

Visualisation for citizen participation: Data practices in the Copenhagen Climate Citizens' Assembly

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Abstract: The recent popularisation of data and their visualisation has offered new opportunities for spaces of citizen participation around contested issues, such as climate assemblies. The potential of data visualisation in opening and supporting discussions has been widely recognised, but so has the risk it carries of naturalising certain perspectives and delegitimising others. Still, the roles played by data visualisation in the specific context of climate assemblies remain unaddressed. This paper investigates those roles through field observation and desk research around a case study, the *Københavnernes Klimaborgerting*. The study explores which data were visualised, how, by who and why. What emerges is that data visualisations were mostly used as top-down tools to frame the process rather than objects mobilised for discussion. The findings highlight the need for more participatory approaches in the data work done in climate assemblies, in line with the democratic principles of participation underlying those processes.

Keywords: data visualisation; citizen participation; climate assemblies; pluralism;

1. Introduction

Data visualisation has an increasingly recognised role in sustaining public engagement. This trend is the result of both technological advancements democratising data visualisation (Bohman, 2015; Hemmersam et al., 2015; Jensen et al., 2021; Moere & Hill, 2012b), and a rising interest in tools and practices for citizen participation. Attempts to involve citizens more deeply are often the response to a state of “democratic malaise” (Foa et al., 2020), and have encouraged a full set of “democracy innovations” (Elstub & Escobar, 2019). A significant portion of those processes has taken the form of Deliberative Mini-Publics or DMPs (Curato et al., 2021; Grönlund et al., 2015). In the last five years, roughly half of this “deliberative wave” (OECD, 2020) has been made up of climate assemblies—citizens’ assemblies on climate policies (Smith, 2024). This pattern reflects how institutional failure to respond adequately to the climate crisis (Boehm et al., 2023; Willis et al., 2022) is often understood as a symptom of the current democratic crisis. Within this frame, climate assemblies can



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provide alternative governance models and enable stronger action (Dryzek & Niemeyer, 2019; Escobar & Elstub, 2025; Mulvad & Popp-Madsen, 2021).

This contribution aims to explore the approaches to data visualisation in this space by answering the question: “What is the role of data and their visualisation in climate assemblies in relation to citizen participation?” While the contributions of visualisation to public engagement are widely inquired in the literature, there is a lack of publications looking at the specific context of climate assemblies, and of DMPs more generally. This is important not only because of the combination of the increased interest in data for public participation, the growing relevance of DMPs, and the urgency of the climate crisis. The evidence-informed nature of these deliberation processes (Curato et al., 2021; Escobar & Elstub, 2025) makes engagement with data a crucial step, even more when addressing complex systemic problems such as sustainability transformations (Pickering et al., 2022).

We address the gap at the intersection of data visualisation and climate assemblies by examining a specific case study: the *Københavnernes Klimaborgerting*¹ (Copenhagen's Climate Citizens' Assembly). Our approach includes both observation of the assembly's meeting and desk research, in order to investigate how the various actors involved throughout the process worked around and with data. Focussing on a single case allows an in-depth analysis, but limits generalisability. While the existence of a “tension between egalitarianism and the need for informed decision-making” (Escobar & Elstub, 2025, p. 67) is widely acknowledged in the field, the specific ways in which it has been materialised through data visualisation are situated and contextual.

We start by positioning our contribution in the literature around the roles and effects of data visualisation in relation to citizen participation. We then present the case study, unpacking the process and highlighting the actors involved. Afterwards, we illustrate the methodology of our inquiry, alongside the two directions of observation and desk research. We present four findings from the case study analysis and conclude by discussing them in relation to the broader literature.

2. Background

Computer and internet technologies have led to a multiplication of accessible data as well as to the popularisation of tools for data dissemination, analysis, and visualisation open to non-professional audiences (Hemmersam et al., 2015; Jensen et al., 2021; Moere & Hill, 2012). Hemmersam et al. argue that the resulting proliferation of data visualisations contributes to making information accessible, and thus empowers citizens' decision making and participation (Hemmersam et al., 2015). Previous studies have argued that data visualisation's role in sustaining citizen participation can take a variety of forms, for example by supporting citizens' sense-making and discussions around contested matters (Amit-Danhi, 2022; Nærland, 2020; Valkanova et al., 2015), by making public opinions visible to governments and decision-makers (Kohlhammer et al., 2012; Nærland, 2020), by spurring emotional engagement around certain causes (Kennedy & Hill, 2018; Nærland, 2020), by enabling public oversight and watchdogging (Hemmersam et al., 2015; Nærland, 2020;

¹ <https://klimaborgerting.kk.dk/>

Suman, 2020), by informing people's voting preferences (Nærland, 2020), and by enhancing the self-recognition of communities (Nærland, 2020; Wihbey et al., 2020).

Data visualisation, however, makes information not only accessible but also persuasive (Amit-Danhi, 2022; Barnhurst, 1994; Fileborn & Trott, 2022; Jensen et al., 2021; Kennedy et al., 2016; Moere & Hill, 2012; Muehlenhaus, 2013; Nash et al., 2022; Pandey et al., 2014). Persuasiveness is mostly understood in terms of claims to objectivity and neutrality. Data, especially quantitative data (Porter, 1995), have a long history of being considered universal and trustworthy (Allen, 2023; Hill, 2020; Hill et al., 2016; Kennedy et al., 2016, 2020; Kennedy & Hill, 2017; Rettberg, 2020). Visualisations, on their end, tend to be perceived as neutral and factual "windows onto data" (Kennedy et al., 2016, p. 716) and hence, once again, appear objective (Hill, 2020; Kennedy et al., 2016, 2020; Rettberg, 2020; Ricker et al., 2020). Furthermore, by being visualised the data become objects that can be mobilised as allies in discussions (Jensen et al., 2021; Latour, 1990).

Despite tending to hide the perspectives that produced them, data visualisations are always situated (Haraway, 1988): as all forms of knowledge, they are "produced by specific people in specific circumstances—cultural, historical, and geographic" (D'Ignazio & Klein, 2020, p. 83). They are the result of choices (Allen, 2023; Ambrosio, 2015; Crawford, 2013; Fileborn & Trott, 2022; Hill, 2020; Kennedy et al., 2016, 2020; Kennedy & Hill, 2017; Lee et al., 2021; Ricker et al., 2020) regarding not only how the data are visualised, but also which data are collected and illustrated (Boehnert, 2016). This distinction between the data and their visualisation is even challenged by Laura Kurgan: she argues that all data are already structured by intent and agency, hence in a way they are already visualisations (Kurgan, 2013). Bowker makes a similar point when suggesting that data are never raw and always cooked (Bowker, 2008) as they are always reflecting someone's predisposition and values (Boehnert, 2016; Gitelman, 2013; Hill, 2020). Drucker's appeal to "reconceive all data as capta" also adds to this argument: "Capta is 'taken' actively while data is assumed to be a 'given' able to be recorded and observed" (Drucker, 2011, para. 4).

Data visualisations carry certain views of the world both by embedding conventions (Kennedy et al., 2016) and by representing specific data in a specific way (Beer, 2016). This is of course not problematic per se, but it becomes problematic when the visualisations' situatedness is hidden under claims of objectivity: when that happens, visualisations contribute to naturalise the worldview they carry and hinder discussion (Nærland, 2020). Countering this "god trick" (Haraway, 1988, p. 581) are concepts of feminist (Haraway, 1988) or strong (Harding, 1995) objectivity, which result from bringing together multiple situated and partial perspectives while also acknowledging where they come from. D'Ignazio and Klein (2020) discuss how to bring this idea of pluralism into data practices as a founding principle of a feminist approach to data. They argue that embracing the value of multiple voices starts from reflexivity and transparency as recognition and disclosure of one's own positionalities (Alcoff, 1995) but does not stop there. It also means "actively and deliberately inviting other perspectives into the data analysis and storytelling process" (D'Ignazio & Klein, 2020, p. 137) and "doing so at all stages of the process—from collection to cleaning to analysis to communication" (D'Ignazio & Klein, 2020, p. 130).

These pluralistic approaches to data are extremely promising for the evidence-based deliberation of climate assemblies: they can inform and empower, acknowledge multiple contributions, open discussions, and support meaningful dialogues between citizens, communities, experts, and policymakers (Nash et al., 2022). Furthermore, collaboration between technical and non-technical actors opens new paths for the cultivation of data literacy, fostering emancipation in the learning process (D'Ignazio, 2017). More persuasive methods, instead, risk to naturalise certain perspectives and delegitimise others, to the point of inhibiting deliberation and conflicting with democratic principles of participation (Pickering et al., 2022). Ultimately, the effects of data and their visualisation in arenas of citizen participation depend on how they are produced and utilised. In this paper we have a closer look at data practices in a climate assembly in Copenhagen (the *Københavnernes Klimaborgerting*): in order to discuss their effects, we explore which data are visualised, which visual models and features are used, which actors are involved around the visualisations and with which roles, as well as what the expressed motivations are for visualising the data.

3. Case study

3.1 Governance and mandates

The *Københavnernes Klimaborgerting* (Copenhagen's Climate Citizens' Assembly) is a city-level climate assembly initiated by the *Teknik- og Miljøforvaltningen*² (Technical and Environmental Administration) of the *Københavns Kommune*³ (Municipality of Copenhagen) together with *We Do Democracy*⁴, an independent consultancy in democratic innovation and deliberation hired to design and carry out the process. The governance is administered through four bodies: *Projektgruppen* (Project Group), *Tredjepartssekretariat* (Third-Party Secretariat), *Ekspertgruppe* (Expert Group) and *Følgegruppe* (Follow-up Group). More details on the role of each group are listed in Table 1 (p. 5). The citizens' representatives in the municipality have given the members of the assembly the mandate to produce recommendations for them to scrutinise. On their side, they have not committed to following or adopting any of the recommendations: they have pledged to follow-up no later than two years after their submission, presenting publicly which ones will be included in the climate plan and which ones will be excluded, as well as why.

3.2 Cycles and remits

The recommendations are meant to inform the *Klimaplan 2035*⁵ (the municipality Climate Plan for the next 10 years), in particular supporting the cutting of emissions. The work of the assembly is structured in three cycles in the period 2023-2026. Each cycle is built around meetings where members deliberate to answer a specific question (or remit). The first cycle run in 2023/24 and was meant to produce guiding principles, the second (2024/2025) focussed on implementation opportunities in existing communities (pilot projects), and the third (2025/2026), yet to start at the moment of writing, is intended to define

² <https://www.kk.dk/om-kommunen/forvaltninger/teknik-og-miljoeforvaltningen>

³ <https://www.kk.dk/>

⁴ <https://www.wedodemocracy.com/>

⁵ <https://urbandevelopmentcph.kk.dk/climate/climate-plan-2035>

recommendations for implementation and involvement. The core question and sub-questions of the first and second cycles are listed in Table 2 (p.6). The remit of the third cycle has not yet been published.

Table 1 Governance bodies of the Københavnerne Klimaborgerting and respective roles.

Body	Role
<i>Projektgruppen</i> (Project Group)	The project group consists of both employees from the municipality of Copenhagen and from <i>We Do Democracy</i> . They are responsible for the ongoing coordination of the assembly.
<i>Tredjepartssekretariat</i> (Third-Party Secretariat)	<i>We Do Democracy</i> acts as an independent third-party secretariat, responsible for having contact with the members and making decisions about the design and facilitation of the process for the <i>Klimaborgertinget</i> .
<i>Ekspertgruppe</i> (Expert Group)	The expert group has the task of ensuring that the members' work is based on neutral and factual knowledge. They have advised the third-party secretariat and contributed knowledge, presenters, and other resources.
<i>Følgegruppe</i> (Follow-up Group)	The follow-up group is made of representatives of various interest groups. They follow the process and provide both inputs and comments to the members' recommendations; they also provide their own input on the implementation of the recommendations to the municipality's politicians and officials; finally, they take part in the implementation work with the influence they have.

3.3 Members and sortition

Members are appointed through sortition: In December 2023, about 50,000 Copenhageners received an invitation to take part in the draw. 1,591 citizens signed up, and 40 were selected to best represent the city's population in terms of gender, age, education, income, and attitudes to climate change. They also came from all the different districts in Copenhagen. Of the 40, three signed off before the start of the assembly, one dropped out during the first meeting, and two more quit later. The final first cycle's recommendations were made in the name of the 36 members who took part in most of the process, even though attendance at the meetings varied from a minimum of 16 to a maximum of 29 people. Participants from the first cycle were invited to join the second as well, and missing seats were filled by selecting from the pool of 1,591 respondents to the invitation, still with the aim to reflect the city population according to the aforementioned criteria. The plan is to do the same with the upcoming third cycle. Out of the 41 members of the second year, approximately two thirds were newly appointed. During different moments of the cycle, a total of 13 citizens dropped out, leaving the assembly with 28 participants at the end.

Table 2 Core question and sub-questions of the first and second cycles (original in Danish and English translation).

Cycle	Language	Core question	Sub-question(s)
1	Danish (original)	Hvordan ser det gode københavnertiliv ud med en langt mindre udledning af drivhusgasser fra forbruget af bl.a. mad, bolig og transport, og hvordan når vi bedst derhen sammen?	Hvordan kommer vi hurtigst muligt i gang med at opnå de største reduktioner? Hvordan sikrer vi, at flest mulige københavnere aktivt bidrager til og bakker op om indsatsen?
	English	What does a good life in Copenhagen look like with far fewer greenhouse gas emissions from the consumption of, among other things, food, housing, and transport, and how can we best get there together?	How do we get started on achieving the greatest reductions as quickly as possible? How do we ensure that as many Copenhageners as possible actively contribute to and support the effort?
2	Danish (original)	Hvordan kan vi gennem fællesskaber opnå et nyt hverdagsliv i København, der kan nedbringe klimaaftrykket fra forbrug?	Hvad kan vi igangsætte for at øge motivation, muligheder og færdigheder til et nyt hverdagsliv, der særligt kan nedbringe udledninger fra bolig, transport og mad?
	English	How can we, through communities, achieve a new everyday life in Copenhagen that can reduce the climate footprint from consumption?	What can we initiate to increase motivation, opportunities and skills for a new everyday life that can particularly reduce emissions from housing, transport, and food?

3.4 Phases in each cycle

Each cycle of the assembly comprises a pre-deliberation, a deliberation, and a post-deliberation phase. The pre-deliberation consists of all the processes of invitation, sortition, development of the remit, kick-off, as well as in the curation of a “knowledge bank” with relevant materials that the members can access. The deliberation phase consists of meetings (6 in the first cycle, 4 in the second) where members are informed about the process and guided through it by the third-party secretariat. They follow presentations and receive informational materials, engage with the municipality and the follow-up group, discuss together and with experts. They work sometimes in plenary and sometimes in groups, and produce recommendations that they vote on before publishing them. Also, one meeting for every cycle is an “open meeting” where every citizen can show up, engage in the process and give feedback to the members. Recommendations are then refined and presented to the municipality, and in the post-deliberation phase they get commented on by the follow-up group as well as by the citizens’ representatives in the kommune. An official response by the

Technical and Environmental Administration will follow, with a clear indication of which recommendations will be kept into considerations and why the others have been rejected. Furthermore, participants are asked to fill in a survey to provide feedback about the process. The results of the survey are then visualised by the third-party secretariat in an evaluation report, addressed primarily to themselves and to the municipality.

4. Methodology

4.1 Mixed methods

The case was engaged and analysed through mixed methods (Tashakkori & Teddlie, 1998) along two different lines of investigation: observation of the meetings of the second cycle's deliberation phase was complemented by desk research on all phases of both the first and second cycles. Flexibility in the research design was identified as key to following the ethnographic nature of the inquiry: contrary to the tradition of mixed methods, the task and role of each type of method was not prefixed but resulted from iterative explorations (Jensen, 2024). Broadly speaking, accessing slide decks and reports used throughout the process provided the opportunity for a quantitative exploration of data visualisations, whereas taking part in the meetings allowed for a more nuanced and in-depth understanding of the dynamics at play.

4.2 Data collection

Data collection during observation mostly relied on field notes. Desk research started with manually scraping the official *Københavnerne's Klimaborgerting's* website⁶, which collects all slide decks, reports, and documents used in the different moments of the process. All pdf documents were saved and ordered based on where they were used in the cycles (first or second), in the phases (pre-deliberation, deliberation, post-deliberation), in the meetings/settings inside the phase (e.g. third meeting of the deliberation phase, or knowledge bank in the pre-deliberation phase). All documents were then converted into JPG format, with one PDF page corresponding to a single image. They were then manually filtered in order to have only images containing at least a portion of a data visualisation. In identifying data visualisation, we followed the broad definition of data as “any type of information that is systematically collected, organised and analysed” (D'Ignazio & Klein, 2020, p. 14).

4.3 Data structuring

The selected images were used to compile a table⁷ that represented the starting point of the analysis. Units of analysis, however, were identified as data visualisations rather than images. For this reason, each image containing more than one visualisation was split into as many data entries in the table as the visualisations, while each sequence of images through which a single visualisation was spread was converted to a single data entry in the table. In this process, arbitrary decisions were taken on how to draw the boundaries around a single visualisation. These decisions tended to hide information about the extension of each

⁶ <https://klimaborgerting.kk.dk/>

⁷ <https://tinyurl.com/VCP-dataset>

visualisation: for example, a single table spanning several pages in a report was counted the same as a chart occupying a small portion of a slide. To provide deeper information on the choices that were made throughout the process, a more detailed version of this protocol was made available⁸.

4.4 Coding

Once the table was filled, each visualisation was coded along various fields that can be traced back to the four clusters highlighted in the introduction: the data, their visualisation, the actors, and the motivations. While the fields were mostly identified through the literature, the values they can assume were not always based on the theory (deductive approach): in some cases, they resulted from looking at the data corpus (inductive approach). Coding was done in two rounds, in order to allow consistency and systematicity between all the entries. Fields are listed in Table 3 (below), grouped in clusters. For each field, the table indicates: which question it answers, whether the values it can assume result from a deductive or inductive approach, whether it can assume a single (exclusive) or multiple values at the same time (inclusive). Finally, the table includes a single example of a value that the field can assume in the dataset.

Table 3 Coding fields, with for each of them indication of: the cluster it belongs to, the question it answers, whether the values it can assume result from a deductive or inductive approach, whether it can assume a single (exclusive) or multiple values at the same time (inclusive), an example of a value that it can assume.

Field	Question	Inductive (I) / Deductive (D)	Inclusive (I) / Exclusive (E)	Values
Cluster 1 – The Data				
Data	What was visualised?	I	I	E.g. Process, Deliberation
Scale	On what scale?	I	I	E.g. National (Denmark)
Cluster 2 – The Visualisation				
Medium	Which type of media ⁹ frames the visualisation?	I	E	E.g. Printable report
Visualisation type	Which is the type ¹⁰ of visualisation?	D	I	E.g. Scatter plot

⁸ <https://tinyurl.com/4zkfcdye>

⁹ Media as defined in Bateman et al. (2017): “Bundles of canvases defined by patterns of productions and consumption”

¹⁰ Typologies according to “the Data Viz Project” (<https://datavizproject.com/>)

Visualisation Family	Which family ¹¹ does the visualisation belong to?	D	I	E.g. Relational - correlations
Interactivity	Which is the level of interactivity ¹² of the visualisation?	D	E	E.g. Medium level
Dynamicity	Is the visualisation dynamic ¹³ ?	D	E	E.g. Yes
Credits	How are sources credited?	I	I	E.g. Linked
Cluster 3 – The Actors				
Data Source	Who collected the data that are visualised?	I	I	E.g. External experts (Politiken)
Visualisation Source	Who produced the visualisation?	I	I	E.g. <i>We Do Democracy</i> (third-party secretariat)
Presenters	Who is presenting the visualisation?	I	I	E.g. Expert group
Original Audience	Who were the intended consumers of the visualisation, according to the original producers?	I	I	E.g. Academics
Intended Audience	Who are the intended consumers of the visualisation, according to the presenters?	I	I	E.g. Members of the assembly
Intended Audience Positioning	Are the visualisation consumers part of the world being depicted ¹⁴ ?	D	E	E.g. Participant

¹¹ CHRTS families according to Kirk (2016)

¹² Three levels according to Weber & Wenzel (2013)

¹³ Dynamicity as defined in Bateman et al. (2017): presence of movement and change in the visualisation

¹⁴ Bateman et al. (2017)

Cluster 4 - The motivations				
Aim	What are the presenters trying to achieve by showing the visualisation?	I	E	E.g. Members present their recommendations to the municipality
Experience	What is the experience ¹⁵ offered by the visualisation?	D	E	E.g. Exploratory

4.5 Visual analysis

The final step in the protocol was to perform exploratory data analysis (Tukey, 1977) by translating the data in a series of exploratory visualisations. Through iterative work with the open-source tool *RAWGraphs* (Mauri et al., 2017)¹⁶, patterns and correlations were identified and investigated, leading to the findings described in the next section. This step was conducted after the end of the observation activities, and situated knowledge from being present in the assembly's meetings allowed for a more nuanced interpretation of the patterns identified.

5. Findings

Data visualisations were a recurring feature in the Copenhagen's Climate Citizens' Assembly. About 37% of the images extracted from the materials of the first cycle contained at least part of a visualisation (128 out of 344), and in the second cycle the same was true for about 26% of the images (83 out of 316). After restructuring our data, we identified 108 visualisations in the first cycle and 88 in the second. They were distributed throughout all the distinct phases of the process: pre-deliberation, deliberation, post-deliberation. Both follow-ups presented a significant number of visualisations, mostly due to the evaluation report aggregating the feedback surveys' responses: the first cycle's report included 26 visualisations, the second cycle's 29 (see Figure 1, p. 11). Given some specificities of this medium, for each finding we address how the visualisations belonging to it are positioned in comparison to the rest of our data.

Having established that visualisations were consistently leveraged in the case study, the focus shifts to analysing the roles they played. Our first finding is that *visualisations were mostly used to sustain specific positions, rather than to explore alternative possibilities*. When looking at what Kirk calls "the experience offered by a visualisation" (2016, p. 82), we see how the majority of visualisations in our study fall into the "explanatory" category (128 out of 196, about 65%): they "offer an experience characterised by the visualiser taking responsibility to present important observations and interpretations to help the viewer more quickly assimilate the meaning of what is presented" (Kirk, 2016, p. 82). There is also a relevant number of "exploratory" visualisations (62 out of 196, about 31%), focussed on

¹⁵ According to Kirk (2016)

¹⁶ <https://app.rawgraphs.io/>

“helping the viewers or – more specifically in this case – the users discover and form their own interpretations” (Kirk, 2016, p. 84), but they almost entirely belong to the evaluation reports (see Figure 2 below). Coherently with the prevalence of explanatory experiences, visualisations are almost exclusively noninteractive (193 out of 196) and non-dynamic (190 out of 196).

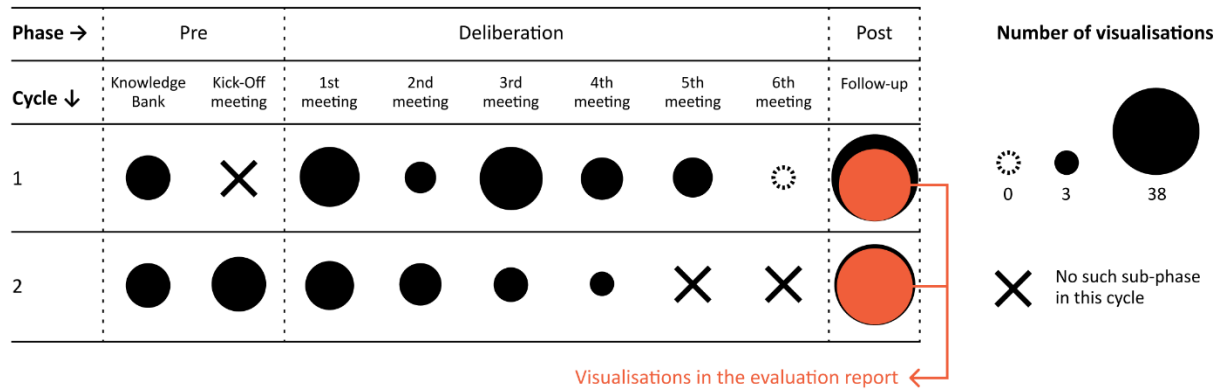


Figure 1 Number of visualisations used in each phase of each cycle of the Copenhagen's Climate Citizens' Assembly

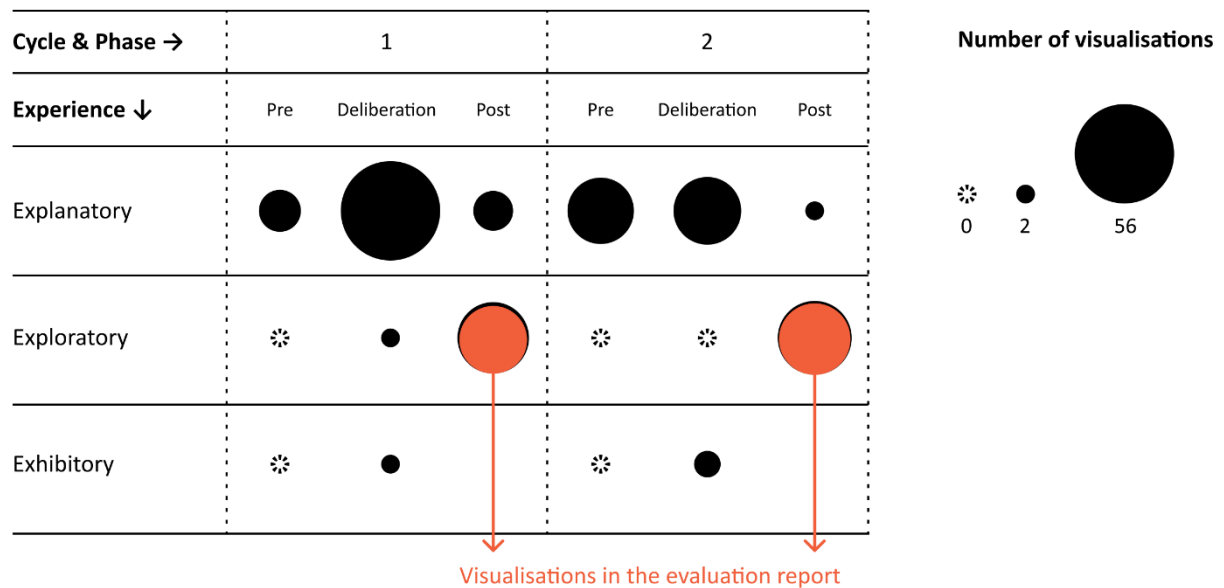
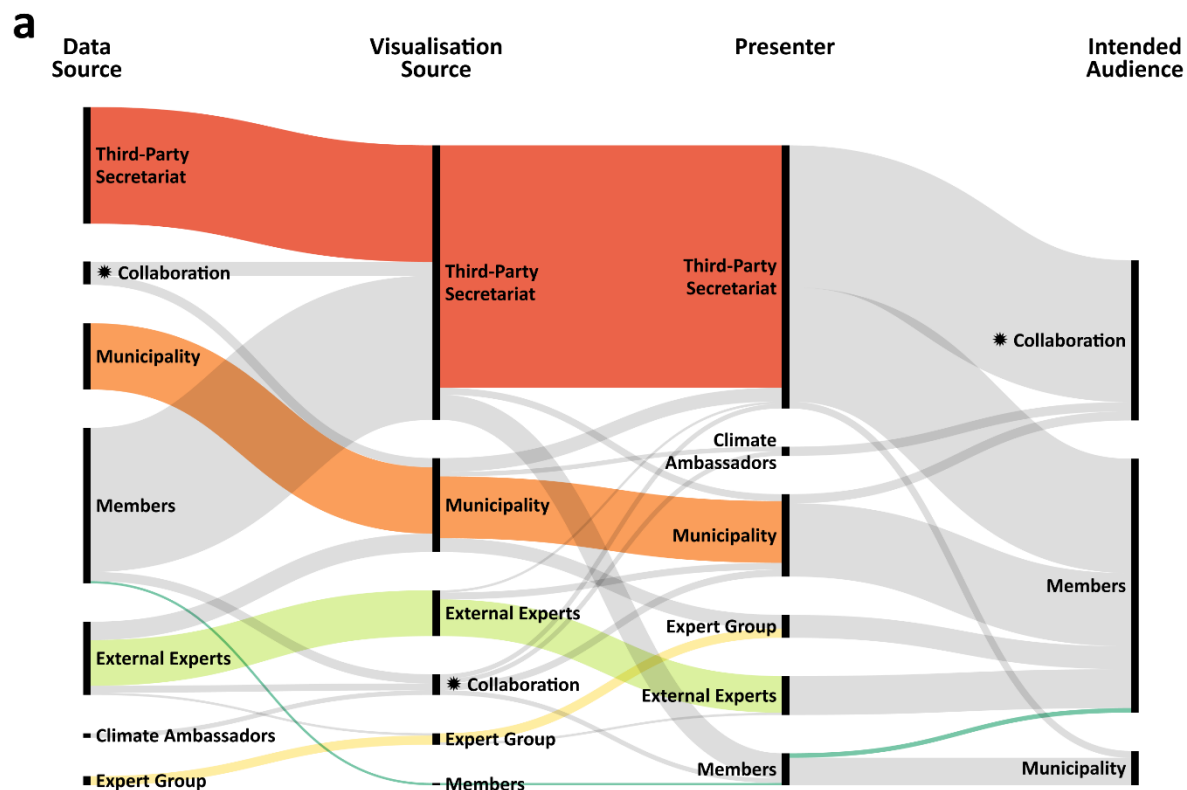


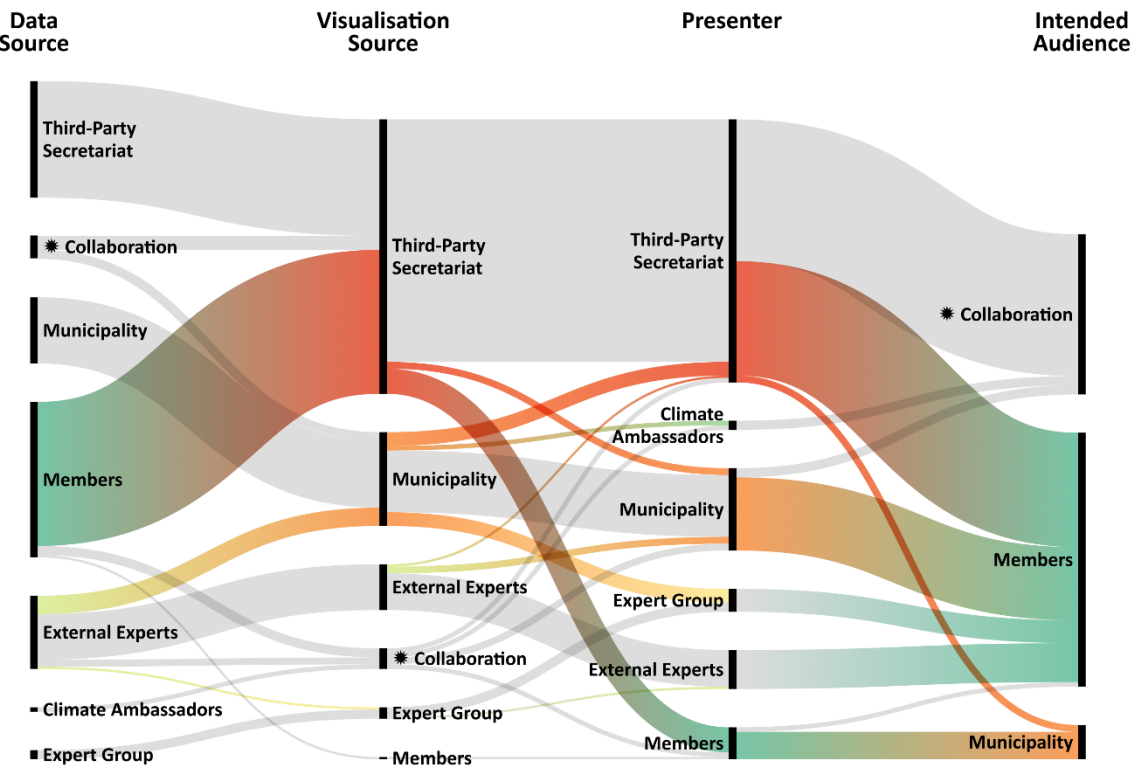
Figure 2 Number of visualisations by experience type in each phase of each cycle of the Copenhagen's Climate Citizens' Assembly

The inquiry can be widened to include not only the interaction with the designed visualisation, but also the process of its production. By mapping the actors involved in the life cycle of each visualisation (data source, visualisation source, presenters and intended audience in Table 2), we can have a deeper understanding of who engaged with the data visualisations and how. This leads to our second finding, which is that *different actors*

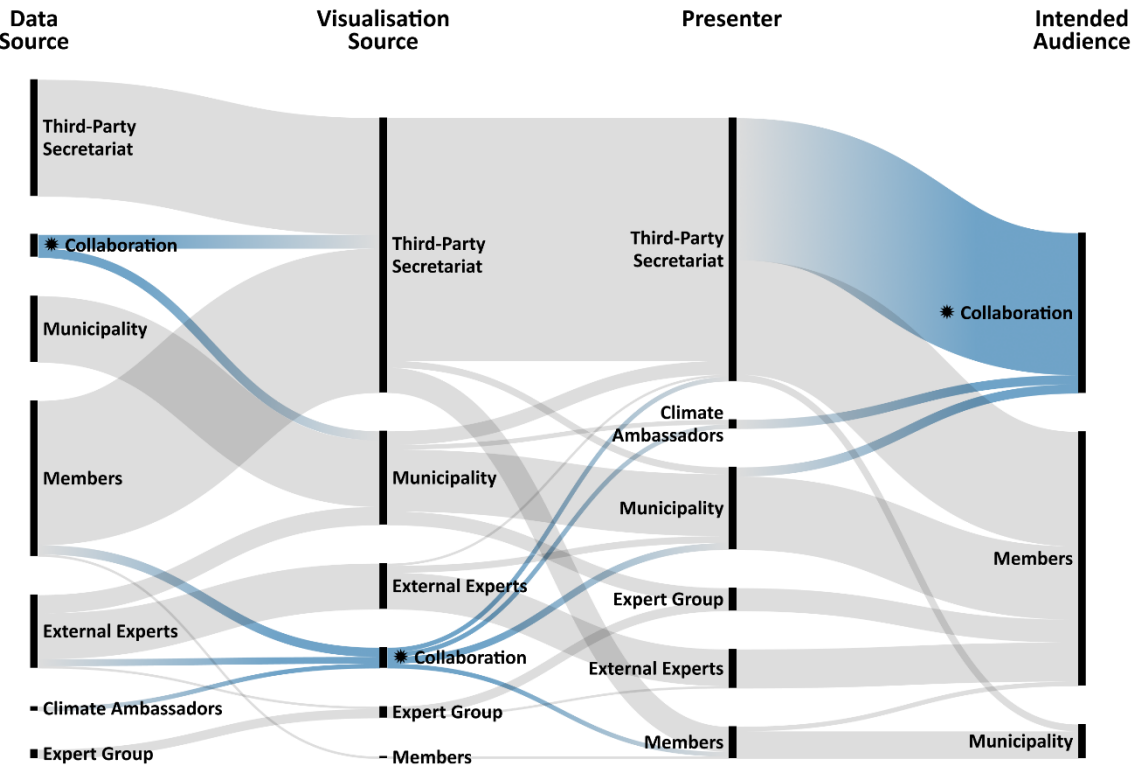
typically engaged with the same data visualisation in separate moments of its life cycle, rather than participating together in a single moment. Looking at a Sankey diagram showing the flows of engagement with visualisations for each actor (Figure 3 below), we can identify visualisations in which the data source, the visualisation source and the presenter correspond (Figure 3a). For example, cases in which data from the municipality were visualised and presented by the municipality itself. There are instead other visualisations in which the data source, the visualisation source and/or the presenter differ (Figure 3b). For example, cases in which data from the members were visualised and presented by *We Do Democracy*. However, there are very few cases of visualisations in which a specific moment sees the presence by multiple actors (Figure 3c). For example, cases in which data from the members were visualised collaboratively by the members and *We Do Democracy*. This is especially true for the data collection, the data visualisation, and the data presentation. It is, instead, much more frequent to have an intended audience made of more than one actor. However, once again, this was almost exclusively due to the evaluation reports, whose audience was both the third-party secretariat and the municipality (Figure 3d).



b



c



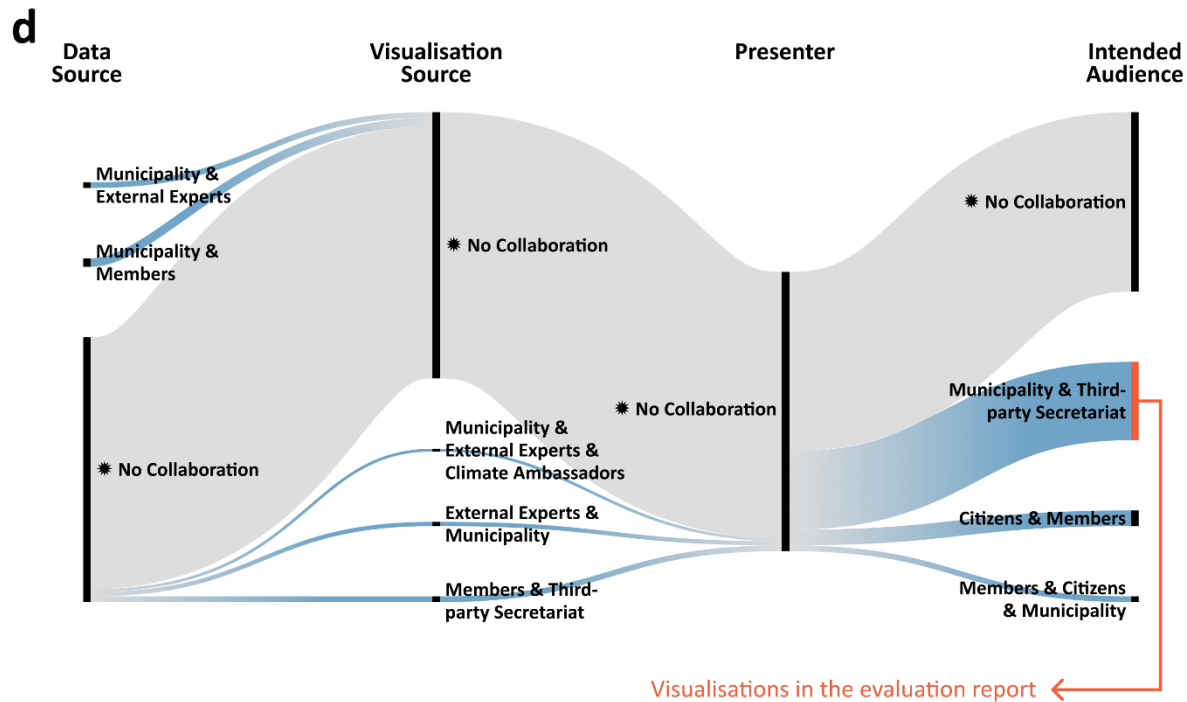


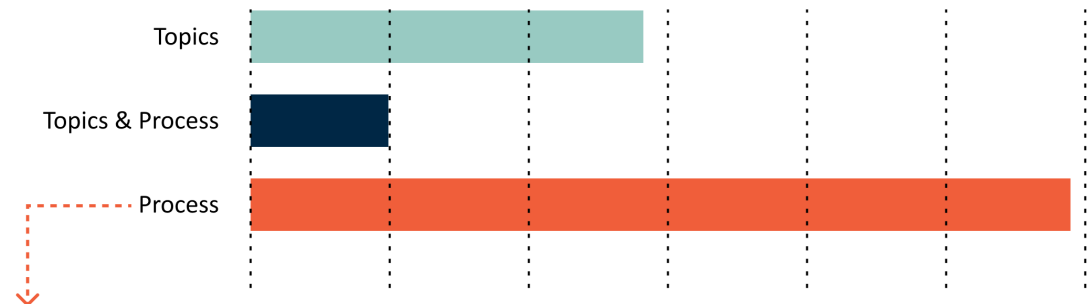
Figure 3 Actors involved around each moment in the life cycle of the data visualisations used in the Copenhagen's Climate Citizens' Assembly; the size of the flow corresponds to the number of visualisations. (a) flows where the actor involved does not change from one step to the next; (b) flows where the actor involved changes from one step to the next; (c) flows where there is collaboration of multiple actors in a single step; (d) detail of the actors involved in the collaborations.

Taking it one step further and focussing more on the actual actors leads to our third finding: *members of the assembly had a very limited role in the production and presentation of visualisations*. When looking at the flows of the municipality, the external experts, and the evidence group in (Figure 3), the pattern is quite striking: they mostly produced data, turned them into visualisations, and presented them (almost exclusively to the members). The third-party secretariat worked similarly, but importantly they also visualised and presented data which were not produced by them, but from the members of the assembly. A big part of those visualisations are the ones featured in the evaluation report. The role of the members in relation to data visualisation, in comparison, was much less active. As already mentioned, they produced a significant amount of data only to have them visualised and presented by the third-party secretariat. They were almost absent as both producers and presenters of visualisation, and their role was mostly that of an audience.

Finally, our last finding turns to the content of the visualisations: the majority of the visualisations represented the process of the assembly rather than the topic of discussion. More than 60% of the visualisations focussed exclusively on the assembly itself (119 out of 196), while only a minority were centred on the topics being discussed, concerning the reduction of emissions in Copenhagen (57 out of 196, about 29%). A tiny portion of visualisations (20 out of 196) addressed both at the same time (see Figure 4). Interestingly, the process-focussed visualisations tended to represent more the sortition and deliberation

phases, rather than the follow-up. Attending the assembly meetings also confirmed that visualisations were often concerned with roles and responsibilities.

Number of visualisations by focus (topics discussed or process of discussion)



Number of process-centred visualisations by focus (phase of the process)

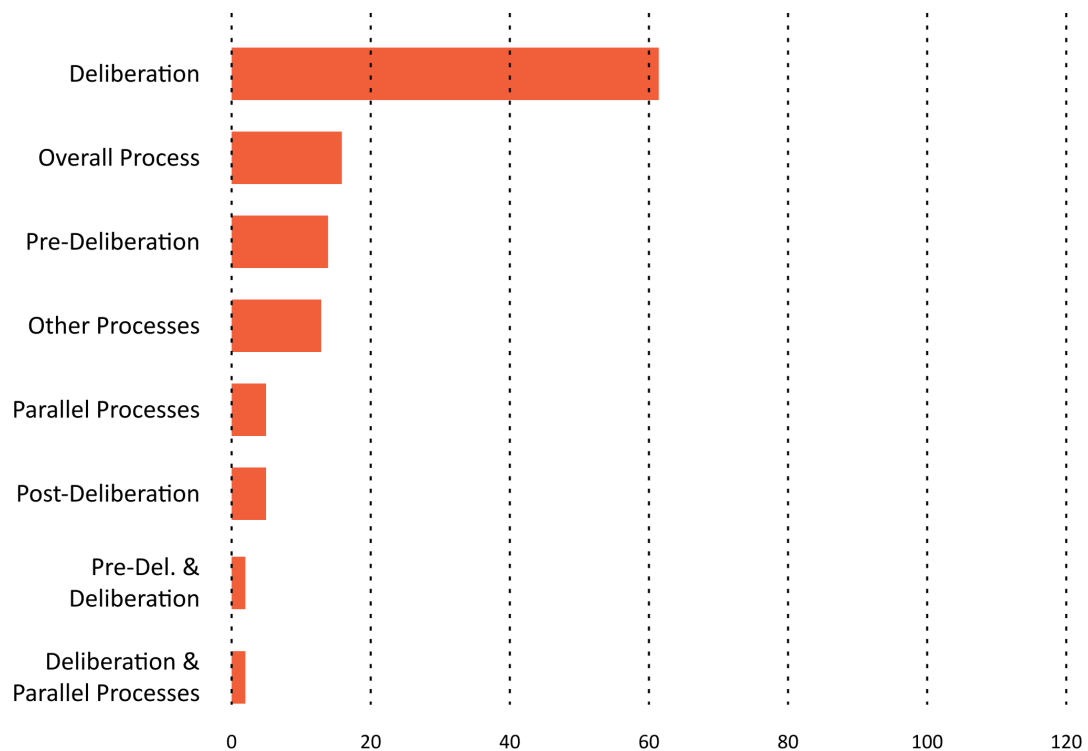


Figure 4 Number of visualisations used in the Copenhagen's Climate Citizens' Assembly by content represented: topics of discussion or the process of the assembly; the process-focused visualisations are broken down according to the phase of the process they represent.

6. Discussion

We have investigated the relation between data visualisation and citizen participation in the context of climate assemblies through the case of the *Københavnerne's Klimaborgerting*. What emerges from our analysis is that the assembly saw the consistent mobilisation of visualisations as allies in the discussions (Finding 1) thanks to their persuasive and material

nature (Jensen et al., 2021; Latour, 1990). However, not all the actors equally leveraged data and their visualisation to support or structure their positions. The members, in particular, had limited opportunities and resources to actively partake in data-centred work. This was due to the conjunction between the nature of the visualisations (Finding 1), and the way the engagement with the visualisation was structured (Findings 2 and 3). What we witnessed throughout the assembly was an “unequal distribution of power over data” (van der Velden, 2015, p. 11). Ultimately, the more powerful actors often used the visualisations themselves to frame the process and the roles the various actors could aspire to (Finding 4).

Due to their limited agency, the members tended to have their views underrepresented in the visualisations. Instead, the perspectives of the municipality, the third-party secretariat, and the experts' group were mostly presented as objective (Nærland, 2020) and framed as starting points and outlines for the deliberation. Crucially, we are not suggesting that dialogical discussions between the institutional and specialised actors and the members did not happen at all in the case study: observation of the deliberation allowed us to identify structured dialogical sessions during both cycles. However, that type of work is not visible in the analysis of data visualisations because data visualisation was not involved in it. Instead, visualisation was mostly leveraged to sustain a specific frame of both the topics to discuss and the process through which to discuss them.

The top-down framing of the topics reflected an approach to knowledge production clashing with the democratic practices and principles of citizen participation in which the assembly was rooted (Pickering et al., 2022). Democratising the work with data, instead, would have been an opportunity to empower the citizens (Hemmersam et al., 2015), support meaningful discussions between the members and the other actors (Nash et al., 2022) and ground objectivity in pluralism (D'Ignazio & Klein, 2020; Haraway, 1988; Harding, 1995), coherently with the aims of the deliberative process. Democratisation is understood here as participation of multiple actors around data visualisation in the same step of its life cycle, and not the presence of different actors in different moments. The latter, which was observed in the assembly, does not produce the same effects as the former, as it does not open real possibilities for dialogue.

This reflection prompts a follow-up question: what would participatory approaches to knowledge production with data visualisation look like in the context of climate assemblies? If participation in the data work represents a crucial direction for public participation, which concrete steps need to be taken? There are few strategies that could be helpful starting points for the design of future deliberative processes: in addition to D'Ignazio and Klein's (2020) suggestions on embracing pluralism with data, they include “Participatory Data Design” (Jensen et al., 2021) as the convergence of participatory design and flexible visualisations, “Data Sprints” (Munk et al., 2019) as intensive workshops around data, and “Collaborative Visualisation” (Heer et al., 2008) as a new possibility emerging from novel technologies. However, diving into how these practices could be translated in the context of climate assemblies is outside the scope of this paper.

Looking instead at how visualisations framed the process of the Københavnerne's Klimaborgering, we take a “critical proximity” approach (Birkbak et al., 2015). Rather than interpreting what is happening on the ground through the lens of abstract panoramas, we

understand data visualisations in our case as sites of problematisation in the field. More concretely, we recognise that some actors had a more prominent role in framing the overall process, and that the work with data was both used to support this framing and subject to it. Still, we also acknowledge that the other actors, namely the members of the assembly, did not just passively accept the framing, but took advantage of the opportunities and spaces they found to question it and challenge it. Which means, they had their own agency in engaging critically. As with the point previously made on the topics, this problematisation rarely transpires through the data visualisation themselves. Even if visualisations sometimes found themselves at the centre of such critical interactions, they were mostly not designed to react to or keep track of them. The observation of the meetings, however, provided more insights into these tensions.

One interesting problematisation emerged during the production of the recommendations of the first cycle. Throughout the deliberation phase, both the municipality and the third-party secretariat had addressed several times that the role of the citizens was to produce recommendations that representative institutions were committing to scrutinise but not necessarily to implement. In response, one of the recommendations produced by the members asked to set up similar panels on a permanent basis and with a right to veto the representatives' decisions. This interaction, partially mediated by visualisations, can be appreciated as an indicator of the multiple contradictory goals and understandings that the various actors had around the process.

From these last remarks, another open question emerges: how would redistributing power over data in an assembly affect the broader tensions around power in society that the same assembly elicits? Answering this question is once again outside the scope of this paper, and would require a deeper engagement with literature from democratic theories, governance transitions, and democracy innovation.

7. Conclusion

Data visualisation can cover a wide variety of roles in relation to citizen participation and public engagement. In the context of climate assemblies, visualisations can either support a plurality of views and open spaces for meaningful discussions or hinder debate by legitimising some perspectives more than others. We explore this tension by engaging with a case study: the *Københavnernes Klimaborgerting* (Copenhagen's Climate Citizens' Assembly). We observe the deliberative meetings and conduct desk research by extracting data visualisations from the slide decks, reports, and official documents used throughout the process. We focus on the engagement with the visualisations, looking at what data were visualised, how, who were the actors involved and which roles they played, as well as which were the expressed motivations for visualising the data.

The analysis shows a lack of participation of the members in the data work and points to a missed opportunity. This raises questions and suggests directions on how collaboration around data could look like in this context, and opens to future inquiries on how redistributing power over data in spaces of citizen participation would affect the broader tensions around power.

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