

Off-grid Cities: Elite infrastructure secession and social justice



Photograph by Graeme Gotz

City sector profile ***Electricity in the City of Johannesburg***

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This document has been prepared as part of the NRF-funded project entitled Off-Grid Cities: Elite Infrastructure Secession and Social Justice. The insights and data used in this City Sector Profile are drawn from desktop research and fieldwork conducted between 2021 and 2023. This document aims to provide a brief overview of electricity in the City of Johannesburg in relation to the investment of private households and businesses in alternative electricity sources.

Introduction

South Africa, one of the biggest economies in Africa, and arguably, the most developed in the SADC region in terms of GDP, relies predominantly on coal-fired electricity generation plants to power its economy.

Eskom, South Africa's main electricity provider, has been unable to keep up with the country's growing energy demands, which has resulted in unreliable and unstable electricity supply.

In 2008, Eskom started implementing loadshedding as a measure to limit the strain placed on the electricity grid due to the inability for electricity generation to meet demand (Amusa et al., 2009). Loadshedding peaked 2023, with 335 days of scheduled power cuts. These electricity interruptions have had huge implications for businesses,

economic growth, quality of life and redressing injustices and inequality.

In addition to South Africa's loadshedding crisis, climate change commitments – in part driven by international pressure - have prompted national plans to diversify the country's energy mix away from a reliance on coal to generate electricity.

South Africa is endowed with extensive coal deposits and has historically used these resources to drive its mining and industry-based economy, and its urban development. Given that Eskom's coal-fired power stations were historically able to produce some of the cheapest electricity in the world, coal has in the past been considered as a huge advantage for South Africa's development. However, there have been mounting concerns about its impacts on the environment and

contributions towards climate change.

Today, South Africa is regarded as one of the highest global emitters of CO₂ (Beidari, Lin and Lewis, 2017; Mapau and Phiri, 2018; Dhansay et al., 2022).

Because the country's emissions stem mainly from its over-reliance on coal as the primary energy generation feedstock, South Africa has reconciled itself to an urgent need for a just energy transition plan. It is widely recognised that this plan must balance economic growth, human and social development, energy security, and the realities of inequalities and social justice.

In recent years, South Africa has made efforts to respond to both its loadshedding crisis, and its environmental and climate change obligations to reduce carbon emissions, by looking to diversify its energy mix and transition to more sustainable and environmentally friendly energy systems. Relevant national policies include, but are not limited to, the Industrial Policy Action Plan, the National Climate Change Response Green Paper and the National Framework for Sustainable Development. In South Africa's evolving policy frameworks there has been a strong emphasis on the importance of ensuring that a decarbonisation process must be socially just.

In May 2022, the Presidential Climate Commission (PCC) unanimously adopted South Africa's Just Transition Framework

(JTF) following periods of research, consultations and engagements with various social partners and communities across the country. The JTF outlines the major steps in the country's climate response and in achieving a just transition, which ensures environmental sustainability through a shift to a low-emissions economy and energy systems that are inclusive, fair and just, while ensuring a healthy economy (PCC, 2022).

As a national energy crisis has continued, and an international climate crisis accelerates, the country faces numerous challenges, especially those related to meeting residents' service needs in the context of rapid population growth, urbanisation and household social mobility. Furthermore, maintaining the pace of economic growth in which industrial development remains an important sectoral component and ensuring environmental sustainability are important priorities (City of Johannesburg (CoJ), 2021). While the plans and commitments to decarbonise have been adopted at a national level, these have implications for provincial and local governments, especially the latter because municipalities have primary energy distribution responsibilities in South Africa's Constitutional framework.

Against this background, this Profile explores electricity and the City of Johannesburg's just transition plans in the energy sector.

A shifting electricity sector in Gauteng

Owing to its economic prowess and 'attractions', Gauteng has over the years seen an increase in population growth. With each passing census, the province is becoming more densely populated. Between 2011 and 2022 for instance, census data reveal that

there has been an estimated 18.7% increase in population density in Gauteng, i.e., from 675 to 831 people per km² (Götz et al., 2023). This growth in population density also suggests an increased demand for services including electricity for cooking, heating and lighting.

Census data reveals that in Gauteng, the number of households using electricity as the main source for lighting has increased from nearly 79% to 93% in 2022 (Götz et al., 2023).

Although access to electricity has increased, electricity insecurity has increased. Even before the 2022-2023 electricity crisis, Johannesburg residents experienced increasing interruptions. Between 2017/18 and 2020/21, the percentage of households who experienced electricity interruptions at least once a week increased from 4.8% to 22.4% (Mushongera et al., 2022). Frequent electricity interruptions have motivated households and businesses to invest in alternative electricity sources

Since 2011, there has been a steady increase nationally in households accessing alternative energy sources for heating, lighting, cooking and other uses, with access to solar increasing from 0.2% in 2011 to 1.1% in 2022 (Stats SA, 2023). This has been spurred by Eskom's inability to meet electricity demand (which has resulted in

successive periods of interrupted power and loadshedding) as well as dramatic electricity tariff increases.

Many Gauteng residents have invested in alternative electricity to cushion themselves from interrupted power cuts and increasing tariffs, with wealthy households proportionately more likely to invest in alternative and renewable solar energy compared to poor households (Culwick Fatti and Khanyile, 2023). While investments in alternative electricity sources (e.g. solar PV), can help to maintain service access for investors and reduce overall demand on the grid, they potentially undermine municipalities' ability to cross-subsidise electricity access for poor households, due to a loss of revenue from wealthy households and businesses. This has potentially significant implications for social justice, given the importance of energy security for low-income households as a means to reduce poverty, increase livelihood, and improve living standards (Department of Minerals and Energy, 1998)

Electricity generation, distribution, funding, and planning

Eskom is responsible for nearly 95% of electricity generation and 60% of distribution across the country (Baker and Phillips, 2019). Municipalities on the other hand are responsible for the distribution of the remaining 40%. The City of Johannesburg (CoJ) purchases electricity in bulk from Eskom at wholesale prices, and then distributes and resells it to the end user (consumers) at a profit. The revenue collected from electricity sales is used to fund service provision and maintain infrastructure. The principle of cross-subsidisation is used to ensure service provision for the poor. Revenue from high consumers is therefore critical for the city to

meet its constitutional requirement of providing basic services to poor households (Baker and Phillips, 2019). In 2013/14, nearly a third of total municipal income in South Africa was generated from electricity sales, thus demonstrating its importance in the fiscal stability of cities (Baker and Phillips, 2019). Thus, private investment in alternative electricity sources pose a significant threat to municipal revenue.

While City Power, a state owned power utility wholly owned by the CoJ gets the bulk (90%) of its electricity from Eskom, it also relies on another privately owned coal-fired power station (Kelvin Power Station) and

other Independent Power Producers (IPPs) (Vollgraff, 2022). In line with the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which seeks to increase electricity capacity through private sector investments in renewable sources like solar, hydro, wind, and biogas, the CoJ is exploring various options, including entering into long-term agreements with IPPs. Recently, the national

government gave permission to municipalities to generate their own electricity or buy from other sources including small scale embedded generation (SSEG) facilities.

Figure 1 provides a simplified diagram of the generation, distribution and consumption of electricity in the CoJ.

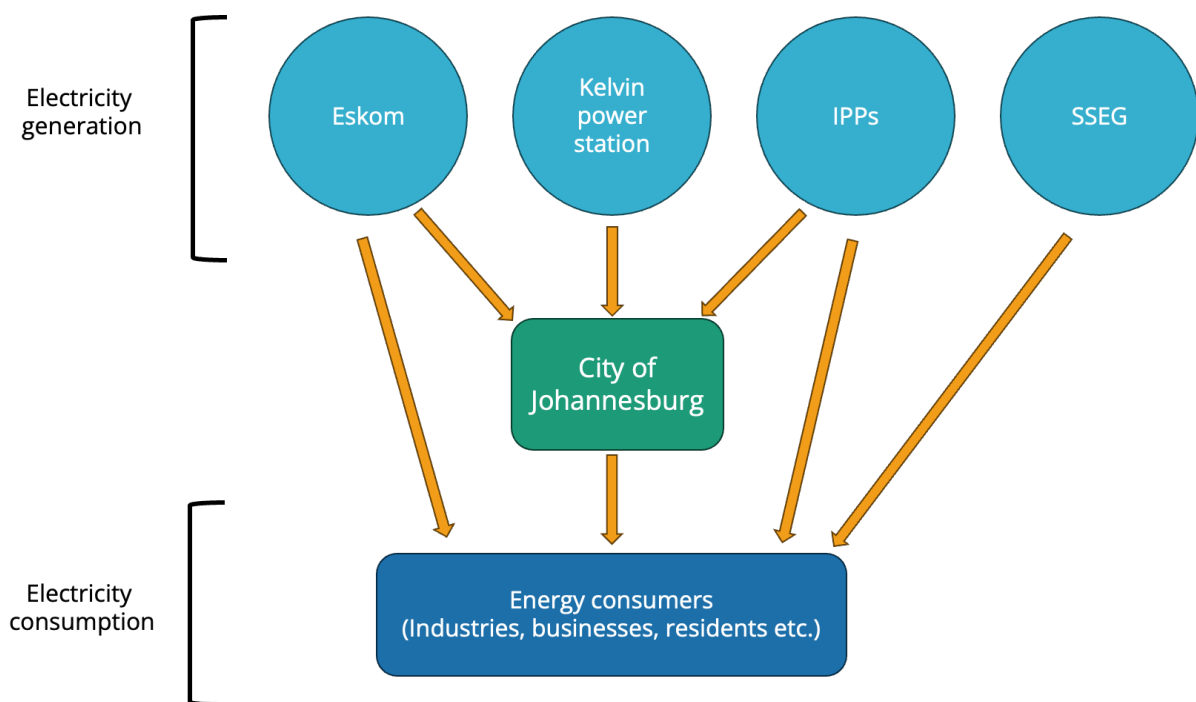


Figure 1: Simplified diagram of generation, distribution and consumption of electricity in Johannesburg.

Legislative frameworks relevant for Johannesburg

The CoJ derives its mandate to provide affordable electricity from the Constitution and other legislative instruments. Municipalities are mandated by the Constitution to deliver basic services. In this respect, municipalities are obliged to provide electricity services in an affordable and sustainable manner. The Municipal Systems Act (No. 32, 2000: 2) details “principles,

mechanisms and processes” for municipalities to “move progressively towards the social and economic upliftment of local communities and ensure universal access to essential services that are affordable to all”.

Under the Municipal Systems Act 32 of 2000, municipalities are required to adopt a five-

year Integrated Development Plan (IDP) that is renewed annually. The IDP is a key planning instrument for municipalities, and is born from various community needs, local sector plans, and national and provincial priorities. While IDPs focus is on municipalities, they are also heavily linked to national policies such as the Integrated Energy Plan whose key objectives are social and economic development, and environmental sustainability. It is the

City of Johannesburg's Just Transition Plans

In its long-term strategy, known as the 2040 Growth and Development Strategy (GDS), the CoJ has made provisions for a resilient, liveable, sustainable urban environment, compatible with a healthy natural environment and underpinned by infrastructure supportive of a low-carbon economy. This is supported by the City's Climate Action Plan, which aligns with the Paris Agreement to reduce carbon emissions and improve climate resilience while ensuring energy security. The Climate Action Plan commits to having 35% of the electricity consumed in the city come from clean energy sources¹ by 2030, with all residents having access to safe, affordable, net-zero emissions energy by 2050 (CoJ, 2021). The City's plan for alternative energy will reduce reliance on the national power utility by 15% and in the process also minimise scheduled loadshedding (CoJ, 2021).

As part of its efforts to address the energy crisis and contribute towards low-carbon emissions, the CoJ has plans to diversify

responsibility of municipalities to secure the necessary resources to meet these objectives. The Municipal Fiscal Powers and Functions Act (no 12, 2007) empowers municipalities to charge fees and tariffs for the provision of electricity. Additionally, the Municipal Finance Management Act (MFMA, No. 56 of 2003) prescribes the formation of public - private partnerships for the provision of electricity.

electricity sources by partnering with IPPs on an R26 billion electricity investment strategy. The investment strategy is designed to place City Power on an environmentally and financially sustainable footing (Creamer, 2022). In 2022, the CoJ issued a request for proposals for alternative energy sources, acknowledging the critical role that IPPs play in addressing the energy crisis. The partnerships with IPPs are regarded as an effective step towards scaling carbon reduction while meeting the growing energy demand. Other measures such as the various tax incentives can be seen as efforts to encourage citizens to invest in private solar PV systems. Individuals are able to claim a rebate from the South African Revenue Service to the value of 25% of the cost of new and unused solar photovoltaic (PV) panels, up to a maximum of R15 000 per individual. Apart from the IPPs, commercial banks, development financial institutions and other funding institutions are also eager to partner with the City in financing its energy plan (Joseph, 2023).

¹ The City's Climate Action Plan cites solar, gas and waste as alternative sources of clean energy.

Off-grid Cities: Elite infrastructure secession and social justice

The Off-grid Cities project, funded by the National Research Fund (NRF), has explored how private households and businesses in South Africa have invested in alternative electricity and water sources. The project has interrogated the imaginaries (motivations, justifications) and practices (financing, regulating, implementing) of elite infrastructure transitions in order to critically consider their outcomes for the current and future city in four dimensions: political, environmental, infrastructural, and financial. The research focused primarily on Cape Town and Johannesburg, and adopted an interdisciplinary approach including interviews, surveys, document analysis, geographical information systems (GIS) and visual methods. The core objective of the project is to explore how elite infrastructure transitions need to be integrated into debates on, and practices of, producing cities that are environmentally sustainable and socially just. The project builds on the social justice literature and introduces it into climate change scholarship in the global South, recognising that the actions of one social group affect resource allocation in highly unequal cities, and that the infrastructures of elites tend to be absent from urban climate thinking.

More information about the project can be found on the project website <https://offgridsa.wordpress.com/>

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References

- Baker, L. and Phillips, J. (2019) 'Tensions in the transition: The politics of electricity distribution in South Africa', *Environment and Planning C: Politics and Space*, 37(1), pp. 177–196. Available at: <https://doi.org/10.1177/2399654418778590>.
- Beidari, M., Lin, S. and Lewis, C. (2017) 'Decomposition Analysis of CO2 Emissions from Coal - Sourced Electricity Production in South Africa', *Aerosol and Air Quality Research*, 17(4), pp. 1043–1051. Available at: <https://doi.org/10.4209/AAQR.2016.11.0477>.
- City of Johannesburg (2021) City unveils new plans to wean itself from Eskom. Available at: https://www.joburg.org.za/media_/Newsroom/Pages/2021%20News%20Articles/October/City-unveils-new-plans-to-wean-itself-from-Eskom.aspx (Accessed 25 April 2023).
- Creamer, T. (2022) Joburg aims to partner with IPPs on R26bn electricity investment strategy. Available at: <https://www.engineeringnews.co.za/article/joburg-aims-to-partner-with-ipps-on-r26bn-electricity-investment-strategy-2022-05-23> (Accessed: 25 April 2023).
- Culwick Fatti, C. and Khanyile, S. (2023) 'Justice implications of household access to alternative water and electricity'. Gauteng City Region Observatory (GCRO). Available at: <https://www.gcro.ac.za/outputs/vignettes/detail/accessing-alternative-water-and-electricity-sources-and-justice/> (Accessed: 9 February 2024).
- Dhansay, T. et al. (2022) 'CO2 storage potential of basaltic rocks, Mpumalanga: Implications for the Just Transition', *South African Journal of Science*, 118(7/8).
- Available at: <https://doi.org/10.17159/sajs.2022/12396>.
- Joseph, S., L. (2023) Gauteng Government to partner with City Power to overcome energy crisis. Available at: https://www.joburg.org.za/media_/Newsroom/Pages/2023%20News%20Articles/February/Gauteng-Government-to-partner-with-City-Power-to-overcome-energy-crisis.aspx (Accessed: 25 April 2023).
- Otter, A. (2024) Loadshed: Loadshedding calendar. *The Outlier*. Available at: <https://loadshed.theoutlier.co.za/> (Accessed 2 July 2024).
- Mapau, B. and Phiri, A. (2018) 'Carbon Emissions and Economic Growth in South Africa: A Quantile Regression Analysis', *International Journal of Energy Economics and Policy*, 8(1), pp. 195–202.
- Mushongera, D., Nyuke, S. and Khanyile, S. (2022) 'Electricity interruptions in the GCR'. Gauteng City Region Observatory (GCRO). Available at: <https://www.gcro.ac.za/outputs/map-of-the-month/detail/electricity-interruptions/> (Accessed: 19 February 2024).
- Presidential Climate Commission (2022) 'A Framework for a Just Transition in South Africa'. Presidential Climate Commission.
- StatsSA (2023) 'Census 2022: Statistical Release'. Department of Statistics, South Africa.
- Stats SA (2023) 'Electricity generated and available for distribution'. Statistics South Africa. Available at: <https://www.statssa.gov.za/publications/P4141/P4141May2023.pdf> (Accessed: 13 February 2024).

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Vollgraff, R. (2022) 'Johannesburg Seeks Extension to Deal With Coal-Fired Power Plant', Bloomberg.com, 5 August. Available at: [https://www.bloomberg.com/news/articles/](https://www.bloomberg.com/news/articles/2022-08-05/johannesburg-seeks-extension-to-deal-with-coal-fired-power-plant)

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[2022-08-05/johannesburg-seeks-extension-to-deal-with-coal-fired-power-plant](https://www.bloomberg.com/news/articles/2022-08-05/johannesburg-seeks-extension-to-deal-with-coal-fired-power-plant)
(Accessed: 13 February 2024).