WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Bridging Systemic Gaps in Waste-to-Energy Infrastructure: A Comparative Study of PPP Structuring, Sustainability Metrics, and Participatory Governance in Sub-Saharan Africa and the EU

Sheperd Sikhosana

Higherway Institute of Learning (Pty) Ltd

ABSTRACT

In light of increasing urbanisation and the dual challenges of waste accumulation and energy insecurity, Waste-to-Energy (WtE) infrastructure presents a promising intersection of environmental stewardship and electricity generation. The effective deployment of WtE technologies in developing regions, particularly Sub-Saharan Africa, remains hampered by fragmented governance, limited financing, and insufficient public engagement. Public–Private Partnerships (PPPs) offer a strategic funding model, yet their efficacy is unevenly realised across geographies. This study adopts a Systematic Literature Review (SLR) methodology within an interpretivist research paradigm, employing a qualitative research approach to analyse 58 peer-reviewed articles, government reports, and institutional case studies published between 2010 and 2025. Data were analysed thematically using NVivo software. The findings reveal that successful WtE PPPs in the UK, Germany, the USA, and Canada are underpinned by robust regulatory frameworks, sustainability metrics, and participatory mechanisms. In contrast, WtE initiatives in Sub-Saharan Africa, including South Africa and Zimbabwe, are undermined by weak policy coherence, poor stakeholder coordination, and limited institutional capacity. The paper concludes that bridging these systemic gaps requires integrative governance, contextualised sustainability assessment, and inclusive stakeholder engagement.

Key Words: Public Private Partnerships, West-to-Energy, Sub-Saharan Africa, Legislative Framework

Introduction and Background

The global waste crisis and the growing demand for electricity have converged into a critical imperative for sustainable energy transitions. Waste-to-Energy technologies harness municipal solid waste and other biodegradable materials to generate electricity, thereby addressing two pressing urban issues simultaneously: waste disposal and energy access. The European Union (EU) has advanced WtE infrastructure through stringent environmental regulations and integrated planning frameworks, while many Sub-Saharan African countries remain at the preliminary stages of conceptualising and deploying such solutions. Although PPPs have emerged as viable funding mechanisms to offset public budgetary constraints, their adoption in the WtE sector varies markedly by context. In the EU, PPPs are governed by comprehensive legal frameworks that facilitate risk-sharing and performance accountability (Foreman-Peck, 2021). However, in much of Sub-Saharan Africa, including South Africa and Zimbabwe, PPPs in the energy sector are challenged by fragmented institutions, politicised procurement processes, and insufficient technical capacity (Dlamini & Botes, 2020). The study seeks to comparatively assess the structuring of PPPs in WtE infrastructure, the application of sustainability metrics, and the implementation of participatory governance across jurisdictions to distil actionable lessons for Sub-Saharan Africa.

Literature Review

In the United Kingdom, WtE projects have historically been delivered under the Private Finance Initiative (PFI), which sought to transfer financial and operational risks to private actors. While successful in mobilising capital for infrastructure development, PFI projects have been criticised for their opaque contract arrangements and cost overruns (Foreman-Peck, 2021; Tahira et al., 2024). Nonetheless, facilities such as the Tees Valley Renewable Energy Plant highlight how PPPs can be structured for long-term value when regulatory oversight and lifecycle costing mechanisms are well integrated.

Germany presents a decentralised WtE model, supported by feed-in tariffs and rigorous environmental compliance standards (Zhan, 2021). The Hamburg WtE facility showcases municipal collaboration with private operators under public utility ownership, facilitating high rates of waste diversion and energy recovery. However, contract rigidity and resistance to renegotiation are recurring challenges in the German context (Gad et al., 2023).

In the United States, PPPs in WtE vary significantly by state, with examples such as the West Palm Beach facility highlighting the potential for successful risk-sharing and community engagement. Despite positive outcomes in terms of energy generation and landfill reduction, many projects face strong public opposition, largely due to environmental justice concerns and historical mistrust (Bourtsalas, 2019; UNECE, 2019).

Canada's WtE sector employs the DBFOM model, integrating design, construction, financing, operations, and maintenance under a single contractual entity. The Surrey Organics Biofuel Facility reflects a matured PPP approach where lifecycle costing and performance metrics are embedded in contract design. Despite this, projects such as Enerkem in Edmonton have experienced setbacks due to technological limitations and unclear stakeholder alignment (Tahira et al., 2024).

In Sub-Saharan Africa, South Africa stands out for its relatively advanced PPP regulatory environment. The Gauteng landfill gas-to-energy initiatives demonstrate the potential of PPPs in small-scale WtE deployment, though progress is hindered by procurement inefficiencies, limited feasibility studies, and inconsistent tariff regimes (Mutezo, 2016; Seeletse, 2016). The Western Cape's WtE roadmap offers promise but lacks cohesive implementation mechanisms.

Zimbabwe remains in the early phases of engaging PPPs for energy infrastructure, with attempts at converting waste to electricity stalling due to political instability, lack of investor confidence, and poor regulatory coherence (DLA Piper Africa, 2018; Bwanali & Rwelamila, 2025). Across the broader Southern African region, WtE projects struggle with limited data on waste composition, weak municipal capacity, and the absence of sustainability benchmarking practices (Ngwenya, 2025; Pinilla-De La Cruz et al., 2020).

Recent bibliometric analyses (Naufal, 2023) reveal that the literature remains heavily skewed toward environmental Life Cycle Assessment (LCA), with minimal integration of social and economic dimensions. Studies calling for Life Cycle Sustainability Assessment (LCSA) underline the need to consider community impacts, gendered outcomes, and financial viability in tandem with environmental performance (Gad et al., 2023).

Theoretical Frameworks

This study is informed by three interrelated theoretical frameworks. Public Value Theory, as articulated by Moore (1995), provides a normative lens through which infrastructure initiatives are evaluated not solely on efficiency, but on their capacity to deliver public benefit. In the WtE domain, this entails inclusive planning, responsiveness to community needs, and transparent service delivery.

Principal–Agent Theory (Jensen & Meckling, 1976) explicates the contractual dynamics inherent in PPP arrangements, particularly the tensions around risk transfer, performance incentives, and information asymmetries. WtE PPPs, being highly capital-intensive and technologically complex, require robust contracts that anticipate opportunistic behaviour and ensure accountability.

Institutional Theory, developed by North (1990), emphasises the role of formal rules and informal norms in shaping organisational behaviour. In Sub-Saharan Africa, institutional fragmentation and regulatory uncertainty significantly influence the success or failure of WtE PPPs. This framework offers insight into how institutional reform can enable more coherent and adaptive governance structures.

Research Methodology

This study adopts a qualitative research design situated within an interpretivist paradigm, recognising the socially constructed nature of infrastructure governance and the contextual complexity of Waste-to-Energy (WtE) Public–Private Partnerships (PPPs). The interpretivist stance is particularly appropriate given the study's focus on institutional dynamics, stakeholder perceptions, and governance frameworks, which are not readily captured through positivist or purely quantitative approaches (Mutezo, 2016; Gad et al., 2023).

The research design is comparative and exploratory, enabling the identification of patterns, divergences, and transferable lessons across jurisdictions. A Systematic Literature Review (SLR) was employed as the primary research approach, guided by PRISMA protocols to ensure transparency, reproducibility, and methodological rigour (Liberati et al., 2009). The SLR was selected to synthesise existing knowledge on PPP structuring, sustainability metrics, and participatory governance in WtE infrastructure, particularly in the context of Sub-Saharan Africa and the European Union.

The population for this study comprised peer-reviewed journal articles, policy documents, institutional reports, and case studies published between 2010 and 2025. These sources were drawn from databases including Scopus, Web of Science, and ScienceDirect, as well as institutional repositories such as UNECE, SANEDI, and PPP Canada. A purposive sampling strategy was adopted to ensure the inclusion of high-quality, thematically relevant literature. The final sample consisted of 58 documents that met the inclusion criteria of geographic diversity, methodological robustness, and relevance to the study's core themes (Tahira et al., 2024; UNECE, 2019).

Data collection was conducted through document analysis, focusing on textual content related to PPP models, sustainability frameworks, and stakeholder engagement mechanisms. NVivo software was utilised to facilitate data organisation, coding, and thematic extraction. Thematic analysis followed Braun and Clarke's (2006) six-phase framework, encompassing familiarisation, initial coding, theme development, review, definition, and final synthesis. This approach enabled the identification of cross-cutting themes such as institutional maturity, risk allocation, lifecycle costing, and participatory governance.

The use of NVivo allowed for systematic coding and comparative analysis across jurisdictions, revealing nuanced differences in PPP structuring and governance practices. For instance, Canadian DBFOM models demonstrated strong alignment with lifecycle sustainability principles, whereas South African PPPs exhibited fragmented procurement and limited stakeholder integration (Dlamini & Botes, 2020; Tahira et al., 2024). Thematic saturation was achieved through iterative coding and triangulation with secondary data sources, enhancing the validity and reliability of the findings.

This methodological framework provides a robust foundation for understanding the systemic gaps in WtE infrastructure and offers a replicable model for future comparative studies in infrastructure governance and sustainable development.

Data Analysis

The data analysis for this study was conducted using thematic analysis, supported by NVivo software, to systematically identify, organise, and interpret patterns across the selected literature. Braun and Clarke's (2006) six-phase framework guided the analytical process, encompassing familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final synthesis. This approach was particularly suited to the interpretivist paradigm adopted in this study, allowing for nuanced exploration of institutional, financial, and governance dynamics within Waste-to-Energy (WtE) Public–Private Partnership (PPP) projects.

NVivo facilitated the coding of 58 documents, including peer-reviewed articles, policy reports, and institutional case studies, enabling the identification of five dominant thematic clusters: PPP structuring and risk allocation, sustainability metrics and lifecycle assessment, participatory governance, financial viability, and technological adaptability. These themes were analysed comparatively across jurisdictions, revealing both convergence and divergence in practice.

In European contexts, particularly the United Kingdom and Germany, PPP structuring was characterised by contractual clarity, performance-based incentives, and robust risk-sharing mechanisms. The Poznań WtE project in Poland, for example, demonstrated how EU Cohesion Funds could be blended with private capital under a DBFO model, supported by transparent funding gap calculations and stakeholder engagement protocols (European Investment Bank, 2012). NVivo coding revealed consistent references to lifecycle costing, value-for-money assessments, and enforceable service-level agreements in EU case studies (UNECE, 2019; Tahira et al., 2024).

In contrast, Sub-Saharan African projects exhibited fragmented procurement processes, limited feasibility data, and inconsistent tariff regimes. South Africa's landfill gas-to-electricity initiatives, while promising, were frequently cited as suffering from inadequate project preparation and weak municipal coordination (Mutezo, 2016; Dlamini & Botes, 2020). NVivo analysis highlighted recurring concerns around institutional fragmentation, lack of technical capacity, and politicised decision-making in African contexts. Zimbabwe's stalled WtE PPPs further illustrated the impact of regulatory ambiguity and investor scepticism on project viability (Bwanali & Rwelamila, 2025).

Sustainability metrics emerged as a critical theme, with European projects embedding Life Cycle Assessment (LCA) and environmental performance benchmarks into project design and monitoring. NVivo coding revealed frequent references to emissions thresholds, resource recovery targets, and circular economy principles in EU documentation (Gad et al., 2023; UNECE, 2019). In African contexts, however, sustainability assessments were largely absent or limited to environmental impact statements, with minimal integration of social and economic indicators. This gap underscores the need for Life Cycle Sustainability Assessment (LCSA) frameworks that capture multidimensional impacts (Naufal, 2023).

Participatory governance was another area of divergence. NVivo analysis showed that EU projects institutionalised stakeholder engagement through community benefit agreements, public consultations, and environmental forums. The Dublin WtE project, for instance, employed a Community Interest Group to facilitate dialogue and mitigate opposition (Bourtsalas, 2019). In Sub-Saharan Africa, participatory mechanisms were often ad hoc and reactive, with limited influence on project design or implementation. South African case studies revealed that while public consultations were mandated, they rarely translated into meaningful co-creation or accountability structures (Saha & Naidoo, 2024).

Financial viability was coded across documents in terms of tariff structures, revenue models, and risk mitigation instruments. EU and Canadian projects demonstrated the use of blended finance, feed-in tariffs, and tipping fees to ensure bankability and investor confidence (Tahira et al., 2024; UNECE, 2019). African projects, by contrast, faced challenges related to low landfill tariffs, currency volatility, and limited access to long-term capital. NVivo analysis revealed that financial modelling was either absent or insufficiently detailed in many African feasibility studies, contributing to project delays and cancellations (Gad et al., 2023; Bwanali & Rwelamila, 2025).

Technological adaptability was the final thematic cluster, with NVivo coding highlighting the importance of matching WtE technologies to local waste profiles and energy demands. EU projects benefited from mature supply chains and standardised platforms, while African initiatives struggled with high capital costs, limited technical expertise, and infrastructure deficits. The Enerkem project in Canada, despite its innovation, faced operational setbacks due to technological complexity and stakeholder misalignment, offering cautionary lessons for technology transfer in developing contexts (Tahira et al., 2024).

In summary, the thematic analysis revealed that successful WtE PPPs are underpinned by institutional coherence, sustainability integration, financial innovation, and participatory governance. The comparative coding across jurisdictions illuminated the structural and procedural gaps that must be addressed to adapt global best practices to Sub-Saharan African realities.

Discussion of Research Findings

The comparative analysis reveals that the efficacy of Waste-to-Energy (WtE) infrastructure delivered through Public–Private Partnerships (PPPs) is fundamentally shaped by institutional maturity, regulatory coherence, and stakeholder engagement. In the European Union (EU), PPPs in WtE projects are underpinned by harmonised legal frameworks, lifecycle costing models, and structured participatory mechanisms. For instance, the Poznań WtE

facility in Poland demonstrates how EU Cohesion Funds, combined with private capital under a DBFO model, can yield high-performance infrastructure when supported by transparent procurement and performance-based contracting (UNECE, 2019). Similarly, Canada's Surrey Organics Biofuel Facility exemplifies the integration of lifecycle sustainability metrics and community engagement into PPP design, resulting in operational efficiency and public legitimacy (Tahira et al., 2024).

In contrast, Sub-Saharan African contexts, particularly South Africa and Zimbabwe, exhibit systemic constraints that undermine PPP effectiveness in the WtE sector. South Africa's National Waste Management Strategy (DFFE, 2020) and the Waste-to-Energy Roadmap (Nell & Trois, 2022) articulate ambitious goals for waste valorisation and energy recovery. However, implementation remains uneven due to fragmented municipal governance, limited technical capacity, and inconsistent tariff structures (Mutezo, 2016; Gad et al., 2023). The Western Cape's landfill gas-to-electricity initiatives, while promising, suffer from inadequate feasibility studies and weak stakeholder coordination (Saha & Naidoo, 2024).

Zimbabwe's PPP landscape is further constrained by political instability and investor scepticism. Despite policy recognition of WtE potential, the absence of enforceable contracts, reliable feedstock data, and institutional accountability has stalled project development (Bwanali & Rwelamila, 2025). Across the broader Southern African region, the lack of integrated sustainability metrics, particularly Life Cycle Sustainability Assessment (LCSA), limits the capacity to evaluate environmental, social, and economic trade-offs in WtE infrastructure (Naufal, 2023).

Participatory governance emerges as a critical determinant of project success. EU jurisdictions mandate structured stakeholder engagement through environmental impact assessments and community benefit agreements (EIB, 2022). These mechanisms foster public trust and mitigate opposition, particularly in projects involving incineration or anaerobic digestion. In South Africa, however, participatory processes are often reactive and limited to consultation phases, with minimal influence on project design or implementation (Mutezo, 2016; Saha & Naidoo, 2024). The South African Waste-to-Energy Roadmap acknowledges the importance of inclusive engagement but lacks operational frameworks to institutionalise these practices (Nell & Trois, 2022).

Financial structuring also diverges significantly across contexts. EU and Canadian PPPs benefit from blended finance models, concessional guarantees, and predictable revenue streams through feed-in tariffs and tipping fees (Tahira et al., 2024; UNECE, 2019). In Sub-Saharan Africa, PPPs are often exposed to high sovereign risk, currency volatility, and limited access to long-term capital. The availability of cheap coal and low landfill tariffs in South Africa further disincentivises private investment in WtE technologies (Saha & Naidoo, 2024).

Technological adaptability remains a challenge in African contexts. While anaerobic digestion and pyrolysis are identified as suitable technologies for organic-rich waste streams, their deployment is constrained by high capital costs, limited technical expertise, and inadequate infrastructure (Gad et al., 2023; SANEDI, 2024). EU projects, by contrast, benefit from mature supply chains, standardised technology platforms, and robust monitoring systems.

In sum, the findings underscore that successful WtE PPPs are not merely a function of financial investment but require a confluence of institutional strength, regulatory clarity, sustainability integration, and participatory governance. Bridging the systemic gaps in Sub-Saharan Africa demands a recalibration of policy frameworks, capacity-building initiatives, and adaptive financial instruments that reflect local realities while drawing on global best practices.

Recommendations

To bridge the systemic gaps identified in Waste-to-Energy (WtE) infrastructure across Sub-Saharan Africa, particularly within the context of Public–Private Partnerships (PPPs), a multidimensional strategy is required, one that integrates institutional reform, sustainability metrics, and participatory governance.

First, governments must prioritise the development of coherent and enforceable PPP legal frameworks tailored to the waste and energy sectors. The absence of harmonised procurement procedures and contract enforcement mechanisms has consistently undermined investor confidence and project viability in African contexts (Bwanali & Rwelamila, 2025; Dlamini & Botes, 2020). Drawing lessons from Canada's DBFOM model, which embeds lifecycle costing and performance-based repayment structures, African jurisdictions should adopt similar contractual clarity to ensure bankability and accountability (Tahira et al., 2024).

Second, sustainability metrics must be mainstreamed into WtE PPP project appraisal and monitoring. The European Union's Waste Framework Directive and Circular Economy Action Plan offer a template for integrating environmental, social, and economic indicators into infrastructure governance (UNECE, 2019; EIB, 2022). In Sub-Saharan Africa, the adoption of Life Cycle Sustainability Assessment (LCSA) methodologies would enable a more holistic evaluation of WtE projects, capturing not only emissions and resource recovery but also community impacts and long-term economic viability (Naufal, 2023; Gad et al., 2023).

Third, participatory governance must be institutionalised across the entire PPP lifecycle. The current practice of reactive consultation in African WtE projects fails to build public trust or reflect local socio-economic realities (Mutezo, 2016; Saha & Naidoo, 2024). Municipalities should implement structured stakeholder mapping, gender-responsive engagement protocols, and community benefit agreements to ensure inclusive planning and social legitimacy. The UNECE's People-First PPP guidelines emphasise that stakeholder cooperation and public support are essential for sustainable infrastructure outcomes (UNECE, 2019).

Fourth, financial innovation is essential to attract private investment and mitigate sovereign risk. Blended finance instruments, such as green bonds, concessional loans, and multilateral guarantees, can de-risk WtE PPPs and improve their commercial viability. The Belgrade WtE PPP, although outside

the African context, demonstrates how bundling legacy waste remediation with energy generation can enhance project attractiveness and revenue diversification (UNECE, 2019). African governments should collaborate with development finance institutions to structure similar models adapted to local fiscal and regulatory conditions.

Fifth, regional knowledge platforms and peer-learning networks must be strengthened to facilitate cross-jurisdictional exchange. The South African Waste-to-Energy Roadmap, developed under IEA Bioenergy Task 36, provides a valuable foundation for regional collaboration and policy harmonisation (Nell & Trois, 2022; SANEDI, 2024). By institutionalising such platforms, African countries can accelerate the localisation of best practices, build technical capacity, and foster innovation in WtE technologies suited to organic-rich waste streams prevalent across the continent.

In sum, the recommendations underscore that successful WtE PPPs in Sub-Saharan Africa will require not only financial mobilisation but also governance transformation, sustainability integration, and democratic engagement. These elements must be pursued in tandem to ensure that infrastructure development contributes meaningfully to inclusive growth, environmental resilience, and energy security.

Conclusion

This study has critically examined the systemic gaps in Waste-to-Energy (WtE) infrastructure development through Public–Private Partnerships (PPPs), drawing comparative insights from the European Union (EU) and Sub-Saharan Africa. The findings underscore that while WtE technologies offer a compelling solution to the intertwined challenges of waste management and energy insecurity, their successful deployment is contingent upon a constellation of enabling factors, chief among them being institutional maturity, regulatory coherence, financial innovation, and participatory governance.

In the EU, PPPs have evolved into sophisticated instruments for infrastructure delivery, supported by harmonised legal frameworks, lifecycle sustainability metrics, and structured stakeholder engagement. Projects such as Poznań in Poland and Surrey in Canada demonstrate how integrated planning, transparent procurement, and community involvement can yield high-performing WtE facilities that contribute meaningfully to circular economy goals and climate resilience (UNECE, 2019; Tahira et al., 2024). These jurisdictions have institutionalised mechanisms for risk allocation, performance monitoring, and public accountability, thereby enhancing investor confidence and operational efficiency.

Conversely, Sub-Saharan Africa presents a more fragmented landscape. Despite policy aspirations articulated in documents such as South Africa's Waste-to-Energy Roadmap (Nell & Trois, 2022) and Zimbabwe's PPP strategy papers (Bwanali & Rwelamila, 2025), implementation remains constrained by weak institutional capacity, politicised procurement, and limited access to concessional finance. The absence of integrated sustainability assessment frameworks, particularly Life Cycle Sustainability Assessment (LCSA), further impedes the ability to evaluate trade-offs and optimise project outcomes (Naufal, 2023; Gad et al., 2023). Moreover, participatory governance remains underdeveloped, with communities often excluded from decision-making processes that directly affect their livelihoods and environmental health (Mutezo, 2016; Saha & Naidoo, 2024).

The comparative analysis reveals that bridging these systemic gaps requires more than policy reform; it demands a paradigmatic shift in how infrastructure is conceptualised, financed, and governed. Sub-Saharan African governments must move beyond transactional PPP models towards transformative partnerships that embed sustainability, equity, and public value at their core. This entails not only legal and financial innovation but also the cultivation of civic trust, institutional learning, and regional collaboration.

In conclusion, WtE PPPs hold significant promise for advancing sustainable urban development in Africa. However, realising this potential will require deliberate efforts to adapt global best practices to local contexts, strengthen institutional frameworks, and empower communities as co-creators of infrastructure solutions. Only through such integrative and inclusive approaches can WtE infrastructure serve as a catalyst for environmental resilience, energy security, and socio-economic transformation across the continent.

Reference List

- Bourtsalas, A. C. (2019). Waste-to-energy in the United States: Benefits and challenges. Columbia University.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
- Bwanali, T., & Rwelamila, P. M. (2025). PPPs and sustainable energy infrastructure in Zimbabwe: Opportunities and constraints. Journal of African Infrastructure Studies, 12(1), 45–60.
- DLA Piper Africa. (2018). PPP frameworks in Southern Africa: Legal and regulatory analysis. Retrieved from https://www.dlapiperafrica.com
- Dlamini, S., & Botes, P. (2020). Evaluating PPP procurement structures in South African infrastructure delivery. Journal of African Governance and Development, 6(2), 134–150.
- European Investment Bank. (2012). Poznań waste-to-energy project: Environmental and social data sheet. Retrieved from https://www.eib.org
- European Investment Bank. (2022). Circular economy and waste-to-energy: Environmental and social principles in EU infrastructure. Retrieved from https://www.eib.org
- Foreman-Peck, J. (2021). The economics of the Private Finance Initiative in UK infrastructure. Public Policy Review, 19(3), 88–102.

- Gad, M., Schroeder, S., & Zhan, G. (2023). Contractual frameworks and renegotiation risks in German WtE PPPs. European Energy Review, 31(2), 112–130.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., … & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. PLoS Medicine, 6(7), e1000100. https://doi.org/10.1371/journal.pmed.1000100
- Moore, M. H. (1995). Creating public value: Strategic management in government. Harvard University Press.
- Mutezo, A. T. (2016). The role of PPPs in municipal waste-to-energy systems in South Africa. South African Journal of Environmental Management, 22(1), 77–89.
- Naufal, R. (2023). Life Cycle Assessment trends in WtE literature: A bibliometric analysis. Sustainability Metrics Journal, 5(4), 215–230.
- Nell, W., & Trois, C. (2022). Waste-to-Energy Roadmap for South Africa. Department of Science and Innovation and CSIR.
- Ngwenya, C. (2025). Municipal waste composition data gaps and benchmarking in Southern Africa. African Urban Development Review, 8(1), 60–74.
- North, D. C. (1990). Institutions, institutional change, and economic performance. Cambridge University Press.
- Pinilla-De La Cruz, J., Adeoti, T., & Simelane, T. (2020). Sustainability challenges in Sub-Saharan Africa's WtE projects. UNECA Working Paper Series, WP/20/114.
- Saha, P., & Naidoo, T. (2024). Stakeholder engagement and governance limitations in South African WtE projects. South African Journal of Public Administration, 29(1), 115–132.
- SANEDI. (2024). Technology options for waste-to-energy systems in South Africa. South African National Energy Development Institute Report.
- Seeletse, S. (2016). Procurement inefficiencies and tariff impacts in South Africa's WtE sector. Journal of Development Economics in Africa, 10(2), 33–49.
- Tahira, K., Maynard, J., & Collins, H. (2024). PPP cost modelling in Canadian and UK waste-to-energy facilities. Global Infrastructure Finance Journal, 14(1), 58–78.
- UNECE. (2019). Environmental justice and community impacts of WtE projects in North America. United Nations Economic Commission for Europe Report.
- Zhan, G. (2021). Decentralised energy systems in Germany: Case studies from the waste sector. Energy Policy & Innovation, 38(2), 140–156.