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Framing artificial intelligence as a policy instrument in urban climate action: Practitioners' perspectives from Paris

Marie Josefine Hintz [a,b,c,d,*], Lynn H. Kaack [c], Felix Creutzig [a,d,e], Tommaso Vitale [b]

[a] Technical University Berlin, Straße des 17. Juni 135, D-10623, Berlin, Germany
[b] Sciences Po Center for European Studies and Comparative Politics, Urban School, 1 Place St Thomas d'Aquin, 75007, Paris, France
[c] Hertie School, Friedrichstraße 180, 10117, Berlin, Germany
[d] Potsdam Institute for Climate Impact Research, Torgauer Str. 12-15, 10829, Berlin, Germany
[e] University of Sussex, Falmer, Brighton, BN1 9RH, United Kingdom

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ABSTRACT

Urban practitioners increasingly integrate artificial intelligence (AI) into tasks related to the implementation of climate action. With the impact of AI transcending specific tasks but changing responsibilities and routines, it must be considered as a policy instrument. While research identified potential AI applications and traced implementation processes, it remains understudied how practitioners introduce AI and how AI systems change workflows and decision hierarchies in urban climate action. Treating AI as a policy instrument, this study examines the city of Paris through 10 open interviews with 12 interviewees and 13 documents. We show that AI currently produces incremental shifts in tasks related to climate action. These shifts redefine urban practitioners' responsibilities towards integrating AI based on socio-technical risk assessment and translation to deliberative formats. We also document how practitioners mediate AI's integration into urban climate action through technocratic, moral, and political logics of action, contrasted with their doubts about the usefulness of AI. Doubts include, for instance, that AI risks depoliticizing urban climate action. By assessing AI as a socio-technical policy instrument rather than a neutral tool, our study unpacks both technical operational utility and symbolic values, including tensions in between, such as complexity-handling versus oversimplification, and acceleration versus accountability. We argue that urban practitioners must critically reflect on their expectations towards AI systems and engage with fundamental concerns to reduce tensions. Finally, we created a checklist for urban practitioners who engage with AI in climate action and aim to operationalize democratic AI governance as a means to reduce adverse consequences.

1. Introduction

Tackling the climate crisis requires effective implementation of urban climate action (Romanello et al., 2025; Rosenzweig et al., 2010). Increasingly, artificial intelligence (AI) is applied towards climate change mitigation and adaptation in urban research and practice (Hintz et al., 2025; Leal Filho et al., 2022). In practice, actors, such as, planners, policy advisors, city innovation experts, urban project managers and architects (hereafter, urban practitioners), are tasked with the implementation of climate action (Bush et al., 2025) and increasingly confronted with the topic of AI (Zheng et al., 2025). Understanding their views and experiences on how AI affects their work likely enables insights into the implications of implementing AI for urban climate action. Here, we make a contribution to both theory and practice, by investigating how the use of AI is assisting the mechanisms through which climate action is implemented in cities, and how practitioners mediate AI's integration across technocratic, political, and moral logics. Our study directly answers recent calls for more empirical, ground-level research on AI in sustainable urban development. Scholars have noted the need for studies that go beyond abstract models or pilot project demonstrations to provide a more comprehensive understanding of how emerging technologies, like AI, are relevant (Gohr et al., 2025; Peretz-Andersson et al., 2021), for instance, to tackle the climate crisis (Kaack et al., 2022). While not a panacea, urban practitioners can use AI systems, for instance, for improved forecasting or simulations (Cowls et al., 2023; Debnath et al., 2023; Kaack et al., 2022). How city staff

* Corresponding author at: Technische Universität Berlin, Institute of Landscape Architecture and Environmental Planning, Straße des 17. Juni 135, D-10623, Berlin, Germany.
E-mail address: marie.josefine.hintz@campus.tu-berlin.de (M.J. Hintz).

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and other practitioners introduce AI into climate projects, and how it changes workflows and decision hierarchies, is currently unclear. By examining the City of Paris as a case study, which is a large city actively pursuing climate action and the use of AI, our study helps to critically assess the effect of AI on implementing climate action by shedding light on real-world implementation mechanisms. These mechanisms encapsulate the different actions that lead to outcomes, showing how, for instance, a climate strategy creates an effect (Lewis et al., 2018). Typically, actors implement strategies through multiple mechanisms (Lewis et al., 2018), and we reveal shifts in four implementation mechanisms. Such findings can connect the theoretical potential to practical realities and help to reduce the risk of mal-adaption of AI-for-climate, informing other cities grappling with similar questions.

Previous research emphasized that AI systems are not a neutral tool (Heyndels, 2023; Stinson, 2022), but AI is, like other technologies, shaped by human intentions, which are embedded into socio-political and institutional dimensions (Caprotti et al., 2024; Cook & Karvonen, 2024; Cugurullo et al., 2025). For example, the choices of AI model architecture, training datasets, and task development come with embedded assumptions, redistributing information and power (Kudless, 2023; Panarese et al., 2025). In this study, we theorize AI as a policy instrument of implementation in urban climate action. A policy instrument is a socio-technical device with models, metrics, interfaces, and procedures. Through its design and use, an instrument organizes responsibilities and coordinates policy implementation activities, at times coupled to a specific or multiple policy goal(s) (Halpern et al., 2019; Lascoumes & Le Gales, 2007; Le Galès, 2022). The policy instrument perspective is a useful tool for analyzing the impact of social and political dimensions of AI systems. It helps to outline these dimensions in highly fragmented policy environments, with non-linear, incomplete, and discontinuous governance modes (Halpern et al., 2019; Lascoumes & Le Gales, 2007; Le Galès & Vitale, 2015). Policy instruments are considered as '*institutions*', not in the sense of an organization, but as a way of practice that is influencing, for instance, how actors behave (Lascoumes & Le Gales, 2007). This framing elevates the scope of analysis, enabling us to focus on the social and political dimension of AI in urban climate action more generally, instead of trying to analyze the impact of individual AI models or use cases. This lens is innovative for AI and climate governance because it highlights both the operational and symbolic effects of AI in climate action. The former includes, for example, re-sequencing maintenance routines, altering data capture, and standardizing permitting scripts; and the latter, for instance, signaling modern, data-driven government to other actors, alongside the relational reconfigurations among departments, elected officials, and residents with new actors, such as AI vendors. Our empirical focus, accordingly, is on how AI works through routines, roles, and inter-organizational linkages to reconfigure the practice of climate policy in Paris (Aggeri & Labatut, 2010).

Analyzing the governance implications of AI is relevant because it may reveal potential changes to urban climate action overall. It is, for instance, unclear why and how city officials, planners, and other urban practitioners incorporate AI systems into their everyday workflows, and how this affects their organizational routines, decision-making, and on-the-ground coordination through which climate policies and projects are realized. Existing research has primarily explored potential application areas and tasks for AI, for instance, optimizing the routing of ride pooling and forecasting to improve efficiency in district heating networks (Hintz et al., 2025). Other studies reported AI's potentially realizable benefits rather than observing why practitioners actually use AI and the implications for processes, practices, and actors involved in implementing climate policies (Cugurullo et al., 2025; Sanchez et al., 2023). As a novel approach in practice, the implementation of AI-assisted urban climate action requires analysis beyond individual projects and the technical level, but an investigation of its change process, for example, if the adoption of AI works through '*displacement*', that is, replacement or elimination of existing tasks, or '*layering*', understood as incrementally working around rules or augmenting existing practice (Mahoney & Thelen, 2010; Van Zoest & Daamen, 2024). In the context of this study, 'layering' is likely most relevant because of the integrative understanding of AI in urbanism. In other words, novel digital infrastructure constitutes a new layer of urban planning that is relevant for climate action (Creutzig, 2021). For example, some studies suggest that AI-simulated design creates a '*new era*' in urban planning, with a more adaptive, iterative process to solving urban design problems instead of linear urban planning models (Batty, 2021; Lartey & Law, 2025). Recent work suggests that AI requires a specific analysis of governance implications in the context of urban climate action (Courmont & Baykurt, 2025; Hintz et al., 2026).

Another gap is practitioners' sense-making, that is, the situated logics and reasoning through which actors qualify AI as acceptable or useful. Different actor groups appropriate and perceive new technologies in heterogeneous ways, rather than one uniform response (Geels, 2010). For example, local politicians, civil servants, utility services, and civil society each have distinct interpretations of the smart-city concept as either a narrow functional tool or a broader policy instrument (Desdemoustier et al., 2019). Instead of assessing the ways through which AI enables technical advancement, we aim to capture the relation of urban practitioners to AI in the context of their work on climate action, suggesting that when AI is deployed in city operations, actors may embrace or contest it for different reasons. Thereby, we fill a gap in research, as knowledge around who supports and opposes the use of AI and why, how collaboration or tension around its use emerge, remain an open field of inquiry. Previous research examined this aspect drawing from academic literature in urban political ecology and urban AI focused on specific socio-environmental issues around energy, water and labour, but not yet based on policy instrument analysis at case study-level (Cugurullo et al., 2025). The urban climate policy context provides a revealing setting because it combines high temporal urgency, strong normative stakes, and complex coordination requirements. Urban climate action is characterized by long-term commitments, irreversible effects, and politically sensitive trade-offs across sectors, territories, and social groups. In this setting, instruments that promise acceleration, prediction, and optimization might acquire heightened symbolic and operational significance. Studying AI within climate action, therefore, allows us to observe not only how digital tools assist with implementation routines, but also how practitioners negotiate risks under conditions of urgency and uncertainty.

AI is embedded into various logics of action from a policy instrument perspective. Implementation research suggests that a combination of technocratic, moral, and political logics of action is likely (Bandola-Gill et al., 2022; Cugurullo, 2025; Sætra & Selinger, 2024). Technocratic logic emphasizes data-driven decision-making, and engineered approaches (Sadowski & Selinger, 2014; Sætra & Selinger, 2024). Political logic operates through elected officials, power dynamics, and institutional norms (Dolšak & Prakash, 2022). Actors may value AI more for its symbolic capital, that is, showcasing innovation (Matland, 1995), regardless of its technical merits, and use political agendas to make sense of deploying AI systems for climate action (Desdemoustier et al., 2019). Moral logic foregrounds well-being, accountability, and environmental justice (Adger et al., 2017). Navigating trade-offs between these different logics, however, can create '*unintended outcomes*' (Ahn & Kazepov, 2024). Some scholars caution that indiscriminate use of AI in climate governance tilts control to technical experts and algorithms at the expense of broader democratic engagement (Machen & Pearce, 2025). Existing research, however, provides only early warnings about potential tensions between logics of action (Suchman, 2023) and has only started to explore how AI governance may resolve such tensions to help steer the deployment of AI in support of democratic climate action, for instance, by supporting engagement processes with residents (Hintz et al., 2025; Machen & Pearce, 2025).

In this article, we fill this gap by studying how AI changes the concrete mechanisms through which climate policies are implemented, and how urban practitioners involved in climate action in Paris make sense of the introduction of artificial intelligence in their everyday work, examining how AI is interpreted, appropriated, or resisted across technocratic, moral, and political logics of action. These three overarching logics are derived deductively from prior implementation research on technocracy, sustainable urban development, and climate-action planning (see Bandola-Gill et al., 2022; Cugurullo, 2025; Sætra & Selinger, 2024). The more detailed categories that populate each logic, however, are developed inductively from the Paris interview transcripts and documents (see Table 5). Empirically, the analysis relies on interviews and grey literature and policy documents to trace how AI incrementally modifies tasks, routines, and coordination arrangements in four domains of implementation. From a technical perspective, the AI projects and interventions described in the study are based on machine learning, used for example in computer vision or predictive analytics. In this study, we define AI operationally as systems whose outputs are generated by learned statistical models, such as supervised computer vision models based on machine learning. We are not considering urban technology in general, which includes networked infrastructure and digital platforms without learned inference, and data analytics, which encompasses computational methods whose outputs are fully determined by pre-specified rules or formulas. We additionally draw on Cugurullo et al. (2023) to frame AI not merely as a technical artifact but as a relational form of agency capable of reconfiguring urban governance, motivating our policy instrument approach. We recognise that in practice AI systems rarely operate in isolation but are embedded within broader digital infrastructures and analytical pipelines. Our focus is therefore on how practitioners encounter and make sense of AI as a distinct component within these wider urban data environments. This operational boundary is consistent with the definitions adopted in recent reviews of urban AI (Caprotti et al., 2024; Hintz et al., 2025). We proceed by outlining the case selection and methodological approach, then present empirical findings on task shifts and practitioners' doubts, before analyzing how plural logics structure AI integration for climate action in Paris. Finally, we discuss these findings through the lens of governance-in-progress and organised anarchy, and propose a practice-oriented framework for democratic AI governance in urban climate action.

2. Methods

2.1. Paris as a case study

Our analysis is based on a single-city case study approach, which allows us to examine contemporary experiences and dynamics in depth (Hancock et al., 2021; Yin, 2009). We selected the City of Paris, France, as a case study given the city's leadership in climate action and an emerging landscape of AI projects that are deployed to solve urban challenges. In the city of Paris (hereafter, Paris), the implementation of climate action is guided by the *Plan local d'urbanisme bioclimatique* (local bioclimatic plan, hereafter PLU bioclimatique) – approved in 2024, the *Plan Climat* 2024–*2030* (climate plan), and *Plan Biodiversité* (biodiversity plan). Paris is exposed to climate risks such as heat waves or flooding (Eurostat, 2017; Mialot, 2024). Based on a recent analysis (Masselot et al., 2023), Parisians are exposed to the highest heat morbidity of 854 European cities. In Paris, the implementation of climate action thrives because of the leadership on the topic by Mayor Hidalgo, who also serves as Chair of C40, a global city-network devoted to urban climate action (Meeks, 2023; Watts, 2017). The Mayor is supported by the Directorate of Ecological Transition and Climate, which oversees the city's climate strategy. In addition, Paris' climate action is based on deliberation among various actors, such as utility companies, start-ups, private planning agencies, civil society, and research institutions (Bullon-Cassis, 2025). Paris reflects a complex multilevel governance structure defined as 'governance-in-progress' (Cremaschi & Vitale, 2026), characterized by 'organised anarchy', that is, loosely coupled organizations, ill-defined policy goals, and opaque processes without a single steering body (Artioli & Le Galès, 2025). This fragmented, negotiated mode of governance makes Paris a theoretically productive case for studying AI as a policy instrument. Both at the metropolitan and city-level, Paris is investing in IT infrastructure and establishing itself as a leader for AI development. For example, Paris aims to attract companies and universities, creating a multi-actor '*AI ecosystem*' (Paris Region, 2025; Ville de Paris, 2025a, b).

2.2. Interviewing city executives and gathering grey literature

Between March and May 2024, we conducted 10 open interviews, with 12 interviewees in French and English. We used purposive sampling to identify organizations relevant to the scope of this research. To be selected, organizations had to work on (1) climate action, (2) in Paris, and (3) AI. These criteria resulted in eight different organizations, to cover municipal, utility, agency, start-up, and operator perspectives active in Paris at the time of data collection, representing the full scope of relevant actors we were able to identify. All participants provided written consent. All interviews included a set of key questions and covered current approaches, prevailing challenges and use of digital technologies, specifically AI in the implementation of climate action in Paris (see the interview guide in Supplementary Information A). We then contacted each organization and identified interviewees either through direct organizational referral or publicly available information on roles and responsibilities. Selected individuals held either in a leadership position or with advanced technical skills related to urban planning and digital technologies, resulting in 10 interviews with 12 interviewees across the eight organizations (Table 1). Ahead of the interview, we explained to the interviewees the purpose of the research. Each interviewee gave verbal and written consent (Declaration of Consent in Supplementary Information B). The first author conducted all interviews online, then recorded, transcribed, and translated them into English for later analysis. In two cases, joint interviews were conducted with two interviewees from the same organization whose

Table 1
Overview of interviewees.

Institution/ Organization	Department	Role	Interviewee ID
City of Paris	Urbanism Directorate	Leadership	A
City of Paris	Ecological Transition and Climate Change Directorate	Leadership	B
City of Paris	Urbanism and architecture	Policy advisor	C
L'APUR (urban planning agency)	Strategic planning unit	Architect	D
Eau de Paris (water utility company)	Digital transformation	Leadership	E1
	Directorate general	Strategic advisor	E2
SOLIDEO (organization for the development and delivery of 2024 Olympic Games)	Strategic management	Smart city and innovation expert	F1
	Urban development	BIM expert and project manager	F2
RATP (transport provider)	Innovation	Leadership	G
NEXQT (AI start-up)	Operations	Leadership	H
City of Paris	Ecological Transition and Climate Change Directorate	Leadership	I
City of Meudon (in Greater Paris)	Digitalization unit	Leadership	J

complementary roles together encompassed the relevant knowledge. Each interviewee was given equal space to respond to all questions, allowing their answers to be coded separately. Following Small (2009) and Bryman (2012), we ceased recruitment when additional interviews no longer produced new conceptual categories or novel descriptions of mechanisms, indicating thematic saturation. Recurring themes around the implementation mechanisms and logics of action became consistent after 7 interviews, with subsequent interviews confirming existing patterns rather than introducing new ones. We acknowledge that saturation was reached within the specific organizational and urban context of Paris, and that different actors or city contexts may result in additional categories. We acknowledge that purposive sampling on this scale cannot exhaust the heterogeneity of practitioner positions in Paris, and have addressed the missing perspectives in the expanded Limitations section.

Because urban design, strategic planning, and infrastructure management are based on explicit plans, our analysis is based on relevant grey literature and policy documents (Guimbail, 2025) identified via keyword searches ($n = 13$, see Table 2). Grey literature and policy documents include both primary policy documents and contextual media sources. Policy documents, such as the local urban plan, provide institutional context with pivotal information about the strategic direction of the city. Media sources, such as news articles, enable timely insights into the latest socio-political context of AI and climate action in Paris. To be included in the analysis, a document had to refer to AI, climate action, and Paris. We ran the following keyword searches on the Google search engine, in July and August 2025, "*ville de paris intelligence artificielle*" (City of Paris artificial intelligence), "*ville de paris intelligence artificielle AND PLU*" (City of Paris artificial intelligence AND local urban plan), "*paris AND artificial intelligence AND urban planning*", and "*ville de paris intelligence artificielle plan climat*" (City of Paris artificial intelligence Climate Action Plan). The grey-literature corpus serves two distinct analytical functions, which differ in their relationship to the interview material. A first set of documents provides institutional and policy context that predates or runs in parallel with the interviews. These documents are triangulated with interview material in the conventional sense. A second set, comprising more recent media coverage and the AI Day survey (D.5), captures developments that postdate the interview window and is used not to triangulate but to contextualise the trajectory of AI integration since the fieldwork.

2.3. Positionality statement

The research has been shaped by both the first author's institutional setting as well as the different dynamics among interviewees. During data collection the first author was a visiting Ph.D. at Sciences Po Paris for four months, working on the topic of AI and urban climate change mitigation with a social sciences perspective. The first author positioned herself as an outsider in relation to the City of Paris, including the multiple institutions represented by the different interviewees. During the interviews, the first author made an effort to create a space in which the interviewees felt comfortable in sharing their experiences and knowledge. For example, these efforts included the offer to switch from English to French language, which in some cases may have impacted interview dynamics towards interviewees expressing themselves more freely than others. However, the first author trusted in the interviewees' ability to signal if a switch in language would be preferable at any point during the interview. During the interviews and analysis, the first author was particularly mindful of interviewee's biases around the topic of AI. To reduce the impact of biases about AI, the first author intended to ground interviewee's expressions by asking for specific examples and context.

2.4. Data analysis and interpretation

We used Atlas.ti Mac (version 25.0.1) to upload all interview transcripts and documents for qualitative content analysis (Bryman, 2012; Kohlbacher, 2006; Mayring, 1994). Suitable for a case study approach, we used a systematic, theory-guided approach to text analysis using a category system (Kohlbacher, 2006). Following an inductive approach, we created a coding framework oriented towards our research questions, and three axes (Table 3). The coding framework was developed by the first author, and then independently tested on three transcripts by another author. Any conflicts around the coding categories were discussed and resolved. Conflicts arose either due to different interpretations of coding categories or coding style, for instance, how much text to code or how to handle text in which multiple codes would apply. Authors resolved each conflict by specifying the descriptions and agreeing on coding rules, such as, applying multiple codes to the same section if applicable. Then the second coder independently coded six transcripts (representing 50% of the interview corpus) based on which intercoder reliability was assessed. Of the 72 codes applied across these transcripts, 61 codes were in agreement, reaching a 84,8% average percentage agreement on code-application, reflecting framework consistency across transcripts. All remaining disagreements were resolved through discussion and the coding rules were updated accordingly before the first author applied the finalised framework to the full corpus (see the full coding framework in Supplementary Information C).

Documents were integrated at two analytical stages. During coding, policy documents and institutional reports were consulted to verify and contextualise practitioner accounts, particularly where interviewees described organizational mandates cross-referenceable against the written record. In the interpretive phase, the news documents were used to assess and confirm the durability of identified patterns. Both sets were subjected to the same coding procedure, ensuring that contextual and policy-relevant documents received equal analytical treatment despite serving distinct functions in relation to the interview material.

To disclose which codes appeared in which source, that is, which transcript or document, we provide a source-by-code matrix (see Supplementary Information D).

3. Results

3.1. Practitioners use AI to support the implementation of climate action

We detected that the use of AI shifts specific tasks and processes in the implementation of urban climate action.[1] In the case of Paris, coding of interview transcripts and documents clusters task shifts across four implementation mechanisms, namely `Operation and maintenance of infrastructure and utilities', `Political processes and progress monitoring', `Sustainable urban lifestyle and behavior', and `Urban planning and building regulation' (see Table 4). Across the four mechanisms, the changes we observe, abstracted from the specific task shifts, affect workflow and routines, decision-making, information, and coordination. Table 4 presents the four mechanisms together with the aspects they affect.

3.1.1. Operation and maintenance of infrastructure and utilities

Interviewees from infrastructure and utility operators described that AI systems are used to further optimize processes and tasks (see Table 4). This includes additional automation and targeted insights for predictive maintenance at a large urban scale. As a consequence, operators improved coordination for the upkeep of infrastructure, such as water pipes or rail tracks, and created better working conditions during extreme temperatures. For example, an interviewee working in the leadership of the innovation team at Régie Autonome des Transports Parisiens (RATP) (G) shared that: ``*before AI, when it's like 35 degrees or more, we have to go everywhere to check if the rails are bent or not. And now*

[1] We define a "task shift" as a reallocation of human attention or a change in sequencing/coordination triggered by AI-enabled analysis.

Table 2
List of documents included in the analysis.

ID	Type	Document title (original)	Document title (translated)	Purpose	Publisher	Year
D.1	Strategy	*Stratégie de la Métropole du Grand Paris pour le déploiement de solutions durables et éthiques d'intelligence artificielle au service des politiques publiques métropolitaines*	*The Greater Paris Metropolitan Area's Strategy for the Deployment of Sustainable and Ethical Artificial Intelligence Solutions to Support Metropolitan Public Policy*	Policy-relevant	Greater Paris Metropolitan Authority	2025
D.2	Blogpost	*AppropriAtion Métropolitaine Programme*	*Metropolitan (AI) Appropriation Program*	Contextual background	Greater Paris Metropolitan Authority	2025
D.3	News story	*Paris veut s'imposer comme capitale de l'IA en Europe*	*Paris aims to establish itself as Europe's AI capital*	Contextual background	BILAN	2025
D.4	Website	*Intelligence artificielle à Paris: où en est-on?*	*Artificial Intelligence in Paris: Where Do We Stand?*	Policy-relevant	City of Paris	2025
D.5	Report	*IA Analyse Consultation Numerique*	*AI Analysis Digital Consultation*	Policy-relevant	Agence Eker	2024
D.6	Website	*Intelligence artificielle à la Ville de Paris: "Nous voyons l'IA comme un assistant"*	*Artificial Intelligence at the City of Paris: "We see AI as an assistant"*	Policy-relevant	City of Paris	2025
D.7	News story	*Paris s'apprête à voter sur son plan d'urbanisme anti-réchauffement climatique*	*Paris is set to vote on its climate-friendly urban planning initiative*	Contextual background	Le Monde	2023
D.8	Blogpost	*Building Urban AI Networks*	–	Contextual background	Urban AI on Medium	2025
D.9	News story	*City of the future: Paris that breathes, designed with the help of artificial intelligence*	–	Contextual background	Telegraph	2025
D.10	News story	*Comment Paris mesure l'efficacité environnementale de ses actions grâce à l'IA*	*How Paris Measures the Environmental Impact of Its Initiatives Using AI*	Contextual background	La Tribune	2025
D.11	Report	*Le Grand Paris en 2050*	*Greater Paris in 2050*	Policy-relevant	Le Journal du Grand Paris et de l'Ile de France	2025
D.12	News story	*RATP Group: Innovating for better solutions*	–	Contextual background	Railexpress	2025
D.13	Report	*The automated metro: sustainable mobility for quality city life*	–	Policy-relevant	RATP	2023

Table 3
Research questions and three axes along which we orient the study.

Research questions		
How does AI change the implementation mechanisms of urban climate action? How do urban practitioners mediate AI's integration across moral, political, and technocratic logics of action?		
Axis 1: Functional integration (usefulness of AI as a policy instrument) *Operational alignment →* AI is adopted by practitioners to reinforce existing practices and objectives.	Axis 2: Normative framing of resistance *Value contestation →* Actors shape or resist the use of AI depending on whether it is perceived as depoliticizing urban climate action or undermining collective deliberation.	Axis 3: The role of moral and political meanings attached to AI *Pragmatic translation →* Urban practitioners adjust and reinterpret AI to fit institutional routines and accountability frameworks.

we can predict and say 'okay, it will be dangerous in Marne-la-Vallée Chessy but not in San Germáin Orly'."

3.1.2. Political processes and progress monitoring

In addition, we found that interviewees described several aspects of climate policy-making in which the use of AI shifted specific tasks (see Table 4). Interviewees shared that through AI, climate policy-makers obtained more precise analytical results, useful as evidence in an argument to politicians from across the party spectrum. Accelerating decision-making for climate action is vital, as a policy advisor for urbanism and architecture at the city of Paris (C) emphasizes: "*the decision of now will be the future for the next 20 or 30 years. So you don't have the right to be wrong.*" Also, interviewees found that using AI facilitated a simulation-based discussion of options for design interventions by offering digital mock-ups. That way, involved actors were able to discuss, negotiate, and decide on the most suitable option before anything was actually built.

Then, interviewees described how AI enabled more precise and accelerated monitoring of performance against set climate targets. For example, a smart city and innovation expert working for SOLIDEO shared that "*we had a lot of promises and hypotheses of how the village would behave based on the design that we did (…) The idea here is to very quickly collect real data to confirm hypotheses, analyzed by specialists and to implement these recommendations in management of the spaces.*" According to interviewees, a key challenge in urban climate action is to determine where to place which interventions to reach climate targets effectively. Using AI was a means to reduce such ambiguity, for example, by evaluating which specific actions were required in different neighborhoods. A policy advisor for urbanism and architecture (C) shared: "*I don't believe in a world where there is no more political and only data-driven urbanism. It sounds to me like a San Francisco dream. (…) but you can use the data to make sure what you're doing is good.*"

3.1.3. Sustainable urban lifestyle and behavior

We found that some interviewees described that AI enabled better matching of suggestions for sustainable lifestyle choices to residents or a community, provided that residents use a specific digital application (Table 4). This mechanism is supported by a thinner evidence base than the three other ones, reflected in fewer codings and a narrower range of interviewee perspectives. Therefore, we interpreted it as an emergent pattern. The behavior and interaction of users was analyzed by an AI system, which then suggested activities and tailored information, in turn, shaping users' experience of living in Paris as well as informing planners' understanding of the city at different spatial scales (D.12). Interviewees emphasized that such practice was a major enabler for the monitoring of sustainability factors across neighborhoods, creating recommendations for interventions related to low-carbon lifestyle across the entire city. A Smart city and Innovation expert (F1) gave the following example: "*We've also created a digital infrastructure so that people can receive recommendations about how to behave based on their habits, their way of life. (…) We're also using artificial intelligence to create a sort of photo of the city, scratched from the interactions between people, how they use this smart app we are creating, the transactions they make, how they access the infrastructure in the city, the library, the swimming pool, the parking lots, all these things. And we work with the city, and also with the*

Table 4
Climate action implementation mechanisms that are partially changed through the use of AI.

Implementation mechanism	Use of AI is supporting the implementation by	Example from interviews – Interviewee ID	Affected aspects (abstracted)
Operation and maintenance of infrastructure and utilities	Increasing resource efficiency of operations based on automation and additional insights.	*"[It] is a way of facilitating and enabling us to achieve specific objectives (…) to understand natural, physical, and technical phenomena, and can enable us to implement corrective actions for better use of resources."* (E2)	Workflow & routines
	Enabling effective predictive maintenance at a large scale.	*"But the AI is used to monitor and prevent failure. If we have a delta between the prediction of the time pump functioning and the real time pump functioning, we can evaluate that there is a problem, there is a leak there."* (G)	Workflow & routines
Political processes and climate progress monitoring	Providing analytical results useful as evidence for making an argument.	*"So we move from the prototype, proof of concept, to something that now is delivering this three-scale of information. So the first scale is the daily and monthly information about the current trends in terms of energy and emissions for several sectors. The second part is the geographical information system, but energy - and carbon-driven information system. And the third part is the scenario we can implement."* (H)	Decision-making
	Simulating mock-ups of potential interventions, fostering informed discussion.	*"And this simulation, which has the added advantage of being not only scientific, but also educational, as you can see from the display, it's particularly easy to understand, even for those who aren't in the business. You can see the effect, you can see that the building is actually going to be comfortable in all conditions."* (F1)	Workflow & routines, information
	More precise monitoring of performance against set climate targets to enable learning.	*"The idea here is to very quickly collect real-time data to confirm hypotheses, analyzed by specialists and to implement these recommendations in management of the green spaces, hopefully also in other urban areas that you can learn from the last experience."* (F2)	Information, coordination
	Reducing ambiguity between climate goals and action tailored to an urban context.	*"And there is a very simple thing to see that the 19th arrondissement, only for scope one and scope two, it's about 1.3 tons of CO2 per inhabitant. In the 16th arrondissement, it is 2.46, two times more. So within the same city, the decarbonization patch rate could not be the same, and the effort should be also balanced with the current situation."* (H)	Coordination
Sustainable urban lifestyle and behavior	Creating tailored suggestions for more sustainable lifestyle choices.	*"The artificial intelligence works there because, first of all, since you have this profiling you can push customized recommendations. For example, based on mobility patterns, you can suggest an alternative to carbon-based mobility (…) All this can be orchestrated by AI, so that it can recommend optimal synergies."* (F1)	Decision-making
Urban planning and building regulations	Supporting architects in complying with building regulations.	*"And we did also with AI, with our architects, some tests on urban design to see how the architect is going to respond to the rules we are doing for the shape of the building, and so on. So it's data-driven with AI and architecture."* (C)	Workflow & routines
	Creating location-specific insights, based on the needs of involved actors that develop climate mitigation tools.	*"We've mapped out the number of roofs in Paris, including those which could be used for installing solar panels, and that gives us a very rough estimate of what the possibilities are and what we could achieve by working with the owners."* (B)	Information
	Suggesting prioritized interventions based on climate impact potential.	*"The ambition is to help these stakeholders accelerate their decarbonization plan. They're facing a very important information gap, as it is difficult to identify where are the most emitting buildings, what is the*	Decision-making

(continued on next page)

Table 4 (*continued*)

Implementation mechanism	Use of AI is supporting the implementation by	Example from interviews – Interviewee ID	Affected aspects (abstracted)
		real impact of some political decision."(H)	

artificial intelligence start-up, to develop these new technologies and change the way people behave."

3.1.4. Urban planning and building regulation

Interviewees describe that AI affects existing urban planning practices and tasks on compliance with building regulations (Table 4). The new PLU Bioclimatique for Paris specifies rules, for instance, related to renovation projects: "*You have to take into account the distance, the length of the street, the distance between two principal views. So there are very, very difficult rules. I know for the architects, it's not easy to understand.*" shared an interviewee who works in the leadership of the Urbanism Directorate at the City of Paris (A). Staff involved in the rule–making described that AI enables them to test how architects may respond to the new regulation by creating different design options for a project. Indeed, PLU Bioclimatique mock-ups and mobility simulations illustrate task shifts in design justification.

Also, interviewees described how the use of AI systems enables practitioners to tailor climate action based on analytical outputs that are location-specific and match the needs of a planner in a project context. By using AI for more location-specific insights, decision-makers can prioritize interventions based on climate impact potential and other sustainability factors. An interviewee working in the leadership of the Ecological Transition and Climate Change Directorate (B) described this for the renovation of buildings: "*(…) finding out which roofs could be painted white which is a big debate in Paris (…) grayslated, it's part of the iconic image of Paris. (…) the mapping out helps with finding out where it could make a big difference. And so [we know] where we need to try and convince the owners to go for this kind of action.*"

3.2. Urban practitioners' doubts and reservations about AI

When asked about the added value of AI systems in implementing climate action, interviewees also expressed doubts, especially around running into the risk of depoliticizing urban climate governance. For example, interviewees emphasized the importance of urban climate action to stay political. They argued that it is vital for elected officials to make the decisions in climate action, as they are able to explain the underlying reasons behind their decisions. Interviewees expressed concerns that the urban fabric is too complex for AI-assisted decision-making, doubting that AI can deal with the intricacies of urban planning. A policy advisor for urbanism and architecture (C) described that "*data does not make the city of tomorrow, in contrary, there was a dream that we advance with smart city design, but it does not work. The city is made up of local fabric, it is a social fabric, that is important.*"

In addition, interviewees highlighted that most analytical tasks can be solved by applying non-AI techniques, or that human interaction is irreplaceable when solving problems in climate action. An interviewee working in the leadership of the Ecological Transition and Climate Change Directorate (B) gave an example of building retrofitting: *"We need feet on the ground. We need people to visit those homes that are not insulated (…) and try to get the owners or the people living there to understand what they can do. It's really door-to-door and that's not something that machines can do."*

Interviewees emphasized the lack of climate-relevant, machine-readable data. For example, interviewees emphasized a prevailing lack of indicators and data collection frameworks that include climate or environmental data points, rendering the deployment of AI systems in urban climate action as rarely applicable. An architect from the urban

Table 5
Practitioner's moral, political, and technocratic logics of action for integrating AI into urban climate action.

Logics of action		Example quotes (Interviewee ID - Organization / Document ID)
Moral	Workers and decision-makers benefit from AI-generated insights	*"As a concept for elected officials, it's very powerful because, you know, it can help you to end an argument. It can help you be very strong, you know, to say, 'hey, you don't want to do this, but look at the data'. So that is going to be good."* (C - City of Paris)
		"*We see AI as an assistant. At this stage, in the usage of the City of Paris, AI is not intended to replace people."* (D6)
	AI is used based on principles and a defined purpose	"*The Metropolis aims to promote the development and deployment of AI solutions by adhering to the following principles: Public interest: AI is used to maximize benefits for society as a whole and to promote the common good."* (D.1)
	Various actors can be engaged in AI development	"*The City of Paris initially sought to understand Parisians' experiences, perceptions, and questions regarding artificial intelligence.*" (D.5)
Political	AI does not replace but is integrated into the decision-making process	"*But for example, these rules, we made it using those data and convincing the elected official, communist, ecologist, socialist, and also from the right part of our Council to say, 'okay, guys, trees are not going to fall from the sky.' So that's a good example.*" (C - City of Paris)
	To shape the use of AI is a strategic opportunity	*"It's an innovative solution. We are beginning to consider what artificial intelligence could offer us."* (A - City of Paris) *"Paris City Council members, city officials, and members of the Paris Council of Europeans had the opportunity to meet with the people who make Paris the most attractive European capital for AI projects.*" - D.4
	City's engagement with AI aligns with the need to establish digital sovereignty	"*We're seeing this isn't just a local or technical issue — it's a geopolitical one. And once it becomes geopolitical, the question becomes: What are the conditions for autonomy and sovereignty in how we operate, when we depend so heavily on external sources?"* (E2 - Eau de Paris)
		"*Greater Paris Metropolis will encourage, whenever possible and appropriate, the use of open-source software and will pay close attention to the guarantees provided for sovereign control over data.*" (D.1)
	Use of AI means to know the city better and quantify progress in climate action	*"Even if we have a lot of data at the national or regional levels, downscaling is very hard. So AI can help us on that, especially when you want to downscale to the scale of building. (…) It can be useful for us to have the knowledge at a very, very small*

(*continued on next page*)

Table 5 (*continued*)

Logics of action		Example quotes (Interviewee ID - Organization / Document ID)
		scale possible and AI can help us to." (I -City of Paris)
Technocratic	AI is only a tool	"*From my perspective, digital tools serve all of this. They are just one means to an end. While the ecological transition is a driver of development and survival for our activities, AI is a way to continue modernizing public services in an increasingly digital society*." (E2 - Eau de Paris)
	Focus is on experimentation with AI	*"AI will help us to do what was not possible, technically possible today. For instance, you can see AI was managing the image and the capacity to analyze all the image [data] and to make some recognition of the vehicle, pedestrian and so on. We had no other technical solution that could have helped us to do such a change."* (J - Meudon)
	Exchange through an ecosystem of actors	*"We've got lots of brilliant ideas coming in, because this is Paris. So lot of people would love to work on it. We had a brilliant conversation last week with a group of students from Harvard. I mean, they had worked on maps and had lots of information and come up with some brilliant ideas. (...) They've given us a sense of maybe possibly what we should look at."* - B (City of Paris)
	Learning process	*"Since urban AI is an emerging field, exchanging insights and experiences among Municipalities and Local Governments is crucial for growth. These exchanges allow cities to learn from each other's successes and challenges, fostering a network of continuous improvement and innovation."* (D.9)
	AI can analyze untapped data to give key insights for climate action	"*So the big paradox is that we have a huge amount of untapped data. The difficulty for the cities is to connect this unstructured, difficult to structure information with their own information system."* (H - NEXQT)
	Obtaining these planning insights cannot be created by a human brain	*"Artificial intelligence is no different. Based on data sets, it's capable of bringing out connections that humans haven't been able to make empirically, because it involves relationships with a huge number of parameters, which humans aren't capable of grasping on their own.*" (E1 - Eau de Paris)

planning agency APUR (D) shared that *"we also don't have any information on the renovation of buildings, when it comes to things that are small, but are in fact very important, which is the change of boilers, that are subject to declaration, but which are not declared at all systematically. So we see that in fact, there are a lot of very important things in relation to existing concerns that are actually not being collected."* Even if relevant data was available, interviewees expressed concerns over the high transaction costs for deploying an AI system. An interviewee working in the leadership of the innovation team at RATP (G) explained: *"we don't use it [AI] a lot, because it's quite tough to change the mindset of the worker. And there aren't lots of people who want to use it."* Similarly, a recent survey that captured the agreement and disagreement of 399 Parisians' on the use ofAI, informing the program of the AI Day,[2] included the statement on 'AI is an opportunity for the ecological transition' (D.5). The plurality of respondents disagreed (44%), indicating that there is doubt among residents.[3]

3.3. AI integration and plural logics of action

In the case of Paris, the integration of AI systems is evolving through the following three approaches: (1) operational practices at utility companies or planning agencies; (2) initiatives and experiments launched by the city, for instance, directed towards residents, businesses, or research; (3) partnerships between the city and tech firms, for example, to create new institutions and AI-themed networking events. In the following, we describe how urban practitioners make sense of AI's integration across technocratic, moral, and political logics of action, enabled by the policy instrument approach. Fig. 1 illustrates the different logics of action that we identified in the interview transcripts and documents.

3.3.1. Technocratic logics of action

Urban practitioners understood the use of AI for climate action as a complex technical tool, emphasizing that AI was an option next to many that could have been deployed (Fig. 1). The interviewee working in the leadership for digital transformation at the water utility company Eau de Paris (E1) described that AI *"allows us to understand natural, physical, and technical phenomena that humans didn't understand before, and can enable us to take corrective action to make better use of resources."* And the input from such large-scale calculations helped to learn more about the city's electricity consumption linked to weather conditions. Interviewees explained that they support the use of AI for climate action because it can uniquely analyze untapped data to give key insights. An interviewee working in the leadership of the AI start-up NEXQT (H) gave the following example: *"machine learning helps us to identify the standard pattern, the sensitivity, to make any assumption or to make any estimates."*

Currently, practitioners described the integration of AI into climate action as experimental and small-scale testing. Interviewees from the City of Paris stated that they are open to testing ideas, because: "*it's about keeping an eye on every new idea that could make a difference in a city like Paris."* (B). Similarly, RATP as a transport operator introduced AI solutions through experimentation. For instance, in a current pilot project at Gare de Lyon station, AI is used to measure density on platforms and trains to inform passengers about crowdedness, enabling them to choose less busy transport options (D.13). At the metropolitan level, the experimentation with AI is anchored in the AI strategy through measures like: "*A group of pilot structures will be selected, along with a service provider to implement the AI solution on a trial basis. These pilot structures will receive methodological support to ensure successful implementation and evaluation of the experiment."* (D.1) In addition, interviewees mentioned that the City of Paris uses the topic of AI as an opportunity for exchange with other actors: *"We've got lots of brilliant ideas coming in, because this is Paris. So a lot of people would love to work on it. We had a brilliant conversation last week with a group of students from Harvard (...). They've given us a sense of maybe possibly what we should look at (...).",* as described by an interviewee working in the leadership of the Ecological Transition and Climate Change Directorate (B). Together with UrbanAI, a network and think tank, the City of Paris is actively building up an ecosystem of actors, that is, research institutes, AI start-ups, other cities, and residents, to engage around the use of AI – not only for climate action but cities' overall interests.

[2] The AI Day was an event that aimed to engage the public around the topic and use of AI in Paris in January 2025.

[3] 25% of respondents did not have an opinion, and 31% agreed with the statement.

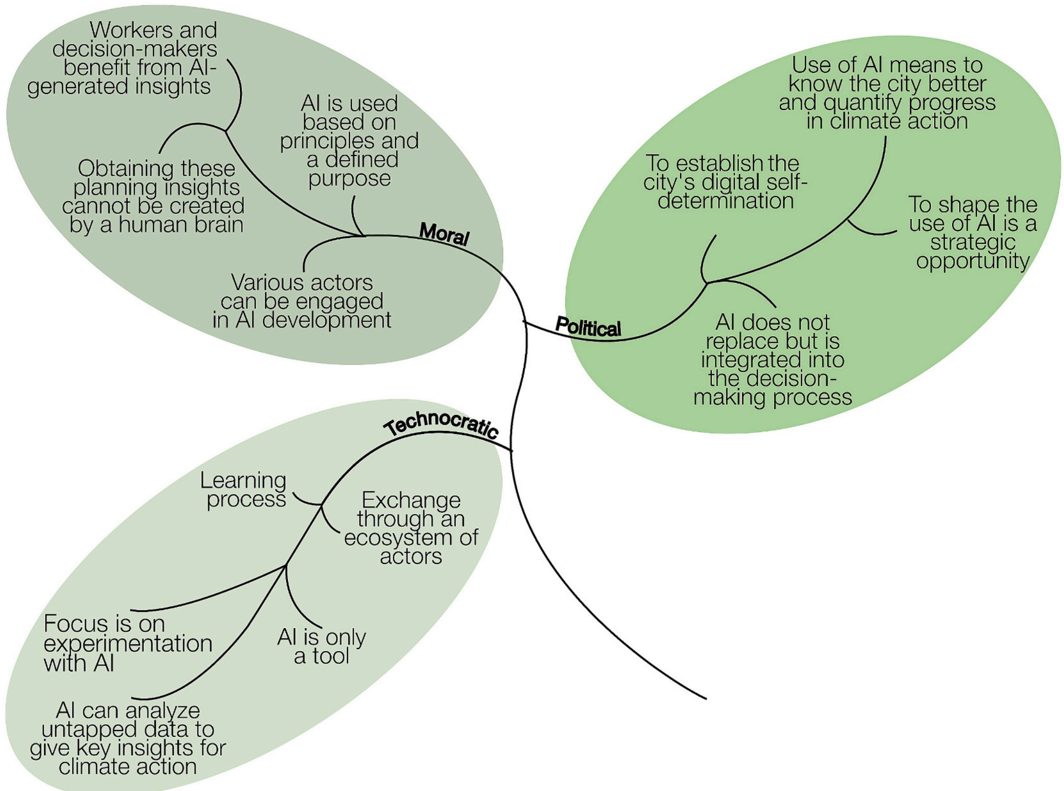

Fig. 1. Technocratic, moral, and political logics of action identified in the collected data.

The testing and scaling of AI solutions was also explained as a learning process. Interviewees described the integration of AI as an opportunity to learn and share lessons around the use of AI with other cities, with the aim to "*scale up these [AI] solutions to encourage adoption by as many municipalities (...) as possible*" (D.1).

3.3.2. Moral logics of action

Practitioners in Paris define the topic of AI through a lens of democratic governance, common good and well-being. For example, the city defined principles to shape the integration of AI, such as `*responsible AI*', `*AI based on open-source software*' and `*using AI in the public interest*'. Similarly, the Greater Paris Metropolitan Authority aims to: ``*promote the development and deployment of AI solutions by adhering to the following principles:* [e.g.] *Public interest: AI is used to maximize benefits for society as a whole and to promote the common good." (D.1).* This moral logic corresponds to tackling climate change as an example of public interest AI. In Paris, both the municipal and the metropolitan governments are also using deliberation to engage actors on the topic of AI. For example, a blogpost on the city's website states that it is "*more than just a question of technological innovation, since 2023 artificial intelligence has become a democratic issue that the City, like the State and the European Union, had to address, along with all its residents."* (D.4).

We identified that urban practitioners make sense of integrating AI because decision-makers and workers can benefit from AI-generated insights (Fig. 1). To ensure appropriate maintenance of rail tracks and to safeguard workers' health during heat waves, RATP collaborates with an AI start-up that predicts air pressure for the days ahead, enabling managers to plan which locations maintenance workers should visit to check whether the rail tracks are bending or remain intact. Beyond its operational value, this predictive system also embodies a concern for workers' well-being and dignity during extreme-heat events: by reallocating inspection tasks to reduce physical strain, it expresses a practical ethic of care that complements technocratic efficiency. The same case shows how AI operates simultaneously within technocratic and moral registers of justification, exemplifying the coexistence of multiple logics in practitioners' sense-making.

3.3.3. Political logics of action

From a political perspective, interviewees clearly stated that the use of AI in the implementation of urban climate action must not replace elected politicians but instead be integrated into decision-making and negotiation processes (Fig. 1). A policy advisor for urbanism and architecture (C) explained that "*as a concept for elected officials, AI, it's very powerful because, (...) it can help you to end an argument. It can help you be very strong to say, 'hey, you don't want to do this, but look at the data'. (...) These rules, we made it using that data and convincing the elected official, communist, ecologist, socialist, and also from the right part of our Council to say, 'okay, guys, trees are not going to fall from the sky'."* Interviewees made sense of AI as a means to resolve urban practitioners' lack of knowledge, for instance, in quantifying progress in climate action or identifying opportunities for interventions at different spatial scales. The City of Paris collaborated with the AI start-up NEXQT to extend the coverage of existing mitigation services to reduce carbon footprint, for instance, identifying properties that are still heated with oil even though they are less than 50 m away from the district heating network. Instead of a wide outreach campaign, the use of AI enables the city to create suitable incentives and offer technical assistance (D.11). Interviewees described the integration of AI into climate action as a strategic opportunity, for instance, exploring ``*what artificial intelligence could bring us"* (A). The city of Paris created AI start-up incubators, AI research institutes, and foundations dedicated to the development and deployment of AI to solve urban challenges and position Paris as the capital of AI in Europe "*in direct competition with other strong places like London or Zurich"* (D.3). In some cases, these efforts are co-created with big tech firms, such as Google or Meta. In turn, we found that the city's engagement with AI for urban climate action is also a means to establish digital self-determination. For example, the City of Paris is mapping the city to eventually be in a position for better design of public services and infrastructure, independent of big tech firms. In its AI strategy, the Greater Paris Metropolitan Authority outlined that *"as both a data producer and a user of AI solutions, the Metropolitan Authority seeks to develop secure and well-structured data platforms (…) [and] will pay close attention to the guarantees provided for sovereign control over data."* (D.1). With the ambition towards digital self-determination on one side and the collaboration with or investment from big tech firms on the other, our results show contradictory approaches and opaque policy processes, both of which signal the 'organised-anarchy' character of the case (see Artioli & Le Galès, 2025).

4. Discussion and conclusion

4.1. Policy instrument perspective captures operational and symbolic value of AI

Treating AI as a socio-technical policy instrument rather than a neutral tool allowed us to capture both its operational utility, for example, predictive capacity in planning and resource efficiency in infrastructure maintenance, and its symbolic dimension, such as signaling Paris as innovative by external actors. Our study shows that these two different values are particularly notable in the work of practitioners who curate, interpret, and manage the use of AI systems. Building on a previous study that emphasized the reduction of workload due to AI (Zheng et al., 2025), our results highlight that AI also introduces a new set of recurring tasks for urban practitioners, including socio-technical risk assessment (considering human factors, technological systems, and organizational contexts), and translation to deliberative formats (assess and reflect on AI systems' applicability in real-world urban contexts). While urban practitioners will not have to become data scientists, they must shape and navigate the integration of AI. A similar development has been found and described as 'urban practitioners becoming curators of AI systems' by Malekzadeh (2026). What changes is not the structure of governance but its texture: how tasks are sequenced, decisions justified, and relationships mediated among urban planners, architects, AI vendors, policy-makers, and residents, in ways consistent with broader patterns of incremental institutional recompositing observed in contested urban governance fields (Vitale et al., 2026). AI systems serve less to impose order than to channel attention and stabilize temporary linkages among actors pursuing heterogeneous goals. As practitioners navigate between technocratic precision and moral responsibility, embodying a professional ethic of care amid data-driven mandates, they must continuously ask '*what problem are we trying to solve, why, and how will we solve it?*' instead of '*how will we use AI to solve a problem?*' We conclude from the experiences of urban practitioners in Paris that cities may benefit from the integration of AI into climate action, but involved actors must acknowledge that opportunities and risks vary depending on the type of AI and application context.

4.2. AI governance-in-progress and recalibration of practitioner's expectations to resolve tensions

Our study applied a policy instrument perspective, which enables a distinct and valuable analytical perspective in the research of AI in urban climate governance. Different logics of action are used among practitioners to mediate the uptake of AI in urban climate action in Paris, creating multiple governance approaches running in parallel – potentially reinforcing siloes and creating tensions to the detriment of effective urban climate action. Similar to previous research (Goodman & Powles, 2019; König, 2023; Turri & Vitale, 2026), our findings suggest that tensions may arise between actors, such as residents, the city administration, and large technology firms. Meaningful public participation likely enables diffusion of tension and away from AI inevitability (Zehner & Ullrich, 2025). Yet evidence from comparable domains of contested urban governance shows that participatory arrangements can be procedurally narrowed once civic claims target allocative or strategic decisions (Turri & Vitale, 2026), suggesting that the design of participatory AI governance must anticipate, rather than presume, executive tolerance.

Implementing climate action already is a contested arena (Bulkeley, 2022) in which urban practitioners must negotiate with various interest groups and navigate between expert and local knowledge (Kohl & Andersen, 2022; Vitale et al., 2026). Tensions about the uptake of AI in climate action emerge between evidence and pluralism, complexity-handling and oversimplification, acceleration and accountability. These tensions show that AI neither enters urban climate action as a technical supplement nor autonomous driver of transformation. Rather, it acts as a policy instrument that makes visible and intensifies pre-existing governance tensions: technocratic logic foregrounds optimisation and acceleration; political logic concerns authority and decision-making power; moral logic raises accountability and democratic control. Their coexistence is an analytical window into a broader urban governance dilemma, that is, cities must act faster and more precisely while remaining accountable and deliberative. In Paris, AI is layered onto existing routines, modifying how problems are framed and evidence mobilised without reallocating formal authority. Beyond Paris, this suggests that the key question for urban climate policy is not whether AI will transform city governance, but under what institutional conditions AI-assisted implementation can remain both operationally useful and democratically governable.

When such tensions occur between logics of action, urban practitioners are best advised to be vigilant in their inquiry (Steiner, 2025) and give way to fundamental concerns, for instance, those of residents (König, 2023). Situating our findings in the governance landscape of Paris makes visible a pattern that resembles 'organised anarchy' (Artioli & Le Galès, 2025), where coupling between problems, solutions, and decision opportunities remains loose. To specify what this means for our argument, it is useful to position the Paris case against two contrasting trajectories of urban AI, both legible in the recent history of Sidewalk Labs' Quayside project in Toronto (Goodman & Powles, 2019).

The first is the paradigm-shift trajectory. In its planning phase, Quayside framed AI as the constitutive logic of a future neighbourhood: sensors, data flows, and algorithmic management were to restructure the relationship between municipal authority, infrastructure, and residents from the ground up. The Paris case does not follow this pattern. Predictive rail-track inspection at RATP, neighbourhood-level carbon mapping by NEXQT, and simulation-based testing of design responses to the PLU Bioclimatique enter established workflows without redesigning the formal distribution of authority among practitioners, elected officials, and infrastructure operators.

The second is the abandonment trajectory. Quayside also offers an example here: the project collapsed in 2020 before its planned arrangements ever entered operational practice. The Paris arrangements diverge from this pattern as well. We can verify AI's integration in specific tasks, including building-retrofit prioritisation, heat-exposure mapping, and lifestyle-recommendation interfaces. Its presence is neither rhetorical nor confined to pilots that dissipate once initial attention recedes.

The Paris pattern sits between these poles, and the analytical category that captures the difference is layering (Mahoney & Thelen, 2010) (Section 3.1). Instead of resolving the tensions between logics of action identified in this study, layering sustains them by modifying tasks and decision sequences without reassigning formal authority. The Paris pattern thus illustrates governance-in-progress not as a transitional stage towards a new paradigm, but as a potentially durable condition of urban climate implementation. In such a condition, technocratic, political, and moral logics appear, recede, and recombine around specific tasks: predictive maintenance, climate monitoring, simulation-based planning, or public consultation. This means that AI-assisted climate action may generate practical adjustments and new responsibilities for practitioners without producing a coherent transformation of urban governance. Its theoretical significance lies precisely in this intermediate status: AI changes the texture of implementation before it changes the architecture of authority.

Our results suggest differences among urban practitioners' expectations regarding the applicability of AI systems in urban climate action. Some interviewees explained that it makes sense to deploy AI systems because urban planning for climate action has become so complex. Characterizing a city as a complex system means to emphasize and better understand the connections between various social fabrics and infrastructural components (Cook & Karvonen, 2024; Filgueiras, 2022; Sanchez et al., 2023). Some interviewees justified deploying AI because urban climate action has become too complex for human cognition alone. Others rejected it on the same grounds, arguing AI cannot handle urban complexity. Both premises are technically misguided. AI models are advanced statistical approaches that replicate dominant patterns from training data, solving specific tasks while oversimplifying context, lacking causal depth, and amplifying existing biases (Sætra & Selinger, 2024; Zhang et al., 2025). Urban practitioners working with AI must understand the need for specificity, anticipate simplification, and recalibrate expectations accordingly, supported by exchange with ML researchers and investment in AI literacy.

4.3. Towards establishing democratic AI governance for climate action in cities

Our analysis exposes the risk of depoliticizing urban climate action by way of AI. Interviewees were concerned that AI may lead to a narrowed space for deliberation and change decision-making in climate action of elected officials, due to lack of transparency related to datasets and code. To reduce the potential for unintended consequences, the integration of AI into climate action requires thoughtful preparation and careful management by urban practitioners (Aggeri & Labatut, 2010; Hintz, 2025), for instance, by establishing democratic AI governance (Machen & Pearce, 2025; Sanchez et al., 2025). In that sense, a city's AI governance determines whether AI-critics will scrutinize AI-assisted urban climate action for lacking democratic legitimacy (Coeckelbergh & Sætra, 2023; Machen & Pearce, 2025; Raymond et al., 2025) or creating new openings for accountability, transparency, and mutual learning, for example, through public datasets and open code (Hughes et al., 2020). Previous research suggests that a democratic AI governance approach includes several aspects. First, it requires practitioners to determine a clear purpose and technically sound expectations for using AI (Machen & Pearce, 2025). Second, it also means to outline how AI can be used to enable better decision-making for climate action, that is, by increasing accountability and overcoming partisan lines, while not replacing the role of elected officials (Filgueiras, 2022). Finally, a democratic governance approach means to equally consider different forms of knowledge, instead of generally prioritizing AI outputs.

To help guide the adoption of democratic AI governance in practice, we created a checklist for urban practitioners who work with AI for climate action. The following six checklist points emerged partly from our Paris findings and partly from related literature: (1) Upskill and connect staff members across teams so that climate and AI expertise can enable informed decision-making about the use of AI in cities (to capture both positive and negative aspects, formulate clear objectives, and critically reflect whether expectations can technically be met by an AI system); (2) Conduct ex-ante impact assessment of AI systems in climate action (analyzing potential effects of deploying an AI system related to climate and socio-political impact), motivated in our data by practitioners' concerns about opacity, oversimplification, and the possible narrowing of deliberation in AI-assisted climate decisions (e.g., Halpern et al., 2019; Kaack et al., 2022); (3) Mitigate potentially adverse consequences of AI affecting the work of urban practitioners (to increase transparency and explainability of AI systems in support of decision-making traceability); (4) Assure knowledge pluralism for decision making in climate action (include and rely on different types of knowledge and sources in addition to AI, e.g., other tools, residents, staff); (5) Consider applying sandboxing with sunset clauses for AI experiments in climate action (new algorithms or data tools are tested for a pre-defined duration, then undergo evaluation regarding democratic legitimacy and performance against set expectations), motivated in the Paris case by the experimental and pilot-based character of current AI integration and by the need to evaluate whether AI remains useful once layered into existing institutional routines (e.g., Hughes et al., 2020; Steiner, 2025); (6) Enable participatory and deliberative AI governance (mechanisms of civic involvement and control are established to align action with the needs of the affected), motivated by the City's consultation efforts, residents' expressed doubts about AI for ecological transition, and practitioners' insistence that AI should support rather than replace political judgement (e.g., Machen & Pearce, 2025; Turri & Vitale, 2026).

By framing AI as a policy instrument for urban climate action in Paris, this study provides insights on how AI can be used as assistance in mechanisms through which climate policies are implemented and how urban practitioners make sense of the introduction of AI in their everyday work. The coexistence of technocratic, political, and moral logics in practitioners' reasoning, and different concerns that they voiced, indicates tensions between evidence and pluralism, complexity-handling and oversimplification, acceleration and accountability. Practitioner's perspectives suggest that AI is interpreted, appropriated, or resisted based on both operational and symbolic values. AI in urban climate action shows governance-in-progress, which works through incremental shifts rather than paradigm disruption. Future research should trace how these governance-in-progress arrangements evolve as AI becomes more established in urban climate action. Our initial checklist for practitioners should be refined based on studies that explore how democratic AI governance can be realized in a variety of urban climate actions.

4.4. Limitations

This study is subject to several limitations. First, the analysis relies on a single-case design focused on Paris, a city that is both highly visible and widely regarded as innovation-oriented in the domain of digital governance. Paris presents a particular constellation of characteristics that shape AI adoption in ways that may not generalize: a centralized metropolitan governance structure with dedicated digital and climate agencies, comparatively high technical capacity within a city administration, established relationships between public actors and the tech sector, and a policy environment that is receptive to experimentation.

While this case offers valuable insights into AI as a policy instrument in urban climate action, the city's institutional capacity, political ambition, and global positioning may not be representative of many other urban contexts; the transferability of findings to less resourced, less visible, or more risk-averse cities therefore remains limited. Future research should consider a multi-city comparative design to enable systematic insight into variation across institutional settings.

Second, the study examines the uptake of AI at an early stage of experimentation and deployment. This raises the risk of overinterpreting intentions, outcomes, or impacts that may not materialise as anticipated, especially given the rapid pace of evolving technologies.

Third, this study does not include interviews with residents or with multiple AI vendors, owing to scope and research timelines. The interviewee composition is also tilted towards practitioners who already work with AI, which may produce a moderate optimism bias in the corpus. Future research should investigate these additional perspectives.

Fourth, the evidence presented combines interviews with analysis of public-facing documents, which differ in their epistemic status and in the institutional biases they carry. Interviews provide in-depth, experience-based perspectives but may reflect subjective interpretations by interviewees; official documents and public communications tend to present curated and institutionally inflected narratives. The uneven nature of these sources requires careful triangulation, and residual asymmetries in perspective and robustness of results cannot be fully eliminated.

CRediT authorship contribution statement

Marie Josefine Hintz: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Lynn H. Kaack:** Writing – review & editing. **Felix Creutzig:** Writing – review & editing. **Tommaso Vitale:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization.

Declarations ethics approval and consent to participate

This research was conducted in compliance with institutional ethical standards. All participants provided informed consent prior to data collection.

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Declaration of competing interest

The authors declare no competing interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cities.2026.107414.

Data availability

Data supporting the findings are available from the authors upon reasonable request. Due to the sensitive nature of qualitative interviews, some restrictions apply.

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