





Full Length Article

Climate Justice or Climate Apartheid? The justice trade-offs of private solar investments for South Africa's just transition

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1. Introduction

Scholarship and policy increasingly frame climate transitions through a justice lens, deploying lexicons such as climate justice, environmental justice, energy justice, and the just transition, for example (e.g. Bulkeley et al., 2013; Heffron & McCauley, 2018; Sovacool & Dworin, 2015). These debates recognise that climate change impacts are unevenly distributed, and that global south countries and marginalised communities are particularly vulnerable to, yet least responsible for, climate change impacts, whilst also having minimal voice and power in climate debates (Hughes & Hoffmann, 2020; Westman & Castán Broto, 2021). Former UN High Commissioner for Human Rights, Mary Robinson (2018), is perhaps the most vocal longstanding advocate for climate justice, arguing for nearly two decades that it provides a crucial lens to understand and challenge socio-economic and environmental global injustices. While justice was overlooked in the 2015 Paris COP21 agreement, the 'just transition' now anchors global policy (e.g. UN Just Transition Work Programme, 2024-26) emphasising that sustainable transitions must not leave anyone behind.

Recent scholarship reveals that climate injustice extends beyond climate change impacts and the power to influence political negotiations, and that climate mitigation and adaptation strategies also frequently deliver unjust outcomes (Rice et al., 2021). Privileged individuals and groups, already disproportionately responsible for carbon emissions (Dodman, 2009; Oswald et al., 2020), increasingly use financial resources to protect themselves from climate change impacts via privatised technology and economic investment. Under the politically-charged label of climate apartheid, these climate strategies and privileged stakeholders are implicitly criticised for prioritising self-centred solutions that exacerbate inequality (e.g. Rice et al., 2021). This discourse traces back to South African Archbishop Desmond Tutu's reference to "adaptation apartheid ... [where] adaptation is becoming a euphemism for social injustice on a global scale", to describe the context whereby wealthy individuals and countries protect themselves from

climate change impacts via infrastructure technology investments that are unavailable to poorer counterparts (United Nations, 2008:166). A decade later, Philip Alston warned the UN Human Rights Council that "we risk a 'climate apartheid' scenario where the wealthy pay to escape overheating, hunger and conflict while the rest of the world is left to suffer" (United Nations, 2019). More recently, scholarship on climate apartheid has emerged, drawing attention to the structural causes and long-term impacts of climate injustice (e.g. Long, 2024a; Long et al., 2020; Rice et al., 2021; Tuana, 2019).

Given that climate apartheid is a relatively new concept in scholarly debates, this paper examines how the concept works in practice, taking South Africa as the 'origin' context. Through this case we critically examine the value of deploying climate apartheid discourse (in contrast to more justice-centric frameworks), recognising its strengths and limits as a provocative label that remains tied to a specific history in South Africa. The paper builds on emerging climate apartheid scholarship by addressing three perspectives that particularly benefit from empirical illumination. First, we explicitly consider how climate apartheid functions at different scales, from global to household. While climate scholarship overwhelmingly focuses on strategies operating at the macro (global/national/municipal) rather than micro (community/household) scale, a plural perspective reveals how climate mitigation strategies can simultaneously deliver justice and exploitation, depending on the stakeholder or scale of assessment (Culwick Fatti, 2021). This leads us to consider whether 'justice trade-offs' might be a more suitable analytical framework than climate apartheid for acknowledging the benefits *and* harms of climate action. We consider whether this less pejorative label offers more value at the granular household scale, where climate apartheid's implicit blaming of privileged groups for the (potentially indirect and unintended) impacts of their actions may be unproductive and inaccurate.

Second, by conducting primary research with "climate privileged" (Rice et al., 2021) groups at the household scale, we interrogate how privileged stakeholders perceive their own climate actions. This is a new

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perspective for climate apartheid scholarship, which largely focuses on structure rather than agency, thereby overlooking the rationale, motivations and perceptions of privileged stakeholders. This perspective matters because those responsible for climate apartheid are implicitly held accountable for the impacts of their actions without evidence demonstrating whether this is intended and/or acknowledged. Arguably, paying for higher living costs (e.g. water, food, energy) and expensive technology (e.g. solar panels, air conditioning, low-emission cars) are self-serving strategies to secure individualised protection from climate hazards and maintain high living standards. However, it is less clear whether climate privileged groups, implicitly or explicitly, recognise their role in potentially facilitating unjust outcomes or consider the impacts of their actions on climate precarious groups (Long & Rice, 2019). This is important because deploying *apartheid* implies connection to South Africa's political system where the privileged minority explicitly supported exploitation of the precarious majority due to perceptions of racial superiority. Consequently, empirically-grounded insights into the attitudes and intentions of privileged stakeholders are essential to interrogating the value of the concept of climate apartheid.

Third, by seeking to understand the motivations of those typically blamed for perpetuating injustices at the granular scale, analysis transfers away from blaming or vilifying these actors, to instead considering how to harness their motivations to bring about equitable climate change solutions. This is important in shifting climate apartheid debates beyond critiquing actions and outcomes, towards recognising the positive role privileged groups could play in just transitions towards a sustainable future, alongside highlighting state responsibility for regulating and incentivising climate actions to ensure just outcomes that challenge structural inequality.

To examine climate apartheid in practice, this paper uses the example of economically privileged groups (private households and businesses) adopting solar photovoltaic (PV) energy in urban South Africa. South Africa has received significant global support for its national energy transition (e.g. Just Energy Transitional Partnership, JETP). Meanwhile, the public electricity utility (Eskom) has struggled to meet domestic energy demand, leading to a national state of disaster in 2023. Loadshedding (scheduled power cuts) has affected the country since 2007, with impact most severe (almost daily) in 2022-23. Consequently, the state has invested significant public funds in the private renewable energy sector, incentivising both utility- and small-scale developments. These investments aim to mitigate loadshedding impacts as well as meet global sustainability targets and foreign trade requirements. However, while these public investments may contribute to environmental and climate justice by reducing carbon emissions, alongside creating a new employment sector in the context of high unemployment and economic stagnation, they simultaneously contribute to socially unjust outcomes. This is because investment in South Africa's renewable energy sector overwhelmingly benefits private businesses and high-income households, whilst also directly undermining the government's ability to cross-subsidise basic services for the poor (due to reduced municipal revenue from electricity tariffs) (Culwick, Anciano, Lemanski, & Rubin, 2023; Jaglin, 2022; Lemanski, 2024). In this paper we highlight how strategies and policies that contribute to environmental, energy and/or climate justice but function within highly unequal economic structures, bring justice trade-offs and (potentially unintended) consequences that (re)produce inequality. Through this analysis we question whether climate apartheid is a valid and productive framework to help explain the uneven impacts of energy transitions in South Africa.

While initial climate apartheid scholarship acknowledged its South African origins (e.g. Tuana, 2019; Rice et al., 2021), more recent scholarship has sought to detach climate apartheid from state-driven forms of institutionalised racism (e.g. Heron, 2024; Long, 2024a, 2024b). However, we argue that adopting the term apartheid in climate discourse (as distinct from the language of climate/energy/environmental justice) requires acknowledgement not only of its historic

meaning, but also the contemporary political and emotional complexities of (re)deploying this lexicon. Apartheid as a word and political system are South African. An Afrikaans term meaning 'apartness', it was adopted by the National Party to describe their political system of racial oppression from 1948 to 1994. The word is used outside South Africa in reference to similar examples of extreme institutionalised, violent, and oppressive racial segregation such as the Israel-Palestine conflict and the Jim Crow era in America, and more recently, 'global apartheid' discourse has expanded its scale to decry the global north's continued economic and racial exploitation of the global south (e.g. Dalby, 2000; Besteman, 2000). Climate apartheid extends this further, arguing that contemporary climate change policies function within this pre-existing system of racial exploitation in ways that perpetuate and extend inequality. However, selecting this term because it is "intentionally provocative" (Long, 2024a, p. 6) requires acknowledgement that it secures attention precisely because of its origins, and that this also brings contextual constraints due to the complexities of re-appropriating a politically sensitive term. While there are domestic perceptions that apartheid is intrinsically South African and refers only to that political system (e.g. Goldstein, 2021; Lalu, 2023), we acknowledge that the term has been, and will continue to be, adapted. Consequently, in this paper we question whether South Africa's transition to 'green' technologies and resources by the climate privileged, to maintain high-consumption lifestyles, demonstrates climate apartheid. We use this empirical investigation to interrogate the emerging concept of climate apartheid more broadly, challenging climate apartheid scholarship to critically consider diverse readings of apartheid.

Our paper frames this empirical case in scholarship on multiple justices (social, environmental, energy, climate) and climate apartheid. We avoid singular readings of climate justice, recognising instead that groups and sectors can simultaneously benefit from, and/or be marginalised by, climate action. The paper then introduces South Africa's energy landscape, where rapid expansion in renewable energy, driven by private adoption of solar PV and state subsidies, is undermining state capacity to subsidise services for the poor. Next, we draw on data collected via online surveys with privileged households, and interviews with privileged households, public officials and private sector stakeholders in Johannesburg and Cape Town, to critically examine stakeholders' perceptions of the impacts of this solar transition. This explicit focus on the agency of household-scale actions and perceptions provides an important contribution to climate apartheid debates that largely address structural systems at global/national/municipal scales. Finally, the complex justice trade-offs of this public-private energy landscape are considered. Specifically, how privileged groups can potentially accumulate wealth from national government subsidies for renewable energy to produce outcomes that, while contributing to sustainability targets for decarbonisation, perpetuate socially unjust processes and outcomes.

2. Literature review: from climate justice trade-offs to climate apartheid

Approaches to justice overwhelmingly rely on John Rawls' (1971) principles of equity, fairness and inclusion, where all citizens hold equal basic rights and opportunities to participate in society. Social justice dominates recent public policy and scholarship, drawing from Rawls' tenets whilst prioritising disadvantaged groups over equal treatment for all (Leach et al., 2018). Anodyne social justice descriptions divide this into four inter-connected elements: distributive justice (distributing resources and outcomes equitably), procedural justice (fair decision-making and conflict resolution processes), justice of recognition (fair treatment without discrimination regardless of identity, values or associations), and restorative justice (addressing past injustices) (Ciplet & Harrison, 2020; Fraser, 2008; Menton et al., 2020; Schlosberg, 2004). However, not only are these definitions contested, but they also assume universal agreement on what is just or equitable (Davies, 2011; Harvey, 2003). Different ontological perspectives, worldviews or

personal experiences provide diverse assessments of what is right, good, fair or just. Some differences relate to questions of justice for whom and for what, while others arise from whether equality in the process or outcome is prioritised (Harvey, 2003).

In some instances, different justices align. For example, both the causes and impacts of climate change are unjust, where those who will likely be worst affected have not only contributed to and benefited least from causative developments and resource consumption, but they also have limited influence over decisions that affect future impacts (i.e. procedural injustice results in distributional injustice) (Davis, 2010). However, it is also possible for a just process to result in distributional injustice, or for an unjust process to result in just distribution. Newell et al. (2022) discuss tensions between needing to take rapid action to counter climate change, whilst recognising that the participatory processes necessary for achieving just sustainability necessitate slow decision-making. When processes and outcomes misalign, determining the most just or fair position becomes extremely challenging (Campbell, 1996). This challenge is complicated where ensuring justice for some undermines the ability to deliver justice for others, or where there is disagreement around what is just (Martin, 2013).

For example, despite hopes that solving environmental ills will improve quality of life for all and thereby deliver social justice for the disadvantaged (Davis, 2010; Schwarz et al., 2015), there are significant tensions between social and environmental justices, and numerous examples show how progress towards one undermines achieving the other (Marcuse, 1998; Patel, 2006; Culwick, Anciano, Lemanski, & Rubin, 2023; Swilling, 2019; Ciplet & Harrison, 2020). Specifically, scholars caution that environmental sustainability transitions are frequently socially unjust because competition over scarce resources entrenches rather than disrupts existing systems of capital accumulation and inequality, particularly when decision-making processes are influenced by power and vested interests (Marcuse, 1998; Swilling, 2019; Menton et al., 2020; Bennett et al., 2019). Conversely, addressing the structural causes of poverty and inequality could easily result in planetary boundaries being overshot (Ciplet & Harrison, 2020; Leach et al., 2018). Long and Rice (2019) highlight how contemporary shifts in policy discourse from sustainable urbanism to neoliberal agendas of climate urbanism distort the temporality and scale of social justice by promoting the urgency of saving global humanity to avert global catastrophe ('climate emergency') against the less urgent need to challenge local social inequality. Climate urbanism is a development paradigm promoting Eurocentric planning models to deliver climate-friendly cities by investing in selective 'sustainability' projects that overwhelmingly protect the cultural and economic interests of existing structures of privilege whilst leaving marginalised groups more vulnerable to climate change impacts (Long & Rice, 2020). This confirms Holgersen's (2025) assertion that sustainability has been popularised at the urban scale precisely because it does not threaten dominant class interests, echoing Harvey's (2003) recognition that justice 'ideals' can hide vested interests that favour maintaining existing power structures within systems that perpetuate injustice. For example, investment in climate-resilient infrastructure is justified as protecting urban economies despite facilitating unsustainable lifestyles and potentially ignoring the needs of marginalised urban dwellers (Holgersen, 2025; Rice et al., 2023). As demonstrated in this paper, South Africa's relatively new renewable energy sector overwhelmingly benefits stakeholders that already hold power and wealth (high-income households and businesses), while historically marginalised groups cannot afford solar panels or access public subsidies for renewable energy and are therefore reliant on failing coal-dependent public energy grids.

Recognising potential conflicts between different justices and stakeholders, it is important to briefly introduce the diverse justice terminologies used regarding 'green' transitions. Although justice is central to global policy responses to the climate emergency (Patterson et al., 2018), this is diluted by the plurality of terms and meanings. The most widely used justices of relevance to this paper are environmental,

climate, and energy justice. Environmental justice highlights how pollution and climate impacts disproportionately affect marginalised communities (Davis, 2010; Malloy & Ashcraft, 2020; Menton et al., 2020; Pineo, 2022; Rockström et al., 2021). Climate justice, which emerged from environmental justice, considers broader climate impacts beyond source pollution and has received growing attention (Malloy & Ashcraft, 2020; Mummery & Mummery, 2019; Westman & Castán Broto, 2021; Ziervogel, 2019). It highlights how climate change vulnerability correlates with existing inequality and (in)ability to influence decision-making (Hughes & Hoffmann, 2020; Westman & Castán Broto, 2021). In contrast to environmental justice, climate justice emphasises restorative justice in addition to distributive and procedural justice (Schlosberg & Collins, 2014). Climate justice acknowledges the unequal distribution of responsibility for and vulnerability to climate change, emphasising intergenerational and intersectional justice, drawing from critical feminist scholarship (Sultana, 2022).

While climate justice scholarship is largely normative and addresses national/global scales, environmental justice scholarship favours case study community-based research. However, recent urban-centric climate justice scholarship resembles the environmental justice methodological and epistemological emphasis on participation and engagement at the community/city-scale, recognising cities as key sites where urban dwellers experience and oppose climate injustice individually and collectively (Hughes & Hoffmann, 2020; Rice et al., 2023). While scholarship examining cities in climate change governance and infrastructure emerged two decades ago (e.g. Angelo & Wachsmuth, 2020; Bulkeley & Betsill, 2003; Revi et al., 2014); the neoliberal discourse of climate urbanism is newer, and increasingly used by governments and the private sector to promote cities as the preferred scale for climate action, often with negative implications for social justice and equity (Lawhon & Patel, 2013; Long & Rice, 2019).

In predicting possible urban futures under climate change, Rice et al. (2023:3) develop a matrix of four scenarios plotted against axes of more/less secure against climate change impacts and more/less equitable. The secure and inequitable scenario imagines a future that is already emerging in neoliberal cities, where the wealthy are secluded into enclaves that are protected from climate change, and where this segregation and inequality is structurally embedded. For example, the development of centrally-located luxury 'eco-districts' or complete 'ecocities' promoting 'low-carbon lifestyles' via technology and proximity to services and employment (e.g. reduced reliance on cars) that shield only their (affluent) occupants from climate hazards (Caprotti, 2014; Rice et al., 2023). These residential enclaves are iniquitous not only because they are exclusively occupied by the "climate resilient elite", but also because they intensify segregation and inequality whereby the "climate vulnerable poor" are resigned to distant under-serviced areas that are at greater risk of natural hazards (e.g. flooding, landslides) and economic marginalisation (Long & Rice, 2019, p. 1002). Critical climate scholars argue that the unjust impacts of climate urbanism strategies are not an unwitting oversight but directly tied to colonial legacies that perpetuate western approaches to economic development and climate governance (Long, 2024b; Robin & Castán Broto, 2021; Sultana, 2024). Consequently, Sultana (2024) argues that confronting climate coloniality requires dismantling existing economic norms that facilitate violent racial capitalism, and decolonising knowledge production to recognise the legitimacy and value of indigenous knowledge and lived experiences of climate action. These examples demonstrate the limitations of assuming universal readings of justice, which overwhelmingly promote vested interests.

Energy justice focuses on ensuring that energy generation, distribution and access meet the needs of all, including marginalised groups. Energy justice builds on climate justice by explicitly recognising that injustices are not neutral or accidental by-products of climate change but embedded in political and economic systems. This is an important contrast to climate urbanism policies, which hyper-focus on reducing carbon emissions without recognising the socio-political structures that

produce uneven emissions. Introducing the new handbook on energy justice, the editors stress that global climate and energy crises are primarily due to political and economic decisions of the world's most powerful leaders (Bouzarovski et al., 2023). Consequently, energy justice is not merely about the production, consumption or regulation of energy per se, or about the winners and losers of contemporary energy transitions. Rather, it addresses the entire energy continuum, and the broader political, legal, social, economic and cultural landscapes in which energy systems function. This resonates with recognition in critical climate justice studies that because these 'systems' are dominated by the agendas of wealthy countries and powerful institutions (largely global north), climate justice requires dismantling entrenched power structures and resource distributions that perpetuate systemic race, class and gender inequities (Ali et al., 2024; Rice et al., 2023; Robin & Castán Broto, 2021; Sultana, 2022, 2024; Tuana, 2019). In practice, however, most energy justice scholarship in Africa focuses on the practical delivery of renewable energy at multiple scales rather than global scale structural inequity per se (Cantoni et al., 2022).

Most recently, scholarship has also explored uneven access to, and impacts of, climate actions, thereby extending the focus of environmental/climate/energy justice on climate change impacts and access to decision-making. The emerging lexicon of eco-apartheid and climate apartheid is used by climate activists and scholars (e.g. Bond, 2016; Heron, 2024; Long, 2024a; Rice et al., 2021; Tuana, 2019) to highlight how the wealthy can afford the costs of climate change impacts (e.g. rising water, food, energy bills) and technologies that minimise climate change impacts (e.g. air-conditioning) and/or meet sustainability targets (e.g. low-emission cars, retrofitting buildings for water harvesting and thermal efficiency, solar PV). In contrast, the poor function in residual climate-impacted spaces, reliant on unsustainable resource consumption, and highly vulnerable to financial and natural shocks (e.g. rising costs, drought, heatwaves). This builds on literature within energy justice and climate coloniality, recognising the limitations of relying on new energy technologies (e.g. solar PV, wind turbines, electric vehicles) to deliver just transitions, due to inequitable access to private energy solutions (Romero-Lankao et al., 2023) and the disproportionate impacts of violent extraction on marginalised communities (DeBoom, 2020). Furthermore, resonating with both climate and energy justice scholarship, climate apartheid goes beyond simply recognising that climate change has different impacts on diverse groups, towards challenging institutional racism in contemporary climate practices (Tuana, 2019). This acknowledges how these injustices are not new, but embedded in and layered onto historic structural inequities such as racism, sexism and colonialism (Long, 2024b; Rice et al., 2021).

Climate apartheid debates resonate closely with the South African context, where apartheid's legacy has entrenched race-based structural inequality. Contemporary environmental and climate vulnerability is entangled with historic disadvantage. Post-apartheid environmental justice activism demonstrates how poor and marginalised communities, particularly black African women, bear the greatest burdens of pollution, resource insecurity, and climate impacts while having little influence over decision-making (Cock, 2019). Post-apartheid efforts to promote restorative justice echo climate justice principles by seeking to redress these inequities through more inclusive governance and equitable access to services. However, powerful and privileged groups, still largely associated with race, but expanding to include a black African elite, continue to shape how resources and benefits are distributed, often reinforcing spatial, racial and class inequality. Contemporary just transition debates emphasise that South Africa's shift to renewable energy must not reproduce past injustices or externalise the costs of development onto disadvantaged groups, but support all elements of justice (Leonard, 2018; Cartwright et al., 2023).

Arguably, climate apartheid is present in contemporary South Africa given reliance on the private sector to deliver sustainable transformation via renewable energy technology that essentially preserves existing resource-intensive lifestyles, with little attempt to fundamentally

change energy practices or ensure equitable resource distribution. However, in considering the contribution of the climate apartheid framework to analysing the country's (un)just transition, we recognise the emotional and political tensions of re-purposing the apartheid label in a context where its legacies continue to divide society (Chari, 2024; Lulu, 2023). Although frequently traced to South African Archbishop Desmond Tutu, the term 'climate apartheid' is rarely deployed in contemporary South Africa, likely due to popular and political resistance against any perceived reappropriation of apartheid beyond its specific racial and political context (e.g. Goldstein, 2021). While the language of apartheid is used to decry South Africa's enduring uneven resource distribution as a legacy of this twentieth century political system (e.g. Koot et al., 2022; Lulu, 2023; Lemanski, 2004; Venter et al., 2020), new adaptations of the term are largely eschewed (Chari, 2024). While we acknowledge the complex and traumatic associations the phrase climate apartheid may provoke in South Africa, because it is a conceptual framework that is gaining momentum within global circuits of knowledge production, it is urgent to consider its usefulness in South Africa as the origin context. Within this, we recognise that climate apartheid scholarship seeks to expose how climate policies and actions are rooted in historic and systemic injustices, and is therefore not intended as an ahistorical reappropriation of apartheid.

3. Methods

To understand the complex economic, political and environmental impacts of renewable energy investments by private households in South Africa, we collected quantitative and qualitative data from diverse stakeholders across three key stages. First, semi-structured interviews were undertaken with 10 government officials and 17 private sector stakeholders (eight businesses representatives, nine experts/practitioners) during 2022-3. Interviews with officials focused on understanding current and proposed regulatory frameworks and identifying officials' perceptions of infrastructure transitions by private households. Private sector stakeholder interviews probed their practices and perspectives on private investments in solar energy. Second, between February-May 2023 an online survey captured 382 responses from South African residents regarding their opinions about, and investments in, alternative electricity and water technologies.¹ Respondents were privileged² and urban (57% from Johannesburg, 28% from Cape Town), and just over one-third (39% of respondents) had invested in household-scale renewable energy solar PV systems. The survey asked about respondents' housing (type, ownership, location), recent experiences of water and electricity interruptions, primary sources of water and electricity, including follow-up questions for those with and without sources beyond the grid (e.g. boreholes, water tanks, solar PV, generators, inverter/battery) about their motivations and experiences (e.g. reliability, uses, installation, registration), as well as their perceptions about the impacts of these technologies on society and the environment. Third, 26 semi-structured interviews were undertaken between May-July 2023 with online survey respondents who indicated willingness to be interviewed and provided contact details. Interviews focused on

¹ Invitations to participate in the online survey were sent via university mailing lists and community WhatsApp groups, with no incentives to respond. The survey invited South African residents to respond to questions about residential water and electricity access, and investments in alternative technologies for residential water and energy consumption.

² The anonymous survey did not capture age, gender or income levels. However, responses regarding housing type (97% of respondents reside in a semi- or detached house) and ownership (84% homeowners), access to networked infrastructure connections (100% electricity connection inside dwelling), alongside the extent of alternative technology indicate privilege and high incomes in the South African context. This indication was confirmed via follow-up interviews with a sample of survey respondents.

understanding respondents' visions, motivations and practices of adopting solar PV, alongside any awareness of the consequences of these practices.

We recognise important limitations in these methods. First, the online survey relies on non-representative sampling. However, the survey data provided valuable baseline data for follow-up interviews, and we augment these primary data with secondary data from the Gauteng City Region Observatory's biennial Quality of Life Surveys, which since 2009 have asked about household access to alternative energy and water sources. Second, most government and private stakeholder interviews were conducted in early 2022, just as the electricity crisis began to worsen and the private solar PV investment boom began (see Fig. 1). Although our engagement with some government officials in late-2023 offered insight into how municipalities responded to the electricity crisis and private investments, the timing may have limited our ability to capture the full extent of these developments.

4. Energy landscape in South Africa

In February 2023, South Africa's President declared a national state of disaster over the electricity crisis. Whilst ostensibly a political response to severe loadshedding throughout 2022-23, where households were without electricity for 289 days in 2023 (Outlier, 2024), it reflects a longer history that has fundamentally shaped energy practices and expectations in South Africa.

South Africa's post-apartheid governments have adopted numerous policies to address apartheid's deliberate undersupply of infrastructure and services to Black people, with a constitutional right to basic services, including electricity regardless of location. Between 1990 and 2007, over 5 million people situated in un(der-)serviced areas were connected to the electricity grid, and the proportion of households connected to electricity increased from 58% (1996) to 86% (2022) (Department of Energy, 2018; World Bank, 2023). Alongside this bulk infrastructure expansion, since 2003 the Free Basic Electricity policy (FBE) has subsidised a minimum of 50 kWh electricity per month to indigent households (Ledger, 2021). The FBE is primarily funded through cross-subsidisation, where energy tariffs from high-consumption customers subsidise provision for the poor (Mögenburg, 2022). This model supports restorative and distributive justice as the privileged groups who benefited from apartheid's unequal infrastructure distribution part-finance service provision for disadvantaged groups (Kirshner et al., 2019). However, despite these aggressive energy policies and impressive statistics, access to grid-tied electricity in South Africa remains

precarious for marginalised households due to affordability and reliability, forcing many households to rely on illegal or unsustainable energy sources (Lemanski et al., 2025).

4.1. Energy loadshedding

South Africa is primarily reliant on coal-based electricity and is among the world's highest emitters of carbon dioxide in absolute terms and per capita (Crippa et al., 2024). Although currently being unbundled, the public utility, Eskom, was historically responsible for electricity generation, transmission and distribution. Over the past fifteen-plus years Eskom has struggled with a fleet of ageing and inadequately maintained coal power stations, electricity theft, infrastructure damage, the delayed upgrade of a major nuclear power plant, and alleged corruption. This has resulted in widespread scheduled power cuts to balance energy demand and supply (colloquially known as loadshedding). This intensified, with 2022 and 2023 recording the most frequent and severe power cuts, where households reported no electricity for ~10 hours a day (Moneyweb, 2024).

Consequently, the nation was deemed to be in crisis, with concerns that Eskom could never meet demand, prompting the 2023 National State of Disaster. Although South Africa experienced a pause in loadshedding from March 2024 to January 2025, power cuts continue to affect Johannesburg (Haffajee, 2025), and nearly two decades of energy instability has fundamentally changed the nation's energy landscape, economy, infrastructure, social norms, health outcomes and public expectations. The timing of South Africa's energy crisis intersects with growing international pressure to shift away from coal-based electricity generation, alongside a global drop in the cost of renewable energy. Consequently, national government has heavily invested in renewable energy, encouraging businesses and households to adopt solar energy through tax incentives, public subsidies, and reducing regulatory hurdles.

4.2. Renewable energy investment

Although government interest in attracting private investment in renewable energy is not new (it was mentioned in South Africa's 1998 White Paper (Republic of South Africa RSA, 1998), the pace of expansion and focus on *small-scale* privately-generated renewable energy is new. Initially targeting large-scale private sector investment, the Renewable Energy Independent Power Producer Programme (REIPPP) was launched by national government in 2011 to incentivise businesses to

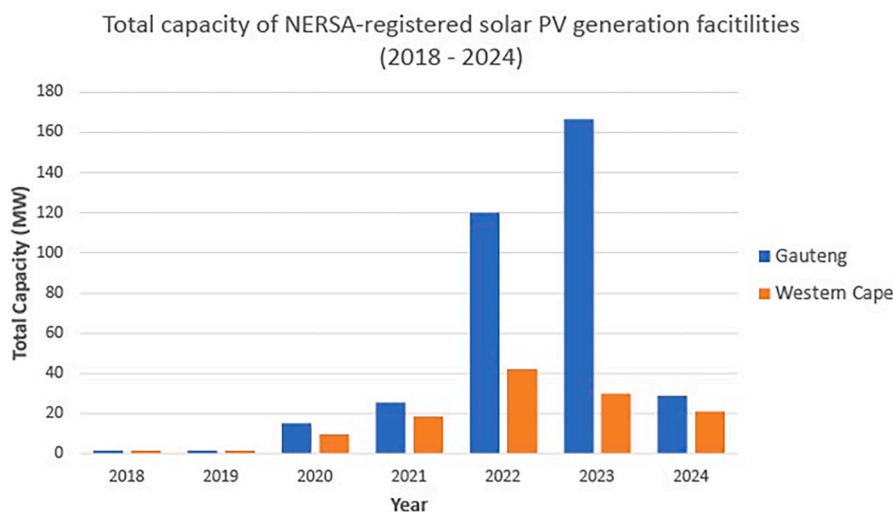


Fig. 1. Total capacity of solar PV generation facilities newly registered with NERSA per year in Gauteng and the Western Cape (2018-2024). Data source: NERSA, January 10, 2025.

develop large renewable energy projects and sell electricity to the national grid. This programme has procured 15.7 GW of renewable energy, 83% of which has come online (IPP Projects). More recently, interventions have also targeted smaller investors. Private embedded generation projects smaller than 100 MW were exempted from national energy regulator licensing in 2023, thus significantly reducing the bureaucratic complexity and time required for bringing online medium- and large-scale embedded generation projects. This policy environment is facilitating significant change, with an 1100% increase in the share of renewables in electricity generation from 2000 to 2022 (IEA, 2022), while renewable energy currently contributes nearly one-third (31%) of South Africa's electricity generation, predicted to rise to 57% by 2039 (Outlier, The, 2026).

There have also been a series of temporary tax incentives to support renewable energy investments, where Section 12J and Section 12BA of the Income tax Act provide venture capital and capital expenditure incentives for renewable energy businesses, respectively. Section 12J, which expired in 2021, targeted supporting high-growth sectors that could create jobs and drive economic development, with renewable energy a qualifying sector. Section 12BA (2023-2025) was solely designed to encourage the rapid deployment of renewable energy to address the electricity crisis. Although these incentives are aimed at small and medium sized businesses, individuals in the highest income groups could benefit from a 125% tax deduction of their investments in qualifying renewable energy assets (National Treasury of the Republic of South Africa, 2023).

In July 2022, an Energy Action Plan was announced by the president to improve the performance of existing power stations, to accelerate the procurement of power under the REIPPP, as well as to encourage municipalities and provincial governments to implement tax incentives and feed-in tariffs to support private investments. And in early 2023, tax incentives were introduced to boost solar installation by private households, allowing individuals to claim a rebate of 25% of the cost of new and unused solar PV panels, up to a maximum of R15,000 (~GBP650) per individual.

This dramatic and rapid policy shift towards state investment in private-sector-led decentralised renewable energy is significant given the previous post-apartheid emphasis on expanding the reticulated electricity grid to deliver universal access. This shift is partly driven by global sustainability goals, including pressure from foreign investors to decarbonise (e.g. JETP), but is also aimed at boosting economic growth and tackling domestic load shedding. While unsurprising that businesses and individuals with the financial means to reduce their reliance on Eskom's electricity grid have shifted towards renewable energy sources (primarily solar technology), uneven access to this transition, alongside the state's role in subsidising the wealthy's accumulation of climate privilege, is significant.

4.3. Private adoption of solar photovoltaics (PVs)

In the first quarter of 2023, South Africa imported approximately USD200 million in solar panels, and investments in the first half of 2023 surpassed the registered generation capacity for 2022 (Kuhudzai, 2023). This corresponds with a significant increase in newly registered solar PV installation in South Africa's two key urban provinces, Gauteng (Johannesburg) and the Western Cape (Cape Town), most notably in 2022 and 2023 (Fig. 1). Nonetheless, the National Energy Regulator of South Africa (NERSA) figures are a significant under-count as most small installations are not registered, partly because the registration requirements were relaxed in 2023 and the expectations on private household/individual installations remain unclear.

This significant surge in 2022-23 is arguably a dual result of the notable increase in loadshedding since 2022, prompting businesses to pursue alternative energy sources to sustain economic activity, and the government incentives introduced in early 2023 that made installing solar energy more economically attractive. Fewer newly registered

systems in 2024 likely results from the pause in loadshedding and the higher threshold for registering renewable energy projects.

While government renewable energy subsidies offer savings, the high up-front costs required to install solar PV remain well beyond the financial reach of most South Africans. In South Africa, residential solar installations range from about R50,000 (GBP2,170) for small grid-tied systems to R350,000 (GBP15,200) for large off-grid setups (Nedbank, 2024; REVOV, 2023).³ Fig. 2, from the GCRO Quality of Life Surveys, reveals that a higher proportion of South Africa's wealthier households are accessing alternative energy sources than poorer households. From 2020/21-2023/24, solar PV access in the highest income group doubled, with one-quarter of these households now having access. This accumulation of energy privilege is effectively state-subsidised, because the President's 2023 tax incentives for solar installation by private households benefits only households who can afford the up-front costs. Conversely, there are no active policies or state subsidies to support renewable energy for low-income households. Instead, the assumption is that low-income households remain dependent on an unreliable coal-dependent electricity grid with high tariffs and an under-utilised FBE subsidy (Lemanski et al., 2025).

This inequity is not just an unequal capacity to access reliable and affordable (in this case, solar) energy, or to benefit from government subsidies, it also reveals a fundamental inequity in how the perspectives and needs of diverse citizens are valued. It further highlights potential trade-offs between different forms of justice because a technology that promotes environmental sustainability simultaneously drives energy injustice. However, blame should not fall narrowly on technology, 'energy privileged' consumers, or state subsidies per se, but requires acknowledgement of the role of broader governance processes facilitating this trade-off. Geopolitically, South Africa's reliance on Western financial and diplomatic support pressures its government to prioritise carbon reduction (e.g. JETP) even at the expense of vulnerable communities. Arguably this is a form of global climate apartheid that has national, municipal and household-scale implications.

5. Justice trade-offs: sustainable energy impacts for basic service provision

Environmental agendas such as the Sustainable Development Goals (SDGs) and the national policies they stimulate, largely promote linear narratives that assume sustainability/climate strategies will bring universally just outcomes. This is exemplified by the language of "(for) all" in six of the twelve SDGs. However, as we discussed above, in practice justice is not homogenous and can bring conflict, where a policy or action that benefits one sector (e.g. environment, economy) or stakeholder (e.g. privileged, able-bodied) potentially brings negative outcomes (intended or otherwise) for other groups/sectors. We refer to these as justice trade-offs, and argue that it is important to recognise, and plan for, the likely negative externalities of climate action interventions. We explicitly use the neutral language of 'trade-offs' to avoid adopting a binary approach that pits sectors/stakeholders against one another - e.g. the able-bodied vs the car-dependent in active travel modal shifts - and instead recognises that climate action interventions necessarily result in both exploitation and justice.

This resonates with the difficult trade-offs intrinsic to South Africa's post-apartheid expansion in service provision. Extending infrastructure to poor and marginalised communities is essential for restorative and distributive justice, but costly and financially unsustainable without significant state support/cross-subsidisation, since the costs do not reflect revenue from these communities. The state however is working within a challenging macro-economic climate. The country faces a strained tax base, low economic growth, high unemployment and

³ This is well outside the reach of most households in Gauteng (>75%) who earn less than R12,800 (555GBP) per month (GCRO, 2024).

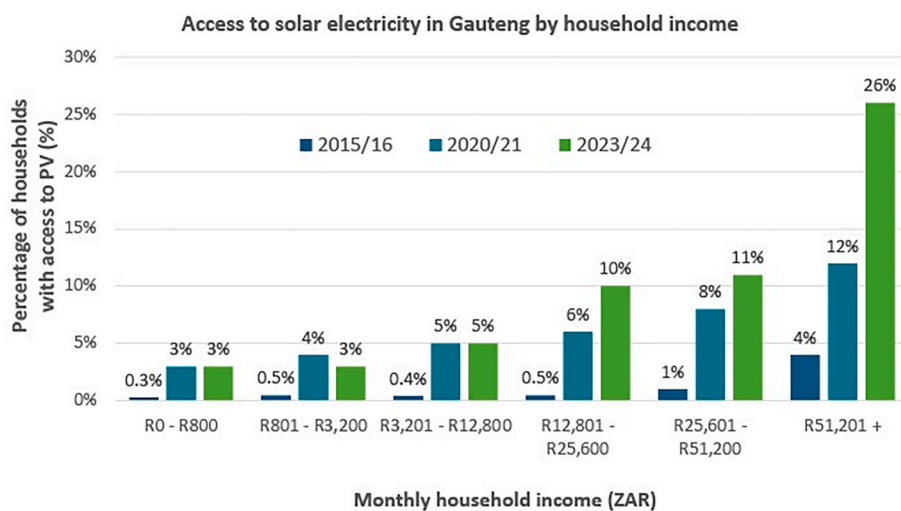


Fig. 2. Trends in solar electricity access among Gauteng households, by household income level (2015/16–2023/24). GBP1 = ZAR23,60. Data source: GCRO 2016, 2021, 2024.

expanding public sector mismanagement, all of which challenge the ability of both national and municipal government spheres to remedy historical inequities and deliver equitable, high-quality services. One consequence of this is reflected in another trade-off: the government delivering new infrastructure to expand service access for previously underserved communities, while neglecting the maintenance of existing systems. The increasing adoption of private solar PV installations in South Africa further highlights complex justice trade-offs. While there are obvious environmental benefits, the economic benefits are contested and disproportionately benefit privileged groups. Shifts towards renewable energy contribute to South Africa's declining carbon emissions, although progress is slow as the country remains heavily reliant on coal and will not meet its 2030 emissions goal (Republic of South Africa, 2023). Nonetheless, evidence that South Africa's private sector renewable industry is expanding has satisfied foreign investors and ensured continued economic support for South Africa's energy transition (United Kingdom Government, 2023). Economically, the energy crisis is crippling, with, for example, the City of Johannesburg estimating over R23 billion in lost revenue as a direct consequence (Vermeulen, 2023). While there is emerging evidence that shifting to renewable energy can boost South Africa's economic growth, e.g. allowing municipalities to purchase solar electricity at lower rates than Eskom, this requires significant state investment (Phiri & Sesoi, 2024). Despite claims that South Africa's Just Energy Transition will create 'green' jobs in the renewable energy sector (e.g. C40 Cities, 2022; FSD Africa, 2024), robust evidence is lacking that these jobs will offset mass unemployment from coal plant closures (Mohlakoana et al., 2024). This challenge is particularly acute given that these labour challenges largely impact under-privileged groups, while renewable energy installations enable privileged households and businesses to maintain high-consumption lifestyles.

There are also negative economic impacts for municipalities' revenue base. South Africa's FBE subsidy for indigent households is financed by cross-subsidising the electricity tariffs of high-demand consumers. Consequently, as high energy-users decrease grid reliance, municipalities' expected revenue streams are depleted. While this has not yet affected FBE subsidy provision per se, the City of Johannesburg confirmed that it has "crippled the municipality's capacity to extend and maintain infrastructure networks for those households and settlements that rely on heavily subsidised services" (Vermeulen, 2023). Furthermore, a significant proportion of consumers with solar PV use prepaid meters, which historically exempted them from fixed service and capacity charges. This combination of reduced electricity sales and prepaid

customer exemptions is described as the "worst-case scenario" for City Power (Vermeulen, 2023). To mitigate these losses, in July 2024, Johannesburg and Cape Town municipalities both restructured prepaid electricity tariffs, introducing service and capacity charges for customers with prepaid meters (Cape Town is targeting only high-value properties). Furthermore, Eskom justified its proposed 36.15% tariff increase for 2025 as a measure to offset revenue losses from private electricity generation, and although NERSA approved a lesser tariff increase (12.74% for direct Eskom customers and 11.32% for municipalities, effective July 1, 2025), a ZAR54 billion miscalculation by NERSA will result in further price increases in 2026–2028 (Ellis, 2025; Eskom, 2025; Mathetsa, 2024; NERSA, 2025). Despite measures to ensure that the poorest customers face the lowest absolute cost increases, in practice the proportional impact is most significant for low-income households, where paying for even modest amounts of electricity is already challenging (CoCT, 2025; Ellis, 2024; Yelland, 2024). Consequently, the poorest are effectively bearing the economic costs of tariff restructuring targeted at wealthier households and their energy choices, exacerbating existing inequalities.

The South African state has arguably prioritised financial investment in climate strategies by subsidising private renewable energy expansion in response to global sustainability commitments and international pressure. Although this has significantly ameliorated the electricity crisis, this approach has protected the interests of privileged groups at the expense of marginalised communities. While accumulation of benefits by the privileged is likely unintentional, it is hardly surprising given South Africa's reliance on expensive technology funded by private capital to lead a highly unequal country's sustainability transition. This echoes experiences in North America where subsidies for private homeowners to access solar PV have successfully reduced carbon emissions but are exclusionary and patently not 'for all' (Romero-Lankao et al., 2023). This also resonates with critical scholarship on climate urbanism, revealing how discourses and strategies badged as 'climate action' (in this case, reducing South Africa's coal-reliance and carbon emissions) perpetuate existing structures of cultural and economic privilege, with little consideration for the impacts on social justice (Long & Rice, 2020; Rice et al., 2023).

South Africa is increasingly promoting social justice within environmental sustainability agendas, demonstrated by the dominance of 'just transition' buzzwords in contemporary policy agendas, political commitments, and popular discourse (e.g. Just Energy Transition Investment Partnership, (United Kingdom Government, 2023). However, this Just Transition agenda overwhelmingly addresses livelihood

opportunities for communities affected by decommissioning coal-based energy plants, ensuring that the transition to renewable energy is ‘just’ for these communities. Much less attention is awarded to the justice implications of electricity distribution and the role of private households and businesses. Arguably this is partly because private solar PV investments make positive contributions towards reducing carbon emissions and loadshedding, alongside supporting job creation and economic growth, and partly because they are of direct benefit to South Africa's political and economic leaders. Consequently, the negative externalities of significant state investment in private renewable technology have been overlooked as an inconvenient necessity given the urgency of responding to the domestic electricity and global climate crises.

Earlier, we indicated South Africa's vulnerability to climate apartheid at a global scale due to its reliance on financial and diplomatic support for a carbon-focused just energy transition. While there is evidence that domestic solar PV investment constitutes climate apartheid, whether the label is beneficial at the household scale is less clear. Evidently, wealthy households are drawing from their historic (largely racial and economic) privilege to invest in new technologies that protect them from resource scarcity and climate change impacts, and the ways in which this widens disparities between the privileged and the precarious arguably produces climate apartheid outcomes. However, in exploring climate apartheid at this granular everyday scale, we argue it is important to consider the alleged perpetrators' (i.e. households with solar PV) motivations for adopting climate actions, and their perceptions of its impacts. As noted earlier, this matters because the opinions of the climate privileged are often overlooked and assumed to be self-centred; yet dismantling climate apartheid and developing equitable solutions undoubtedly requires their support.

6. Justice trade-offs: privileged stakeholders' perceptions of climate apartheid actions

Climate apartheid scholarship argues that individuals with the capacity to mitigate climate change occupy “a privileged position based upon education, income, and access to green infrastructure, amenities, and services” (Long & Rice, 2019, p. 1002). In South Africa, the legacies of apartheid ensure ongoing structural and spatial inequality, with significant divergence in lifestyles and opportunities between privileged and marginalised groups. Particularly in this context, where the lexicon of apartheid refers to a political system that intentionally and explicitly oppressed the majority for the benefit of the minority, there is an implicit assumption that this terminology involves attributing blame. This is unwittingly reinforced in climate apartheid scholarship by the heuristic binary of climate privileged/precarious (Rice et al., 2021) implying direct causality between the actions of the former on the latter. These factors reinforce perceptions that the climate privileged are at worst directly culpable for driving oppression and inequality, and at best naively adopt climate actions (e.g. investments, mitigation strategies) with limited concern for, or awareness of, their impacts on the climate precarious. To explore these views, and counter the lack of research on the rationales of climate privileged groups, we investigated why privileged residents in South Africa invest in renewable energy and their perceptions of the broader consequences of their actions. Capturing this perspective is important to ascertain to what extent the energy privileged explicitly support policies and practices that (intentionally or unintentionally) bolster climate apartheid. South Africa's political system of racial apartheid was enforced by a government, but it was endorsed by the majority of the racially privileged. Does this hold for climate apartheid? While recent climate apartheid scholarship has shifted away from acknowledging its origins (e.g. Heron, 2024; Long, 2024a, 2024b), we argue that because the framework relies on an Afrikaans term (rather than climate gentrification or injustice, for example) it is crucial to interrogate the extent to which climate apartheid parallels the apartheid political project, for cases both within and beyond South Africa.

Given South Africa's energy crisis, private household investments in renewable energy are unsurprisingly motivated by desires to maintain living standards. Johannesburg and Cape Town respondents want to cook, access the internet for work, watch television and use lights during loadshedding. As one interviewee noted, “*I guess selfishness kicks in. I needed to ... look after myself and my family, to make sure that we were in a situation where we are not inconvenienced by load shedding*” (Interview 1, April 13, 2023). However, our research also shows that motivations are not exclusively self-interested: most households with renewable energy consider that their private investment contributes to collective environmental justice. Specifically, 54% of the 150 survey respondents with solar PV indicated that a motivation for installing these systems was to access ‘clean or renewable energy’ (Fig. 3) and 97% believed their solar PV installation is beneficial for the environment (Fig. 4). An interview respondent explained, “*it feels important to have greener power, coal dependence is worrying when we have renewable energy options*” (Interview 12, April 20, 2023). While this quotation indicates a level of personal responsibility for reducing reliance on fossil fuels, very few survey respondents (10%) believed that households should be responsible for sustainable energy transitions (Fig. 5). Instead, most respondents (75%) stated that municipal government and Eskom should be primarily responsible for securing energy from independent power producers and addressing the electricity crisis (Fig. 5). This resonates with Anantharaman's (2024) findings from India, where she demonstrates how elite groups enact ‘performative environmentalism’, legitimising their ‘green’ lifestyle as evidence of their moral superiority within climate change debates even though their adoption of renewable technologies sustains wealth concentration and high consumption practices rather than driving structural change.

Anantharaman (2024) argues that this turns climate change politics into a moral rather than structural problem, whereby cultural elites weaponize their financial capacity to decarbonise (frequently via tokenistic measures) to dictate ecological debates in the city, while stigmatising those without such capacity as ecologically illegitimate and therefore excluding them from participating in environmental politics. While such extreme politics is not evident in South Africa, respondents overwhelmingly framed their climate actions as making a positive net contribution to society and the environment, with some climate privileged justifying their adoption of solar as a benevolent gesture that benefits the climate precarious:

Going off-grid is critical for the poor, because it means that those contributing to the tax base can continue to do so - as they keep their businesses going and earn a living - and that means government has tax [to] redistribute and support the poor. ... After all, it's about the economy - no economy, no tax and no government income. (Survey respondent RS_4192NGQ, 09/03/2023)

This quotation reveals the dominance of Eurocentric neoliberal approaches to economic development that prioritise infinite capitalist growth to protect vested interests, rather than challenging the structures that benefit the privileged. This resonates with critical climate justice scholarship highlighting how colonial legacies intersect with racial capitalism and neoliberalism to produce climate actions that ‘green-wash’ private wealth accumulation and entrench existing inequalities (Long & Rice, 2019; Rice et al., 2023). Indeed, the respondent legitimises their “everyday elite environmentalism” through paternalistic perceptions of benevolence that “emerge[s] from colonised mindsets and reinscribe[s] colonial relations” (Anantharaman, 2024:142). McClintock (2018) refers to this as “sustainability capital” in which sustainability has been commodified and co-opted to legitimise minor interventions (e.g. installing solar or EV charging systems) that fit the agenda of cultural elites without challenging structural causes or benefitting the precarious.

While most survey respondents focused on their personal household needs and costs in justifying solar PV installation, a handful of interviewees demonstrated awareness of the negative consequences on

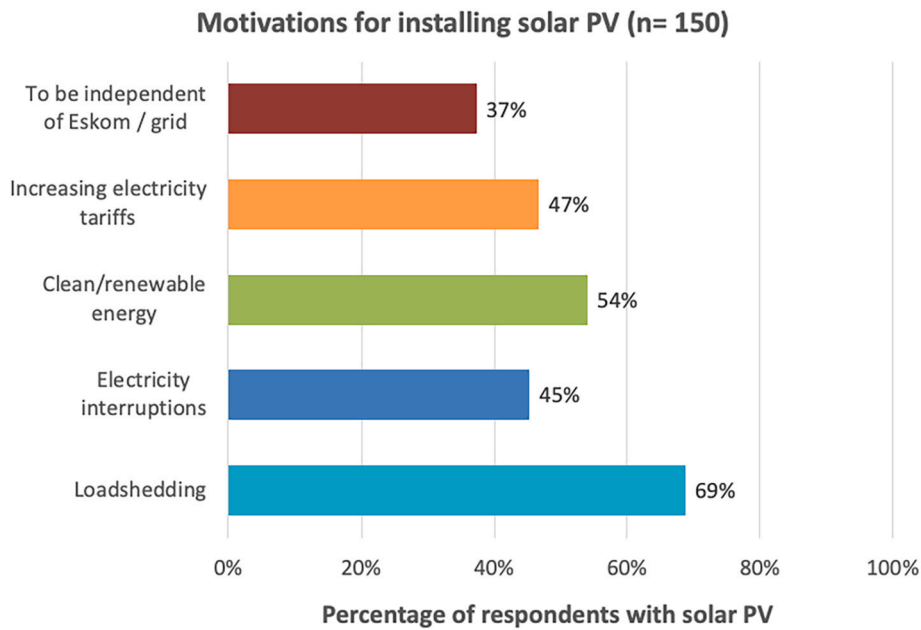


Fig. 3. Motivations for installing solar PV among survey respondents who had access to solar PV (n = 150). Data source: Off-grid Cities online survey, 2023.

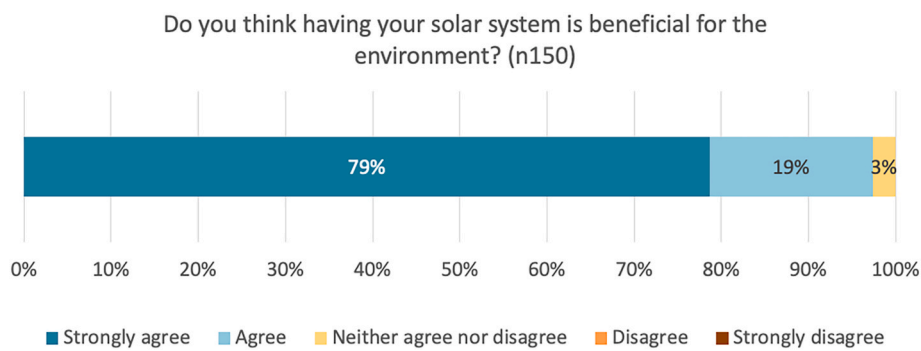


Fig. 4. Percentage of respondents with solar PV who agree or disagree that having their solar system is beneficial for the environment (n = 150). Data source: Off-grid Cities online survey, 2023.

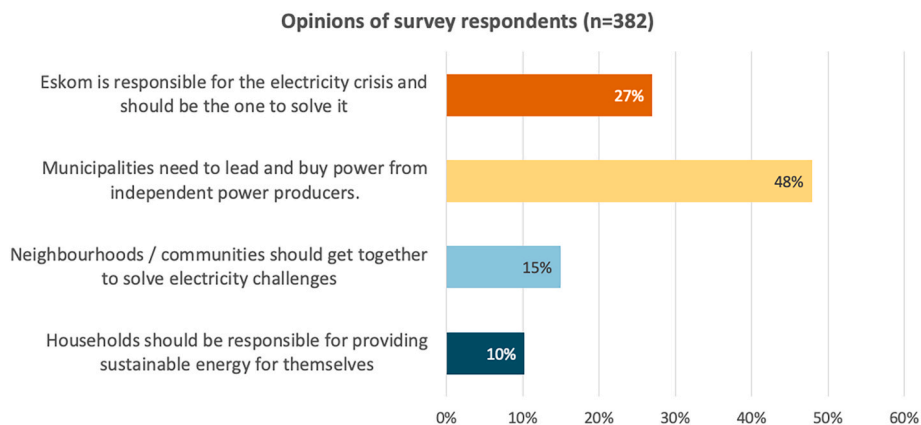


Fig. 5. The percentage of survey respondents who agree most strongly with the respective statements (n = 382). Data source: Off-grid Cities online survey, 2023.

poorer communities. These interviewees recognised that reduced consumption of municipal electricity by privileged households “decrease[s] the amount of income that the city has ... to cross subsidise” (Interview 1, April 13, 2023). However, most respondents still argued that the government is responsible for mitigating the unjust impacts of their actions.

A survey comment noted:

All three spheres of government [municipal, provincial, national] should be exploring ways in which to (1) make renewable energy the norm rather than the exception and then (2) how the low-income ... are not excluded

from reaping the benefits of renewables and bearing the brunt of the energy crisis (Survey respondent RS_8477NSR, 9 May 2023).

This view that the government is solely responsible for equitable service provision overlooks the complicity of privileged households in potentially benefiting from state subsidies and reducing state capacity whilst benefitting from historic colonial structures of racialised capital accumulation. In interviews, privileged households expressed frustration with their perception that their energy costs are high (installing solar and municipal tariffs for grid electricity) and would consequently be unwilling to provide (in their eyes, additional) financial support to subsidise equitable energy provision. An interviewee explained, “I don't think it's my responsibility to fund suburbs that don't have power. But I do think that I can use my spending power to do something that's responsible ... energy wise and also alleviates the grid which hopefully should offer more power to people that can't afford the choice to go off the grid.” (Interview 2, June 06, 2023) Arguably these views are entwined with widespread perspectives that the privileged are not directly responsible for the broader impacts of their actions. In South Africa, this is layered onto historic mistrust of the state and Eskom, both of which are perceived as corrupt. For example, while nearly half of survey respondents (47%) indicated a theoretical willingness to feed-in excess energy from their solar panels to the grid without financial compensation (Fig. 6), this is logistically impossible in a context where only 10% of respondents had registered solar panels with their municipality (Fig. 7). As one respondent explained, “many South Africans prefer to do things independently or under the radar, for fear of new taxes that penalise the ‘haves’” (Survey respondent RS_4881AJL, February 25, 2023).

In sum, our research demonstrates that while there is sensitivity by some privileged households to the impacts of their climate actions on state finances (rather than on sustaining a structurally unjust socio-economic system per se), most privileged stakeholders are primarily motivated by securing their own energy needs. As secondary motivations, households perceive that their adoption of renewable energy benefits South Africa's environment (by reducing reliance on fossil-fuels), energy availability (by reducing demand on an over-burdened energy utility) and the economy (by supporting the renewable energy sector and increasing energy availability). This provides an important insight into the rationale and motivations of the climate privileged. First, self-interest is at the core of rich environmentalism, and second, while the climate privileged legitimise their individual actions as essential to achieving collective environmental sustainability, they simultaneously reject recognition of, or responsibility for, any negative externalities

from their actions, perceiving these as a collective burden for the state. This is important because it demonstrates the pervasiveness of climate urbanism's temporal and scalar logic, justifying the urgency of interventions that ‘save’ the global environment from climate emergency (and protect the interests of the established) over challenging local forms of social injustice that affect the poor's everyday lives (Long & Rice, 2019; Rice et al., 2023).

The combination of privileged populations leveraging climate action to securitise their personal futures (financial, lifestyle), alongside these actions contributing (potentially unwittingly and indirectly) to a worsening of climate precarity and living standards for the poor (as outlined in section 5), arguably renders the adoption of private solar PV by wealthy households in South Africa a form of climate apartheid. In this case, climate apartheid differs from racial apartheid as there is less explicit support by the privileged for unequal treatment of different groups, however, in practice unequal social and economic outcomes transpire. While the lexicon of climate apartheid is largely avoided in South Africa's popular and political discourse, it is hardly surprising that the legacies of a political system that institutionalised racial capitalism facilitate a contemporary structure in which exclusionary actions are justified through environmental discourse (Rice et al., 2021, p. 625).

7. Conclusion

This paper offers a fresh contribution to emerging scholarship on climate apartheid by explicitly including household-scale climate privileged perspectives, alongside concentrating on a case study from South Africa, where the term originates, grounded in its historic political system, but is rarely used. By bringing South Africa into climate apartheid debates, this paper expands the scholarship in two ways. First, by adding an exemplary country case study and second by examining an under-researched scale. While climate apartheid functions at multiple scales, from the “public theatres” of global and national climate change governance to the “everyday and intimate registers” of granular household actions (Anantharaman, 2024, p. 139), scholarship largely addresses macro scales and structural drivers. In contrast, by focusing on household-scale climate actions and perceptions this paper illuminates the granular agency and impacts of climate apartheid, whilst also highlighting the limitations of binary conclusions at the granular scale.

The rapid increase in state-subsidised private renewable energy in South Africa is arguably an example of climate apartheid across multiple scales, but the helpfulness of the term varies according to scale. Global climate apartheid is evident given the South African state's dependency

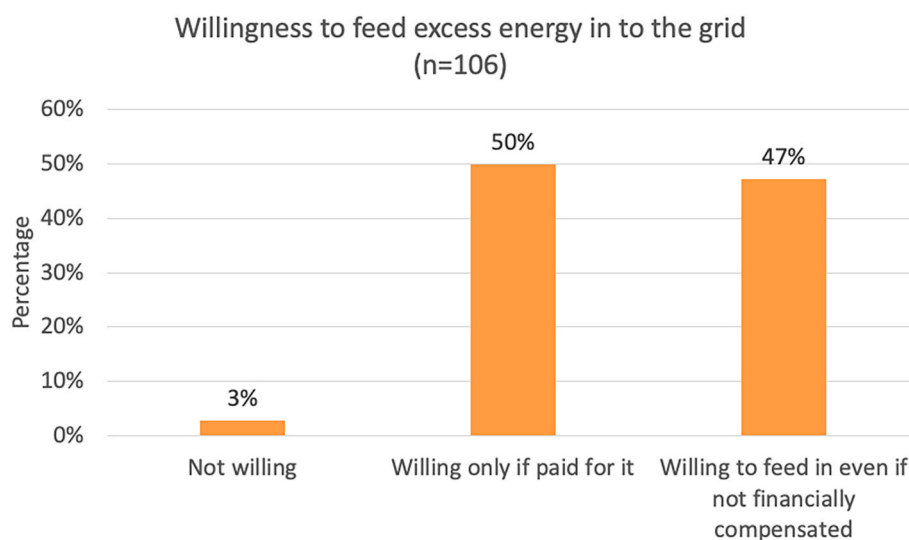


Fig. 6. The potential willingness of survey respondents with solar PV systems that generate more energy than they need to feed excess energy into the grid (n = 106). Data source: Off-grid Cities online survey, 2023.

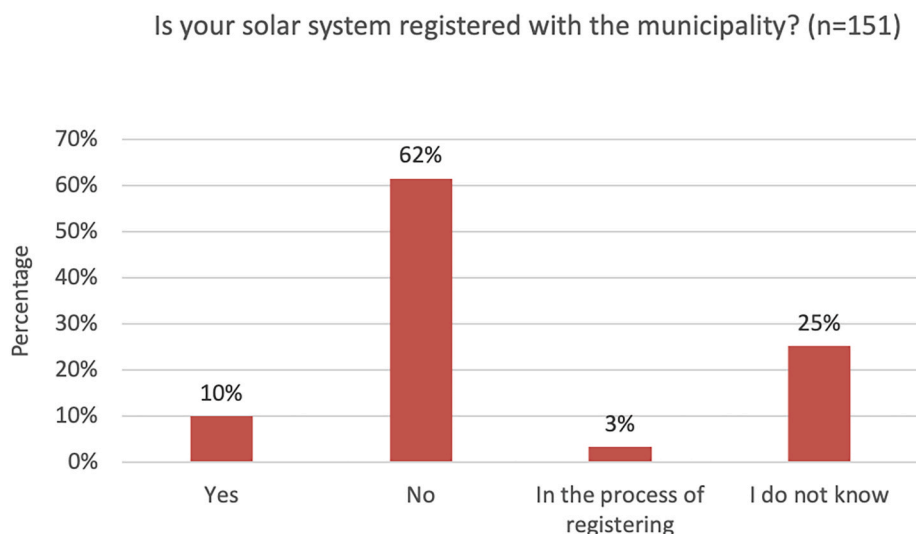


Fig. 7. Responses of survey respondents with solar PV regarding whether their solar system was registered with the municipality. Data source: Off-grid Cities online survey, 2023.

on international finance that demands replication of the global North emphasis on carbon emission reductions as the primary strategy to avert global climate catastrophe, with little concern for negative impacts on marginalised groups. However, significant state investment in private renewable technology has also facilitated granular (household) scale climate apartheid. Through ‘green’ private investments the wealthy have protected themselves from loadshedding and benefitted from tax incentives that are inaccessible to poorer households, a process which undermines state capacity to deliver affordable and reliable energy to the poor. The severity of this dynamic is potentially missed by the reluctance of South African discourse to use the term ‘climate apartheid’, due to disinclination to associate contemporary actions/individuals with the atrocities of the apartheid regime. While we argue that the term has validity in South Africa, and offers an important and powerful lens, we are reluctant to deploy climate apartheid discourse at the granular scale, proposing ‘justice trade-offs’ as a phrase that avoids attributing blame or assuming impacts are intentional. This is important because, at least at the granular scale, there is no binary balance sheet where actions by the climate privileged directly and intentionally impact the climate precarious. While acknowledging that climate apartheid scholarship is careful not to explicitly blame climate privileged groups for the unjust impacts of their actions, the language of apartheid (particularly in South Africa) risks vilifying those who have significant potential to contribute to equitable sustainable transitions. That is not to absolve privileged households from their responsibilities as beneficiaries of racist capitalist structures, but rather, to emphasise that other actors, such as the state (at all scales), arguably have greater capacity to mitigate these privileges and balance trade-offs. As [Anantharaman \(2024\)](#) explains, individual elite environmentalists cannot alone be blamed for the impacts of their actions, rather the structure of colonial capitalism requires dismantling to challenge the injustices of climate impacts. At the granular scale, this could involve state regulation to harness the actions of the privileged to benefit the precarious.

South Africa's shift to renewable energy thus contributes to climate apartheid in contested and complex ways, as it perpetuates rather than challenges existing inequalities. We have shown there are multiple intertwined injustices: first, low-income households cannot afford solar energy and are consequently disproportionately affected by loadshedding and rising electricity tariffs. Second, as high-energy consumers shift away from grid consumption this weakens the grid's capacity and reliability for those dependent on it. Third, the South African state is complicit in supporting these investments and subsidising the concentration of wealth and benefits among already privileged groups in ways

that deepen inequality and social injustice. However, because these are rooted in historical structures of colonial oppression and the West's economic dominance (alongside urgency to address a national energy crisis), this highlights South Africa's marginal position in global-scale climate apartheid.

CRediT authorship contribution statement

Charlotte Lemanski: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Christina Culwick Fatti:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Fiona Anciano:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

No competing interests to declare.

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Data availability

The data that has been used is confidential.

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