ATHENA, 2025, Nr. 20, ISSN 1822-5047

https://doi.org/10.53631/Athena.2025.20.8

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THE ANTHROPOCENE AIR CONDITION(ING)

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ABSTRACT. This paper theorizes "air conditioning" as a dual apparatus: a technological system for atmospheric control and a philosophical metaphor for humanity's project of environmental domination in the Anthropocene. Analyzing thinkers like Peter Sloterdijk, Bruno Latour, Achille Mbembe, Eva Horn, and Nerea Calvillo, the paper argues that air conditioning generates a fatal paradox, producing localized immunological spheres of comfort while systemically exacerbating global atmospheric entropy – thickening the air with toxicity, social exclusion, and precarity. The crisis is thus not merely environmental but ontological and political, demanding a radical reconceptualization of air as a shared, life-sustaining commons and a move beyond techno-solutionism toward equitable, systemic repair.
KEYWORDS: Anthropocene, human condition, air conditioning, retroactive entropic effect, environmental inequality.

ORO KONDICIJOS/KONDICIONAVIMAS ANTROPOCENO EPOCHOJE

SANTRAUKA. Šiame straipsnyje „oro kondicionavimas" apmąstomas kaip dvigubas dispozityvas: technologinė atmosferos kontrolės sistema ir filosofinė metafora, išreiškianti žmogiškąjį siekį dominuoti aplinkos atžvilgiu antropoceno epochoje. Analizuodamas Peterio Sloterdijko, Bruno Latouro, Achille'o Mbembe, Eva'os Horn ir Nerea'os Calvillo tekstus, straipsnio autorius teigia, kad oro kondicionavimas generuoja fatališką paradoksą, sukuriantį lokalizuotas imunologines komforto sferas, sistemiškai pagilindamas globalią atmosferos entropiją – padidindamas oro užterštumą, socialinę atskirtį ir nesaugumą. Tad krizė nėra vien aplinkosauginė, bet ir ontologinė bei politinė krizė, reikalaujanti iš naujo permąstyti atmosferą kaip bendrą, gyvybę palaikantį išteklių ir judėti anapus technologinio absoliutizmo link teisingo, sisteminio atitaisymo.
RAKTAŽODŽIAI: antropocenas, žmogaus būklė, oro kondicionavimas, retroaktyvus entropinis poveikis, aplinkos nelygybė.

The international press has become a frontline witness to the collapse of breathable air, charting a new global reality where the most basic human necessity is transforming into a source of hazard, inequality, and displacement. This crisis is vividly illustrated by a series of recent reports.

In an investigative report published by *The Guardian* on September 20, 2023, journalists Matthew Taylor and Pamela Duncan revealed a severe and pervasive public health crisis across Europe: an overwhelming majority of the continent's population is breathing air laced with toxic pollutants. The report detailed how this invisible threat has become a near-universal condition for Europeans.

This human toll is starkly uneven, mapping a geography of injustice onto the continent. The crisis disproportionately burdens Eastern Europe, with North Macedonia suffering the most extreme conditions, while Northern Italy also emerges as a severe hotspot. An expert behind the study starkly summarized the situation, stating that "nearly everyone in Europe is breathing unhealthy air" (Taylor and Duncan 2023).

The report frames the crisis as a profound environmental injustice, where the toxic burden falls most heavily upon poorer nations and communities. This inequity prompts a clear ethical demand, articulated by experts, for a targeted cleanup to ensure the fundamental right to a healthy life is available to all Europeans, not just those in wealthier regions. The comprehensive findings, considered a definitive portrait of the continent's air quality, lead to an inescapable conclusion: only decisive and courageous political intervention can now rectify this systemic failure.

In November 2024, in *The Guardian*, Shah Meer Baloch and Hannah Ellis-Petersen detailed how Lahore and Delhi were "choked by smog." The piece described the onset of a "pollution season" in which the cities transformed into gas chambers, with visibility collapsing, hospitals overwhelmed, and daily life suspended. Residents suffered scratchy throats, burning eyes, and persistent coughing, making even short trips outdoors difficult. The smog was fueled by crop stubble burning, industrial emissions, traffic, and construction dust, worsened by stagnant winter air. Authorities' efforts were largely ineffective, and clean air had become a luxury only the wealthy could afford, with pollution-related illnesses rising, especially among children and the elderly.

An article in *The Guardian* on Friday, 24 January 2025, citing Agence France-Presse, reported that Bangkok was engulfed in a severe air pollution crisis, as a hazardous seasonal smog forced school closures and disrupted the education of thousands of students.

The report described how the concentration of dangerous, cancer-causing microparticles in the air was exceptionally high. At the time, this pollution placed

Bangkok among the world's most polluted major cities, with air quality levels vastly exceeding the international safe limit.

The article situated Bangkok's crisis within a broader regional pattern, noting that cities in Vietnam and Cambodia also ranked high on pollution lists. It further contextualized the event by referencing recent school closures in India and Pakistan due to similar air quality issues, underscoring a recurring climate and public health challenge across parts of Asia.

Together, these accounts chart the collapse of the air condition – the quality of the atmosphere itself. What the press is documenting is more than environmental reportage. It is an early record of planetary collapse, told through the lens of cities where the air itself has become incompatible with life. The canary in the coal mine is no longer symbolic: it is Lahore, it is Delhi, it is Bangkok, it is every (mega)city where survival depends not on the condition of the commons but on the capacity to privatize it.

In the Anthropocene, the very medium of life – air – has been transformed into a commodity, a border, and a battleground. The chronicles of pollution thus offer more than local stories; they are dispatches from the front lines of a new reality that reveal the collapse of breathability. This paper traces the anatomy of this rupture. It begins by re-examining the human condition in the Anthropocene, where humanity's uncoordinated "telluric force" – the power to consciously reshape the Earth – generates a "retroactive entropic effect" that destabilizes both our survival and meaningful existence, particularly through its impact on the air we breathe. This entropy is most visibly concentrated in the Anthropocene "air condition," a thickening of the atmosphere with toxicity, exclusion, and precarity. Finally, I critique Anthropocene "air conditioning," showing how technological fixes provide comfort for some while worsening climate, air quality, and inequality, which in turn highlights the need for systemic, equitable solutions to ensure breathable air for all.

1. The human condition in the Anthropocene

The expression "human condition in the Anthropocene" signifies a fundamental expansion of its traditional definition. As established in Mendes (2024: part 1), the "human condition" has traditionally been defined by two dimensions: a vital dimension (our biological needs) and an existential dimension (our freedom to create a meaningful life) – a duality that philosopher José Ortega y Gasset described as the "ontological centaur" (Ortega y Gasset 1964: 338). The Anthropocene introduces a third dimension: the "condition of telluric force." This concept builds

upon geologist Antonio Stoppani's description of humanity as a "new telluric force" (Stoppani 1873: 732), positioning us as geological agents capable of altering the Earth System on a planetary scale. However, as historian Dipesh Chakrabarty clarifies, while this "force" is a physical and amoral concept (Chakrabarty 2021: 159), its full significance is only grasped when understood as a conscious "power" – a geological force imbued with human intentionality and responsibility (Chakrabarty 2021:163).

This third *anthropocenic* dimension – constituting an abstract aggregate without central moral agency (Mendes 2024: 78–79) – in turn generates a dangerous, potentially fatal, retroactive entropic effect.[1] This corrosive effect not only threatens the future but actively dismantles the historical conditions of stability that made civilization possible, undermining both the vital and existential dimensions. The example of air perfectly illustrates this paradox: the degraded atmospheric condition, laden with pollutants, makes air itself a threat to survival. Our technological response – air conditioning – creates localized refuges but globally intensifies the problem through energy consumption and emissions, fueling the same destructive cycle it aims to mitigate. This technological mediation, intended to secure a niche within the vital dimension, ends up amplifying the disorder that threatens both dimensions of the human condition.

2. Anthropocene air condition

2.1. The onto-phenomenological nature of air

Air is indispensable not only for human survival, but also for maintaining a healthy life, performing a vital and existential function. Although scientific lexicon distinguishes between "air", the localized gaseous medium we breathe, and the "atmosphere", the stratified gaseous envelope of the planet, this discussion treats them as functionally equivalent (see Horn 2016: 235). The justification for treating them as equivalent is not merely pragmatic, but ontological. The atmosphere is the condition of possibility for air; it is the global, systemic entity whose regulatory functions make the local, breathable moment of "air" possible. To separate the two is to commit a categorical error, akin to isolating a single wave from the ocean that gives it its very existence and movement.

This unity is illuminated by the aesthetic-phenomenological concept of "atmosphere" developed by thinkers such as Tonino Griffero. Griffero argues that atmospheres are not subjective projections, but quasi-objective affective powers that permeate a space and fundamentally shape our bodily experience (Griffero 2016:

[1] A concept inspired by Neyrat (2016) and Serres (1980).

especially section 3.2). In this perspective, scientific "air" and felt "atmosphere" are not two distinct entities, but two dimensions of a single reality. The carbon-laden "air" of a congested city is the very physical embodiment of a claustrophobic "atmosphere"; the fresh, clean "air" of a mountain peak is the material basis for an "atmosphere" of vitality and expansion.

Therefore, treating them as two dimensions of the same phenomenon is to recognize a profound truth: the physical and the phenomenological are co-constitutive. We do not simply inhabit a biosphere; we are immersed in a respiratory sphere, a singular field where the chemical composition of a gas directly generates the qualitative tone of a place and where our emotional states are, literally, the *air we breathe*. This deeper understanding reveals that ensuring air quality is a task that transcends mere pollutant control. It is about managing the very medium of our existence, a commitment to maintaining an atmosphere – both in the scientific and human sense – that is truly breathable, both for the body and the spirit.

2.2. Breathing as an ethical and political act

This co-constitutive relationship forces us to reconsider our very breathing. Philosophically, breathing can be seen as an example of what Maurice Merleau-Ponty identified as the "chiasmatic" intertwining between the body and the world; it is an active and reciprocal exchange where the boundary between the self and the environment is perpetually negotiated (Merleau-Ponty 1968). With each inhalation, we draw the world into the most intimate recesses of our bodies, and with each exhalation, we return a part of ourselves – our breath, our metabolic traces – to the collective atmospheric whole. This cyclical process dissolves the illusion of the atomistic individual, revealing the human form as a transitory whirlpool in the atmospheric flow, a node through which the world feels and knows itself.

Consequently, the act of breathing becomes a profound ethical and political gesture, however involuntary it may be. Breathing polluted air means not only suffering physiological aggression but also being forcibly inscribed by a toxic environment, an experience of what feminist philosopher Nancy Tuana might call "viscous porosity," where harmful elements cross bodily boundaries beyond our control (Tuana 2008). The struggle for clean air thus transforms from a technical regulatory issue into a fundamental struggle for the right to an experience free from environmental aggression. It is a demand for an atmosphere that allows both biological life and spiritual potential to flourish fully. Air management is, in its

deepest sense, the curation of a shared existential environment – a commitment to forging a world whose atmosphere is not only life-sustaining but also life-affirming.

According to Parsons (2014), for air to be considered truly breathable, it must meet specific criteria that support optimal pulmonary function, free from hazardous contaminants and extremes of dryness or moisture that could impede respiration. Additionally, the thermal properties of air play a critical role in helping the body maintain homeostasis; excessively high or low temperatures can place significant stress on the body's thermoregulatory systems. Furthermore, imbalanced humidity levels – whether too high or too low – can lead to respiratory discomfort, dehydration, and thermal stress.

In sum, air must meet an integrated set of criteria, encompassing purity, temperature, and humidity, so that it is both respirable and thermally manageable and supports health and physiological equilibrium.

2.3. Historical shifts and the right to clean air

The idea that air is essential to life is not new; centuries before modern science, Anaximenes of Miletus developed a theory of air, of which only fragments survive. He posited that air constitutes an invisible, neutral substance that permeates all things and is readily available to engage in natural (physical, chemical, and biological) processes. The Milesian philosopher of the 6th century BCE regarded air as a fundamental yet often taken-for-granted resource – an immutable and perhaps even unalterable element – perpetually available to sustain life and facilitate the transformations of nature (Graham, 2006, chapter 3).

Anaximenes' conception of air, which endured for over 2,500 years, is no longer tenable. Air can no longer be considered a neutral or guaranteed resource for respiration; its composition is increasingly compromised by harmful substances across a growing range of locations. Moreover, air has transformed into an asymmetrically distributed good, with access to air of adequate quality now limited to a shrinking minority. Thus, it has shifted from a universally available element to a scarce and conditionally accessible resource.

When did this transformation occur? According to Peter Sloterdijk, the pivotal moment occurred on the 22nd of April, 1915, near Ypres, Belgium, when German forces first employed toxic gas as a weapon during the First World War (Sloterdijk 2004: 86 et seq.). In his commentary on this notion articulated by Slotedijk, Bruno Latour observes that on that day, "Air has entered the list of what could be withdrawn from us. […] air has been made *explicit*; air has been reconfigured; it is now part of an air-conditioning *system* that makes our life possible" (Latour 2005).

However, one might contend that the origins of this transformation can be traced back to the First Industrial Revolution in the mid-eighteenth century (Calvillo 2019), with its effects becoming markedly pronounced during the so-called Great Acceleration that followed the Second World War – two key dates frequently proposed as the commencement of the Anthropocene.

Indeed, when we examine the Great Acceleration graphs, developed and popularized by a group of scientists led by Australian chemist Will Steffen, this transformation becomes starkly evident, particularly when we focus on the evolution of carbon dioxide, methane, and nitrous oxide emissions into the atmosphere. These emissions have not only continued to rise since approximately 1750, but have also escalated dramatically since 1950 (Steffen et al. 2004; Steffen et al. 2015).

Using even more recent data concerning air quality indicators provided by the National Oceanic and Atmospheric Administration of the United States government, levels of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and sulfur hexafluoride (SF_6) have continued to increase dramatically since 1950, reaching alarmingly high values last year (NOAA Global Monitoring Laboratory 2024).

The four gases in question, as is well-known, create a powerful greenhouse effect that drives global warming and climate change. Primarily produced by human activities, they adversely affect air quality by contributing to air pollution and the formation of ground-level ozone. The rising concentrations of these gases in the atmosphere present significant challenges to environmental health and climate stability.

The Cameroonian philosopher Achille Mbembe, in a paper he published on April 13, 2020, advocated for the recognition of a universal right to breathe. In the context of the COVID-19 pandemic, his primary concern was access to a technological resource that proved to be scarce: ventilators. This shortage highlighted the pressing need to ensure that this right to breathe could be effectively realized, particularly in hospitals where the demand for respiratory support surged during the crisis.

However, this proposal remains relevant in the post-pandemic context in which we now find ourselves and is increasingly intertwined with the issue of deteriorating air quality and the rising temperatures to which more and more people are being exposed. The implications of Mbembe's advocacy for a universal right to breathe resonate powerfully today, as environmental crises highlight the urgency of addressing the right to clean air as an essential component of human dignity and survival. This ongoing dialogue underscores the need for a holistic

approach to health and environmental justice, recognizing that the right to breathe clean air is fundamental not only for individual well-being but also for the collective health of communities and ecosystems alike.[2]

A particularly significant aspect of Mbembe's proposal pertains to the meaning of "universal." Adopting a perspective that is neither anthropocentric nor anchored in the present, he argues that the right to breathe should not be confined solely to humans or to those living today. Instead, it should extend to non-human entities and future generations of humans as well. This expansive view emphasizes the interconnectedness of all living beings and the environments in which they exist, advocating for a more inclusive understanding of rights that encompasses the broader ecological context.

In many respects, the challenge of the Anthropocene can be encapsulated in this question: will we continue to have access to breathable air?

3. Anthropocene air conditioning

3.1. Human desire to control climate

As noted by Eva Horn, Professor of German Literature and Cultural Theory at the University of Vienna

> Air conditioning – the possibility of "fixing" the air's temperature and humidity at one's own comfort level – is one of the oldest dreams of mankind. It means creating a world without heat or cold, rain or snow, without suffocating humidity or dusty winds (Horn 2016: 234).

Horn argues that the endeavor to condition air reflects a broader aspiration for climate control that extends beyond the confines of twentieth-century society's pursuit of comfort. Rather, it constitutes a central aspect of the human civilizational project, fundamentally aimed at liberating human society from the contingencies of nature – particularly those elements of nature that are as elusive and pervasive as air itself (Op. cit.: 235).

Moreover, she posits that, ultimately, "the venture of controlling and dominating nature comes into its own in the dreams of creating an atmosphere that is completely adapted to human needs and comfort" (Horn 2016: 237). This perspective, as inferred from her remarks, is rooted in the dualism of the external

[2] While one might also assert the fundamental necessity of water and food, air poignantly illustrates the urgency of our predicament. A human can survive without food for approximately two months and without water for up to a week; however, without air, survival is limited to a mere ten minutes, with loss of consciousness typically occurring within one to two minutes (Merck & Co., Inc. 2022).

and internal, or ambient and domestic environments. Sloterdijk's philosophy fundamentally challenges this dualism by arguing that we cannot exist – or come into being – outside the environments we construct for ourselves, which he terms "spheres" or, more precisely, "atmo-spheres," which refers to the breathable layers of air that are simultaneously physiological, psychological, and social (van Balen 2021: 182).

In his conception, the human condition is characterized by a primordial separation from the external world, compelling us to perpetually project our existence into artificially constructed domains. This spherogenic impulse is not a choice, but an ontological necessity, a response to what he calls the "premature birth" of the human. Sloterdijk's historical topology of spheres reveals this imperative at different scales: it begins with the intimate microsphere (the bubble), such as the maternal dyad, which serves as the first immune system. This expands to the macrosphere (the globe), the totalizing cosmological worlds – such as the medieval imago mundi – that provide collective meaning and immunity. Finally, the contemporary condition is that of plural spheroids (the foam), a complex aggregation of countless self-sufficient but adjacent atmospheric units – from apartments to nation-states – that characterize modern life as a state of co-isolation.

Consequently, the dream identified by Horn is, in Sloterdijk's view, the very engine of human history. The political question is thus reformulated. It is no longer a question of the ethics of dominating an external nature, but rather of the conception and politics of our shared immune structures. The crucial task now becomes analyzing who is contained within these breathable spheres, who is exposed, and what kind of shared life is possible within the fragile and interconnected foam of our artificially sustained atmospheres.

However, this separation cannot be considered absolute, as we are not entirely immune to the influences of our environment. In fact, what happens is a co-production of both elements, where human existence and the surrounding environment interact continuously, shaping each other. Events that take place within our borders do not remain isolated; on the contrary, they give rise to negative externalities. This dynamic is inherent in Sloterdijk's spherology: although spheres create immune barriers, they remain permeable membranes. The very act of atmospheric creation produces a new kind of relationship with the outside – a relationship of metabolic exchange and inevitable escape. The climate crisis itself represents the ultimate negative externality of our spherical project, proving that the "outside" is, in fact, the cumulative consequence of all our separate "insides."

This dynamic significantly contributes to the ongoing failure to address the formidable challenge of the Anthropocene, which involves controlling the quality

of the atmosphere and temperature. Nearly a decade after the Paris Agreement was established, the Earth's atmosphere now contains approximately 426 parts per million of CO_2 (NASA 2025), while the global mean near-surface temperature has reached approximately 1.6 degrees Celsius above pre-industrial levels (World Meteorological Organization 2025).

As we grapple with the challenges of effectively and successfully controlling the external environment, we frequently redirect our focus inward, striving to regulate conditions within the artificial spheres we have designed and constructed. As Eva Horn articulates,

> Our world "outside" has become a climate-controlled interior which we only leave for occasional adventure trips into more extreme climates. […] While we're heating the planet by cooling our climate-controlled life-world, it might be worth stepping out into the very wet, very cold, very hot, very dry air that is waiting for us (Horn 2016: 241).

And the time we spend between artificial environments – those so-called atmospheres identified by Sloterdijk, such as our homes, offices, schools, supermarkets, and places of worship – is increasingly diminishing.

However, as noted above, the relationship between the interior and exterior is not a closed system; rather, they are interconnected, leading to an increase in entropy. The climate control of these internal spheres is achieved at the expense of raising external temperatures and degrading air quality. This phenomenon encapsulates the paradox of air conditioning (Brion & Laffont 2023; Irfan 2022; Nugraha et al. 2024).

3.2. Social, ethical, and political implications of cooling

In this context, American science writer and political journalist Leigh Phillips advocates for the use of air conditioning, maintaining that opposition to this technology constitutes a form of political austerity that exacerbates class divisions, particularly impacting the working class. He asserts that all individuals have the right to optimal thermal conditions, specifically air temperatures ranging from 18°C to 24°C, as recommended by the World Health Organization (Phillips 2018).

Phillips calls for the inclusion of air conditioning in new buildings as part of any proposed "Green New Deal" and stresses that retrofitting initiatives should prioritize the installation of efficient cooling systems powered by renewable energy. He underscores the life-saving potential of air conditioning, noting that heat waves rank among the deadliest natural disasters. Furthermore, he points out that extreme temperatures can result in significant health consequences

> Tens of millions of people suffer from non-life-threatening but nonetheless severe health impacts and disruption of livelihoods. We are much more lethargic, less productive, and experience substantially reduced cognitive capacity. In extreme cases, people become too weak to work (Phillips 2018).

Consequently, he argues that universal access to air conditioning is vital for promoting public health and achieving social equity.

Furthermore, as Eva Horn aptly observes, we have developed a physical dependency on air-conditioned air, leading to a situation where

> Today, climate is, except for the exotic options in greenhouses and zoos, well on its way to becoming globally standardized. Landing in Singapore places you in the same 72 degrees Fahrenheit with 50 percent humidity as landing in Moscow; working in an office in Montreal has you sit in the same climate as in Dubai. (This temperature standard is, by the way, adapted to middle-aged men and generally slightly too cold for women.) (Phillips 2018: 240).

The issue with Phillips' advocacy for a right to air conditioning is that, while it is both morally justifiable and theoretically attainable, its realization must be carefully managed to avoid aggravating climate change, air pollution, or energy inequality. Australian scholar Emily McAvan bolsters Phillips' argument by introducing the concept of "subaltern discomfort" to describe the experience "felt by subjects who are excluded from the global economy in which comfort, in the form of access to technologies like air-conditioning, can be purchased to ameliorate the emerging effects of the warming climate of the Anthropocene" (McAvan 2024: 3).

McAvan points out that while nearly 90% of American households possess air conditioning, in India only a privileged minority – primarily the wealthy – have similar access. In other regions, cooling is reliant on fans, baths, and other less effective methods, and in many areas, there is no access to even these modest resources. She concludes that "[s]ubaltern discomfort in the Anthropocene, therefore, means an exposure to the worst aspects of this environmental regime, of a lack of protection from them" (McAvan 2024: 4).

And this is, according to Eric Wilson, the problem of the twenty-first century: "Who gets to be comfortable and at what cost to others?" (Wilson 2021: 396). The expansion of the North American model of comfort – characterized by high energy consumption and an emphasis on individualism – among the new global middle classes constitutes an ethical and socio-environmental dilemma. It would be contradictory to deny millions of people access to the conveniences that North Americans have historically enjoyed. However, as the author argues, the essence of the problem does not lie in determining who is entitled to comfort, but in

interrogating the very foundations upon which the concept itself is constructed. The hegemonic model, which equates comfort with individual status and intensive energy consumption, has displaced alternative visions – more collective, relational, and sustainable – of well-being, establishing itself as a global paradigm whose continuation proves environmentally and socially unsustainable. Hence Wilson concludes with pessimism: "I have little faith that technological advances in energy efficiency or carbon capture will solve our crises by carrying us magically toward a solution" (Wilson 2021: 397).

This paradox is particularly evident in the case of air conditioning. If its expanding use contributes to worsening climate change, air pollution, or energy poverty, we must confront the challenge directly. Either the universal right to breathe freely proves unattainable, perpetuating inequality, or alternative solutions must be imagined.

3.3. Technological and infrastructural responses

Architect Nerea Calvillo encourages us to rethink air as an "atmospheric infrastructure that sustains our breath," rather than merely a substance we breathe (Calvillo and Franzone 2023). This perspective leads her to explore the idea of "airing pollution," emphasizing the need to make certain gases and particles visible. By focusing on the most concentrated or controversial pollutants, we can elevate air pollution as a public concern (Calvillo 2018). She advocates for designing buildings that reveal external air pollution levels, using urban infrastructures to enhance public awareness through direct interaction with data.

An illustrative example is a structure that translates PM2.5 data into mist, enabling citizens to experience pollution levels in a tangible way. Such "data intimacies" foster deeper engagement and have the potential to reshape how individuals respond to air quality issues (Calvillo 2019). PM2.5 refers to fine particulate matter with a diameter of 2.5 micrometers or smaller, which can include dust, soot, and smoke, primarily emitted from sources such as vehicle exhaust and industrial processes. These tiny particles pose serious health risks as they can penetrate deep into the lungs and bloodstream.

Emerging proposals in engineering aim to develop climate-friendly air conditioning units that significantly reduce greenhouse gas emissions while remaining cost-effective. The goal is to create systems that maintain comfort in extreme heat using less energy and sustainable refrigerants. Strategies include smart controls, solar panels, and solid refrigerants from organic crystals to mitigate leaks and address the environmental impact of traditional cooling technologies. However,

as Emily Underwood (2020) warns, it is a race against time, as it is estimated that by 2050, the number of room air conditioners could quadruple to 4.5 billion, becoming as ubiquitous as cell phones today.

These architectural and engineering approaches to addressing the challenges posed by air conditioning raise concerns about an overreliance on technosolutionism – the belief that technology can solve all problems, including those caused by technology itself and non-technological social, economic, political, or environmental issues (Huesemann and Huesemann 2011). Perhaps true reform must be pursued at a deeper level by addressing global population control, our consumption patterns, and lifestyle choices.

Conclusion

In conclusion, this paper has examined the significant challenges posed by the degradation of air quality in the Anthropocene and argued that this degradation represents a profound crisis of scarcity and inequality. The techno-solution of air conditioning, while offering temporary relief, ultimately fuels a vicious cycle that exacerbates the very environmental harms that make it necessary and thereby trading one population's comfort for another's peril. This is not a matter of impartial observation, for as Hsuan Hsu asserts, "[…] there is no impartial, 'outsider' perspective on air conditioning. We're all conditioned by its emissions and expenditures, whether we use it or not" (Hsu 2024: 142). This entanglement underscores the fundamental insufficiency of a paradigm that, by its very operation, complicates the problem it seeks to solve.

Consequently, a truly effective response must reject the narrow technological paradigm. It demands systemic reorientation grounded in the recognition of breathable air as a fundamental, intergenerational right. This begins with the crucial shift in perspective that Hsu proposes: "recognizing our status as beings entangled with air and climate" (Hsu 2024: 147). This ethos is the necessary foundation for developing "more livable and equitable ways of engaging with the atmospheric commons." Ultimately, securing this future necessitates transformative changes in global consumption and lifestyles, along with stronger commitments to equity – moving beyond mere technical efficiency to address the root socio-ecological causes of the crisis.

Received 2025 10 11
Accepted 2025 11 19

References

Agence France-Presse. 2025. "Bangkok pollution: Hundreds of schools closed, free public transport", *The Guardian*, 24 January. https://www.theguardian.com/world/2025/jan/24/bangkok-pollution-hundreds-schools-closed-free-public-transport

Baloch, S.M. and Ellis-Petersen, H. 2024. "Lahore and Delhi choked by smog", *The Guardian*, 1 November. https://www.theguardian.com/world/2024/nov/01/lahore-delhi-choked-smog-pollution-season-india-pakistan

Bonneuil, C. and Fressoz, J.B. 2013. *L'événement Anthropocène – La terre, l'histoire et nous*. Paris: Seuil.

Brion, J. and Laffont, J. 2023. "The paradox of air conditioning: A life-saver that aggravates global warming", *Le Monde*, 22 August. https://www.lemonde.fr/en/environment/article/2023/08/22/the-paradox-of-air-conditioning-a-life-saver-that-aggravates-global-warming_6102678_114.html

Calvillo, N. 2018. "Particular sensibilities", *e-flux Architecture*, 5 October. https://www.e-flux.com/architecture/accumulation/217054/particular-sensibilities

Calvillo, N. 2019. "Atmospheric Infrastructures to Deal with the Toxic Air in a Changing Climate", *ARDÈTH*. https://journals.openedition.org/ardeth/393

Calvillo, N. and Franzone, V. 2023. "The many (political) lives of air: Nerea Calvillo in conversation", *KoozArch*, 6 November. https://www.koozarch.com/library/the-many-political-lives-of-air-nerea-calvillo-in-conversation

Chakrabarty, D. 2021. "Anthropocene Time", in: Chakrabarty, D. *The climate of history in a planetary age*. Chicago: University of Chicago Press, p. 155–181.

Crutzen, P.J. and Stoermer, E.F. 2000. "The "Anthropocene"", *Global Change Newsletter*, 41: 17–18.

Graham, D.W. 2006. *Explaining the Cosmos: The Ionian Tradition of Scientific Philosophy*. Princeton: Princeton University Press.

Griffero, T. 2016. *Atmospheres: Aesthetics of Emotional Spaces*. Routledge.

Hamilton, C. and Grinevald, J. 2015. "Was the Anthropocene anticipated?", *The Anthropocene Review*, 2(1): 59–72. https://doi.org/10.1177/2053019614567155

Horn, E. 2016. "Air conditioning. Taming the climate as a dream of civilization", in: Graham, J., Blanchfield, C., Anderson, A., Carver, J. and Moore, J. (eds.) *Climates: Architecture and the Planetary Imaginary*. Zurich: Lars Müller Publishers, p. 233–243.

Hsu, H.L. 2024. *Air Conditioning*. London: Bloomsbury Academic, Object Lessons.

Huesemann, M. and Huesemann, J. 2011. *Techno-Fix: Why Technology Won't Save Us or the Environment*. Gabriola Island, BC: New Society Publishers.

Irfan, U. 2022. "The air conditioning paradox", *Vox*, 18 May. https://www.vox.com/science-and-health/23067049/heat-wave-air-conditioning-cooling-india-climate-change

Latour, B. 2005. "Air", in: Jones, C.A. (ed.) *Sensorium: Embodied Experience, Technology, and Contemporary Art*. Cambridge, MA: MIT Press, p. 104–105. http://www.bruno-latour.fr/sites/default/files/P-115-AIR-SENSORIUMpdf.pdf

Lewis, S. and Maslin, M. 2015. "Defining the Anthropocene", *Nature*, 519: 171–180. https://doi.org/10.1038/nature14258

Mbembe, A. 2020. *The Universal Right to Breathe*. Trans. by C. Shread. *Critical Inquiry Blog*. https://critinq.wordpress.com/2020/04/13/the-universal-right-to-breathe

McAvan, E. 2024. "Subaltern discomfort: a phenomenology of the air-conditioner in the age of climate (in)justice", *Textual Practice*. https://doi.org/10.1080/0950236X.2024.2380256

Mendes, J. 2024. "The human condition in the Anthropocene – four Chakrabartian parallaxes", *Anthropocenica. Revista de Estudos do Antropoceno e Ecocrítica*, 5: 69–91. https://revistas.uminho.pt/index.php/anthropocenica/article/view/6024

Merck & Co., Inc. 2022. *Effects of lack of oxygen on the body*. In: *The Merck Manual: Consumer Version*. https://www.merckmanuals.com/home/lung-and-airway-disorders/respiratory-failure-and-acute-respiratory-distress-syndrome/respiratory-failure

Merleau-Ponty, M. 1968. *The Visible and the Invisible*. Northwestern University Press.

NASA. 2025. *Carbon dioxide*. https://science.nasa.gov/earth/explore/earth-indicators/carbon-dioxide

Neyrat, F. 2016. *La part inconstructible de la Terre: Critique du géo-constructivisme*. Paris: Seuil, "Anthropocène". English translation: (2019) *The Unconstructable Earth: An Ecology of Separation*. Translated by D.S. Burk. New York: Fordham University Press.

NOAA Global Monitoring Laboratory. 2024. *Trends in Atmospheric Carbon Dioxide [and Methane, Nitrous Oxide, SF_6]*. https://gml.noaa.gov/ccgg/trends/

Nugraha, M., Fathir, M. and Azima, T. 2024. "Air conditioner: A paradox", *E3S Web of Conferences*, 506, 02008. https://www.e3s-conferences.org/articles/e3sconf/pdf/2024/36/e3sconf_iseep2024_02008.pdf

Ortega y Gasset, J. 1964. "Meditación de la técnica", in: *Obras completas*, Tomo V (1933–1941). 6th edn. Madrid: Revista de Occidente, p. 317–375.

Parsons, K. 2014. *Human Thermal Environments: The Effects of Hot, Moderate, and Cold Environments on Human Health, Comfort, and Performance*. 3rd edn. CRC Press.

Phillips, L. 2018. "In defence of air-conditioning", *Jacobin*, 30 August. https://jacobin.com/2018/08/air-conditioning-climate-change-energy-pollution

Rull, V. 2020. "The Anthropozoic era revisited", *Lethaia*, 54: 289–299.

Serres, M. 1980. *Le parasite*. Paris: Bernard Grasset; English translation: *The Parasite* (1982), trans. L.R. Schehr, Baltimore, MD: The Johns Hopkins University Press.

Sloterdijk, P. 2004. *Sphären III – Schäume*. Frankfurt am Main: Suhrkamp.

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O. and Ludwig, C. 2015. "The trajectory of the Anthropocene: The Great Acceleration", *The Anthropocene Review*, 2(1): 81–98.

Steffen, W., Sanderson, A., Tyson, P.D., Jäger, J., Matson, P.A., Moore, B., Oldfield, F., Richardson, K., Schellnhuber, H.J., Turner, B.L. and Wasson, R.J. 2004. *Global change and the Earth system: a planet under pressure*. The IGBP Book Series. Berlin: Springer-Verlag.

Stoppani, A. 1873. *Corso di geologia* (vol. 2: Geologia stratigrafica). Bernardoni e rigola.

Taylor, M. and Duncan, P. 2023. "Revealed: almost everyone in Europe breathing toxic air", *The Guardian*, 20 September. https://www.theguardian.com/environment/2023/sep/20/revealed-almost-everyone-in-europe-breathing-toxic-air

Tuana, N. 2008. "Viscous Porosity: Witnessing Katrina", in: *Material Feminisms*, ed. by S. Alaimo and S. Hekman. Indiana University Press, p. 188–213.

Underwood, E. 2020. "The race is on to build an AC unit that doesn't cook the planet", *Anthropocene*, 8 July. https://www.anthropocenemagazine.org/2020/07/the-race-is-on-to-build-an-ac-unit-that-doesnt-cook-the-planet

van Balen, S. 2021. "Becoming human in anthropogenic hothouses: Sloterdijk's foam anthropology of breathability in times of atmospheric crisis", *Internationales Jahrbuch für Anthropologie*, 10(1): 181–194. https://doi.org/10.1515/jbpa-2020-0010

Wilson, E.D. 2021. *After Cooling: On Freon, Global Warming, and the Terrible Cost of Comfort*. New York: Simon & Schuster.

World Meteorological Organization. 2025. *WMO confirms 2024 warmest year on record, about 1.55°C above pre-industrial level*. https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level