Journal *Flux*

Special issue

Territories and infrastructures of heat and cooling

Call for contributions

Guest editors : Antoine Fontaine, Laurence Rocher, Eric Verdeil

Keywords: *thermal planning, energy grids, urban environments, nexuses, heating and cooling technological devices, thermal refurbishment of buildings, thermal ghettos, heat refuges, heating and cooling practices, urban metabolism, history of infrastructure.*

Heat and cold are major challenges for contemporary urban societies, whether it is a question of adapting cities to more frequent and intense heat waves or controlling the ecological and social impacts of heating and cooling systems. While urban inhabitants are confronted with the challenge of rethinking the ways they live, work and move around, technological innovations raise as many unresolved questions as they provide solutions. These issues are addressed by the scientific community through multiple but rather fragmented disciplinary approaches. Urban climatology is providing increasingly accurate knowledge of urban heat island phenomena (Oke *et al.* 2017). These approaches document the potential of nature-based solutions for adapting cities to climate change (Wong *et al.* 2021) while highlighting the adverse effects of the success of individual air conditioning units (de Munck *et al.* 2013). Research focusing on infrastructures examines the evolution of district heating and cooling solutions (Lund *et al.* 2014; Østergaard *et al.* 2022; Monstadt *et al.* 2025), their roles in urban transition policies (Rocher 2013), and highlight the opportunities but also the contradictions they raise (Florentin 2017). Several studies conducted using a *political ecology* approach have highlighted the extent of thermal inequalities and injustices (Graham 2015; Bouzarovski 2022; Plueckhahn 2022), and even thermal violence (Hamstead 2024), as well as the mechanisms that perpetuate them (Mazzone *et al.* 2024). The contribution of urban sociology is also important, as situations of thermal precariousness are exacerbated by social vulnerability (Klinenberg 2015).

With the adoption of new construction techniques and the spread of technologies that generate "controlled environments" in which indoor temperatures are precisely measured and adapted to the very different needs of occupants (Marvin and Rutherford 2018), the thermal problem has been addressed in part as a question of enclosing and insulating built spaces. However, the issue of heat and cold in cities also arises in terms of continuity and interdependence, as the cooling of certain spaces results in the warming of others. The need to adapt to climate change calls for an examination of metabolism and thermal flows (Caprotti and Romanowicz 2013), since they contribute, in the same way as other energy flows, to the liveability of urban spaces. These multiple ways of thinking about, measuring and qualifying heat, cold and their effects emerge as *heat studies.* This research strand considers heat largely as a sanitary risk (Hamstead 2023), focusing on the scales of the body, housing, buildings and neighbourhoods, and only rarely on the city-scale.

The aim of this special issue is to address thermal issues (whether from the perspective of current or past techniques, grids and infrastructures, flows and metabolisms, practices and uses) from their implications at the urban scale. The aim is to understand how urban areas are being

transformed in the light of thermal issues and, more broadly, to reflect on how research in the humanities and social sciences addresses and problematises heat and cold (Robinson 2024; Fontaine and Rocher 2025). We welcome articles that jointly analyse the evolution of urban planning practices, the evolution of infrastructure, the use of urban environments (*i.e.* the subsoil, the air, waterways) for cooling and/or heating, the role of actors, the interplay of scales and power issues. Together, they can inform the role that urban research on these thermal issues may play in thinking about the construction of urban futures.
Contributions may focus on a variety of urban contexts in the Global North and/or South. Empirical research on the Global South, which is under-represented in studies on infrastructure, particularly heating and cooling, could help to fill empirical gaps and enrich analyses by geographical and cultural decentring. These contributions will focus more specifically on:

Technical devices and infrastructure for heating and cooling. Heating and cooling solutions are multiplying and diversifying in their modalities. This raises a series of socio-technical questions. One of them, familiar to the Flux journal, is the dialectic between collective networked solutions, which are undergoing rapid development in France and Europe, and individual solutions, which develop on the margins or instead of networked solutions. For instance, district heating and cooling is currently attracting considerable interest within large cities. But district cooling solutions, unlike other urban networks, are still selective in the areas they serve (social housing, public facilities, productive spaces in the tertiary economy). Paper proposals may focus, for example, on the development of district heating and/or cooling, the rise of heat pumps and individual air conditioning systems, the spread of *low-tech* and devices enabling the adoption of more energy-efficient domestic heating practices (De Grave *et al.* 2024), passive techniques relating to building design or urban design, or the technoscientific promises associated with new sectors such as small modular nuclear reactors. Does the deployment of these collective, individual or intermediate heating and cooling solutions represent new forms of networked urbanism, or does it reinforce "post-networked" trends? What can we learn from historical approaches to successive generations of heating and cooling systems deployed in different cities? How does the development of infrastructural solutions (Monstadt *et al.* 2025) frame and guide the way in which urban actors address thermal issues? Contributions may question the development of these solutions on the basis of specific cases, or, conversely, examine more global adoption trajectories and their contexts (Shove *et al.* 2014).
Paper submissions may also analyse technological and infrastructural developments within a metabolic framework or in considering how they are embedded in urban environments. Thermal flows are closely intertwined with infrastructure, particularly electricity and gas grids, and with the various geophysical environments that constitute the urban tissue. The subsoil is particularly concerned with cooling: it is both a source of cold (underground cooling plants, Canadian wells) and a sensitive environment to thermal emissions (groundwater heated by geothermal energy). The fragility of waterways and ambient air, two environments that are also used as sources of heat or cold depending on the season and as thermal sinks, must also be questioned. In order to document and discuss these issues, contributions may in particular examine the emergence or reconfiguration dynamics of urban nexuses (Monstadt and Coutard 2019; Fontaine and Rocher 2024) in relation to the production and distribution of heat and cold.

Urban planning and thermal transition. How are territories and energy infrastructures being transformed by contemporary thermal issues? How are transition processes unfolding? Are they the result of planning processes, or, on the contrary, are they unplanned? Do these transitions lead to the emergence of new urban energy landscapes? For example, the mastery and widespread use of individual and collective boiler technologies has been an essential

dimension of the verticalisation of Istanbul's urban landscape over the last thirty years (Arik 2020). Conversely, the concrete, glass and steel architecture of cities in the Persian Gulf, Singapore and Southeast Asia goes hand in hand with the widespread use of air conditioning (Sahakian 2014; Courtney 2024; Kobi 2024), which can account for more than half of their total electricity consumption. These new urban landscapes are the product of these technologies, for which any idea of energy efficiency is unthinkable in the short term, given how lifestyles depend on them. What are the links between the energy policies adopted and implemented at different levels? The literature highlights that cities are able to act more quickly than other levels of governance and are capable of pushing forward experimental projects (Rutherford 2020), but that they face limitations (Monstadt *et al.* 2025). As the thermal qualities of buildings are decisive in terms of heating and cooling needs, policies for thermal renovation, but also for reconsidering traditional architecture, are an important dimension of the thermal issue at the urban level. The supply of heating and cooling has significant consequences in terms of energy consumption and directly affects the management of energy networks, particularly the electric grid, at the national or regional level. The rapid growth of air conditioning places a heavy strain on electricity grids, putting pressure on supply systems on a daily or even seasonal basis. This is particularly true in many southern countries, with a reversal of peak demand from winter to summer. Expected contributions may question, for example, the implementation and effects of thermal planning dynamics (Keith *et al.* 2023), the intended or unintended effects of specific legislation and its scalar trajectories, the obstacles encountered by urban actors in implementing their thermal transition projects, or the dynamics of transformation over longer time scales in urban energy landscapes (Hatton-Proulx 2020).

Policies and uses of urban space: taking thermal inequalities into account. Conditions of access to energy, and their inherent inequalities, manifest themselves in different ways depending on global and urban geographies. The term "energy poverty", which initially referred to the difficulty Northern households have in accessing a certain level of thermal comfort in winter, is increasingly relevant to summer comfort. Regardless of the region concerned, access to cool spaces is a key factor in quality of life, both in private and public spaces. It is also a critical factor in the increasing vulnerability of some urban populations and widening inequalities, as well as reducing the attractiveness of neighborhoods. The responses provided in terms of spatial planning, combined with uncontrolled gentrification processes, can reinforce segregation dynamics (Whitehead 2013). Several authors call for consideration of climate and energy inequality situations and their inclusion in adaptation policies (Hamstead 2023). They warn against the formation of "thermal ghettos" fueled by the spatially differentiated spread of air conditioning (Chang 2024) and call for greater attention to be paid to the multiple socio-political dimensions of urban heat islands. This is because the liveability of overheated cities also depends on social ties and the organisation of urban services during periods of crisis (Klinenberg 2015). Certain practices involving changes to the opening hours of public facilities (swimming pools, museums, libraries), or the closure of schools in the event of high temperatures, highlight the crucial role and vulnerability of public facilities in terms of thermal sensitivity.

Contributions to the theme issue may address the exposure of residents and other users of urban spaces to extreme temperatures, as well as the inequalities in access to solutions for improving comfort in both public and private spaces. In Southern countries, *low-tech* practices, which are partly inherited but also largely reinvented and adapted to contemporary architectures and to new urban forms, are often the only ones available. Nonetheless, they can be criticised on the basis of aesthetic and moral values with counterproductive effects (Ghodbane 2019). Beyond the provision of heating and cooling, contributions may question the evolution of urban policies and the organisation of urban public services to mitigate thermal vulnerability and situations

of inequality or even injustice: de-impermeabilisation and greening of public spaces, technical and organisational innovations, regulation of the installation of air conditioning systems, promotion of new heating and/or cooling practices and new building standards, etc.

Information for authors

Deadline for abstracts: March 11, 2026

Contributors should send an abstract of no more than 4,000 characters, along with the authors' names and institutional affiliations, to:
antoine.fontaine@cnrs.fr
laurence.rocher@univ-lyon3.fr
eric.verdeil@sciencespo.fr

Deadline for full articles (first version): October 5, 2026

Based on the summaries pre-validated by the editorial board (within two weeks of reception), authors will have until October 5, 2026 to send the full version of their article.

Submitted articles should comply with the journal's standards (see link below), esp.: a maximum of 50,000 signs (including spaces), a 1,000-1,500 signs summary in French and English, as well as a short biographical note (approximately 600 characters for each author).

More information about *Flux* and recommendations for authors:
https://revue-flux.cairn.info/recommendations-for-authors/

The publication of this issue of *Flux* is scheduled for March 2028. Articles finalized before the deadline may be published online ahead of schedule.

Bibliography

Arik E. 2020, Grandeur urbaine et vulnérabilité énergétique : le cas de la ville-satellite de Kayaşehir à Istanbul, *Urbanités, n°14.*

Bouzarovski S. 2022, Just Transitions: A Political Ecology Critique, *Antipode* 54 (4): 1003-20.

Caprotti F., Romanowicz J. 2013, Thermal Eco-cities: Green Building and Urban Thermal Metabolism, *International Journal of Urban and Regional Research* 37 (6): 1949-67.

Chang JH. 2024, Thermal Governance, Urban Metabolism and Carbonised Comfort: Air-Conditioning and Urbanisation in the Gulf and Doha, *Urban Studies* 61 (15): 2928-44.

Courtney C. 2024, The Birth of Cool: Heat and Air-Conditioning in the History of Wuhan, 1950–2020, *Urban Studies* 61 (15): 2963-78.

De Grave D., Anciaux A., Sobczak J., Wallenborn G., van Moeseke G. 2024, *Slowheat: chauffer les corps, moins les logements. Une recherche collective sur la sobriété de nos pratiques de chauffage*, Presses Universitaires de Louvain, 291p.

de Munck C., Pigeon G., Masson V., Meunier F., Bousquet P., Tréméac B., Merchat M., Poeuf P., Marchadier C. 2013, How Much Can Air Conditioning Increase Air Temperatures for a City like Paris, France?, *International Journal of Climatology* 33 (1): 210-27.

Florentin D. 2017, Juxtaposer efficacité énergétique et proximité : contradictions des systèmes de chauffage urbain dans l'Est de l'Allemagne, *Flux* (109-110) : 48-60.

Fontaine A., Rocher L. 2024, Cities Looking for Waste Heat: The Dilemmas of Energy and Industry Nexuses in French Metropolitan Areas, *Urban Studies* 61 (2): 254-72.

Fontaine A., Rocher L. 2025, *Le défi thermique. Normes, territoires et politiques de la chaleur et du chauffage*, Presses des Mines, 273p.

Ghodbane D. 2019, L'air et la manière. Pratiques et savoir-faire thermiques dans les espaces domestiques du Caire, *Urbanité*s n°12.

Graham S. 2015, Life Support: The Political Ecology of Urban Air, *City* 19 (2-3): 192 215.

Hamstead Z. 2023, Critical Heat Studies: Deconstructing Heat Studies for Climate Justice, *Planning Theory & Practice* 24 (2): 153-72.

Hamstead Z. 2024, Thermal Insecurity: Violence of Heat and Cold in the Urban Climate Refuge, *Urban Studies* 61 (3): 531-48.

Hatton-Proulx C. 2020, « Sous vos pas, un parfait agencement » : la transformation du paysage énergétique urbain de Montréal, 1890-1950, *Flux* N° 121 (3): 4-28.

Keith L., Gabbe CJ., Schmidt E. 2023, Urban Heat Governance: Examining the Role of Urban Planning, *Journal of Environmental Policy & Planning* 25 (5): 642-62.

Klinenberg E. 2015, *Heat wave: a social autopsy of disaster in Chicago*, University of Chicago Press, 305p.

Kobi M. 2024, Urban Energy Landscape in Practice: Architecture, Infrastructure and the Material Culture of Cooling in Post-Reform Chongqing, China, Urban Studies 61 (15): 2979-94.

Lund H., Werner S., Wiltshire R., Svendsen S., Thorsen JE., Hvelplund F., Mathiesen BV. 2014, 4th Generation District Heating (4GDH), *Energy* 68:1-11.

Marvin S., Rutherford J. 2018, Controlled environments: An urban research agenda on microclimatic enclosure, *Urban Studies* 55(6): 1143–1162.

Mazzone A., De Cian E., De Paula E., Ferreira A., Khosla R. 2024, Understanding Thermal Justice and Systemic Cooling Poverty from the Margins: Intersectional Perspectives from Rio de Janeiro, *Local Environment* 29 (8): 1026-43.

Monstadt J., Coutard O. 2019, Cities in an Era of Interfacing Infrastructures: Politics and Spatialities of the Urban Nexus, *Urban Studies* 56 (11): 2191-2206.

Monstadt J., Pilo' F., et Van Gils B. 2025, Towards the next Generation of Urban Heating Systems? Governing Multi-Infrastructural Solutions in Amsterdam, *Urban Studies 62 (9)*, 1826-49.

Monstadt J., Rutherford J., Coutard O. 2025, Infrastructures as Urban Solutions? Critical Perspectives on Transformative Socio-Technical Change, *Urban Studies* 62 (9): 1709-30.

Oke T. R., Mills G., Christen A., Voogt JA. 2017, *Urban Climates*, Cambridge University Press, 526p.

Østergaard PA., Werner S., Dyrelund A., Lund H., Arabkoohsar A., Sorknæs P., Gudmundsson O., Thorsen JE., Mathiesen BV. 2022, The Four Generations of District Cooling - A Categorization of the Development in District Cooling from Origin to Future Prospect, *Energy* 253.

Plueckhahn R. 2022, Accessing Heat: Environmental Stigma and ‘Porous’ Infrastructural Configurations in Ulaanbaatar, *Urban Studies* 59 (3): 608-23.

Robinson C. 2025, Raising the Temperature: A Critical Geographical Perspective on Heat, *Progress in Environmental Geography* 4 (2): 165-89.

Rocher L. 2013, Le chauffage urbain dans la transition énergétique: des reconfigurations entre flux et réseau, *Flux* (92) : 23-35.

Rutherford J. 2020, *Redeploying Urban Infrastructure: The Politics of Urban Socio-Technical Futures*, Springer International Publishing, 191p.

Sahakian M. 2014, *Keeping Cool in Southeast Asia: Energy Consumption and Urban Air-Conditioning*, Palgrave Macmillan, 264p.

Shove E., Walker G., Brown S. 2014, Transnational Transitions: The Diffusion and Integration of Mechanical Cooling, *Urban Studies* 51(7): 1506–1519.

Whitehead M. 2013, Neoliberal Urban Environmentalism and the Adaptive City: Towards a Critical Urban Theory and Climate Change, *Urban Studies* 50 (7): 1348-67.

Wong NH., Tan CL., Kolokotsa D., Takebayashi H. 2021, Greenery as a Mitigation and Adaptation Strategy to Urban Heat, *Nature Reviews Earth & Environment* 2 (3): 166-81.