

Article

Sunbread Max Hubs: Integrating Solar Energy, e-Mobility and Rural Micro-Industrialization.

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Abstract

The purpose of this study is to highlight how “Janus Cleantech” – an innovative startup in the electric vehicle (EV) space in Nigeria – is addressing the triple challenge of e-mobility, energy access, and energy conversion & storage (theme 1), energy distribution & transaction (theme 2), and economic participation and access (theme 3) – through an integrated innovation that combines solar energy infrastructure with electric mobility solutions to catalyse rural economic empowerment and micro-industrialization. The company’s flagship solution, Sunbread Max Hub (SMH), is a modular, containerized solar-powered charging hub that provides clean, off-grid electricity for both productive use and EV charging. These trikes are not just vehicles, but also tools of micro-industrialization – capable of powering mobile cold chains, agro-processing, vending, and delivery enterprises. Built within a 20-foot container, SMH – with mini and micro locally fabricated metal containers – represents a pivotal solution for addressing micro-industrialization – with resilient, solar-powered charging infrastructure, which enables sustained local commerce, job creation, and zero-emission micro-mobility. This practitioner case study highlights a story of innovation, climate adaptation and mitigation addressing the last mile question and empowering rural enterprise development.

Keywords: Three-wheeled vehicles; micro-industrialization; solar-powered charging infrastructure; e-mobility; energy access; energy conversion & storage; energy distribution & transaction; integrated innovation



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1. Introduction

Across Africa, millions of rural and peri-urban communities remain disconnected from reliable electricity and affordable mobility. This energy and transport poverty limits productivity, restricts trade, and deepens socio-economic inequality. The socioeconomic status of rural and peri-urban areas is often lower than that of urban areas. Due to several reasons, including the possibility of low-income users experiencing payment difficulties, the high cost of electricity connections deterring potential customers, and the modest amounts of energy consumed by households, which lower earnings, utilities are frequently hesitant to prioritize or extend services to these areas.

The purpose of this study is to highlight how “Janus Cleantech” – an innovative startup in the electric vehicle (EV) space in Nigeria – is addressing the triple challenge of e-mobility, energy access, and energy conversion & storage (theme 1), energy distribution & transaction (theme 2), and economic participation and access (theme 3) – through an integrated innovation that combines solar energy infrastructure with electric mobility solutions to catalyse rural economic empowerment and micro-industrialization.

Janus Cleantech differentiates itself through its integrated innovation that combines solar energy infrastructure with electric mobility solutions to catalyse rural economic empowerment and micro-industrialization.

The company’s flagship solution, Sunbread Max Hub, is a modular, containerized solar-powered charging hub that provides clean, off-grid electricity for both productive use and electric vehicle (EV) charging. Each Sunbread hub powers clean transportation, off-grid commerce, and rural productivity. These trikes (three-wheelers) are not just vehicles, but serve as tools of micro-industrialization – capable of powering mobile cold chains, agro-processing, vending, and delivery enterprises (see Exhibit 1 in the appendix).

The Sunbread max Hubs is built within a 20-foot container, while the Mini and Micro are locally fabricated metal containers – represents a pivotal solution for addressing micro-industrialization – with resilient, solar-powered charging infrastructure, which enables sustained local commerce, job creation, and zero-emission micro-mobility. Overall, this practitioner case study highlights how innovation, climate adaptation and mitigation, success story addressing the last mile question and empowering rural enterprise development.

Exhibit 1 – The Sunbread By Janus Africa/ Cleantech



The Sunbread represents a pivotal solution for addressing micro-industrialization – with resilient, solar-powered charging infrastructure – enabling sustained local commerce, job creation, and zero-emission transportation networks.

Last-Mile Mobility – Inside the Three-wheelers

In Africa, millions of rural and peri-urban communities remain disconnected from reliable electricity and affordable mobility (Akinbamiwa et al., 2025). This energy and transport poverty limits productivity, restricts trade, and deepens socio-economic inequality. The socioeconomic status of rural and peri-urban areas is often lower than that of urban areas. Due to a number of reasons, including the possibility of low-income users experiencing payment difficulties, the high cost of electricity connections deterring potential customers, and the modest amounts of energy consumed by households, which lower earnings, utilities are frequently hesitant to prioritize or extend services to these areas (Cantoni et al., 2022).

In recent years, three-wheeled vehicles – such as trikes, autocycles, and motorcycles with sidecars – have gained popularity among riders seeking a middle ground between the stability of a car and the freedom of a motorcycle. While these machines provide greater stability than traditional two-wheeled motorcycles under many conditions, they also bring unique handling challenges that require specialized knowledge and skill. Three-wheeled vehicles can be broadly categorized into two structural types – double-track and triple-track. While double-track configuration refers to a motorcycle with a sidecar, where the wheels form two parallel tracks, triple-track vehicles – commonly known as trikes – feature three wheels aligned either as two in front and one in back, or one in front and two in back.

2. Literature Review

Sustainable last-mile delivery and mobility systems

Sustainable last-mile delivery and mobility systems have emerged as critical components of modern transport and logistics, particularly in the context of rapid urbanization, environmental concerns, and the need for efficient service delivery. The growing body of literature reflects an increasing recognition that last-mile challenges are not only logistical but also deeply connected to sustainability, accessibility, and technological innovation. Across both developed and developing contexts, researchers have explored how transport systems can be redesigned to reduce emissions, improve efficiency, and enhance user experience, yet the literature reveals significant gaps between conceptual advancements and practical implementation.

A central theme in the literature reviewed in this study (see Table 1) is the importance of designing context-specific solutions, particularly for developing regions where infrastructure limitations and informal transport systems are prevalent. For instance, Ampaw et al., (2026) in their study on “Developing a Sustainable Last-Mile Transport System for Ghana and Burkina Faso,” present a modeling framework to optimize multimodal transport systems, suggesting that coordinated networks can significantly improve accessibility and sustainability outcomes. While such approaches provide valuable theoretical insights, they often rely on simulation rather than real-world validation, raising concerns about their applicability in complex, unpredictable environments.

Table 1: Summary of Reviewed Studies

Study	Research Context	Methodology	Country/Region
Ampaw et al. (2026)	Sustainable last-mile transport system design	Modeling & simulation	Ghana & Burkina Faso
Dadashzada et al. (2025)	EV adoption barriers in logistics	Empirical (survey & analysis)	Global / Multi-context
Hussin et al. (2021)	Integrated mobility systems	Case study	Egypt (New Cairo)
Kafile & Mbhele (2023)	IoT in last-mile distribution	Case study	South Africa
Mogire (2026)	Green innovation research agenda	Conceptual paper	Not country-specific
Mogire et al. (2025)	EV research trends	Bibliometric analysis	Global
Oluwaseyi et al. (2025)	AI-driven green logistics	Modeling / optimization	USA
Omweno et al. (2025)	Smart mobility & sustainability	Case study	Kenya (Nairobi)
Razak (2022)	Passenger last-mile accessibility	Conceptual / analytical	Global
Silva et al. (2023)	Urban logistics sustainability	Systematic literature review	Global
Sogbe et al. (2024)	Externalities in first/last mile	Empirical analysis	Developing country context
Stratford & Booysen (2025)	EV motorcycles feasibility	Case study / technical analysis	South Africa
Watts et al. (2026)	First vs last mile behaviour	Case study	South Africa

This limitation is echoed in Mogire (2026) in study on Green Innovations in Last Mile Delivery, which outlines future directions for sustainable innovation but stops short of offering empirically tested solutions. The reliance on conceptual and modelling approaches across the literature indicates a broader implementation gap, where proposed solutions remain largely untested in operational settings.

Integrated mobility systems

The need for integrated mobility systems is another recurring focus – be it in terms of micro-mobility (Comi et al. 2022; Reck et al. 2022) or first and last-mile solutions (Hussin et al., 2021; Kafile & Mbhele, 2023; Sogbe et al. 2024). In their study on “The First and Last Mile Solutions in Developing Countries, (Hussin et al., 2021) emphasizes that seamless connections between transport modes are essential for improving urban mobility, particularly in rapidly growing cities such as New Cairo. Similarly, Sogbe et al., (2024) in a study “First-Mile and Last-Mile Externalities,” highlighted how inefficiencies in these segments contribute to congestion, pollution, and reduced system performance. Although these studies underscore the importance of integration, they often treat first- and last-mile challenges as technical problems, with limited attention to the institutional and behavioural factors that influence system adoption and effectiveness.

Technological innovation is widely presented as a key enabler of sustainable last-mile systems. The application of digital technologies such as the Internet of Things (IoT) and artificial intelligence (AI) has been shown to enhance operational efficiency and reduce environmental impact. For example, Kafile & Mbhele (2023) investigated, using a South African Case, how “Last Mile Distribution Systems” may be improved “Through the Internet of Things.” These authors sought to demonstrate how IoT technologies improve tracking, coordination, and decision-making in logistics networks.

However, these studies tend to examine technologies in isolation, resulting in a fragmented understanding of how different innovations can be integrated into cohesive systems. This lack of technological integration limits the practical relevance of the research, as real-world logistics systems require interoperability across multiple platforms and tools.

Electric vehicles – cornerstone of sustainable last-mile delivery

Electric vehicles are consistently identified as a cornerstone of sustainable last-mile delivery, offering the potential to reduce greenhouse gas emissions and improve urban air quality. A comprehensive overview is provided by Mogire et al., (2025) “Electric Vehicles in Last-Mile Delivery: A Bibliometric Review,” which documents the rapid growth of research in this area and highlights the central role of EVs in future logistics systems (Mogire et al., 2025). Despite this optimism, the literature also reveals persistent barriers to adoption. An Investigation into the Major Barriers to the Adoption of Electric Vehicles in Last-Mile Deliveries for Sustainable Transport identifies high costs, inadequate charging infrastructure, and technological uncertainties as major obstacles (Dadashzada et al., 2025). While these challenges are well documented, there is relatively little research on how to overcome them in practice. Even context-specific studies such as “Electrifying Last-Mile Delivery Motorcycles in Cape Town: Challenges and Opportunities” provide valuable insights into feasibility but do not offer scalable solutions that can be generalized across regions (Stratford & Booysen, 2025). This suggests that the literature is more effective at diagnosing problems than at developing actionable strategies for large-scale implementation.

Urban sustainability considerations further underscore the importance of last-mile systems. For example, in their systematic review of “ Sustainable Urban Last-Mile Logistics,” Silva et al., (2023) identified a range of strategies, including consolidation centres and alternative delivery modes, that can reduce environmental impacts in urban areas. From a passenger perspective, Razak (2022) argues that efficient last-mile connectivity is essential for improving accessibility and reducing reliance on private vehicles. Nevertheless, much of this work remains focused on system-level efficiency, with insufficient attention to user behaviour and adoption dynamics. This gap is partially addressed by Watts et al., (2026) in a South African case study on first mile versus last mile behaviour, which demonstrates that user behaviour varies between different segments of the journey and must be considered in system design. However, such behavioural studies are relatively rare, indicating a need for more user-centred research.

The geographical focus of the literature reveals both strengths and limitations. Many studies concentrate on developing regions such as Africa, where last-mile challenges are particularly acute. For example, Omweno et al., (2025) in their evaluation of the role of urban smart mobility innovations, provide insights into how smart mobility solutions can improve sustainability outcomes in Nairobi. While these context-specific studies offer valuable contributions, their findings are often difficult to generalize due to differences in infrastructure, governance, and socio-economic conditions. Furthermore, the role of informal transport systems, which are widespread in many developing countries, is frequently overlooked, limiting the comprehensiveness of the analysis.

Another critical limitation of the literature is the lack of longitudinal and impact-based studies. Much of the existing research is cross-sectional or based on reviews, which, while useful for identifying trends, do not provide evidence of long-term sustainability outcomes. This makes it difficult to assess whether proposed solutions deliver lasting environmental and economic benefits. As a result, there is a pressing need for studies that track the implementation and performance of last-mile innovations over time.

Overall, the literature provides a strong foundation for understanding the complexities of sustainable last-mile delivery and mobility systems, but it remains fragmented and heavily skewed toward theoretical and exploratory approaches. There is clear consensus on the importance of integrating transport modes, adopting green technologies, and leveraging digital innovations, yet the path to achieving these goals in practice remains insufficiently explored. Future research must prioritize empirical validation, technological integration, and user-centred design, while also addressing policy and governance challenges. Only through such a holistic approach can sustainable and scalable last-mile solutions be developed to meet the demands of rapidly evolving urban environments.

3. Methodology

This case study adopts a descriptive research design following in the tradition of Nwankwo et al. (2005) in an article “*Methodological Issues in Researching Ethnic Entrepreneurship: African Entrepreneurship in London*”, which examined the methodological challenges of studying African-owned businesses in London. By using a context-aware approach as suggested by Nwankwo et al. (2005), this study interrogates the market context and opportunities within the Nigerian market.

The combined entry of new firms into the market underscores a rapidly evolving Nigerian EV market. Common drivers include: Rising Fuel Prices – Escalating costs of petrol make EV solutions increasingly attractive; Infrastructure Gaps – While CNG (compressed natural gas) and other alternatives exist, limited infrastructure hampers large-scale adoption; Energy Access Needs – Janus Cleantech’s innovation taps into Nigeria’s broader challenge of unreliable electricity access; and Sustainability Imperatives – Businesses and individuals are seeking greener, more affordable alternatives.

This practitioner case study presents a story of innovation, climate adaptation, and climate mitigation that addresses the last-mile challenge while empowering rural enterprise development. Case study research is a qualitative methodology that enables an in-depth investigation of a real-life phenomenon within its natural environmental and social context (Madichie, 2011; Madichie & Nkamnebe, 2025). A case may focus on an individual, a group, an organisation, an event, a problem, or a unique situation. Unlike experimental research, case studies do not isolate or control contextual conditions; instead, they examine how these conditions influence the phenomenon under investigation, providing a holistic understanding of complex real-world situations.

A major strength of a single case study lies in its ability to offer rich description and detailed analysis, helping researchers understand not only what happens but also how and why it happens. By exploring underlying processes and contextual factors, case studies can reveal deeper causal mechanisms that are often hidden in other research approaches. They also facilitate the identification of patterns, relationships, and emerging themes, contributing to the development, extension, or testing of theory (Stake 2005; Yin 2009, 2014). Consequently, case study research is widely recognised as a valuable approach for examining organisational, social, and developmental phenomena, particularly when addressing complex issues such as innovation, climate resilience, and sustainable rural development.

For this particular study, a case study research design was adopted. Data was collected through narrative storytelling and analysed iteratively using grounded theory techniques. The study’s methodology emphasizes flexibility, reflexivity, and community engagement, offering a model for researching underrepresented or hard-to-reach populations where standard methods are ineffective. It demonstrates that meaningful insights into ethnic (Indigenous in our case) entrepreneurship emerge best through trust-based, participatory, and context-aware approaches rather than rigid scientific conventions.

4. Findings

The SMH – with the mantra, “Powering Rural Economies with Decentralized Solar Energy and Electric Mobility” – was designed to provide solutions to a range of problems. Approximately 760 million people don’t have access to electricity in Sub-Saharan Africa (SSA) (Benayed et al., 2024), with over 60% of rural communities in SSA lack access to reliable electricity and affordable transport. This dual deficiency constrains smallholder farmers, market women, and rural entrepreneurs from processing, storing, and transporting goods efficiently. Petrol tricycles dominate rural logistics but are expensive to fuel and maintain, while unreliable grid supply limits local enterprise productivity. Without affordable energy and mobility, rural economies remain trapped in low productivity cycles –unable to grow beyond subsistence. There is an urgent need for decentralized sustainable solutions that simultaneously power transport and productive livelihoods.

Project Objective – To empower rural and peri-urban communities through clean, decentralized solar-powered charging infrastructure (Sunbread) and affordable electric mobility (Janus e-Trikes) that drive micro-industrialization, improve income, and expand access to modern energy services (see Exhibit 2).

The Solution: The Sunbread Ecosystem – Sunbread is a modular solar-powered micro-infrastructure hub designed for off-grid EV charging and productive energy use. Built within a 20-foot container, each hub integrates solar panels, battery storage, and multiple AC/DC chargers to support electric tricycles used for transport and micro-enterprises (see Table 1). To improve affordability and scalability, Sunbread is engineered into three investment-ready models. Each Sunbread hub powers Janus electric tricycles: Ayoka (7.2 kWh cargo trike) for logistics and micro-commerce; and Ketekete (9.6 kWh passenger trike) for affordable transport services. These trikes are designed as tools for micro-industrialization – supporting mobile refrigeration, agro-processing, vending, and delivery enterprises across rural communities (Table 2). Each Sunbread Max hub can support 2, 10, and 25 trikes, generating livelihood opportunities for over 5, 20, and 50 direct and indirect beneficiaries per community.

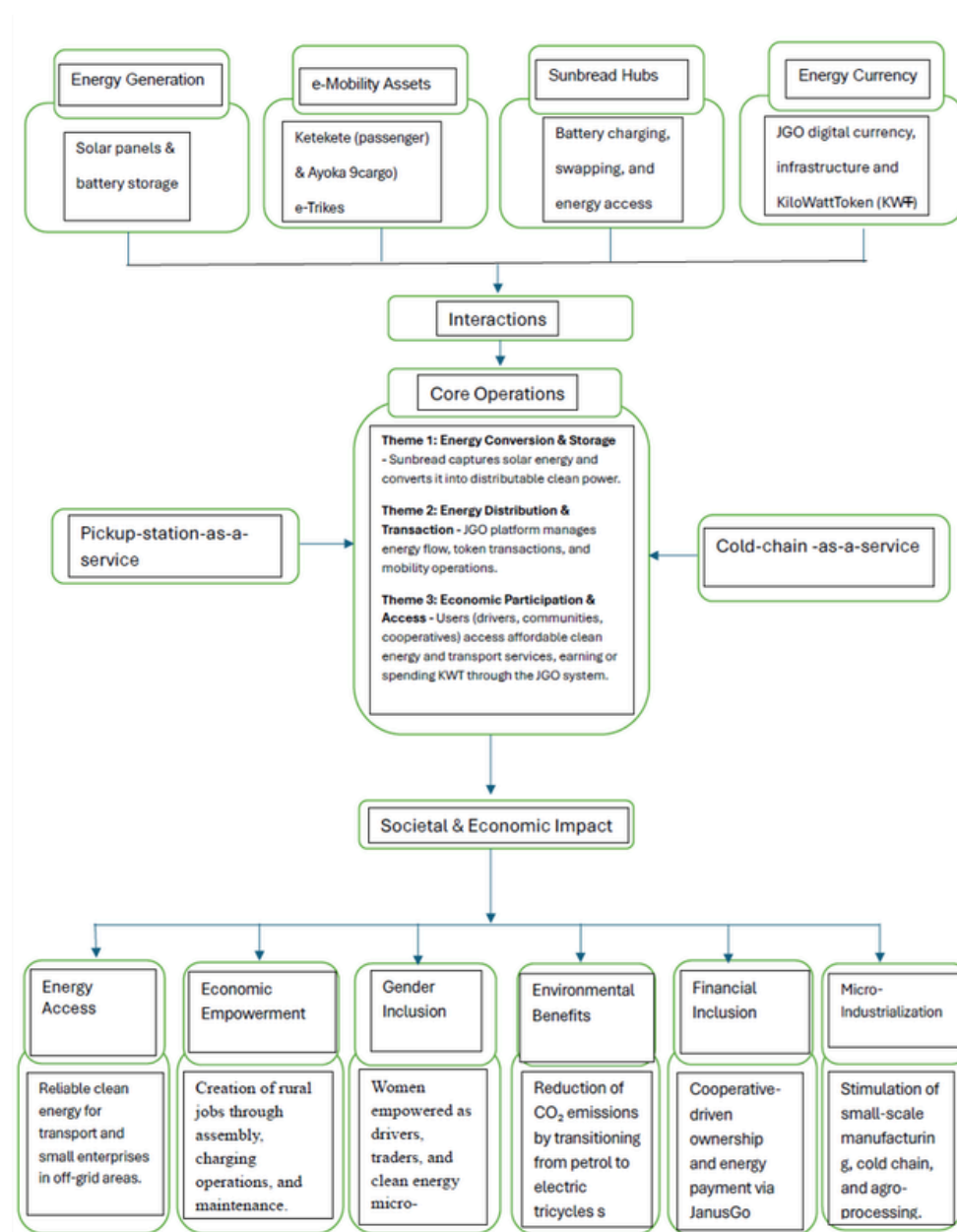
Table 2. Mobile capacity, components and use

Model Capacity	Components	Target Use	Cost
Sunbread Macro	2 e-trikes 4 solar panels, 1 battery, 2 DC chargers	Small communities & cooperatives	US\$10,000.00
Sunbread Mini	10 e-trikes 8 solar panels, 2 batteries, 5 AC chargers, 2 DC chargers	Rural markets & clusters	US\$50,000.00
Sunbread Max	25 e-trikes 16 solar panels, 4 batteries, 10 AC chargers, 4 DC chargers	Regional transport hubs & mini-grids	US\$120,000.00

Table 3. Outcomes and Impact

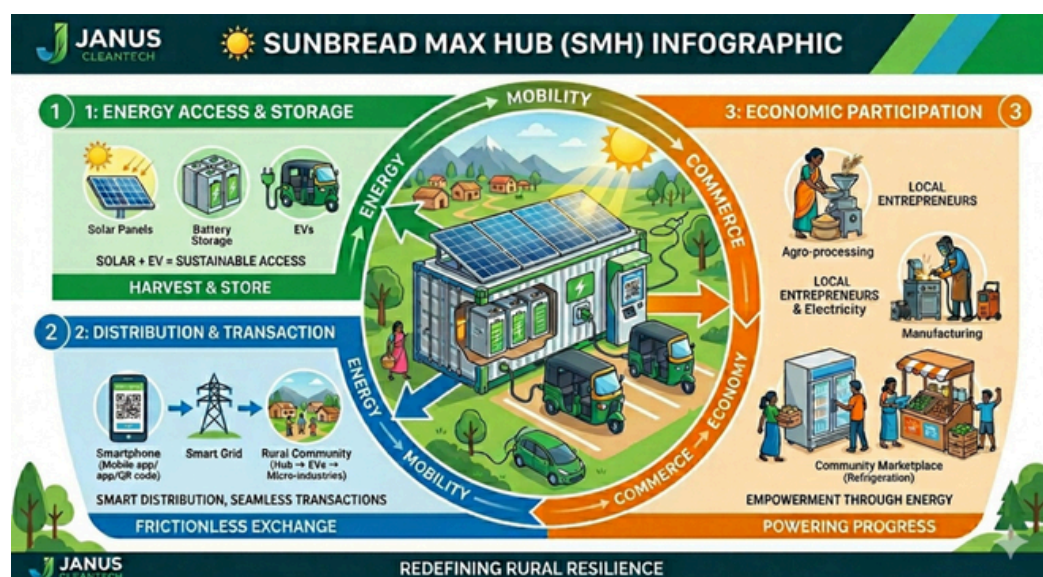
Impact Area	Key Results
Energy Access	Reliable clean energy for transport and small enterprises in off-grid areas.
Economic Empowerment	Creation of rural jobs through assembly, charging operations, and maintenance.
Gender Inclusion	Women empowered as drivers, traders, and clean energy micro-entrepreneurs.
Environmental Benefits	Reduction of CO ₂ emissions by transitioning from petrol to electric tricycles.
Digital & Financial Inclusion	Cooperative-driven ownership and energy payment via JanusGo (JGO) platform.
Micro-Industrialization	Stimulation of small-scale manufacturing, cold chain, and agro-processing.

This practitioner case study sheds light on the intricate dynamics of the energy ecosystem at Janus Africa/ CleanTech cutting across energy generation, e-mobility assets, ‘sunbread’ hubs (charging, swapping and energy access), the JGO platform/ digital infrastructure, and energy level at one level – and three themes in terms of interactions – energy conversion & storage (theme 1), energy distribution & transaction (theme 2), and economic participation and access (theme 3). Collectively, these three themes translate into societal and economic impact cutting across clean energy access, green mobility adoption, financial inclusion, local industrialisation, and climate resilience (see Figure 1 for a summary, and Exhibit 2 for the infographic of the themes).

Figure 1. The Janus Cleantech Ecosystem

Empirical Performance Indicators

From a technical standpoint, a standard Sunbread hub (20-foot, 15kWp configuration) can generate an estimated 60–75 kWh of electricity per day, depending on solar irradiance conditions. This supports continuous operation of cold storage systems, phone charging infrastructure, and electric mobility charging with an uptime of 95–98%, enabled by integrated battery storage and load prioritization. In terms of cold-chain utilization, each hub equipped with four chest freezers (approximately 319L each) provides a combined storage capacity of over 1,200 litres, enabling daily preservation of perishable goods such as fish, meat, and produce. Early modelling suggests that this can reduce post-harvest losses by 30–50%, particularly in coastal and market environments where spoilage is prevalent.

Exhibit 2 – The Sunbread Ecosystem and sub-themes

On the economic side, Sunbread hubs are designed to support multiple daily revenue streams, including cold storage fees, ice block sales, phone charging, and mobility charging. A single hub is projected to serve 50–150 users per day, depending on location density, while enabling direct and indirect income opportunities for traders, transport operators, and local service providers. Furthermore, the integration of electric tricycles reduces fuel costs for operators by up to 40–60% compared to petrol alternatives, significantly improving net daily earnings and financial resilience. While these indicators are based on pilot modelling and early deployments, they provide a quantifiable foundation for evaluating Sunbread’s role in enabling decentralized, energy-driven micro-economies.

Scalability, Risk, and Sustainability Considerations***Scalability***

The Sunbread model is inherently modular, enabling phased deployment across multiple market clusters and rural communities. Each unit operates as an independent economic node, while also contributing to a broader network of decentralized energy and commerce infrastructure. This modularity allows for replication across diverse geographies with minimal redesign, particularly in regions with similar energy deficits and economic structures. Scalability is further enhanced by the integration of digital platforms such as JanusGo, which enables energy transaction tracking, asset financing, and user engagement. As deployment expands, multiple Sunbread hubs can form interconnected networks that support regional aggregation, logistics coordination, and data-driven optimization of energy and economic flows. However, scaling requires access to blended financing models, including developer equity, concessional funding, and private capital, as upfront infrastructure costs remain a barrier in early-stage expansion.

Risk Considerations

Despite its potential, the Sunbread model faces several operational and contextual risks. These include: **Technical Risks** – such as equipment failure, battery degradation, and system downtime in harsh coastal environments. **Market Risks** – variability in user demand, pricing sensitivity among low-income users, and adoption barriers. **Operational Risks** – community management challenges, theft or vandalism, and maintenance capacity constraints. **Financial Risks** – these include currency fluctuations, capital recovery timelines, and dependency on external funding for early deployment. To mitigate these risks, the model incorporates preventive maintenance protocols, local operator training, community engagement, diversified revenue streams to ensure resilience and communal ownership strategies.

Sustainability

The long-term sustainability of the Sunbread model is anchored on three pillars: economic viability, environmental impact, and community ownership. Economically, the multi-revenue structure ensures that the system is not dependent on a single income stream, improving financial resilience. Environmentally, the transition from fossil fuel-based energy and transport systems to solar-powered infrastructure significantly reduces carbon emissions and local pollution. Social sustainability is reinforced through community participation, including local employment, gender inclusion, and cooperative engagement models. By embedding Sunbread within existing economic activities—such as food markets and fisheries—the system aligns with real demand, ensuring continued utilization and relevance.

Ultimately, sustainability is achieved not by technology alone, but by aligning energy infrastructure with livelihood systems, ensuring that value creation and energy access evolve together. Overall Janus contributes to the emerging discourse on energy-enabled micro-industrialization in developing economies, with relevance to rural and coastal communities in Africa. As part of its practical validation, Janus Cleantech was selected as a finalist in the Foundation for Partnership Initiatives in the Niger Delta (PIND) Coastal Communities Off-Grid Energy Challenge. This selection supports the deployment of the Sunbread™ platform as a Solar Refrigeration Hub, designed to enhance cold-chain access, reduce post-harvest losses, and enable productive economic activities in coastal markets. The initiative reflects growing institutional recognition of integrated, decentralized energy systems as viable pathways for sustainable development and local value creation (PIND, 2026).

5. Conclusions and Implications

Sunbread by Janus Cleantech marks a transformative milestone in Africa's clean energy and mobility landscape – seamlessly integrating solar power, electric transportation, and local enterprise into a unified ecosystem that empowers communities, safeguards the environment, and drives inclusive economic growth. Through this initiative, partners could fuel prosperity from the ground up, transforming rural regions into self-sustaining, energy-enabled micro-economies.

As part of a growing portfolio of projects, Sunbread not only advances Nigeria's Energy Transition Plan (ETP) and the Rural Electrification Agency's Decentralized Energy Access Framework, but also reinforces the nation's commitment to clean energy and low-carbon mobility. Moreover, it aligns closely with the United Nations Sustainable Development Goals (SDGs) – particularly SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action).

In conclusion, the KilowattToken (KWT) represents a groundbreaking convergence of clean energy and digital finance (see for example, Chopade, Patne & Funde, 2025; Ray, 2026) – transforming measurable electrical power into a secure, tradeable asset that drives transparency, inclusivity, and sustainability. By enabling decentralized energy exchange, automated settlements, and verifiable smart metering, KWT establishes a scalable framework that links renewable energy generation directly to economic empowerment. This invention not only advances the global transition toward a carbon-neutral future but also demonstrates that environmental sustainability and profitability can coexist. Ultimately, this case study lays the foundation for future innovations and research that propel the achievement of the Sustainable Development Goals through technology-driven societal impact.

6. Societal impact

Nigeria's transportation sector is at the cusp of a clean mobility revolution. The combination of rising fuel costs, sustainability imperatives, and growing technological adoption is driving innovation in both corporate and public transport (Farinloye et al., 2024). In 2025, three pioneering companies introduced electric mobility solutions that promise to redefine how Nigerians commute and how organizations manage staff mobility (Madichie, 2025). These initiatives highlight opportunities for businesses, commuters, and policymakers to align around a shared vision of cost efficiency, innovation, and environmental responsibility.

In September 2025, one of the reported pioneering firms, Lagos-based clean energy company Janus Cleantech introduced Nigeria's first passenger and cargo electric tricycles, named Ketekete and Ayoka (Abraham, 2025; Adam, 2025). Unlike other players, Janus integrates mobility with energy access, making its solution particularly distinctive. Janus Cleantech's dual approach – transport plus energy – positions it as both a mobility provider and an energy enabler, directly addressing Nigeria's challenges around energy poverty and fuel dependency. Key Janus innovations include: IoT-Enabled Design – Vehicles run on swappable lithium batteries equipped with Vehicle-to-Home (V2H) and Vehicle-to-Business (V2B) capabilities. Mobile Power Solutions – The e-trikes double as massive portable power banks, providing electricity for households and small businesses. Driver Affordability – With petrol tricycles consuming up to 60% of a driver's daily income, Janus' e-trikes lower operational costs, enabling long-term savings.

In the pulse of African cities, movement is life. The three-wheeled keke that weaves through Lagos traffic, the tricycle that carries market goods before dawn, the rickshaw that brings a sick child to the clinic – these vehicles are not just transport. They are the arteries of informal economies, the difference between isolation and opportunity for millions. Yet they run on a fragile promise: fuel that is expensive, unpredictable, and toxic to the very communities they serve. A driver can spend 60 to 70 percent of her daily earnings at the pump, watching her margin vanish into fumes that choke her street and her children's lungs.

Janus Africa began with a refusal to accept that trade-off. The company looked at the same roads, the same drivers, the same urgent need for last-mile mobility, and asked a different question: What if the vehicle itself could become a source of wealth, not a drain on it? What if mobility was designed not around imported assumptions, but around African realities – potholes, power cuts, solar abundance, and the ingenuity of people who have always made systems work with what they have?

From that question came vehicles that feel familiar but function radically differently. Ayoka, the rugged electric tricycle built for cargo and while Ketekete is the passengers variant. They take on the broken roads and heavy loads that define African logistics. 'Keketric' reimagines the vehicles already on the street, converting existing petrol 'kekes' into clean electric workhorses so drivers are not forced to abandon the asset they spent years paying off. And 'Sunbread,' the solar-powered charging and battery swap hub, closes the loop – off-grid, resilient, and deployable where the national grid is absent or unreliable.

The impact is immediate and personal. When a driver in Ibadan swaps a depleted lithium battery for a full one in under three minutes, she is not just saving time. She is saving 5,500 naira that day, money that goes to school fees, to food, to reinvestment in her business. Across a month, that is a transformation in household income. Across a city, it is a shift in air quality as tailpipes go silent. Across a region, it is the beginning of energy independence, because that same battery can light a home after the keke is parked. Mobility and electricity stop being separate problems and become a single, integrated solution. But Janus Africa's vision stretches beyond individual vehicles. It is building ecosystems. Each Sunbread hub is more than a charging station. It is a micro-industrial node that creates local jobs for technicians and attendants, that anchors small businesses, that proves clean infrastructure can be profitable at the community level. The company's lithium battery systems are designed to be swappable and scalable, turning energy into something tangible that can be owned, traded, and stored. With platforms like KiloWattToken, Janus is even exploring how drivers and households can buy and sell power peer-to-peer, blending hardware with digital finance so that energy becomes a form of currency in places where cash is scarce but sunlight is not.

The environmental stakes are equally profound. Africa is urbanizing faster than any continent in history, yet it is also becoming the destination for the world's discarded combustion vehicles — old, inefficient, and polluting. Every electric tricycle Janus deploys removes roughly 4.5 tons of carbon emissions annually compared to its petrol counterpart. Multiplied across fleets, that is a measurable change in urban air quality and in the continent's climate ledger. More importantly, it is a model of leapfrogging. Africa does not need to repeat the century-long arc of fossil-fuelled industrialization. It can skip straight to distributed, clean, locally manufactured mobility powered by the sun.

This is already scaling beyond light vehicles, as the same battery swap systems and electric drivetrain technology that power a keke are being adapted for heavy transport across Africa's mining and logistics corridors. Through partnerships that will see hundreds of electric truck conversions per year, Janus is proving that the economics of electrification hold from the last mile to the long haul. The continent's growth does not have to come at the cost of its air, its health, or its balance sheets.

Ultimately, the impact of Janus Africa's vehicles cannot be measured only in kilometres driven or tons of CO₂ avoided. It is measured in the dignity of a driver who keeps more of what she earns. It is measured in the technician who learned to assemble lithium packs instead of importing them — and the child who studies under an LED powered by the same battery that moved goods that morning. Africa's mobility future will not be dictated by aid or by second-hand solutions. It will be built, owned, and driven by Africans. Janus Africa is putting the keys in their hands — and making sure the engine is clean, the energy is local, and the road ahead is theirs to define.

Sunbread by Janus Cleantech marks a transformative milestone in Africa's clean energy and mobility landscape — seamlessly integrating solar power, electric transportation, and local enterprise into a unified ecosystem that empowers communities, safeguards the environment, and drives inclusive economic growth.

Through this initiative, partners could fuel prosperity from the ground up, transforming rural regions into self-sustaining, energy-enabled micro-economies. As part of a growing portfolio of projects, Sunbread not only advances Nigeria's Energy Transition Plan (ETP) and the Rural Electrification Agency's Decentralized Energy Access Framework, but also reinforces the nation's commitment to clean energy and low-carbon mobility. Moreover, it aligns closely with the United Nations Sustainable Development Goals (SDGs) – particularly SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action).

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