of life, energy efficiency and affordable housing?
  - Where are cooperation potentials between housing industry and municipalities?

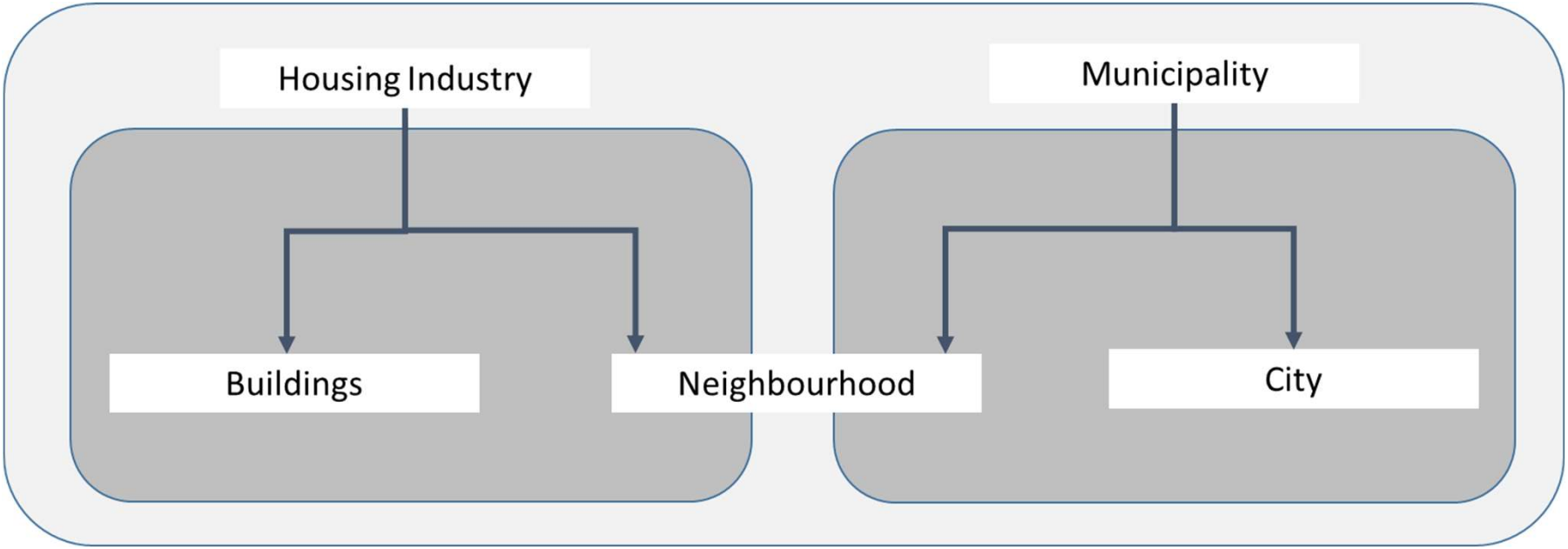
- Funding source: Zukunftsinitiative »Wasser in der Stadt von morgen«
- Client: Vonovia and City of Bochum
- Partner: InWIS



Source: InWIS

Case Study Nach2Bo

the spatial and stakeholder's perspective



Case Study Nach2Bo

Starting Point and Findings

Neigbourhood of around 50 buildings in Bochum

- Energy-efficient refurbishment and addition of one full storey (of 2 storey-buildings)

- **Aims**
  - Economic feasible adding of blue and green infrastructures for flood prevention, alternative water resources and increased housing quality

- **Findings**
  - long list of measures such as green roofs for water retention and cut-off from sewer system, multi-codes green spaces with infiltration capacities, and green facades for additional shading as well as for enhancing biodiversity

- **Advantages for housing company**
  - increased efficiency (ca. 4-5%) of PV modules on roof in combination with green roofs
  - savings due to infiltration of rainwater onsite (instead of use of sewers) – as measures pay off after a few years
  - increased protection against damage from hail events by facade-greenings
  - **increased flood prevention**, probably savings for insurances in the future

- **Advantages for the municipality**
  - **increased flood prevention**
  - scale-up of adaptive measures
  - reduced rainwater in municipal wastewater treatment plant

Climate Adaptation

Lessons learnt

- Cities are the space to act in.
- People are the reason to act for.
- Impacts of decisions in buildings and infrastrutures last long, due to high path-dependencies.
- As climate change impacts are already taking place (and will increase) there is no time to wait for solutions to „happen“ from others.
- Municipalities are one stakeholder among many others.
- All people, institutions, companies and stakeholders are called upon to act.
- Now.

Stakeholders

Stakeholders

Now it's your turn (last time, promise ;-)

Questions on municipal actors

With which actors do municipalities most frequently exchange on climate policy issues?

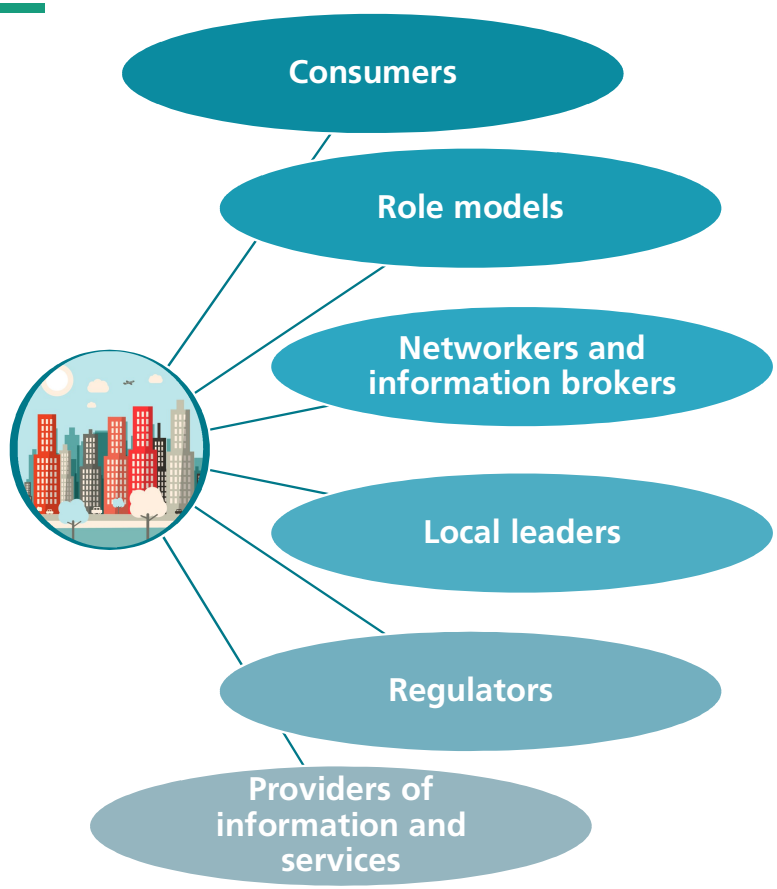
a. Other municipalities and municipal networks
b. State government
c. Federal government
d. Supra-national level (EU and UN)
e. Companies
f. Civil society

Which measure to institutionalize climate change mitigation is implemented most frequently in German municipalities?

a) Adoption of a climate change mitigation plan
b) Compiling an inventory of CO_2 emissions
c) Availability of a budget dedicated to climate change mitigation
d) Setting of a climate change mitigation target

Stakeholders: Municipalities as pathmakers for a sustainable future

Possible roles of municipalities in climate action



By consuming goods and services in a climate friendly way, they can contribute to triggering the demand for sustainable innovations

They can lead by example – implementation of climate friendly behaviours can be observed by local actors

They can support the exchange of information and diffusion of knowledge among different local actors as well as superordinate levels and other municipalities

Through strategic governance they can guide local actors

In Germany, they are responsible for public administration and public services ("Daseinsvorsorge")

Consultancy, e.g. on mobility or energy issues, and provision of services, e.g. mobility planning, car sharing

Stakeholders: Overview on two studies on municipal climate actions

Research goals

Study 1

- Analysis of the roles of municipalities in climate action
- Analysis of interactions with actors outside the municipal administration

Study 2

- Assessment of municipal approaches in the strategic institutionalisation of climate change mitigation and adaptation
- Analysis of the effects of local framework conditions on strategic institutionalisation

Stakeholders: Study 1

Description of the mixed-methods approach

Unique internet links to the online-survey were used to connect the information in the questionnaire with **structural data**

Stakeholders: Study 1

Results: Municipalities' perceived role in climate action

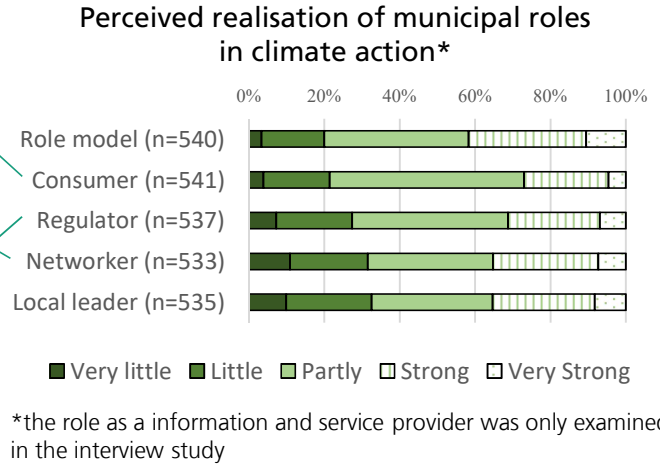
- 48% of the municipalities rated their **level of engagement** in the field of climate action as high or rather high - many others are in the midfield (39%)
- Of the municipalities' perceived roles, the most dominant one is being a **role model**:

+ Simple and direct measure; can lead by example

- High costs; lack of personnel

Larger municipalities embrace this role more than smaller municipalities

- Some municipalities consider the means of binding regulations to be an important instrument
- Others favor to lead by example instead or by offering financial incentives



*the role as a information and service provider was only examined in the interview study

➢ While enacting one role, the municipality is often also exercising another simultaneously; e.g. by acting as a consumer, municipalities also act as role models

Stakeholders: Study 1

Results: Municipalities' perceived role in climate action - in relation to higher levels of government

- Majority (64%) of the municipalities claim to be able to make a **significant, independent contribution** to climate action
- 45% further stated that the local administration should **act as a leader** with regards to climate action, since higher levels are not committed enough

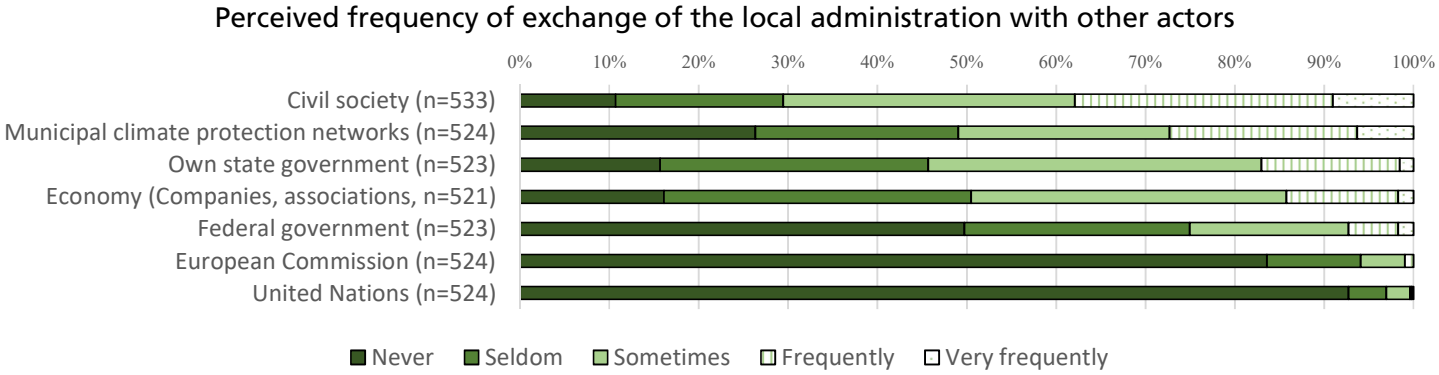
- But many (45%) also think that **more committed action by higher-level actors** is needed for their activities to be feasible

  - Central role of higher levels of government in municipal climate action through their **provision of funding** and the **regulatory framework** they establish
  - Municipalities partly orient themselves towards **(inter-)national targets** and higher level goals are referred to in order to legitimize municipal climate action
    - But implementation of targets is not perceived as central task (voluntary action)

Stakeholders: Study 1

Results: Interactions with actors outside the municipal administration

- The primary exchange partners are actors from **civil society**, which are perceived as **key initiators** of local climate action
- Exchange with higher levels of government often takes place indirectly by participating in **climate protection networks**
  - ➢ Interaction with the **federal government** is sometimes institutionalised within funding programmes
- Municipalities have limited influence on climate action measures in the commercial sector. However, persuading **companies** to engage in climate action is viewed as difficult.



Stakeholders: Study 1

Conclusion

- Municipalities **combine various different approaches** in contributing to climate change mitigation

- Municipal administrations are in **active exchange with citizens and other municipalities**. With regards to higher levels of government, interactions are more limited.
  - Indirect exchange through **municipal networks** is of importance

- **Overall: Climate action is an important issue for German municipalities**
  - Municipalities claim to be able to make a **significant, independent contribution** to climate action

Stakeholders: Study 2

Motivation

Institutionalising climate action as a means to … (Anguelovski and Carmin 2011)

- Facilitate implementation and
- Strengthen the legitimacy, coordination, and support for the respective policies across sectors and departments

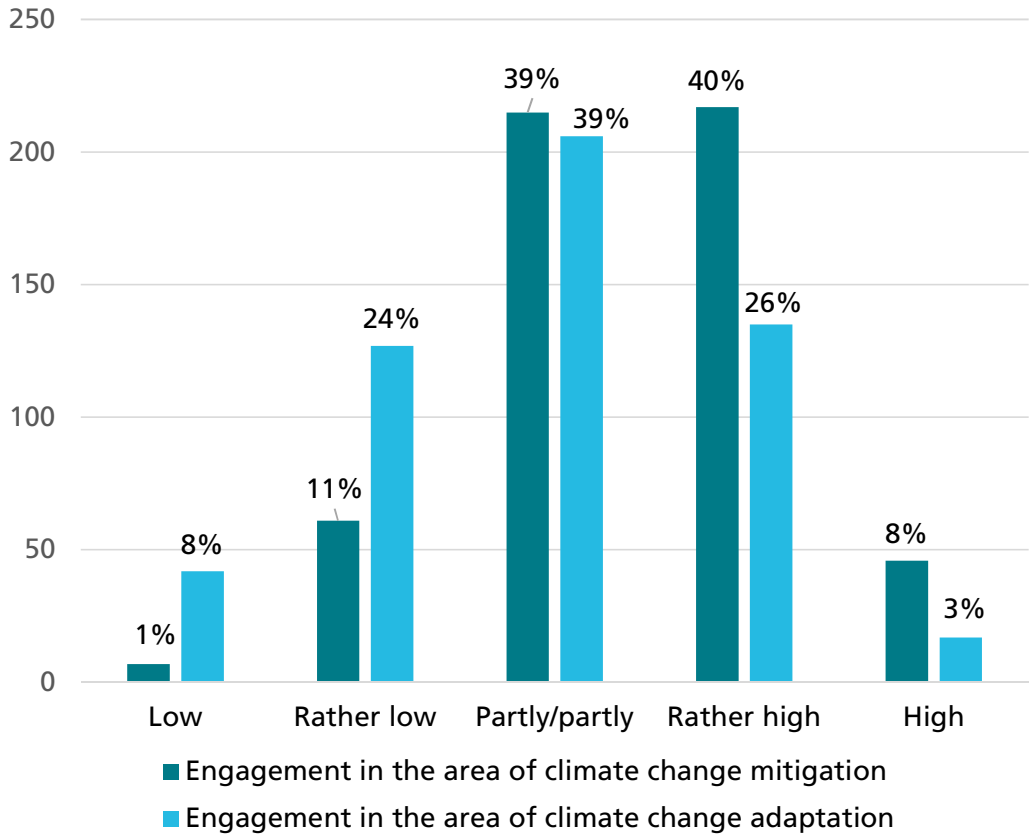
➢ Helps climate policies to sustain (short-term) electoral cycles

Stakeholders: Study 2

Results: Municipal engagement in climate change mitigation and adaptation

Compared to climate change mitigation, the **level of engagement in the area of climate change adaptation is somewhat lower**.

Both are connected: Higher engagement in climate protection is often also accompanied by higher engagement in climate adaptation (rs = 0.43).



Responses from 519-546 of the 550 municipalities

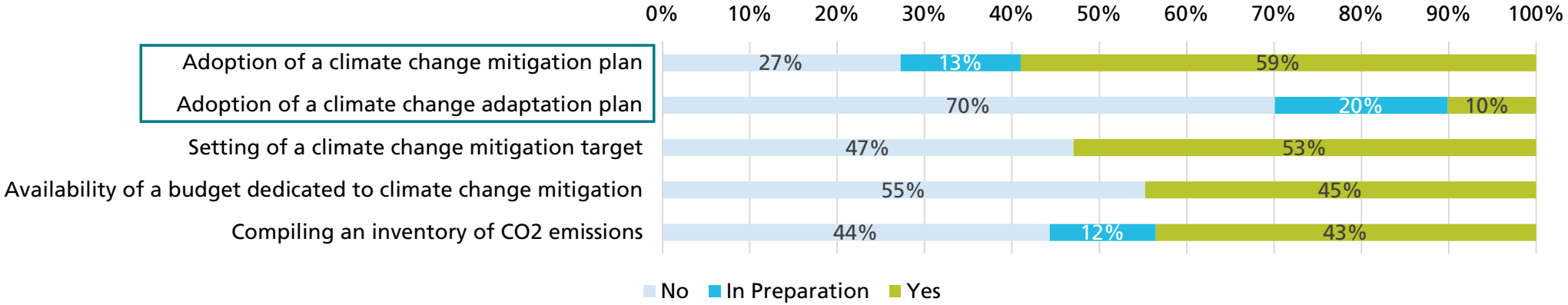
Stakeholders: Study 2

Results: Institutionalising climate change mitigation and adaptation

About **66%** of the municipalities **address climate change mitigation and adaptation together.**

38% of the municipalities **consider the topics to be of equal importance.**

Measures for institutionalising climate change mitigation/adaptation in the municipalities

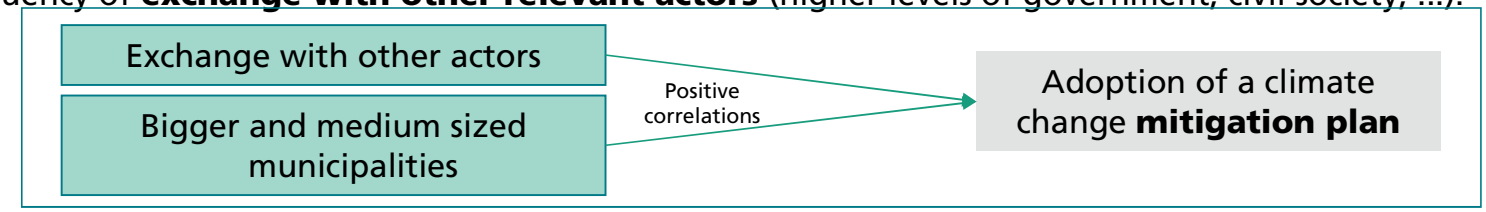


Responses from 519-539 of the 550 municipalities

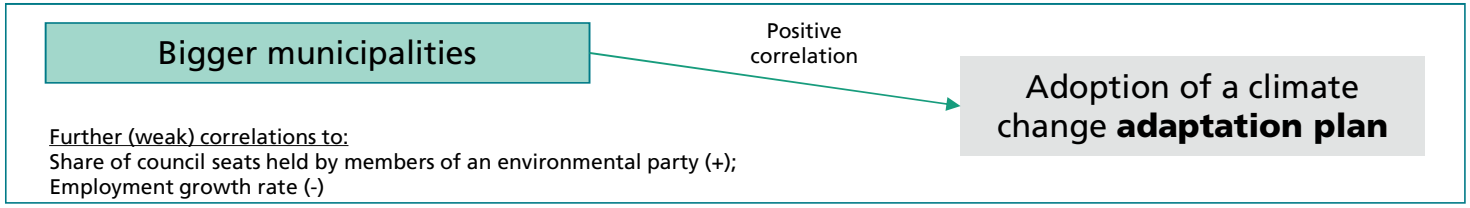
Stakeholders: Study 2

Concluding results: Enabling and impeding factors for institutionalising mitigation and adaptation

- The strategic institutionalisation of climate change mitigation in municipalities takes place in various ways. The most common is in the form of a **climate change mitigation plan.**
  - Strategic institutionalisation in climate change mitigation plans is strongly related to the **size of the municipality** as well as the frequency of **exchange with other relevant actors** (higher levels of government, civil society, ...).



- In comparison, municipalities are **less engaged in climate change adaptation**, and it is also less frequently institutionalized in an adaptation plan.
  - **Very large municipalities** in particular have climate change adaptation plans in place.



- No links to perceived climate effects.

Stakeholders: Municipalities as pathmakers for a sustainable future

What can we learn?

- **Climate change adaptation and mitigation are both perceived as important issues** for German municipalities
  - Often worked on simultaneously
  - Municipalities most actively implementing mitigation and adaptation measures both differ in their characteristics

- Municipalities claim to be able to make a **significant, independent contribution** (in terms of climate change mitigation)
  - They combine different approaches
  - They interact with other actors (especially civil society and other municipalities)

Summary

Municipalities and other stakeholders' role in urban transitions

- The energy and mobility **transition** at the municipal level are a **complex undertaking**: new issues are emerging, many players are affected
- Same point with climate change adaptation.

- **Municipalities play a central role** and they can contribute by their own actions (e.g. in terms of climate change mitigation and adaptation)

- And…
  All people, institutions, companies and stakeholders are called upon to act, take part in this change, act (together) and design the way into the future.

https://klimamacher.berlin

The major problems we face today cannot be solved with the same thinking we had when we created them. «

A. Einstein

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Thank you for your interest and contributions!