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Strategic heating and cooling planning to shape our future cities

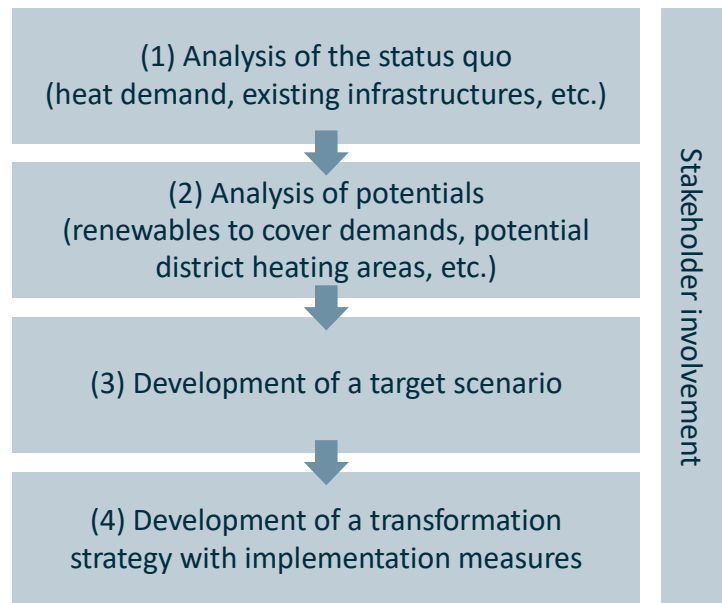
Survey on success factors and challenges of heating and cooling planning in Germany

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Motivation and Objective

Relevance of topic, state of literature and objective

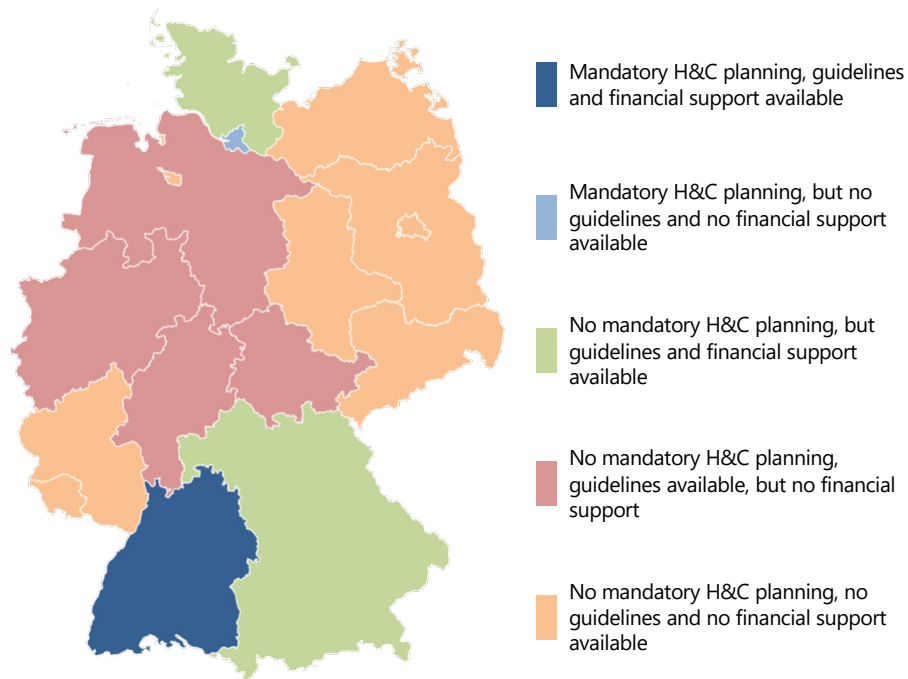


- The heating and cooling (H&C) sector is the single most important energy demand sector in Europe, while still largely based on fossil fuels.¹
 - H&C planning has proven to be an effective tool to develop measures locally and to drive the decarbonisation of H&C.²
 - Existing literature and documents show that there is already some expertise in H&C planning.³
 - So far, there is no empirical analysis of success factors and challenges for H&C planning.
- **Objective: Analyse success factors and key challenges of strategic H&C planning with empirical data from Germany.**

1 Heat Roadmap Europe 2017 and Eurostat 2022; 2 Chittum and Østergaard 2014; 3 e.g. Nilsson and Mårtensson 2003, Weinand 2020, Chittum and Østergaard 2014, Harrestrup and Svendsen 2014, Johannsen et al. 2021, Büchele et al. 2019, Mathiesen, Bertelsen 2020, Peters et al. 2020

H&C planning in Germany

Obligations, guidelines and support for H&C planning in Germany



Note: Financial support in Baden-Württemberg is only available for municipalities that are not obligated to prepare H&C plans.

- In Germany, strategic H&C planning is still in its infancy and only very few cities have prepared strategic H&C plans so far.
- Some cities have developed climate protection concepts or strategies and some large district heating companies have prepared transformation plans.
- From a legal perspective, only two federal states have an obligation for H&C planning: Baden-Württemberg and Hamburg.
- In a few states, there is financial support and several states have developed guidelines for H&C planning.

Data and Methodology

Data collection method

- We conducted six semi-structured interviews along nine questions with stakeholders in Germany.
- Additionally, an online survey was carried out, including 15 questions divided into five thematic blocks:

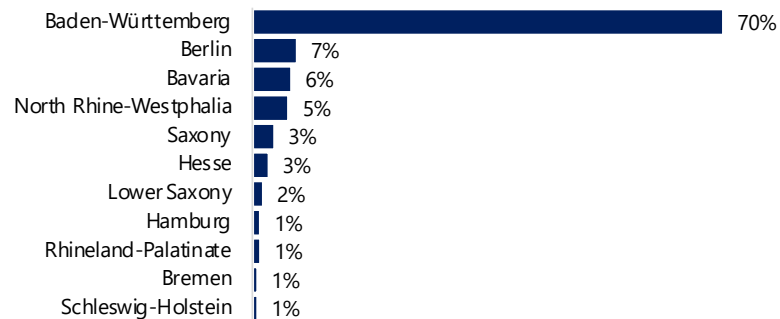
Block	Theme
(1)	General data (postal code, workspace, connection to H&C planning etc.)
(2)	Objectives, content, involved parties, time schedule of H&C plans
(3)	Success factors of H&C plans
(4)	Challenging factors of H&C plans
(5)	Evaluation of the instrument

- Around 500 participants were contacted directly and several thousand were contacted indirectly with mailing lists.
- Participation was possible from end of July until September 2021.
- The sample was analysed using descriptive statistics and a comparative analysis.

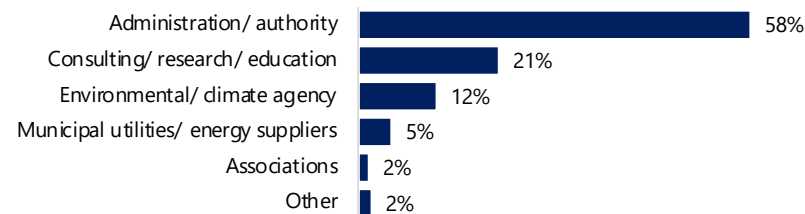
Data and Methodology

Outline of the sample contained in the online survey

Federal states of respondents



Workplace of respondents

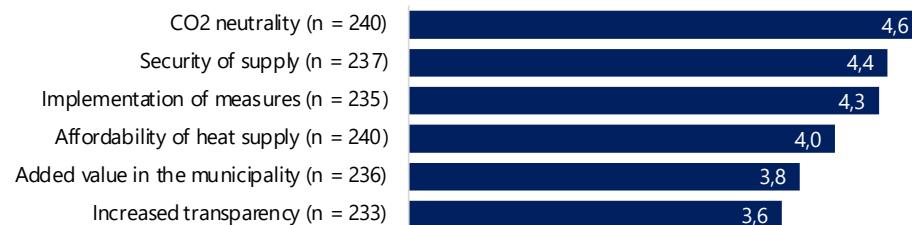


- We received 241 responses to the online survey.
- The significant majority of the respondents come from the federal state of Baden-Württemberg.
- The majority of the respondents work in administration, followed by consulting and research.
- One-third of the respondents stated that their city is obligated to carry out H&C planning.
- The sample covers around 65% of all municipalities with obligations for H&C planning.

Results of the online survey

Objectives, contents and operational points of a H&C plan

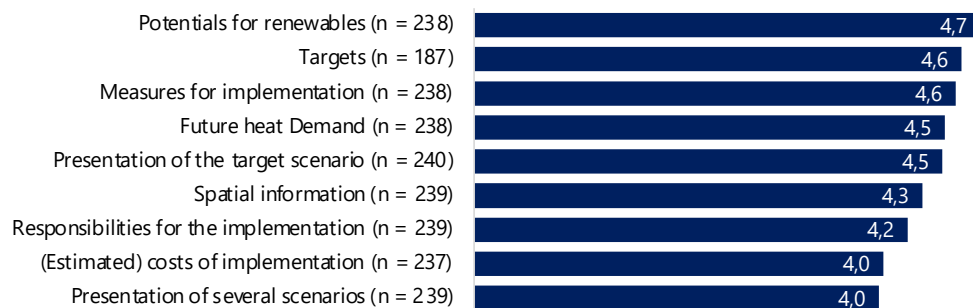
What should be the objectives of H&C plans?



Graph shows average of responses on the 5-point Likert scale

- Among the listed objectives, the most important is reaching CO2 neutrality.
- All listed topics of H&C plans received a high level of approval.
- Renewable potentials, targets as well as measures for implementation were rated the highest.

What topics should be included in H&C plans?



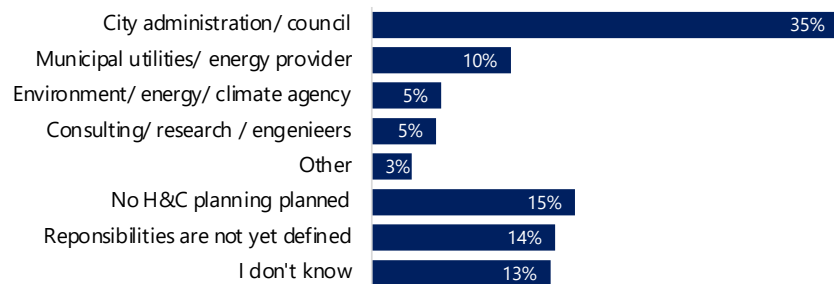
Graph shows average of responses on the 5-point Likert scale

- Results indicate that there is consensus on the objectives and content of H&C plans among the respondents.

Results of the online survey

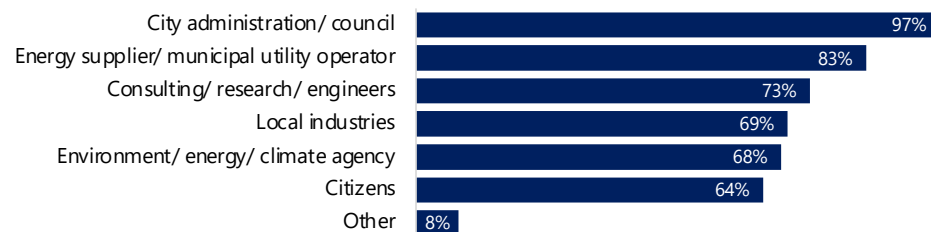
Objectives, contents and operational points of a H&C plan

Who is responsible for H&C planning?



Graph shows number of responses in percent (single selection)

Who should be involved in H&C planning?



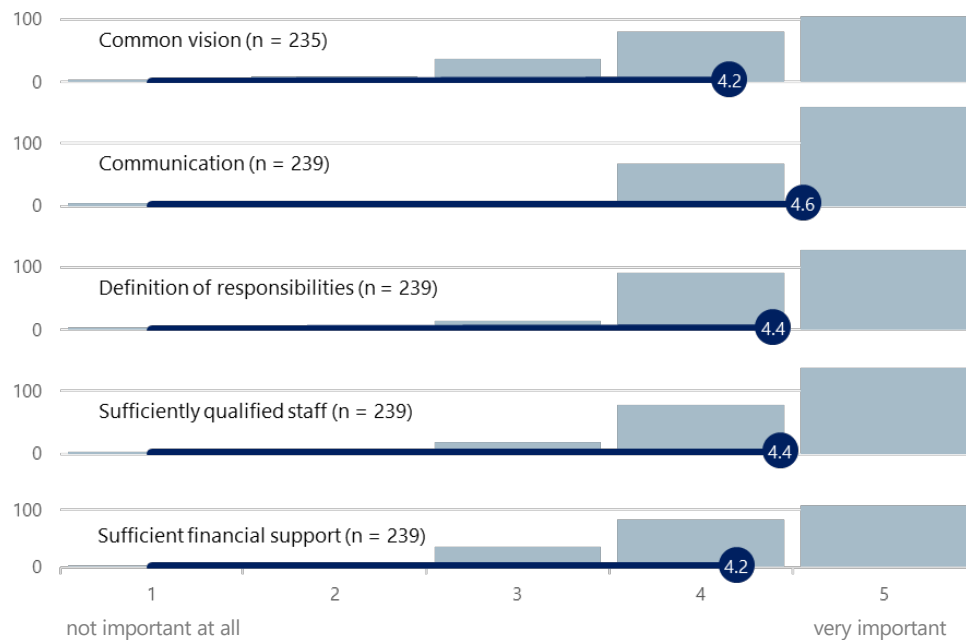
Graph shows number of responses in percent (multiple selection)

- In most cases, city administrations are responsible for the development of the H&C plan.
 - In some cases, other parties, like local energy suppliers, climate agencies or engineering companies hold the responsibility.
 - Many respondents indicate that other parties such as engineering and research institutes, local industry or citizens should also be involved in H&C planning.
- Results indicate that the involvement of many different actors is desired.

Results of the online survey

Success factors

In your opinion, how important are the following aspects for successful H&C planning?

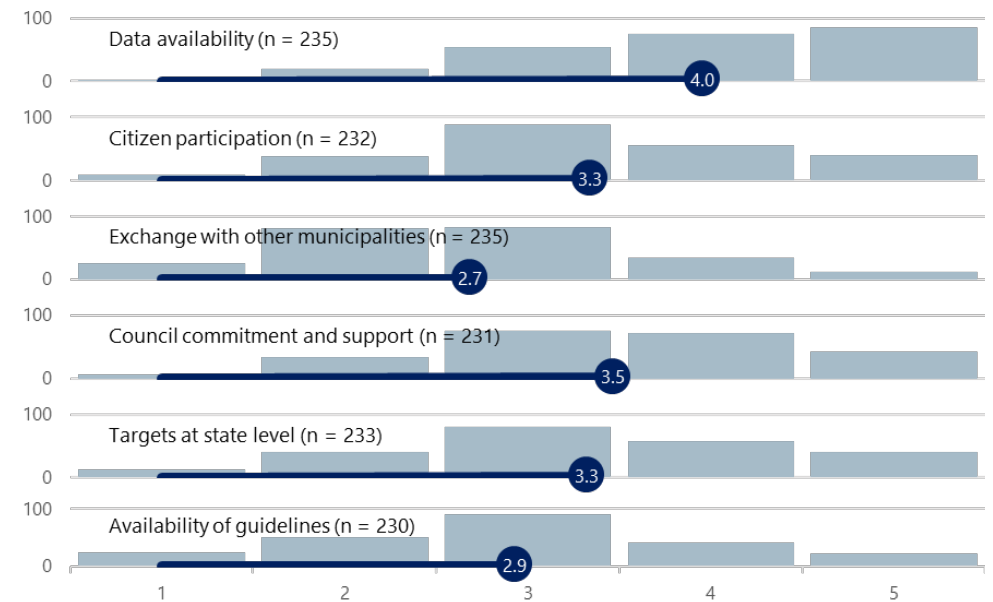
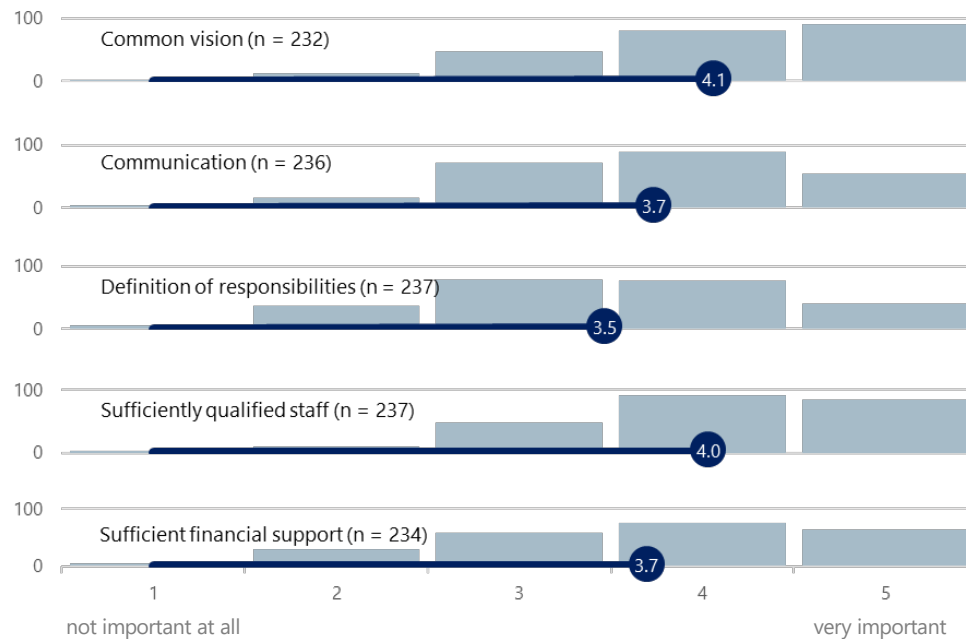


Graph shows distribution and average of responses on the 5-point Likert scale

Results of the online survey

Key challenges

In your opinion, how challenging are the following aspects of H&C planning?

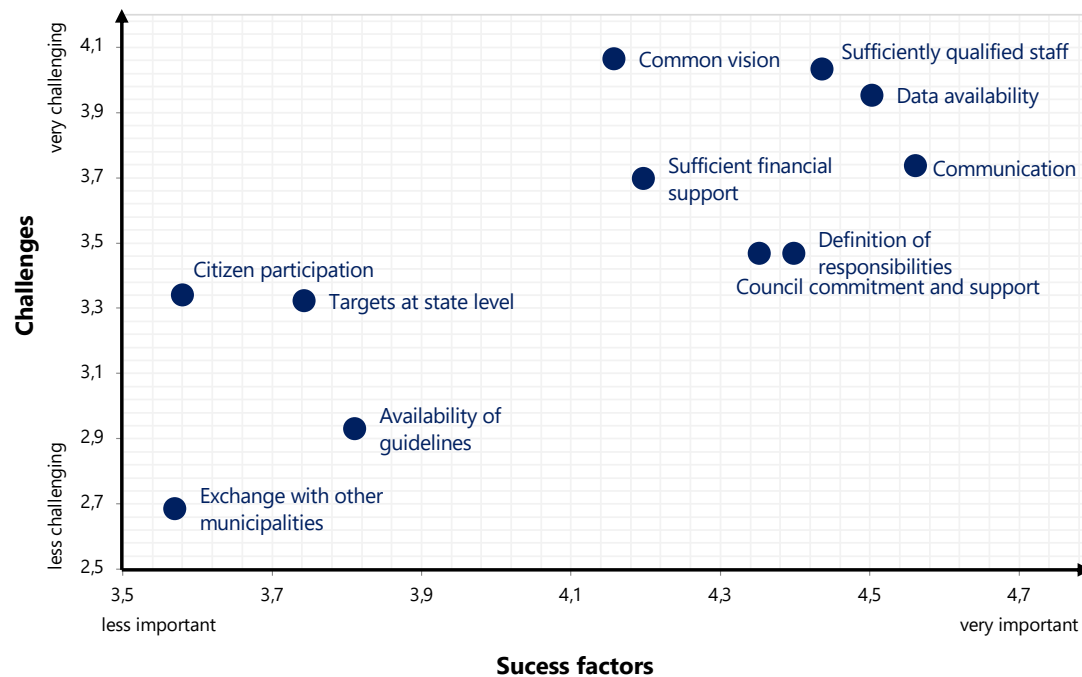


Graph shows distribution and average of responses on the 5-point Likert scale

Results of the online survey

Success factors and key challenges

Success factors and key challenges of strategic H&C planning

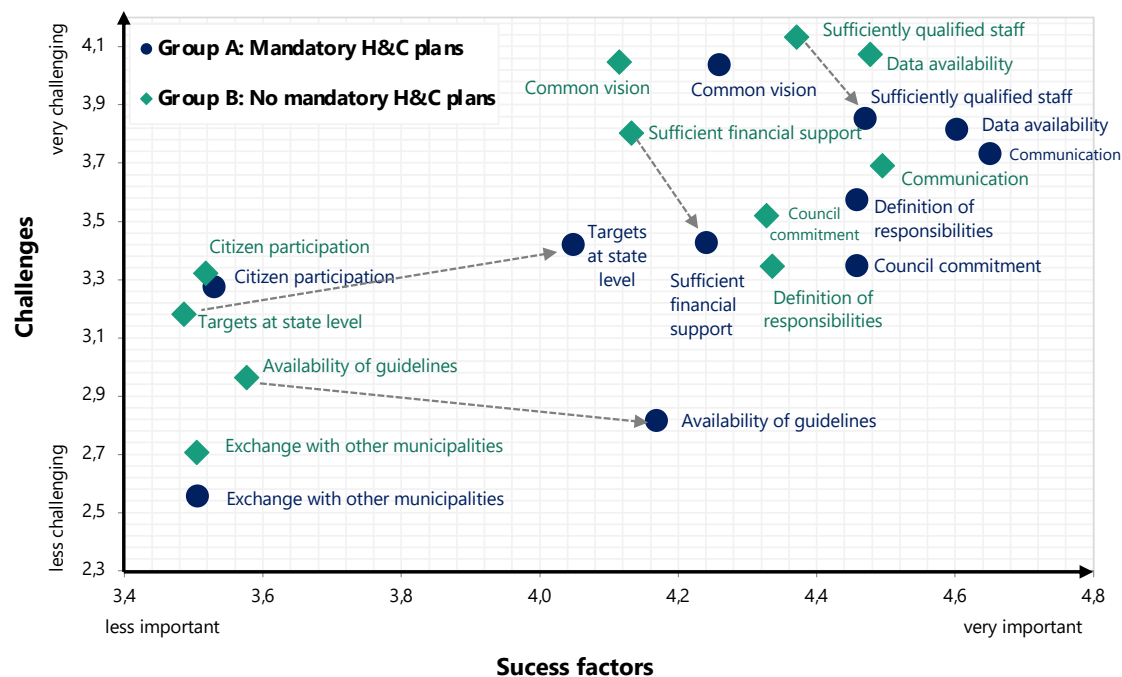


- Sufficiently qualified staff, data availability and communication are perceived as particularly important and challenging at the same time.
- Availability of guidance and exchange with other communities are perceived as less important for success and less challenging.

Results of the online survey

Success factors and key challenges

Success factors and key challenges of strategic H&C planning by groups

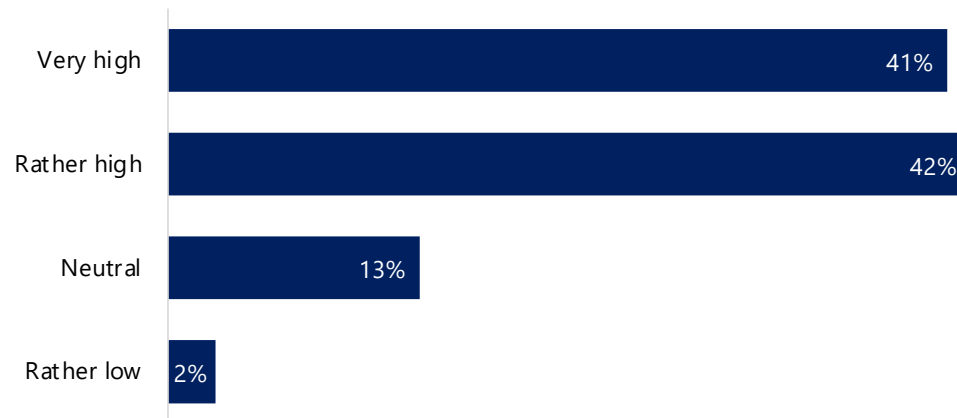


- Targets at state level and guidelines are perceived as more important for success by respondents with mandatory H&C planning.
- Sufficient qualified staff and financial support are perceived as less challenging by respondents with mandatory H&C planning.
- Results show that perception changes significantly when cities are obligated to set up a H&C plan.

Results of the online survey

Evaluation of the instrument

Effectiveness and suitability of strategic H&C planning



- More than 80% of the participants rate the instrument as effective and suitable to archive climate and energy targets.
 - Only 2% rate effectiveness and suitability as rather low.
- Results indicate that the participants see a strong suitability of the instrument for achieving CO2 neutrality.

Discussion and Conclusion

Main take aways and further research

- The sample covers up to 200 cities, including several cities without an obligation for H&C planning.
- The 241 participants see CO2 neutrality as the main objective of strategic H&C plans.
- Sufficiently qualified staff, data availability and communication are perceived as particularly important for success and challenging at the same time.
- Availability of guidelines and exchange with other communities are perceived as less important and less challenging.
- Targets at state level and guidelines are more important if the city is obligated to strategic H&C planning.
- The instrument is seen as effective and suitable to tackle climate change in cities by the participants.
- Further research is needed, e.g. on:
 - How to convince non-obligated municipalities to develop H&C plans?
 - What data is particularly relevant for H&C planning?
 - How can a successful contribution of the instrument be achieved and guaranteed?

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Thank you for your attention!

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