Case Study: Johannesburg’s Smart City Initiatives

Executive Summary

Johannesburg's smart city trajectory presents a complex portrait of ambitious technological modernization tempered by significant governance challenges, equity gaps, and surveillance concerns. With a planned $5.56 billion investment over ten years, the city demonstrates substantial financial commitment to digital transformation. However, the implementation reveals concerning patterns: extensive surveillance infrastructure expanding from 570 municipal cameras to a planned 100,000+ cameras despite officials admitting no evidence proves such systems reduce crime; high vendor lock-in risks with foreign technology providers, particularly Chinese firms Huawei and Hikvision; and a widening digital divide where only one in four high-income households access solar technologies while over 300 informal settlements lack basic grid connectivity.

The city has achieved notable operational successes, including 83 percent emergency response improvements and deployment of 100,000 smart meters. Yet these gains coexist with implementation failures: widespread smart meter tampering causing 60 percent revenue losses in some areas, environmental targets badly missed with only 9.21 percent waste diversion against a 70 percent goal, and governance instability exemplified by a CCTV by-law implemented then judicially overturned within six months. The ownership model combines public-private partnerships with unclear data governance, raising questions about whose interests these systems ultimately serve.

From an African Union policy perspective aligned with the AU Data Policy Framework and Digital Transformation Strategy principles of inclusion, equity, and data sovereignty, Johannesburg's approach reveals troubling misalignments. The emphasis on surveillance and control technologies over participatory development, the concentration of benefits among affluent populations, and weak accountability mechanisms contradict the AU's vision of people-centered digital transformation that empowers citizens and reduces inequalities. While innovation initiatives like the Smart City Challenge demonstrate promising community engagement with 749 applications, these participatory elements remain peripheral to core infrastructure decisions dominated by vendor-driven deployments and elite security concerns.

1. Ownership

Johannesburg's smart city ownership structure reflects a mixed public-private partnership model with significant foreign corporate involvement, raising fundamental questions about sovereignty and control over critical urban infrastructure. The City of Johannesburg maintains nominal public ownership through municipal departments like the Johannesburg Metropolitan Police Department and city-owned entities such as Metro Trading Company for broadband infrastructure. However, operational reality reveals extensive private sector control: VumaCam, a private company, operates 6,800 cameras with plans to expand to over 100,000, effectively privatizing surveillance infrastructure while the private network dwarfs the municipal system's 570 cameras.

Foreign technology providers dominate the ownership landscape through both hardware supply and system control. Huawei provides Video Management Systems, ANPR cameras, facial recognition capabilities, and 800G fiber backbone networks. IBM supplied Network Video Recorder infrastructure and predictive analytics through a 2011 partnership whose outcomes remain opaque. Hikvision supplies cameras, Genetec provides video management from Canada, and Geutebrück contributes ANPR systems from Germany. This constellation of foreign vendors creates dependencies that contradict AU Data Policy Framework principles of African data sovereignty and the Digital Transformation Strategy's emphasis on local ownership and control.

Data ownership represents perhaps the most critical governance gap. The Integrated Intelligence Operations Centre integrates municipal data on a single platform nominally controlled by the city, yet VumaCam owns data from its extensive private camera network, vendor access rights remain unclear, and the 2011 IBM partnership outcome is described by independent researchers as "shrouded in mystery" with R60 million loan litigation. The Protection of Personal Information Act provides a national framework, but leading regulators interpret surveillance as permissible if in the "legitimate interest" of observed persons—an interpretation enabling mass data collection with minimal safeguards. This ambiguity regarding who truly owns, controls, and benefits from urban data generated by residents fundamentally undermines the AU principle that "digital identity data belongs to and remains in the control of Africans."

The ownership structure exhibits high vendor lock-in risk, with proprietary systems from Huawei, IBM, and Microsoft creating technological dependencies difficult to reverse. City Power's smart meter infrastructure alone requires 33 integration interfaces connecting proprietary Hexing and iTron meters with Microsoft BizTalk and SAP systems. Such fragmentation and vendor dependence contradicts AU recommendations for open standards, interoperability, and technology transfer provisions that would enable African cities to self-manage their digital infrastructure. The absence of publicized technology transfer clauses or capacity building requirements in vendor contracts suggests these deployments prioritize vendor commercial interests over building local technical sovereignty.

2. Finance

Johannesburg's smart city financing demonstrates substantial public investment complemented by private sector participation, yet transparency concerns and unclear value realization raise questions about optimal resource allocation for equitable urban development. The municipality committed R100 billion (approximately $5.56 billion) over ten years announced in October 2023, alongside an R89.4 billion annual 2025/26 budget with R8.7 billion for capital projects. This scale of investment signals political prioritization of technological modernization as central to the city's development strategy. Additional support from the Development Bank of Southern Africa, World Bank, and Department of Cooperative Governance provides development finance backing across four South African metros including Johannesburg.

Private sector funding flows primarily through public-private partnerships and direct commercial deployments. Fidelity ADT installed 300,000 IoT alarm systems, VumaCam built 6,800 cameras planning expansion to 100,000+, and wealthy households invest privately in solar photovoltaic systems and connectivity. This mixed funding model estimated at 26-50 percent private share aligns with global smart city financing patterns but raises equity concerns when private investment

concentrates in affluent areas and security technologies rather than addressing basic service gaps affecting marginalized communities. The Chinese presence through Huawei's infrastructure provision represents significant though unquantified foreign financing, part of broader patterns where 22 African states contracted Huawei for surveillance technology.

Funding transparency reveals a troubling dichotomy: municipal budgets receive public disclosure while vendor contracts and partnership arrangements remain opaque. The SAIIA independent briefing documented that the IBM partnership outcome is "shrouded in mystery," VumaCam's CEO refused researcher interviews, and Huawei did not respond to information requests. This opacity contradicts AU Data Policy Framework principles requiring transparent, evidence-based, and participatory policy processes. Citizens cannot meaningfully assess whether R100 billion investment prioritizes their needs or vendor commercial interests when contract terms, performance metrics, and benefit distribution mechanisms remain undisclosed. The CCTV by-law controversy—where regulations were implemented, judicially challenged, and repealed within months—further demonstrates governance processes insufficiently transparent or consultative to withstand scrutiny.

Revenue generation models primarily depend on user fees through City Power's smart meter system and solar feed-in tariffs, with most surveillance and command center operations constituting government-subsidized public services without direct cost recovery. However, smart meter tampering by 700+ households in the Mayibuye area causing 60 percent revenue decline from R2 million to R800,000 monthly reveals fragility in anticipated revenue streams when systems fail to gain community acceptance or face resistance. This pattern suggests insufficient attention to social feasibility and community buy-in during technology deployment planning. The absence of documented cost savings or return on investment calculations for major systems like the IIOC command center operating 24/7 with 100 operators monitoring over 50 large screens makes it impossible to assess financial sustainability or value for money against alternative uses of scarce public resources.

3. Technology

Johannesburg's technology infrastructure reveals a fragmented ecosystem dominated by foreign vendors using predominantly proprietary systems, creating dependencies that undermine the city's capacity for technological self-determination. The primary vendors span global origins: Huawei and Hikvision from China provide surveillance infrastructure, IBM and Microsoft from the United States supply analytics and integration platforms, Genetec from Canada and Geutebrück from Germany contribute video management and ANPR systems. While this diversity might appear beneficial, the reality involves multiple incompatible proprietary systems requiring complex integration rather than interoperable open platforms that would enable local innovation and vendor independence.

Local and African technology participation exists but remains subordinate to foreign platforms. The Council for Scientific and Industrial Research developed the Cmore surveillance system piloted at the IIOC, VumaCam operates as a South African private company building camera networks, and Metro Trading Company manages municipal broadband as a city-owned entity. The Smart City Innovation Challenge received 749 applications developing local solutions like township recycling apps and low-cost lighting for informal settlements, demonstrating vibrant local innovation capacity. However, these initiatives operate at the periphery while core infrastructure decisions lock the city into foreign

vendor ecosystems. This pattern contradicts AU Digital Transformation Strategy goals to "support the creation and dissemination of digital public goods" and "promote indigenous cybersecurity solutions" that enhance digital sovereignty.

The absence of unified platform architecture represents a critical governance failure. Rather than an integrated smart city operating system, Johannesburg deploys multiple separate systems: Huawei Video Management, IBM Network Video Recorder, CSIR Cmore pilot, City Power Microsoft BizTalk/SAP integration with 33 interfaces for smart meters alone. Metro Trading Company envisions serving as a future interoperability hub, but current reality involves technological fragmentation requiring extensive middleware and custom integration increasing costs, complexity, and vendor dependencies. This architecture contradicts AU recommendations for "integrated national data systems" enabling efficient data flows while maintaining security and sovereignty.

The use of open standards versus proprietary technologies reflects mixed approaches disadvantaging the city's long-term flexibility and bargaining power. City Power's smart meters combine open technologies like SQL, Windows Server, and ASP.NET with proprietary SAP, Microsoft BizTalk, and Hexing/iTron meter firmware. The IIOC relies on proprietary Huawei Video Management Systems. No evidence indicates requirements for open APIs, data portability, or technology transfer clauses that would enable the city to switch vendors, develop local capabilities, or avoid lock-in. This approach contradicts AU Data Policy Framework guidance to "promote interoperability, data sharing and responsiveness to data demand through setting of open data standards" and "develop FRAND licensing obligations for platforms and cloud providers." When contracts span decades and technologies evolve rapidly, today's vendor dependencies become tomorrow's strategic vulnerabilities limiting the city's adaptive capacity and bargaining position.

4. Governance

Johannesburg's smart city governance reveals institutional frameworks weakened by fragmentation, insufficient transparency, and instability that undermine effective stewardship of digital transformation. The Smart City Office led by Monique Griffith coordinates initiatives through partnerships with Wits University and manages the Innovation Challenge, while the IIOC operates within the Johannesburg Metropolitan Police Department for surveillance functions. However, this structure lacks the integrated cross-sectoral coordination mechanisms recommended by AU frameworks. Different systems answer to different authorities—City Power manages smart meters, JMPD controls surveillance, MTC handles broadband—without evident unified governance ensuring coherence, accountability, or alignment with broader developmental objectives beyond technological deployment.

Policy and strategic frameworks exist on paper but reveal concerning gaps between aspiration and implementation. The city operates under a 20-Year Plan directive from October 2023, a 4IR Strategy emphasizing governance over technology, a Climate Action Plan prioritizing clean energy, and a 25-Year Transport Master Plan. South Africa's national Smart Cities Framework 2023 provides guidance. Yet the CCTV by-law debacle exemplifies governance dysfunction: regulations approved March 2025 requiring municipal approval for private cameras were judicially overturned September 2025 after the South African Property Owners Association legal challenge, then formally repealed. This six-month policy reversal signals governance processes insufficiently consultative, legally robust,

or politically sustainable to provide the stable regulatory environment essential for long-term investment and planning.

Data governance and privacy protection frameworks nominally exist through the Protection of Personal Information Act 2021 but demonstrate weak practical implementation. No comprehensive Johannesburg-specific data governance policy addresses smart city data flows. Leading POPIA regulator Collen Weapond's statement that surveillance is permissible if in the "legitimate interest" of observed persons provides broad interpretation enabling mass surveillance with minimal independent oversight. No privacy impact assessments were conducted before deploying extensive camera networks. No independent data protection authority oversees municipal data practices. This governance vacuum contradicts AU Data Policy Framework requirements for "independent, well-resourced and effective Data Protection Authorities" and "privacy impact assessments" ensuring rights-preserving technology deployment.

Multi-stakeholder participation reveals tension between bottom-up rhetoric and top-down practice. The Innovation Challenge engages residents, businesses, students, and city employees through workshops from Soweto to Sandton, generating 749 applications representing genuine participatory innovation. However, core infrastructure decisions bypassed meaningful consultation: the CCTV by-law was imposed without adequate public engagement leading to judicial rebuke. SAIIA researchers reported "some city departments accessible and transparent, others did not respond to numerous requests for interview." VumaCam's CEO refused engagement, Huawei did not respond to inquiries. This selective transparency contradicts AU principles requiring "inclusive, consultative and transparent processes" and "institutions responsible for overseeing the use of data accountable to those whose data is used." When vendors refuse accountability and major decisions avoid consultation, governance becomes technocratic imposition rather than democratic deliberation, undermining the social contract essential for legitimate digital transformation.

5. Surveillance

Johannesburg's surveillance infrastructure expansion represents the most concerning dimension of its smart city implementation, exemplifying technology-first deployment prioritizing control over evidence-based policymaking or rights protection. The city currently operates 7,370 cameras: 570 municipal IIOC cameras with 561 operational as of October 2025, plus VumaCam's 6,800 private cameras. VumaCam plans expansion to over 100,000 cameras across Johannesburg. This represents exponential growth from 16 cameras in 2003 to 216 by 2009, accelerating toward mass surveillance infrastructure that would place cameras throughout the urban landscape. The Integrated Intelligence Operations Centre operates 24/7 with 100 operators monitoring over 50 large screens, each displaying approximately 15 camera feeds, creating a panopticon-like command center embodying Foucauldian visions of constant observation.

Advanced surveillance technologies deployed or piloted include facial recognition at strategic locations for clear face capture, Automatic Number Plate Recognition from Geutebrück and Huawei, AI analytics for behavior detection, biometric verification for driver licensing, and plans to integrate drone surveillance from banks like Absa. The CSIR Cmore system integrates cameras, sensors, geospatial data, and weather information creating comprehensive monitoring capabilities. Official justifications emphasize public safety, crime prevention, traffic management, and emergency

response. More troublingly, the system is explicitly envisioned to "police undocumented persons" and "service delivery protests"—purposes that raise serious civil liberties concerns about surveillance serving social control rather than public safety.

The critical governance failure lies in the absence of evidence supporting surveillance effectiveness despite massive investment. JMPD spokespeople publicly claim crime has "dramatically declined" due to cameras. However, city officials admitted to SAIIA researchers that "no studies exist to show video surveillance was curbing crime." This contradiction reveals policy driven by assumption and vendor marketing rather than evidence-based assessment. Deploying 7,370 cameras with plans for 100,000+ without empirical validation represents profound misallocation of scarce resources that could address root causes of insecurity: inequality, unemployment, inadequate housing, insufficient lighting in informal settlements. This approach contradicts AU Continental AI Strategy principles requiring "evidence-based policy processes" and "assess the implications of AI on Africa's peace and security landscape."

Oversight mechanisms remain demonstrably weak, contradicting AU frameworks requiring robust accountability. No independent surveillance oversight body exists. Data retention policies are not publicly specified. Access rights for surveillance data span police, metro police, SAPS, and potentially multiple agencies, but formal policies and warrant requirements remain unclear. Privacy impact assessments were not conducted. SAIIA researchers warned that initiatives were "launched without full public transparency" and "mass surveillance threatens civil rights and liberties." The CCTV by-law attempt revealed governance instability when courts overturned regulations, yet this check came through reactive judicial review rather than proactive independent oversight. VumaCam's refusal to engage with researchers and the CSIR's declined discussion of Cmore demonstrate vendor and government entities operating without accountability to the public whose data they collect, contradicting AU principles that "institutions responsible for overseeing the use of data are accountable to those whose data is used."

6. Performance

Johannesburg's smart city performance reveals selective operational gains undermined by implementation failures, absent evaluation frameworks, and concerning gaps between official claims and independently documented realities. The AURA Automatic Dispatching System achieved impressive emergency response improvements, reducing times from up to 30 minutes to as little as 5 minutes—an 83 percent reduction. This integration linking verified alerts directly to JMPD and Emergency Medical Services fleets with radio contact demonstrates technology's potential for genuine public value when properly implemented. City Power commissioned over 100,000 smart meters in its first phase with 99 percent of prepaid meters successfully converted from KRN1 to KRN2 encryption standard, earning Microsoft recognition in 2015 global awards.

However, these successes coexist with significant failures revealing implementation challenges. Smart meter tampering affected 700+ households in the Mayibuye area alone, causing 60 percent revenue loss from R2 million to R800,000 monthly. This widespread resistance signals insufficient community consultation, affordability concerns, or rejection of technology perceived as punitive metering rather than empowering infrastructure. The pattern contradicts AU Digital Transformation Strategy principles that digital systems must be "inclusive and accessible to all" with "demand

creation programs for broadband and ICT adoption." When technology deployment provokes organized resistance causing massive revenue losses, the failure lies not in the technology but in governance processes that failed to secure social acceptance.

Environmental performance reveals alarming shortfalls against stated targets. The city diverts only 9.21 percent of waste from landfills with a Zero Waste Index of 0.34, far below the 2035 target of 70 percent waste diversion. The stationary sector generates over 50 percent of greenhouse gas emissions, air pollution exceeds WHO guidelines reducing life expectancy by 3.2 years, and only 9.21 percent waste management success despite IoT-enabled smart bins and garbage tracking systems suggests technology deployment without addressing systemic challenges in waste infrastructure, behavior change, or economic incentives for recycling. The planned 88MW waste-to-energy program and biogas projects remain in planning stages. This performance contradicts the city's Climate Action Plan priorities and demonstrates technology cannot substitute for comprehensive environmental strategy addressing consumption patterns, informal sector integration, and community participation in sustainability initiatives.

The absence of independent comprehensive evaluation represents a critical governance gap. While SAIIA Policy Briefing 231 and academic studies from Bandauko et al. and the University of Johannesburg provide external critical analysis, no municipal evaluation systematically assesses return on investment, cost savings, service improvements, or equity impacts across smart city systems. Cost savings remain undocumented despite claims. The city cannot demonstrate value for R100 billion planned investment when performance metrics, baseline comparisons, and impact assessments are absent. This contradicts AU recommendations for "robust monitoring and evaluation frameworks" with "specific indicators and benchmarks." Without systematic evaluation, the city cannot learn from failures like meter tampering or CCTV by-law reversal, cannot demonstrate accountability for public expenditure, and cannot make evidence-based decisions about scaling successful initiatives versus abandoning ineffective ones. The pattern suggests technology deployment prioritized over performance accountability and learning.

7. Social Benefit

Johannesburg's smart city social benefits present a deeply paradoxical picture: genuine innovations addressing community needs coexist with widening inequalities and technology deployment patterns that risk deepening existing social divides rather than bridging them. The Smart City Innovation Challenge demonstrates participatory potential, receiving 749 applications from residents, small businesses, students, and city employees through accessible platforms like Airtable. Workshops conducted across diverse communities from Soweto to Sandton generated grassroots solutions including township recycling applications and low-cost lighting designed for informal settlements. This represents meaningful bottom-up innovation engaging marginalized communities as active agents rather than passive recipients of top-down technological intervention, aligning with AU principles of "inclusivity and empowerment of all segments of society."

Solar microgrid pilots in five informal settlements—Amarasta, Shalazile, Vukani, View, and Vlakfontein—demonstrate technology's potential for addressing energy poverty through community co-design processes. These installations provide cleaner alternatives to paraffin and firewood, improving air quality and health outcomes while reducing emissions. Mobile licensing trucks visiting

Ivory Park, Orange Farm, and Cosmo City bring digital licensing services with biometric verification directly to underserved communities previously requiring expensive, time-consuming travel to centralized facilities. These targeted interventions recognize spatial inequalities and deploy technology to reduce rather than reproduce exclusion, exemplifying how smart city infrastructure can advance social justice when deliberately designed for equity.

However, these positive examples operate as peripheral initiatives while mainstream smart city deployment exacerbates inequality. Only one in four highest-income households access solar photovoltaic systems with feed-in tariff benefits, while over 300 informal settlements lack basic grid access, relying on dangerous illegal connections, expensive paraffin, or polluting firewood. Air pollution that reduces life expectancy by 3.2 years disproportionately affects poor communities. Wealthy areas receive private surveillance infrastructure through VumaCam's 6,800 cameras and Fidelity ADT's 300,000 IoT alarm systems, while informal settlements lack basic lighting that would genuinely improve safety. This pattern aligns with Bandauko et al.'s peer-reviewed warning that Johannesburg's smart city approach "risks deepening existing inequalities" through a 3RC framework analyzing how technological solutions serve elite interests while marginalizing vulnerable populations.

Digital literacy initiatives and inclusion programs remain insufficient to bridge capability gaps preventing equitable participation. While the Innovation Challenge engages residents, no comprehensive digital literacy strategy ensures marginalized communities can utilize smart city services. No evidence documents accessibility features for persons with disabilities. The assumption that smartphone-based services universally benefit citizens ignores digital divides in device ownership, data costs, and technological literacy. When smart meters require digital interfaces for monitoring and management, tampering by 700+ households suggests not criminal intent but potentially capability gaps and affordability crises. This contradicts AU Digital Transformation Strategy directives to "integrate digital skills and literacy into educational systems at all levels" ensuring "programs are inclusive and accessible to everyone, including vulnerable and rural communities." Without proactive inclusion measures, technology deployment that assumes universal capability inevitably reproduces and amplifies existing social inequalities.

8. Environmental Benefit

Johannesburg's environmental performance through smart city technologies reveals significant ambition tempered by concerning implementation gaps and missed targets that undermine climate action credibility. The city's Climate Action Plan addresses energy poverty across 300+ informal settlements, acknowledges air pollution exceeding WHO guidelines, and recognizes the stationary sector's responsibility for over 50 percent of greenhouse gas emissions. Solar microgrid pilots in five informal settlements demonstrate localized environmental benefits: replacing paraffin and firewood with clean electricity reduces household air pollution, improves respiratory health particularly for women and children who suffer disproportionate exposure, and eliminates carbon emissions from traditional fuel sources. These targeted interventions show technology can deliver environmental justice when designed to serve communities bearing greatest pollution burdens.

Smart grid infrastructure through City Power's 100,000+ deployed smart meters enables better monitoring, load management, and distributed generation integration including a feed-in tariff

program paying residential customers 85.50 cents per kWh for solar excess. This creates economic incentives for renewable generation while reducing grid pressure during peak demand. The planned Virtual Power Plant, network visibility technology, and battery storage integration could optimize renewable integration and demand response. Street-to-street smart lighting pilots leverage IoT to improve energy efficiency in municipal lighting. The Innovation Challenge produced low-cost smart lighting solutions specifically designed for informal settlements. Collectively, these interventions represent the building blocks for cleaner, more efficient, and resilient energy systems essential for climate mitigation and adaptation.

However, these positive developments are overshadowed by dramatic underperformance against stated environmental targets. The city diverts only 9.21 percent of waste from landfills with a Zero Waste Index of 0.34, catastrophically below the 2035 target of 70 percent waste diversion. This 760 percent gap between target and performance suggests fundamental disconnection between policy ambition and operational reality. Smart bins with sensors and GPS-tracked garbage trucks exist but clearly lack the systemic integration with separation-at-source programs, recycling infrastructure, informal waste picker support, and behavior change campaigns necessary for transformative improvement. The planned 88MW waste-to-energy program and biogas projects remain in planning rather than operation. Air pollution continues exceeding WHO guidelines, reducing life expectancy by 3.2 years, with no documented improvements despite monitoring systems.

The environmental technology deployment pattern reveals troubling prioritization: extensive investment in surveillance infrastructure for security while environmental monitoring remains unclear or underdeveloped. Air quality sensor network deployment, coverage, parameters measured, and data accessibility remain undocumented. Water quality monitoring system specifics are unknown despite water scarcity challenges. Climate and weather monitoring integration for flood warnings and climate adaptation planning lacks detail. This asymmetry—comprehensive surveillance capabilities versus opaque environmental monitoring—suggests security concerns dominate environmental priorities in smart city investment decisions, contradicting AU Digital Transformation Strategy principles that digital technologies should "address climate change" and support "environmental stewardship." Without robust environmental data infrastructure publicly accessible for research, policy development, and community monitoring, the city cannot demonstrate progress toward climate commitments or enable participatory environmental governance essential for just transitions.

9. Economic Benefit

Johannesburg's economic benefits from smart city initiatives demonstrate potential for innovation ecosystem development and job creation, yet quantified impacts remain largely aspirational with documented achievements concentrated in specific sectors rather than broad-based inclusive growth. Multiple innovation hubs have been established: the Tshimologong Precinct in Newtown-Braamfontein, Braamfontein-Auckland Park Corridor, Hillbrow Health Innovation District, and Makers Spaces in libraries supporting startups. These institutions provide physical infrastructure, mentorship networks, and access to capital for digital entrepreneurs, potentially catalyzing the technology sector development essential for African economic diversification beyond extractive industries and low-value services. The Smart City Innovation Challenge's 749 applications represent

significant entrepreneurial energy and local problem-solving capacity waiting for support and investment.

The most substantial economic commitment comes from Sun King's announcement of $1.3 billion investment by 2030 deploying 3.8 gigawatts of solar power across 50 million homes, creating 45,000 jobs and 1,200 retail stores across Africa with Johannesburg serving as a key hub. If realized, this represents transformative economic development in renewable energy manufacturing, installation, maintenance, financing, and distribution. Industrial corridor plans promise "thousands of jobs in logistics and smart manufacturing." Fidelity ADT's 300,000 IoT alarm system deployment demonstrates private security sector economic activity. City Power's smart meter program employed contractors and technicians for installation and maintenance. These initiatives show smart city infrastructure can drive employment and economic activity across skill levels from manufacturing to professional services.

However, documentation of actual job creation, business formation, investment attraction, and economic multiplier effects remains sparse, limiting assessment of return on massive public investment. No systematic employment impact study quantifies jobs created versus projections. No tracking documents new business registrations in innovation hubs. No measurement compares Johannesburg's technology sector growth against comparator cities. The Innovation Challenge's 749 applications represent potential rather than realized economic impact without data on how many received funding, launched businesses, created jobs, or generated revenue. Sun King's $1.3 billion and 45,000 jobs are continental commitments spanning multiple countries, not Johannesburg-specific outcomes. This evidence gap contradicts AU recommendations for "monitoring and evaluation frameworks" tracking economic development indicators.

Economic benefits distribution raises serious equity concerns when affluent communities and established businesses capture opportunities while marginalized populations face economic exclusion exacerbated by smart city deployment. Wealthy households invest in solar systems with feed-in tariff benefits, private security subscriptions, and high-speed connectivity, building resilience and capturing economic value. Informal settlements face smart meter costs without commensurate income increases, leading to tampering and disconnection rather than economic empowerment. Innovation hub geographic concentration in central Johannesburg rather than townships limits access for entrepreneurs lacking transport, capital, and networks to access these resources. The absence of explicit pro-poor economic inclusion strategies—such as preferential procurement from township enterprises, subsidized innovation hub access for disadvantaged entrepreneurs, or technology cooperatives in informal settlements—suggests economic benefits will follow existing patterns of racialized spatial inequality. This contradicts AU principles of "equitable sharing of benefits" and "reducing inequalities through redressing national and global inequalities" requiring deliberate redistribution mechanisms not evident in current implementation.

10. Systems

Johannesburg's systems integration reveals critical weaknesses: fragmented architectures, absent interoperability standards, and technology deployments operating as silos rather than a cohesive smart city ecosystem enabling efficient data flows and coordinated service delivery. The city lacks a unified smart city platform. Instead, multiple separate systems coexist: Huawei Video Management

Systems for surveillance, IBM Network Video Recorder infrastructure, CSIR Cmore pilot integration, City Power's Microsoft BizTalk/SAP environment with 33 integration interfaces for smart meters alone. Each system uses proprietary data formats, authentication mechanisms, and APIs requiring expensive custom integration rather than open standards enabling seamless interoperability. Metro Trading Company envisions serving as a future centralized data hub, but this remains conceptual rather than operational.

The Integrated Intelligence Operations Centre represents an attempt at systems integration for public safety, bringing together CCTV feeds, AURA emergency dispatch connecting alerts to JMPD and EMS fleets, traffic monitoring, and incident management. This integration demonstrates value: emergency response times improved 83 percent from 30 to 5 minutes through coordinated data flows enabling rapid mobilization. However, IIOC integration remains limited to security and emergency response rather than comprehensive smart city integration spanning utilities, transport, health, education, and environmental monitoring. The absence of integration between, for example, smart meter data, traffic patterns, air quality monitoring, waste collection routes, and emergency response demonstrates missed opportunities for holistic urban management where insights from one system optimize others.

The planned technology roadmap includes promising systems: a citizen resolution platform for collaborative communication and data collection (feasibility study stage), an AI hub as "centralized repository with AI technology for assisted decision-making" (feasibility stage), smart grid with Virtual Power Plant integration, 25-Year Transport Master Plan addressing modal integration, and the Innovation Challenge as a bottom-up innovation pipeline. However, these remain largely aspirational with unclear integration architecture, data governance frameworks, or interoperability standards ensuring coherent ecosystem development. The pattern suggests reactive technology adoption responding to vendor proposals rather than proactive systems architecture defining requirements, standards, and governance enabling coordinated development.

Most critically, the systems approach lacks the integrated data governance architecture recommended by AU frameworks for creating trusted, accessible, interoperable, and secure data ecosystems. No open data portal provides public access to city datasets despite global recognition that open data drives innovation, accountability, and participatory governance. No published APIs enable third-party developers to build applications on city data. No data categorization framework distinguishes personal, non-personal, and sensitive data with appropriate governance for each. No digital twin simulates urban dynamics for planning and decision-making. Basic GIS exists for land records and asset management but not advanced spatial data infrastructure integrated with IoT sensors and real-time feeds. This contradicts AU Data Policy Framework guidance to "establish or maintain independent, well-resourced and effective Data Protection Authorities," "promote data portability," "establish an integrated national data system," and "promote interoperability, data sharing, and responsiveness to data demand." Without foundational data governance and interoperability architecture, Johannesburg's smart city remains a collection of disconnected technology projects rather than an integrated intelligent urban system.

Conclusions

Johannesburg's smart city trajectory exemplifies broader tensions in African urban digital transformation: ambitious technological modernization confronting governance capacity constraints, vendor-driven deployment versus community-determined priorities, elite security concerns overshadowing grassroots development needs. The city demonstrates significant financial commitment through $5.56 billion planned investment and operational capacity through emergency response improvements and smart meter deployment. However, these capabilities serve a problematic vision prioritizing surveillance expansion (7,370 cameras toward 100,000+) despite admitting no evidence proves effectiveness, creating vendor dependencies through proprietary systems from Huawei, IBM, and Microsoft, and concentrating benefits among affluent populations while 300+ informal settlements lack basic electricity grid access.

From an African Union policy perspective, Johannesburg's approach contradicts core principles across multiple frameworks. The AU Data Policy Framework emphasizes African data sovereignty, yet foreign vendors control critical infrastructure with opaque contracts. The framework requires "independent, well-resourced and effective Data Protection Authorities," yet no independent oversight monitors extensive surveillance. It demands "integrated national data systems" with interoperability, yet Johannesburg deploys fragmented silos requiring 33 interfaces for smart meters alone. The AU Digital Transformation Strategy prioritizes inclusion and equity, yet only one in four high-income households access solar while 300+ settlements face energy poverty. It requires evidence-based policy, yet the city deploys mass surveillance admitting no studies prove crime reduction.

The Continental AI Strategy emphasizes ethical AI addressing bias and protecting rights, yet facial recognition targets "undocumented persons" and "service delivery protests" with weak accountability. The African Digital Compact champions digital rights, privacy, and human-centered development, yet POPIA interpretation enables mass surveillance as "legitimate interest" without privacy impact assessments. These disconnections suggest Johannesburg's trajectory follows global North smart city models emphasizing security, efficiency, and economic competitiveness rather than African frameworks prioritizing social justice, inclusion, and community empowerment. The city imports vendor-driven solutions without adapting to African values, needs, or rights frameworks.

Opportunities exist for course correction. The Smart City Innovation Challenge's 749 applications demonstrate vibrant community innovation. Solar microgrid pilots show participatory technology can address energy poverty. The judicial reversal of the CCTV by-law reveals civil society and courts can check executive overreach. These elements could build toward more democratic, equitable, and accountable smart city governance if elevated from peripheral initiatives to core principles guiding all deployments. This requires fundamental reorientation: from surveillance to service delivery, from vendor dependency to technological sovereignty through open standards and local capacity building, from elite benefits to universal access with deliberate pro-poor strategies, from opaque contracts to transparent governance with independent oversight and community participation.

Without such transformation, Johannesburg risks becoming an cautionary tale: billions invested in foreign technology creating surveillance infrastructure and vendor lock-in while failing to address fundamental urban challenges of inequality, environmental sustainability, and inclusive development. The city stands at a crossroads between continuing the current path toward technocratic control serving elite interests, or pivoting toward the AU's vision of digital transformation that is inclusive,

equitable, participatory, rights-respecting, and genuinely empowering for all Johannesburg residents particularly those historically marginalized by apartheid spatial planning and contemporary economic exclusion.

Methodology

This entire study was researched and written by Perplexity Max in Labs mode. Perplexity AI is an AI-powered answer engine that combines large language models with real-time internet search capabilities to provide sourced, synthesised responses to complex queries. Unlike traditional search engines that return lists of links, Perplexity interprets natural language questions, conducts comprehensive web searches across multiple authoritative sources, and generates concise summaries with inline citations linking to original sources. This transparency in sourcing enables rapid verification of information while maintaining research rigor. For this study, Perplexity was employed to systematically gather, synthesize, and cross-reference academic and official policy documents along with news from national and trade press sources, significantly accelerating the literature review process while ensuring comprehensive coverage of relevant sources.

Perplexity's strength lies in its research capacity, less so in high quality report writing. Because of difficulties retrieving source data from feeder documents the sources for the evidence in the country case studies are contained in a lengthy annex of research notes and references appended to each case study.

The full methodology, outlining the design of the project through incremental iterative interactions with Perplexity, can be found here.

Annex – Research notes and references

1. Ownership

Private CCTV Camera Network Partnership

Source: City of Johannesburg steps up safety drive with new technology, fire engines and crime busting
URL:
https://insidemetros.co.za/2025/10/29/city-of-johannesburg-steps-up-safety-drive-with-new-technology-fire-engines-and-crime-busting/
Date: October 28, 2025

Content:

- Through the IIOC, Johannesburg works with **VumaCam**, which provides an additional **6,800 private cameras** to enhance public safety coverage
- Partnership model between municipal and private sector surveillance systems

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Public-Private Surveillance Ecosystem

Source: The City Surveillance State: Inside Johannesburg's Safe City Initiative (SAIIA Policy Briefing 231)
URL: https://saiia.org.za/wp-content/uploads/2021/03/Policy-Briefing-231-kwet-FINAL.pdf
Date: March 2021

Content:

- **VumaCam** is building its own private network of CCTV networks, with the aim of blanketing all of Johannesburg with cameras and building new networks across the country
- Plans to extend its network to **over 100,000 cameras**
- The City is considering integrating CCTV streams from corporations (e.g., VumaCam) and other sources (e.g., the University of Johannesburg and the University of the Witwatersrand), as well as from drones (e.g., provided by banks such as Absa), into the IIOC
- Technology vendors include:
  - **Hikvision (China)** - basic "dumb" cameras
  - **Genetec (Canada)** and **Huawei (China)** - Video Management Systems
  - **Geutebrück (Germany)** and **Huawei** - Automatic Number Plate Recognition cameras
  - **Huawei** - facial recognition
  - **IBM (US)** - Network Video Recorder infrastructure for some cameras
  - **CSIR (South Africa)** - Cmore surveillance system (pilot)

IBM Partnership (2011)

Source: The City Surveillance State: Inside Johannesburg's Safe City Initiative (SAIIA Policy Briefing 231)
URL: https://saiia.org.za/wp-content/uploads/2021/03/Policy-Briefing-231-kwet-FINAL.pdf

Content:

- In 2011, the City of Johannesburg announced a partnership with **IBM** to conduct a "five-year public safety strategy in line with the city's 2040 vision of a smart city"
- IBM was to offer "integrated intelligence" for "crime prevention and investigation – including increased police presence and visibility, better coordination amongst agencies, and a data centre with predictive analytics", as well as "intelligence sharing"
- The partnership concluded with little publicity or transparency
- City was "facing litigation" over a **ZAR 60 million ($7.5 million) loan** provided by IBM in 2009

Metro Trading Company (MTC) Broadband Ownership

Source: IIOC provides for intelligent policing using CCTV cameras
URL:
https://www.joburg.org.za/media_/Pages/Media/Newsroom/IIOC-provides-for-intelligent-policing-using-CCTV-cameras.aspx
Date: August 22, 2025

Content:

- **Metro Trading Company (MTC)**, a city-owned entity charged with the deployment of broadband
- In future, the IIOC will serve as a modern data centre, allowing seamless interoperability, transmission, sharing and exchange of data packets between all city-owned entities

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2. Finance

Development Finance Institutions (DFI) Support

Source: Development Bank of Southern Africa (DBSA) 2022. Role of Development Finance Institutions in Smart Cities. Research Paper.

URL:
https://www.dbsa.org/sites/default/files/media/documents/2022-09/Role%20of%20Development%20Finance%20Institutions%20in%20Smart%20Cities.pdf

Content:

- Maps Development Bank of Southern Africa's (DBSA) support for smart city initiatives with World Bank, Department of Cooperative Governance and Traditional Affairs (CoGTA), and **four South African metropolitan cities: Johannesburg, Tshwane, Ekurhuleni, eThekwini**
- Examines how DFIs mobilize funds and foster innovation, drawing on PPP implementations in Singapore, South Korea, UK, Australia, and India
- Clarifies potential role for DBSA in South African smart city development
- Essential for understanding DFI financing role in African smart cities

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Public-Private Partnerships (PPPs) in South Africa

Source: Sanni, M., Hashim, N. 2023. The Role of Public-Private Partnerships in Smart City Development: A South African Perspective. Conference Paper.

URL: https://corp.at/archive/CORP2024/41.pdf

Content:

- Analyzes how PPPs mobilize funds and foster innovation in South African smart cities, drawing lessons from Singapore and South Korea
- Identifies key PPP aspects including:
  - Technology integration
  - Risk profiling
  - Resident engagement as essential for stakeholder involvement

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Continental Funding Context

Source: African Development Bank 2018. Developing Smart Cities in Africa. Conference Presentation.

URL: https://afdb-org.jp/wp-content/uploads/2018/08/JABF2014_Gateway-Innovations_Mr.-Owusu.pdf

Content:

- Documents need for **$93 billion (14% of GDP) annual infrastructure investment** over next decade
- Examines financing mechanisms and capacity building requirements for African smart cities

Source: Finance Smart City Africa 2025. Finance Smart City Africa: Funding & Investment.

URL: https://smartcitymall.africa/finance-smart-city-africa-funding-investment/

Content:

- Documents funding models including:
  - Public funding (government budgets, grants, development funds)
  - Private investment (equity, debt, impact investing)
  - PPPs
  - Municipal bonds and green bonds
  - Innovative mechanisms (land value capture, user fees, crowdfunding)
- Notes **$514 billion worth of new city and urban expansion projects underway across Africa**
- Identifies investment opportunities in smart infrastructure, urban tech solutions, sustainable real estate, FinTech, and impact investing

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R100 Billion Investment Plan (10-Year)

Source: Investing in building a Global Smart City – Johannesburg
URL:
https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/
Date: October 26, 2023

Content:

- The MMC of Finance, Councillor Dada Morero, gave directive for development of a **20-Year Plan** to develop Joburg to compare with Smart Cities in Asia
- The city needs an investment of **more than R100-billion over the next 10 years** on key strategic initiatives
- These initiatives aim to:
    - Rapidly eliminate infrastructure backlogs
    - Invest in a mix of energy solutions and guarantee energy security
    - Ensure digital connectivity
    - Retrofit buildings for energy, water-saving and efficiency
    - Build high-density new-age residential areas
    - Mobilise a range of funding options with DFIs and other funders as well as PPPs with the private sector
    - Build iconic infrastructure, structures and facilities that can put the city on the front page of global media

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2025/26 People's Budget

Source: Joburg invests billions in ageing infrastructure to drive service delivery
URL:
https://www.joburg.org.za/media_/Newsroom/Pages/2025-News-Articles/Joburg-invests-billions-in-ageing-infrastructure-to-drive-service-delivery.aspx
Date: November 7, 2025

Content:

- **Total allocation of R89.4 billion**
    - Operating revenue of **R84.8 billion**
    - Operating expenditure of **R80.7 billion**
    - Projected surplus of **R4.1 billion** (before taxation and capital grants)

- **Capital budget: R8.7 billion**
- **R26.2 billion investment projected over the medium term**

Key allocations include:

- Electricity: R31.7 billion
- Water and sanitation: R18.3 billion
- Roads and stormwater: R9.3 billion
- Waste management: R7.2 billion

IIOC Infrastructure Investment

Source: The City Surveillance State: Inside Johannesburg's Safe City Initiative (SAIIA Policy Briefing 231)
URL: https://saiia.org.za/wp-content/uploads/2021/03/Policy-Briefing-231-kwet-FINAL.pdf

Content:

- **Phase 1 (c. 2003):** 16 CCTV cameras installed by Business Against Crime (BAC)
- **Phase 2 (c. 2008):** 216-camera network at cost of **ZAR 51 million ($6.6 million)**
- **Phase 3 (2015):** Building the IIOC at cost of **ZAR 71 million ($5.8 million)**

Smart City Innovation Challenge Funding

Source: Joburg sparks the future with smart city innovation challenge
URL:
https://www.joburg.org.za/media_/Newsroom/Pages/2025-News-Articles/Joburg-sparks-the-future-with-smart-city-innovation-challenge.aspx
Date: August 27, 2025

Content:

- Since 2020, Smart City Innovation Challenge by Joburg's Smart City Office in collaboration with Wits University
- Most promising ideas receive not only recognition but also **essential funding, mentorship, and the invaluable opportunity to pilot their innovations** within real-life city settings
- By the close of submissions (December 20, 2024), **749 applications** were received from residents, entrepreneurs, and community organisations

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Gauteng Investment Conference Infrastructure Projects

Source: GAUTENG INVESTMENT BOOKLET 2025
URL: https://gic.ggda.co.za/wp-content/uploads/2025/04/Gauteng-Investment-Conference-Project-Book-Final.pdf
Date: 2025

Content:

- Over **R200 billion worth of infrastructure projects** coordinated across all spheres of government
- Projects include:
  - South Africa's first post-apartheid smart city with smart infrastructure, green energy, and innovation ecosystems
  - **City of Johannesburg Alternative Waste-to-Energy Programme:** generate up to **88MW of green energy** through landfill gas extraction and biodigester

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Fidelity ADT IoT Security Investment

Source: Sigfox South Africa to secure the country, together with Fidelity ADT and Amber IoT
URL: https://eitsmart.eitowers.it/en/case-history-en/sigfox-south-africa-security/
Date: December 8, 2024

Content:

- Fidelity ADT and Amber IoT installed **more than 300,000 anti-jamming IoT alarm systems** on the Sigfox protocol
- Pilot project in 2017 installing Sigfox-based communication system for IoT alarm systems in homes and businesses in **Johannesburg**
- Significant cost savings and increased operational efficiency

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Solar Microgrid Investments

Source: How Johannesburg Is Powering Informal Settlements With Solar
URL: https://www.youtube.com/watch?v=21Q0fSEKcWc
Date: November 21, 2025

Content:

- City is **piloting solar microgrids in five communities:** Amarasta, Shalazile, Vukani, View and Vlakfontein

- Each site offers valuable lessons in delivering reliable, affordable, clean energy to vulnerable households

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3. Technology

Technology Deployment in South African Smart Cities

Source: University of Johannesburg 2024. Emerging South African smart cities: Data security and privacy risks and challenges. South African Journal of Information Management, 26(1).

URL: https://sajim.co.za/index.php/sajim/article/view/1847

Content:

- Notes South African smart cities leverage:
  - **IoT (Internet of Things)**
  - **5G networks**
  - **Data analytics**
- Facing ongoing concerns about data security and privacy

Chinese Technology in South Africa

Source: Center for Strategic and International Studies 2024. China's Smart Cities in Africa: Should the United States Be Concerned? Analysis.

URL: https://www.csis.org/analysis/chinas-smart-cities-africa-should-united-states-be-concerned

Content:

- Examines nine African countries using Chinese smart city systems, including **South Africa** (along with Botswana, Côte d'Ivoire, Ghana, Kenya, Mauritius, Morocco, Uganda, and Zambia)
- Raises concerns about:
  - Surveillance enabling authoritarian regimes
  - Chinese espionage through data access
  - Specific case of CloudWalk Technology-Zimbabwe deal sending biometric data to China

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IIOC Surveillance Technology

Source: IIOC provides for intelligent policing using CCTV cameras
URL:
https://www.joburg.org.za/media_/Pages/Media/Newsroom/IIOC-provides-for-intelligent-policing-using-CCTV-cameras.aspx
Date: August 22, 2025

Content:

- **Integrated Intelligence Operations Centre (IIOC)** located within JMPD's Martindale headquarters
- Provides for **integration of all municipal data on a single platform**
- **570 CCTV cameras** now deployed across the city, **561 of which are fully operational** (as of October 2025)
- Partnership with **VumaCam** provides additional **6,800 private cameras**
- **New Automatic Dispatching System (AURA)** links verified alerts directly to JMPD and EMS fleets
- **Emergency response times** cut from up to 30 minutes to **as little as five minutes**

CCTV System Features:

- Camera network expanded from **216 in 2009 to 491** (as of the article date)
- Located strategically at crime hotspots including access routes into CBD, Vilakazi Street, Mayfair, Fordsburg, Joubert Park, Doornfontein, Auckland Park, Selby and busy intersections
- Each camera has a clear lens that can **zoom in accurately up to two kilometres**
- Time and date recorded, permitted as evidence in court
- **Control room functions 24 hours** with **100 operators**, 25 per shift, supplemented by seven metro police and SAPS officers
- More than **50 large screens** (one meter by half-a-meter in size) that monitor about 15 cameras each

Future Upgrades:

- Surveillance system will be upgraded to incorporate **facial recognition**
- Will be expanded to cover all regions of the City

Smart Meters Deployment - City Power

Source: City Power clamps down on smart meter tampering
URL:
https://joburg.org.za/media_/Documents/2024-Media-Statements/City-Power-cracks-down-on-mete

r-tampering.pdf
Date: March 28, 2024

Content:

- **Smart Meter Implementation Programme (SMIP)** by City Power
- Last year, City Power undertook the process of installing smart meters across all Service Delivery Centres (SDC), most notably in areas including **Alexandra, Mayibuye, Naturena** and others
- From November 2023, City Power began setting up infrastructure and installing smart meters
- **In first phase, over 100,000 meters were commissioned** and integrated into billing platforms, across LPU (Large power users) and normal end users (Single & Three Phase Meters)
- **33 unique integration interfaces** created
- Technologies used: **Microsoft BizTalk**, Microsoft SQL in private cloud deployment
- Includes **Meter Data Management Systems, Meter Data Collection Systems, SQL, Windows Server, SAP, BizTalk, ASP.NET, WCF, APN's, Oracle, Hexing Meters and iTron Meters**

Smart Meter Conversion (KRN1 to KRN2)

Source: Here's how to verify if your prepaid meter has been upgraded - Joburg City Power
URL:
https://iol.co.za/news/energy/2024-10-25-heres-how-to-verify-if-your-prepaid-meter-has-been-converted-city-power/
Date: October 24, 2024

Content:

- Deadline for **Token Identifier (TID) upgrade: November 24, 2024**
- City Power managed to convert **99% of all vending prepaid meters** across its Service Delivery Centres (SDCs) supply areas in Johannesburg
- Conversion from **KRN 1 to KRN 2** is crucial for moving from old conventional meters to smart or semi-smart meters
- KRN 2 meters come equipped with features that facilitate **better monitoring and management of electricity usage**
- If customer attempts to tamper with meter, **City Power will receive a signal** and immediate action will be taken

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IoT and Smart City Technologies

Source: IoT trends that are shaping a smarter, more connected future
URL: https://www.bcx.co.za/technology-insights/iot-trends-that-are-shaping-a-smarter-more-connected-future/
Date: April 22, 2025

Content:

- Smart city initiatives in **Johannesburg are leveraging AI and IoT** for:
  - **Smart waste management**
  - **Traffic optimisation**
  - **Street lighting systems** to improve urban living and sustainability
- **5G connectivity** in Johannesburg will enhance smart city developments by supporting real-time data from connected devices
- IoT improving **waste management, street lighting, and traffic flow**, creating more sustainable and efficient urban environment

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Solar Energy Technology

Source: A bright future for South Africa's solar power
URL: https://ratedpower.com/blog/South-Africa-solar-power/
Date: April 14, 2025

Content:

- **Joburg's City Power feed-in tariff program** allows homeowners and businesses with solar systems to sell excess electricity back to the grid
- Rates: **85.50 c/kWh for residential users and 70.85 c/kWh for businesses**
- Helps reduce monthly bills while encouraging more investments in solar energy

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Fiber and Broadband Connectivity

Source: The Impact of Fiber Optic Networks on Africa's Digital Landscape
URL: https://www.telecomreviewafrica.com/articles/features/11836-the-impact-of-fiber-optic-networks-on-africas-digital-landscape/
Date: May 5, 2025

Content:

- Cities like **Johannesburg** seeing increasing demand for high-speed connectivity from both residential and commercial users
- **Fiber-to-the-Home (FTTH) services** becoming more accessible
- Telecom operators like **Openserve and MTN** deploying last-mile fiber solutions
- **Seacom** strengthened its national high-capacity fiber network by rolling out new services along the N1 corridor, linking **Johannesburg, Bloemfontein, and Cape Town**

Broadband Infrastructure Expansion

Source: Connecting every corner of South Africa
URL: https://www.imd.org/ibyimd/featured-content/connecting-every-corner-of-south-africa/
Date: December 18, 2025

Content:

- **Broadband Infraco (BBI)** in collaboration with **Huawei** building intelligent all-optical backbone network
- Using **Huawei's next-generation Optical Cross-Connect (OXC) technology** to deliver **800G wavelengths** across network
- BBI completed construction of **100G/400G/800G backbone networks** across Gauteng and northern regions
- Plans to extend fiber connections from **Johannesburg to the Kopfontein border**
- BBI connected **over 13,000 public Wi-Fi hotspots** and more than **two million homes** in underserved and rural areas nationwide

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Biometric Verification for Licensing

Source: City of Johannesburg steps up safety drive with new technology
URL:
https://insidemetros.co.za/2025/10/29/city-of-johannesburg-steps-up-safety-drive-with-new-technology-fire-engines-and-crime-busting/
Date: October 28, 2025

Content:

- Rolled out **computerised learner's licence testing with biometric verification** to curb corruption
- Launched **digital licensing communication platform** to improve customer service

- **Mobile licensing trucks** visit communities including Ivory Park, Orange Farm, and Cosmo City

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4. Governance

Integrated Development Plans and Citizen Engagement

Source: South African Cities Network 2020. Smart Cities Paper Series: Smart Governance in South African Cities.

URL:
https://www.sacities.net/wp-content/uploads/2020/10/SmartCitiesPapersVolume1Final-Draft.pdf

Content:

- Comprehensive series on smart city initiatives in **Johannesburg and Cape Town** through lens of local government policy tools: Integrated Development Plans
- Documents **City of Johannesburg's use of smart governance tools to communicate with citizens and encourage public engagement**
- **Key Findings:**
    - Emphasizes importance of **bottom-up approach** and learning from civil society/NGO initiatives
    - **Warning:** Top-down approach carries risk of deepening inequality

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National Smart Cities Framework

Source: South African Department of Cooperative Governance 2023. A South African Smart Cities Framework.

URL:
https://www.cogta.gov.za/cgta_2016/wp-content/uploads/2023/01/Annexure-A-DCoGSmart-Cities-Framework.pdf

Content:

- Official national framework applicable to South African cities including Johannesburg
- Outlines framework for:
    - Data-driven decision-making
    - Automation through IoT and AI for water/electricity service delivery
    - Integration of digital technologies across South African cities

- Documents Cape Town named smartest city in Africa by Smart City Playbook 2016

Data Governance and Privacy Legislation

Source: Yusuf, B. 2024. Sustainable Data Governance Frameworks in Africa. Centre for International Governance Innovation Digital Policy Hub Paper.

URL: https://www.cigionline.org/static/documents/DPH-paper-Yusuf.pdf

Content:

- Critical analysis of data governance constraints African actors face, examining competing Chinese, American, and European models limiting African countries' ability to develop indigenous data governance frameworks
- Documents African states' strategies including data onshoring, legislation for local control over citizen data flows
- Examines **South Africa Protection of Personal Information Act 2021** (along with Senegal Law No. 2008-12, Kenya Data Protection Act 2019, Egypt Personal Data Protection Law 2020, and Nigeria Data Protection Act 2023)
- Essential for understanding data sovereignty challenges

Data Security Challenges

Source: University of Johannesburg 2024. Emerging South African smart cities: Data security and privacy risks and challenges. South African Journal of Information Management, 26(1).

URL: https://sajim.co.za/index.php/sajim/article/view/1847

Content:

- Identifies major risks and challenges in South African smart cities:
  - **Poor governance**
  - **Shortage of skills**
  - **Lack of awareness and training**
  - **Insufficient funding**
- Emphasizes importance of safeguarding individuals' data and privacy in smart city contexts, advocating proactive measures
- Notes South African smart cities leverage IoT, 5G networks, and data analytics while facing ongoing concerns about data security and privacy

Integrated Data Governance Framework

Source: T20 South Africa 2025. Towards an Integrated Data Governance Framework for Digital Public Infrastructure. Policy Brief.

URL:
https://t20southafrica.org/wp-content/uploads/2025/11/T20_TF2_SB3_PB7_IntegratedDataGovernance.pdf

Content:

- Policy brief examining data governance challenges in African smart cities and digital public infrastructure
- Proposes integrated frameworks balancing innovation with privacy protection

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Smart City Office and Community Innovation

Source: Joburg drives local innovation to tackle urban challenges
URL:
https://www.joburg.org.za/media_/Newsroom/Pages/2025-News-Articles/Joburg-drives-local-innovation-to-tackle-urban-challenges.aspx
Date: August 27, 2025

Content:

- **Smart City Office** led by **Monique Griffith, Head of Innovation Partnerships**
- **2024/2025 City of Johannesburg Smart City Community Innovation Challenge & Awards** initiative aims to empower:
  - Residents
  - Small businesses
  - Community groups to develop and implement solutions
- Focus on addressing urban challenges, enhancing public services, driving skills training and economic growth
- Submissions conducted electronically via **Airtable**
- Original deadline extended from November 29, 2024 to **December 20, 2024**
- **749 applications received** by close of submissions

Project Manager: Nelson Sekgota

Quote: "This isn't just a competition. It's a movement. It's about giving people the tools and the voice to shape their communities."

CCTV By-Law Controversy and Repeal

Source: New CCTV by-law from the City of Johannesburg
URL: https://www.cliffedekkerhofmeyr.com/news/publications/2025/Practice/Corporate-Commercial/corporate-and-commercial-alert-19-march-2025-New-CCTV-by-law-from-the-City-of-Johannesburg.html
Date: March 18, 2025

Content:

- Council for City of Johannesburg approved **Privately-Owned Closed-Circuit Television Surveillance Camera By-Law (CCTV Camera By-Law)**
- Aims to promote lawful and constitutional use of CCTV cameras in public areas through regulation and registration of privately-owned CCTV surveillance cameras
- Requirements included:
    - CCTV camera owners required to apply for approval from CoJ **before installation** where cameras are on public property or take video footage of public areas
    - Pre-evaluation application for installation
    - Prescribed fee for installation
    - Within two days of installation, completion certificate from registered engineer must be provided
    - Approval endures for **one year** after installation
    - Application for renewal must be brought **three months before expiry**
- **Prohibited:** Temporary CCTV cameras on CoJ land for more than 30 days
- **Prohibited:** Drone CCTV cameras over any private or public property
- Non-compliance may result in **fine and/or imprisonment of up to two years**

Source: Court overturns Johannesburg CCTV By-Law in favour of property owners
URL: https://www.youtube.com/watch?v=_urztteNw2Q
Date: September 12, 2025

Content:

- **South African Property Owners Association successfully overturned** the City of Johannesburg's controversial by-law
- Court awarded the association costs on a higher scale

Source: Lights, camera, repeal: Joburg ditches CCTV bylaw
URL:
https://www.outa.co.za/blog/newsroom-1/lights-camera-repeal-joburg-ditches-cctv-by-law-1443

Content:

- City of Joburg council **formally repeals the by-law** that extended the City's control over residents' private CCTV cameras

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Smart City Framework and Strategy

Source: Leveraging 4IR for Governance and Urban Development in Johannesburg
URL:
https://digitalmallblobstorage.blob.core.windows.net/wp-content/uploads/2025/02/Urban-governance-PB.pdf
Date: February 2025

Content:

- The CoJ has demonstrated foresight in embracing **4IR (Fourth Industrial Revolution)** through initiatives such as the **Smart City Strategy**
- Quote: "Technology alone will not drive progress – effective governance does. The success of 4IR in Johannesburg will depend on the city's ability to integrate digital innovation with sound governance"
- Must prioritise:
    - Leadership and administrative capacity-building
    - Strengthen institutional stability
    - Refine existing policies to maximize benefits of 4IR
- Moving forward, Johannesburg must adopt a governance framework that ensures:
    - Policy consistency
    - Embraces digital transformation
    - Fosters strategic public-private partnerships

Climate Action Plan

Source: Solar solution for the View Informal Settlement in Johannesburg - Benefits Assessment
URL: https://www.c40.org/wp-content/uploads/2025/06/20241007-Johannesburg-Energy_HVDB.pdf
Date: July 2024

Content:

- **Johannesburg's Climate Action Plan** prioritises affordable clean energy for its residents
- Aims to address energy poverty through renewable energy generation and storage solutions
- As of 2023-2024, total of **312 informal settlements** registered, representing **249,000 structures**
- The stationary sector (combination of coal-dependant grid and households using solid fuels) is responsible for **more than half of Johannesburg's greenhouse gas (GHG) emissions**

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5. Surveillance

Chinese Surveillance Technology Adoption in South Africa

Source: Atlantic Council 2025. What is driving the adoption of Chinese surveillance technology in Africa? Issue Brief.

URL:
https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/what-is-driving-the-adoption-of-chinese-surveillance-technology-in-africa/

Content:

- Critical demand-side analysis that shifts focus from Chinese motivations to African demand factors driving surveillance technology adoption
- Examines **Kenya, South Africa, and Uganda as primary case studies**
- Documents that approximately **22 African states have contracted with Huawei to adopt digital surveillance technology**
- **Key Arguments:**
  - African governments see surveillance systems as solutions to traditional challenges (crime, terrorism)
  - Benefit from China's "no strings attached" policy that doesn't condition assistance on human rights records
- Essential for understanding African agency and volition in surveillance adoption

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Geopolitical Dimensions

Source: Center for Strategic and International Studies 2024. China's Smart Cities in Africa: Should the United States Be Concerned? Analysis.

URL: https://www.csis.org/analysis/chinas-smart-cities-africa-should-united-states-be-concerned

Content:

- Examines nine African countries using Chinese smart city systems, including **South Africa**
- Raises concerns about:
  - Surveillance enabling authoritarian regimes
  - Chinese espionage through data access
  - CloudWalk Technology-Zimbabwe deal sending biometric data to China
- Essential for geopolitical dimensions of African smart cities

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IIOC Surveillance Capabilities (Detailed)

Source: The City Surveillance State: Inside Johannesburg's Safe City Initiative (SAIIA Policy Briefing 231)
URL: https://saiia.org.za/wp-content/uploads/2021/03/Policy-Briefing-231-kwet-FINAL.pdf
Date: March 2021

Content:

- The IIOC is outfitted with **512 cameras on several separate CCTV networks**
- Most CCTVs are "dumb" cameras that feed into the centre, where software adds basic video analytics
- **IIOC has facial recognition capabilities**, but feature is in pilot testing phase configured for strategic spots where cameras positioned to capture clear shot of face
- Handful of **Automatic Number Plate Recognition cameras** deployed by City
- Safe City project is forerunner of smart city in Johannesburg

Technologies:

- **Hikvision (China)** - basic "dumb" cameras
- **Genetec (Canada)** and **Huawei (China)** - Video Management Systems
- **Geutebrück (Germany)** and **Huawei** - Automatic Number Plate Recognition cameras
- **Huawei** - facial recognition (pilot phase)
- **IBM (US)** - Network Video Recorder infrastructure

CSIR Cmore System:

- IIOC piloting Council for Scientific and Industrial Research's (CSIR) **Cmore**, a "Jason Bourne" style system

- Can integrate various sources of surveillance data – from cameras and sensors to geospatial data and weather activity
- Acts as communications platform for Cmore users
- Cmore's current functionality at IIOC provides communications platform for police officers
- City considering whether to continue using this system or shop for commercial product

Planned Integration:

- City considering integrating CCTV streams from:
  - Corporations (e.g., **VumaCam**)
  - Universities (University of Johannesburg and University of the Witwatersrand)
  - Drones (provided by banks such as **Absa**)
- These streams could be viewed in real time and potentially stored by IIOC for evidence in criminal investigations

Future Vision:

- City officials said it envisioned:
  - Use of **facial recognition to police undocumented persons**
  - Use of **video analytics to police service delivery protests**
  - Use of **predictive analytics**
  - Convergence of safe city technology with smart city initiatives

Critical Note:

- City officials admitted **no studies to show video surveillance was curbing crime**
- "Opening a Pandora's box" - legal limits on camera use can be lifted in response to crisis or change in city government

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VumaCam Private Surveillance Network

Source: The City Surveillance State: Inside Johannesburg's Safe City Initiative (SAIIA Policy Briefing 231)
URL: https://saiia.org.za/wp-content/uploads/2021/03/Policy-Briefing-231-kwet-FINAL.pdf

Content:

- **VumaCam** presently building its own private network of CCTV networks
- Aim of **blanketing all of Johannesburg with cameras** and building new networks across country
- Plans to extend network to **over 100,000 cameras**

- CEO **Ricky Croock** refused to go on record about CCTV surveillance network

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Crime Reduction Claims

Source: IIOC provides for intelligent policing using CCTV cameras
URL: https://www.joburg.org.za/media_/Pages/Media/Newsroom/IIOC-provides-for-intelligent-policing-using-CCTV-cameras.aspx

Content:

- **Quote:** "Since the installation of the CCTV surveillance system, all crime in Johannesburg, from bag snatching, pickpocketing and cellphone theft, to smash-and-grab attacks, indecent assault, robbery and other serious crime has dramatically declined"
- About **52 arrests** since new reaction unit launched (as of article date)
- **JMPD spokesman Superintendent Wayne Minnaar:** "The CCTVs have helped reduce crime in the inner city tremendously. The reaction unit is much quicker. Over time, the public can expect to see less crime in the CBD"

Surveillance and Civil Liberties Concerns

Source: The City Surveillance State: Inside Johannesburg's Safe City Initiative (SAIIA Policy Briefing 231)
URL: https://saiia.org.za/wp-content/uploads/2021/03/Policy-Briefing-231-kwet-FINAL.pdf

Content:
Key Concerns Raised:

- "Mass surveillance threatens civil rights and liberties, and has no place in safe or smart city initiatives"
- These initiatives are being launched **without full public transparency**
- While technologies deployed in name of fighting crime, they **reinforce some of the very structural inequities** that underlie national crime problem
- Studies show that people tend to conform to status quo when they know they are being watched
- **Freedom of expression withers** under watchful eye of authorities
- Throughout history, surveillance has been marshalled against oppressed and marginalised communities

Privacy Law Issues:

- South African constitution guarantees right to privacy
- South Africa permits use of surveillance in public where there is "no reasonable expectation to privacy"
- **Protection of Personal Information Act (POPIA)** is being interpreted to allow mass CCTV surveillance in public spaces
- Leading POPIA regulator **Collen Weapond** said surveillance was permissible under POPIA if it was in "the legitimate interest" of those being observed

Transparency Issues:

- Some city departments accessible and transparent, others did not respond to numerous requests for interview
- Outcome of IBM smart city project "shrouded in mystery"
- Huawei did not respond to email inquiries
- CSIR refused to discuss Cmore surveillance system

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6. Performance

Smart Meter Tampering Issues

Source: City Power clamps down on smart meter tampering
URL: https://joburg.org.za/media_/Documents/2024-Media-Statements/City-Power-cracks-down-on-meter-tampering.pdf
Date: March 28, 2024

Content:

- In **Mayibuye** area: In first month after installation, utility collected **over R2 million in revenue**
- Following month that figure dropped to about **R800,000**
- Audit found **over 700 households** had tampered with meters
- **88 newly metered customers disconnected** on March 26, 2024
- Criminal complaints registered with South African Police Services (SAPS)
- Despite having spent millions maintaining and replacing infrastructure in area over years, **only one business was paying for electricity** in Mayibuye before smart meter installation

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IIOC Performance Metrics

Source: IIOC provides for intelligent policing using CCTV cameras
URL: https://www.joburg.org.za/media_/Pages/Media/Newsroom/IIOC-provides-for-intelligent-policing-using-CCTV-cameras.aspx

Content:

- **Emergency response times:** cut from up to **30 minutes to as little as five minutes** (with new AURA system)
- Camera network expanded from **216 in 2009 to 491** cameras (later expanded to 570 cameras with 561 operational)
- About **52 arrests** since new reaction unit launched

City Power Smart Meter Integration Success

Source: City Power Johannesburg IoT BizTalk - nVisionIT
URL: https://www.nvisionitgroup.com/city-power-johannesburg-iot-biztalk/

Content:

- In **first phase** of project, **over 100,000 meters commissioned** and integrated into billing platforms
- City Power's use of technology was recognised by **Microsoft in its 2015 annual global awards**
- **nVisionIT** named worldwide **Application Integration Partner of the Year** by Microsoft

Benefits Achieved:

- Reduce cost/time to gather and reconcile meter data from multiple collection systems
- Provide higher quality data from operating single enterprise-wide data repository
- Improve reliability, security and consistency of meter data for billing and analytics
- Enable utility to offer new dynamic pricing programs that encourage energy efficiency
- Allow utility to make use of load management functionality to reduce pressure on national grid

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7. Social Benefit

Critical Analysis of Inequality Risks

Source: Bandauko, E., Hack-Polay, D., Rahman, M. 2023. A critical analysis of smart cities as an urban development strategy in Africa. International Development Planning Review, 45(1), 69-86.

URL: https://www.tandfonline.com/doi/full/10.1080/13563475.2022.2137112

Content:

- This paper uses the **3RC framework** to critically analyze smart cities across five African cities: **Nairobi (Kenya), Johannesburg (South Africa), Lagos (Nigeria), Kigali (Rwanda), and Casablanca (Morocco)**
- **Key Findings:**
  - While smart city interventions have potential to transform African urban planning, management, and governance
  - They **risk deepening existing inequalities and amplifying spatial exclusion** through privatization and marketization of urban space if deployed ineffectively
  - Smart city adoption in Africa must be **rooted in contextual realities** and properly calibrated to create sustainable and inclusive urban spaces
- **Significance:** Foundational literature for understanding the contradictions between smart city rhetoric and actual implementation outcomes in African contexts

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Bottom-Up Approach for Social Inclusion

Source: South African Cities Network 2020. Smart Cities Paper Series: Smart Governance in South African Cities.

URL:
https://www.sacities.net/wp-content/uploads/2020/10/SmartCitiesPapersVolume1Final-Draft.pdf

Content:

- Documents City of Johannesburg's use of smart governance tools to communicate with citizens and encourage public engagement
- **Emphasizes importance of bottom-up approach** and learning from civil society/NGO initiatives
- **Warning:** Top-down approach carries risk of deepening inequality

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Community-Driven Innovation

Source: Joburg sparks the future with smart city innovation challenge
URL:
https://goldenmetro.co.za/newsroom/joburg-sparks-the-future-with-smart-city-innovation-challenge

/

Date: June 10, 2025

Content:

- Since 2020, **Smart City Innovation Challenge** empowers Johannesburg residents to become architects of their own urban future
- Invites residents, small business owners, students, and City employees to submit ideas addressing:
  - Traffic congestion
  - Waste management
  - Housing
  - Digital inclusion
- **Workshops and town hall meetings** conducted across City, from Soweto to Sandton
- Most promising ideas receive funding, mentorship, and opportunity to pilot innovations

Examples of Grassroots Innovations:

- **Township-based recycling application**
- **Low-cost smart lighting solution designed for informal settlements**

Quote from Nelson Sekgota (Project Manager): "This isn't just a competition. It's a movement. It's about giving people the tools and the voice to shape their communities."

Solar Energy Access for Informal Settlements

Source: How Johannesburg Is Powering Informal Settlements With Solar
URL: https://www.youtube.com/watch?v=21Q0fSEKcWc
Date: November 21, 2025

Content:

- Johannesburg faces dual challenge: **rapid urban growth and deep energy poverty** across more than **300 informal settlements**
- Many families live without formal electricity, relying on **paraffin, firewood and illegal connections**, often at great cost to health and safety
- City piloting **solar microgrids in five communities:** Amarasta, Shalazile, Vukani, View and Vlakfontein
- Each site offers lessons in delivering **reliable, affordable, clean energy** to vulnerable households

Benefits:

- Community co-design
- Improved safety
- Emergence of new businesses
- **Cleaner air**
- **Reduced emissions**
- **Household savings**
- More equitable future

Energy Poverty and Air Quality

Source: Solar solution for the View Informal Settlement in Johannesburg
URL: https://www.c40.org/wp-content/uploads/2025/06/20241007-Johannesburg-Energy_HVDB.pdf
Date: July 2024

Content:

- Most informal settlements **lack access to the grid**
- Households resort to **paraffin, wood, and coal** for cooking and heating
- Many resort to **illegal and unsafe electricity connections**
- **Air pollution** from solid fuels has been found to **lower life expectancy in Johannesburg by 3.2 years**
- Air pollution levels consistently **exceed WHO recommended guidelines**

Digital Divide and Connectivity

Source: JOZI digital connectivity project (mentioned in R100 billion plan)
URL:
https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:

- **JOZI digital connectivity:** An integrated approach to **bridging the Digital Divide** and ensuring Digital Connectivity and Access
- Part of feasibility studies currently in progress

Inequality and Access Concerns

Source: The impact of private solar adoption on social justice in South African cities
URL: https://www.jetknowledge.org/insights/unequal-energy-transitions-impact-of-private-solar-social-justice-south-african-cities/
Date: December 5, 2024

Content:

- In Gauteng, approximately **one in four households in the highest income category** has access to solar PV (2023/24)
- **Wealthier households more likely** than poorer households to have shifted to alternative electricity sources
- Gives wealthier households **greater energy security** and associated benefits such as **lower and more stable electricity costs**
- By investing in off-grid solar PV, **more affluent citizens able to protect themselves** from electricity interruptions

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8. Environmental Benefit

Solar Microgrid Environmental Impact

Source: How Johannesburg Is Powering Informal Settlements With Solar
URL: https://www.youtube.com/watch?v=21Q0fSEKcWc
Date: November 21, 2025

Content:

- Solar microgrids in five communities provide:
    - **Cleaner air** (replacing paraffin and firewood)
    - **Reduced emissions**
    - What a **just energy transition** can look like in the global South

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Waste-to-Energy Programme

Source: GAUTENG INVESTMENT BOOKLET 2025
URL:

https://gic.ggda.co.za/wp-content/uploads/2025/04/Gauteng-Investment-Conference-Project-Book-Final.pdf

Content:

- **City of Johannesburg Alternative Waste-to-Energy Programme**
- Will generate up to **88MW of green energy** through:
  - **Landfill gas extraction**
  - **Biodigester** technology

Climate Action and GHG Emissions

Source: Solar solution for the View Informal Settlement in Johannesburg
URL: https://www.c40.org/wp-content/uploads/2025/06/20241007-Johannesburg-Energy_HVDB.pdf

Content:

- Stationary sector (coal-dependant grid and households using solid fuels) responsible for **more than half of Johannesburg's greenhouse gas (GHG) emissions**
- Climate Action Plan prioritises **affordable clean energy**
- Aims to address energy poverty through **renewable energy generation and storage solutions**

Air Quality Improvement

Source: Solar solution for the View Informal Settlement
URL: https://www.c40.org/wp-content/uploads/2025/06/20241007-Johannesburg-Energy_HVDB.pdf

Content:

- Air pollution from solid fuels (paraffin, wood, coal) has been found to **lower life expectancy in Johannesburg by 3.2 years**
- Air pollution levels consistently **exceed WHO recommended guidelines**
- Solar microgrids replacing dirty fuels will improve air quality

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Waste Diversion Performance

Source: Assessing waste management performance in smart cities: Johannesburg case study
URL: https://www.frontiersin.org/journals/sustainable-cities/articles/10.3389/frsc.2025.1449868/full
Date: March 13, 2025

Content:

- Study investigates waste management performance in Johannesburg
- Focuses on **African Waste Reclaimers Organisation (ARO)** within smart city framework
- Approximately **9.21% of Johannesburg's total waste diverted from landfills**
- **'Zero Waste Index' of 0.34**, indicating **33.82% of resources are reclaimed**
- According to Department of Environmental Affairs (2018), estimated **90% of total waste in South Africa** finds way to landfills and illegal dumpsites, with only **10% undergoing recycling**
- **55 million tonnes of general waste** generated in South Africa, with only **11% diverted from landfills**
- **2020 National Waste Management Strategy** targets:
  - **40% waste diversion within 5 years**
  - **55% within 10 years**
  - Minimum **70% within 15 years** (by 2035)

Smart Waste Management Technologies

Source: Smart Cities and Garbage Truck Technology - Transtech
URL: https://transtech.co.za/smart-cities-and-garbage-truck-technology/
Date: January 1, 2025

Content:

- Cities like **Johannesburg and Cape Town** have experimented with:
  - **Smart bins** (sensors let workers know when they're full)
  - **Garbage compactor trucks** (can compress trash and make room for more waste, need fewer runs)
- South Africa generates **over 122 million tonnes of waste annually**, only **10% recycled**

Separation at Source and Recycling

Source: Investing in building a Global Smart City – Johannesburg
URL:
https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:

- Continue to drive **500,000 ton alternative-waste-treatment plant** with private sector
- Make full transition to **separation at source**
- Promote more **recycling** and implementing **bio-gas projects**
- Creating financial incentives and support packages for low-cost technology for **waste pickers**

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9. Economic Benefit

Innovation and Job Creation

Source: Joburg sparks the future with smart city innovation challenge
URL: https://www.joburg.org.za/media_/Newsroom/Pages/2025-News-Articles/Joburg-sparks-the-future-with-smart-city-innovation-challenge.aspx

Content:

- Smart City Community Innovation Challenge aims to:
  - Drive **skills training**
  - Drive **economic growth**
  - Empower residents, small businesses, and community groups
- From township-based recycling application to low-cost smart lighting solution for informal settlements
- These grassroots innovations actively transforming Johannesburg

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Economic Hub Positioning

Source: Joburg invests billions in ageing infrastructure
URL: https://www.joburg.org.za/media_/Newsroom/Pages/2025-News-Articles/Joburg-invests-billions-in-ageing-infrastructure-to-drive-service-delivery.aspx

Content:

- By prioritising infrastructure investment, City aims to **reaffirm its position as South Africa's economic hub** and **leading city on global stage**
- **Quote:** "We are investing in Johannesburg's future and building a city that works for all its residents"

Innovation Hubs and Economic Corridors

Source: Investing in building a Global Smart City – Johannesburg
URL: https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:
Innovation Hubs/Districts/Corridors can drive vision of making Joburg **Leading Innovation City of Africa** and **Urban Living Lab:**

- **Newtown-Braamfontein Link Innovation District:** anchored by Tshimologong Innovation Precinct (arts and culture, science and technology)
- **Braamfontein-Auckland Park Innovation Corridor:** linking Wits and University of Johannesburg
- **Hillbrow Health Innovation District**
- **Nasrec Sports Precinct:** to develop Sports and e-Gaming Theme Park
- **UJ Soweto-Orlando Tower/Ekhaya-Soweto Empowerment Zone Precinct**

Spatial Transformation Projects:

- **The South West Corridor (South West Rand):** Create economically self-sufficient corridor
- **The Booysens-Selby-City Deep-OR Tambo-IDZ Industrial Belt:** Could unleash **thousands of jobs in logistics and smart manufacturing**

Training and Entrepreneurship:

- Link all Innovation Hubs and Incubators in Gauteng City Region as part of innovation ecosystem
- More training through city's libraries and e-Learning Programme
- **Makers Spaces** at libraries and Rec Centres to become centres of new startups to encourage development of entrepreneurs

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Solar Energy Economic Benefits

Source: Johannesburg Concludes Year-Long Scaling Up Renewables in Africa (SURA) campaign
URL: https://www.globalcitizen.org/en/content/global-citizen-now-johannesburg/
Date: November 25, 2025

Content:

- **Sun King** announced $1.3 billion commitment by 2030 to deploy 3.8 GW of solar energy

- Goal: bring clean power to **50 million homes**, schools, health centers, and small businesses
- Bringing clean electricity to **200 million people**
- Creating **45,000 jobs**
- Opening **1,200 new stores across Africa**

ICT and Digital Economy

Source: Exploring Perspectives of the Information Technology Industry in a South African City
URL: https://www.mdpi.com/2071-1050/11/22/6520/pdf
Date: November 18, 2019

Content:

- Development of IT industry in Johannesburg will:
  - Enable enhancement in earning from IT industry
  - Strengthen housing and built-up infrastructure for IT industry
  - Enhance number of knowledge workers in city

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10. Systems

Smart Governance Systems

Source: South African Cities Network 2020. Smart Cities Paper Series: Smart Governance in South African Cities.

URL:
https://www.sacities.net/wp-content/uploads/2020/10/SmartCitiesPapersVolume1Final-Draft.pdf

Content:

- Documents **City of Johannesburg's use of smart governance tools** to:
  - Communicate with citizens
  - Encourage public engagement
- Implementation through Integrated Development Plans (IDPs)

Technology Infrastructure

Source: South African Department of Cooperative Governance 2023. A South African Smart Cities Framework.

URL: https://www.cogta.gov.za/cgta_2016/wp-content/uploads/2023/01/Annexure-A-DCoGSmart-Cities-Framework.pdf

Content:

- Framework includes automation through **IoT and AI** for:
  - Water service delivery
  - Electricity service delivery
- Integration of digital technologies across South African cities

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Data Analytics and Network Infrastructure

Source: University of Johannesburg 2024. Emerging South African smart cities: Data security and privacy risks and challenges. South African Journal of Information Management, 26(1).

URL: https://sajim.co.za/index.php/sajim/article/view/1847

Content:

- South African smart cities (including Johannesburg) leverage:
  - **IoT (Internet of Things)**
  - **5G networks**
  - **Data analytics**

Smart Lighting

Source: Investing in building a Global Smart City – Johannesburg
URL: https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:

- **Street-to-street and area-wide smart lighting**
- **Connecting informal settlements** with appropriate technologies
- Low-cost smart lighting solution designed for informal settlements (from Innovation Challenge)

Smart Waste Management Systems

Source: IoT trends that are shaping a smarter, more connected future
URL: https://www.bcx.co.za/technology-insights/iot-trends-that-are-shaping-a-smarter-more-connected-future/

Content:

- Smart city initiatives in Johannesburg leveraging AI and IoT for **smart waste management**
- **Smart bins** that signal when full
- **Garbage compactor trucks** for efficient collection

Source: Design of a Smart Waste Management System for the City of Johannesburg
URL: https://arxiv.org/abs/2303.14436
Date: 2023

Content:

- Paper designs **smart waste management system** for City of Johannesburg
- System for waste municipality workers

Traffic Management and Optimisation

Source: IoT trends that are shaping a smarter, more connected future
URL: https://www.bcx.co.za/technology-insights/iot-trends-that-are-shaping-a-smarter-more-connected-future/

Content:

- Smart city initiatives in Johannesburg leveraging AI and IoT for **traffic optimisation**
- IIOC monitors and analyses **traffic flow and congestion**

Energy Management - Smart Grid

Source: Investing in building a Global Smart City – Johannesburg
URL: https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:
Energy mix and just energy transition systems:

- Investing in **New Generation Renewable Energy Systems** including:
  - **Solar farms**
  - **Rooftop solar generation**
  - **Battery-storage facilities**
- **Smart grid**
- **VPP (Virtual Power Plant)**
- **Network visibility technology**
- **Smart metering**
- Energy-performance audits and energy-performance systems in major city buildings

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Smart Metering Infrastructure

Source: City Power Johannesburg IoT BizTalk - nVisionIT
URL: https://www.nvisionitgroup.com/city-power-johannesburg-iot-biztalk/

Content:
City Power's Smart Meter Implementation Programme (SMIP) includes:

- **Intelligent energy meters** in homes and businesses collect information on usage and send all data to central hub at City Power
- Requires major IT investments:
  - **Smart meters**
  - **Smart communicating modules**
  - **Advanced communications networks**
  - Technologies to secure data

End-to-end solution includes:

- Field Deployment Managers
- **Meter Data Management Systems**
- **Meter Data Collection Systems**
- SQL, Windows Server, SAP, **BizTalk**, ASP.NET, WCF, APN's, Oracle
- **Hexing Meters and iTron Meters**

Features:

- **Scalable, Open-Architecture** enterprise-wide data management solution
- **Secure, Centralized Data Environment**
- **Advanced Metering** with seamless integration
- Over **33 unique integration interfaces**
- Platform integration across various technology stacks (WS*, REST, flat file Processing to Queues)
- Process orchestration and Advanced reporting
- SQL Analysis Services, Reporting Services and Dashboard built in .Net MVC

Water Management

Source: Investing in building a Global Smart City – Johannesburg
URL:
https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:

- Investment in new bulk infrastructure
- **Alternative sources of water**
- **Water-saving**
- **Metering and monitoring**

Emergency Management and Response

Source: City of Johannesburg steps up safety drive with new technology
URL:
https://insidemetros.co.za/2025/10/29/city-of-johannesburg-steps-up-safety-drive-with-new-technology-fire-engines-and-crime-busting/

Content:

- **New Automatic Dispatching System (AURA)** links verified alerts directly to **JMPD and EMS fleets**
- **Emergency response times** cut from up to **30 minutes to as little as five minutes**
- Direct radio contact with officers on patrol for swift response

Digital Licensing and Citizen Services

Source: City of Johannesburg steps up safety drive with new technology
URL:
https://insidemetros.co.za/2025/10/29/city-of-johannesburg-steps-up-safety-drive-with-new-technology-fire-engines-and-crime-busting/

Content:

- **Computerised learner's licence testing with biometric verification** to curb corruption
- **Digital licensing communication platform** to improve customer service
- **Mobile licensing trucks** visit various communities (Ivory Park, Orange Farm, Cosmo City)

Citizen Engagement Platform

Source: Investing in building a Global Smart City – Johannesburg
URL:
https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:

- **Citizen resolution platform:** An online communication and platform to collaborate with citizens and increase data collection
- Part of feasibility studies currently in progress

AI Hub

Source: Investing in building a Global Smart City – Johannesburg
URL:
https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:

- **AI hub:** A centralised repository with **AI technology as the heartbeat for assisted decision-making**
- Part of feasibility studies currently in progress

Transport Systems

Source: Investing in building a Global Smart City – Johannesburg
URL:
https://bluechipdigital.co.za/southern-africa-investment-news/economy-insights/investing-in-building-a-global-smart-city-johannesburg/

Content:

- Developing **25-Year Transport Master Plan** to address:
    - Spatial integration
    - Transportation systems and modal integration
    - Safe, affordable and efficient movement
- Through rail, buses, mini-bus taxis, air travel and non-motorised transport
- Design, fund and implement **public mass-transport system through a PPP**
- Either as extension or complementary to **Gautrain and Bus Rapid Transport**